REPORT

DARWIN CITY WATERFRONT REDEVELOPMENT

Supplement to the Draft Environmental Impact Statement

Prepared for

Department of Infrastructure Planning and Environment

27 July 2004

36909-007 / DCWR Supplement

URS

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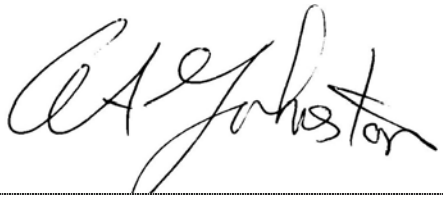
Authorised by:			
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Acronyms

DBIRD	Department of Business Industry and Resource Development
CEMP	Construction Environmental Management Plan
DCC	Darwin City Council
DCEC	Darwin Conference and Exhibition Centre
DCW	Darwin City Waterfront
Defence	Department of Defence
DEIS	Draft Environmental Impact Statement
DFS	Darwin Film Society
DHCS	Department of Health and Community Services
DIPE	Department of Infrastructure Planning and Environment
DPC	Darwin Port Corporation
ECNT	Environment Centre N.T. Inc
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
FHW	Fort Hill Wharf
IOW	Iron Ore Wharf
MAGNT	Museums and Art Galleries of the Northern Territory
NFI	Naval Fuel Installation
OEH	Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
PFES	Police Fire and Emergency Services
PWC	Power Water Corporation
RAP	Remediation Action Plan
SHW	Stokes Hill Wharf
SMP	Site Management Plan

1.1 Purpose of this Document

The purpose of this document is to respond to submissions made on the *Darwin City Waterfront Draft Environmental Impact Statement* produced by the Department of Infrastructure Planning and Environment (DIPE). The document was available for government and public review from 28 May until 12 July 2004. The deadline for submission of comments was 12 July 2004.

This Supplement provides detailed responses to comments made and questions raised in the submissions and provides clarification about a number of issues that were raised by government and the public related to the Draft EIS. It also updates several aspects of the project with information developed since the Draft Environmental Impact Statement (EIS) was written.

This Supplement, plus the original Draft EIS, constitutes the final EIS for the proposed redevelopment of the Darwin City Waterfront (DCW). These documents form the basis for government decisions about the environmental implications of the proposed project.

Copies of the Supplement have been sent to the relevant Northern Territory government departments and to all individuals and organisations that provided submissions on the Draft EIS.

1.2 Structure of this Document

1.2.1 Sections of the Supplement

This document presents seven sections as follows.

1. The Introduction outlines the number and source of submissions received, and presents a summary of issues raised in submissions.
2. Errata to the Draft EIS
3. Detailed responses to all submissions received are provided in this section, each submission is presented (in summary form) in italics and the response is provided immediately below. This section of the Supplement is arranged by section numbers and headings from the Draft EIS to enable cross-referencing to the Draft EIS. The source of the submission is also identified to enable the originators of the submissions to identify responses to their comments and questions.
4. Details of environmental management measure
5. A summary of commitments made by the proponent
6. References used in responses to the submission comments
7. An acknowledgment of the assistance provided by a number of government officers and members of the study team in producing this Supplement.

1.2.2 Section Numbering

Review of this Supplement to the Draft EIS may be complicated by the dual section numbering for the two documents. The Supplement has been prepared to try to minimise this confusion by referring to sections in the Draft EIS by either stating "from the Draft EIS" (or similar) or providing the prefix "DEIS", particularly in Section 3.2 (e.g., "DEIS 1.4.4").

1.3 Assessment Process for this Supplement

The Draft EIS and Supplement will be assessed under the Northern Territory *Environmental Assessment Act* 1982. Under Clauses 12 to 14 of the Environmental Assessment Administrative Procedures, 35 days are allowed for the review of the Supplement by the Office of Environment and Heritage (OEH) (in consultation with relevant departments and agencies), development and consideration of advice on the results of the assessment, and the passing of recommendations from the Environment Minister to the Minister responsible for approving the project. Provision exists for the extension of this timeframe under certain circumstances, for example, if the Minister requires more information to assist in the review of the proposal.

By negotiation, it is expected that a decision on the final EIS (comprising the Draft EIS and the Supplement) will be made by the Minster for the Environment on 23 August 2004. Under this timeframe, comments from government agencies are to be provided to OEH by 10 August, and OEH will prepare their Assessment Report and recommendations to the Minister by 18 August.

1.4 Number and Source of Submissions Received

A whole of government submission to the Draft EIS was received from departments and authorities of the Northern Territory Government. Comments from individual organisations were received from the Office of Environment and Heritage, Darwin City Council, the Environment Centre N.T. Inc, the Darwin Film Society (as operators of the Deckchair Cinema) and the Department of Defence. Each of these submissions included comments and questions regarding the proposed redevelopment.

1.5 Clarifications

Meetings and telephone conversations were arranged with selected government officers to discuss and clarify the intent and meaning of a number of submissions. The people consulted in the preparation of the Supplement are listed in section 7.2 of this document

1.6 Summary of Issues Raised in Submissions

The submissions received about the Draft EIS are summarised in **Table S-1**.

Table S-1 Summary of Submissions

Source	DEIS Section	Issue
DHCS	1.4.4	Relevant Government Legislation and Policies
	1.7.7	Timeframe and Project Schedule of the Proposed Project
	4.7	Associated Headworks
	5.2.4	Soils
	5.2.5	Existing Soil Contamination
	5.2.6	Hydrogeology
	5.3.4	Biting Insects
	6.2.2	Soil Contamination
	6.2.5	Stages of the Redevelopment
	6.5.1	Changes to the Existing Built Environment
	8.3.1	Soils
	8.3.2	Hydrogeology
	8.4.4	Biting Insects
PFES	6.5.4	Traffic, Roads and Public Transport Network
	6.7.3	Demand for Services
	8	Mitigation, Management and Monitoring
AAPA	8.2.3	Soil Remediation
	8.5.6	Traffic and Transport
	8.6.1	Aboriginal Cultural Heritage, Archaeology and Native Title
DIPE	5.2.8	Hydrology and Surface Water Quality
	6.2.4	Groundwater Contamination
	6.3.3	Acid Sulfate Soils
	6.5.4	Traffic, Roads and Public Transport Network
	7.2.8	Cyclones and Storm Surge
	8.5.6	Traffic and Transport
PWC	4.7	Associated Headworks
	5.4.1	Existing Land Uses
	8.5.2	Waste Management Register

Source	DEIS Section	Issue
MAGNT	5.1.2	Field Surveys
	5.3.5	Marine Biota
	6.2.4	Groundwater Contamination
	6.4.3	Marine Ecology
	7.2.4	Vessel Collision/Grounding
	8.3.4	Marine Environment
	8.6.2	European Heritage
DBIRD	1.6.8	Wharves
	1.7.1	Land Tenure
	1.7.5	Access Requirements
	5.4.1	Existing Land Uses
	5.8.5	Use of Current Site Facilities
	6.8.3	Use of Current Site Facilities
	8.7	Socio-economic Environment
Defence	1.3.2	The Proposed Project
	1.6.1	Fort Hill
	1.6.8	Wharves
	4.3	Proposed Land Uses.
	5.2.5	Existing Soil Contamination
	5.7.3	Outcomes from Stakeholder Interviews
	6.3.6	Marine Environment; Noise
	6.3.7	Transport and Traffic
	7.2.2	Storage, Transfer and Offloading of Fuels and Other Hazardous; Materials
	7.2.3	
	8.2	Site Contamination
	8.7	Socio-economic Environment
	9	Public Involvement and Consultation
ECNT	8.2.11	Construction Environmental Management Plan
	8.5.2	Waste Management Register
	8.9	Environmental Management Plans

Source	DEIS Section	Issue
DCC	ES 2	The Proposed Project
	5.4.3	Road Network and Traffic
	5.6	Cultural Environment
	6.3.5	Hydrology and Surface Water Quality
	6.3.6	Marine Environment
	6.5.4	Traffic, Roads and Public Transport Network
	6.6	Impacts on the Cultural Environment
	7.2.2	Transport and Traffic
	8.2.7	Disposal of Contaminated Material
	8.2.11	Construction Environmental Management Plan
	8.2.12	Site Management Plan
	8.5.1	Preliminary Site Activities
	8.5.4	Noise
	8.5.6	Traffic and Transport
DFS	5.4.1	Existing Land Uses
	6.3.7	Noise
	8.5.4	Noise
OEH	ES 9	Air Quality
	1.7.1	Land Tenure
	5.4.1	Existing Land Uses
	6.3.7	Noise
	6.3.8	Air Quality
	6.5.4	Traffic, Roads and Public Transport Network
	7	Preliminary Hazard Analysis
	7.2.3	Storage, Transfer and Offloading of Fuels and Other Hazardous Materials
	8	Mitigation, Management and Monitoring
	8.2	Site Contamination
	8.5.1	Preliminary Site Activities
	8.5.4	Noise
	8.9	Environmental Management Plans
	App L	Noise

Legend: AAPA – Aboriginal Area Protection Authority
DBIRD – Department of Business Industry and Resource Development
DCC – Darwin City Council

Defence – Department of Defence
DFS - Darwin Film Society
DHCS – Department of Health and Community Services
DIPE – Department of Infrastructure Planning and Environment
MAGNT – Museums and Art Galleries of the Northern Territory
OEH – Office of Environment and Heritage
PFES – Police Fire and Emergency Services
PWC – Power Water Corporation
ECNT – The Environment Centre N.T. Inc

1.7 Respondent Matrix

The issues raised by the various respondents to the Draft EIS are summarised in **Table S-2.**

Table S-2 Matrix of Comments on the Draft EIS

RESPONDENT	1.3.2 The Proposed Project	1.4.3 Status of the Proposed Project in the EIA process	4.4 Relevant Government egislation and Policies	1.6.8 Wharves	7.7 Timeframe and Project chedule of the Proposed roject	Objectives and Benefits of the roposed Project	2.2 Benefits	3 Alternatives	4.1 Project Description	4.3 Proposed Land Uses	4.7 Associated Headworks	5.1.2 Field Surveys	5.2.4 Soils	2.5 Existing Soil ontamination	5.2.6 Hydrogeology	5.2.10 Acid Sulfate Soils	5.2.11 Local Air Quality	5.2.12 Noise	3.1 Intertidal and Terrestrial ora
Department of Health and Community Services (1)																			
Police Fire and Emergency Services (2)																			
Aboriginal Area Protection Authority (3)																			
Department of Infrastructure Planning and Environment (4)																			
Museum's and Art Gallery's of the Northern Territory (5)																			
Power Water Corporation (6)																			
Department of Business Industry and Resource Development (7)																			
Department of Defence (8)																			
The Environment Centre NT Inc (9)																			
Darwin City Council (10)																			
Office of Environment and Heritage (11)																			
Darwin Film Society (12)																			

RESPONDENT	5.3.4 Biting Insects	5.3.5 Marine Biota	5.4.1 Existing Land Uses	5.4.3 Road Network and Traffic	5.6 Cultural Environment	5.7.3 Existing Environment	6.2.2 Soil Contamination	6.2.4 Groundwater Contamination	6.2.5 Stages of the Redevelopment	6.3 Impacts on the Physical Environment	6.3.3 Acid Sulfate Soils	6.3.4 Hydrogeology	6.3.5 Hydrology and Surface Water Quality	6.3.6 Marine Environment	6.3.7 Noise	6.3.8 Air Quality	6.4.1 Vegetation and Weeds	6.4.3 Marine Ecology	6.5.1 Changes to the Existing Built Environment
Department of Health and Community Services (1)	■						■		■										■
Police Fire and Emergency Services (2)							■												
Aboriginal Area Protection Authority (3)							■												
Department of Infrastructure Planning and Environment (4)							■	■			■		■						
Museum's and Art Gallery's of the Northern Territory (5)		■					■	■		■								■	
Power Water Corporation (6)			■				■												
Department of Business Industry and Resource Development (7)							■												
Department of Defence (8)			■	■		■								■	■				
The Environment Centre NT Inc (9)																			
Darwin City Council (10)				■											■				
Office of Environment and Heritage (11)			■		■						■	■		■	■	■	■		
Darwin Film Society (12)															■				

RESPONDENT	6.5.4 Traffic, Roads and Public Transport Network	6.6 Impacts on the Cultural Environment	6.7 Impacts on Socio-economic Environment	6.7.6 Defence Use of the Darwin Wharves	7 Preliminary Hazard Analysis	7.2.2 Transport and Traffic	7.2.3 Storage, Transfer and Offloading of Fuels	7.2.4 Vessel Collision/Grounding	7.2.8 Cyclones and Storm Surge	7.2.10 Terrorist Attacks	8.2.1 Site Contamination	8.2.3 Soil Remediation	8.2.6 Acid Sulfate Soils	8.2.7 Disposal of Contaminated Material	8.2.11 Construction Environmental Management Plan	8.2.12 Site Management Plan	8.3.1 Soils	8.3.3 Site Hydrology	8.3.4 Marine Environment
Department of Health and Community Services (1)																	■	■	
Police Fire and Emergency Services (2)	■																		
Aboriginal Area Protection Authority (3)												■							
Department of Infrastructure Planning and Environment (4)	■								■				■						
Museum's and Art Gallery's of the Northern Territory (5)								■											■
Power Water Corporation (6)																			
Department of Business Industry and Resource Development (7)																			
Department of Defence (8)	■			■		■	■			■		■							
The Environment Centre NT Inc (9)																			
Darwin City Council (10)	■		■			■							■	■	■	■			
Office of Environment and Heritage (11)		■			■						■	■	■					■	■
Darwin Film Society (12)																			

RESPONDENT	8.4.4 Biting Insects	8.5 Built Environment	8.5.1 Preliminary Site Activities	8.5.2 Waste Management Register	8.5.3 Air Quality	8.5.4 Noise	8.5.5 Visual Characteristics and Values	8.5.6 Traffic and Transport	8.6.1 Aboriginal Cultural Heritage	8.6.2 European Heritage	8.6.3 Legal Heritage Requirements	8.7 Socio-economic Environment	8.9 Environmental Management Plans	Appendix D: Assessment of Surface Water Hydrology	Appendix L: Noise	Appendix N: Traffic Assessment
Department of Health and Community Services (1)	■															
Police Fire and Emergency Services (2)		■														
Aboriginal Area Protection Authority (3)								■	■							
Department of Infrastructure Planning and Environment (4)								■								
Museum's and Art Gallery's of the Northern Territory (5)										■						
Power Water Corporation (6)				■												
Department of Business Industry and Resource Development (7)												■				
Department of Defence (8)												■			■	
The Environment Centre NT Inc (9)																
Darwin City Council (10)			■													■
Office of Environment and Heritage (11)			■	■	■		■	■	■		■	■	■	■	■	
Darwin Film Society (12)						■										

Draft EIS Section	Draft EIS page	Explanation
Executive Summary	ES-9	Air Quality - Mitigation Dust monitoring during construction was included in the section on air quality mitigation in the Executive Summary. OEH noted that monitoring is not a mitigation measure, but a means of assessing an impact and determining the effectiveness of mitigation measures. Reference to monitoring should be removed from this section.
1.4.1	1-9	Table 1.1 – Timeframe for the Northern Territory Environmental Impact Assessment Process OEH noted that this table does not allow for additional time for the Minster for the Environment to call for further information during the preparation of the Assessment Report for the EIS. The amended table is shown as **Table S-3** below with an additional note in the second last row.
4.3	4-4	Proposed Land Uses – Adjacent Areas The final sentence in the first paragraph should read: ”Refuelling facilities are likely to remain on Fort Hill and Stokes Hill Wharves. At present, cruise ships do not refuel at either wharf, however a locally-based cruise ship is expected to start operation by the end of 2004 and is expected to refuel at Fort Hill Wharf. Bulk-fuel off-loading from the Iron Ore Wharf is intended to cease when alternative facilities are finalised at East Arm Port.”
5.6.2	5-58	Legislative Protection of Heritage Places OEH advised that the reference to “Heritage Management Plan” in the first paragraph should changed to “Conservation Management Plan”.
6.3.7	6-18	Noise Sensitive Premises The Deckchair Cinema should be added to the list of noise sensitive premises.
7.2.1	7-8	Biting Insects - Impacts from Introduced Dengue Vector Mosquitoes The first line of the bottom row of this table (Potential Management Controls) refers to biting midges. This should be changed to mosquitoes.

7.2.2	7-10	Transport and Traffic In the second last line of this page, reference is made to Section 2.1.4. This should be changed to Section 7.2.3.
7.2.2	7-11	The environmental effects "Heavy Vehicle Accidents causing Damage to Infrastructure" and "Small Vehicle Accidents causing Damage to Infrastructure" were incorrectly rated in the Draft EIS. The environmental effects of these potential events should be are "Moderate" and "Minor", respectively. The overall risk rating for heavy vehicle accidents remains unchanged, however the overall risk rating for small vehicle accidents changes to "Moderate: management attention and integration into management plans required". The amended tables are shown as **Table S-4** and **Table S-5**.
7.2.4	7-18	Vessel Collision/Grounding The phrase "It must also be noted that much of the increase in" should be deleted from the third paragraph of this section.
8.4.4	8-24	Biting Insects DHCS advised that insect repellent vegetation does not exist. The phrase "introduction of insect repellent vegetation" in the first paragraph of this section should be changed to "introduction of shrub type vegetation to allow the use of insecticide barrier treatments".
8.4.4	8-25	Personal Protection from Mosquitoes DHCS requested that the phrase "to some extent" should be added to the end of second dot point.

Table S-3 Amended Table 1.1 from Draft EIS

Timeframe for the Northern Territory Environmental Impact Assessment Process

Stage Of EIA Process	PER	EIS
The proponent notifies the responsible Minister of a proposal including details (NOI).	Open	
The Responsible Minister notifies the Minister for the Environment and Heritage (the Minister) of the proposal.	Open	
The Minister may require further information from the proponent to assist in determining the level of environmental significance.	Within 14 days	
The Minister determines the level of assessment and notifies the responsible Minister and the proponent if a PER or EIS is necessary. The Commonwealth Government involvement may be required at this stage, depending on the nature of the proposal and the expected impacts.	Open	
Draft Guidelines for a PER or EIS are prepared.	Open	
Draft Guidelines are made available for public comment and referred to advisory bodies.	Within 14 days	
The Minister finalises the Guidelines, issues them to the proponent and directs the preparation of a PER or a draft EIS, if required	Within 14 days	
The proponent prepares the PER or draft EIS and submits it to the Minister.	Either determined by the Minister, or at the proponent's discretion	
The PER or draft EIS is advertised for public comment and circulated to advisory bodies for comment.	Max 28 days	Not less than 28 days
Public and advisory body comments are forwarded to proponent	-	ASAP
Proponent prepares the Supplement to the draft EIS and submits the Supplement to the Minister.	-	Open (usually)
The Supplement to the draft EIS is circulated to advisory bodies for comment	-	Within 14 days
The Minister can request further information.	Within the above 28 days	Within 21 days of delivery of the Supplement

Table S-3 Amended Table 1.1 from Draft EIS

Timeframe for the Northern Territory

Environmental Impact Assessment Process

Stage Of EIA Process	PER	EIS
The report and recommendations on the PER is prepared. The Minister forwards the report and recommendations to the responsible Minister	Within 14 days of expiration of above 28 days	-
The assessment report and recommendations are prepared based on the draft EIS, the Supplement and comments received. *Note: If the Minister requests additional information, the assessment report and recommendation are prepared within 35 days of receipt of that information.*	-	Within 35 days of delivery of the Supplement (*see note opposite*)
Incorporation of recommendations in lease or license conditions, and relevant management procedures	Open	Open

Table S-4 Amended Preliminary Hazard Analysis Table for *Heavy Vehicle Accidents causing Damage to Infrastructure*

Hazard:	Heavy Vehicle Accidents Causing Damage to Infrastructure			
Highest Consequence	**Injury and Disease**	**Environmental Effects**	**Total Cost Impact**	**Community**
Moderate	NA	Moderate	Moderate	Minor
Event Likelihood	Unlikely			
Overall Risk Rating	Moderate: management attention and integration into management plans required			
Potential Management Controls	Install vehicle crash barriers between the roadways and the lines Enforce safe speed limits Install adequate roadways for truck manoeuvrability Use traffic management during trucking activities Relocation or removal of fuel pipelines			
Further Recommendations	None			

Table S-5 Amended Preliminary Hazard Analysis Table for *Small Vehicle Accidents causing Damage to Infrastructure*

Hazard:	Small Traffic Accidents Causing Damage to Infrastructure			
Highest Consequence	**Injury and Disease**	**Environmental Effects**	**Total Cost Impact**	**Community**
Insignificant	NA	Minor	Insignificant	Insignificant
Event Likelihood	Moderate			
Overall Risk Rating	Moderate: management attention and integration into management plans required			
Potential Management Controls	Install vehicle crash barriers between the roadways and the lines Enforce safe speed limits Install adequate roadways for truck manoeuvrability Use traffic management during trucking activities Relocation or removal of fuel pipelines			
Further Recommendations	None			

3.1 Incorporation of EIS Studies into Master Plan Proposals

3.1.1 Obligations on the Eventual Developer

Several comments and concerns raised in submissions have been addressed by the obligations placed on the potential developers preparing draft Master Plans as part of the final Master Plan selection process. The *Darwin City Waterfront Call for Detailed Proposals* dated 15 January 2004 outlines the expectations of the Northern Territory Government for the proposed redevelopment and the priorities for features and services to be included or highlighted in the Master Plan and the eventual redevelopment. The document details a range of requirements that the developers were required to incorporate into the draft Master Plan proposals. These obligations on the developer include issues and measures that must be addressed or incorporated into the Master Plan. These obligations are summarised in **Table S-6**.

Table S-6 Obligations to be incorporated into the final Master Plan by the Developer

Issue	Obligation on Developer	Timeframe
Economically Sustainable Development	The Proponent will provide a sustainability (ESD) plan for all elements of the Master Plan, which outlines how the Proponent has addressed sustainable outcomes to achieve: • Waste recycling and minimisation • Pollution control • Energy efficiency • Passive climate control measures • Water capture, storage, recycling and reuse • Environmental protection and enhancement of land and marine environments • Noise attenuation • Innovation in design and construction techniques and in the use of construction materials, fittings and fixtures • Other features proposed to demonstrate superior economic, social and environmental outcomes The sustainability plan will include, but not limited to: • Key performance indicators • A sustainability performance monitoring program • A mechanism to ensure the sustainability plan's evolution with advances in sustainable technologies Periodic sustainability audits and reports	Finalisation of the Master Plan

Issue	Obligation on Developer	Timeframe
Traffic	Proponents submissions will provide a traffic study for the development proposal and for any alternative proposals offered, establishing the following • Travel demand information • Traffic characteristics (vehicle types and operational factors eg. peak volumes) • Impact of specific events on traffic demand • Assessment of impacts on site traffic with Public transport options eg. links to CBD/pedestrian or feeder bus option	Finalisation of the Master Plan
Public Transport (including Public buses/taxis/potential sea transport)	Proponents submissions will provide a traffic study for the development proposal and for any alternative proposals offered, establishing the following • Assessment of Public transport interfaces with developments (set-down/security/weather protection issues) • Potential for off-site transfer to parking facilities Pedestrian connections	Finalisation of the Master Plan
Parking	Considering the above, the proponent will assess parking issues and options for meeting demands	Finalisation of the Master Plan
Internal Road Network and Linkages to External Network	DCW Site development plans will provide clear linkages and integration of pedestrian/cyclist and public transport facilities Following the completion of the proponents traffic assessments, the Territory will undertake a review of previous CBD traffic/transportation studies to establish the external impacts of the proposals	Finalisation of the Master Plan
Haulage Roads	The proponent will undertake an assessment of the visible conditions of haulage roads to be used during construction. All haulage roads will be returned to their pre-development visual condition or compensation will be paid to the appropriate Authority, DIPE or DCC, for damage to roads resulting from the development construction phase	Prior to construction
Stormwater Drainage	The proponent will assess the current and future expected volumes of discharge from a fully developed Government Precinct or neighbouring residential. The proponent will be required to collect all stormwater flows from the escarpment and provide all necessary cut off drains and connections to the existing stormwater drainage system.	Finalisation of the Master Plan
Water Supply	The proponent will ensure that where aggressive soils are present, appropriate materials, and/or protective measures are implemented to ensure the design life of any water supply assets	During construction

Issue	Obligation on Developer	Timeframe
Sewerage	Upon sub-division of the DCW Site, the proponent will be required to construct a reticulated sewerage system. The proponent shall liaise with Power and Water and the NT Government to develop a strategy for the future discharge of ship-borne wastewater directly to the new sewerage system associated with the proposed development of the DCW Site.	Upon sub-division of the DCW Site

3.1.2 Information Provided Previously to all Draft Master Plan Proponents

A number of submission comments questioned how information obtained during the preparation of the Draft EIS and from other associated investigations would inform both the development of the three draft Master Plan proposals and the process for selecting the final Master Plan.

Development of Draft Master Plans

A number of technical reports were provided to the Master Plan developers between January and May 2004 to inform them of key issues about the site and to assist with the planning of the draft Master Plan proposals.

The *Darwin City Waterfront Call for Detailed Proposals* was issued in January 2004. The Appendices to this document included two reports from the Contaminated Site Assessment (CSA) undertaken by URS of the project site. The final report for Phase 1 of the CSA was a detailed site history that identified all potential sources of historical contamination. The preliminary report for Phase 2 was also included and comprised results and analysis from extensive intrusive investigations across the site.

A report was issued to the three Master Plan proponents on 28 February 2004 that contained all information that had been collected about the project site. This included the results of technical investigations carried out for the Draft EIS and geotechnical and contaminated site assessments undertaken for broader purposes. This report detailed the following elements of the environment on the site:

- Land use, geology and soils;
- Hydrogeology;
- Hydrology;
- Terrestrial and intertidal flora;
- Terrestrial fauna;
- Biting insects;

- Indigenous cultural heritage;
- European cultural heritage;
- Marine environment;
- Air quality;
- Noise;
- Visual assessment;
- Traffic and transport; and
- Construction and waste management.

For each of these issues, information was provide about:

- The existing environment;
- Elements of the redevelopment Concept Plan that may affect the environment;
- The potential impacts of the proposed development; and
- Proposed mitigation strategies and measures to minimise those impacts.

This report was targeted to inform the draft Master Plan developers about key environmental issues that should be addressed in their proposal and provided guidance on how best to address a broad range of environmental issues.

A further detailed technical report was provided to the Master Plan developers in May 2004 that provided the most up to date data about the geotechnical characteristics of the site and the CSA.

Selection of the Final Master Plan

The final Master Plan will be selected on the basis of a number of criteria listed in the *Call for Detailed Proposals* for the Master Plan. These criteria include:

- Sustainability principles to achieve best practice in environmentally sustainable development;
- Achievement of connectivity with the CDB (by vehicle and pedestrian routes);
- Incorporation of public space and facilities suitable for a tropical environment;
- Reflection of the cultural heritage and history of the site and surrounding areas; and
- Engagement and participation of the local business community.

3.2 SUBMISSIONS ON DRAFT EIS (Volume 1)

3.2.1 Responses to General Comments

Consultation

Several government agencies requested further consultation about various aspects of the project and/or an opportunity to comment on the various plans (such as the RAP, SMP and Construction EMP) being prepared for the redevelopment. Several agencies stated that this consultation was necessary to allow them to plan for adequate service provision in the future. These issues have been addressed under the individual comments in Section 3.2 and in Section 4.5 of this Supplement.

Environmental Management Commitments

OEH noted that options and recommendations stated in the Draft EIS should be clarified as commitments and a summary table of these commitments provided.

The commitments for the proposed project have been resolved and are discussed in Section 5 of this Supplement. A summary table of commitments is provided in Section 5.4.

Integrated Environmental Management

OEH requested elaboration of the environmental management responsibilities, particularly in regard to land ownership changes and transitional arrangements for continuity of environmental management and transfer of environmental commitments.

The DCW site is expected to be established as two Development Leases for the DCEC and the remainder of the site until the completed stages of the development are sold or leased. Once each stage of the redevelopment is completed, that stage will be excised from the Development Lease(s) and a long-term title documents issued to the end owner (freehold) or lessee (leasehold). It is likely that residential development in the site will be freehold to the end owner, while the commercial land uses will be a mix of leasehold and freehold, as appropriate. Community facilities and other infrastructure will revert to public ownership (NT Government, Darwin City Council or other relevant authorities).

Given the industrial history of the site, it is imperative that any future changes in land ownership and/or land use are based on the constraints of the site, particularly from residual contamination after remediation work has been completed. Only contaminants determined by thorough assessment, the independent Contaminated Land Auditor and NT Government regulators to be of low risk and manageable will be left on site. This residual contamination will be managed by implementation of the SMP. Nonetheless, future changes to more sensitive land uses may be restricted at some locations across the site. This, and the continuity of environmental management and the transfer of environmental

commitments, will be dealt with through limitations placed on land titles and conditions on leases to ensure the risk from changes in land tenure and land use are minimised.

OEH also sought clearer definition of the relationship between the environmental impact assessment and contaminated site assessment processes, and the inter-relationships between the various remediation and environmental management plans. Figure 8.1 from the Draft EIS was to be amended.

Figure Fig 8.1 has been amended and the amended is shown in the Supplement as **Figure S-0.**

Legislative Relationships

The environmental impact assessment is carried out under the *Environmental Assessment Act* and its Regulations. The contaminated site assessment for the redevelopment site is being undertaken through two mechanisms: the Victorian Contaminated Land Auditor Accreditation Scheme (implementing the National Environment Protection [Contaminated Land] Measure) (NEPM), and assessment through the Office of Environment and Heritage. Auditing of the assessment and remediation is centred on a risk management basis that seeks to ensure the level of remediation is sufficient to allow particular ranges of land uses to occur on a piece of land. More sensitive land uses, for example ones involving direct contact with soil, require more stringent remediation. The contaminated site assessment process seeks to balance the high cost of remediation work with the risk of different proposed land uses to ensure that land is not locked away and can be reutilised for appropriate land uses. A future proposed change to a more sensitive land use beyond the level of remediation would require further assessment and possibly further remediation.

Use of the NEPM and the Auditor ensures that the investigation and remediation are carried out to national standards, and provides some assurance to relevant NT government agencies that the work has been carried out through an approved process

Aspects of the contaminated site assessment, remediation and ongoing management of residual contamination (through the SMP) will also involve environmental health provisions under the *Public Health Act* and its Regulations to ensure that any risks to public health is minor and acceptable.

Although the contaminated site assessment and remediation is being carried out in parallel to the environmental impact assessment, it has provided detailed information to assist in preparing both the Draft EIS and the Supplement. It has also informed the potential developers about the characteristics of the site.

When the Master Plan has been finalised, the redevelopment will be subject to a Development Application under the *Planning Act*. Public review of the Master Plan is allowed for during the assessment of the Development Application.

Consultative Relationships

The legislative requirements summarised above lead to consultative requirement to allow relevant government agencies to meet their legislative obligations and to achieve the objectives that legislation was design for. The Office of Environment and Heritage is central to many of these consultation and

review processes. Consultation about the public health issues of the RAP, the remediation and the SMP is also required. Key steps in the process for agency consultation and review are shown in **Figure S-0**.

OEH also sought clarification about the interrelationships between pre-remediation site works, the SMP and the Construction EMP.

Refer also to **Figure S-0**.

Pre-remediation site work has been carried out recently to clear disused surface infrastructure, as well as some underground infrastructure away from soils with significant contamination. The work also provided further assessment of the contamination of the site buy giving greater access to areas previously covered by sealed surface. This allowed more thorough sampling across the site and further clarification of contamination characteristics for planning the subsequent phase of investigations.

The RAP, and the remediation activities of the RAP will define, will remove, treat or contain the contaminants that can not be managed adequately on the site in its current form. The RAP is expected to be finalised by the end of 2004. As noted above, there will be some low level or immobilised contamination that remains on site, and this will be managed through implementation of the SMP. This document will define the acceptable land uses and activities that can be undertaken without unacceptable risk to public health or the environment. The SMP will also define a range of engineering controls and management actions required to protection human health and the environment.

The Construction EMP will utilise information in the RAP as well as broader environmental information to ensure that human health and the environment are protected during construction activities. Construction of later stages of the redevelopment may also use information in the SMP. Construction will occur in stages over an expect 10-15 year timeframe.

The Operational EMP will detail the action required to minimise the environmental impacts from the finished redevelopment (or stages). Aspects of the Operational EMP will be heavily influenced by the RAP and the SMP to ensure ongoing activities, such as maintenance or installation of underground infrastructure, is done in such a way to minimise any risk to human health or the environment. The details of the Operational EMP will be highly dependent on the finalisation of the Master Plan. The selected developer will be required to prepare this EMP as part of the development process.

Further Assessment and Studies

OEH requested a summary table of the proposed further studies with timeframes for their completion.

The additional studies proposed to be undertaken are discussed in Section 4.6 of this Supplement with a summary table.

Land Use Conflicts

OEH requested assessment of the relationships between the proposed redevelopment and adjacent land uses, and consideration of the potential conflicts that may occur on the proposed development as well as on adjacent land uses.

The NFI will remain in operation for the foreseeable future (likely to be at least 15 years). The issues from the activities at this facility are discussed in a number of sections below. The IOW is coming to the end of its useful life and is expected to be decommissioned with in the next 5 years

Noise impacts on the proposed development from adjacent land uses has been addressed in DEIS 6.3.7. The potential odour and air emissions impacts from adjacent land uses has been addressed in DEIS 6.3.8. Management strategies to ensure access for adjacent land uses is discussed in DEIS 8.7. Issues about hazards to human safety are discussed in DEIS 7.

3.2.2 Comments on Section 1 of the Draft EIS - INTRODUCTION

DEIS - 1.3.2 The Proposed Project

Defence questioned if the statement that the redevelopment "specifically excludes any industrial or related incompatible uses of the land" was compatible with the road transport required to support the wharves and heightened port *security arrangements.*

The Northern Territory Government has stated its commitment to maintaining the Darwin Wharves as working maritime facilities. This has been reflected in the criteria for assessing the Master Plan proposals. The transport requirements to support these working wharves will be addressed in the Master Plan.

Defence also noted that the components of the redevelopment listed in this section did not recognise the continuing use of the Darwin Wharves by Defence.

The Darwin Wharves are not part of the DCW redevelopment and therefore not included in the potential land uses within the DCW site. Defence uses of the area and its strategic infrastructure to Defence has been noted in 5.4.1.

DEIS - 1.4.3 Status of the Proposed Project in the EIA Process

ECNT raised a concern that the Environmental Impact Assessment process will be completed prior to the actual development plans being finalised and made public.

The Draft EIS notes that the assessment has been based on the Concept Plan for the redevelopment. The proponent has given a commitment that, if the final Master Plan for the redevelopment differs significantly from the Concept Plan, additional assessment will be undertaken as required by the Office of Environment and Heritage

DEIS - 1.4.4 Relevant Government Legislation and Policies

DCHS noted that the list of relevant and applicable Northern Territory legislation should include a number of additional Acts and Regulations.

The followings Northern Territory legislation is relevant to the proposed project.

- *Food Act* 2004

  The objects of this Act include:

  - ensuring food for sale is safe and suitable for human consumption;
  - preventing misleading conduct in connection with the sale of food; and
  - providing for the application of the Food Standards Code in the Territory.

- *Public Health Act*

  The Act sets out the appointment and powers of the Chief Health Officer, with the power to require rectification of risks to public health. The Act also sets powers to make regulations about a broad range of issues including the promotion and maintenance of public health, disease prevention and diseases control, garbage and sanitation, control and inspection of food and premises, the prevention and abatement of nuisances and noxious vermin and insects.

Several regulations under the *Public Health Act* are also relevant.

- Public Health (General Sanitation, Mosquito Prevention, Rat Exclusion and Prevention) Regulations

  The Regulations define a range of regulatory offences. Issues covered under general sanitation include offence matter, refuse, septic tanks, litter, waste food and garbage. The owner or occupier is responsible for carrying out the requirement of the regulations for mosquito control for, amongst other things, tanks, wells, ponds, excavations and interference with drains. The regulations set out requirements for rat prevention in drains, hotels, restaurants and shops.

- Public Health (Night-Soil, Garbage, Cesspits, Wells and Water) Regulations

  These regulations define, among other issues, requirements for septic tanks, the use and maintenance of garbage receptacles by an owner or occupier and requirements for the removal of garbage.

- Public Health (Nuisance Prevention) Regulations

  The Regulations include measures for the control of mosquito breeding grounds and infestation of any premises by rats, mice or any other vermin.

- Public Health (Shops, Boarding-Houses, Hostels and Hotels) Regulations

  The Regulation includes several requirements for shops and hotels.

DEIS - 1.6.8 Wharves

Defence commented that the Introduction acknowledge Defence as an important user of, and stakeholder in, the existing port".

The proponent acknowledges that Defence is a significant user of the wharves and other facilities in and adjacent to the project site. This is elaborated in later sections.

DEIS - 1.7.7 Timeframe And Project Schedule – Status of the Redevelopment

DCHS noted that the Department expected to be given an opportunity to comment on the RAP and SMP. It was also requested that the Department be included in ongoing consultation during remediation, particularly during the remediation phase.

Arrangements for Northern Territory agency consultation about, and review of, various documents and plans (including the RAP and SMP) are noted in Section 4.5 of this Supplement.

3.2.3 Comments on Section 2 of the Draft EIS - OBJECTIVES AND BENEFITS OF THE PROPOSED PROJECT

DCHS noted that the Department expected to be given an opportunity to comment on the RAP and SMP. It was also requested that the Department be included in ongoing consultation during remediation, particularly during the remediation phase.

Arrangements for Northern Territory agency consultation about, and review, of various documents and plans (including the RAP and SMP) are noted in DEIS 4.5.

DEIS - 2.2 Benefits

OEH noted that a number of positive environmental benefits should be noted in this section.

The Darwin City Waterfront redevelopment offers a number of clear environmental benefits for a site with an extended and varied history of industrial uses.

Remediation of site contamination

The DCW site has a long and varied industrial history, which has left a legacy of contamination. Further industrial activity in the area is inappropriate given its proximity to a growing CBD and the shift in port activity to East Arm Port. Without the redevelopment as an impetus, it is unlikely that this contamination would be remediated sufficiently to allow significant re-use of the area for other non-industrial purposes. The redevelopment presents an opportunity to:

- adequately assess and characterise the location, type and level of contamination;

- identify appropriate options for remediating the site and managing the site into the future to ensure the protection of public health and the environment;
- undertake the necessary remediation activities; and
- appropriately disposing of any contaminated material that is to be removed from the site.

These steps will reduce the risk of mobilisation of contaminants into the natural environment and of public exposure.

Heritage interpretation

A key requirement for the redevelopment Master Plan is historical and cultural sustainability. This is an explicit obligation in *Call for Detailed Proposals* released by the NT Government in January 2004. Potential developers must reflect in their Master Plan proposals the unique cultural heritage and history to the site. Implementation of this requirement in the final Master Plan offers the opportunity to improve the awareness of the Darwin community and visitors to the Aboriginal and European history of the site and the varied and unique mix of heritage values that the site contains.

Implementation of this requirement in the Master Plan and the redevelopment will open up a semi-derelict and poorly utilised area of Darwin, and allow significant numbers of local people and visitors to gain access to the broad range of cultural and historical elements of the site. The final Master Plan will integrate a plan for the interpretation of cultural and historic sites at key locations across the site, and allow integration with the nearby historic features of the CBD.

Enhancement of the Darwin city environs

At present, the DCW area is an unsightly mix of disused (or soon to be disused) industrial and vacant land that offers little attraction to visitors nor provides any positive visual amenity from the primary vantage points of the harbour and the CBD escarpment. The *Call for Detailed Proposals* requires the Master Plan to demonstrate that the redevelopment will encourage people to participate in a broad range of features and facilitate that participation with ready access for both day and night time activities. The redevelopment will transform this disused industrial landscape into a vibrant social and commercial focal point.

Local Industry Participation

The *Call for Detailed Proposals* requires Master Plan developers to demonstrate that the redevelopment will maximise local industry participation to:

- Enhance local business and industry capability; and
- Ensure regional economic benefits and significant benefits for the ongoing economic growth of the Northern Territory.

These outcomes offer major investments for future development capacity of Darwin and the Northern Territory.

3.2.4 Comments on Section 3 of the Draft EIS - ALTERNATIVES

OEH requested that additional information be provided about the alternatives to the proposed project and the benefits of the project in relation to those alternatives.

Justification for Selecting the Concept Plan

In mid 1998, the NT Government invited registrations of interest for the purchase and development of the Kitchener Bay and Stokes Hill Power Station areas within the site. The proposals received did not meet the government's expectations for community amenity and commercial and tourism uses, nor did they adequately address the design concepts in the Darwin Land Use Objectives. The 1999 Central Darwin Planning Concepts and Land Use Objectives defined these expectations for the site more clearly and included large areas of public open space, contained areas of residential and commercial development, community use buildings and various water use facilities. The Government invited public comment on this document in late 2001. The submissions identified that any redevelopment of the site should:

- Display the Darwin community's aspirations and reflect their heritage, as so much of it is associated with the area;
- Complement the CBD rather than compete with it;
- Be designed primarily to cater for local people;
- Be designed to facilitate access to the foreshore;
- Be a pre-eminent site for Darwin, facilitate leisure and entertainment while allowing for a mix of uses and support ongoing maritime activities; and
- Allow for adequate transport links, especially pedestrian links to the CBD.

From this public consultation process and over two years, the Darwin Revitalisation Concept Plan was developed, which attempted to reflect the community feedback received.

Alternatives to the Concept Plan

The primary benefit of the Concept Plan is its integrated vision for the entire site, which was designed to avoid a piecemeal approach to the redevelopment of the site. A number of redevelopment proposals for portions of the site, particularly for high-density housing, have been received over the last five years. However, these have not been accepted because they lack urban planning vision and do not meet community expectations for a vibrant local destination. Of specific concern was the lack of an integrated approach to the redevelopment of the whole site to ensure an optimum range of uses and activities that suited the Darwin community. The development proposals received in mid 1998 were for large high-density residential developments and had little regard for the overall amenity of the site.

A planning concept was prepared immediately after the 2001 public consultation. This plan included extensive open public space, a convention centre, several community buildings, a small area of residential development and a resort hotel. However, implementation of this plan presented obstacles and was

assessed as being a poor investment for the major cost to Government for the required infrastructure. In addition, the plan was considered likely to attract only piecemeal interest from developers for the commercially viable components and lead to a poorly integrated development.

The Darwin Wharf Precinct Redevelopment Taskforce identified the key need to develop a Master Plan that had vision, property development potential and was attractive to the people of Darwin.

A range of specific development options has been considered in the development of the Concept Plan.

- Density of development

  A balance between local developers preference for high-density low, amenity proposals and high cost, high amenity preference from the community was sought. This balance would also sufficient and broad benefits to warrant the high cost of headworks and infrastructure.

- Building heights

  The need for diversity in building mass and heights was recognised to avoid a monotonous harbour-front image, while protecting the views to and from the escarpment above the site. A small number of high rise buildings in appropriate locations would also provide greater variety of building form and better opportunity to maximise public open space than a larger number of medium rise buildings.

Background to the Master Planning process

The Taskforce concluded, through experience of similar Precinct developments and detailed discussions with major developers, that private sector input was needed to ensure the redevelopment achieved its goal as a landmark development. It was considered, given the complex nature of the DCW, that the full potential of the site would only be achieved with the development expertise of the private sector. In addition, the Taskforce determined that:

- A development environment was needed that provided incentive for an integrated whole of site development;
- Individual building projects need to be property developer driven, rather than builder driven, to ensure quality and integration; and
- The greatest potential for establishing and integrating abroad range of suitable development and activities would come from a single major developer.

These conclusions were used to develop the process for calling for and selecting a Master Plan for the redevelopment.

Alternatives to the Master Planning process

The most likely alternative to the development of a Master Plan in partnership between the Government and a private developer (Public Private Partnership) would be for the Government to develop the Master

Plan and release individual lots for building developments over time. This would allow the Government to retain control over planning and development of the site. However, this approach is unlikely to deliver development that is integrated and realises the potential of the site. As noted above, the Government considered that private sector expertise was essential to achieve the optimum development and community outcomes from the site. Based on previous proposal for the site and experience elsewhere, multiple smaller developments were also considered inadequate and unable to deliver a redevelopment that met community expectations.

Benefits of Incorporating the DCEC into the Redevelopment

The DCEC was included in the redevelopment proposal for several reasons as outlined in the Draft EIS. In particular, the DCEC will act as a catalyst project to stimulate the overall development of the site with major public investment and the early consolidation of the Public Private Partnership between the Government and the developer. This component of the redevelopment will support the necessary early investment in infrastructure. The DCEC will also provide a transitional link from the CBD to the site and provide the necessary connectivity to integrate the new development with the Darwin Peninsula. The DCEC will be important to attract broader complementary tourist uses including a hotel and serviced apartments into the site, as well as consolidating a long-term association with the cruise shipping industry and promoting the mixed-use development. In turn these facilities help support the viability of the DCEC.

Excluding the DCEC from the redevelopment would hinder the establishment and integration of the desired broad mix of activities at the site.

3.2.5 Comments on Section 4 of the Draft EIS - PROJECT DESCRIPTION

DEIS - 4.1 Project Description

Defence stated that the integration of the proposed development with existing uses of the site and Darwin wharves should be addressed.

A key desired outcome of the redevelopment is to maintain Stokes Hill and Fort Hill Wharves as working marine facilities. The proponent acknowledges that this will require integration of the proposed redevelopment with existing uses. This is addressed more fully in a number of areas under "Potential Impacts".

ECNT stated that project offered an opportunity for leadership in environmental management of a major development and particularly for the design and construction of buildings suited to Darwin's tropical climate.

One of the objectives stated in the *Call for Detailed Proposals* for the Master Plan is that the redevelopment "will achieve best practice in environmentally sustainable development in a tropical environment" and that the project demonstrates the following sustainable outcomes:

- Waste recycling and minimisation;

- Pollution control;
- Environmental protection and enhancement of marine and land environments;
- Effective design to maximise energy efficiency and water conservation;
- Passive climate control measures; and
- Innovation in design and construction.

Each of the three potential developers have been required to prepare a Sustainability Plan as part of their Master Plan proposal showing clear objectives, measurable targets and a performance monitoring plan.

DEIS - 4.3 Proposed Land Uses

The Project Site

Defence commented that the loss of the Iron Ore Wharf is contradictory to the statement "much of the existing land uses in adjacent areas are not expected to be affected directly by the proposed project", given the current uses of the structure by Defence.

NT Government (as the land owner) has sought to have bulk fuel off-loading cease at the Darwin Wharves and alternative methods of supply adopted to allow the full potential of the Fort Hill area to be realised. The Northern Territory Government has advised Defence that, beyond the short-term, bulk fuel discharge at Iron Ore Wharf is not compatible with the proposed DCW redevelopment and the broader planning for fuel management in the Port of Darwin. This issue is dealt in more detail in 6.7.6 below.

Adjacent Areas

Defence questioned whether the final sentence in the first paragraph was contradictory.

This has been addressed in the Errata.

Defence stated that Defence planning requires the use of the NFI for at least the next 15-20 years in conjunction with wharf bulk fuel off-loading capabilities.

The proponent recognises the strategic importance of the NFI under current infrastructure and operational conditions, and the NT Government has not sought its decommissioning in the foreseeable future.

DEIS - 4.7 Associated Headworks

Power Water Corporation requested further detail of known service upgrades, particularly the likely requirements for a new sewerage pump station central to the redevelopment. This includes environmental aspects such as overflow control, odour control, footprint and a buffer zone.

Details of the service upgrades at the DCW site will be provided by the selected developer during finalisation of the Master Plan.

During development of the Master Plan, the proponents are required to conform to the 'Guide to Infrastructure Requirements' attached to the *Call for Detailed Proposals*. Selected parts of these requirements and comments included the following:

Subdivision Development Infrastructure Requirements/Comments

- Upon subdivision of the DCW site, the selected developer will be required to construct a reticulated sewerage system, to the requirements of Power and Water, to be gifted to Power and Water for ownership and operation.
- The selected developer shall provide a mechanism for emergency overflow of sewage from the sewerage system. The overflow system shall conform to the requirements of Power Water, Darwin City Council and relevant Territory Agencies (health and environment areas).
- The selected developer shall liaise with Power and Water and Darwin City Council to develop a strategy for any proposed public sewerage services (public toilets) that covers issues associated with construction, ownership, maintenance and stormwater ingress.
- Any sewage pumping station to be gifted to Power and Water must also have a land title and 30m odour buffer zone in which development is restricted.
- Separate sewerage services shall be provided to the new lots to the satisfaction of Power and Water.
- Sewer mains shall be located in public land, where easements have been specifically permitted by Power and Water for the purpose of sewerage services, such services shall be made available to Power and Water, at no cost to Power and Water.
- Any proposed staging of the development of the DCW Site must take into account in the aforementioned sewerage services design requirements.
- Sewerage servicing shall conform to Power and Water's Connection Code, available on-line at www.powerwater.com.au/powerwater/connectioncode/ .

Building Development Infrastructure Requirements/Comments

- Sanitary drainage plans for the development of the DCW Site shall be submitted to Power and Water for review and approval prior to the commencement of works.
- No structures are to be located over a sewerage easement, or where no easement exists such as within a road reserve, within 1.5 metres of the centre line of the sewerage main, without obtaining the prior written approval of Power and Water. It is the responsibility of the developer to ensure the location of all services on or adjacent to the DCW site.
- Any planting within Power and Water sewerage easements , or adjacent to Power and Water assets within road reserves shall be in accordance with the requirements of Power and Water.

DCHS commented that the entire development must be sewered and incorporate approved trade waste disposal from food outlets.

The *Call of Detailed Proposal* for the Master Plan specifies the entire site must be fully sewered and that waste disposed of to sewer will require a Trade Waste Agreement with Power Water Corporation.

3.2.6 Comments on Section 5 of the Draft EIS - EXISTING ENVIRONMENT

DEIS - 5.1.2 Field Surveys

MAGNT noted that the assessment of "marine and intertidal ecology" was not included within the listing of field surveys.

This assessment was undertaken during the investigation of marine sediment quality (31 October – 4 November 2003, refer Appendix C of the Draft EIS). Further details of the marine fauna survey are provided in DEIS 5.3.5.

DEIS - 5.2.4 Soils

DHCS noted that the Public Health Act precludes the use of greywater. In addition, the proximity of the site to the harbour would preclude such use in the future, even if national guidelines for the reuse of greywater change.

No greywater will be used on site, in accordance with the *Public Health Act* and to protect the marine environment of Darwin Harbour.

OEH required further justification of the statement made on page 5-7 that "the conceptual land use is compatible with the existing soils and geology" supported by a map showing the relevant local characteristics. OEH also questioned how the assessment of geology and soils has or will inform the layout of the redevelopment.

Figure S-1 shows the land suitability for the project site. Areas around the former Fort Hill and to the east of Stokes Hill are either bedrock or fill on bedrock. These areas provide highly stable landform for structures with shallow footing under medium to high loads (e.g., high rise buildings). The remaining areas of reclaimed are suitable for shallow footing under very light to light load (e.g., single storey buildings. More substantial buildings in these areas will require suitable engineering to accommodate the geotechnical properties of the areas.

The potential developers have been advised on the geotechnical characteristics of the site in February and have taken these into consideration in the preparation of their Master Plan proposals. As noted in DEIS 3.1.2 of this Supplement, the preliminary report provided in February 2004 to potential developers of proposals for the Master Plan included the most up to date information about the geology and soils of the site. Further and more detailed information about the geotechnical characteristics of the site was provided in May 2004. This information was provided specifically to allow the potential developers to incorporate the information into the layout and design of the proposals.

DEIS - 5.2.5 Existing Soil Contamination

DHCS requested an opportunity to comment on the RAP.

Arrangements for Northern Territory agency consultation about, and review, of various documents and plans (including the RAP and SMP) are noted in DEIS 4.5.

Defence noted that the possible migration of hydrocarbon contamination from the NFI onto the project site requires further coordinated investigation. Defence have undertaken several studies into the issue and the results of these should be acknowledged.

The proponent agrees that further investigation is needed and has sought to undertake the necessary investigations as part of the fourth phase of the Contaminated Site Assessment. The proponent has sought to coordinate these investigations with Defence and is anticipating obtaining data from Defence and access to the NFI in the near future.

Previous assessments by Defence include:

- Environmental Management Plan for the NFI (including a review of past contamination studies at the NFI and recommendations for future work); and
- A 1998 assessment of groundwater and soil contamination.

The results of these studies will be used in the Contaminated Site Assessment to clarify the contamination process on and off the redevelopment site. As noted in the Draft EIS and this Supplement, the Contaminated Site Assessment is being reviewed by Northern Territory Government regulators separately from the EIS and independently audited under the Victorian Contaminated Land Auditor Accreditation Scheme.

DEIS - 5.2.6 Existing Groundwater Contamination – Overview

DHCS noted that the use of groundwater is unlikely to be approved due to contamination issues.

Groundwater will be managed in accordance with the SMP. It will not be used for any purposes identified in the SMP as posing a risk to public health or the environment.

DEIS - 5.2.10 Acid Sulfate Soils

OEH requested clarification of how the assessment of Acid Sulfate Soils would inform the site design and layout of the redevelopment, and construction methods and materials.

The preliminary technical report provided in February 2004 to potential developers of proposals for the Master Plan included the most up to date information about Acid Sulfate Soils (ASS) and Potential Acid Sulfate Soils (PASS) in and near the site. Further and more detailed information about the geotechnical characteristics of the site was provided in May 2004. This information was provided specifically to allow the potential developers to incorporate the information into the layout and design of the proposals.

DIPE commented that "the issue has not been adequately addressed in the Draft EIS. The report fails to…detail the amount of ASS or PASS material present". OEH also requested a clearer map of the known and predicted ASS and PASS.

Formation of Acid Sulfate Soils

Acid Sulfate Soils (ASS) are extensively developed around the Australian coastline, although they have only recently come to prominence in land use planning as a result of the detrimental environmental consequences that can arise from disturbing them. In Australia, coastal ASS occurs in soils ranging from thick deposits (>10m) of unconsolidated estuarine mud to thin bands in the coarse sands or outer barrier systems.

ASS are saline soils or sediments containing a build-up of iron sulfides in the upper soil layers under waterlogged or highly reducing conditions. Undisturbed, the potential acid generation is contained within the sulfide materials. When the soils are disturbed, either directly by removal of the overlying soil profile or by a lowering of the watertable, oxidation of the iron pyrite occurs resulting in the formation of sulphuric acid (pH < 3.5) and mobilisation of metal contaminants. These contaminants include aluminium, iron, manganese and heavy metals such as arsenic and copper into soil and drainage waters.

The presence of carbonates and shell fragments may provide some buffering capacity and resist the lowering of the soil pH. The effectiveness of these buffering components in maintaining soil pH at acceptable levels (eg pH 6.5 – 9.0) will depend on the types and quantities of clay minerals in the soil, and on the type, amount and particle size of the carbonates or other minerals present. Seawater will also buffer the effects of ASS.

The hazards represented by ASS are magnified by their location and specific properties. For example, depth of the actual acid sulfate (eg. sulfuric horizon) or potential acid sulfate (eg. Sulfidic materials) materials as well as the concentration of salts and minerals (eg sodium chloride, jarosite or pyrite) are critical. The unique properties of coastal ASS arise from their sulfide content. Sulfide concentrations (as iron pyrite FeS_2) range from about 0.01% to as high as 15%. The reaction between acid and soil constituents, mainly clay, liberates dissolved aluminium, iron, manganese, and heavy metals into surrounding surface and groundwater.

Definitions

Acid Sulfate Soil Material (ASSM)

ASSM is the common name given to soils containing iron and other mineral sulfides. These soils do generate or have the potential to generate subsurface acidic conditions through sulfuric acid production. The sulfuric acid is produced through oxidation of the sulfur content of the soil. Two types of ASSM may be defined.

Potential Acid Sulfate Soil Materials

Iron sulfides are often contained in layers of waterlogged soil. Such layers can be clay, silt or sand, and are usually dark grey and soft. The waterlogging limits oxygen in the air reacting with the iron sulfides.

Soils forming such layers are commonly known as potential acid sulfate soil materials (PASSM) because they have potential to oxidise and produce sulfuric acid.

Actual Acid Sulfate Soil Materials

When iron sulfides within the soil are exposed to air and produce sulfuric acid, the soil becomes an actual acid sulfate soil material (AASSM). The soil itself usually has some capacity to neutralise and/or buffer some of the sulfuric acid, but typically acid produced in excess of this capacity moves through the soil, acidifying the soil water, ground water, and eventually surface waters

ASS in the Existing Environment

Sampling and analysis for ASS was undertaken as part of the Contaminated Site Assessment and field geotechnical investigation during the Phase 2 and Phase 3 investigations by URS. Figure S-2 presents the location of ASSM, within the proposed redevelopment site, that exceed the action criteria as adopted by the Western Australian Department of the Environment (DoE) from Queensland's Soil Management Guidelines (2002) as presented in (refer to **Table S-8** under DEIS 8.2.6) for fine textured soils with expected disturbance of over 1000 tonne.

Exceedence of these criteria indicates risk of an ASS issue and the need for an ASS management plan with developmental approval. Residual sediments of marine origin, which contain concentrations of oxidisable sulfides above the adopted action criteria, are widely present beneath areas of reclaimed land and particularly in the central part of the site toward the warehouse area. These sediments are silty to clay rich in nature, grey to black and may or may not contain shell fragments.

Figures S-3a and S-3b present a geological cross section showing the ASSM that exceeds the action criteria at depth. The Total Actual Acidity (TAA) has been included for samples that are either AASSM or are PASSM that has partly oxidised. These ASSMs are predominantly within the marine sediments of the proposed redevelopment location.

The results of the investigation indicate the following:

Fort Hill Area

PASSM was identified near the marine environment on the eastern boundary of this area only. The material is associated with marine sediments underlying fill materials. TAA levels indicate the material has partly oxidised at depths of 5.5 and 6.0 m at this location, correlating with clay rich materials, minor silt and mangrove derived organic matter. These marine sediments have little Acid Neutralising Capacity (ANC). Exposure of this material would cause further oxidation of PASSM to AASSM. Acidic leachate has the potential to mobilize heavy metals, iron and aluminium, which would have a negative impact on the marine environment.

Bitumen Plant Area

PASSM were identified at TP 12 at a depth of 5.0 m and associated with marine sediments. Sandy, silty and gravelly fill materials overlie to a thickness of approximately 4 m. The potential impacts of

excavating and stockpiling this material or dewatering this material would be the further oxidation of sulfidic material and the generation of substantial acidic leachate.

Warehouse Area

PASSM was located at numerous locations including some in the western portion of the area adjacent to the Shell Bitumen Plant and isolated locations along the southern portion of the site adjacent to the Northern Cement site. Analytical results indicate PASSM occurs between 5 and 10 m depth within the marine sediment profile.

AASSM is locally present at the interface (approximately 5 – 6 m depth) between fill material and underlying marine sediments. There is some ANC present in the material but generally insufficient to neutralise the acidity generated.

Old Northern Cement Plant Area

PASSMs were identified in this area adjacent to the marine environment and were associated with marine sediments underlying fill materials (approximately 13.5 – 14.0 m depth), including adjacent to the eastern boundary with the Recently Reclaimed Area. The profile suggests that there is little ANC associated with these sediments. Disturbance of these soils at depth would lead to further oxidation of PASSM to AASSM.

Recent Reclamation Area

PASSMs were identified throughout this area, including locations in its western portion, adjacent to the Warehouse Area, and some locations in the southern portion of the area adjacent to the marine environment. All samples identified as PASSM were located within the marine sediments of the proposed redevelopment site. In most cases the sulfidic acidity is greater than the ANC implying that exposure of these soils would cause the soil to become acid generating.

Stokes Hill Area

For the areas that were sampled there was sufficient ANC present, within the PASSM, to imply that limited environmental impact would occur from the oxidation of sulfides at this location.

Kitchener Bay Marine Sediments

No AASSM or PASSM were identified within the top 1 m of the marine sediments, and based on available data no environmental concerns regarding ASS are foreseen. Deeper sampling is recommended, once the layout of marine and foreshore components of the redevelopment is known, to assess possible exposure of PASSM and transformation to ASSM if dredging and removal of marine mud is contemplated.

DIE - 5.2.11 Air Quality

OEH requested clarification about the timeframe for decommissioning the quarantine incinerator.

Plans have been prepared for some time to decommission the quarantine incinerator on the project site and establish a new facility near East Arm Port. These plans have not been implemented yet, despite the poor condition of the current incinerator. Darwin Port Corporation has indicated that there is currently no indication of when the facility will be decommissioned.

The nearby Bitumen Plant (with two stacks) is expected to be decommissioned and the site remediated by the end of 2004.

DEIS - 5.3.1 Intertidal and Terrestrial Flora - Weeds

OEH requested that two additional weed species be included this section.

In addition to the weed species noted in the Draft EIS as occurring on the site, Itch Grass (*Rottboellia cochinchinensis*) and *Pennisetum pedicellatum* occur in dense weed infestations among native vegetation.

DEIS - 5.3.4 Biting Insects

DHCS noted that rectification of any mosquito breeding areas will be vital to preserve public health and amenity of the site. DHCS also noted that biting midges will disperse to the site, particularly Stokes Hill, in minor to moderate pest numbers.

Given the proximity of the site to the CBD and high use recreation areas, as well as the expected increased use of the areas with the redevelopment, control of mosquito breeding areas on the site will be a major priority. Management procedures will be implemented during all construction phases of the redevelopment to minimise mosquito breeding habitat and reduce opportunities for mosquito breeding. These measures have been incorporate into the Construction Environmental Management Plan (EMP). Similarly, ongoing management protocols will be incorporated into the Operational EMP to minimize mosquito numbers.

Biting midges will disperse to the site in minor to moderate pest numbers from nearby tidal areas to the north and north-east. Numbers of biting midges will be most prevalent on Stokes Hill at specific periods in the tidal cycle. As this dispersion is from natural breeding habitat areas off the redevelopment site, the developer can take no action to minimise breeding activity.

DEIS - 5.3.5 Marine Biota

MAGNT considered that marine habitats had not been adequately described and also noted that the 18 species of syngnathids found in Darwin Harbour (Larson & Williams 1997) are protected species under the EPBC Act.

Further information pertinent to each of the habitats listed in Section 6.4.2 of the EIS Guidelines (Appendix B of the Draft EIS) is presented below. Additional information on some of the biota which could be expected to be present within the project area are included in Hanley et al. (1997) and Russell & Hewitt (2000).

The marine habitats of Darwin Harbour are shown in Figure 5.25 of the Draft EIS. The marine habitats of the project area are evident in Figure 5.21 of the Draft EIS – the intertidal flats are almost fully exposed, the mangrove communities are defined and all of the shorelines abutting the terrestrial parts of the project area are "rocky shores".

Rocky Shoreline

This habitat is described under the heading "Wharf Structures" in Section 5.3.5 of the Draft EIS. As indicated, there would be expected to be close similarities between the biotic communities associated with each of these habitats. Rock walls within the project area would also be expected to support similar communities.

The potential for the wharf structures to provide habitat for syngnathids (seahorses and pipefishes), some species of which are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), was not described in the Draft EIS but is considered a possibility. Larson & Williams (1997) found some of the species associated with habitats where fauna such as sponges, soft corals, bryozoans and algae were present. The fouling communities on the wharf structures would primarily comprise these types of fauna, hence syngnathids may be present.

Larson & Williams (1997) provide the following information on the syngnathid species listed under the EPBC Act:

- three-keel pipefish (*Campichthys tricarinatus*) collected near the mouth of Woods Inlet and also known from Channel Island;
- short-bodied pipefish (*Choeroichthys brachysoma*) known from Lee Point, Bullocky Point and Channel Island;
- reef-top pipefish (*Corythoichthys haemopterus*), Brock's pipefish (*Halicampus brocki*), nose-ridge pipefish (*Halicampus dunckeri*) and mud/Gray's pipefish (*Halicampus grayi*) known from "Darwin";
- Girdled pipefish (*Festucalex cinctus*) known from "bottom end" of Woods Inlet
- ribboned seadragon/pipefish (*Haliichthys taeniophorus*) collected near Talc Head and in West and East Arms and also known from Fannie Bay and East Point Reef;
- blue speckled/spotted pipefish (*Hippichthys cyanospilos*) known from Bullocky Point and East Arm;
- short-keeled pipefish (*Hippichthys parvicarinatus*) known from Dinah Beach Inlet (possibly within 2 km of the project area) and Ludmilla Creek;
- beady/steep-nosed pipefish (*Hippichthys penicillus*) known from Ludmilla Creek, Channel Island and Woods Inlet;
- spiny seahorse (*Hippocampus histrix*) collected from lower reaches of Elizabeth River and also known from the "bottom end" of Woods Inlet;

- spotted/yellow seahorse (*Hippocampus kuda*) known from "Darwin Harbour";
- flat-face seahorse (*Hippocampus planifrons*) collected from lower reaches of Blackmore River and also known from Cullen Beach;
- low-crowned/flat-faced seahorse (*Hippocampus trimaculatus*) known from Fannie Bay;
- tidepool pipefish (*Micrognathus micronotopterus*) known from East Point;
- bend-stick/short-tailed pipefish (*Trachyrhamphus bicoarctatus*) known from "Port Darwin"; and
- straight-stick/long-nosed pipefish (*Trachyrhamphus longirostris*) collected from Fannie Bay, West Arm and lower reaches of Blackmore River and also known from Woods Inlet.

The wharf structures could also provide shelter for Queensland grouper (*Epinephelus lanceolatus*) and estuary rock cod (*Epinephelus coiodes*), two fish species classified as threatened by the IUCN and also listed as protected or partially protected under the *Territory Parks and Wildlife Conservation Act 2001*. The former species is known from the Elizabeth River and Mandorah Wharf and the latter species was collected by Larson & Williams (1997) off Stokes Point and is also known from Nightcliff, Bullocky Point and Channel Island.

URS is not aware of any surveys undertaken upon which to base an assessment of the likely abundances of any of these fish species in the vicinity of the project area. Larson & Williams (1997) did not sample any sites in the vicinity of the project area during their 1993 fish surveys. However, the habitat afforded by the wharf structures is not unique within Darwin Harbour and, as shown above, the species also occur in locations distant from the project area.

The serpulid worm *Hydroides elegans* was recorded by Russell & Hewitt (2000) on the structures of both Fort Hill and Stokes Hill wharves. This is listed as an "exotic species" by the Australian Ballast Water Management Advisory Committee (ABWMAC), though Dr C. Glasby of MAGNT (pers. comm. in Russell & Hewitt 2000) expressed some doubt as to the native range of the species, which is widespread around Australia, and considered that it was probably best regarded as a cosmopolitan rather than introduced species.

The barnacle *Megabalanus tintinnabulum* was recorded by Russell & Hewitt (2000) on the structure of Fort Hill wharf. This is listed as an "exotic species" by the ABWMAC but is a well known cosmopolitan fouling species, is not considered to pose a threat and is not a pest species (Russell & Hewitt 2000).

Muddy Tidal Flats

This habitat is described under the heading "Intertidal Flats" in Section 5.3.5 of the Draft EIS. It is recognised that the intertidal flat within Kitchener Bay could potentially provide habitat for certain species listed under the EPBC Act and the *Territory Parks and Wildlife Conservation Act 2001*. However, the area of this habitat is minimal when compared with the broad expanses of similar habitat elsewhere within the harbour, including the nearby intertidal flat within Frances Bay, adjacent to Charles Darwin National Park.

Sandy Beach

This habitat is not known within the project area.

Mangrove Forests

As described under the heading "Mangroves" in Section 5.3.5 of the Draft EIS, mangroves are poorly represented within the project area and could not be considered critical habitat for any species listed under the EPBC Act or the *Territory Parks and Wildlife Conservation Act 2001*. The area of this habitat is minimal when compared with the broad expanses of similar habitat elsewhere within the harbour, including within nearby Charles Darwin National Park.

Upper Intertidal/Supratidal Salt Marshes

This habitat is not known within the project area.

Sponge/Coral/Algal Assemblages

As discussed under the "Rocky Shoreline" heading above, these assemblages could be expected to exist upon the wharf structures adjacent the project area. Protected species which may be associated with these assemblages have been recorded elsewhere within Darwin Harbour (refer Larson & Williams 1997). Corals are also discussed under the heading "Corals and Rocky Reefs" in Section 5.3.5 of the Draft EIS.

Seagrass Beds

This habitat is described under an equivalent heading in Section 5.3.5 of the Draft EIS.

MAGNT indicated that reference to listed marine species under the EPBC Act and the Territory Parks and Wildlife Conservation Act 2001 should be made where relevant.

The EPBC Act lists nine 'threatened' species which, according to a search of the EPBC Act database, may be encountered in the marine waters adjacent to the proposed development:

- two 'endangered' species - Loggerhead Turtle (*Caretta caretta*) and Olive Ridley (*Lepidochelys olivacea*); and
- seven 'vulnerable' species - Freshwater Sawfish (*Pristis microdon*), Whale Shark (*Rhincodon typus*), False Water Rat (*Xeromys myoides*), Green Turtle (*Chelonia mydas*), Leatherback Turtle (*Dermochelys coriacea*), Hawksbill Turtle (*Eretmochelys imbricata*), and Flatback Turtle (*Natator depressus*).

However, it should be noted that the Freshwater Sawfish do not appear on the Checklist of Darwin Harbour fishes (Larson & Williams 1997). Whale sharks are also unknown within Darwin Harbour.

The EPBC Act also includes 12 listed marine migratory species that may occur in the area - Bryde's Whale (*Balaenoptera edeni*), Dugong (*Dugong dugon*), Killer Whale (*Orcinus orca*), Spotted Bottlenose

Dolphin (*Tursiops aduncus*), Estuarine Crocodile (*Crocodylus porosus*), Whale Shark and the six turtle species listed above.

As discussed above, the 18 species of syngnathids found in Darwin Harbour (Larson & Williams 1997) are protected under the EPBC Act.

The following marine species listed as 'threatened' under the *Territory Parks and Wildlife Conservation Act 2001* may be present within Darwin Harbour:

- one 'endangered' species - Loggerhead Turtle;
- one 'vulnerable' species - Leatherback Turtle. The seven fish species listed as 'vulnerable' do not appear on the Checklist of Darwin Harbour fishes (Larson & Williams 1997); and
- two 'near threatened' species – Dugong and False Water Rat.

MAGNT noted that three threatened fish species are mentioned, but not discussed.

The three fish species classified as threatened by the IUCN and also listed as protected or partially protected under the *Territory Parks and Wildlife Conservation Act 2001* are:

- the dwarf sawfish (*Pristis clavata*) which is not listed in the Checklist of Darwin Harbour fishes (Larson & Williams 1997) and therefore could be considered unlikely to be present adjacent the DCWR area; and
- the Queensland grouper and the estuary rock cod, which may utilise the wharf structures adjacent to the DCWR area as habitat, as discussed above.

Whilst it is anticipated that most of the wharf structures will be retained during the DCWR project, it is recognised that potential food chain effects could arise from the release of contaminants during dredging. The potential for these effects to impact upon the protected fish species will need to be taken into consideration during the ecological risk assessment conducted when the dredging requirements of the preferred Master Plan are investigated.

MAGNT considered that the two potentially most serious impacts on the marine environment are:

1. *the release of heavy metals into the food chain during the dredging of Kitchener Bay, noting that it is important to monitor levels of heavy metals being released during and after dredging so that remedial action can be taken quickly;*

Elutriate testing of Kitchener Bay sediments (Appendix C of the Draft EIS) has indicated that the dredging of some sediments in the western and central parts of the bay may release concentrations of lead and zinc which are in excess of the ANZECC & ARMCANZ Water Quality Guidelines (DEIS 6.3.6). Monitoring of metals released during and after dredging can be considered, though the practicality of

applying "remedial action(s)" quickly during dredging is questionable. The large tidal movement of the waters within, and adjacent to, the project area will pose problems in the collection of representative water samples. Experience with other dredging programmes within the harbour indicates that sediments disturbed by dredging form turbulent plumes which align with the current flow at the time but within which the distribution of sediments (and therefore of metals) will not be uniform.

The time required for laboratory analysis of water samples also limits the applicability of such a monitoring programme to drive quick remedial action(s). To align with the principles in the National Ocean Disposal Guidelines for Dredged Material (Environment Australia 2002) it is recommended that dredging and spoil disposal options are defined on the basis of an ecological risk assessment. This may entail further sampling of the sediments in the western and central parts of Kitchener Bay, if any are to be dredged within the preferred Master Plan development.

2. *an increased risk of introduced (exotic) species with the development of marinas, pleasure craft moorings etc.*

The potential for introduction of marine pests is recognised in Section 6.3.6 of the Draft EIS.

MAGNT requested further details of the marine biota survey and provided details of two further publications on the marine biota of Darwin Harbour.

The marine biota sampling was undertaken by URS using a Van Veen grab which typically removed a portion of seabed ~0.12 m^2 in area down to depths of 0.3 m or less. One grab sample was taken at each site, with the entire contents of each grab sieved through 5 mm and 1 mm mesh. Fauna retained on the sieves were fixed in 10% formalin buffered with seawater (soft-bodied fauna such as polychaete worms and fish) or preserved in a 70% ethanol solution (fauna with calcareous exoskeletons, such as crustaceans and echinoderms). Fauna fixed in formalin were transferred to ethanol for preservation within 48 hours.

Fauna were identified to Family level by appropriately qualified URS personnel (Ian Baxter and David Barter) using standard reference texts. The data are included in **Table S-7** below. Site locations and field descriptions of, and particle size distributions within, the sediments are included in Appendix C of the Draft EIS.

The two publications, Larson & Williams (1997) and Russell & Hewitt (2000), have been reviewed and are included in the Section 6 of this EIS Supplement.

Table S-7 Results of Benthic Fauna Survey undertaken for the Draft EIS

	DW REF	DW01	DW02	DW03	DW04	DW05	DW06	DW07	DW08	DW09	DW10	DW11	DW12
Phylum Annelida													
Class Polychaeta													
Terebellidae		3											
Oweniidae			2				4						
Glyceridae			2	2								1	2
Capitellidae	4		4		2	4		2	1				
Nephtyidae			3				2						
Opheliidae			1										
Orbiniidae						2	1						
Nereidae					1								
Onuphidae										1			
Amphinomidae				3						3			6
Spionidae	2			1									3
Nereidae									1	1		2	3
Phylum Crustacea													
Class Malacostraca													
Grapsidae								2					5
Ocypodidae		1	4		1				15				
Geryonidae									8				
Alpheidae								1					
Nephropidae								1					
Suborder Gammaridea			3	3	20		2	1	33	2	1		2
Phylum Mollusca													
Class Gastropoda													
Cerithidae			6		1	3		1					5
Potamididae					1			1			1		
Cypraeidae					1								
Nassariidae			3			2							
Olividae													2
Phylum Mollusca													
Class Bivalvia													
Carditidae		1		4			2	2			1		
Arcidae			2		1								
Tellinidae			4	3	4			1					3
Mytilidae					1				1			1	1
Mactridae						1		1	2				
Veneridae			3	5	4								
Phylum Echinodermata													
Class Ophiuroidea													
Ophioneridae	1			3	1		1	1					
Class Holothuroidea													
Holothuriidae				1			1	1					2
Phylum Chordata													
Class Osteichthyes													
Platycephalidae	1	1											
TOTAL ABUNDANCE	**8**	**6**	**37**	**25**	**38**	**12**	**13**	**15**	**61**	**7**	**3**	**4**	**34**
NO. of TAXA	**4**	**4**	**12**	**9**	**12**	**5**	**7**	**12**	**7**	**4**	**3**	**3**	**11**

MAGNT considered documentation and monitoring of the marine intertidal and subtidal biota to be important for assisting the detection of changes in the marine environment due to increased sedimentation, contamination, etc. It was noted that "As the area is already contaminated at a number of points, this may be a significant factor".

Interestingly, the site with the greatest abundance and diversity of benthic fauna (Site DW08 at the western end of Kitchener Bay) also had the highest concentrations of cadmium, copper, lead and zinc. In some of the replicate sediment samples, concentrations of lead and zinc were in excess of Environment Australia (2002) Maximum Levels (i.e. concentrations at which toxic effects on organisms are probable if the contaminant is in a biologically available form).

These data will be taken into account during the ecological risk assessment conducted when the dredging requirements of the preferred Master Plan are investigated. The efficacy of monitoring benthic fauna to assist in detecting changes due to developments within Kitchener Bay will also be evaluated – the small-scale variability in the distribution of benthic fauna within marine sediments is well documented and a high level of sampling effort is typically required to establish a programme of sufficient statistical power to detect significant change.

DEIS - 5.4.1 Existing Land Uses

PWC clarified the land tenure status of Lot No. 5225 and the infrastructure remaining on the site.

Power Water Corporation discontinued their lease on Lot 5225 in 2003. At this time, Power Water Corporation decommissioned the water tank and removed some items. The majority of the infrastructure at the former Stokes Hill Power Station was removed, except for three disconnected transformers, large underground cooling water inlets, and outlets (and associated pipe work) and underground conduit lines. At this stage, it is unclear if the underground infrastructure will require removal for the development.

Defence stated that the integration of the proposed development with existing uses of the site and Darwin wharves should be addressed.

A key desired outcome of the redevelopment is to maintain Stokes Hill and Fort Hill Wharves as working marine facilities. The proponent acknowledges that this will require integration of the proposed redevelopment with existing uses. This is addressed more fully in a number of areas under "Potential Impacts".

Defence commented that the Draft EIS did not acknowledge the strategic significance of Darwin and its Port to Defence operations.

Darwin and its Port are of primary strategic importance to Defence as a staging site for operations in and from northern Australia, and for Australia's defence. Darwin's location makes it a key site for port logistical support facilities and services for both routine operations and contingency activities. The facilities are particularly important for staging prolonged naval operations and amphibious operations with the Army in northern Australia and offshore. This importance has been heightened with recent world events and the current security climate. The facilities at the Darwin Wharves also support surveillance, border control and fisheries protection activities for the northern region.

It is not intended that the proposed redevelopment disrupt or restrict this strategic capability. The proponent acknowledges that the future use of the Darwin Wharves is fundamental to meeting strategic demands. Defence's strategic requirements have been met through the existing operational infrastructure and procedures at and near the Darwin Wharves. The proponent provides a commitment to consult and collaborate with Defence to ensure that the proposed redevelopment does not lessen the Defence's strategic capabilities or reduce the current flexibility for the servicing and logistical support at the Port, particularly for of re-supply and berthing.

This is discussed in more detail in subsequent sections of the Supplement.

DEIS - 5.4.3 Road Network and Traffic

DCC noted that the Draft EIS should acknowledge and define roads controlled by Council, and that a comprehensive traffic management study was required for all major routes through the CBD.

Darwin City Council controls all roads in and near the Darwin CBD, except for the Stuart Highway and Tiger Brennan Drive, which are controlled by the NT Government.

More detailed assessment of traffic and transport issues will be undertaken once the final Master Plan has been selected. The *Call for Detailed Proposals* for the Master Plan requires the eventual developer to undertake a detailed assessment of traffic and transport issues, including:

- Travel demand;
- Traffic characteristics;
- Impact of specific events on traffic demand;
- Impacts of on-site traffic with public transport options (including links to CBD and feeder bus options);
- Public transport to and from the site (including public buses/taxis/potential sea transport);
- Assessment of public transport interfaces with components of the redevelopment;
- Potential for off-site transfer to parking facilities;
- Pedestrian connections;
- Options for parking meeting demands;
- Linkages and integration of pedestrian/cyclist and public transport facilities; and
- Internal road network and linkages to external network.

Relevant Northern Territory Government departments and Darwin City Council will be consulted once this assessment has been completed to ensure transport planning is coordinated.

Defence questioned the adequacy of the traffic assessment for resupply operations at the Darwin Wharves.

Further information will be gathered to assess this issue through traffic counts during periods of naval ship resupply, and were possible, when multiple ship are berthed at the Darwin Wharves. This has also been noted under DEIS 8.5.6.

DEIS - 5.6 Cultural Environment

OEH noted the need to undertake field work prior to commencing work on site to enable assessment of the potential for areas to contain sites or object of Aboriginal cultural or historical significance. OEH also noted several additional historic places that have not been listed on a register and were not included In the Draft EIS. Three sites near the redevelopment area have recently been nominated to the NT Heritage Register. A map was requested showing all identified features of the cultural environment.

Two identified historic places of note were not included in the Draft EIS. These comprise: the route North Australia Railway (NAR) which led to the base of Stokes Hill Wharf and the Stella Maris Hostel which lies just outside the site along McMinn Street. Three sites near the redevelopment area have recently been nominated to the NT Heritage Register. These comprise Goyder's Camp, Hughes Avenue and the Stella Maris Hostel. If these nominations are accepted, archaeological investigations of the sites will be undertaken by OEH under the *Heritage Protection Act*.

The locations of all identified features of the cultural environment are shown in **Figure S-4.**

Heritage field inspections will be undertaken of the site before works commence to clarify if areas with archaeological elements remain. The arrangements for these inspections are detailed as part of the mitigation measures discussed in DEIS 8.6.

DEIS - 5.7.3 Socio-economic Environment

Defence stated that the Draft EIS did not acknowledge that Defence personnel and activities contribute significantly to the Northern Territory and Darwin economies.

Defence personnel and activities contribute significantly to the Northern Territory and Darwin economies. Defence personnel and families totalling 6.5% of the NT population and Defence salaries amounting to 7.0% of total consumption expenditure in the NT. Defence procurement and outsourced operations support a significant portion of the Darwin and NT business sector and help to maintain the ongoing business and technical capacity of that sector. Further more, visits by domestic and foreign navy ships at the Darwin City Wharves, in close proximity to the Darwin CBD, provide an economic boost to CBD businesses, with the expenditure by visiting navy personnel contributing to the viability of the Darwin business community.

3.2.7 Comments on Section 6 of the Draft EIS - POTENTIAL IMPACTS

DEIS - 6.2.2 Soil Contamination

DHCS questioned whether full details for the remediation of hydrocarbon-contaminated soils would be included in the RAP.

The RAP is being prepared, and will be assessed under, the Victorian Contaminated Land Auditor accreditation scheme and to comply with the National Environment Protection (Assessment of Site Contamination) Measure. The RAP will include all details of all remediation actions required to meet the requirements of the independent Contaminated Land Auditor, including any required remediation of hydrocarbon-contaminated soil.

An amalgamated comment from NT Government agencies sought clarification of the receiving location for hydrocarbon-contaminated soil that is to be removed from the site for remediation. Assurances were required that demonstrate that the receiving location for contaminated soils is appropriate and assessed adequately.

Contaminated soil and other material on the site will be dealt with in two ways (to the satisfaction of the Contaminated Land Auditor).

1. Soils and other material that are determined to pose an unacceptable risk to public health and the environment will be removed from the site.

   Hydrocarbon-contaminated soils can be remediated by natural processes (which can be accelerated with active management) to lower the hydrocarbon content to levels where the soils can later be reused in an appropriate situation (such as specific types of fill). Since preparation of the Draft EIS, the proponent has taken a number of steps to ensure that suitable receiving locations are found for contaminated soil to be removed from the site during remediation. It is recognised that these contaminated soils must be disposed of and/or treated at suitable sites with appropriate facilities. An assessment of potential sites for such disposal/treatment was undertaken in April and May 2004. This assessment identified a location at Hidden Valley for a remediation facility for hydrocarbon-contaminated soils. This site provides suitable physical features to facilitate containment of the contaminants with adequate area to allow accelerated biological breakdown of the hydrocarbons compounds. At the time of preparing the Supplement, engineering designs for the facility were being prepared. These designs will include engineering features to ensure that:

   - The selected bioremediation treatment technique is enhanced;
   - As much as possible, clean surface run-off and groundwater does not come into contact with contaminated material (eg, bunding); and
   - Containment of all contaminated material so that contaminants are not transport off the remediation facility in surface water, groundwater or dust (eg, lining, bunding and leachate collection and control).

This proposal for a remediation facility is being assessed by OEH and other government agencies under the *Environment Assessment Act* and most likely the *Planning Act*, and licensing processes.

Options for disposal of metal-contaminated soil continue to be assessed. Any selected option will be subject to assessment by OEH and other government agencies.

2. Contaminated material that is determined to not pose an unmanageable risk to the public and the environment may be left onsite.

Some contaminated material may be left on-site if it is shown to be stable and ecological and health and safety risks are at acceptable levels. Any such residual contamination that remains on-site after the remediation will be managed under the SMP. This document will define site management controls necessary to provide sufficient protection to human health and the environment. The SMP will be developed to the requirements of the independent Auditor and Northern Territory regulatory agencies.

DEIS - 6.2.4 Groundwater Contamination

Both DIPE and MAGNT commented upon the groundwater contamination and the potential impact of a seawall or marina. DIPE-Natural Systems did not believe that groundwater contamination and its subsequent impact on the external receiving environment would be an issue given the slow rate of groundwater movement across the site, unless either the groundwater or the receiving seawater were impounded by a seawall or marina. They recognised that the impact of a seawall or marina cannot be evaluated until their location or design is known. MAGNT proposed that a separate assessment of these parts of the development (if included) be undertaken as their placement and consequent effects upon the environment and hydrology are as yet unknown.

As indicated by DIPE-Natural Systems, this is recognised in the Draft EIS. There will be a requirement that the selected developer addresses these issues during the engineering design of any seawall or marina which may be included in the preferred Master Plan. The design will be undertaken in consultation with the appropriate Authorities. It is contended that adequate engineering solutions can be implemented to mitigate against the risk of increased migration of contaminants from the groundwater into the marine environment.

The inclusion of a marina and/or a seawall will be determined through the selection of the final Master Plan. The Master Plan will also define the purpose of these structures, if included. If such marine structures are part of the final Master Plan, further assessments will be undertaken if required by government regulators.

Hydrogeological assessment is continuing as part of the current phase of the Contaminated Site Assessment, and this information will be used to review any marina and/or a seawall that may be included in the final Master Plan.

The proponent makes a commitment to consult with relevant agencies, particularly OEH, about the final Master Plan to facilitate the resolution of any outstanding issues about a marina and/or a seawall, if these components are included in the final Master Plan.

DEIS - 6.2.5 Stages of the Redevelopment

DHCS advised that they should be notified by OEH about the EMP for pre-remediation site works, particularly in relation to the removal of existing septic tanks. DHCS also requested an opportunity to review the RAP to assess the adequacy of transport and disposal of material, including asbestos. The Department noted that marine wastewater facilities must be connected to sewer.

Pre-Remediation Site Works

Infrastructure removal within the central 9.2 ha of the site as part of the pre-remediation site works was completed on 16 July 2004. Three septic tanks were removed, with only one remaining on the site near the intersection of the McMinn St and Kitchener Drive.

Remediation of Site Contamination

Review of the RAP by relevant departments has been included in the commitment for consultation noted in DEIS 4.5.

Commercial and Recreational Vessel facilities

The *Call of Detailed Proposal* for the Master Plan specifies that the selected developer most ensure that the entire site is fully sewered. This includes all wastewater from marine vessels.

DEIS - 6.3 Impacts on the Physical Environment

MAGNT commented that the seawall at Cullen Bay appears to have changed some of the sediment flows along the east side of the harbour. It was recognised that this effect is difficult to separate from long-term natural changes within the harbour system. The DCC commented that specific reference is not made to possible erosion, accretion and changes in sand movement as a result of the development.

There will be a requirement that the selected developer addresses coastal sediment transport during the engineering design of any seawall or marina which may be included in the preferred Master Plan. The design will be undertaken in consultation with the required Authorities. This assessment will involve assessment using the accepted hydrodynamic computer model for Darwin Harbour. It is contended that adequate engineering solutions can be implemented to mitigate against the risk of significant unwanted sediment erosion and accretion within, and adjacent to, the DCWR area.

DEIS - 6.3.3 Acid Sulfate Soils

DIPE commented that more detailed assessment of ASS and PASS was required, including information about any on-shore disposal site and the amount of ASS or PASS material present at the project site.

An assessment of the amount of ASSM and PASSM present in and near the site is provided in 5.2.10 above.

It is expected that almost all of the ASSM and PASSM to be disposed of will be uncontaminated. Metal contaminants in the sediments of Kitchener Bay are largely confined to the top 0.5m, whereas PASSM and ASSM occur below this level. Therefore, most of the ASSM and PASSM that is to be removed during the redevelopment will be uncontaminated and can be disposed of subtidally to prevent exposure

to the atmosphere and the initiation of acid forming processes. Any subtidal disposal will be undertaken in full consultation with the Darwin Harbour Dredging Technical Advisory Committee. Any contaminated marine sediments, particularly those contaminated with metals that may be mobilised by acid-generation, is expected to be disposed of to land at an appropriate location. The potential on-shore disposal of any contaminated ASSM or PASSM will be planned in consultation with all relevant government agencies to ensure the selected disposal site is suitable for the purpose. The volumes of ASSM and PASSM requiring disposal cannot be determined until the Master Plan has been finalised. At this time, planning and consultation for any sediment removal and disposal will be undertaken.

OEH requested more detailed information about the implications of ASS and PASS for the proposed project.

Overview

Projects and developments in ASSM risk areas that involve excavation, lowering the water table or compacting saturated soils or sediments and/or laterally displacing previously saturated sediments, resulting in groundwater extrusion and aeration of ASSM, may result in soil, groundwater and/or surface water acidity and the release of metals and precipitates.

Projects and development involving the disturbance of ASSM must assess the risk associated with disturbance through the consideration of both on and off site impacts. A thorough ASS investigation is needed within these areas of disturbance, to provide information on the environmental setting, location and depth to ASSM, existing and potential acidity present in the soil, and soil characteristics.

The impacts these soils have once they partly or completely oxidise include:

1. Economic impacts such as treatment and rehabilitation of contaminated areas;
2. Loss of production through fish kills and customer confidence;
3. Engineering consequences such as blocking and/or impairment of drainage systems, corrosion of infrastructure and uneven settlement of pilings and rafts;
4. Groundwater/surface water contamination;
5. Loss of biodiversity; and
6. Odour problems from exposure of Hydrogen Sulfide.

Potential Impacts of PASSM / AASSM

The following potential impacts may result from excavation, dewatering, stockpiling and dredging:

- Exposure to oxygen of the marine sediment profile, which is the primary location of PASSM/ASSM within the proposed development, may generate acidity (pH <3.5). This will result in a possible lowering of the soil, surface and groundwater pH as well as the mobilisation of metal contaminants.

- Dewatering or drainage poses a high risk to adjacent *in-situ* PASS and these soils will require remediation if oxidation of iron sulfides takes place. The scale of the dewatering or drainage and the size of any potentially acid generating material would typically be defined by the size of the dewatering cone of depression.

- The reaction of the generated acidity with the soil may bring about a permanent change to the soil structure, which can cause the soil to shrink to up to 50 % of its volume. The net result is that soil surface elevations may vary with time and will be a significant factor in the settling and movement of infrastructure.

- Ideally, ASS in areas or adjacent to the habitat of particularly sensitive protected species should not be disturbed. Mildly aquatic environments occur naturally in some coastal areas and treatment by neutralisation may impact on these if incorrectly administered. (See provision of State Legislation of the *Environmental Protection Act 1994)*

- The rate of oxidation of the PASS to AASS is critical to its management, since it determines the persistence and magnitude of the acidic outflows. Even in present-day, undrained mangrove communities, oxidation of newly formed sulfides to sulfuric acid occurs at very low tide, although the acid is neutralised by the subsequent high tide. Therefore the length of time that stockpiled PASS/AASS material is left untreated is critical.

- Movement of stockpiled material increases the risk of underestimating the liming requirements as the soil horizons become mixed. Mixing of this material with the sandy/silty gravely fill, which overlies the marine sediments of the proposed redevelopment site, will increase oxidation conditions and significant quantities of acid can build up in these porous stockpiles. Onsite reburial and/or immediate return needs to be integrated into the management plan.

- Excavation/stockpiling activities progressing through the wet season will incur added risks in groundwater/surface water contamination through leachate from onsite stockpiled or exposed PASSM/AASSM. Movement of this water into the marine environment, via the aquifer, causes possible precipitation of ferric hydroxide/oxides. Iron rich water can cause blocking of drains, pumps and water wells.

- AASSM corrode steel, aluminium and concrete. Metals such as iron and aluminium are quickly corroded in acidic solutions. Aluminium boats are chemically attacked by acidic waters and many ASS are gel-like with low load bearing capacity. As a consequence, foundations or earthworks built on this material may settle or subside unevenly. Such an event can be preceded by material that is reburied but not treated sufficiently.

- Dewatering and excavation may release a large amount of Hydrogen Sulfide gas from groundwater. This gas may reach toxic levels within excavations and in confined spaces.

It is therefore expected that PASSM/AASSM management will be proposed using best practice management in accordance with the *Western Australian State Strategy for Managing Acid Sulfate Soils (Draft) (2003)* and by management strategies proposed by URS Australia.

DEIS - 6.3.4 Hydrogeology

OEH requested clarification of potential impacts of coastal activities and structures, such as a marina, revetment, sea wall, reclamation and dredging) on groundwater movement and the potential for transport and discharge of contaminants to the marine environment and elsewhere.

This is dealt with in DEIS 6.2.4 (Groundwater Contamination).

DEIS - 6.3.5 Hydrology And Surface Water

DIPE questioned whether surface water issues had been addressed sufficiently, particularly with regard to the mapping of the stormwater catchment flowing to the site from the CBD and an assessment of the implications of seepage discharging to the surface of the site.

Stormwater flows from the CBD may contain nutrients from fertilizer use on lawns and gardens in the southern CBD. The *Call for Detailed Proposals* for the Master Plan noted that the eventual developer will be responsible for collecting all surface flows through the site and ensuring that the volume and quality of those flows are managed appropriately and that their quality is satisfactory before discharge to the harbour. Specifically, the developer will be required to assess the current and future expected volumes of discharge from the fully developed Civic Precinct and neighbouring residential areas. The Developer will be required to collect all stormwater flows from the escarpment and provide all necessary cut off drains and connections to the existing stormwater drainage system.

DCC stormwater drainage plans for the southern CBD are shown in Appendix 5. These and the original plan drawings were reviewed in the preparation of the catchment map shown in the Draft EIS. The delineation of the sub-catchments shown in the Draft EIS map, including those above the escarpment, was determined from this information

Seepage from the escarpment may be from a number of sources including natural infiltration during the Wet season, infiltration of irrigation water on parks and gardens and release of water from air-conditioning units. The latter was believed to be the primary source (from the Supreme Court building) of seepage into Oil Storage Tunnel No. 6 in the mid 1990s (Peter Jolly, pers. com.). This seepage was entering the tunnel from a spring that fed into a crack in the wall. This outflow was collected in a pipe and drained to stormwater. Groundwater discharging at the base of the escarpment is collected in a drain along Kitchener Drive at the base of the escarpment. As noted above, the eventual developer will be responsible for appropriate management of any surface flows through the site (whether from upstream surface flows or groundwater discharge).

DEIS - 6.3.6 Marine Environment

OEH requested an explanation of assessment potential impacts from possible components on desirability of Master Plan options, particularly reclamation, dredging and marine structure.

Technical information was provided to potential developers in February and May 2004 to guide the design for the Master Plan proposals.

OEH required clarification of the assessment studies required to fully understand the potential impacts associated with the proposed dredging, changes to tidal regime and any reclamation works.

There will be a requirement that the selected developer undertakes adequate assessment studies (to the satisfaction of OEH) to assess these potential impacts. The specific studies required cannot be articulated until the preferred Master Plan is selected. As indicated under DEIS 6.2.4 above, the design of marine structures will be undertaken in consultation with the appropriate Authorities.

Hydrodynamic modelling of Kitchener Bay will be fundamental to assessing the potential impacts arising from dredging, land reclamation and the construction of marine structures. The existing DIPE model will be reviewed to ascertain whether it is of sufficiently fine detail to provide the necessary assessments. If it found to be less than adequate, then smaller-scale hydrodynamic modelling of Kitchener Bay will be undertaken. This modelling, and the assessment of impacts arising from the aforementioned construction activities, will be undertaken prior to the commencement of any of these activities.

As detailed in the Draft EIS, if dredging of parts of Kitchener Bay is required as a part of the DCWR then a Dredging Management Plan will be developed to minimise the potential for adverse environmental impacts. This will be developed in consultation with the Darwin Harbour Dredging Technical Advisory Committee and submitted to OEH for approval prior to the commencement of any dredging works.

OEH called for an assessment of the impact of possible coastal activities and structures, such as a marina, revetment, sea wall, reclamation and dredging) on tidal movements. DCC commented that that the Draft EIS did not adequately considered the implications of the possible foreshore and marine structures such as a marina and seawall.

The Draft EIS was prepared by consideration of the Concept Plan for the redevelopment. The details of specific features of the redevelopment will be determined when the final Master Plan is selected. If major marine and foreshore structures are part of the final Master Plan, further assessments will be undertaken if required by government regulators. If such structures are included, the selected developer will undertake assessment to facilitate the preparation of engineering designs and to identify the need for any engineering solutions to mitigate any potential environmental risks.

Commercial and Recreational Vessel Facilities – Spillages (page 6-16)

Defence noted that consultation with their organisation would have provided additional clarification for this section.

It is noted that all fuel transfers at the Darwin wharves are currently conducted in accordance with the requirements laid down by the Darwin Port Corporation and relevant legislation.

6.3.7 Noise

OEH commented that potential noise impacts associated with the construction of this site has not been addressed adequately.

The number and frequency of heavy and light road vehicles passing existing residential and commercial premises is likely to increase during construction. Measures to mitigate the impacts of construction noise (from direct construction activities and traffic) are described under DEIS 8.5.4.

Further survey work will be carried out while naval vessels are present at the Darwin Wharves, particularly in relation to likely future residential sites. The noise surveys will be timed to coincide with heightened activity at Fort Hill Wharf and/or the Iron Ore Wharf.

6.3.8 Air Quality

OEH noted the need to clarify potential impacts to the redevelopment from odour and air emissions and recommended that suitable guidelines be considered and dispersion modelling of fugitive emissions from the NFI undertaken.

The proponent has committed to undertaken modelling of release and dispersion of fugitive emission from the NFI and refuelling operations at Fort Hill Wharf.

Modelling of the emission types and rates from the NFI tanks will be based on the characteristics of F76 diesel (to characterise the volatile emissions) and the throughput and engineering structure of the tanks. A model such as TANKS (used by the USEPA) will be used to determine the rate of release of the emissions. Modelling of the dispersion of those emissions will be carried out with a model such as AUSPLUME. Although simpler than other dispersion modelling, AUSPLUME is considered more appropriate for the DCW site because of:

- The low elevation of the tanks and emission;
- The volatile nature of the expected emissions;
- The local scale of future sensitive land uses (compared to regional air quality modelling); and
- Darwin's meteorological conditions.

Appropriate air quality guidelines will be considered as part of this modelling process. Modelling for the Iron Ore Wharf is not proposed because of the likely decommissioning of that structure within the timeframe of the development of the Fort Hill area.

Modelling will be carried out once the Master Plan has been selected and is expected to be completed within two months. The information from the modelling will be used in the finalization of the Master Plan.

On-ground monitoring is not considered necessary for the modelling because the source is known and readily characterised. This modelling could be done before the Master Plan is finalised and applied later.

DEIS - 6.4.1 Vegetation and Weeds

OEH noted that the existing weed infestations have the potential to cause weed infestation on and off site.

It is acknowledged that the weed infestations across the project site are sources of seed which may cause weed infestation on and off the site unless appropriate measures are implemented. This has been addressed in the Construction EMP

DEIS - 6.4.3 Marine Ecology

Contamination and Acid Generation

MAGNT comments that the ways in which ASS leachate and contaminants may bond, flocculate or remain in the marine environment have not been addressed. They also note that monitoring of mobilised pollutants is not mentioned.

Further discussion of ASS and potential acid leachate containing contaminant is shown in DIES 5.2.10, 6.3.3 and 8.2.6.

Marine Pests and Aquatic Pathogens

MAGNT commented that the construction of a marina is likely to increase the probability of an exotic species being introduced, not the reverse.

The Draft EIS indicates that it is the inspection of vessels arriving in Darwin Harbour by Customs and AQIS officers that reduces the potential for the introduction of marine pest species. It is further stated that the construction of marina facilities as a part of the DCWR is considered unlikely to significantly increase the risk of marine pest introductions, given the existing marine facilities adjacent the harbour and the diversity of vessel arriving into the harbour.

6.5.1 Changes to Existing Built Environment

DHCS advised that septic tanks and on-site disposal of wastewater will not be allowed due to the proximity to the harbour, and all developments must to be connected to sewer.

The *Call for Detailed Proposals* for the Master Plan requires the selected developer construct a reticulated sewerage system for the redevelopment site. No septic tanks and on-site disposal of wastewater will be allowed.

DEIS - 6.5.4 Traffic Roads and Public Transport

PFES noted the potential increase in heavy traffic on weekdays with impacts on demands for police traffic control services.

The potential for increased demand for police traffic control services is addressed under DEIS 6.7.3.

DIPE commented that although the traffic assessment had been done in consultation with the relevant Division, traffic scenarios will need to be verified once the Master Plan finalized. DCC concurred with this conclusion.

The traffic assessment undertaken for the Draft EIS considered the Concept Plan for the redevelopment, and therefore could not address any detail of the eventual development. More detailed assessment will be undertaken once the final Master Plan has been selected. The *Call for Detailed Proposals* for the Master Plan requires the eventual developer to undertake a detailed assessment of traffic and transport issues, including:

- Travel demand;

- Traffic characteristics;
- Impact of specific events on traffic demand;
- Impacts of on-site traffic with public transport options (including links to CBD and feeder bus options);
- Public transport to and from the site (including public buses/taxis/potential sea transport);
- Assessment of public transport interfaces with components of the redevelopment;
- Potential for off-site transfer to parking facilities;
- Pedestrian connections
- Options for parking meeting demands;
- Linkages and integration of pedestrian/cyclist and public transport facilities; and
- Internal road network and linkages to external network.

Once these traffic assessments have been completed by the developer, the Northern Territory Government will undertake a review of previous CBD traffic/transportation studies to establish the external impacts of the proposals.

DCC highlighted that the Draft EIS did not identify Council controlled roads. It also did not acknowledge the increased traffic on these roads or the effects on the levels of service at several other intersections into and through the CBD.

In and near the Darwin CBD, the NT Government controls the Stuart Highway and Tiger Brennan Drive. Darwin City Council controls all other roads in this area. As noted above, the traffic assessment undertaken for the Draft EIS consider the Concept Plan for the redevelopment, and therefore could not address any detail of the eventual development. Nonetheless, the traffic specialist engaged for the Draft EIS noted that the general impact of traffic generation on the CBD is expected to be minimal. Key inflow points to the CBD in the vicinity of the DCW (McMinn Street and Tiger Brennan Drive) were assessed in the Draft EIS. The redevelopment provides an opportunity to establish alternative means of transport particularly for residents of the DCW. The emphasis in the *Call for Detailed Proposals* for the Master Plan placed on integration between the redevelopment and the CDB.

The traffic specialist noted that several issues remained to be resolved (Andrew Leedham, pers. com.), including:

- Implication from any potential DCW-related parking facilities (e.g., for the DCEC) being located in the CBD;
- A possible public transport shuttle service from the southern CBD to the DCW;

- The need for the extension of existing routes and services; and
- Pedestrian access between the CBD and the DCW, and potential implications for pedestrian crossing of Bennett St at the Smith Street Mall
- Clarification of any potential effects on the levels of service at intersections into and through the southern CBD.

These details cannot be assessed until the Master Plan has been finalised.

More detailed assessment will be undertaken once the final Master Plan has been selected. This assessment will consider issues relevant to Council Controlled roads in the area.

DCC raised concern over potential damage to roads during construction and remediation activities. DCC sought an assurance that the condition of roads would be documented condition prior to works and any impacts assessed during works.

The *Call for Detailed Proposals* for the Master Plan places an obligation on the eventual developer to undertake an assessment of the visible conditions of haulage roads to be used during construction. All haulage roads will be returned to their pre-development visual condition or compensation will be paid to the appropriate Authority (DIPE or DCC) for damage to roads resulting from the development construction phase.

DCC also noted the need for haulage trucks to secure loads to avoid spills and minimise dust.

The Construction EMP will ensure that all material is transported appropriately to and from the site. Haulage trucks will have their loads secured. This will be particularly important during the remediation of the site, and particular attention will be paid to this issues in the RAP.

Defence stated that use of the secure staging area near Fort Hill Wharf will required the movement of heavy machinery through the DCW site, such as low loaders carrying armoured vehicles, and trucks carrying personnel, equipment and supplies. This may have impacts on other road users and residents.

The proponent acknowledges that the use of the staging area will require suitable access through the redevelopment site for heavy vehicles. The requirements for vehicle access, including the frequency, timing and intensity, will be considered in the finalisation of the Master Plan. The Northern Territory Government has stated its commitment to maintaining the DCW area as a working maritime precinct. This has been reflected in the criteria for assessing the Master Plan proposals.

Defence also stated that it considered the traffic estimates in the Draft EIS were too low to have included the logistics of supporting multiple ship visits or major operational loading periods.

The developer of the selected Master Plan will be required to carry out a detailed assessment of traffic and transport at the DCW site and demonstrate that the Master Plan will accommodate current and future transport needs. This assessment will clarify and incorporate Defence requirements. The Northern Territory Government has given a commitment and has placed an obligation on the eventual developer to

meet all traffic and transport requirements for existing (as well as future) users of the DCW site and the Darwin Wharves.

DEIS - 6.6 Impacts on the Cultural Environment

OEH commented that the potential impacts on all 24 heritage sites (including the additional two sites noted in DEIS *5.6 above) should be considered. This should also recognise that adverse impact can occur from loss of context and setting, as well as damage or loss, particularly for Government House.*

The Draft EIS stated damage to or loss of significant sites and structures was the primary potential impact. However, adverse impacts on heritage features can also result from the loss of context and setting for a site. In this way, the heritage setting of Government House may be affected by the redevelopment altering the views from and to the building.

Government House was built in the 1870s as a prominent and highly recognisable landmark structure overlooking Darwin Harbour. Without sympathetic planning and design, the redevelopment has the potential to disturb the setting and context of this significant building.

A key obligation on potential developers has been that Master Plan proposals reflect, enhance and utilise the heritage features in and near the site. It is expected that Government House will be a primary focal point for European heritage for the redevelopment and will seek to mitigate any adverse impacts. This can only be assessed once the final Master Plan has been finalised.

Similarly, the heritage setting of the other heritage features within and near the redevelopment site is recognized. The *Call for Detailed Proposals* for the Master Plan notes the variety and significance of heritage features within the site and seeks to ensure the final Master Plan utilises the opportunities those features offer. In particular, potential developers must ensure that their proposals "reflect the cultural heritage and history of this unique site". It is expected that the heritage themes of the site, particularly the World War II history, will be features in the final Master Plan. This will ensure that the appropriate context and setting are maintained.

Of the 24 heritage sites and features noted in the Draft EIS and in this Supplement, the Stokes Hill Sacred Site and the Steam Pump House have formal protection. An area including the Steam Pump House has been excluded from the redevelopment site and this feature will be retained as a heritage focal point. The Stokes Hill Sacred Site is protected under the *Northern Territory Aboriginal Sacred Sites Act* 2000. The portion of the Sacred Site within the redevelopment area is noted as a Restricted Work Area with no excavation allowed, and no other works can be undertaken without the formal approval of senior Aboriginal custodians for the site. The other nearby in the vicinity of Lameroo Beach lies outside the redevelopment and is not expected to be adversely affected.

The redevelopment is not expected to adverse impacts on several heritage sites outside the redevelopment area. On the contrary, the redevelopment may provide an opportunity to enhance the interpretation and appreciation of these features by increasing the number of people passing them as they move between the redevelopment and the CBD. These sites include:

- Sites along Smith Street (Town Hall Ruins, Browns Mart, Smith Street stone kerbing, Christ Church portico and the Former Court House and Police Station);
- Access ways between the CBD and the redevelopment (Traveller's Walk and Hughes Avenue); and
- Major heritage features on the edge of the site (Government House and the Oil Storage Tunnels).

The utilisation and management of several sites has not been clarified and will only be determined once the Master Plan has been finalised. These sites include:

- Submarine Cable landing point;
- The two tamarind trees near the old port office;
- Goyder's Camp;
- Goyder Memorial;
- Boom Maintenance Shed;
- Knight's Folly;
- Kitchener Drive; and
- The former Stella Maris hostel.

Two of these sites (Goyder's Camp and the Stella Maris Hostel) and Hughes Avenue have been nominated recently to the NT Heritage Register. If these nominations are successful, archaeological investigations of the sites would be undertaken as a requirement under the *Heritage Conservation Act*. In addition, an archaeological investigation of Knight's Folly has been commenced by Charles Darwin University.

Three heritage features are currently not visible: the *Warrego* wreck, the MV *Neptuna* and the route of the North Australia Railway). The management of these sites has not been clarified and will only be determined once the Master Plan has been finalized.

One of the sites noted in the Draft EIS has been relocated since preparation of the document. The Burnett design "G" type house that was located near the intersection of McMinn Street and Kitchener Drive has been removed for use at a site in Berrimah. The Draft EIS notes that heritage significance of this building was limited because it had been previously moved from its original location in Larrakeyah in the early 1990s. As the heritage assessment appended to the Draft EIS states, its relocation effectively diminished its historic links and context and in turn its heritage significance".

DEIS - 6.7 Impacts on Socio-economic Environment

Darwin City Council suggested that construction noise (including traffic) outside reasonable times has not been considered in the Preliminary Hazard Analysis.

A Preliminary Hazard Analysis will be completed by the Remediation Contractor and the selected developer during formulation of the Remediation Action Plan and finalisation of the Master Plan. This will need to include assessments of noise generators (construction equipment, construction activities and traffic), distance to sensitive noise receivers (restaurants, deck chair cinema and local residents) and their respective hours of operation. This will be used to estimate the potential social and economic impacts from noise generation on these sensitive noise receivers.

The results of this Preliminary Hazard Analysis will be used by the Remediation Contractor and selected developer during the development of the Remediation Action Plan (RAP) and Construction Environmental Management Plan (CEMP) to minimise the impact from noise generation on the sensitive noise receivers and the surrounding environment. The CEMP will be required to include targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and timeframes and contingency plans. The CEMP will require approval from Office of Environment and Heritage prior to commencement of works at the DCW site.

Darwin City Council suggested that impacts on the character and viability of the CBD have not been addressed adequately

The *Call for Detailed Proposals* requires the Master Plan to demonstrate that the redevelopment will encourage people to participate in a broad range of features, and facilitate that participation with ready access for both day and night time activities. The redevelopment will transform this disused industrial landscape into a vibrant social and commercial focal point. Potential developers preparing Master Plan proposals have been required to ensure their layout and design achieves connectivity with the CDB by both pedestrian and vehicle routes. The redevelopment aims to attract more people to Darwin and to the CBD by establishing a broad mix of activities and making the site a living precinct in direct connection with the CBD

At present, the DCW area is an unsightly mix of disused (or soon to be disused) industrial and vacant land that offers little attraction to visitors nor provides any positive visual amenity from the primary vantage points of the harbour and the CBD escarpment. By replacing this with an active precinct in close proximity to the CBD, the redevelopment will enhancement of the Darwin city environs and the viability of the CBD.

DEIS - 6.7.6 Defence Use of the Darwin Wharves (Additional section not in Draft EIS)

The Defence submission on the Draft EIS contained a broad range of concerns , particularly about the range of future uses of the Darwin Wharves and existing infrastructure in the area. The key Defence concern was the potential to limit future operational use of the existing wharves, with consequent restrictions of operational and contingency capability and responsiveness. The expected loss of bulk fuel off-loading was of particular concern.

The proponent acknowledges the strategic importance to Defence of Darwin and its Port as a staging site for operations in and from northern Australia, and for Australia's defence. Darwin's location makes it a key site for port logistical support facilities and services for both routine operations and contingency activities. The future use of the Port of Darwin, including the Darwin Wharves, is fundamental to

meeting strategic demands. However, the Northern Territory Government does not accept that Port services should continue to operate as they have in the past.

The Northern Territory Government has implemented long-term planning for the Port of Darwin by constructing new wharf and industrial facilities at East Arm. Industrial activities at the Darwin wharves are being progressively relocated to a more appropriate and larger industrial site at East Arm, freeing up the land adjacent to the Darwin wharves for expansion of the city.

The servicing and logistical support infrastructure at the Darwin Wharves will be either:

- Unaffected by the DCW redevelopment;
- Subject to negotiations outside the scope of the EIS process; or
- Capable of being met by alternative means.

Issues Unlikely to be affected by the Redevelopment

A number of current port activities under taken by Defence will continue for some time, regardless of the DCW redevelopment. The Northern Territory Government has noted its wish that naval vessels continue to use the Darwin Wharves. Defence access to Fort Hill Wharf has been reaffirmed

The Defence submission on the Draft EIS raised a number of concerns about the use of Port facilities and the potential for the proposed redevelopment to limit Defence's strategic capability in Australia's northern region. The Northern Territory Government has noted previously that it will continue to honour the Deed of Licence for Use of the Darwin Port (for 15 years from 24 June 2003) with Defence and the following activities will not be affected by the redevelopment:

- Berthing at Fort Hill Wharf;
- Loading and deployment of Defence equipment, including equipment needed for amphibious operations and loaded via the Ro-Ro facility at Fort Hill Wharf;
- An area of approximately 7,500m^2 of land in close proximity to Fort Hill Wharf, either singularly or severally, for use by the military for assembly of cargoes including supplies and equipment from time to time;
- Continued proximity of berths to Defence facilities for ammunition storage, logistics support and training;
- Most alongside services, including reprovisioning of the necessary wide range of stores, water and power, and waste discharge (e.g. sullage, dirty water/oil, quarantine items); and
- Access to onshore amenities.

Several of the facilities required for these activities were specifically excluded from the redevelopment site to minimise any incompatibility in land uses.

Coordination of Defence and Redevelopment Planning

It is recognised that any lack of integration and coordination between the final design and layout for the DCW redevelopment and the ongoing use of the Darwin Wharves by Defence (as well as other users) have the potential to create land use incompatibilities. Such incompatibilities could effect the options for the redevelopment, the flexibility and capacity for Defence activities, or both. Options are being sought by the proponent to resolve a number of issues and the related risks for the redevelopment, Defence and other port users through high-level discussions with Defence and consultation with other users.

Several issues could also be addressed by integration and coordination of planning by Defence and the proponent, particularly about the staging of implementation of infrastructure developments and operational changes. Staging of the implementation of the redevelopment has been planned in general terms. Stage 1 of the redevelopment will occur on the central 9.2 ha of the site and include the construction of the DCEC and public use infrastructure such as the waterside promenade. Construction for this Stage is expected to start in early 2005. The Fort Hill area is expected to be developed later in the project and is expected to include medium- to high-density residential buildings near Fort Hill Wharf and the Iron Ore Wharf. Construction activities are not expected before 2008.

Use of the Iron Ore Wharf by Defence

The proponent recognises that the Iron Ore Wharf is significant to Defence by providing bulk fuel off-loading capacity from sea-tankers and additional berthing space, and allowing refuelling at more than one berth.

The Iron Ore Wharf is approaching the end of its operational life and would require significant refurbishment for continued operation after 2005 to ensure its structural integrity and the adequacy of spill prevention and fire suppression equipment.

Bulk Fuel Off-Loading at the Iron Ore Wharf

Defence considers the maintenance of fuel off-loading facilities at the Iron Ore Wharf as a key strategic capability for ease of supply to the NFI and facilitating storage of contingency reserves at the NFI. Defence has stated that it has no strategic requirement to develop new naval facilities in Darwin in the next 15-20 years, and is seeking to continue to use the existing infrastructure and operations for at least that time.

Although both the NFI and the Iron Ore Wharf (which is a Northern Territory asset) lie outside the site, continued bulk fuel transfers between them have major implications for the redevelopment, particularly in the Fort Hill area. Defence receives an average of four bulk fuel deliveries by sea tanker occur each year at the Iron Ore Wharf for transfer to the NFI and uses approximately 35 megalitres of fuel per year.

The proponent recognises Defence's requirements to maintain access to fuel (F76 diesel) and adequate storage facilities to meet fluctuating general demands as well as peak demands from unusual circumstances. However, the NT Government (as the land owner) has sought to have bulk fuel off-loading cease at the Darwin Wharves and alternative methods of supply adopted to allow the full potential of the Fort Hill area to be realised. The Northern Territory Government has advised Defence that, beyond

the short-term, bulk fuel discharge at Iron Ore Wharf is not compatible with the proposed DCW redevelopment and the broader planning for fuel management in the Port of Darwin. The Iron Ore Wharf is coming to the end of its useful life and lacks modern-day safety provisions. It is appropriate that tanker discharge operations move to the new facilities being established at East Arm which include a tanker berth and high capacity fuel lines to a modern fuel terminal incorporating state of the art safety systems.

The primary, though remote, risk from bulk fuel offloading is an ignited major fuel spill (2,000m^3 or 2 megalitres) resulting from a ship to ship or ship to berth collision. Initial non risk-based analyses of such an event without any mitigation measures in place has indicated that impacts would be significant up to approximately 448 m from the Iron Ore Wharf. A more detailed risk based study, which was commissioned by Defence, indicates that a safety template of 300 m or less would be appropriate providing various mitigation measures are implemented such as:

- Targeted engineering improvements to the Iron Ore Wharf;
- Upgraded spill prevention and fire suppression equipment;
- Implementation of improved management procedures; and
- Acquisition of two more powerful tugs for the port planned in 2006.

Cessation of Bulk Fuel Off-loading

If bulk fuel offloading operations cease at the Iron Ore Wharf (either from decommissioning of the Wharf or changes to the operations considered acceptable at it) prior to the redevelopment of the Fort Hill area, the redevelopment would not be affected by this issue.

Under current operations, Defence has an average of four bulk fuel deliveries by sea-tanker each year through the Iron Ore Wharf. Cessation of fuel-offloading operations at the Wharf would require Defence to develop alternative means of resupplying the NFI and consider alternative options for berthing and refuelling vessels when several ships are at berth at the Darwin Wharves. The Defence document *Strategic Importance to Defence of Darwin Port Infrastructure* acknowledges that Defence is considering fuel supply options when the Iron Ore Wharf is decommissioned. Alternatives may include delivery from the Joint User Terminal at East Arm Port to the NFI by road tanker (equivalent to approximately one to two v-double road tankers per day), a bunker vessel (not a fuel barge as stated in the Defence submission) or a under harbour pipeline from the Joint User Terminal to the NFI. The use of a bunker vessel could also increase the flexibility and responsiveness of Defence's refuelling capability by allowing refuelling of ships at anchor, increasing the number of refuelling sites (when berthing space is not available at the Port) and facilitating fuel delivery to Darwin Naval Base.

Contingency Fuel Requirements

Darwin facilities provide a strategic reserve for F76 diesel suitable for navy vessels for ongoing operations as well as contingencies. The maintenance of this reserve can be achieved in a number of ways other than by resupply from the Iron Ore Wharf. In particular, contingency requirements could be maintained by management of the NFI to hold one or more tanks in store.

Naval Fuel Installation

The proponent recognises the strategic importance of the NFI under current infrastructure and operational conditions, and the NT Government has not sought its decommissioning in the foreseeable future. Its presence on Stokes Hill require a minimum safety distance of 50 m to comply with Australian and international standards. The layout of the redevelopment on the former Stokes Hill power station site will be designed with this in mind.

Fuel delivery to Darwin Naval Base is by road tanker from the NFI. This can be continued in the future regardless of the fate of the Iron Ore Wharf.

Refuelling at the Darwin Wharves

Fuel can be supplied to all three existing wharves for refuelling, using pipelines owned by Darwin Port Corporation and Defence. The structural integrity of Stokes Hill Wharf is inadequate for large ships, and navy vessels and cruise ships are not refuelled at this wharf. Currently, cruise ships do not refuel at any of the wharves in the Darwin Wharves. A locally-based cruise ship is expected to commence operations at the end of 2004 and require refuelling with (non defence standard) diesel from Fort Hill Wharf. The vessel is expected to visit the Darwin Wharves about 20 times in the 12 months from October 2004. This may create some competition with Defence for refuelling facilities. It should be noted that this cruise ship does not use F76 (Defence standard) diesel. Currently, no plans have been developed to facilitate refuelling of cruise ships.

The proponent recognises that Defence own some of the Stokes Hill Wharf pipelines. However, the wharves are outside the redevelopment site and any infrastructure changes on the wharves are not part of the present project.

Consultation

Defence stated that consultation about the proposed redevelopment has been inadequate and sought "further meaningful consultation".

The Northern Territory Government has sought to initiate consultation about the DCW redevelopment on a number of occasions and for a range of purposes. In particular, the Government has tried to resolve the issues about bulk fuel delivery and the future of the Iron Ore Wharf. The complexity of these issues has not allowed a resolution to be achieved. Indeed, on some occasions the nature of the more strategic issues has limited the opportunities for open consultation. However, the Government maintains a commitment to consult with Defence to resolve issues. Consultation will continue and focus on the key issues noted in this Supplement.

Security

Defence commented that the increased security measures required under the Maritime Transport Security Act *2003 may result in restricted access for people to sections of Fort Hill Wharf and vessels entering Kitchener Bay.*

The proponent acknowledges the increased port security measures being introduced at the Port of Darwin and throughout Australia. The potential restrictions on public access to wharf areas noted in the Defence submission is likely to occur regardless of the redevelopment because of the heightened security arrangements required by international standards and Commonwealth legislation.

Port security is a generic management issue and must be addressed by port managers and all port users. Furthermore, it is a developing issue because of the recent changes in requirements for security at ports. Darwin Port Corporation has prepared the Port Security Plan for the Darwin Wharves to ensure that security standards of the Port meet international standards. This security plan has been finalised, but several on-ground actions remain outstanding such as new fencing from Fort Hill Wharf to the Iron Ore Wharf and the installation of closed circuit television monitoring system.

The continued implementation of the new security standards and measures will require cooperation and coordination between the Darwin Port Corporation and port users. Notwithstanding the heightened requirements for Defence, security measures for cruise ships and navy vessels share some common features, and adequate planning would allow measures adopted for each to augment and complement each other.

The security concerns raised by Defence, including the management of vessels entering Kitchener Bay, would be best addressed through a management approach based on a security working group including Darwin Port Corporation, Defence and the Northern Territory Government through DCW management. This would best be undertaken once the Master Plan has been finalised.

3.2.8 Comments on Section 7 of the Draft EIS - PRELIMINARY HAZARD ANALYSIS

DEIS 7 – Preliminary Hazard Analysis

OEH request clarification of how the recommendations in the Preliminary Hazard Analysis would be implemented.

Further risk assessment will be undertaken by the selected developer once the Master Plan for the redevelopment is finalised. This is a requirement of from the *Call for Detailed Proposals*. The details of the Master Plan will be used as the basis of this assessment.

The recommendations from the Preliminary Hazard Analysis will be incorporated into the various management plans for the project, particularly the Construction and Operational EMPs.

DEIS 7 - Public Safety Hazards

OEH has made a number of suggestions and comments:

- *clarification of information regarding safety hazards from the development, particularly storage, transfer and offloading of fuels and other hazardous materials.*

- *suggestion that the EIS is unclear when considering future adjacent land uses and current land uses in the Preliminary Hazard Analysis.*

- *comment that the draft EIS makes reference to the need for further risk assessment to be undertaken once the decision on the final redevelopment of the site has been made. It is suggested that an outline of the studies to be undertaken, their timing and how these are to inform site design should be included.*

- *suggestion that a description is included of how the Recommendations outlined in Section 7 of the EIS are to be implemented.*

The hazard analysis in the EIS includes activities that are likely to occur during construction, commissioning and operation of the development. The risks during construction and operation of the DCW site have been included.

The possibility of spills during fuel storage, transfer and offloading activities is considered unlikely and are expected to continue during the construction and during operation of the DCW site. It is acknowledged that the fuel handling operations could have major consequences in both their current form and after the development. Accordingly this has been rated 'high risk'.

The possibility of a major fire and/or explosion involving the fuel handling operations, including the NFI, is considered rare both currently as well as during the construction and during operation of the DCW site. It is acknowledged that a major fire and/or explosion would have major consequences in both their current form and after the development. Accordingly this has been rated 'high risk'.

More detailed risk assessments will be undertaken by the selected developer during finalisation of the Master Plan. These assessments will include a gaps analysis for risk assessment. This gaps analysis will identify and describe the requirements and timing for further risk assessment studies that need to be undertaken. The recommendations of these further risk assessment will be incorporated into the final Master Plan for the DCW site. Recommendations are expected to include:

- Identifying areas at the site that are not acceptable for particular land uses (e.g. residential land use) due to the identified potential risks (e.g. fire and/or explosion).

- Identifying engineering controls that should be included in design the and management practices to reduce or remove the identified risks.

The recommendations from the further risk assessments will be incorporated into the relevant management plans for each phase of the project including:

- Risks identified as occurring during remediation stage of the project will be included in the remediation contractor's Health and Safety Plan, remediation contractor's Work Plan and the Remediation Action Plan.

- Risks identified as occurring during construction stage of the project will be included in the construction contractor's Work Plan, construction contractor's Health and Safety Plan, Construction Environmental Management Plan and Site Management Plan.

- Risks identified as occurring during the operational stage of the project will be included in the Operational Environmental Management Plan and the Site Management Plan.

Risks that will remain throughout each of these stages of the development, will be required to be addressed in each of these management plans.

DEIS - 7.2.2 Transport and Traffic

Defence noted two inconsistencies in the assessment of the consequence in the tables for "Heavy Vehicle Accidents causing Damage to Infrastructure" and "Small Vehicle Accidents causing Damage to Infrastructure".

The environmental effects "Heavy Vehicle Accidents causing Damage to Infrastructure" and "Small Vehicle Accidents causing Damage to Infrastructure" were incorrectly rated in the Draft EIS. The environmental effects of these potential events should be are "Moderate" and "Minor", respectively. The overall risk rating for heavy vehicle accidents remains unchanged, however the overall risk rating for small vehicle accidents changes to "Moderate: management attention and integration into management plans required". This has also been noted in the Errata.

DCC noted that noise outside reasonable hours during the construction would be an issue for residents.

Noise during construction activities will be addressed in the Construction EMP.

DEIS - 7.2.3 Storage, Transport and Off-loading of Fuel and Other Hazardous Materials

Safety of Fuel Pipelines

Defence commented that the safety risk from the aboveground fuel pipelines along Kitchener Drive will be greater with the likely increased traffic through the site during construction and operation of the redevelopment.

The hazard (in contrast to the risk of an incident occurring) from the aboveground fuel pipelines along Kitchener Drive was assessed in the Draft EIS by considering the risk of an incident occurring and the consequences of such an incident. The presence of these pipelines presents a risk, however the safety consequences of any incident are minor because of the high ignition point for diesel fuel. In addition, greater protection of the pipelines can be incorporated into the redevelopment to minimise the risk of rupture from a traffic accident or malicious activity. Options include relocating the pipelines underground or installing appropriate guard railing.

Ammunition Transfers

Defence commented that the occasional need to transfer ammunition through the site should be discussed.

Transfer of ammunition usually occurs from specialised barges while vessels are at anchor in the harbour. These operations meet the necessary standards and do not pose a risk to the public. However, in exceptional circumstances, such as periods of conflict, this may be required while vessels are berthed at the wharves. DPC requires such activities to be completed before 8.00 am. At these unusual times, public risk waivers would be required under the Deed of Licence for use of the Port facilities.

DEIS - 7.2.4 Vessel Collision and Grounding

MAGNT indicated that there was no indication of whether a marina would be enclosed by a wall or be a series of jetties built over a dredged harbour that would need regular dredging to keep depth acceptable. It was reiterated that any marina plan would need to have its development and potential impacts assessed separately.

The form of any marina included in the preferred Master Plan will be refined during detailed engineering design. Factors such as the requirement for maintenance dredging will be addressed as a part of the design. As previously stated, the design will be undertaken in consultation with the appropriate Authorities.

DEIS - 7.2.8 Cyclone and Storm Surge

DIPE commented on the adequacy of the adopted design storm surge level and the validity of the storm surge reference site chosen (Frances Bay). DIPE also raised concerns that wave run-up was not adequately accounted for.

DIPE storm surge requirements have been met and an additional 0.3m has been included to account for changes caused by global warming. Additionally, a difference of 0.3 is small compared with the overall uncertainty of the modelling particularly in regard to representative cyclone climatology (Steve Oliver, GEMS, pers. comm.).

The VIPAC storm surge modelling data (used for the Draft EIS) included wave height but not wave run-up. However, the redevelopment will include a vertical or near-vertical sea wall and/or a revetment along foreshore which will minimise wave run-up, in comparison to a beach or a gently sloping foreshore.

The storm surge reference point in Frances Bay was selected as the most appropriate for the project, rather than reference location at Wickham Point. The Frances Bay reference point is the nearest modelled location to the project site and reflects the aspect of the redevelopment site; the storm surge level for the reference point is 6.1m as stated in the Draft EIS. Differences in wave setup at these two reference point is one, and probably the most important, reason for differences between the design level at Francis Bay and Wickham Point. Wave heights affecting Wickham Point would be greater due its (relative) vulnerability to wave propagating into the harbour in conjunction with the worst case surge event (cyclone to west with strong NW winds into the harbour). The development location is less exposed to such waves. The largest waves affecting this location would be from the west-southwest after any cyclone had crossed the coast (and begun weakening). In addition, these waves are fetch limited across the harbour. In conclusion, the Francis Bay site value is the more representative for the project site (Steve Oliver, GEMS, pers. comm.).

With this rationale, the design criterion of 6.5m AHD for building floors has not been adopted.

DEIS - 7.2.10 Terrorist Attacks

Defence commented that Preliminary Hazard Analysis "did not explore the implications for cruise ship (in particular) berthed at the City wharves". Defence also noted that the Draft EIS did not clarify the arrangements for satisfying the Maritime Transport Security Act.

The hazard analysis gave a generic assessment of the risks from terrorist attack at a multi-use port such as the Darwin Wharves. More detailed assessment would need to be based on the details of any proposed marina in Kitchener Bay. Further discussion of security issues is included in 6.7.6 above. This section notes that implementation of the new port security legislation will best be done through a cooperative approach between Darwin Port Corporation, Defence and the Northern Territory Government as proponent for the redevelopment.

3.2.9 Comments on Section 8 of the Draft EIS - MITIGATION, MANAGEMENT AND MONITORING

DEIS – 8.2.1 Site Contamination - Introduction

OEH requested that Figure 8.1 in the Draft EIS be revised to show milestones in their correct sequence.

The revised Figure is shown as **Figure S-6**.

DEIS - 8.2.3 Soil Remediation

OEH made a number of comments:

- *General fill: Consider also the choice of appropriate plant species e.g. rooting depth, non edible.*
- *Hydrocarbon source: How will areas required to remain undeveloped be identified and how will the proponent ensure they remain undeveloped.*
- *Volatile Hydrocarbons: How will developer requirements be enforced? Consider timing of Site Management Plan in relation to first construction.*
- *Excavation: What protocols will be implemented by the proponent?*
- *Shell Bitumen Plant: "It is understood that Shell commitments …"*
  Define Shell commitments, and how the proponent can be satisfied that Shell will meet its commitments. Indicate the tenure of the Shell site and any conditions attached to the tenure, including the timeframe for release of Shell from its environmental conditions.
  Describe how Shell's activities are currently and will be in future integrated into overall site management.
- *Is the statement "…no special conditions or limitations to use of the site…" realistic?*

Responses to each of these points are provided below.

General Fill

Over the majority of the site there is the need to bring in imported fill to build up the site to the storm surge protection design level of 6.5 m RL. The imported fill will be required to be analysed for potential contaminants prior to placement on the site. This material will be suitable for plant growth and human contact.

There is a widespread fill material across the site, which has contaminant levels, especially heavy metals, which at certain locations are above the adopted Ecological Investigation Levels (EILs). These areas would not expected to be suitable in their present state for sustaining plant growth. In these areas, placing an appropriate depth of clean fill will be required to protect plant life and will include landscaping where required. Minimum depths of clean fill in these areas will be specified in the conditions of the Statement of Environmental Audit for the site. These conditions will also specify the maximum root depth of plants to be planted in these areas. The selected developer's Master Plan will need to adhere to these conditions or alternatively if planting plants with greater root depths is intended, the impacted fill materials will need to be removed and replaced with a suitable depth of appropriate clean fill.

No edible plant species will be planted in areas with identified soil or groundwater contamination. It is expected that no edible species will be planted at the DCW site as part of the development.

Hydrocarbon Source

The site Victorian Environment Protection Authority accredited Contaminated Land Auditor (VICEPA CLA) will include a statement of suitable land uses at the DCW site and place conditions of development to the selected developer in the Statement of Environmental Audit. These conditions will identify any areas that are suitable for particular land uses including any areas that are to remain undeveloped. The conditions may include placing covenants on land titles restricting or banning particular activities over part, or the entire DCW site.

The Selected developer will be required to integrate the conditions of the VICEPA CLA Statement of Environmental Audit into their finalised Master Plan for the DCW site. The Master Plan will require approval of the VICEPA CLA and the NT Government.

Volatile Hydrocarbons

Requirements for volatile hydrocarbons will be included in the conditions of the VICEPA CLA Statement of Environmental Audit and will be addressed as part of both the SMP and CEMP for the selected developer. The conditions may include placing covenants on land titles restricting or banning particular activities over part, or the entire DCW site.

The SMP and CEMP will require approval from Office of Environment and Heritage prior to commencement of works at the DCW site.

The CEMP will be enforced as part of the selected developer's construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

Excavation

Protocols for excavation activities at the site will be included as part of the selected developer's CEMP.

Requirements for excavation protocols will be included in the conditions of the VICEPA CLA Statement of Environmental Audit and may include placing Covenants restricting or banning particular activities over part or the entire DCW site. Requirements for excavation, dewatering, stockpiling and deep excavation will be included in the Acid Sulfate Soil Management Plan (ASSMP) for the DCW site. The requirements of the Statement of Environmental Audit and the ASSMP will then be addressed in both the SMP and CEMP for the developer.

The SMP and CEMP will require approval from Office of Environment and Heritage prior to commencement of works at the DCW site.

The CEMP will be enforced as part of the selected developer's construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

Shell Bitumen Plant

The Shell Bitumen Plant has not been included as part of the current investigation area. The Plant is scheduled for demolition and removal during 2004. It is expected that the existing above and below ground infrastructure will be removed from the site prior to soil and groundwater investigations being undertaken at the Shell Bitumen Plant. These investigations will be undertaken by environmental consultants appointed by Shell. The remediation requirements of the Plant will be dictated by the land use proposed in the selected developer's Master Plan and the extent of soil and groundwater contamination identified. The Plant will be included as part of the VICEPA CLA Statement of Environmental Audit for the DCW site.

Discussions between Shell and the NT Government are currently being undertaken regarding the timeline for the demolition, investigation and remediation activities at the Plant and any areas at the DCW site impacted by previous activities at the Plant. These discussions include the extent of the area to be remediated and the level of remediation required. Shell have agreed to work with the VICEPA CLA for the DCW site.

Once Shell has met its remediation commitments, the NT Government will carry the environmental risk for the site.

AAPA noted the need for formal approval of senor Aboriginal Custodians for any works on Stokes Hill Sacred Site.

Any works proposed within the Stokes Hill Sacred Site will only be carried out under the conditions specified in the AAPA Certificate for the Sacred Site. Such works include any remediation of soil contaminated with hydrocarbons from Tanks 13 and 14.

Defence noted that the possible migration of hydrocarbon contamination from the NFI onto the project site requires further coordinated investigation. Defence have undertaken several studies into the issue and the results of these should be acknowledged.

As noted under 5.2.5 above, the proponent agrees that further investigation is needed and has sought to undertake the necessary investigations as part of the fourth phase of the Contaminated Site Assessment for the site. The proponent has sought to coordinate these investigations with Defence and is anticipating obtaining data from Defence and access to the NFI in the near future.

The results of the previous assessments by Defence, noted in 5.2.5, will be used in the Contaminated Site Assessment to clarify the contamination process on and off the redevelopment site. The Contaminated Site Assessment will also consider the requirement for ongoing operation of the NFI. As noted in the Draft EIS and this Supplement, the Contaminated Site Assessment is being reviewed by Northern Territory Government regulators separately from the EIS and independently audited under the Victorian Contaminated Land Auditor Accreditation Scheme.

DEIS - 8.2.6 Acid Sulfate Soils

OEH requested more detailed information about the implications of ASS and PASS for the project and associated investigations, planning, management and monitoring.

Further investigations of PASS within Kitchener Bay will be best undertaken when details of the final Master Plan are known to allow accurate planning of the investigations and coordination with any engineering investigations required by the eventual developer. Such investigations are likely to require drilling from a barge during suitable tidal periods. Further information about ASS issues is provided below.

DIPE supported the preparation of a detailed Acid Sulfate Soil Management Plan to minimise impacts from site works and impacts on underground infrastructure. DIPE also noted that the disposal of spoil with ASS or PASS requires more detailed assessment once the Master Plan has been finalised.

DCC commented on other sections of the Draft EIS that consideration needs to be given to possible impacts stormwater and other underground infrastructure from acidic leachate.

Introduction

This section provides information on management requirements and defines the level of treatment that would require neutralisation of the existing and potential acidity associated with disturbance of ASSM,

including the level of management and reporting expected given levels of treatment. These guidelines have been prepared based on best practice guidelines for the management of ASSM in Australia.

Physical Characteristics and Environmental Setting

Physical site characteristics will need to be documented and should include all available information on site geology and hydrology and details of the receiving environment. Particular attention should be given to the environmental receptors sensitive to acidic/ high metal loads such as surface water bodies and groundwater abstraction bores. In addition a summary of current and historical land use should also be documented.

A site plan should be prepared illustrating the aerial distribution of ASSM. Where possible a distinction should be made between PASSM and AASSM. In addition a series of cross sections and long section should be prepared for the site detailing areas of PASSM and AASSM at depth intervals of not less than 0.5 m to a depth 1.0 m greater than the proposed excavation and/or dewatering level. This information will form the basis of the ASSMP and set the scene for the development.

Results from the ASSM investigations prepared by URS (2003, 2004) should also be included. It is often helpful for these results to be superimposed onto cross sections and long sections detailing soils with high sulphide contents.

Proposed Development Works

An overview of the proposed development works needs to be included in the ASSMP. Particular attention should be given to the soil excavation, dewatering and drainage strategies. Particular notes should be made of any clay, peat and horizons that may affect dewatering or excavation of soil.

Temporary storage areas for the excavated ASSM should be carefully thought through taking the potential for environment contamination or amenity to human health into consideration.

In addition strategies for ASSM reuse and/ disposal of excavated ASSM also need to be developed. The appropriate method of disposal/ reuse will need to be considered carefully and may vary in different parts of the site. Such strategies may include but are not limited to:

- Strategic reburial onsite (below the water table)
- Strategic reburial offsite (approved land refuse disposal facility- appropriate approvals need to be sought)
- Onsite neutralisation

The potential onsite and offsite effects of the soil and/or groundwater levels also need consideration. This may include but is not limited to impacts from the exposure of ASSM onsite or offsite due to dewatering operations.

Management Strategies

A detailed management strategy for minimising the impacts from the site works will need to be developed. These strategies should include methods of preventing the oxidation of iron sulfides. In some case the avoidance of ASSM may require changing the locations of excavation and/or reflooding of potential ASSM to limit oxidation.

In addition the management strategy should address any treatment requirements for the ASSM, which may include but not be limited to soil neutralisation through application of lime, use of barriers (lime or limestone), buffering with seawater or the reburial of PASSM.

Strategies also need to be developed for watertable management both onsite and off site, during and upon completion of dewatering works. Furthermore, strategies need to be developed for containment of contaminated stormwater and acidic leachate associated with ASSM oxidation on site, in order to ensure that the material does not enter the receiving environment before being treated.

Performance indicators also need to be developed to assess the effectiveness of the management strategies, procedures and monitoring measures. An extensive and comprehensive monitoring program for soil, surface and ground water quality should be developed, to assess the effectiveness of the management strategies. The monitoring should commence prior to, during and upon completion of the excavation works. The following details should be included in the plan:

- Monitoring locations
- Monitoring timing and frequency
- Sample analytes to be tested both in the field and in the laboratory. These should include but are not limited to pH, electrical conductivity, total dissolved solids, sulfate, chloride, iron, arsenic, aluminium and SPOCAS.
- Procedure for carrying out field tests should also be included together with record sheets.

The sampling requirements should also demonstrate the ability to comply with agreed standards and performance targets stated in the ASSMP.

If large-scale dewatering or excavation operations are proposed, it is recommended that a field trial be conducted. This will test the management procedures developed for the site, proving there effectiveness and feasibility to deal with issues associated with ASSM management and their impacts. Two field trials that would be of particular relevance would be the effective treatment of extracted water during dewatering and the effective blending of lime with PASSM, if these management strategies were adopted. By carrying out a trial it would also demonstrate the effective implementation of the appropriate management strategies and demonstrate the ability to comply with agreed standards and performance targets.

Contingency Plan

A Contingency Plan (including remedial and restoration planning) needs to be prepared with procedures in place, in case unexpected events or in the event of management procedure failure. The Contingency Plan should include, but is not limited to the following:

- Methods of enforcing the implementation of the ASSM management strategies stated in the ASSMP, which may include stopping earthworks to reassess determine the problems caused by breaches of standards or performance levels.
- If the problems are related to ineffective implementation of the ASSMP, then the plan should be audited to ensure improved implementation. In this circumstance monitoring and testing should be increased to ensure compliance with the established standards.
- Outline of reporting procedures for meeting environmental performance objectives and demonstrating quality assurance to relevant authorities and the community.

The ASSMP should be reviewed and updated throughout the duration of the development to reflect knowledge gained during the development works. Such changes should be developed and implemented in consultation with relevant authorities.

Management Procedures

Risk Categorisation

Levels of oxidisable sulfur within soil or sediment are an indication of the level of risk to the environment if the soil is disturbed. For projects that disturb > 1000 tonnes of ASS material with > 0.1 % oxidisable sulfur or equivalent existing or potential acidity, a detailed management plan and development consent will be required (**Table S-8**).

Performance indicators will be developed to assess the effectiveness of the management strategies, procedures and monitoring measures. An extensive and comprehensive monitoring program for soil, surface and ground water quality has been developed to assess the effectiveness of the management strategies. Monitoring commencing prior to development works will continue during and upon completion of the excavation works.

Table S-8 Texture-based Acid Sulfate Soil Action Criteria

Department of the Environment (WA)Soil Management Guidelines 2002)

Type of Material		*Action criteria* if 1 to 1000 tonnes of material is disturbed		*Action criteria* if more than 1000 tonnes of material is disturbed	
		Existing + Potential Acidity		Existing + Potential Acidity	
Texture range (McDonald *et al*. 1990)	Approx. clay content (%)	Equivalent sulfur (%S) (oven-dry basis)	Equivalent acidity (mol H^+/tonne) (oven-dry basis)	Equivalent sulfur (%S) (oven-dry basis)	Equivalent acidity (mol H^+/tonne) (oven-dry basis)
Coarse texture *Sands to loamy sands*	≤5	0.03	18	0.03	18
Medium texture *Sandy loams to light clays*	5–40	0.06	36	0.03	18
Fine texture *Medium to heavy clays and silty clays*	≥40	0.1	62	0.03	18

Oven-dried basis means dried in a fan-forced oven at 80–85°C for 48 hours.

Recognition

It is vital that all parties involved in the project are familiar with and can differentiate ASSM from sediments expected in the redevelopment, so that if uncovered the soil can be re-covered and treated immediately. It is also important to be able to recognise the indicators of PASSM and AASSM to prevent acidification of land and waterways. The following simple indicators help identify AASSM.

- Drop of >1 pH unit between field pH and field peroxide oxidation pH
- Unusually clear or milky drain water with a pH<5.5.
- Extensive rust coloured iron stains on any drain surfaces.
- Iron stained drain water.
- Butter coloured jarosite present in surface spoil.
- Iron oxide mottling. (Also may exist in areas not affected by ASSM)
- Soil surfaces in undisturbed areas displaying salt crusts or scalds (bare patches);

Where none of the above is present, the soils are waterlogged mangrove swamps or comprise of silty sands having:

- mid to dark grey to dark greenish grey in colour; or
- soft and buttery clay consistency.

The soils could be PASSM and field $pH_{(fox)}$ measurements will be used to confirm presence of pyrite backed up by SPOCAS testing. Field $pH_{(f)}$ and $pH_{(fox)}$ test will be carried out for every $500m^3$ of the additional material excavated.

Reporting

All incidents of PASSM or AASSM disturbance should be recorded. Details recorded would include how the material was disturbed and the remediation procedures that were employed to prevent site contamination.

A report should also be prepared to include:

- effectiveness of the management strategies;
- problems in implementing the ASSMP;
- compliance with testing requirements, runoff control and materials handling; and
- effectiveness of any corrective action adopted.

A formal validation report including all field and laboratory test data should be prepared upon completion of the excavation works/ dewatering operations.

Excavation Operations

Stockpiling

The risks of stockpiling large volumes of ASSM may be very high even over the short-term. OEH recommends that stockpiling of small volumes of untreated ASSM should only be undertaken as a short-term activity. Some examples of short-term activities that may result in small stockpiles of ASSM include:

- Part of day excavation of fine textured material that may be stockpiled over weekend before strategic reburial;
- Problem encountered due to weather slowing treatment;
- Problems obtaining laboratory test results;
- Space in neutralising treatment areas not being available as quickly as anticipated in earthworks strategy.

Stockpiling of untreated ASSM should be minimised. This can be achieved by preparing a detailed earthworks strategy that documents the timing of soil volumes to be moved, treatment locations and capacity of those areas to accept materials. Stockpiling can often result in double handling and increased earth moving costs. It is important to account for risk from wet weather and plan for other contingencies.

- *Short-term Stockpiles*

Table S-9 outlines the maximum time period recommended by WA DoE (2003), for which soils can be temporarily stockpiled without treatment. However, hot environments such as that experienced in Darwin may result in sands being oxidised within a matter of hours. It is therefore recommended that delay times be determined prior to the stockpiling of material. This can be determined through testing. WA DoE (2003) recommends that the total volume of material that is stockpiled should not exceed 20% of a day's total extraction.

Table S-9: Indicative Maximum Period for Short-term Stockpiling of ASS

Type of Material		Duration of Stockpiling	
Texture Range (McDonald et al (1990)	Approximate clay content (%)	Days	Hours
Coarse Texture Sands to loamy sand	≤5	Overnight	18
Medium Texture Sandy loams and light clays	5-40	2 ½	70
Fine Texture Medium to heavy clays and silty clays	≥ 40	2 ½	70

- *Medium-term Stockpiles*

Situations that require the stockpiling of untreated ASSM for moderate periods of time will need to be justified to the relevant administrative agency and therefore wherever possible should be avoided. Management to reduce the oxidation of sulfides and the collection and treatment of all leachate and runoff water will need to be implemented during the stockpiling period.

The maximum period of time for which soils can be temporarily stockpiled in the medium-term as determined by WA DoE (2003) is listed in **Table S-10**. A risk assessment should be carried out to determine the risk associated with stockpiling the ASSM. If the risks associated with stockpiling cannot be demonstrated to be minimal then neutralisation treatment may be required. Stockpiling in the medium term should be a contingency measure and not a standard practice.

Table S-10: Maximum Periods for Medium Term Stockpiling of untreated ASSM

Type of Material		Duration of Stockpiling	
Texture Range (McDonald et. al. (1990)	Approximate clay content (%)	Days	Weeks
Coarse Texture Sands to loamy sand	≤5	14	2
Medium Texture Sandy loams and light clays	5-40	21	3
Fine Texture Medium to heavy clays and silty clays	≥ 40	228	4

A guard layer (limestone or similar pad) must be placed under all medium-term stockpiles. In addition the following management strategies may need to be implemented to manage risk:

- The volume of material stockpiled should not exceed more than one week's volume of extraction;
- All stockpiling will need to be bunded and diversion banks installed upslope to prevent runoff water and should not be constructed out of untreated ASSM. The materials used should have low permeabilities to prevent leakage;
- Leachate collection and treatment systems should be installed;
- Stockpile surface area should be kept to a minimum and should be shaped accordingly.
- Keep the surface of the stockpiled material moist using a spray of water or neutralising agents. Over wetting should be avoided and should be a fine mist to prevent disaggregation of soil particles from the stockpile surface. This any also involve collection and treatment of any run-off.
- Construct erosion and sediment control measures.

➢ *Long-term Stockpiles*

Any stockpile present on site that exceeds the requirements stated in **Table S-10** is considered long-term stockpiling, and is an inappropriate management strategy. To manage any such soil, the recommendations of the risk assessment must be fully implemented.

Disposal/ Treatment Options

➢ *Dewatering and Groundwater Operations*

Provided that groundwater pumping and effluent disposal is well managed, dewatering can be a viable option or lowering the watertable at a construction site to allow foundations and other sub-surface infrastructure to be built in areas where there is a high risk of acid soil soils occurring.

Before a dewatering/draining program can be designated and implemented, it is essential that a site assessment have been undertaken in accordance with both the general requirements of the WA DoE (WRC 2003) and the specific OEH requirements.

Disposal of water to stormwater drains to discharge to waterways or wetlands should always be considered as a last resort when planning dewatering operations. This is only acceptable if the discharge has been approved by the OEH, if the discharge meets water quality criteria that will protect the environmental values of the receiving water bodies and if there is a contingency plan in place to manage the discharge if water quality deteriorates during the dewatering program.

It is recommended that additional soil and groundwater investigations are undertaken after dewatering is completed to assess the extent to which oxidation of sulfide materials has taken place during the period when groundwater pumping was carried out.

- *Groundwater and surface water*

If dewatering operations are to take place, historical and seasonal changes in groundwater level should be determined and the changes in water table depth recorded over the duration of the dewatering operations. Maximum allowable changes to water table depth should also be determined (based on site conditions such as location of ASSM) prior to the commencement of dewatering and will become a performance indicator during dewatering works. In addition water quality parameters also need to be tested and these should include but not be limited to pH, electrical conductivity, total dissolved solids, sulfate, chloride, Fe and Al.

- *Stockpile drainage water*

If stockpiling of the PASSM is to take place, for periods greater than 12 hours, laboratory testing by a NATA accredited laboratory of stockpile drainage water should be carried out for pH, electrical conductivity, total dissolved solids, sulfate, chloride, Fe and Al. Acceptable criteria for these parameters are as follows:

pH	6.5 to 8.5 pH units or <1 unit change in pH
Fe	<1,000 µg/L
Al	<5.0 µg/L if pH <=6.5 pH units
	<100.0 µg/L if pH >6.5 pH units

Extracted Water

The extracted groundwater and surrounding monitoring bores should be tested twice daily (morning and night) for pH and electrical conductivity.

pH	6.5 to 8.5 pH units or <1 unit change in pH
Fe	<1,000 µg/L
Al	<5.0 µg/L if pH <=6.5 pH units
	<100.0 µg/L if pH >6.5 pH units

Testing for the Fe and Al concentrations will only be necessary if the pH of the water in the retention basin(s) is less than pH of 6.0.

- *Dewatering Discharge and Water Neutralisation Treatment*

Soil drainage waters will be collected tested and treated if required, prior to being released into the receiving environment. The drainage water collected will be monitored for pH, electrical conductivity and dissolved oxygen and if these water exceeds target quality levels then the water will be treated using the required lime dosage amount to increase soil pH to the acceptable level of 5.5. In the event that large volumes of water require treatment, the water will be diverted to the dewatering retention pond and neutralized.

- *Groundwater/ Surface water program*

Shallow groundwater level and quality monitoring will be carried out at all permanent monitoring locations, at locations to be determined. The following monitoring is proposed:

- Weekly groundwater level, pH and conductivity monitoring from all monitor bores during the first two months of the program.
- Weekly collection and analysis of groundwater from all monitor bores for chloride, sulfate and alkalinity during the initial 2 months of the program.

The frequency and scope of groundwater monitoring from Week 9 onwards will be tailored according to the findings in Weeks 1 to 8 and will be agreed beforehand with OEH.

- *Performance Indicators*

Most of the performance indicators should be derived from the background conditions determined from the environmental monitoring and the ANZECC and ARMCANZ water quality guidelines. Therefore monitoring should commence before dewatering operations starts and continue during, and for at least the duration of dewatering after the finalisation of dewatering. In addition these indicators will also be determined on the basis of the environmental setting. for example if freshwater or marine. Most natural freshwater has a pH range between 6 and 7, and marine water close to pH 8.2. In addition marine water is strongly buffered and even small changes in pH may indicate major changes to the system.

- *Strategic Reburial*

Where over excavation of non-ASS includes some excavation of AASSM or PASSM and immediate reburial is not possible, then neutralisation procedures will be adopted to treat the excavated AASSM and to prevent oxidation of PASSM.. Environmental controls will also be put into place to prevent the onset of oxidation of sulfidic material.

Essential to the success of the technique is the strategic component. Soils requiring reburial will be deposited into areas that permanently preclude oxygen. The reburial location will be carefully planned to ensure void space is available when needed. Timelines for an earthworks strategy will be calculated and met to ensure that the above conditions are consistently achieved.

- *Neutralisation of Acid Sulfate Soil Material*

These specifications have been adapted from Instructions for the Treatment and Management of Acid Sulfate Soils, 2001 produced by the Queensland Government in consultation with the Department of Natural Resources and Mines and the Department of Primary Industries. **Table S-11** depicts the appropriate dosing requirements for acid sulfate soil material conservation. Provided that mining by scraper is possible a lime spreader can be used to spread lime on the surface of the affected material, then mine by scraper. The action of the scraper mining then dumping should be quite effective at mixing in the limestone.

Treated material must be tested and validated before it may be covered. If emplaced material were found not to have been adequately treated, it would need to be re-excavated and re-treated. This option would need to be negotiated with the DEWCP.

Table S-11 Acid Sulfate Soil Material Conservation

(Based on 1 mol sulfide producing 2 mol sulfuric acid and corresponding liming rates)

Oxid. S%	Moles H+/kg (S% x 0.6237)	Moles H+/t (S% x 623.7)	kgH_2SO_4/tonne (S% x30.59)	Kg lime/tonne soil X Safety Factor 1.5	Est. lime cost / tonne soil or Cost/m3 of soil $	Cost/ha/m depth of soil@ 50/t of lime $
0.02	0.0125	12.47	0.61	0.94	0.05	**468**
0.03	0.0167	18.71	0.92	1.4	0.07	702
0.06	0.0374	37.43	1.84	2.8	0.14	1,404
0.1	0.0624	62.37	3.06	4.7	0.23	2,340
0.2	0.1247	124.7	6.12	9.4	0.47	4,680
0.3	**0.1871**	**197.1**	**9.18**	**14**	**0.7**	**7,020**
1	**0.6237**	**623.7**	**30.6**	**46.8**	**2.34**	**23,410**
5	**3.119**	**3119**	**153**	**234**	**11.7**	**117,000**

The analysis of the oxidisable sulfur in the soil samples can be used to calculate the theoretical maximum amount of acid that can be generated as a result of the complete oxidation of sulfides. The assumptions are that the entire oxidisable sulfur in the sample is pyrite and it produces 2 mol of sulfuric acid per mol of pyrite and no soil buffering is available. Validation testing should be carried out on all treated areas.

Sample analytes to be tested both in the field and in the laboratory. These should include but are not limited to pH, pH(fox), electrical conductivity, total dissolved solids, sulfate, chloride, iron, arsenic, aluminium and SPOCAS.

- *Frequency and Timing Summary*

1. Soil samples should be obtained throughout the day during excavation works, and tested for $pH_{(fox)}$. This will give an indication of potential acidity of the PASSM.
2. The sampling and testing of any lime treated soil will be subject to quality assurance testing which will be repeated until satisfactory results are obtained.

Reporting

All incidents of PASSM or AASSM disturbance should be recorded. Details recorded would include how the material was disturbed and the remediation procedures that were employed to prevent site contamination.

A report should also be prepared to include:

- effectiveness of the management strategies;
- problems in implementing the ASSMP;
- compliance with testing requirements, runoff control and materials handling; and
- effectiveness of any corrective action adopted.

A formal validation report including all field and laboratory test data should be prepared upon completion of the excavation works/dewatering

DEIS - 8.2.7 Disposal of Contaminated Material

DCC has included a number of statements and comments including:

- *A comment that there is some concern arising from limited reference to appropriate solid waste management methodologies.*
- *A statement that the EIS fails to mention that a "secure landfill" is not available in the Northern Territory.*

- *A suggestion to prepare a detailed Waste Management Plan that includes characterization of waste materials produced and the associated disposal options available in the Northern Territory for each waste classification.*

Responses to each of these points are provided below.

Solid waste management methodologies

Solid waste management methodologies during the construction phase of the project will be described by the selected developer in their CEMP. This document will require approval from OEH prior to commencement of works at the DCW site.

The CEMP will be enforced as part of the selected developer's construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

Solid waste management methodologies during the operation phase of the project will be described by the selected developer during the finalisation of the Operational Environmental Management Plan (OEMP). It is expected the selected developer will liaise with DCC with regard to these issues during the finalisation of the OEMP. Waste streams are expected to include domestic rubbish from residences, commercial waste from restaurants, cafes, shops and the convention centre. Solid waste management during the operation of the site is expected to be the responsibility of the site occupier and DCC.

Secure Landfill

Hazardous material from the DCW site will be disposed at an appropriately licensed landfill facility.

Identification, development, design and construction of appropriate landfill facilities that will be licensed to receive contaminated materials from the DCW site is currently being undertaken by the Northern Territory Government, independent of the Darwin Waterfront Project. These facilities are subject to the existing Northern Territory development process.

Waste Management Plan

A plan for waste management during the construction phase of the project will be described by the selected developer in their CEMP and OEMP. The CEMP document will require approval from OEH prior to commencement of works at the DCW site.

The CEMP will be enforced as part of the selected developer's construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

The OEMP will be negotiated between the developer, DCC and the NT Government.

Waste streams will be characterized and disposal options will be described by the selected developer during the finalisation of the Master Plan for the DCW site. It is expected the Selected developer will liaise with DCC with regard to these issues during the finalisation of the Master Plan. Waste streams are expected to include domestic rubbish from residences, commercial waste from restaurants, cafes, shops and the convention centre.

DEIS - 8.2.11 Construction Environmental Management Plan

DCC has commented that some issues could be incorporated into this Plan (CEMP) and DCC would seek to be involved in the development of the CEMP. DCC has also commented that the CEMP should encompass an area beyond the DCW site for potential issues including traffic impacts.

The CEMP will developed by the selected developer and will encompass a wide range of environmental issues for the DCW site during the construction phase of the project, including soil, water, dust and waste management, erosion and odour control, traffic control, asbestos, protection of flora, fauna and heritage, complaints procedure and contingency planning.

It is acknowledged that the traffic management section of the CEMP should include off site impacts during the construction stage of the project. This would include an assessment of anticipated traffic volumes, intended working hours of travel and measures to be undertaken during transport to and from the DCW site.

It is anticipated that the selected developer will consult with DCC during the development of the CEMP.

The CEMP will be enforced as part of the selected developer's construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

DEIS - 8.2.12 Site Management Plan

Darwin City Council noted the SMP should address hydrocarbon contamination that may enter stormwater and mitigation measures to address possible impacts of acidic leachates on stormwater infrastructure.

These issues will be addressed by both the RAP (to remove contaminants where possible) and the SMP.

DEIS - 8.3.1 Physical Environment – Soils

DHCS made the comment that the party responsible for sediment and erosion control during construction is not named. It is suggested that this should not be self regulating. It is also stated that the effectiveness of silt traps and filters during the wet season is questionable.

Comments are also made that DCC has no jurisdiction on the site, building certifiers will unlikely be concerned with erosion and sedimentation and DIPE should take the lead role.

The party responsible for implementing sediment and erosion control plan during the construction phase of the project will be the developer. The requirements for sediment and erosion control will be detailed in the CEMP. The CEMP will require the approval of OEH prior to the commencement of works at the DCW site. The CEMP will be enforced as part of the construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

The effectiveness of silt traps and filters during the wet season will depend on the activities that are conducted at the DCW site during the wet season and the appropriate design and construction of these measures will be required.

DEIS 8.3.3 - Site Hydrology

OEH has suggested that a description of the measures being taken to ensure the controlled and uncontrolled release of potentially contaminated water into stormwater does not occur and how these measures are to be implemented and by whom. It is also suggested that confirmation of whether baseline surface water monitoring has commenced at the site since commencement of the pre-remediation site works at the site.

The measures to be undertaken will be incorporated into the relevant management plans for each phase of the project including:

- Measures during the remediation stage of the project will be included in the Remediation Action Plan (RAP). The party responsible for implementing sediment and erosion control plan during the remediation phase of the project will be the remediation contractor. The requirements for sediment and erosion control will be detailed in the RAP. The RAP will require the approval of OEH prior to the commencement of remediation works at the DCW site. The RAP will be enforced as part of the remediation Contract conditions. The RAP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The RAP will be audited on a regular basis by OEH during the remediation phase of the works.

- Measures during the construction stage of the project will be included in the CEMP. The party responsible for implementing sediment and erosion control plan during the construction phase of the project will be the developer. The requirements for sediment and erosion control will be detailed in the CEMP. The CEMP will require the approval of OEH prior to the commencement of works at the DCW site. The CEMP will be enforced as part of the construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

- Measures during the operational stage of the project will be included in the OEMP. The parties responsible for implementing the surface water plan during the operational phase of the project will be negotiated between the developer, DCC and the NT Government. The requirements for surface water control will be detailed in the OEMP. The OEMP will require the approval of the NT Government and DCC prior to occupying the DCW site.

Measures that will remain throughout each of these stages of the development, will be required to be addressed in each of these management plans.

Surface water sampling has not been undertaken during Pre-Remediation Site Works as these works have been undertaken during the 2004 dry season and as a result there has been an absence of rainfall and surface water at the site during these works. Erosion control measures have been installed by the Contractor as detailed in the Pre-Remediation Site Works Environmental Management Plan.

OEH has suggested that a description should be included of how best practice for surface water is to be implemented and integrated in the management plans for the project. It is also suggested that a description should be included of how this will be benign or beneficial to the receiving environment.

The measures to be undertaken will be incorporated into the relevant management plans for each phase of the project including:

- Measures during the remediation stage of the project will be included in the RAP. The party responsible for implementing the surface water plan during the remediation phase of the project will be the remediation contractor. The requirements for surface water control will be detailed in the RAP. The RAP will be required to be in accordance with existing NT regulations and require the approval of OEH prior to the commencement of remediation works at the DCW site. The RAP will be enforced as part of the remediation Contract conditions. The RAP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The RAP will be audited on a regular basis by OEH during the remediation phase of the works.

- Measures during the construction stage of the project will be included in the CEMP. The party responsible for implementing the surface water plan during the construction phase of the project will be the developer. The requirements for surface water control will be detailed in the CEMP. The CEMP will be required to be in accordance with NT regulations and the approval of OEH prior to the commencement of works at the DCW site. The CEMP will be enforced as part of the construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

- Measures during the operational stage of the project will be included in the OEMP. The parties responsible for implementing the surface water plan during the operational phase of the project will

be negotiated between the developer, DCC and the NT Government. The requirements for surface water control will be detailed in the OEMP. The OEMP will require the approval of the NT Government and DCC prior to occupying the DCW site.

Measures that will remain throughout each of these stages of the development, will be required to be addressed in each of these management plans.

The DCW redevelopment offers a number of clear environmental benefits for a site with an extended and varied history of industrial uses. One of these benefits is the remediation of site contamination. The DCW site has a long and varied industrial history, which has left a legacy of contamination. Further industrial activity in the area is inappropriate given its proximity to a growing CBD and the shift in port activity to East Arm Wharf. Without the redevelopment as an impetus, it is unlikely that this contamination would be remediated sufficiently to allow significant re-use of the area for other non-industrial purposes. The redevelopment presents an opportunity to:

- adequately assess and characterise the location, type and level of contamination;
- identify appropriate options for remediating the site and managing the site into the future to ensure the protection of public health and the environment;
- undertake the necessary remediation activities; and
- appropriately disposing of any contaminated material that is to be removed from the site.

These steps will reduce the risk of mobilisation of contaminants into the natural environment and of public exposure. The change in land use from industrial land use to more benign residential and open space land uses will remove the risk of ongoing contamination and reduce the risk of contamination of the environment in the future at the site.

Water Management in Ponds and Swimming Features

DHCS advised that the Department would not permit the recycling of water from within the development for use in any swimming feature.

Water that has been recycled from within the development will not be used in any swimming feature.

DEIS - 8.3.4 Marine Environment

MAGNT commented that dredging can easily mobilise contaminants and that the Draft EIS indicates that ASS may be disposed of subtidally. A "demonstration" is requested that this will not include contaminated soil.

Data presented in Appendix C of the Draft EIS demonstrate that contaminants within the marine sediments of Kitchener Bay are typically limited to the surface (0-0.5 m) layer. This reflects the primary potential sources of anthropogenic contaminant inputs into the bay – via dust deposition and stormwater runoff. ASS typically occur in subsurface, anoxic sediments. Segregation and disposal options for differentially contaminated sediments will be considered during development of the Dredging Management Plan described in the Draft EIS.

OEH requested more detail on the management of the potential for (the introduction of) marine pests associated with any proposed marinas.

As indicated in Section 6.4.3 of the Draft EIS, vessels arriving in Darwin Harbour are inspected by Customs and AQIS officers. In addition to these measures, the Aquatic Pest Management Unit (APMU) within DBIRD routinely screens yachts and other vessels arriving from International waters and wishing to enter Darwin marinas. Any such vessel unable to demonstrate operations that the hull has been cleaned or antifouled in Australia is requested to undergo a hull inspection and treatment of internal seawater systems to kill marine pests. It is expected that the APMU would apply a similar screening regime to any vessels wishing to enter a marina in Kitchener Bay (if one is developed as a part of the preferred Master Plan).

DEIS - 8.4.4 Biting Insects

Department of Health and Community Services has made a number of comments including:

It is suggested that references to insect repelling vegetation should be removed as this vegetation does not exist and replaced with reference to shrub type vegetation to allow the use of insecticide barrier treatments such as bifenthrin.

It is suggested that ponded water may lead to the creation of temporary mosquito breeding habitats and areas of ponding may require insecticide control after 4 days. It is also suggested that weekly inspections during the wet season are carried out to locate larvae and treat with the biological insecticide Bascillus thuringiensis var. israelensis (B.t.i.)

The CEMP will developed by the selected developer and will encompass a wide range of environmental issues for the DCW site during the construction phase of the project including mosquito control. The requirements for mosquito control will be detailed in the CEMP and will include weekly inspections for ponded water during the wet season. Treatment of ponded water with Bti will be a follow up action. The CEMP will require the approval of OEH prior to the commencement of works at the DCW site. The CEMP will be enforced as part of the construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

Department of Health and Community Services has also made a comment regarding stormwater drainage including:

- *A suggestion that open stormwater drains should be upgraded to underground stormwater systems where possible.*
- *A suggestion that the entire stormwater system at the site be surveyed to locate areas of pooling water.*

It is expected that the stormwater drainage infrastructure across the site will be largely replaced to accommodate major changes in site layout and land use. Where possible and allowed under the DCC

Guidelines for Subdivision and Development, the proponent will upgrade open stormwater drains to underground stormwater systems. The extensive replacement of stormwater infrastructure is expected to obviate the need for a survey of drains across the entire site.

The selected developer will be required to provide new stormwater drainage at the site for any new development in accordance with NT Government and DCC requirements. This will be enforced as part of the construction Contract conditions. NT Government and DCC approval will be required prior to the commencement of works.

Weekly inspections for ponded water during the wet season will be carried out as part of the CEMP. Treatment of ponded water with Bti will be a follow up action.

Two additional points made by DHCS under this section of the Draft EIS have been included in the Errata.

DEIS - 8.5 Built Environment

PFES requested that the agency be consulted about final Master Plan. The planning and operations of the agency will be affected by the redevelopment. The expected residential development will require amendment to the NT Counter Disaster Plan, particularly the planning for cyclones and the potential effects of storm surge.

Arrangements for Northern Territory agency consultation about the final Master Plan are noted in DEIS 4.5.

DEIS - 8.5.1 Preliminary Site Activities

DCC requested input into the development of the SMP, particularly in regard to roads, landscaping and drainage.

Arrangements for consultation with DCC about the SMP are noted in DEIS 4.5.

DCC suggested that the SMP needs to incorporate input from DCC with particular focus on roads, landscaping and drainage.

DCC will be consulted during the preparation of the SMP with regard to roads, traffic, landscaping and drainage issues for the DCW site.

OEH asked for an indication of how the controls proposed in the Site Management Plan will be incorporated into the Operational EMP.

The SMP will form part of the OEMP for the DCW site.

DEIS - 8.5.2 Waste Management Register

Power Water Corporation commented that the development will likely include upgrading waste disposal facilities at Stokes Hill and Fort Hill Wharves. A suggestion is made that the EIS should include an

assessment of the risk from and mitigation strategies for the movement of this material. A suggestion is made that the Proponent should liaise with Power Water Corporation about this likely upgrade

Risk assessments for waste management at the DCW site will be provided by the selected developer during finalisation of the Master Plan.

During development of the Master Plan, the proponents are required to conform to the 'Guide to Infrastructure Requirements' in the Call for Detailed Proposals. Section 4 of this document details requirements for the selected developer. Selected parts of these requirements and comments included the following:

Subdivision Development Infrastructure Requirements/Comments - Sewerage

The selected developer will be required to provide a new sewerage services to Stokes Hill and Fort Hill wharves, the Pumphouse/Indo-Pacific Marine lots and the deckchair cinema area as part of the proposed development of the DCW site.

The selected developer shall provide a mechanism for emergency overflow of sewage from the sewerage system. The overflow system shall conform to the requirements of Power Water, Darwin City Council and relevant Territory Agencies (health and environment areas).

Civilian and military ships currently discharge a range of classes of wastewater from Stokes Hill and Fort Hill wharves to waste transport trucks that transport waste from ships to Power and Water's sewerage system. The selected developer shall liaise with Power and Water and NT Government to develop a strategy for the future discharge of ship-borne wastewater directly to the new sewer system associated with the proposed development of the DCW site. The Territory will meet the cost of works external to the development site to deliver the improved service (cost of works on the wharves).

Upon subdivision of the DCW site, the selected developer will be required to construct a reticulated sewerage system, to the requirements of Power and Water, to be gifted to Power and Water for ownership and operation.

Sewerage servicing shall conform to Power and Water's Connection Code, available on-line at www.powerwater.com.au/powerwater/connectioncode/ .

Building Development Infrastructure Requirements/Comments - Sewerage

Sanitary drainage plans for the development of the DCW Site shall be submitted to Power and Water for review and approval prior to the commencement of works.

If trade waste (non-domestic waste is to be discharged to Power and Water's sewerage system from the DCW Site, sanitary drainage plans showing all trade waste details shall be submitted to Power and Water for review and approval prior to the commencement of works. A trade waste agreement must be entered into prior to commencement of the works.

Power and Water has commented that commercial liquid waste is pumped from the wharf through the DCW site at present. It is suggested that environmental issues relating to overflow, storage and transport should be included in the EIS and EMPs.

Environmental issues for the overflow, storage and transport of commercial liquid waste will be incorporated into the relevant management plans for each phase of the project. Power and Water Corporation will be consulted during the formulation of each of these plans including:

- Liquid wastes during remediation stage of the project will be included in the RAP.
- Liquid wastes during construction stage of the project will be included in the CEMP.
- Liquid wastes during the operational stage of the project will be included in the OEMP.

Liquid wastes that will be present throughout each of these stages of the development, will be required to be addressed in each of these management plans.

Power and Water has commented that the disposal of hazardous and non-hazardous wastes (including sewerage that may be present in septic tanks) is not detailed in the EIS and the developer may request the use of Power and Water Corporation facilities for the treatment and/or disposal of such wastes. It is also suggested that the developer should be aware of Trade Waste and other requirements for such discharges.

The selected developer is required to conform to the 'Guide to Infrastructure Requirements' in the Call for Detailed Proposals. Section 4 of this document details requirements for the selected developer. Selected parts of these requirements and comments included the following:

> *Subdivision Development Infrastructure Requirements/Comments - Sewerage*
>
> Power and Water has an existing trunk sewer in the Frances Bay Drive / McMinns Street area. There is no external trunk sewerage augmentation required however the land developer will need to transport sewerage from the DCW site to the trunk sewer (i.e. via a new sewerage rising main). The connection point will depend on the discharge rate proposed, but will be somewhere in the sewerage system between Lot 5260 (Stella Maris) and Mavie St.
>
> Upon subdivision of the DCW site, the selected developer will be required to construct a reticulated sewerage system, to the requirements of Power and Water, to be gifted to Power and Water for ownership and operation.
>
> The selected developer shall ensure the continuity of sewerage services to existing customers during the development of the DCW site.
>
> The selected developer shall develop a sewerage servicing strategy that provides an economic solution not only to construct, but to maintain and operate. Given the expansive and largely flat nature of the DCW Site, the selected developer shall investigate innovative solutions utilising appropriate technology (i.e. A single central vacuum sewerage pumping station may allow a single

sewerage catchment, where as the use of traditional gravity sewers may require multiple sewerage catchments and multiple sewerage pumping stations).

The selected developer shall provide a mechanism for emergency overflow of sewage from the sewerage system. The overflow system shall conform with the requirements of Power Water, Darwin City Council and relevant Territory Agencies (health and environment areas).

Civilian and military ships currently discharge a range of classes of wastewater from Stokes Hill and Fort Hill wharves to waste transport trucks that transport waste from ships to Power and Water's sewerage system. The selected developer shall liaise with Power and Water and NT Government to develop a strategy for the future discharge of ship-borne wastewater directly to the new sewer system associated with the proposed development of the DCW site. The Territory will meet the cost of works external to the development site to deliver the improved service (cost of works on the wharves).

The selected developer shall liaise with Power and Water and Darwin City Council to develop a strategy for any proposed public sewerage services (public toilets) that covers issues associated with construction, ownership, maintenance and stormwater ingress.

Any sewage pumping station to be gifted to Power and Water must also have a land title and 30m odour buffer zone in which development is restricted.

Separate sewerage services shall be provided to the new lots to the satisfaction of Power and Water.

Sewer mains shall be located in public land, where easements have been specifically permitted by Power and Water for the purpose of sewerage services, such services shall be made available to Power and Water, at no cost to Power and Water.

Any proposed staging of the development of the DCW Site must take into account in the aforementioned sewerage services design requirements.

The selected developer may incur charges under Sections 52 and 54 of the Water Supply and Sewerage Services Act.

Power and Water's sewerage services related developer capital contributions do not currently apply to subdivision activity, however Power and Water is reviewing its developer charging policy and developer charges may apply to the development of the DCW Site depending on the timeframe of the development of the DCW Site and the outcomes of the current review.

Sewerage servicing shall conform to Power and Water's Connection Code, available on-line at www.powerwater.com.au/powerwater/connectioncode/ .

Building Development Infrastructure Requirements/Comments - Sewerage

Any upgrading of the sewerage services will be at the selected developer's expense to the satisfaction of Power and Water, at no cost to Power and Water.

Sanitary drainage plans for the development of the DCW Site shall be submitted to Power and Water for review and approval prior to the commencement of works.

If trade waste (non domestic waste) is to be discharged to Power and Water's sewerage system from the DCW site, sanitary drainage plans showing all trade waste details shall be submitted to Power and Water for review and approval prior to the commencement of works. A trade waste discharge agreement must be entered into prior to the commencement of works.

No structures are to be located over a sewerage easement, or where no easement exists such as within a road reserve, within 1.5 metres of the centre line of the sewerage main, without obtaining the prior written approval of Power and Water. It is the responsibility of the developer to ensure the location of all services on or adjacent to the DCW site.

Any planting within Power and Water sewerage easements , or adjacent to Power and Water assets within road reserves shall be in accordance with the requirements of Power and Water.

The selected developer may incur charges under Sections 52 and 54 of the Water Supply and Sewerage Services Act.

Power and Water has suggested that disposal methods need to be detailed on the construction and/or operational EMPs where appropriate.

Disposal methods for liquid waste will be incorporated into the relevant management plans for each phase of the project. Power and Water Corporation will be consulted during the formulation of each of these plans including:

- Liquid wastes during remediation stage of the project will be included in the Remediation Action Plan.
- Liquid wastes during construction stage of the project will be included in the Construction Environmental Management Plan.
- Liquid wastes during the operational stage of the project will be included in the Operational Environmental Management Plan.

Liquid wastes that will be present throughout each of these stages of the development, will be required to be addressed in each of these management plans.

Power and Water has requested the opportunity to review the final EMPs.

Power and Water will be forwarded copies of the RAP, CEMP and OEMP for comment when they are submitted to OEH for approval.

Due to the timelines for the project, Power and Water will be required to provide comments in the timeframe allowed by the developer for consideration. OEH will remain the regulatory authority to authorise these management plans.

OEH has suggested that a description should be included of specific wastes from remediation and construction, and how disposal is managed including timing of waste disposal required during remediation/construction.

Descriptions of the specific wastes and volume estimated will be included in the relevant environmental management plans and contact documents for each phase of the project including:

- Description of waste types and estimated volumes during remediation in the remediation contract documents and RAP.
- Description of waste types and estimated volumes during construction in the construction contract documents and CEMP.

The management, methodology and timing for disposal will be incorporated into the relevant management plans for each phase of the project including:

- Management, methodology and timing of waste during remediation stage of the project will be included in the RAP. The party responsible for implementing the waste management methodology and timing of waste disposal during the remediation phase of the project will be the remediation contractor. The requirements for waste management and associated environmental issues will be detailed in the RAP. The RAP will be required to be in accordance with existing NT regulations and require the approval of OEH prior to the commencement of remediation works at the DCW site. The RAP will be enforced as part of the remediation Contract conditions. The RAP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The RAP will be audited on a regular basis by OEH during the remediation phase of the works.
- Management, methodology and timing of waste during the construction stage of the project will be included in the CEMP. The party responsible for implementing the waste management methodology and timing of waste disposal during the construction phase of the project will be the developer. The requirements for waste management and associated environmental issues will be detailed in the CEMP. The CEMP will be required to be in accordance with NT regulations and the approval of OEH prior to the commencement of works at the DCW site. The CEMP will be enforced as part of the construction Contract conditions. The CEMP will be required to provide targets, describe methodologies, describe monitoring to be conducted and by whom, reporting responsibilities and the associated timeframes and describe contingency plans if the targets are not met. The CEMP will be audited on a regular basis by OEH during the construction phase of the works.

Measures that will remain throughout each of these stages of the development will be required to be addressed in each of these management plans.

DEIS - 8.5.4 Noise

OEH sought further detail about the noise mitigation measures to be adopted for the project.

The Northern Territory Government allows noise from construction sites between the hours of 07:00 and 19:00 hours Monday to Saturday to be controlled through the implementation of best practical means. Outside of these hours, more extensive control measures and/or management is required.

Recommendation made by DIPE, which were included in the Draft EIS, comprised:

- Preparation of a Noise Management Plan for out of hours work; and
- Provision of 48-hour prior notice required where noise limits expected to be exceeded (e.g., for work between 19:00 and 07:00 hours).

For out of hours work, the notification should include a brief description of the work being undertaken, details of the controls in place to minimise noise impacts, daily start and stop times and the expected duration of the works, and contact details for reporting of complaints.

Due to the nature of surrounding land use (residential, commercial) and the central location of construction works (Darwin CBD) associated with the development, Noise Management Plans will be prepared for all construction phases.

As multiple construction contractors are likely to be involved over several years, a NMP will be submitted by each construction contractor prior to the commencement of their works. These plans will include details of the intended construction operations (such as equipment to be used, equipment noise levels and works schedules) and details of required to be implemented.

The following measures will be implemented place to minimise noise impacts associated with the construction activities.

- All personnel involved with the construction activities will be informed of the need to reduce noise as far as possible.
- Where practicable, the number of items of noisy equipment operating simultaneously will be kept as low as possible.
- Where practicable, noisy activities will be scheduled for times that will cause the least annoyance (expected to be between 07:00 and 19:00 hours).
- All machines and combustion engines will be switched off or have their speed reduced when not in use.
- Where there is scope for the choice of location of any noisy equipment, a location will be chosen which will cause the least annoyance.

- Equipment whose noise emissions are strongly directional will be orientated so as to cause the least annoyance.
- Voice levels will be kept to a minimum.
- Any deliveries will aim to be scheduled during the day.
- Where feasible, no work will commence before 6.00 am or finish after 10.00 pm.
- Public access to areas where noise levels exceed 85 dB(A) will be restricted. (Typically within 5m of noisy activities.)

Traffic Noise

The number and frequency of Heavy and light road vehicles passing existing residential and commercial premises is likely to increase during construction. Impacts from these activities will be mitigated by the following measures:

- Traffic to follow paths away from noise sensitive premises
- Hours of vehicle operation to be limited to daytime hours where feasible
- Low noise vehicles to be used where feasible
- Noise barriers to be used where feasible

Defence questioned the acceptability and feasibility of noise mitigation measures noted in the noise assessment. Defence also advised that multiple Naval ship visits July/August 2004 would provide an opportunity to monitoring the noise impacts of such events.

The proponent acknowledges that the restriction of servicing of vessels to day time hours, as suggested in the Draft EIS, is not feasible.

DEIS - 8.5.5 Visual Characteristics and Values

OEH asked for clarification about how view lines would be protected.

The *Call for Detailed Proposal* for the Master Plan generally restricts building heights to 25 metres AHD in the central section of the site to protect the view lines to the harbour from the top of the escarpment. This height may be exceed if there is sufficient architectural merit from a specific proposal, but any such exception is not expected to have significant building mass and have only minimal restriction of the view lines. This issue will be clarified when the Master Plan has been finalised.

DEIS - 8.5.6 Traffic and Transport

PFES requested consultation during redevelopment planning to ensure relevant issues are addressed and future service provision planned adequately.

Arrangements for Northern Territory agency consultation about the final Master Plan are noted in DEIS 4.5.

DIPE commented that the EIS should "acknowledge some of the broader transport planning issues as part of the environmental assessment process".

As noted in other sections of this document, the *Call for Master Plan Proposals* for the Master Plan places numerous obligations on the eventual develop of the site. Details of traffic and transport management issues are shown under DEIS 6.5.4 above. In summary, the developer is required to carry out a detailed traffic assessment of the final Master Plan, including public transport, parking pedestrian and cycle linkages and the internal road network. This assessment will also address traffic issues during and after all construction phases. This assessment will identify potential planning mechanisms for alternative transport options, such as public transport, pedestrian and cycle access and the linkages with the CBD, to mitigate the potential impacts. In addition, the developer must define all headworks requirements for the redevelopment, including the necessary staging of those headworks for the various construction phases.

AAPA voiced a concern that the possible widening of roadways neat the intersection of McMinn Street and Kitchener Drive may impact on the Stokes Hill Sacred Site.

Any road improvements along McMinn Street and at the intersection of McMinn Street and Kitchener Drive will be carried out with full regard to the conditions of the AAPA Certificate covering the Stokes Hill Sacred Site. The proponent will clarify the boundary of the Sacred Site with AAPA. Where ever possible required road improvements will be undertaken outside the boundary of the Sacred Site. If there is a possibility that proposed works may affect the Sacred Site, formal approval will be sought from senior Aboriginal Custodians for the site before those works commence.

OEH requested clarification of the mechanisms for addressing the issues listed in Section 8.5.6 of the Draft EIS once the Master Plan has been finalised.

As noted above, the selected developer will be responsible for the detailed assessment of traffic and transport issues and requirements. The developer will provide all transport infrastructure within the redevelopment site. The provision of public transport infrastructure will be undertaken through the existing planning framework, with the input about necessary staging from the developer.

Defence questioned the adequacy of the traffic assessment for resupply operations at the Darwin Wharves.

The proponent has committed to undertaken traffic counts during periods of naval ship resupply, and were possible, when multiple ships are berthed at the Darwin Wharves.

DEIS - 8.6.1 Aboriginal Cultural Heritage, Archaeology and Native Title

AAPA approved of the recognition of the Aboriginal people in the redevelopment, but cautioned that the development of any interpretative material must be in consultation with relevant Aboriginal communities.

The short-listed developers have been encouraged to consult with the local Aboriginal community to identify the opportunities for incorporating cultural features into the redevelopment and developing interpretation facilities. The arrangements will be clarified when the final Master Plan is selected.

OEH requested clarification of cultural heritage strategies and mitigation measures and the commitments and mechanisms for managing Aboriginal Cultural Heritage.

The Preliminary Aboriginal Heritage Assessment (Appendix J of the Draft EIS) concluded that, on the basis of the desktop study and preliminary Aboriginal community consultation, the study area is therefore considered to have low archaeological potential. Nonetheless, the assessment report recommended the following measures to ensure cultural heritage issues are dealt with appropriately:

- Ongoing local Aboriginal community consultation to ensure their concerns about the area and development are appropriately addressed;
- Targeted archaeological investigations once the redeveloped has been clearly defined through the final Master Plan;
- Recognition of contemporary values and use of area by Aboriginal people; and
- Acknowledgement of the Aboriginal cultural significance and recognition of past and present Aboriginal land use of the area through development of interpretation of Aboriginal archaeological and culturally significant sites with input from the Aboriginal community.

Potential developers were advised of these recommended measures in the technical information provided to them in February 2004 (see DEIS 3.1.2 of this Supplement). As noted under the preceding comment from the AAPA, the short-listed developers have been encouraged to use this information to inform their proposals for the Master Plan.

An earlier comment from OEH (from DEIS *5.6 above) sought an assurance of the mechanism for undertaking field inspections and/or surveys of the project site to identify areas of potential archaeological significance before works commence.*

The Preliminary Aboriginal Heritage Assessment (Appendix J of the Draft EIS) noted that, "given the high level of ground surface modification, it is highly unlikely that any archaeological evidence of occupation remains." The level of disturbance is also likely to have removed European archaeological artefacts. The Assessment concluded that "as much of the study area has been reclaimed and original landforms levelled, filled and excavated, any archaeological evidence that may have existed in the past in this area, is unlikely to remain intact. This theory however, is subject to confirmation through field inspection."

Discussions were held with officers from Heritage Protection Services within the OEH about the requirements for field assessments of the heritage potential for areas in the project site. OEH require an initial inspection and assessment of sites that may retain intact archaeological elements before any site works proceed. This initial assessment would assess the landform and the degree of disturbance to determine and the likelihood of archaeological elements remaining. The results of this initial assessment

would identify the need for further archaeological field investigation, which would be expected to be incorporated into the first breaking of soil at the location in question.

The CEMP has been amended to include a requirement for heritage field inspections to be undertaken of areas where works are planned before those works commence. These inspections will be undertaken according to the requirements of OEH and with the aim of clarifying if areas retain sufficient archaeological elements to warrant more detailed field investigations. Proposals for these inspections will be prepared in consultation with OEH. Either an officer from OEH or a consultant archaeologist, as required by OEH, will carry out the inspections. It is acknowledged that further archaeological investigations may be required for areas determined to retain archaeological artefacts.

Areas of particular interest for heritage inspection include Goyder's Camp and the base of the escarpment, which formed the original shoreline of Kitchener Bay. This original shoreline included a track in the early years of European settlement. OEH have noted in comments on the Draft EIS that "there is little likelihood of finding European archaeological artefact in the area of Goyder's Camp." Nonetheless, the historical significance of this site warrants assessment and investigation. The site has been nominated recently to the NT Heritage Register, and if this nomination is successful, archaeological investigations of the site would be undertaken as a requirement of the *Heritage Conservation Act*.

Similarly, Hughes Avenue has been nominated to the NT Heritage Register and will be subject to archaeological investigations if registered. An archaeological investigation of Knight's Folly has been commenced by Charles Darwin University.

The only identified heritage features within the proposed Stage 1 of the redevelopment (the central 9.2 hectares of the site between, but not including, the Boom Shed and Stokes Hill) are the Burnett design "G" type house and Kitchener Drive. As explained under DEIS 6.6 above, "G" type house had been relocated to the project site in the early 1990s and therefore had only limited heritage significance. It was removed as part of the preliminary site preparations in July 2004. Kitchener Drive runs along the route of the former walking track along the original shoreline from the early Port of Darwin settlement. Archaeological field investigations of this historical feature are hampered by the presence and active use of Kitchener Drive. Any planned works along Kitchener Drive will be carried out to allow for an initial inspection of the area and any necessary investigatory excavations to be undertaken once the current surface has been removed and before large scale disturbance. This timeframe would also allow UXO assessment and clearance of the area along the base of the escarpment once the surface layer had been scraped away and before any deeper excavations occurred.

DEIS - 8.6.2 European Heritage

MAGNT commented that appropriate measures should be taken to preserve the tangible and intangible heritage values of the site. OEH stressed the importance of adequate interpretation to allow the greatest appreciation of the heritage values, given that much of the physical evidence has been lost.

Historical and cultural sustainability is a key requirement for the redevelopment Master Plan and is an explicit obligation in the *Call for Detailed Proposals*. Furthermore, potential developers have been advised to utilise the varied heritage attributes of the site and incorporate them into the Master Plan

proposals. Potential developers must reflect the unique cultural heritage and history to the site in their proposals. Implementation of this requirement in the final Master Plan offers the opportunity to improve the awareness of the Darwin community and visitors to the both Aboriginal and European history of the site and the varied and unique mix of heritage values that the site contains.

Implementation of this requirement in the Master Plan and the redevelopment will allow significant numbers of local people and visitors to gain access to the broad range of cultural and historical elements of the site. The final Master Plan will integrate a plan for the interpretation of cultural and historic sites at key locations across the site, and allow integration with the nearby historic features of the CBD. It is expected that major historical themes will be incorporated into the redevelopment, however the details of these themes will not be made public until the final Master Plan has been selected. All potential developers were informed of the range and variety of heritage features and potential heritage themes within and near the site in the technical information provided to them in February 2004 (see DEIS 3.1.2 of this Supplement). Goyder's Camp and the early European settlement was given particular emphasis in this advice to developers to ensure that they were aware of the significant opportunity to highlight this heritage attribute and provide suitable interpretation facilities. As noted by OEH, other heritage themes include:

- The natural history of the area;
- Aboriginal occupation before European arrival;
- Contact between Europeans and Aboriginal people;
- Maritime history including wrecks;
- The coming of the Overland Telegraph line;
- The Chinese in Darwin;
- The gold rush era;
- The coming of the railway;
- Darwin as a strategic outpost; oil storage, World War Two, the 1942 bombing, Harbour defences and the boom net;
- Aviation history centred around the flying boat base;
- Cyclone Tracy; and
- Industrial use of the site, including the power station and the iron ore wharf.

DEIS - 8.6.3 Legal Heritage Requirements (Additional Section not included in the Draft EIS)

OEH noted that the legal obligations about heritage protection should be clarified.

The *Heritage Conservation Act* includes obligations for heritage sites. Under Section 39 of the Act, an application must be made to OEH for any action that may impact on any place or object listed on the NT Heritage Register. This requirement was noted in the Draft EIS under "Potential Impacts" but was not repeated in Section 8.6 of the Draft EIS.

The *Heritage Conservation Act* also includes provisions for the protection of any archaeological place associated with Aboriginal or Macassan people, whether the existence or presence of such a place is known or unknown. If any such place is found during the redevelopment, the developer is required to cease work at that location and contact OEH immediately to allow an assessment to be made. This requirement will be included as a condition of contract for all remediation and construction works. The Construction EMP will also include a requirement that, in the event of a discovery of any other heritage artefacts, work will stop and OEH contacted as soon as possible to determine the appropriate actions to be taken.

DEIS - 8.7 Socio-Economic Environment

OEH called for clarification of how the Master Plan will be "sensitive to socio-economic conditions".

The *Call for Detailed Proposals* for the Master Plan has been based on research and consultation undertaken over five years about the preferences and priorities of the Darwin community. The document seeks to ensure that these attributes are incorporated into the Master Plan and the eventual redevelopment. In particular, the document requires developers to:

- Achieve best practice in environmentally sustainable development in a tropical environment;
- To ensure consistency with superior economic, social and environmental outcomes; and
- Demonstrate superior economic, social and environmental outcomes.

Based on the *Call for Detailed Proposals*, the Master Plan will:

- Create a vibrant site which enhances the experience of residents and visitors to Darwin and has a positive cultural impact across all sectors of he DCW site;
- Promote participation of the community and draws people to the site for a broad range of uses;
- Establish and integrate multiple uses of the DCW site to achieve the best outcomes for all users;
- Recognise and utilise the heritage attributes of the site and surrounding areas; and
- Ensure local industry participation and provide for training of the local workforce.

DBIRD stated that recognition should be given to the Defence facilities and uses in the areas adjacent to the site continuing and possible changing after construction. DBIRD also recommended that Defence be included in the development of the agreed EMP for the site.

The range of Defence facilities in, and uses of, the project site are described under DEIS 4 above. Many of these activities will continue as the redevelopment is implemented and may change as longer-term planning issues are resolved. All potential developers have been advised of this in the *Call for Detailed Proposals* for the Master Plan.

As a major user of the Darwin City Wharves, Defence will be consulted about the ongoing risk and environmental management of the site. This will include consultation for the development of the Operational EMP for the site, particularly about management of relevant risks from Defence uses of the wharf facilities and other facilities. The results of a current Defence review of the hazard assessment for the NFI will be incorporated into the Master Plan assessment process.

Further details about issues relating to Defence use of the project site and nearby areas are included in relevant parts of this Supplement.

DBIRD noted that the transitional and construction impacts on businesses and residents must be minimised by ensuring that key issues are managed effectively with the Construction EMP.

Considerable consultation has occurred with adjacent businesses and residents about the redevelopment and its potential impacts. In general, the reactions of this section of the community have been positive.

The Construction EMP will be prepared and implemented by the developer. It is acknowledged that minimisation of impacts on neighbouring businesses and residents will require effective management based on this Plan.

Defence commented that the potential impacts on Defence and other port users have not been adequately considered.

The proponent has stated a commitment to maintain the Darwin Wharves as a working maritime facility to meet one of the key public expectations of the area. Potential developers have been made aware of the range and intensity of use of the Darwin Wharves by Defence and other port users and have been required to incorporate this into their proposals for the Master Plan.

Once the Master Plan has been selected, the proponent and the eventual developer will consult with port users, including Defence and the Darwin Port Corporation, to further clarify any concerns and identify measures to prevent or minimise any impacts.

DEIS – 8.9 Environmental Management Plans

OEH requested an overview of the various management plans proposed to minimise potential impacts.

An outline of these plans is provided in Section 4.4 of this Supplement

3.3 SUBMISSIONS ON APPENDICES TO DRAFT EIS (Volume 2)

A number of respondents commented that one or more of the technical studies in the Appendices (Volume 2 of the Draft EIS) were insufficient.

3.3.1 Appendix D – Assessment of Surface Water Hydrology

OEH noted statement in this assessment acknowledging "the potential for stormwater to become contaminated by soils and groundwater containing metals and hydrocarbons, particularly during the early stages of the project before remediation and stabilisation of contaminated areas has occurred". OEH requested that the Supplement outline measures, and responsible parties, to prevent controlled and uncontrolled release of potentially contaminated water into stormwater. OEH also requested comment about the commencement of baseline surface water monitoring.

The prevention of the mobilisation and release of contaminants will be addressed in the RAP, the Construction EMP and the SMP. These documents are closely related but deal with different stages of the redevelopment (see 3.2.1 [Responses to General Comments] in this Supplement)

OEH also sought clarification about the implementation of best practice and the integration of the various management plans noted in the hydrology assessment.

These issues have been addressed in Section 3.2.9 of the Supplement under DEIS 8.3.3.

3.3.2 Appendix L - Noise Assessment

OEH requested clarification about a number of issues in the noise study and an assessment of the potential impacts of reclamation on the proximity of noise sources to sensitive receivers. OEH also sought clarification of the implementation, measurement and monitoring of suggested noise guidelines, and the timing proposed further surveys and any proposed noise management plan.

These issues have been addressed in Section 3.2.9 of the Supplement under DEIS 6.3.7 and DEIS 8.3.3.

3.3.3 Appendix N – Traffic Assessment

DCC considered the traffic assessment to be insufficient due to its basis on assumptions about the project.

As noted in DEIS 3.2 of this Supplement, the traffic assessment undertaken for the Draft EIS considered the Concept Plan for the redevelopment, and therefore could not address any detail of the eventual development. More detailed assessment will be undertaken once the final Master Plan has been selected. The *Call for Detailed Proposals* for the Master Plan requires the eventual developer to undertake a detailed assessment of traffic and transport issues. Further detail of the required traffic assessment is in DEIS 3.2 of this Supplement.

4.1 Additions to the Construction EMP

Preparation of the Supplement has identified a number of issues that the eventual developer should include in the Construction EMP. These include both statutory requirements and best management practices.

The following statutory requirements should be included as conditions of contract for all remediation and construction works and, where appropriate, the Construction EMP.

Heritage Protection

- An application must be made to OEH for any action that may impact on any place or object listed on the NT Heritage Register (Section 39 of the *Heritage Conservation Act*)
- If any archaeological place associated with Aboriginal or Macassan people, whether the existence or presence of such a place is known or unknown, is found during the redevelopment, the developer is required to cease work at that location and contact OEH immediately to allow an assessment to be made. (*Heritage Conservation Act*)

4.2 Environmental Management Plans

Table S -12 summarises the various environmental management plans proposed for the project.

Table S -12 Summary of Environmental Management Plans

Issue	Management Plan	Basis of Management Plan
Site Contamination	Pre-remediation Site Works Environmental Management Plan (EMP)	The Pre-remediation Site Works EMP will define requirements and operational standards to be adhered to during the initial demolition works. An Occupational Health and Safety Plan (OH&S) supports this plan for the pre-remediation site works that aims to protect site workers from possible exposure to contamination.
Site Contamination	Remediation Action Plan (RAP)	The RAP will define the actions that will be necessary to remediate the site to the necessary extent. The RAP will be finalised once the Auditor is satisfied that remediation objectives have been clearly defined and that the proposed remediation methodologies will meet the objectives for cleanup of the site.
Site Contamination	Site Management Plan (SMP)	The SMP will govern the requirements for incorporating design requirements into construction development and landscaping plans to ensure that residual contaminants do not pose an unacceptable risk to human health or the environment. Additionally, the SMP will address environmental management and waste handling requirements for

Issue	Management Plan	Basis of Management Plan
		any ongoing and future intrusive maintenance or construction works that could compromise any implemented remediation or mitigation measures.
Acid Sulfate Soils (ASS)	ASS Management Plan (ASSMP)	This will address excavation, dewatering and stockpiling This will achieve the desired outcome of containment, treatment or appropriate disposal of ASS material.
Erosion and Sedimentation	An Erosion and Sedimentation Control Plan (ESCP) will be incorporated into the Construction and Operational Management Plans	This Plan will be implemented to minimise soil erosion, sedimentation and dust generation. The objective of the Plan is to manage on-site erosion and drainage and release of stormwater from the development area during construction so that there is no adverse impact on the quality of water in Darwin Harbour.
Marine Environment	Dredging and Reclamation Management Plan (DRMP)	The DRMP will be developed to minimise any adverse environmental impacts associated with dredging, reclamation and spoil disposal.
Unexploded Ordnance	Operational procedures covering detection of UXO and contingency plans in the event of detection have been developed and will be integrated within Construction and Operational Management Plans.	These plans will be developed to avoid casualties through undetected UXO
Air Quality	A program of dust monitoring will be implemented as part of the Construction EMP	Construction, remediation and site management plans will be implemented to reduce dust and other emissions, and reduce risk from contamination
Demolition of various existing buildings and infrastructure	EMP and RAP	The Pre-remediation Site Works EMP will define requirements and operational standards to be adhered to during the initial demolition works. An Occupational Health and Safety Plan supports this plan for the pre-remediation site works that aims to protect site workers from possible exposure to contamination.
Heritage	Heritage Management Plan	Under the *Heritage Conservation Act* 1991, declared heritage places and heritage objects (i.e. places or objects listed on the Northern Territory Heritage Register) are protected from damage, demolition, destruction, desecration or alteration, unless the activity complies with a Heritage Management Plan
Biting insects	Biting insects management plan	Currently the mosquito problem at the Redevelopment area is minor. However, the development area is susceptible to the introduction of exotic species of mosquitos, which may carry the Dengue virus. These species may be brought into the area on visiting ships or cargo from overseas

Issue	Management Plan	Basis of Management Plan
		where these species are endemic. These Dengue vector species may also be introduced from road transport from Queensland and Tennant Creek where the species has been detected.
Traffic Accidents	Construction management plan	The plan will aim to minimise accidents associated with increased traffic movements
Collision of Vessels/Grounding of vessels	Port Management and Planning Process.	These risks will be mitigated through adherence to existing port operational procedures under the direction of the Darwin Port Corporation.
Exposure to Hydrocarbon Impacted Vapours and/or Soil and Groundwater	RAP and SMP	These plans will aim to reduce risks associated with hydrocarbons to site personnel.
Exposure to Airborne Asbestos Fibres	Asbestos management plan	An asbestos management plan needs prepared in case asbestos fibres are encountered during excavation works.
Occupational Health and Safety	Occupational Health and Safety Plan (OH&S)	The plan will define requirements and operational standards to be adhered to during works.
Environmental impacts from construction activities	CEMP	The CEMP will cover a range of issues and measures to prevent or minimise environmental impacts from construction activities. These will include measures to ensure workers and the public are not exposed to contaminants and to prevent mobilisation of contaminants.
Bund wall failure	Contingency Plans in the event of bund wall failure at the site during remediation should be addressed under the remediation contractor's EMP, during construction under the construction contractor's EMP and during operation under the SMP.	Plans will include procedures for contacting emergency services including fire services, the Site Supervisor, the Superintendent and the Office of Environment and Heritage; and for construction of temporary bunding repairs such as temporary earth bunding. The Contractor would be required to include suitable stockpile(s) of material at the site for this purpose; appropriate repair to permanent bunding and the associated holding vessel to the satisfaction of the Contract Superintendent; and appropriate clean up and validation of any contamination that may result from the bund wall failure to the satisfaction of the Contract Superintendent.
Significant Acid Generation	Contingency plans in the event of significant volumes of acid being generated at the site would be addressed under the ASSMP	The plan will include containment of the acidic leachate generated by constructing emergency earth bunding or excavating cut off drains; neutralisation of acidic leachate by adding a neutralising agent, such as lime, to the leachate, or buffering with seawater; constructing reactive barriers, such as limestone caps, to neutralise acid that comes into contact with the barrier; prevention of ASS coming into contact with rainfall, surface water or groundwater by constructing physical barriers, such as covering stockpiles or excavations with ASS with liners or inert earth material; and prevention of ASS

Issue	Management Plan	Basis of Management Plan
		in excavations being exposed to air by burial of exposed ASS or pumping seawater into excavations to prevent exposure of ASS to air and buffer the material.
Stormwater Management including Water Management in Ponds and Swimming Features	Surface Water Management Plan (SWMP)	The plan will address issues by detailing construction specifications and water management and maintenance procedures. The plan will include water requirements and sources; mechanisms for diversion of surface waters and recycling water; maintenance of salinity level; management of potential impacts from high/extreme rainfall events; measures to ensure potentially contaminated water is isolated from the feature; and details of the necessary water quality monitoring program (for protection of both the environment and human health).
Seawall Construction	RAP and SMP	The plans will address the potential, during the excavation of any residual contaminated sediments, for the release of contaminants to the marine environment.
Maritime Activity	Oil Spill Contingency Plan (OSCP)	Any major spillages will be managed by the Darwin Port Corporation through its OSCP.
Weeds	Weed Management Plan	A Weed Management Plan will be developed for the site to assist in the prevention of further introductions and for the long term control of weeds
Excavation and Earthworks	SMP	Measures to minimise dust generation and discharge of sediments to the stormwater system will be addressed as part of the SMP and will include stormwater diversion, stormwater treatment, erosion control and dust suppression
Underground Services	SMP	The SMP will detail the ongoing management of residual contaminated soils at the site.
Ongoing Management of Roadways, Buildings and Landscaping	SMP	Measures will be implemented as part of the SMP for chemical storage, spill control and prevention as well as soil, groundwater and stormwater protection. The SMP will include stormwater diversion and erosion control measures to minimise the discharge of sediments to the stormwater system. Dust suppression measures will be addressed as part of the SMP.
Air Quality During Operation	Development Master Plan	Potential air quality impacts arising from vehicle emissions during ongoing operation of the redeveloped site may be mitigated through

Issue	Management Plan	Basis of Management Plan
		advocacy of public transport and traffic design/management principles in the final Development Master Plan. The conceptual design of the pedestrian connection with the CBD will provide the basis for Traffic Demand Management principles to be incorporated into the long-term planning for the Darwin Waterfront.
Noise	Noise Management Plan (NMP)	The NMP is to contain the proposed schedule of works and activities, and an explanation of noise control techniques planned to be undertaken.
Potential impacts on existing businesses	Master Plan	The Master Plan is expected to integrate CBD businesses and services into the Redevelopment, and provide connectivity between Redevelopment site and CBD.

4.3 Consultation

Several government agencies requested further consultation about various aspects of the project and/or an opportunity to comment on the various plans. In addition to the consultation listed below, the selected developer will be responsible for all consultation required for meet agency requirements for infrastructure (e.g, DIPE-Roads, Power Water Corporation).

Agency	Issues	Purpose
DCC	SMP	Implications for service provision
	CEMP	Potential impacts from unsecured roads on DCC roads
	Master plan	Service provision
Defence	Wharf infrastructure	Negotiations about future use of IOW
	NFI	Assessment as possible soil contamination source; implications of fugitive emissions
	Fuel pipelines	Assessment of possible changes to pipelines
	Port security	Operational requirements; Compliance with Commonwealth legislation and international standards
DHCS	RAP	Comment on plan
	Remediation	Environmental and public health issues
	SMP	Comment on plan
DPC	Port activities and uses	Service provision
	Port security	Service provision; Compliance with Commonwealth legislation and international standards

Agency	Issues	Purpose
OEH	Pre-remediation Site Works and EMP	Compliance
	RAP	Review and assessment
	Remediation	Assessment and compliance
	Construction EMP	Review, assessment and compliance
PFES	Traffic planning	Service provision

Agency acronyms:

DCC	Darwin City Council
Defence	Department of Defence
DFS	Darwin Film Society
DHCS	Department of Health and Community Services
DIPE	Department of Infrastructure Planning and Environment
DPC	Darwin Port Corporation
OEH	Office of Environment and Heritage
PFES	Police Fire and Emergency Services
PWC	Power Water Corporation

Other acronyms:

CEMP	Construction Environmental Management Plan
FHW	Fort Hill Wharf
IOW	Iron Ore Wharf
NFI	Naval Fuel Installation
OEMP	Operational Environmental Management Plan
RAP	Remediation Action Plan
SHW	Stokes Hill Wharf
SMP	Site Management Plan

4.4 Proposed Further Studies

Proposed further studies are shown in **Table S-13**

Table S-13 Summary Of Proposed Further Studies

Issue	Proposed study	Timeframe for completion
PASS/ASS	Further investigations to support initial engineering planning and design	After finalisation of the Master Plan
Potential impacts of marine structures	Hydrodynamic modelling Detailed hydrogeological modelling (including impact of coastal structures on groundwater movement)	After finalisation of the Master Plan
Noise from navy vessels	Expanded noise survey of navy vessels art berth at Darwin Wharves	December 2004
Air Quality	Dispersion modelling of fugitive emissions from NFI and wharf refuelling facilities	
Traffic	Detailed traffic/transport assessment of the Master Plan	After finalisation of the Master Plan

5.1 Summary of Commitments

In addition to the obligations of developers, the proponent has made the commitments listed in **Table S-14**.

Table S-14 Summary of Commitments

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
4.1 Project Description	Remediation	Remediation of portions of the site will be undertaken	DIPE (Central 9.2 hectares) Developer (Remainder of site)	RAP; Compliance with CL Auditor requirements
4.3 Proposed Land Uses	Building heights	Building heights on the central section of the site will be restricted to no greater than RL 25m (except for possible landmark feature)	DIPE	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
4.3 Proposed Land Uses	Surrounding Landscape	Escarpment will be maintained as a buffer of vegetation and backdrop to site	DIPE	NT Government commitment
4.3 Proposed Land Uses	Stokes Hill Area	Approval from Senior Aboriginal custodians will sought for possible demolishing of Fuel Tanks and/or rehabilitation proposed to remove source of contamination	DIPE	Requirement of Sacred Sites Act and condition of AAPA Certificate
6.1 Introduction	Remediation	Remediation and any site management conditions will comply with the requirements of the Contaminated Land Auditor	DIPE (Central 9.2 hectares) Developer (Remainder of site)	Compliance with CL Auditor requirements; Requirement to obtain CL Auditor State of Environmental Audit
6.2.2 Soil Contamination	Hydrocarbons in soil	Soils heavily impacted with hydrocarbons associated with disused infrastructure will be removed and remediated.	DIPE (Central 9.2 hectares) Developer (Remainder of site)	RAP; Compliance with CL Auditor requirements
6.2.2 Soil Contamination	Hydrocarbons in soil	Site management controls will be implemented to provide protection to human health and environment.	DIPE DHCS	Site Management Plan Compliance with *Public Health Act*
6.2.2 Soil Contamination	Management of Volatile Petroleum Hydrocarbons	Mitigating actions will be implemented if fuel oil contamination gives rise to odours.	DIPE (Central 9.2 hectares) Developer (Remainder of site)	RAP – Remediation; SMP – Post remediation; Compliance with CL Auditor requirements and State of

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
				Environmental Audit
6.2.2 Soil Contamination	Surface Water Transport	Site Management Plan will be implemented.	DIPE – until hand over Developer – following handover	Compliance with CL Auditor State of Environmental Audit
6.2.3 Marine Sediments	Contaminants	If required for approved disposal option, tests of the sediments to determine the capacity for contaminants to be released to water column would be undertaken to assess suitability	DIPE	Requirement of disposal approval; Compliance with *Waste Management and Pollution Act*
6.2.5 Stages of the Redevelopment	Pre-Remediation Site Works	Pre- Remediation Environmental Management Plan will be implemented (IMPLEMENTED)	Contractor – implementation; DIPE – Supervision	Condition of works approval
6.2.5 Stages of the Redevelopment	Remediation of Site Contamination	Appropriate location and type of disposal facility for contaminated material will be determined.	DIPE	Licensing under *Waste Management and Pollution Act*
6.2.5 Stages of the Redevelopment	Remediation of Site Contamination	A Remediation Action Plan for the site will be implemented.	DIPE	Compliance with CL Auditor requirements
6.3.2 Geology, Topography and Soils	Sources of Fill	Only clean fill will be used at the site	Contractors, DIPE	RAP, Compliance with Construction EMP
6.3.5 Hydrology	Flooding	Drainage infrastructure will be upgraded throughout the Redevelopment area to safely accommodate runoff from heavy rainfall events	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
6.3.8 Air Quality	Construction	Dust will be managed to have a negligible impact on human health or amenity in the CBD	Contractors DIPE prior to handover; Developer following handover	Construction EMP

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
6.4.5 Impacts on Species of Conservation Significance	Escarpment Vegetation	Construction of the Smith St pedestrian connection between the CBD and the project site will be undertaken with minimal clearing of escarpment vegetation and with measures in place to minimise the risk introduction of weeds	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
6.5.1 Changes to the Existing Built Environment	Toilet facilities	Any new site buildings with toilet facilities will be connected to sewer	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
6.5.2 Unexploded Ordnance	UXO occurrence	Appropriate procedures will be followed to minimise risk from turbidity and mobilisation of contaminants during dredging and excavation works.	Developer, contractor	Construction EMP, Dredging Management Plan
6.5.4 Traffic, Roads and Public Transport Network	Construction Traffic	Potentially affected roads will be strengthened as required and maintained regularly so as to maintain safety standards	Developer, contractor	Construction EMP
7.2.3 Storage, Transfer and Offloading of Fuels and Other Hazardous Materials	Fuel Transport Vehicle Accidents	Spill contingency plans will be developed	Developer, contractor	Construction EMP
7.2.3 Storage, Transfer and Offloading of Fuels and Other Hazardous Materials	Fire, Explosion and Release of Product from Traffic Accident Damage to Fuel Pipelines Or Refuelling and Bunkering (including NFI)[1]	Contingency plans for fire and explosion scenario should be developed and or reviewed and exercises conducted.	Developer, contractors Developer	Construction EMP Operational EMP
7.2.3 Storage, Transfer and Offloading of Fuels and Other Hazardous Materials	Product Spills and Releases	Contingency plans will be developed; Management and engineering controls will be assessed as part of risk assessment and hazard and operability study.	Developer, contractors Developer	Construction EMP Operational EMP

[1] Assumes uncontrolled ship fire

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
7.2.5 Hydrocarbon Soil and Groundwater Contamination	Contaminated soil and groundwater	Control will be maintained on handling and disposal of potentially hydrocarbon impacted groundwater and soil.	DIPE, Developer, contractors Developer	RAP Construction EMP, SMP
7.2.9 Tsunami/Earthquake	Tsunami/Earthquake	Buildings and foreshore areas will be built to code standards to protect against storm surge	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
7.2.10 Terrorist Attacks	Terrorist Attacks	Liaison will be undertaken with the Darwin Port Corporation to confirm their coordinating role and responsibility for the establishment of security committees. The port security plan will be implemented.	Developer	Compliance with Commonwealth maritime security legislation
8.2.3 Soil Remediation	Metal Ore Materials	All metal ores will be removed prior to redevelopment of the site.	DIPE (Central 9.2 hectares) Developer (Remainder of site)	RAP; Compliance with CL Auditor requirements
8.2.3 Soil Remediation	General Fill	Management controls will be implemented for future developments to control contamination.	Developer	SMP; Compliance with CL Auditor State of Environmental Audit
8.2.3 Soil Remediation	Hydrocarbons	Monitoring of contamination levels will be undertaken to ensure that concentrations are at a steady state or declining, unless Government approval is given to allow contamination within smear zone to remain in place.	DIPE, Developer	SMP; Compliance with CL Auditor State of Environmental Audit
8.2.3 Soil Remediation	Volatile Petroleum Hydrocarbons	Developers required to implement suitable odour and vapour protection measures to ensure that accumulation of vapours and odours does not pose risk.	Developer	SMP; Compliance with CL Auditor State of Environmental Audit
8.2.3 Soil Remediation	Volatile Petroleum Hydrocarbons	If required, external ventilation systems may need to be included in building design. The developer will confirm vapour exhaust design requirements.	Developer	SMP; Compliance with CL Auditor State of Environmental Audit

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.2.3 Soil Remediation	Excavation of Disused Infrastructure, Building Foundations and Piping	If significant concentrations of contamination are detected, these will be reported in accordance with relevant NT guidelines.	Developer	SMP; Compliance with CL Auditor State of Environmental Audit; Compliance with *Public Health Act;* Compliance with *Waste Management and Pollution Act*
8.2.3 Soil Remediation	Remediation of Shell Bitumen Plant	Site remediation will be appropriately validated by an environmental auditor to meet clean up standards consistent with redeveloped site.	DIPE (Central 9.2 hectares) Developer (Remainder of site)	RAP; Compliance with CL Auditor requirements
8.2.4 Groundwater Remediation	Hydrocarbon Impacted Groundwater	Monitoring and contingency management will be undertaken, including treatment of dewatered groundwater during construction before discharge to the marine environment	DIPE – until hand over Developer – following handover	SMP; Compliance with CL Auditor requirements
8.2.4 Groundwater Remediation	Petroleum Hydrocarbons Impact on Marine Environment	Developer must provide an engineered program satisfying the provisions of the *Waste Management and Pollution Control Act* and the *Water Act*	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.2.5 Contaminated Marine Sediment/ 8.3.4 Marine Environment	Dredging	Environmental specifications within a Dredging Management Plan for activities will be defined to ensure that turbidity and contamination effects are minimised. Monitoring will be undertaken during dredging and triggers will be implemented to stop work if criteria threshold are exceeded.	Developer	Compliance with *Waste Management and Pollution Act,* Requirement of Darwin Harbour Dredging Technical Advisory Committee
8.2.6 Acid Sulphate Soils and Contamination	ASS Management	An Acid Sulfate Soil Management Plan (ASSMP) will be implemented for development works requiring deep excavation or dewatering in areas with potential acid sulfate soils. This will include storage, disposal and dewatering procedures.	Developer	Compliance with *Waste Management and Pollution Act*
8.2.6 Acid Sulphate Soils and Contamination	Excavation and Stockpiling	Stockpiling of excavated and untreated ASS should be minimised	Developer	Compliance with Acid Sulfate Soil Management Plan

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.2.7 Disposal of Contaminated Material	Disposal facilities	Selection of facilities will be undertaken through standard Northern Territory Government approvals processes and under requirements of the *Waste Management and Pollution Control Act* and, where appropriate the Darwin Harbour Dredging Technical Advisory Committee	Developer	Compliance with *Waste Management and Pollution Act,* Requirement of Darwin Harbour Dredging Technical Advisory Committee
8.2.8 Management Controls Addressing Contamination Handling Practices	Remediation	Remedial Program will be finalised including required special handling procedures. Remediation options will address appropriate methodologies to protect human health and the environment for agreed land uses	DIPE (Central 9.2 hectares) Developer (Remainder of site)	RAP; Compliance with CL Auditor requirements
8.2.8 Management Controls Addressing Contamination Handling Practices	Initial Cleanup Measures	Remedial Action Plan (RAP) will be implemented.	DIPE (Central 9.2 hectares) Developer (Remainder of site)	Compliance with CL Auditor requirements
8.2.8 Management Controls Addressing Contamination Handling Practices	Future Construction and Intrusive Maintenance Operations	The Site Management Plan (SMP) will be implemented	Developer	SMP; Compliance with CL Auditor State of Environmental Audit; Compliance with *Public Health Act;* Compliance with *Waste Management and Pollution Act*
8.2.8 Management Controls Addressing Contamination Handling Practices	Construction Activities	The Construction Environmental Management Plan (CEMP) will be implemented	Developer	Condition of approval for development under *Planning Act*
8.3.1 Soils	Soil Erosion and Excavation	Activities will be restricted to the Dry season, drains will be designed and constructed to produce non-scour velocities and to avoid erosion at inlet and outlet points.	DIPE – until hand over Developer – following handover	Construction Environmental Management Plan
8.3.1 Soils	Soil Erosion and Excavation	Erosion and Sedimentation Control Plan (ESCP) will be implemented.	Developer	Construction Environmental Management Plan

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.3.1 Soils	Dust	Water trucks will be used to suppress excessive dust generation.	Developer	Construction Environmental Management Plan
8.3.1 Soils	Acid Sulfate Soils	Disturbance of ASS and PASS will be minimised wherever possible.	Developer	Construction Environmental Management Plan
8.3.1 Soils	Debris from Existing Fill Material	Debris generated by or exposed during site preparation will be disposed at appropriate waste disposal facilities.	DIPE – until hand over Developer – following handover	Condition of approval for works Condition of approval for development under *Planning Act*
8.3.1 Soils	Problematic Subsurface Conditions	Buildings will be located on areas with subsurface conditions that suit the load of the structures; this will include appropriate geotechnical assessment and engineering design.	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.3.1 Soils	Construction Waste Generation and Management	Waste management and disposal will be carried out in accordance with the *Waste Management and Pollution Control Act.*	DIPE – until hand over Developer – following handover	Compliance with *Waste Management and Pollution Act* Compliance with *Public Health Act;* SMP,
8.3.1 Soils	Release of Contaminants from Dewatering	A detailed dewatering plan will be prepared and implemented to ensure that the impact of dewatering activities is minimised	Developer	Condition of approval for development under *Planning Act*
8.3.1 Soils	Land Reclamation	Neutralisation, including buffering with seawater, will undertaken where required to combat the potential generation of acid if ASS materials are incorporated with materials used for reclamation.	Developer	Acid Sulfate Soil Management Plan
8.3.1 Soils	Contingency Plans – Bund Wall Failures	Contingency Plans to be implemented in the event of bund wall failure	Developer Remediation contractor Construction contractor	RAP, Construction Environmental Management Plan; SMP

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.3.1 Soils	Contingency Plans – Significant Acid Generation	Contingency Plans to be implemented in the event of significant volumes of acid being generated at the site would be addressed under the ASSMP.	Developer	Construction Environmental Management Plan, Acid Sulfate Soil Management Plan
8.3.2 Hydrogeology	Acid Sulfate Soils and Infrastructure Protection	Management of disturbance of acid sulfate soils will address stockpiling, dewatering, foundation design and revegetation.	Developer	Acid Sulfate Soil Management Plan, Construction Environmental Management Plan
8.3.3 Hydrology	Erosion/Contamination	Erosion risk will be managed using an ESCP, and contamination managed with appropriate site remediation and stabilisation.	Developer	Construction Environmental Management Plan; SMP
8.3.3 Hydrology	Water Management in Ponds and Swimming Features	The ponds and swimming feature will be designed to accommodate rainfall or stormwater inflows up to a 100-year ARI. Where appropriate, water supply will access water recycled from within the development area (for non-contact use) and ponds will be incorporated into and supplement the stormwater quality treatment system.	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.3.3 Hydrology	Stormwater Management	Surface water management plan will be implemented.	Developer	Construction Environmental Management Plan; Operational Environmental Management Plan, SMP
8.3.4 Marine Environment	Options for Dredging Operations	Dredging operations will consider the location of proposed operations, the contaminant status of the sediments and the proposed disposal location	Developer	Dredging Management Plan
8.3.4 Marine Environment	Maritime Activity	Sufficient materials to combat oil spills will be maintained within the site, and procedures will be put in place to manage any spills. Appropriate refuelling, cooking, washing, ablution and toilet facilities will be incorporated into design at site to minimise risks	Darwin Port Corporation	Oil Spill Contingency Plan

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
		of small spillages.	Developer	Requirement of approval under *Planning Act*
8.4.1 Vegetation	Vegetation clearing	Clearing of vegetation will be undertaken with a commitment to minimal impact on surrounding forest and maintaining integrity of vegetation community.	Developer	Construction Environmental Management Plan;
8.4.1 Vegetation	Weeds	A weed management plan will be developed to assist in prevention of further introductions and long-term control of weeds. Spread of Class B noxious weeds will be controlled and wash-down facilities will be provided for earthmoving equipment.	Developer	Construction Environmental Management Plan; Operational Environmental Management Plan
8.4.1 Vegetation	Trees	Wherever possible, trees listed on the Register of Significant trees in and near the project site will be retained for aesthetic or historical value.	Developer	Construction Environmental Management Plan; Operational Environmental Management Plan
8.4.2 Terrestrial Fauna	Habitat Protection	Existing habitat will be protected through the installation of temporary fencing of vegetation at the base of escarpment prior to any road works.	Developer	Construction Environmental Management Plan
8.4.4 Biting Insects	Topographical Depressions	Potential mosquito breeding depressions will be either filled, drained or re-contoured; development activity will not create areas capable of holding water for more than three days	Developer	Construction Environmental Management Plan; Operational Environmental Management Plan
8.4.4 Biting Insects	Stormwater Drains	Stormwater drains identified as potential breeding habitats for mosquitoes will be treated to reduce breeding	Developer	Replacement of stormwater system an obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.4.4 Biting Insects	Artificial Receptacles	Site preparation and construction will be undertaken to prevent an increase in artificial receptacles capable of mosquito breeding.	Developer	Construction Environmental Management Plan

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.4.4 Biting Insects	Landscaping	Shrub type vegetation will be considered around any proposed public areas to control mosquitoes.	Developer	Advise during finalisation of the Master Plan and ongoing vegetation management
8.4.4 Biting Insects	Personal Protection from Mosquitoes	Information about the timing of biting insects and personal protection measures will be provided to developers, potential residents, landholders and businesses in the project site.	DHCS Developer	Advise during finalisation of the Master Plan and ongoing site development
8.5 Built Environment	Site Clearance	Stormwater runoff controls will be implemented to minimise erosion and dust generation will be minimised through dust suppression measures.	Developer	Construction Environmental Management Plan
8.5 Built Environment	Excavation and Earthworks	Waste material will either be re-used on site as fill material or transported to licensed landfill	Developer	Construction Environmental Management Plan, SMP
8.5 Built Environment	Underground Services	Uncontaminated soil will either be re-used on site as fill material or transported to licensed waste facility	Developer	Construction Environmental Management Plan
8.5 Built Environment	Buildings, Roadways and Landscaping	Measures will be implemented for chemical storage, spill control and prevention as well as soil, groundwater and stormwater protection (including stormwater diversion and erosion control, and dust suppression measures). Where required, clean topsoil will be imported to facilitate establishment of landscape as intended.	Developer	SMP, Construction Environmental Management Plan, Operational Environmental Management Plan
8.5 Built Environment	Site Personnel	Liquid waste will be transported and disposed of at a licensed liquid and solid waste facility. The SMP will be implemented for chemical storage, spill control and prevention as well as soil, groundwater and stormwater protection.	Developer	Construction Environmental Management Plan, SMP

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.5 Built Environment	Site Operation and Maintenance	Designated areas for solid non-hazardous waste and defined recyclable and non-recyclable waste systems will be established.	Developer	Construction Environmental Management Plan
8.5.3 Air Quality	Demolition and Remediation Works	Water sprays will be used across work zones and unsealed areas, mitigation measures will be implemented, and direction of prevailing winds will be assessed in relation to impact of dust on surrounding vegetation, housing and offices and mitigation methods implemented	DIPE	Condition of approval for works
8.5.3 Air Quality	Construction	Measures will be will be implemented to minimise the potential for off-site dust emissions, which will include dust suppression measures; also regular checks of dust levels generated by works and remedial action will be taken whenever visible off-site emissions occur.	Developer	Construction Environmental Management Plan
8.5.3 Air Quality	Operation	Impacts arising from vehicle emissions will be mitigated through advocacy of public transport and traffic design/management principles in the final Development Master Plan.	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.5.3 Air Quality	Air Emissions and Energy Efficiency	An analysis of building design and operation, public transport, non-vehicular access and energy efficient technology will be made in regards to emissions and efficiency.	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.5.3 Air Quality	Emissions of and Exposure to Air Toxics	Assessment of the dispersion of fugitive emissions from the NFI will be undertaken before Stage 1 construction works commence.	DIPE	Expected to be a condition of environmental approval
8.5.4 Noise	Construction Noise	Written notice will be issued at least 48 hours before proposed works to occupiers of all noise sensitive premises where maximum allowable noise level of the site is likely to be exceeded. A Noise Management Plan (NMP) must be established for night-time construction activities.	Developer, contractors	Construction Environmental Management Plan

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
8.5.4 Noise	Entertainment Noise	Permanent entertainment facilities at redeveloped site will comply with the standards required by NT Government regulators. Management of noise from external events should form an integral part of the NMP.	Owner or lessee	Expected condition of Development Approval for premises
8.5.4 Noise	Traffic	Separation distance between main access roads and premises should be maximised and volumes of passing traffic ill be minimised, external fabric of buildings within development should be designed to achieve noise reduction.	Developer	Finalisation of Master Plan
8.5.4 Noise	Mechanical and Electrical Equipment	Mechanical and electrical equipment and associated air inlets and outlets will be located away from noise sensitive premises.	Developer, owners/lessees	Finalisation of Master Plan, Expected condition of Development Approval for individual sites
8.5.4 Noise	Wharf Activities	Noise impact associated with servicing of navy and cruise liner vessels at the wharves will be minimised through effective planning and layout design.	Developer	Finalisation of Master Plan
8.5.4 Noise	Mechanical and Electrical Services	Noise will be controlled to prevent exceedence of noise limits at surrounding noise sensitive premises.	Developer, owners/lessees	Finalisation of Master Plan, Expected condition of Development Approval for individual sites
8.5.4 Noise	Item Specific Noise Limits	Noise from continuously operating equipment will have item specific noise limits established.	Developer, owners/lessees	Finalisation of Master Plan, Expected condition of Development Approval for individual sites
8.5.5	Visual Characteristics and Values	Height controls for all structures will not exceed view lines obtainable from the city, Visual and functional integration will be achieved along the Smith Street axis,	Developer	Finalisation of Master Plan
8.5.6 Traffic and Transport	Impacts	Detailed traffic assessment will be undertaken of the final Master	Developer	Obligation on developer (*Call for*

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
		Plan		*Detailed Proposals* for the Master Plan)
8.5.7 Unexploded Ordnance	Contingency and Management Plan	Operational procedures covering detection of UXO and contingency plans in the event of detection will be implemented	Developer	Construction and Operational Environmental Management Plans
8.5.7 Unexploded Ordnance	General Site Procedures	Awareness training and general operation procedures will be implemented and be part of any tender documentation for works on the site. Any excavation into 1942 soil and sediment should only proceed with UXO clearance from specialists.	Developer	Construction and Operational Management Plans
8.6 Heritage	Heritage	Heritage sites and artefacts will be used to form an identity to the Redevelopment.	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.6 Heritage	Heritage	If any heritage artefact is discovered works will stop and OEH notified as soon as possible.	Developer	Construction Environmental Management Plan
8.6.1 Aboriginal Cultural Heritage, Archaeology and Native Title	Acknowledgement of Aboriginal Cultural Significance	The Cultural significance of the project site will be acknowledged	Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.6.1 Aboriginal Cultural Heritage, Archaeology and Native Title	Recognition of Contemporary Values	Development of the escarpment base should be avoided.	Developer	NT Government commitment, Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.6.1 Aboriginal Cultural Heritage, Archaeology and Native Title	Ongoing Local Aboriginal Community Consultation	Consultation should be undertaken with the relevant Aboriginal community groups, the proponent and the OEH to determine possible future land uses for Stokes Hill.	DIPE, Developer	Obligation on developer (*Call for Detailed Proposals* for the Master Plan)
8.6.2 European Heritage	Heritage Features	Mitigation measures will be implemented to retain and protect heritage sites, retained heritage features will be utilised in the Redevelopment. Any removal or destruction of heritage sites should be documented to the requirements of the OEH before	Developer	Construction Environmental Management Plan

Section	Issue	Commitment	Responsibility	Mechanism for Implementation
		any works are undertaken.		
8.7 Socio-economic Environment	Impact	Planning for continued during construction access will minimise the impact on local businesses.	Developer	Construction Environmental Management Plan
8.8.1 Hydrology	Monitoring	Surface water monitoring will be undertaken for baseline and construction/operational phases of the project.	DIPE – until hand over Developer – following handover	Compliance with *Waste Management and Pollution Act* Compliance with *Public Health Act;* SMP,
8.8.3 Vegetation	Monitoring	Monitoring of management actions, notably weed control, and changes in vegetation condition will be used to guide future management decisions.	Developer	Operational Environmental Management Plan
8.8.5 Air Quality	Demolition and Construction	Dust monitoring will be continued during major demolition and construction works.	Developer	Construction Environmental Management Plan
8.9 Environmental Management Plans	Management Plans	Pre-remediation Site Works Environmental Plan, RAP, SMP, framework for the CEMP, and the framework for the OEMP will be implemented.	DIPE – until hand over Developer – following handover	Compliance with CL Auditor requirements; Requirement to obtain CL Auditor State of Environmental Audit; Compliance with *Waste Management and Pollution Act* Compliance with *Public Health Act;*

Hanley, J.R., Caswell, G., Megirian, D. and Larson, H.K. (1997). *The Marine Flora and Fauna of Darwin Harbour, Northern Australia.* Proceedings of the Sixth International Marine Biological Workshop. Museum and Art Galleries of the Northern Territory and Australian Marine Sciences Association.

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7.1 Study Team

Management and technical direction for preparation of the Supplement to the Draft EIS was provided by Charles Johnston and Paul Lloyd of URS Darwin.

Special thanks goes to Pat Coleman, Terry O'Neill and Hannah Clement from the Darwin City Waterfront Team and Phill Piper from DIPE for their assistance in the preparation of the Supplement.

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7.2 Consultation

Several specialists who had conducted investigations and assessments for the Draft EIS also provided technical advice for the Supplement:

- Preston Adams, SVT (Noise)
- Andrew Leedham, Connell Wagner (Traffic and Transport)

Technical advice was obtained from key people in government agencies during the preparation of the Supplement:

Mark Every	Darwin Port Corporation
Chris Glasby	Museum and Art Gallery of the NT
Peter Jolly	DIPE - Natural Systems
Tim Merrigan	Darwin City Council
Gerard Niemoeller	Office of Environment and Heritage, Heritage Protection Services
Steve Oliver	GEMS
Neil Smit	DIPE – Conservation and Natural Resources
Shane Smith	Darwin City Council
Michael Wells	Office of Environment and Heritage, Heritage Protection Services

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The methodology adopted and sources of information used by URS are outlined in this report. 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 report as provided to URS was false.

This report was prepared between 15 –17 July and is based on the information reviewed 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 does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

N

LEGEND

SUB SURFACE CONDITIONS

- Fill /Bedrock (Original Hills) Suitable for shallow footing under medium to high loading (i.e high rise buildings)
- Fill/Marine Mud/Bedrock (Reclaimed Land) Suitable for shallow footing under very light to light loading (i.e. single storey buildings.)
- Estimated Original Shoreline
- 0.4 Marine Mud Thickness
- Stokes Hill Area
- Bitumen Plant Area
- Fort Hill Area
- Northern Cement Plant Area
- Recent Reclaimed Area
- Warehouse Area
- To be retained

NOTE: Locations of some test pits may require to be replaced by boreholes or relocated due to restrictions from utilities or other encumbrances.

0 40 80 120 160 200

METRES

Fort Hill Wharf

Job No.	36909-007-562	
Prep. By	TMC	22 Jul 04
Chk'd By	EAN	22 Jul 04
Revision No.		0

Department of Infrastructure, Planning and Environment
DARWIN WATERFRONT PROJECT

LAND USE SUITABILITY

Figure S-1

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S:\Risk and Liability\DIPE\36909007 DRW Harbour Precinct Study\Drawing\r041\36909007r041FS-1.dgn

WA-RR2

WA-RR1

WA-NC

BP-FH

FH

SH

VALVE PIT

WA_TP41

KD_TP08

WA_SB09

WA_SB10

WA_TP02

WA_TP01

WA_SB07

RR_SB02

RR_TP11

WA_SB01

WA_TP05

RR_SB04

RR_MW15

RR_SB06

WA_TP07

WA_SB03

BP_TP12

KD_MW02

RR_MW16

BP_SB03

NC_TP08

NC_MW17

Fort Hill Wharf

N

LEGEND

- Groundwater Monitoring Well
- Additional Soil Bore
- Additional Test Pit
- Surface and Shallow Samples
- Phase 3 Acid Sulphate Soil Samples
- Sample Tests
- PASS/ASS materials showing percentage oxidisable sulfur greater than action criteria (WA DEP, 2003)
- Not to be investigated
- Extent of Marine Sediment
- -4.0 Top of Marine Sediment (mAHD)

0 40 80 120 160 200

METRES

Job No.	36909-007-562	
Prep. By	MN	23 Jul 04
Chk'd By	WD	23 Jul 04
Revision No.		1

Department of Infrastructure, Planning and Environment
DARWIN WATERFRONT PROJECT PHASE 3

ACID SULPHATE SOIL DISTRIBUTION EXCEEDING ACTION CRITERIA

Figure S-2

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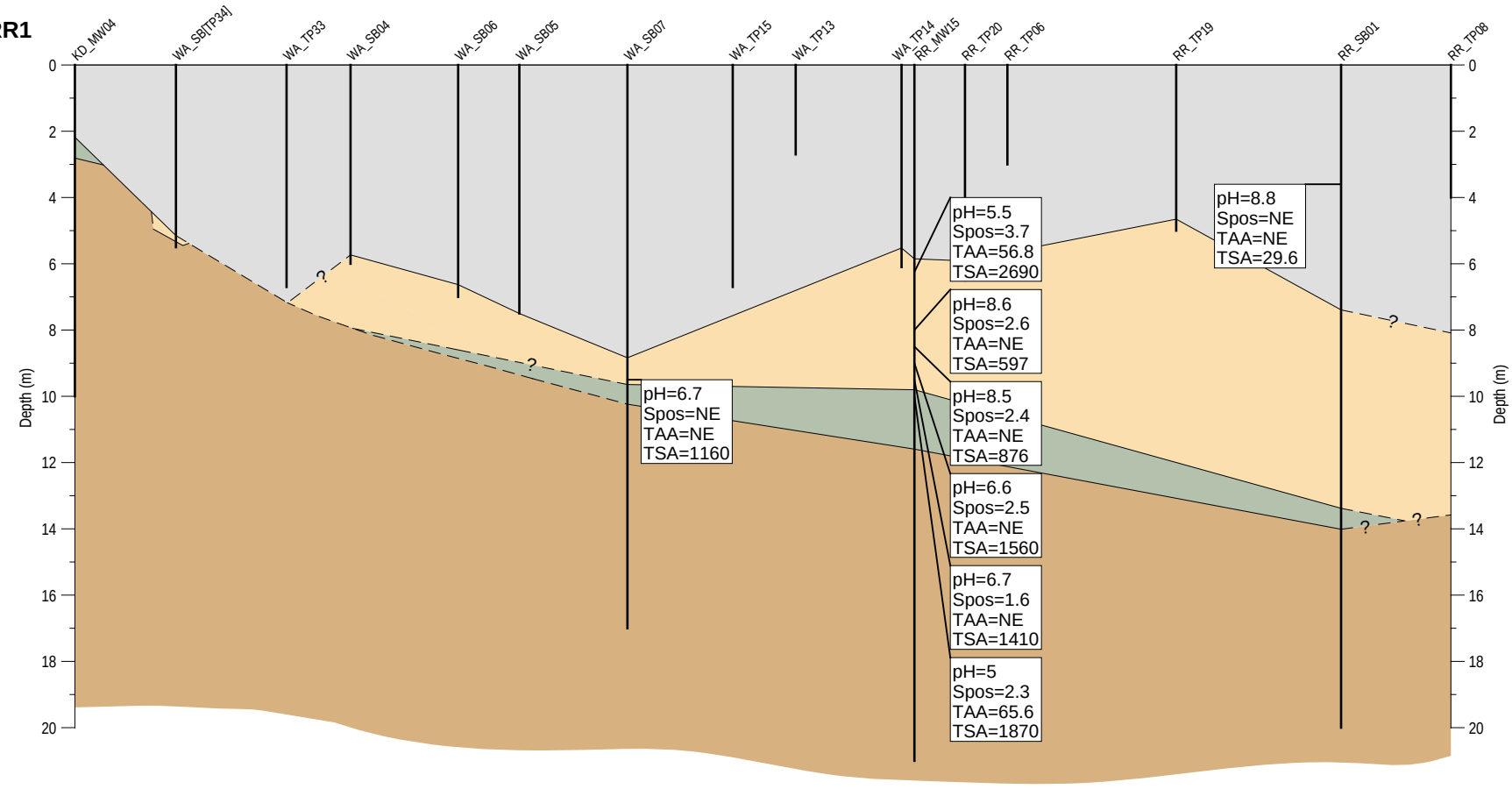
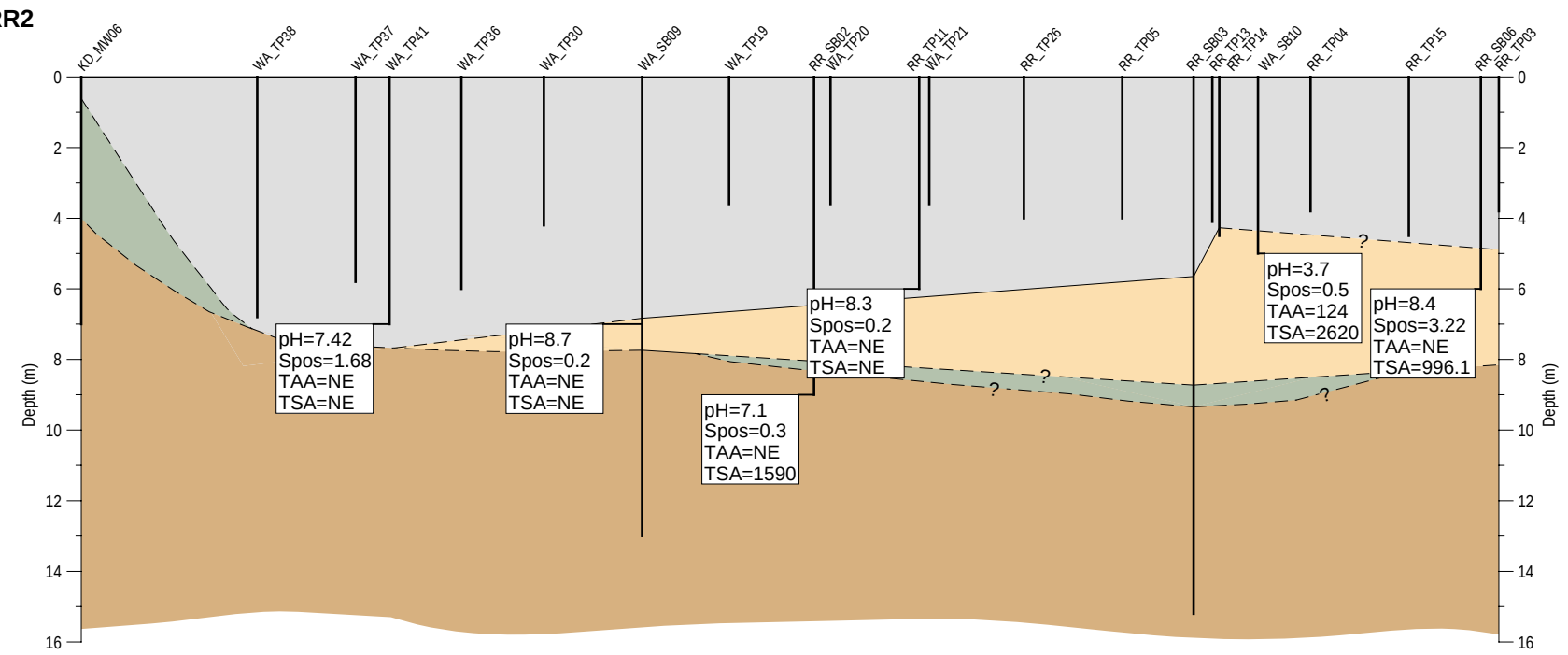
36909007/0415-3B.dgn

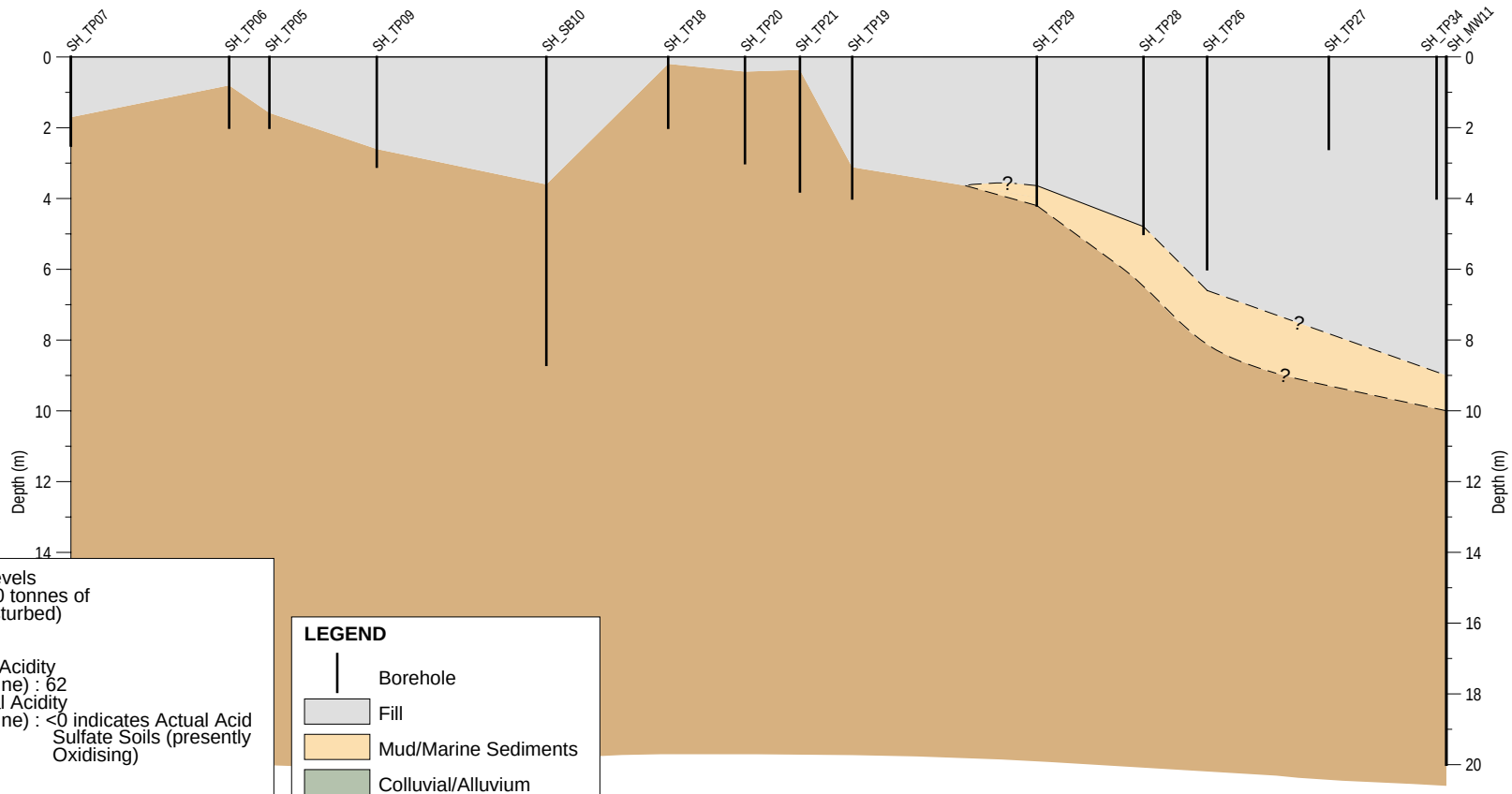
WA-RR1



WA-RR2



SH-SH



Action Criteria Levels
(Assuming >1000 tonnes of material to be disturbed)

%S (Spos) : 0.03
TSA (Equivalent Acidity molH+/tonne) : 62
TAA (Total Actual Acidity molH+/tonne) : <0 indicates Actual Acid Sulfate Soils (presently Oxidising)
pH : pH Value

NE : No Exceedance of action criteria

LEGEND

- Borehole
- Fill
- Mud/Marine Sediments
- Colluvial/Alluvium
- Bedrock

0 25 50m

HORIZONTAL SCALE 1 : 1 000 at A4
VERTICAL SCALE 1 : 250 at A4
VERTICAL EXAGERATION 5x

Job No.	36909-007-562	
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Department of Infrastructure, Planning and Environment
DARWIN WATERFRONT PROJECT PHASE 2

CROSS SECTIONS WA-RR1, WA-RR2 & SH-SH OF PASS/AASS MATERIAL EXCEEDING ACTION CRITERIA

Figure S-3b

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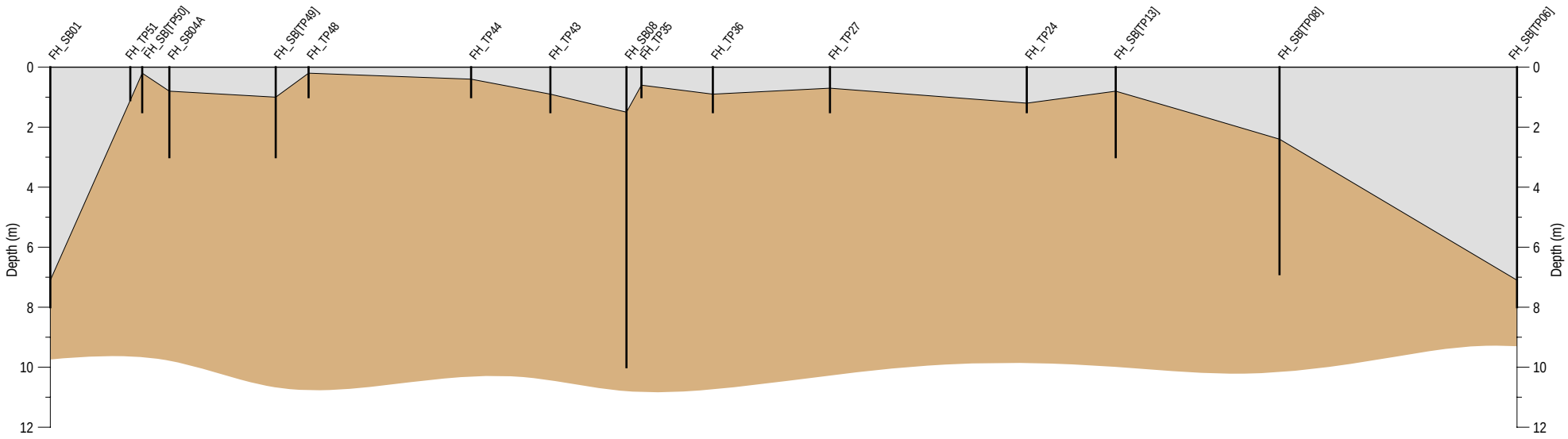
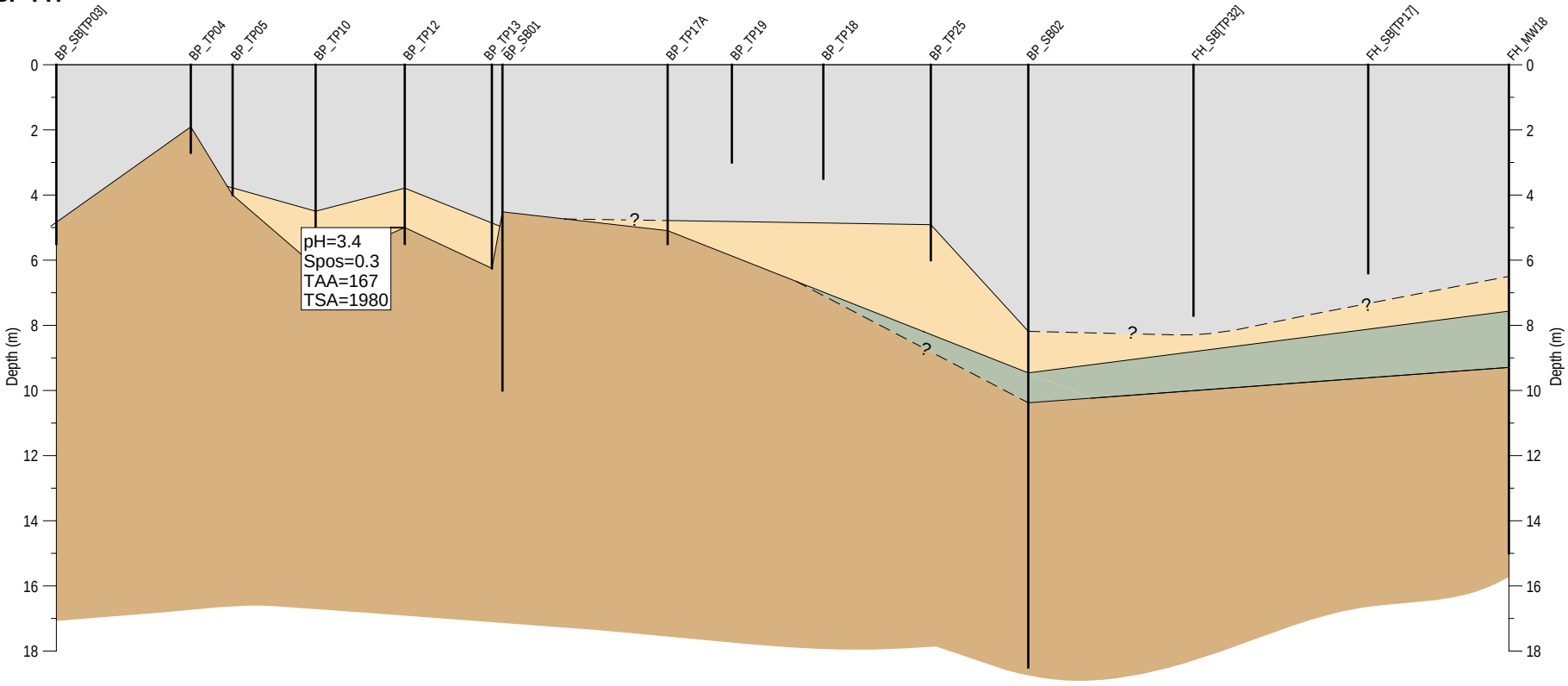
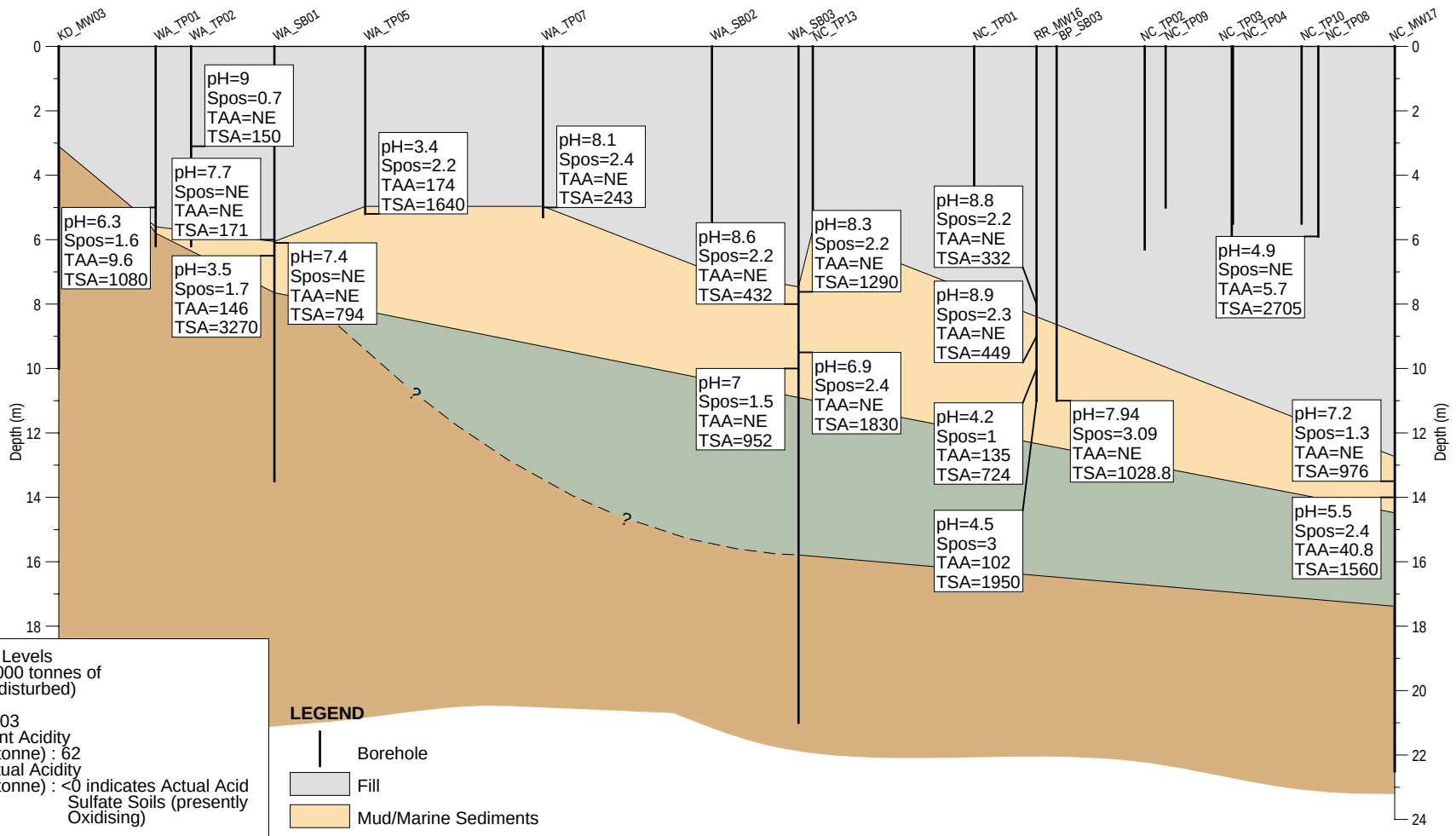
FH-FH



BP-FH



WA-NC



Action Criteria Levels
(Assuming >1000 tonnes of material to be disturbed)

%S (Spos) : 0.03
TSA (Equivalent Acidity molH+/tonne) : 62
TAA (Total Actual Acidity molH+/tonne) : <0 indicates Actual Acid Sulfate Soils (presently Oxidising)
pH : pH Value

NE : No Exceedance of action criteria

LEGEND

- Borehole
- Fill
- Mud/Marine Sediments
- Colluvial/Alluvium
- Bedrock

0 25 50m

HORIZONTAL SCALE 1 : 1 000 at A4
VERTICAL SCALE 1 : 250 at A4
VERTICAL EXAGERATION 5x

Job No.	36909-007-562	
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Revision No.		0

Department of Infrastructure, Planning and Environment
DARWIN WATERFRONT PROJECT PHASE 2

CROSS SECTIONS FH-FH, BP-FH & WA-NC OF PASS/AASS MATERIAL EXCEEDING ACTION CRITERIA

Figure S3a

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LEGEND

1 Danoe Ra Park
2 Submarine Cable Landing Point
3 Tamarind Trees
4 Goyder's Camp
5 Goyder Memorial
6 Boom Maintenance Shed
7 Government House
8 Knight's Folly
9 Former Court House and Poilce Station
10 Town Hall Ruins
11 Browns Mart
12 Smith Street Stone Kerbing
13 Christ Church Portico
14 Burnett Design "G" Type Residence
15 Stella Maris
16 Steam Pump House
17 *Warrego* Wreck
18 MV *Neptuna*

N

0 40 80 120 160 200
METRES

Job No.	36909-007-562	
Prep. By	PL	23 Jul 04
Chk'd By	PL	23 Jul 04
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Department of Infrastructure, Planning and Environment
DARWIN WATERFRONT PROJECT PHASE 2

HERITAGE FEATURES IN AND NEAR THE DCW SITE

Figure S-4

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