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**Northern Territory Government,
Department of Planning and Infrastructure**

Darwin City Waterfront
Residential Area

Environmental Audit Report

Wharf One Residential/Mixed Use Complex
19 Kitchener Drive, Darwin

July 2009



Statement of Environmental Audit

This Statement provides a summary of the findings of an Environmental Audit of the Site referred to as **Wharf One Residential / Mixed Use Complex** located at **19 Kitchener Drive, Darwin**, Northern Territory in accordance with Section 47d of the *Waste Management and Pollution Control Act (NT)*.

Name of Auditor	Dr Peter Nadebaum of GHD Pty Ltd
Term of appointment of Auditor (under the Victorian Environment Protection Act 1970)	16 May 1990 to 29 November 2011
Date Audit requested	September 2003
Owners of the site	Northern Territory Government under the Administration of Department of Planning and Infrastructure.
Person requesting a Certificate	Terry O'Neill of the Northern Territory Government Department of Planning and Infrastructure.
Municipality	Town of Darwin
Title Information	Part of Volume 735 Folio 642 as defined on Lot 7610 and Part Lot 7770, Subdivision of Lot 7769, Town of Darwin as defined on Lot A of Drawing No. 2008/094B (attached in Appendix A)
Area of the Site	1.2 hectares
Zoning	Central Business under the Northern Territory Planning Scheme

The audit has had regard to, amongst other things:

- ▶ The Waste Management and Pollution Control Act (NT),
- ▶ The National Environment Protection (Assessment of Site Contamination) Measure (NEPM 1999),
- ▶ Water Act (NT),
- ▶ Advice provided by the Northern Territory Environment Heritage & Arts Division, Department of Natural Resources Environment & the Arts (EHA/DNRETA), and
- ▶ Guidance provided by the Victorian Environment Protection Authority.

Summary of findings

The Site is historically a marine area reclaimed through uncontrolled and controlled filling and was previously utilised for industrial purposes. Remediation of the Site has been undertaken to make the Site suitable for its intended purpose, and the Site is now covered with a basement, associated stairwells and overlying the building. The ongoing use of the Site is subject to certain conditions and the Site Management Plan (Environment) and Groundwater Management Plan attached to this Statement of Environmental Audit. The following information is relevant regarding the condition of the Site:

- ▶ Underlying fill can include glass, concrete, plastic, metal, wood pieces and other building and demolition waste at some locations. Very little biodegradable material is present and the age of the fill makes it unlikely that methane and other gases would be generated at levels of concern or above concentrations that would occur naturally where marine sediments are present. The fill material may be judged to be aesthetically objectionable if it were to be uncovered and may also adversely affect



the growth of plants if it were present in garden areas. We note that there are no garden areas on this site.

- ▶ Asbestos cement sheeting was detected in one area during the validation works. This material was removed from site and further excavation was conducted in the vicinity of the area where the asbestos was found, and no additional asbestos was found. It is possible that some pieces of asbestos cement sheeting remain elsewhere and if excavations take place in the future the work should be managed in accordance with the Site Management Plan (Environment) and any asbestos disposed of off Site in accordance with regulatory requirements.
- ▶ A dark purplish iron ore material has been observed off site to the southwest of the Site. This material was also removed from on site during basement excavation / remediation works. The Remediation Action Plan has had provision to remove any such material identified during site works as it may be considered to be aesthetically objectionable. It does not represent a health risk. Inspections have not identified the presence of such material remaining on the site.
- ▶ Concentrations of heavy metals and PAHs have been measured in isolated samples of fill at concentrations that exceed residential land use health investigation levels, but comply with commercial and industrial land use levels. This material is located beneath the building basement with limited opportunity for exposure and this material would not be expected to adversely affect human health. On a precautionary basis, sub-slab maintenance work should comply with the requirements for occupational health and safety outlined in the Site Management Plan (Environment).
- ▶ Hydrocarbon contamination can be present in fill and natural soil and rock at the Site. The contamination is generally several meters beneath the surface and in the vicinity of the groundwater, and can give rise to contamination of the groundwater. This contamination is odorous and may be judged to be objectionable if exposed and may be hazardous to persons if they come into direct contact with the material. If excavations take place and intersect the material, it should be managed and disposed of off Site in accordance with regulatory requirements and the Site Management Plan (Environment).
- ▶ Hydrocarbon contaminated groundwater is present at the site; this includes a thin film or sheen of hydrocarbons on the groundwater in some locations. This could adversely affect the lagoon if it were to discharge into the lagoon. A drainage system is provided to avoid this occurring, and the Northern Territory Government advises that this system will remain in operation until monitoring shows that contamination has reduced to a level where the drainage system can safely cease operation. Hydrocarbon contaminated groundwater could be aesthetically objectionable if it were allowed to enter building basements. To avoid this, the Site development has included a groundwater drainage system to assist in maintaining the groundwater below the level of the residential building basement floor slab, consisting of subsoil drains and a perimeter drainage system around the residential building. Certain areas of the building basement have also been tanked. Groundwater at the site can be saline, and selection and planting of trees if proposed should take this into account. However we note that the site is entirely covered by building basements or stairwells, and is therefore not relevant to this site. Groundwater at the Site should be managed in accordance with the Groundwater Management Plan.



- ▶ Methane gas testing was undertaken and methane was detected in two groundwater bores adjacent to the Site. The measured concentrations were less than the adopted trigger value of 20% of the Lower Explosive Limit (LEL) of methane in air and it is concluded that methane poses a low risk with respect to explosion or asphyxiation.
- ▶ Potential acid sulphate soils can be present in the natural marine sediments underlying the fill. Any work undertaken that may aerate or otherwise disturb these soils (such as excavation or dewatering) could give rise to acidic conditions and should be undertaken in accordance with an Acid Sulphate Soil (ASS) Management Plan as specified in the Site Management Plan (Environment).
- ▶ Consideration has been given as to whether further clean up should take place. It has been determined that clean up has been carried out to the extent practicable, and EHA/DNRETA has been consulted to confirm that it is in agreement with the determination. Natural biodegradation of residual hydrocarbon contamination will continue to occur and the sub-soil drain will continue to remove hydrocarbons from the site. It can be expected that at some time in the future that controls such as the subsurface drain will no longer be required to operate. The assessment consultant infers that this might occur within a decade; however, the audit concluded that there is considerable uncertainty in such an estimate.

The Site Management Plan (Environment) provides information on the requirements for management of materials that may be encountered if sub-surface works are carried out at the Site. The Groundwater Management Plan provides information on the requirements for ongoing monitoring of groundwater at the Site.

Note that this audit considers only contamination of the soil and groundwater by potentially hazardous substances, and does not consider or advise on geotechnical conditions, suitability of soil and fill for planting from the perspective of nutrient content and physical form, and other aspects of the suitability of the land for development that are not related to hazardous substances.

Note that there is potential for unexploded ordnance (UXO) to be present from World War 2 bombing, and for this to pose a risk if detonation should occur. Assessment of UXO is outside the scope of this audit and has not been considered; the risk associated with UXO is managed through other means.

Suitability of the Site

On the basis of the work undertaken, the auditor is of the opinion that the Site (Wharf One Residential complex) is suitable for the intended purpose, that being a development with mixed use as outlined in the site development plan (Attachment A) comprising:

- ▶ Residential units within three separate apartment buildings located on the first floor and above of building two, and the second floor and above in buildings one and three;
- ▶ Retail and commercial uses on the ground floor of all three buildings and the first floor of buildings one and three, including ground level outdoor areas, and outdoor walkway areas;
- ▶ A single contiguous basement car park consisting of car park areas, lift wells and stair wells;

subject to the following conditions:

1. All future development and maintenance works at the site involving excavation, and disposal of soil and fill shall be carried out in accordance with the Site Management Plan (Environment) (Attachment B).



2. Buildings shall be designed to prevent oily water from entering the basement, and other potentially occupied sub-surface structures, where there is a likelihood of oily water being present.
3. Buildings and structures shall be built to withstand acidic conditions, particularly associated with Acid Sulphate Soil and Potential Acid Sulphate Soil.

4. Groundwater at the site shall be managed in accordance with the Groundwater Management Plan (Attachment C) to avoid contaminated groundwater discharging to the lagoon and entering sub-surface building spaces such as lift overruns.
5. Groundwater at the site shall not be used for any beneficial purpose other than environmental monitoring and for site remediation.

Other related information:

The reader should note that the SMP and GMP are subject to review and will be updated as appropriate. The reader should contact the Darwin Waterfront Corporation to obtain the current version of these documents.

The limitations outlined in the next section of this report should be referred to.

DATED: 15 July 2009

SIGNED:

PETER NADEBAUM

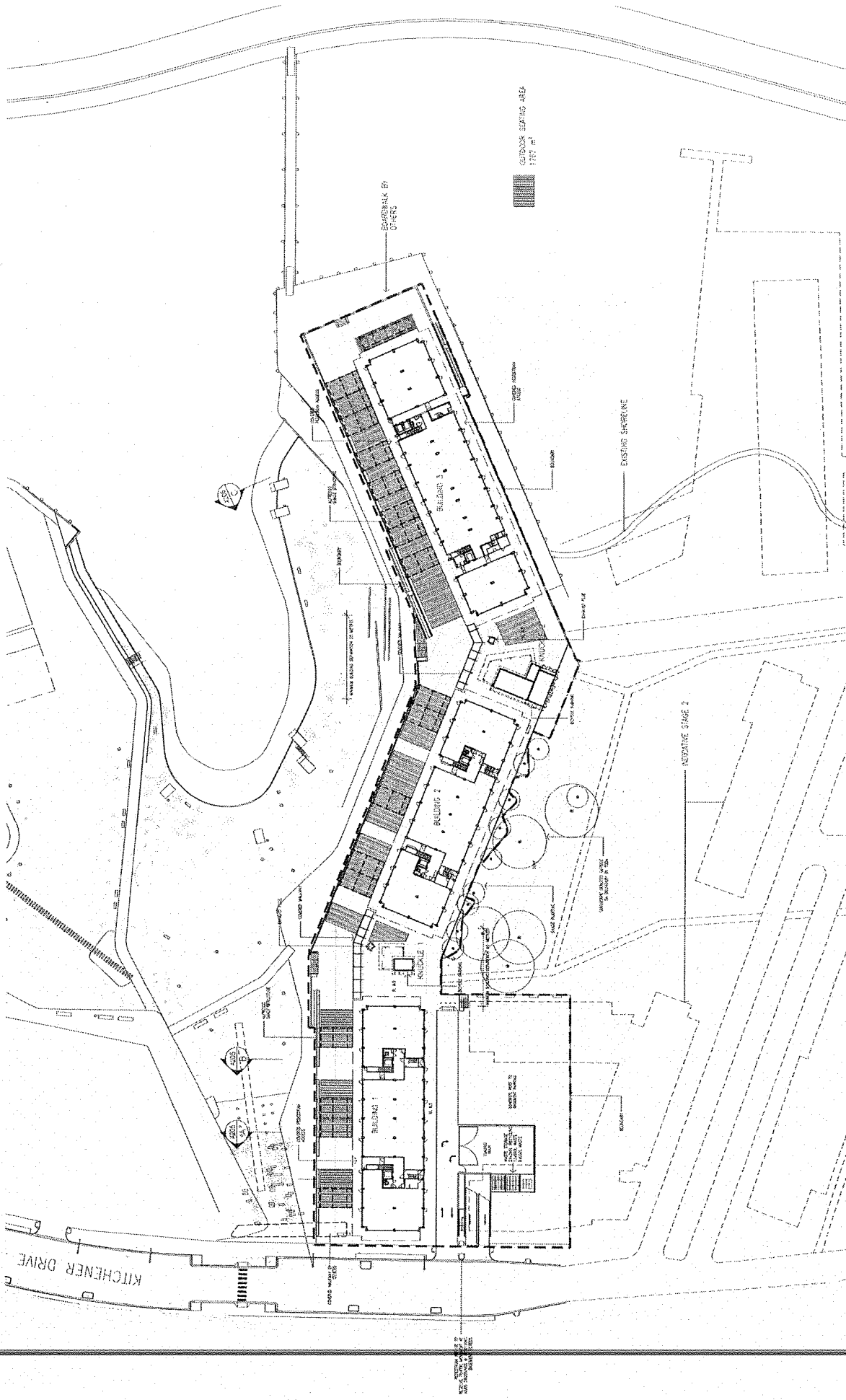
Environmental Auditor (Appointed Pursuant to the Victorian Environmental Protection Act 1970) and recognised in the Northern Territory under section 68 of the *Waste Management and Pollution Control Act (NT)*.

Statement Attachment A:	Site Development Plan
Statement Attachment B	Site Management Plan (Environment) – Current version as at 15/7/2009
Statement Attachment C	Groundwater Management Plan – Current version as at 30/4/2009



Statement Attachment A

Site Development Plan and Surveyed Plan of Site Boundaries



Darwin City Waterfront - Stage 1

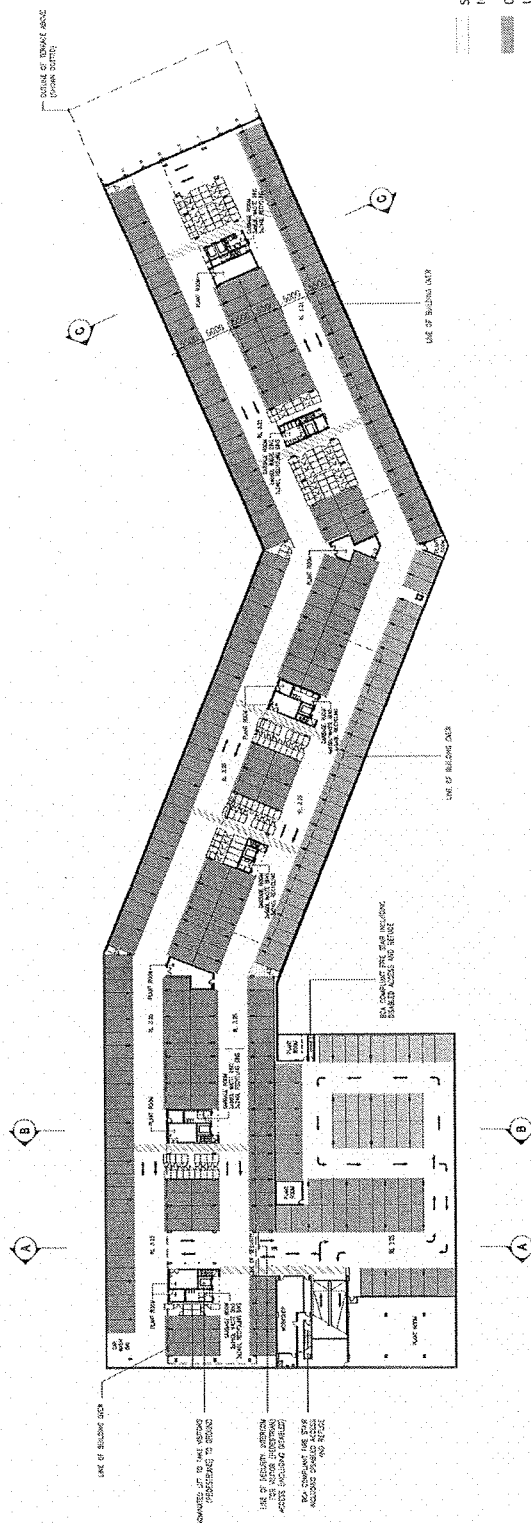
FLOOR PLAN - PUBLIC DOMAIN / GROUND LEVEL

Residential / Mixed Use
PSA7339_A101 - M
20 July 2007

TOGA GROUP

Scale: 1:500 @ A1

0 10m 20m 40m
0 10m 20m 40m



STORAGE	total = 140 spaces
COMMERCIAL VISITOR PARKING	total = 31 spaces
SERVICE DELIVERY BAY	= 4 SPACES
COMMERCIAL OCCUPANT PARKING	total = 33 car spaces
RESIDENTIAL VISITOR PARKING	total = 24 car spaces
RESIDENTIAL PARKING	

34 (1 bay)	= 44 car spaces
50 (2 bay)	= 100 car spaces
54 (3 bay)	= 108 car spaces
total	= 252 car spaces
TOTAL NUMBER OF CAR SPACES PROVIDED IN THE BASEMENT	= 344

FLOOR PLAN - CAR PARK/ BASEMENT LEVEL

Darwin City Waterfront - Stage 1

Residential / Mixed Use
 PSA7339_A100 - L
 20 July 2007





Statement Attachment B

Site Management Plan (Environment)
– Current version as at 15/7/2009

**SITE MANAGEMENT
PLAN
(ENVIRONMENT)**

SMP - Darwin Waterfront Precinct

Wharf 1 - Residential

Prepared for

Darwin Waterfront Office

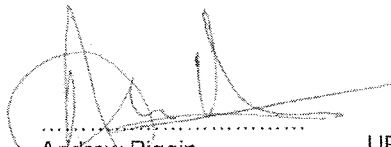
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Project Manager:

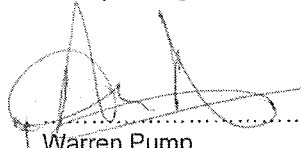


Andrew Piggin
Principal Engineer

URS Australia Pty Ltd

Level 3, 93 Mitchell Street
Darwin, NT 0801
GPO Box 2005, Darwin NT 0801

Project Director:



Warren Pump
Senior Principal

Australia
T: 61 8 8980 2900
F: 61 8 8941 3920

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