Site Audit Report, Former Mobil Service Station, 25-27 Market Street Merimbula

Prepared for:
Mobil Oil Australia Pty Ltd

Prepared by:
ENVIRON Australia Pty Ltd

Date:
April 2014

Project Number:
AS121206

Audit Number:
RS 001

ENVIRON

16 April 2014 Our Ref: AS121206

Mobil Oil Australia Pty Ltd
PO Box 1141,
Camden NSW 2570

Attn: Nikki Maksimovic

Dear Nikki

Re: Site Audit Report, Former Mobil Service Station, 25-27 Market Street Merimbula

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW Contaminated Land Management Act 1997 follows this letter. The Audit was commissioned by Mobil Oil Australia Pty Ltd to assess the suitability of the site for permitted uses under the current zoning (B2 Local Centre).

This Site Audit Report is not currently required by regulation or legislation and is therefore a non-statutory audit. Although a non-statutory audit, the Site Audit Report is being provided to Bega Valley Shire Council so that the Site Audit Statement and accompanying Environmental Management Plan can be noted on the Section 149 certificate for the relevant lots.

Thank you for giving me the opportunity to conduct this Audit. Please call me on 9954 8100 if you have any questions.

Yours faithfully,
ENVIRON Australia Pty Ltd

Rowena Salmon
EPA Accredited Site Auditor 1002

CC: Bega Valley Shire Council
NSW EPA

NSW Site Auditor Scheme
SITE AUDIT STATEMENT

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the* Contaminated Land Management Act 1997 *on 31st October 2012. For more information about completing this form, go to Part IV.

PART I: Site audit identification

Site audit statement no. RS 001

This site audit is a ~~**statutory audit/**~~**non-statutory audit*** within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details (as accredited under the *Contaminated Land Management Act 1997*)

Name:	Rowena Salmon	Company:	ENVIRON Australia Pty Ltd
Address:	Level 3, 100 Pacific Highway (PO Box 560)		
	North Sydney NSW	Postcode:	2060
Phone:	02 9954 8100	Fax:	02 9954 8150

Site details

Address: 25-27 Market Street, Merimbula NSW

Postcode: 2548

Property description *(attach a list if several properties are included in the site audit)*

Lot 12 DP 567260, Lot 1 DP 163768, Lot 2 DP 91361 and Lot A DP 201599

Local Government Area: Bega

Area of site (e.g. hectares): 0.16 ha Current zoning: B2 Local Centre under Bega Valley LEP 2013

To the best of my knowledge, the site ~~**is/**~~**is not*** the subject of a declaration, order, agreement or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

Declaration/Order/Agreement/Proposal/Notice* no(s): NA

Strike out as appropriate

Site audit commissioned by

Name: Nikki Maksimovic Company: Mobil Oil Australia

Address: PO Box 1141, Camden NSW 2570

Postcode: 2570

Phone: 02 4636 6654 Fax: NA

Name and phone number of contact person (if different from above)

NA

Purpose of site audit

☑ A. To determine land use suitability *(please specify intended use[s])*

...Road reserve and commercial land use

~~**OR**~~

☐ ~~B(i) To determine the nature and extent of contamination, and/or~~

☐ ~~B(ii) To determine the appropriateness of an **investigation/remedial action/management plan***, and/or~~

☐ ~~B(iii) To determine if the land can be made suitable for a particular use or uses by implementation of a specified **remedial action plan/management plan*** *(please specify intended use[s])*~~

……..

Information sources for site audit

Consultancy(ies) which conducted the site investigation(s) and/or remediation

- IT Environmental Pty Ltd (IT)
- URS Australia Pty Ltd (URS)

Title(s) of report(s) reviewed:

- IT (2005a). Phase I Environmental Site Assessment, Mobil Service Station, Merimbula, 27 Market Street, Merimbula NSW 2548. 31 October 2005. Ref: J101275A.
- IT (2005b). Phase II Environmental Site Assessment, Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW 2548. 31 October 2005. Ref: J101275A.
- URS (2009). Post Phase II Environmental Site Assessment, Mobil Service Station, Merimbula, 27 Market Street, Merimbula NSW 2548. 13 August 2009. Ref: 42424195.
- URS (2010). Remediation Action Plan, Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW. 10 May 2010. Ref: 43513311.
- URS (2011). Sampling, Analysis and Quality Plan, Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW 2548. 15 April 2011. Ref: 43513489.
- URS (2012). Site Environmental Report, Former Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW. 18 December 2012. Ref: 43513838, including as appendices:

Strike out as appropriate

  - Letter Subject: Waste Classification for Soils from 27 Market St, Merimbula, NSW dated 23 November 2010, by URS.
  - Letter Subject: VENM Classification for Nominated Excavation Backfill for 27 Market St, Merimbula, NSW dated 25 August 2011, by URS.
  - Safe Work & Environments Pty Ltd (2011) Clearance Certificate For Asbestos Removal Former Mobile *(sic)* Service Station Site, South East Corner, 27 Market Street, Merimbula NSW. Dated 16 November 2011.
  - JBS Environmental Pty Ltd (2012) Asbestos Air Monitoring and Clearance Works, Former Mobil Service Station – 27 Market Street, Merimbula NSW. Dated 30 October 2012.
  - URS Final Report Groundwater Risk Assessment, Former Mobil Service Station Merimbula (NO1063), 27 Market Street, Merimbula, NSW dated 18 December 2012.
- ENVIRON Australia Pty Ltd (2014). Environmental Management Plan, 25-27 Market Street, Merimbula NSW (Lot 12 DP567260, Lot 1 DP163768, Lot 2 DP91361 and Lot A DP201599). 15 April 2014.

Other information reviewed (including previous site audit reports and statements relating to the site)

- Email dated 15 February 2011 Re: Merimbula Figures and Tables from UST removal and Demolition Works. From URS (Dodz David). Includes attachments: “Figure 1 – Extent of excavation works” showing extent of validation sampling; and excel table of analytical results “43513378 tables”.
- Email dated 18 February 2011 Re: Merimbula Pit Logs. From URS (Dodz David). Includes attachments: “Merimbula_TEA_Excavation logs” showing location of sampling as referenced in Email above.
- Email dated 27 June 2013 Re: 25-27 Market Street, Merimbula LTL:[BVS00609]. From Lindsay Taylor Lawyers (Frances, Wing Yee Tse) to Mobil (Nikki Maksimovic).
- Email dated 26 July 2013 Re: Response to Auditor Comments – Former Mobil Merimbula Service Station, Merimbula (NO1063). From Mobil (Mikki Maksimovic). Includes attachment: “Tank Destruction Certificate.pdf” confirming destruction of tanks excavated from site.
- Email dated 13 August 2013 Re: Response to Auditor Comments – Former Mobil Merimbula Service Station Merimbula (NO1063). From Mobil (Nikki Maksimovic). Includes attachment: “Mobil Merimbula Response to Auditor Comments v3.pdf”.

Site audit report

Title:… Site Audit Report – Former Mobil Service Station, 25-27 Market Street Merimbula

Report no. RS 001 (ENVIRON Ref: AS121206) Date: April 2014

Strike out as appropriate

PART II: Auditor's findings

Please complete either Section A or Section B, **not** both. *(Strike out the irrelevant section.)*

Use Section A where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land use(s).

Use Section B where the audit is to determine the nature and extent of contamination and/or the appropriateness of an investigation or remedial action or management plan and/or whether the site can be made suitable for a specified land use or uses subject to the successful implementation of a remedial action or management plan.

Section A

☑ **I certify that, in my opinion, the site is SUITABLE for the following use(s)** *(tick all appropriate uses and strike out those not applicable)*:

- ~~☐ Residential, including substantial vegetable garden and poultry~~
- ~~☐ Residential, including substantial vegetable garden, excluding poultry~~
- ~~☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~
- ☑ Day care centre, preschool, primary school
- ☑ Residential with minimal opportunity for soil access, including units
- ☑ Secondary school
- ☑ Park, recreational open space, playing field
- ☑ Commercial/industrial
- ☑ Other *(please specify): Roads*

subject to compliance with the following environmental management plan ***(insert title, date and author of plan)*** in light of contamination remaining on the site: …

"Environmental Management Plan, 27 Market Street, Merimbula NSW (Lot 1 DP 163768, Lot 2 DP91361 and Lot A DP201599)" dated 15 April 2014. Prepared by ENVIRON Australia Pty Ltd.

~~**OR**~~

~~☐ **I certify that, in my opinion, the site is NOT SUITABLE for any use due to the risk of harm from contamination.**~~

Overall comments…

The site was previously operated as a service station with mechanics shop and car wash and has been remediated. The remediation works included excavation, removal and validation of the former service station infrastructure. In addition the upper layers of soil/fill (to depths of between 0.5-1.5m) across the entire site area were excavated and disposed off-site due to the presence of asbestos containing material (ACM).

There are some residual hydrocarbon impacts at the site including groundwater and soil in the groundwater table smear zone (at around 2m below ground level) within the vicinity of the former car wash located along the western boundary of the site. Strong hydrocarbon odours

are associated with this material. Groundwater in the east of the site, downgradient of the former bowsers, also has some residual hydrocarbon impact, to a lesser degree.

Risk-based assessment of the residual hydrocarbon impacts indicate that the site is suitable for the permitted uses under the current zoning (B2 Local Centre), noting that the likely site usage is as a road reserve and commercial development. The site is currently vacant. The environmental management plan (EMP) includes the following management measures which should be applied during excavation below 1 m or extraction of groundwater during site development:

- Workers should be made aware of potentially contaminated materials including visually contaminated or odorous soil and/ or groundwater.
- Appropriate occupational health and safety measures should be developed to mitigate against potential exposure. This should include limiting dermal contact with soil and groundwater and the monitoring of potential gases and vapours.
- Odorous or other suspect soils should be separated and specialist advice sought from a suitably qualified environmental consultant regarding environmental management measures and disposal.
- All liquid and solid waste should be disposed in accordance with the requirements of the Protection of the Environment Operations Act 1997 and Protection of the Environment Operations (Waste) Regulation 2005.

No active management is required except during site development activities, except that groundwater should not be extracted for use.

Given the presence of groundwater impact near the site boundary, there is potential for offsite migration of low level contamination in groundwater to have occurred across the eastern site boundary towards Market Street. The results of groundwater investigations indicate that significant offsite migration of contamination in groundwater is unlikely, and such migration would not present a risk to offsite human or environmental receptors. This issue was discussed with NSW EPA prior to finalisation of the audit.

It is noted that ACM impacted fill, which has been excavated from the audit site area, may extend to offsite areas under the road and adjacent properties.

~~Section B~~

Purpose of the plan[1] which is the subject of the audit …

I certify that, in my opinion:

- ❑ **the nature and extent of the contamination HAS/HAS NOT* been appropriately determined**

AND/OR

- ❑ **the investigation/remedial action plan/management plan* IS/IS NOT* appropriate for the purpose stated above**

AND/OR

- ❑ **the site CAN BE MADE SUITABLE for the following uses** *(tick all appropriate uses and strike out those not applicable)*:
  - ❑ Residential, including substantial vegetable garden and poultry
  - ❑ Residential, including substantial vegetable garden, excluding poultry
  - ❑ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
  - ❑ Day care centre, preschool, primary school
  - ❑ Residential with minimal opportunity for soil access, including units
  - ❑ Secondary school
  - ❑ Park, recreational open space, playing field
  - ❑ Commercial/industrial
  - ❑ Other *(please specify)* ……

if the site is remediated/managed* in accordance with the following remedial action plan/management plan* *(insert title, date and author of plan)*

…

subject to compliance with the following condition(s):

…

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

**** Strike out as appropriate***

~~**Overall comments**~~

...

PART III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (Accreditation No. 1002).

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed...  Date... 16 APRIL 2014

PART IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remedial action or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use(s) of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A or Section B of Part II, **not** both.

In **Section A** the auditor may conclude that the land is *suitable* for a specified use(s) OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further remediation or investigation of the site was needed to render the site fit for the specified use(s). Any **condition** imposed should be limited to implementation of an environmental management plan to help ensure the site remains safe for the specified use(s). The plan should be legally enforceable: for example a requirement of a notice under the *Contaminated Land Management Act 1997* (CLM Act) or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of the *Environmental Planning and Assessment Act 1979*.

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

In **Section B** the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or whether land can be made suitable for a particular land use or uses upon implementation of a remedial action or management plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

In **Part III** the auditor certifies his/her standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to:

EPA (NSW)
Contaminated Sites Section
PO Box A290, SYDNEY SOUTH NSW 1232
nswauditors@epa.nsw.gov.au

AND

the **local council** for the land which is the subject of the audit.

Contents

List of Tables and Figures

List of Appendices

List of Abbreviations

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
BaP	Benzo(a)pyrene
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (Monocyclic Aromatic Hydrocarbons)
CLM Act	NSW Contaminated Land Management Act 1997
CN	Cyanide (total or free)
COC	Chain of Custody
COPC	chemical of potential concern
Council	Bega Valley Shire Council
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CT	Certificate of Title
DA	Development Application
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EMP	Environmental Management Plan
Empire	Empire Contracting Pty Ltd
EPS	Enviropacific Services Pty Ltd
EPA	Environment Protection Authority (NSW)
ESA	Environmental Site Assessment report
GME	Groundwater Monitoring Event
GRA	groundwater risk assessment
HIL	Health Investigation Level
ha	Hectare
IT	IT Environmental (Australia) Pty Ltd
JBS	JBS Pty Ltd
km	Kilometres
LEP	Local Environmental Plan
LOR	Limit of Reporting
m	Metres
MAH	Monocyclic Aromatic Hydrocarbons
Mercury	Inorganic mercury unless noted otherwise
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mbgs	Metres below ground surface
µg/L	Micrograms per Litre
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
ng/L	Nanograms per Litre
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
n	Number of Samples
OCPs	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls

pH	a measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
ppm	Parts Per Million
PQL	Practical Quantitation Limit
PSH	Phase Separated Hydrocarbon
PVI	petroleum vapour intrusion
QA/QC	Quality Assurance/Quality Control
RAP	Remediation Action Plan
RPD	Relative Percent Difference
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SILs	Soil Investigation Levels
SVOCs	Semi Volatile Organic Compounds
SWE	Safe Work and Environments Pty Ltd
SWL	Standing Water Level
TEA	tank excavation assessment
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons (NEPM(1999)[2013] fractions)
TV	Trigger Value
UCL	Upper Confidence Limit
URS	URS (Australia) Pty Ltd
UST	Underground Storage Tank
VENM	virgin excavated natural material
VMP	Voluntary Management Proposal
VHC	volatile halogenated compounds
VOCs	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1 Introduction

A site contamination audit has been conducted in relation to the former Mobil service station located at 25-27 Market Street, Merimbula NSW.

1.1 Background to the Audit

The site was previously operated as a service station with mechanics shop and car wash. The audit is non-statutory and was requested by Mobil to satisfy contract conditions associated with sale of the property to Bega Valley Shire Council (Council).

1.2 Summary of Investigation and Remediation

A phase 1 & 2 environmental site assessment (ESA) was undertaken by IT Environmental (Australia) Pty Ltd (IT) in 2005. The site was an operational service station at the time of the investigation. The investigations reported fill overlying sand and a shallow water bearing zone at depths of between 1-2 metres below ground surface (mbgs). Hydrocarbon impact was detected in the soil at depths of between 0.5-2.0m along the western boundary of the site and relatively low concentrations of hydrocarbons were detected in the groundwater at one location along the western boundary of the site.

Following closure of the service station, URS (Australia) Pty Ltd (URS) conducted a 'Post Phase 2 ESA' in 2009 to further investigate the nature and extent of petroleum hydrocarbon impacts at the site and qualitatively assess any potential risks. All service station infrastructure was still present at the time of the investigation. The results of the investigation confirmed the presence of relatively low concentrations of dissolved phase hydrocarbon compounds within the groundwater at the site although no significant soil contamination was encountered.

A remediation action plan (RAP) was prepared by URS in 2010 to decommission the service station infrastructure and to undertake secondary source control through the reduction in soil and dissolved phase hydrocarbon groundwater impacts. The Auditor was engaged following preparation of the RAP but before removal of service station infrastructure.

The service station infrastructure was removed between August and September 2010, with the exception of some sections of concrete pavement, triple interceptor trap and remnant underground pipelines. Following removal of the infrastructure, excavations were immediately backfilled with excavated soils and it is understood that no validation sampling or secondary source removal was undertaken prior to backfilling. A report documenting removal of the service station infrastructure was not prepared.

Following removal of service station infrastructure, secondary source excavation and site validation works were undertaken by URS in 2011-2012. Works included two stages of excavation, soil validation sampling, post remediation groundwater monitoring, soil vapour sampling and a quantitative human health risk assessment. The results were reported in the Site Environmental Report dated December 2012.

1.3 2013 Amendment of the Assessment of Site Contamination NEPM 1999

On 11 April 2013, the Standing Council on Environment and Water (SCEW) agreed to amend the National Environment Protection (Assessment of Site Contamination) Measure

1999 (NEPM 1999[2013]). The amendment came into effect on 16 May 2013. To enable its implementation in NSW, the list of approved guidelines under section 105 of the Contaminated Land Management Act 1997 was updated by NSW EPA to include the amended ASC NEPM and its associated schedules.

NSW EPA have advised that the amended NEPM 1999[2013] and its supporting schedules apply to works completed after 15 May 2013. Any exemptions from applying the amended NEPM 1999[2013] must be appropriately justified and only when all of the following circumstances are met:

- reports are almost complete by 15 May 2013, and
- significant additional works and/or cost would be necessary to meet the amended NEPM 1999 (2013), and
- there are no unacceptable risks associated with applying the original NEPM (1999).

The investigations, remediation and validation works were completed prior to 15 May 2013 and in the Auditor's opinion these works meet the NSW EPA criteria for exemption from applying the amended NEPM 1999[2013].

1.4 Scope of the Audit

The audit was conducted to provide an independent review by an EPA Accredited Auditor of whether the land is suitable for any specified use or range of uses i.e. a "Site Audit" as defined in Section 4 (1) (b) (iii) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

Details of the audit are:

Requested by:	Nikki Maksimovic on behalf of Mobil Oil Australia Pty Ltd
Request/Commencement Date:	3 June 2010
Auditor:	Rowena Salmon
Accreditation No.:	1002

The scope of the audit included:

- Review of the following reports:
  - IT (2005a). Phase I Environmental Site Assessment, Mobil Service Station, Merimbula, 27 Market Street, Merimbula NSW 2548. 31 October 2005. Ref: J101275A.
  - IT (2005b). Phase II Environmental Site Assessment, Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW 2548. 31 October 2005. Ref: J101275A.
  - URS (2009). Post Phase II Environmental Site Assessment, Mobil Service Station, Merimbula, 27 Market Street, Merimbula NSW 2548. 13 August 2009. Ref: 42424195.

- URS (2010). Remediation Action Plan, Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW. 10 May 2010. Ref: 43513311.
- URS (2011) Sampling, Analysis and Quality Plan, Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW 2548. 15 April 2011. Ref: 43513489.
- URS (2012). Site Environmental Report, Former Mobil Service Station Merimbula, 27 Market Street, Merimbula NSW. (the "SER"). 18 December 2012. Ref: 43513838, including as appendices:
    - Letter *Subject: Waste Classification for Soils from 27 Market St, Merimbula, NSW* dated 23 November 2010, by URS.
    - Letter *Subject: VENM Classification for Nominated Excavation Backfill for 27 Market St, Merimbula, NSW* dated 25 August 2011, by URS.
    - Safe Work & Environments Pty Ltd (2011) Clearance Certificate For Asbestos Removal Former Mobile *(sic)* Service Station Site, South East Corner, 27 Market Street, Merimbula NSW. Dated 16 November 2011.
    - JBS Environmental Pty Ltd (2012) Asbestos Air Monitoring and Clearance Works, Former Mobil Service Station – 27 Market Street, Merimbula NSW. Dated 30 October 2012.
    - Final Report *Groundwater Risk Assessment, Former Mobil Service Station Merimbula (NO1063), 27 Market Street, Merimbula, NSW* dated 18 December 2012, by URS.
- ENVIRON Australia Pty Ltd (2014). Environmental Management Plan, 25-27 Market Street, Merimbula NSW (Lot 12 DP567260, Lot 1 DP163768, Lot 2 DP91361 and Lot A DP201599). 15 April 2014.

- A review of correspondence in Email format (Appendix F), unless specified these were addressed to the Auditor:
    - Email dated 15 February 2011 *Re: Merimbula Figures and Tables from UST removal and Demolition Works.* From URS (Dodz David). Includes attachments: "Figure 1 – Extent of excavation works" showing extent of validation sampling; and excel table of analytical results "43513378 tables".
    - Email dated 18 February 2011 *Re: Merimbula Pit Logs.* From URS (Dodz David). Includes attachments: "Merimbula_TEA_Excavation logs" showing location of sampling as referenced in Email above.
    - Email dated 27 June 2013 *Re: 25-27 Market Street, Merimbula LTL:[BVS00609].* From Lindsay Taylor Lawyers (Frances, Wing Yee Tse) to Mobil (Nikki Maksimovic).
    - Email dated 26 July 2013 *Re: Response to Auditor Comments – Former Mobil Merimbula Service Station, Merimbula (NO1063)*. From Mobil (Mikki Maksimovic). Includes attachment: "Tank Destruction Certificate.pdf" confirming destruction of tanks excavated from site.

- Email dated 13 August 2013 *Re: Response to Auditor Comments – Former Mobil Merimbula Service Station Merimbula (NO1063).* From Mobil (Nikki Maksimovic). Includes attachment: “Mobil Merimbula Response to Auditor Comments v3.pdf”.

- Site visits by the Auditor on 9 December 2010 and 10 November 2011.
- Discussions with Council, Mobil, and with URS who undertook the later phases of investigation and validation. The earlier investigations undertaken by IT were completed prior to the Auditor’s engagement and no discussion with IT was undertaken.

1.5 Expert Support Team

The Auditor used the following expert support team members during the preparation of this report:

- Ms Emma Struik and Ms Belinda Goldsworthy (ENVIRON Australia Pty Ltd) in the field of risk evaluation and exposure assessment.

2 Site Details

2.1 Location

The site locality is shown on Attachment 1, Appendix A.

The site details are as follows:

Street address: 25-27 Market Street, Merimbula. NSW 2548.

Identifier: Lot 12 DP567260, Lot 1 DP163768, Lot 2 DP91361 and Lot A DP201599 (see Attachment 2, Appendix A), noting:

- Lot 1 DP163768 and Lot A DP201599 were previously identified as Auto Consol 8237-66
- URS and IT incorrectly identify Lot 2 as DP163768
- URS and IT did not list Lot 12 DP567260 within the site (see below).

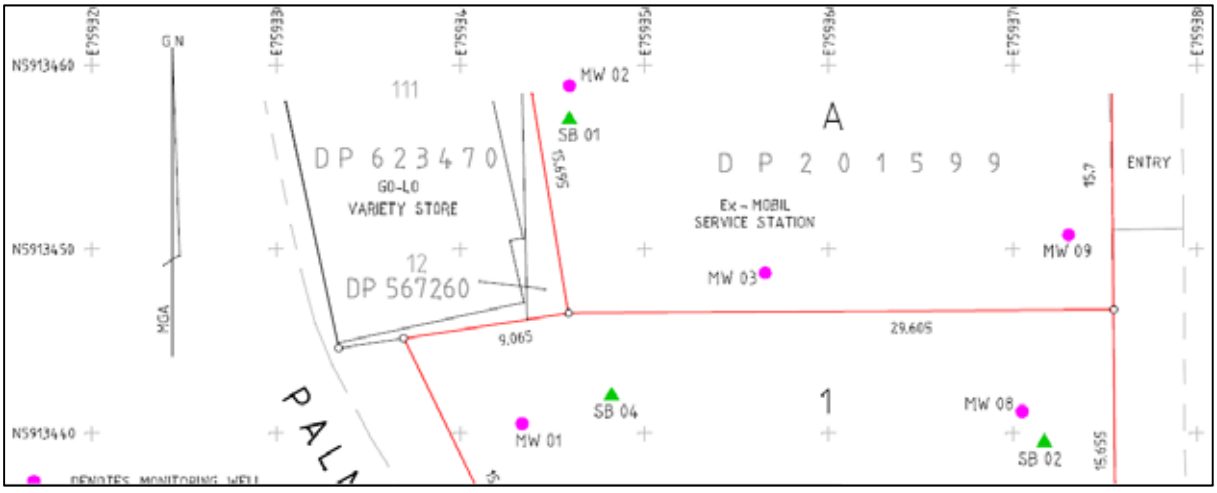
Local Government: Bega Valley Shire Council

Owner: Mobil Oil Australia Pty Ltd

Site Area: 1,600m^2

The boundaries of the site are generally well defined by streets and adjoining properties.

Lot 12 DP 567260 is a thin triangular lot in the northwest of the site that was not referenced in the reports reviewed or included within the site area on plans. However, based on the survey extract below and photographs of the excavation performed in the northwest of the site that show the excavation adjoins the variety store building, the Auditor is satisfied that the remediation works have encompassed this lot and therefore it is included within the site audit area.



2.2 Zoning

The zoning of the site was reported by URS as 3(a) General Business Zone, under the Bega Valley Local Environmental Plan (LEP) 2002. However, the zoning was revised under the Bega Valley LEP 2013 to B2 Local Centre.

The objectives of the B2 Local Centre zoning are to:

- provide a range of retail, business, entertainment and community uses that serve the needs of people who live in, work in and visit the local area.
- encourage employment opportunities in accessible locations.
- maximise public transport patronage and encourage walking and cycling.
- enable other land uses that are complementary to, and do not detract from, the viability of commercial uses within the zone.
- minimise conflict between land uses on land in the zone and land uses on land in adjoining zones.
- strengthen the viability of existing business centres as places for investment, employment and cultural activity.

Permitted uses as detailed in the Bega Valley LEP 2013 are summarised below:

- Boarding houses; Child care centres; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Function centres; Information and education facilities; Medical centres; Passenger transport facilities; Recreation facilities (indoor); Registered clubs; Respite day care centres; Restricted premises; Roads; Service stations; Shop top housing; Tourist and visitor accommodation.

Prohibited uses include:

- Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Camping grounds; Caravan parks; Cemeteries; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Exhibition villages; Extractive industries; Forestry; Freight transport facilities; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Mortuaries; Open cut mining; Recreation facilities (major); Recreation facilities (outdoor); Residential accommodation; Resource recovery facilities; Rural industries; Sewage treatment plants; Sex services premises; Storage premises; Transport depots; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Warehouse or distribution centres; Waste disposal facilities; Water recreation structures; Water recycling facilities; Water supply systems; Wharf or boating facilities; Wholesale supplies

2.3 Adjacent Uses

The site is located within an area of mixed high density residential use and commercial properties (Attachment 3, Appendix A) as follows:

- North: commercial properties (Centrepoint shopping centre)

- West: high density residential units (Monaro Court) across Wonga Street. A child care centre is also located approximately 100m to the west of the site
- South: commercial properties across Monaro Street
- East: commercial properties (Promenade Shopping Complex and Lakeside Walk Shopping Complex) across Market Street.

Merimbula Lake (tidally influenced) was reported by IT (2005b) to be located approximately 85-100m to the east, southeast and south of the site. The auditor notes that the site is actually located approximately 55m away from the edge of the shoreline (high tide mark).

Two service stations are located approximately 100m to the northwest of the site across Merimbula Drive. These are considered to be hydraulically upgradient of the site and are a potential offsite source of contamination.

2.4 Site Condition

During the IT investigations (IT, 2005a; IT, 2005b) the site was an operating service station and IT reported operational service station infrastructure (Attachment 4, Appendix A) as follows;

- Five underground storage tanks (USTs) used for the storage of petroleum products (T1-T4) were present and operational
- Anecdotal information indicated that the diesel UST (T5) had been decommissioned and removed
- An LPG above ground storage tank (AST) (T6) was located in the southern portion of the site and LPG cylinders were reported in front of the sales building
- A 2,000L UST (T7) located adjacent to the car wash area for the storage of water
- The site included a car wash facility, workshop, salesroom, canopy and bowsers.

The site elevation was reported to be approximately 10m Australian Height Datum (AHD) with a gentle slope to the east towards Market Street.

URS (2010) reported that the site was closed in 2010 and "…*URS and its subcontractor removed all above ground structures and USTs from the site*."

The Auditor notes that the site layout plan provided in the URS (2012) report (included as Attachment 4, Appendix A) shows a slightly different orientation of USTs T1 and T7 compared to the IT investigation reports. In addition a waste oil tank is marked within the former workshop area that was not previously noted by IT. However, in consideration of the remediation works undertaken, the Auditor does not consider this discrepancy to affect the outcome of the audit. The tank removal works are further discussed in section 11.

During a site visit on 9 December 2010, the auditor noted that all above ground infrastructure had been removed and areas of concrete/hard standing had been removed exposing sand, consistent with reported tank removal works. The site was fenced and locked.

During a second site visit on 10 November 2011, the Auditor observed excavations being undertaken to allow validation sampling to be undertaken (this is further discussed in section 11).

2.5 Proposed Development

URS reported the proposed site use as "*any allowable development under the current zoning*". Email correspondence (dated 27 June 2013) from lawyers representing Council advised Mobil that "a large portion of the property is intended for use as a road reserve, with the remainder identified for development as commercial property".

Allowable uses for the current zoning (B2 Local Centre) under the current Bega Valley LEP (2013) are listed in section 2.2 above and specifically exclude residential accommodation. However it is noted that 'shop-top' housing, boarding houses and child care centres are permitted and in recognition of the potential exposure scenarios associated with these uses, the most sensitive 'residential with soil access' land use scenario has been assumed.

3 Site History

IT provided a site history based on aerial photographs, site photographs, certificates of title, Merimbula-Imlay Historical Society records and Council records. The Auditor has summarised this information in Table 3.1.

Table 3.1: Site History

Date	Activity
1900's - 1960	Title records indicate site was purchased by a "manufacturer" in 1896. Historical society records indicate that by the early 1900's the site consisted of three different properties: – General store (located on the corner block) including a house and storage building – Two weatherboard cottages.
1960s - 2010	The two cottages were purchased by Vacuum Oil Company Pty Ltd in 1959. The cottages were demolished and the service station built. The corner block was later purchased (early 1960's) and the service station extended to cover the current site area. Council records confirm operation of a service station at the site from at least the early 1960's. Historical society records also noted the presence of a garage to the east of the site across Market Street. This is considered to be hydraulically downgradient of the site.
2010 - present	Service station demolished and site vacant.

The summary indicates that the site was previously used for residential and light commercial purposes before development as a service station in the early 1960's.

3.1 Auditor's Opinion

In the Auditor's opinion, the site history provides an adequate indication of past activities. The primary on-site source of contamination is considered to be the former service station use. There is also potential for contamination to have occurred during filling of the site or demolition of previous structures (e.g. asbestos containing material (ACM) and lead).

4 Contaminants of Concern

IT did not specifically identify a list of the contaminants of concern and potentially contaminating activities, although soil and groundwater samples were analysed for total petroleum hydrocarbons (TPH), monocyclic aromatic hydrocarbons (BTEX – benzene, toluene, ethylbenzene and xylenes), volatile halogenated compounds (VHCs), polycyclic aromatic hydrocarbons (PAHs), phenols and heavy metals. In addition, soils were also analysed for organochlorine and organophosphorus pesticides (OCP/OPPs). These analytes are consistent with the use of the site as a service station.

A preliminary conceptual site model (CSM) was presented by URS (URS, 2009) which included identification of potential contaminant sources/ activities and contaminants of potential concern. These have been tabulated in Table 4.1.

Table 4.1: Contaminants of Concern

Activity	Potential Contaminants
Underground fuel storage tanks, fuel lines, fill lines, bowsers and any remote fill points	TPH, BTEX, lead, PAHs, phenol
Offsite upgradient service stations	
Workshop	As above plus chlorinated solvents (degreasers)
Car wash facility	Heavy metals and surfactants
Historic fill material	Heavy metals and PAHs

4.1 Auditor's Opinion

The Auditor notes that asbestos was not considered as a contaminant of concern within fill or from demolition of previous structures on site. The auditor considers asbestos to be a contaminant of potential concern. Asbestos was considered during the remediation works and is further discussed in section 11 of this site audit report (SAR).

Overall, in consideration of the site history and extensive remediation works undertaken, the analyte list was acceptable. The individual substances included in each suite of analytes are listed in Appendix D.

5 Stratigraphy and Hydrogeology

Following a review of the reports provided, a summary of the site stratigraphy and hydrogeology was compiled as follows.

5.1 Stratigraphy

Merimbula is located on the boundary of two different geological regions as follows (refer Attachment 3, Appendix A):

- Eastern Merimbula – Ben Bite Formation (massive mudrock and coarse sandstone) underlain by Worange Point Formation (massive sandstone and mudrock) and the Bellbird Creek Formation (thinly bedded sandstone, siltstone and mudstone).
- Western Merimbula – Quaternary alluvial and colluvial deposits, including the site area.

The sub-surface profile of the site encountered during the investigations is summarised in Table 5.1.

Table 5.1: Stratigraphy

Depth (mbgs)	Subsurface Profile
0.0 – 0.5	TOPSOIL/CONCRETE/ASPHALT and FILL – sand, grey-white, medium grained.
0.3 – 3.8	SAND – grey, fine to medium grained, poorly graded, sub-rounded, damp becoming wet at around 2mbgs.
3.8 to depth	CLAY – red with white to grey mottling, some sand, dry firm, medium plasticity.

mbgs – metres below ground surface

During remediation works, the extent of fill was found to be deeper than encountered during the investigations, up to a maximum of 1.5mbgs across the site.

The Auditor has checked the acid sulphate soil map for the site (Acid Sulfate Soils Map – Sheet ASS_020B) and notes that the site is not located in an area classified as acid suphate soils.

5.2 Hydrogeology

The site is located in a low-lying area adjacent to the Merimbula Lake (a tidal lake located over 50m to the east) and groundwater within the shallow sand unit is considered to flow towards Merimbula Lake. There are no other surface water receptors within 500 m of the site.

IT originally undertook a search for groundwater bores (repeated by URS in 2012) and identified no registered groundwater bores within a 500 m radius of the site. The nearest registered bores in the area are located approximately 700m to the northwest (upgradient) and 550m to the southeast (downgradient). The bores are recorded as being installed within “water bearing beach sand” and are registered for domestic use. Depths were recorded

between 2.5-15m and standing water levels (SWLs) (where recorded) ranged between 1-4mbgs.

Table 5.2: Site-Specific Hydrogeology

Aspect	Details
Aquifers Identified and depth to water.	Groundwater was encountered within the sand unit at depths of around 2mbgs. Standing groundwater elevations ranged between 0.55-0.69mAHD.
Phase Separated Hydrocarbon (PSH) presence and thickness	URS reported that *"…no PSH, including hydrocarbon sheen, was encountered in any of the monitoring wells."*
Hydraulic Gradient and Interpreted Flow Direction	The hydraulic gradient calculated from the inferred groundwater contours was reported by URS as 0.002-0.005 towards the southeast.
Hydraulic Conductivity	URS estimated hydraulic conductivity, based on literature values for fine to medium grained sand, to be in the order of 0.0173 to 17.28 m/day (Domenico & Schwartz, 1990).
Seepage Velocity	URS assumed an effective porosity of 26 to 53% (Domenico & Schwartz, 1990, range for fine grained sand) and estimated the groundwater velocity beneath the site to be in the order of approximately 0.02 to 120 m/year.
Groundwater Quality	Groundwater salinity was reported to range between 360 to 683 mg/L. URS reported that the groundwater is likely to be suitable for stock, domestic and some irrigation purposes, although the groundwater is unlikely to be used for drinking water in this area because the township of Merimbula has a reticulated water supply.

5.3 Auditor's Opinion

The stratigraphy and hydrogeology reported was acceptable for the purposes of the audit and the groundwater flow direction is considered adequately defined.

6 Evaluation of Quality Assurance and Quality Control

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The Auditor's assessment follows in Tables 6.1 and 6.2.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) IT did not specifically define DQOs, although the later remediation works by URS were undertaken in accordance with specific DQOs defined in the SAQP (URS, 2011).	Although DQOs were not specifically defined by IT, project objectives were clearly stated and effective sampling strategies were designed to achieve the objectives. The omission of specific DQOs for the investigations does not affect the outcome of the audit. The DQOs defined for the remediation works were considered appropriate.
Sampling pattern and locations *Soil Investigations:* Eleven soil bores were located in accessible areas of the site, noting that the site was still an operating service station. *Groundwater Investigation:* Four monitoring wells (MW1-MW4) were installed as part of the IT (2005b) investigations and an additional three installed as part of the URS (2009) investigations. The wells were concentrated in downgradient and cross gradient positions with two wells (MW4 and MW7) located in upgradient positions. *Soil Remediation:* Initial validation sampling was undertaken following removal of the tanks, although these samples were not used as final validation samples. Following re-excavation of the site during the Stage 1 and 2 excavation works, final validation soil sampling was undertaken utilising a systematic grid across the walls and base of the excavations *Soil Gas:* Four soil gas bores (SV1-SV4) were installed across the site and targeted the main areas of concern including the two main tank farm areas and the residual impacted area adjacent to MW8. *Post-Remediation Groundwater*: Nine monitoring wells (MW8-MW16) were installed by URS during the remediation works (URS, 2012). These were located in assumed up and downgradient locations and within the central area of the site.	The soil and groundwater investigation locations adequately targeted the main areas of concern and were sufficient for remediation planning purposes. Systematic, grid based soil validation sampling locations were appropriate. Post-remediation groundwater and soil vapour monitoring well locations were appropriate.
Sampling Density and Depths *Soil Investigations:* The sampling locations were placed on a roughly 8.5m grid across accessible areas of the site, noting that the immediate areas around service station infrastructure were not investigated. TPH, BTEX, PAHs, VHCs, metals and OCPs/OPPs were the main analytes. Samples were collected from the fill and the	The sampling density and depths were undertaken in consideration of the conceptual site model (CSM) and were acceptable.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor's Opinion**
underlying sand unit at depths ranging between 0.5-4mbgs. *Groundwater Investigations***:** A total of seven groundwater wells were installed during the investigation phases. Well construction details are discussed below. *Soil Remediation:* Excavation extended below the depth of former tanks and in the remaining areas of the site, excavation extended to depths of 0.5-1.5m to facilitate removal of asbestos impacted fill material. Final validation sampling locations were collected at a rate of 1 per $25m^2$ in the tankpits. Samples in the remaining areas of the site (following removal of asbestos impacted fill) were located on a 8.5m grid across the walls and base of the excavations. Final validation samples were analysed for TPH/BTEX, PAHs, phenols, metals, VHCs and asbestos. *Soil Gas*: One of the well locations targeted the identified contaminant source in the vicinity of MW8 with two wells located downgradient of the source and one additional well located roughly upgradient. Soil gas was analysed for VOCs by USEPA method TO15 and TPH (aliphatic and aromatic fractions). *Post-Remediation Groundwater*: Nine monitoring wells (MW8-MW16) were installed by URS during the remediation works (URS, 2012). Final groundwater samples were analysed for the full suite of volatile organic compounds (VOCs) including monocyclic aromatic hydrocarbons as well as VHC. Well construction details are discussed below.	
Well construction *Groundwater:* The wells were installed to depths of between 4-4.5m with the top of the screened interval installed to extend up to 1 m above the depth of groundwater. The wells were completed in the shallow sand unit. *Soil Gas:* The four soil gas bores were installed to depths of between 1.5-*2*.0mbgs with the depth of the geoprobe implant (screened section) reportedly located between 1.2-1.4mbgs. The wells were constructed of inert materials (geoprobe implant was constructed of stainless steel with Teflon tubing). Helium leak detection testing was undertaken which did not detect any significant leaks in the sample train.	The well construction was acceptable.
Sample Collection Method *Soil Investigation*: Sample collection was via a SPT split spoon and push-tube using disposable single use inserts. *Groundwater*: IT did not provide details of well development. URS developed wells with dedicated tubing and a hand operated check valve (Waterra footvalve). All wells were purged and sampled using dedicated disposable HDPE bailers. *Soil Validation Sampling*: Samples were collected by hand	Overall in the context of the remediation works undertaken, the sample collection method was found to be acceptable.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor's Opinion**
directly from the excavator bucket. *Soil Gas:* Soil vapour samples were collected using stainless steel, one-litre evacuated air canisters with stainless steel flow controller attachments provided by ALS laboratory (Newcastle). Prior to sampling each bore was purged using a landfill gas meter, with the goal of collecting readings of carbon dioxide, oxygen and methane.	
Decontamination procedures *Soil:* All drilling and sampling equipment was decontaminated with Extran 90/Decon 90 and high pressure water spray between sampling events to prevent cross contamination. New gloves were reportedly used for each new sample. *Groundwater*: Dedicated sampling equipment was used for each well. New gloves were reportedly used for each new sample. *Soil Validation Sampling*: Samples were collected using dedicated disposable nitrile gloves and decontamination was not required.	Acceptable
Sample handling and containers All samples were placed into prepared and preserved sampling bottles provided by the laboratory and chilled during storage and subsequent transport to the labs with the exception of metals in groundwater sampled by URS during the post phase II ESA (URS, 2009). These water samples were supplied in unpreserved glass bottles. URS did not indicate if the samples were field filtered. Water samples from the post-remediation phase of groundwater monitoring were field filtered, acidified and placed in appropriate containers. Soil gas samples were collected in laboratory supplied canisters fitted with a regulator. Although pre and post sample vacuum readings were not provided in the field notes, sample canisters were found to be acceptable for analysis by the laboratory which infers that the vacuum between sampling and analysis was acceptable.	The incorrect sample containers for metals during the post phase II ESA is not a significant issue considering that later groundwater monitoring rounds were undertaken using correct sampling containers. Overall the sampling handling and containers used are considered acceptable.
Chain of Custody (COC) *Investigations*: Completed chain of custody forms were provided in the reports. URS noted that an extra sample was provided which was not included on the COC. *Validation*: Completed chain of custody forms were not provided in the report. However, URS conducted a data validation review which clearly stated that chain of custody documents were complete.	Acceptable, noting that the Auditor has relied on URS data validation reports which state that chain of custody was complete.
Detailed description of field screening protocols and calibration of field equipment Field screening for volatiles was undertaken using a PID.	Acceptable. Exclusion of analysis of the high PID sample is not considered to affect the outcome of the audit since this sample was

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor's Opinion**
The PID was reported to have been calibrated prior to use and calibration certificates were included in the reports. PID readings were provided on borehole logs (investigations) and in analytical results tables (soil validation sampling). During the initial investigations the highest PID concentration was 46 ppm (MW5 1.8-2.0) where a hydrocarbon odour was noted on the borelog although the soil sample was not analysed. During the Stage 2 investigations elevated PID readings were recorded in grid squares D3 and E3 corresponding to elevated soil TPH concentrations and strong hydrocarbon odours. Groundwater field parameters were measured during well sampling and development. Meters were reported to have been calibrated prior to the start of each day. Calibration certificates were provided	below the groundwater table and groundwater from this location was analysed.
Sampling logs *Investigations*: Soil logs are provided within the report, indicating sample depth, PID readings and lithology. Groundwater field sampling records were included in the report. Soil descriptions encountered during validation sampling were recorded in a validation sample register.	Acceptable

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
Field quality control samples Field quality control samples including trip blanks, rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken in accordance with NEPM (1999).	No trip spikes were analysed, although considering the use of standard sampling protocols and laboratory supplied sampling containers with adequate seals, this was considered to be a minor non-conformance which is unlikely to affect the usability of the data. Overall the field quality control undertaken is considered to appropriate.
Field quality control results *Soil and groundwater investigations*: The results from all field quality control samples were within appropriate limits with the exception of: - Relative percent difference calculations (RPDs) for MW2-0.2 & QC1 for barium (66%), chromium (62%), nickel (63%) and vanadium (63%). - RPDs for MW2-0.2 & QC1a for chromium (53%) and	Overall, in the context of the dataset reported, the reported exceptions are not considered significant and the field quality control results are acceptable.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
toluene (127%) - During the IT Phase II ESA (IT, 2005b), trace concentrations of metals (barium, chromium, nickel and zinc) were detected in the field blank and rinsate blank (collected during soil sampling) and trace chloroform and metals (lead, barium, nickel and chromium) were detected in the field blank and equipment rinsate (collected during the groundwater sampling). A review of the RPD exceedances indicates that elevated RPD results were attributable to samples where concentrations were detected close to the laboratory limit of reporting. In these instances large exaggerations in the calculated RPD can occur. Significant detections of the contaminants detected in rinsate samples were not detected in the corresponding soil or groundwater samples, indicating that the results do not indicate the potential for cross contamination. IT noted that barium and chloroform were likely to have been contained in the laboratory supplied rinsate water. *Validation and post-remediation groundwater*: The results from all field quality control samples were within appropriate limits with the exception of: – RPDs for MW08 & QC06 for ferric iron (104%), ferrous iron (176%) & 2-methylphenol (82%) – RPDs for MW08 & QC07 for ferric iron (175%), ferrous iron (194%), lead (74%), 2-methylphenol (120%), TPH C10-C14 (130%), C15-C28 (94%), C16-C34 (113%) – B1_1.5W_Base & QC_209 for lead (54%). URS reported that there were some differences in the amount of sediment observed in the primary and duplicate groundwater samples. The large RPDs recorded for TPH and phenols may be a due to absorption onto sediment in the sample. URS applied the highest groundwater result in the assessment. The exceedance in the soil RPD was marginal and URS noted that this was due to soil heterogeneity.	
NATA registered laboratory and NATA endorsed methods Laboratories used included: ALS, Labmark, MGT and Amdel. Laboratory certificates were NATA stamped for the analyses undertaken.	Acceptable
Analytical methods Analytical methods were included in the laboratory test certificates (referenced as in-house methods). The laboratories were NATA accredited and a full description of the analytical methods for each laboratory is provided on the NATA website. Asbestos analysis was a qualitative determination of asbestos fibres in bulk samples using polarised light microscopy and dispersion staining techniques in accordance with the method	A review of the analytical methods indicates that they are consistent with NEPM (1999). The analytical methods are considered acceptable for the purposes of the audit, noting that the AS4964-2004 is currently the only available method in Australia for analysing asbestos.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
described in AS4964-2004.	
Holding times Review of the COCs and laboratory certificates indicate that the holding times had been met with the exception of some QC rinsate and duplicate samples analysed 2-3 days outside the holding time. URS reviewed the results and noted that these exceedances did not affect the overall quality of the data set.	The Auditor agrees with the URS evaluation. Overall in the context of the works undertaken the holding times reported are acceptable.
Practical Quantitation Limits (PQLs) *Soil*: PQLs (except asbestos) were all less than the threshold criteria for the contaminants of concern. *Asbestos*: The limit of detection for asbestos in soil was 0.01% w/w. *Groundwater*: Not all PQLs for the groundwater analysis were sufficiently low, with the following PQLs exceeding the relevant trigger values: – Anthracene 0.2-0.5µg/L, trigger value 0.01µg/L – Benzo(a) pyrene 0.2-0.5µg/L, trigger value 0.1 µg/L – OCPs/OPPs 1-10µg/L, trigger value 0.01-0.2 µg/L – Some constituent VHCs 5 - 50ug/L	*Soil (except asbestos):* Overall the soil PQLs are acceptable. Asbestos: In the absence of any other validated analytical method, the detection limit for asbestos is considered acceptable. A positive result would be considered to exceed the "no asbestos detected in soil" criteria, providing this is applied within a weight of evidence approach to assess the significance of the exceedance, accounting for the history of the site and frequency of the occurrence. *Groundwater*: The elevated PQLs were only marginally elevated above the trigger values and in the context of the results reported and remediation works undertaken, overall these discrepancies do not materially affect the outcome of the audit.
Laboratory quality control samples Laboratory quality control samples including laboratory control samples (LCS), matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory in accordance with the NATA certification.	Acceptable
Laboratory quality control results The results from all laboratory quality control samples were within appropriate limits with the exception of: - URS (2009) - Slightly elevated LCS spike recoveries recorded for some VHC. RPD for zinc in soil sample MW7_0.5-0.6 was marginally outside the RPD limit of 20%. VHC compounds were not detected above guidelines in any of the samples analysed. The zinc RPD was a minor exceedance, likely due to sample heterogeneity. - URS (2012) - High LCS spike recoveries of naphthalene, pentachlorophenol and several VHCs were greater than	Overall in the context of the laboratory QC reported, the exceedances are not considered significant and the laboratory quality control results are acceptable.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor's Opinion**
upper control limits in various sample batches. All of these compound concentrations were reported less than limit of reporting (LOR) for the associated samples and URS concluded that interpretation of the data was not affected by the potential positive bias.	
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) IT and URS undertook formal analytical data evaluation referred to as an 'analytical data validation' describing all information relevant to the site assessment. IT concluded that *"the QC results are acceptable for the purposes of the investigation"* and URS concluded that "…*the analytical data produced is considered to be of an acceptable standard for interpretive use."*	An assessment of the data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

In considering the data as a whole the Auditor concludes that:

- The data set is considered to be complete because sufficient samples have been collected and analysed in accordance with documented procedures. Laboratory analysis was NATA accredited. Although chain of custody documentation was not provided as part of the validation reporting, URS conducted a data validation review which confirmed that chain of custody documentation was complete and acceptable.
- There is a high degree of confidence that data is comparable. The samples were collected by experienced personnel in accordance with standard industry practice and were preserved, transported and analysed in a consistent manner.
- The data set is likely to be representative of the conditions on site because appropriate media (soil, soil vapour and groundwater) have been sampled and characterised.
- The precision (reproducibility) of the data is considered acceptable for the purposes of the audit. Although some issues with elevated RPDs for groundwater were noted these were considered to be due to sediment in the groundwater sample and were not considered significant although the highest analytical results was used in the interpretation. In addition, the laboratory provided sufficient information to conclude that the data is of sufficient precision.
- The data is likely to be accurate. The field QC samples did not indicate any significant bias in the results. Standard methods were employed during sampling and the laboratory QC data evaluation was found to be within acceptable limits.

7 Environmental Quality Criteria

As discussed in section 1.3, the investigations and remediation were completed prior to implementation of the amended NEPM (1999[2013]), therefore this document was not referenced for the majority of the audit (which commenced in 2010). However, certain aspects of the audit, including consideration of risks from petroleum hydrocarbon vapour intrusion, have considered NEPM (1999[2013]) as previous guidance was not available.

7.1 Soil

The Auditor has assessed the soil data with reference to the following criteria:

- Soil Investigation Levels for Urban Redevelopment Sites in NSW (SIL Column 1 – 'low density residential' and column 5 – provisional phytotoxicity based investigation levels) in DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*.
- EPA (1994) *Guidelines for Assessing Service Station Sites* for assessing TPH and BTEX results.

URS adopted these same criteria over the course of the soil investigations, and additionally compared the maximum soil contaminant concentrations to the CRC CARE (2011)[1] criteria during consideration of risks from residual soil concentrations at the site.

Prior to implementation of the amended NEPM 1999[2013] there were no NSW EPA approved guidelines for asbestos in soil relating to human health. DEC (2006) stated that Auditors must exercise their professional judgement when assessing whether a site is suitable for a specific use.

Imported fill has been assessed by the Auditor in relation to attributes expected of virgin excavated natural material (VENM). The NSW DECC (July 2009) *Waste Classification Guidelines, Part 1: Classifying Waste* classifies VENM as *"…natural material*

- *'that has been excavated or quarried from areas that are not contaminated with manufactured chemicals or process residues, as a result of industrial, commercial, mining or agricultural activities, and*
- *'that does not contain sulphidic ores or soils, and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA gazettal notice."*

On this basis, the Auditor considers that for soil to be classified as VENM, the following criteria generally apply:

- Organic compounds (including petroleum hydrocarbons, PAHs, OCPs, PCBs, phenols) should be less than the LORs; and
- Inorganic compounds should be consistent with background concentrations.

[1] Friebel, E and Nadebaum, P (2011) Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater. CRC CARE Technical Report No 10.

The Auditor considered the need for remediation based on the 'aesthetic' contamination as outlined in the NEPM (1999) Schedule B(1) *Guideline on the Investigation Levels for Soil and Groundwater* that states that "there are no numeric Aesthetic Guidelines but the fundamental principle is that the soils should not be discoloured, malodorous (including when dug over or wet) nor of abnormal consistency. The natural state of the soil should be considered".

7.2 Groundwater

URS considered that due the potential beneficial use of the water for domestic purposes (based on low salinity) the following criteria were relevant for comparison with groundwater results:

- Drinking Water - NHMRC & NRMMC (2004) 'Australian Drinking Water Guidelines'.
- Maintenance of Ecosystems - ANZECC & ARMCANZ (2000) 'Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters' Water Quality Guidelines. The receptor is Merimbula Lake (tidally influenced) located over 50m to the east, southeast and south of the site. The guideline trigger values for marine waters have been used as recommended in ANZECC (2000) for estuarine environments. No criteria for TPH in groundwater were referenced although criteria for some BTEX compounds and polycyclic aromatic hydrocarbons were used to assess individual hydrocarbon compounds.

The Auditor agrees with the beneficial uses identified by URS and criteria adopted but also considers that the following additional beneficial uses require consideration and in addition to the criteria listed above has also assessed the groundwater data against:

- Recreation and Aesthetics - ANZECC & ARMCANZ (2000) Water Quality Guidelines for recreational purposes.
- Aquaculture and Human Consumers of Food - details of aquaculture licences in Merimbula Lake were not provided by URS, the Auditor has conservatively assumed that aquaculture is occurring within Merimbula Lake.

The Auditor notes that industrial water use and agricultural irrigation water use have not been considered as these are prohibited under the current zoning.

The Auditor has also considered the NEPM (1999)[2013] health screening levels (HSLs) for petroleum hydrocarbon compounds in the assessment of risk (Section 13).

7.3 Soil Vapour

The URS (2012) report indicates that the CRC CARE (2011) HSLs were used to assess the soil vapour data, although HSL criteria used by URS are not included in the soil vapour tables 9a and 9b in the URS report and the HSL checklist for soil vapour was not provided.

The Auditor considers that the CRC CARE (2011) HSLs are appropriate screening criteria for the soil vapour data given the site is a former service station and that the chemicals of concern are petroleum hydrocarbons. In addition, the CRC CARE (2011) HSLs have been largely adopted in the NEPM (1999)[2013] with minor modification. As part of the audit, a HSL checklist for soil vapour was completed and is kept on file. Further discussion regarding

the application of the HSLs is provided in section 13. For analytes detected in soil vapour above the laboratory limits of reporting for which there are no HSL criteria, the Auditor has considered air screening criteria as presented in Table 7.1 below.

Table 7.1: ENVIRON Soil Vapour Screening Criteria

Chemical of Concern in Soil Vapour	Soil Vapour Screening Criteria (mg/m^3)	Source
>C_5-C_7 Aromatic	Assessed BTEX	CRC CARE (2011) HSL – A, 1-2m, Sand
>C_7-C_8 Aromatic	Assessed BTEX	CRC CARE (2011) HSL – A, 1-2m, Sand
>C_5-C_6 Aliphatic	640	CRC CARE (2011) HSL – A, 1-2m, Sand
>C_6-C_8 Aliphatic		CRC CARE (2011) HSL – A, 1-2m, Sand
>C_8-C_{10} Aliphatic		CRC CARE (2011) HSL – A, 1-2m, Sand
>C_8-C_{10} Aromatic	Assessed BTEX	CRC CARE (2011) HSL – A, 1-2m, Sand
>C_{10}-C_{12} Aliphatic	560	CRC CARE (2011) HSL – A, 1-2m, Sand
>C_{10}-C_{12} Aromatic		CRC CARE (2011) HSL – A, 1-2m, Sand
Benzene	2.9	CRC CARE (2011) HSL – A, 1-2m, Sand
Toluene	3800	CRC CARE (2011) HSL – A, 1-2m, Sand
Ethylbenzene	1100	CRC CARE (2011) HSL – A, 1-2m, Sand
Total Xylenes	750	CRC CARE (2011) HSL – A, 1-2m, Sand
Naphthalene	3.0	CRC CARE (2011) HSL – A, 1-2m, Sand
Hexane	700	USEPA RSL

8 Evaluation of Soil Analytical Results

As noted in section 1.2, during the investigation phases, the site was an operating service station and sampling was undertaken only in accessible areas of the site. Soil samples were analysed for a variety of contaminants including petroleum hydrocarbons (TPH/BTEX), PAHs, phenols, heavy metals, VHCs and OCP/OPPs.

Soil sampling locations and analytical results are shown as Attachments 5 and 6, Appendix A.

The site was subsequently remediated and validated including UST removal/validation and excavation of the of upper layers of soil/fill (to depths of between 0.5-1.5m) across the entire site area. Site remediation and validation is discussed in section 11.

8.1 Auditor's Opinion

In the Auditor's opinion, the soil analytical results are consistent with the site history and field observations. The results indicate that some hydrocarbon soil impact was present above and at the saturated zone within the western portion of the site. Sampling of the areas in the vicinity of service station infrastructure was undertaken as part of the remediation works (section 11). Discussion of residual soil impact remaining at the site is discussed in section 13.

9 Evaluation of Soil Vapour Results

URS installed four soil vapour wells to provide further data regarding concentrations of petroleum hydrocarbons beneath the site as a result of the residual soil and/or groundwater contamination and to supplement risk modelling from dissolved phase impacts in groundwater.

Shallow soil vapour data was collected on 21 November 2012 at four locations on the site. Soil vapour wells were installed to 1.5 – 2.0mbgs although were screened from 1.2 – 1.4mbgs. The wells were installed in areas of open ground which had been excavated and backfilled with VENM between November 2011 and November 2012 (section 11).

Table 9.1: Soil Vapour Results, 21 November 2012

Analyte	Screening criteria HSL – A SAND 1m – 2 m ($\mu g/m^3$)	SV01 ($\mu g/m^3$)	SV02 ($\mu g/m^3$)	SV03 ($\mu g/m^3$)	SV04 ($\mu g/m^3$)
Naphthalene	3000	<5.2	<5.3	<5.2	<5.2
Benzene*	2900	7.7	<3.2	<3.2	<3.2
Toluene	3800 000	44.4	<3.8	5.6	18.4**
Ethylbenzene	1100 000	<4.3	<4.3	<4.3	<4.3
Xylenes	750 000	23	<13.1	<13	<13
TPH C5-C6 (aliphatic)	640 000	<330	<330	<330	<330
TPH C6-C8 (aliphatic)		<400	<400	<400	<400
TPH C10-C12 (aliphatic)	560 000	<600	<600	<600	<600
TPH C10-C12 (aromatic)		<50	<50	<50	<50

*Genotoxic carcinogen - guideline value based on 1 x 10^{-5} risk

** Duplicate result

9.1 Auditor's Opinion

The data indicates no concentrations in soil vapour above the CRC CARE (2011) HSL-A criteria for vapour samples collected from 1-2 m in sand.

The Auditor agrees with the URS conclusions that:

- the measured low concentrations of petroleum hydrocarbons in the soil vapour samples are reflective of biodegradation occurring in the soil, consistent with the elevated oxygen concentrations observed during purging (around 20%).
- there is the potential that future construction of a large building at the site could limit the oxygen penetration into the soil profile and therefore limit the biodegradation of vapours. As such, the measured soil vapour results may underestimate future soil vapour concentrations following redevelopment.

The Auditor notes that the elevated levels of oxygen are likely related to the shallow depth of the soil vapour samples (up to 1.4 m), the geology (sand), the unpaved nature of the vapour well locations and that the soil profile had recently been disturbed/backfilled at the time of sampling. Based on the potential for future variation, the Auditor has not relied on the soil vapour results in the assessment of risks (section 13).

10 Evaluation of Groundwater Analytical Results

Groundwater monitoring was undertaken at the site prior to remediation by both IT (MW1-4) in September 2005 and URS (MW1-MW7) in May 2009.

The wells were destroyed during the remedial works. New wells were installed by URS across the site (MW8-16) and a post-remediation groundwater monitoring event was undertaken in late November 2012.

Well locations are shown on Attachments 4 and 7, Appendix A.

Table 9.1 presents a summary of the groundwater monitoring results from May 2009 (MW1-7 destroyed during remediation works) and November 2012 (MW8-16 installed post-remediation). All wells were analysed for TPH, BTEX, PAHs, phenols, metals and VOCs. The results are compared to the criteria discussed in Section 7.2

URS reported that no phase separated hydrocarbon (PSH) has been observed during any monitoring events, although the Auditor notes that a hydrocarbon sheen and odour was noted historically in MW4 and MW5 (IT, 2005b). During the post remediation monitoring, URS reported a hydrocarbon sheen and odour in MW8 and MW15 during well development, although this was not observed during purging and sampling of these wells. In addition, the Auditor notes that URS reported ingress of "…*groundwater and weathered PSH globules*" during the excavation works, in the vicinity of MW8. These observations correlate with the laboratory results (discussed below).

Table 9.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L)

Analyte	May 2009 MW1-MW7			November 2012 MW8-MW16			Comments
	No of Detections & Range (µg/L)		n > Criteria	No of Detections & Range (µg/L)		n > Criteria	
TPH (C_6-C_9)	0	<PQL	-	2	<PQL-650	-	Detections in MW8 and MW15.
TPH (C_{10}-C_{36})	7	200-3,110	-	9	110-26,800	-	TPH (C_{10}-C_{36}) recorded in all wells with maximum in MW8 (25,800 µg/L) and MW7 (3,110 µg/L). See Table 9.2 for TPH summary.
BTEX	1	<PQL-10	None	1	<PQL-41	-	Benzene in MW7 (10µg/L) & MW8 (41µg/L) exceeds ANZECC (2000) marine aquatic ecosystems and ADWG (2011). MW8 also exceeds recreational water quality guidelines.

Table 9.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L)

Analyte	May 2009 MW1-MW7			November 2012 MW8-MW16			Comments
	No of Detections & Range (µg/L)		n > Criteria	No of Detections & Range (µg/L)		n > Criteria	
Other MAH	NA	NA	NA	2	<PQL-376	-	Detections include trimethylbenzenes and propylbenzenes. Maximum individual concentration 376 µg/L 1,2,4-trimethylbenzene in MW15.
Benzo(a)pyrene	0	<PQL	None	0	<PQL	None	-
Naphthalene	4	1.2-4.2	None	2	<PQL-70	None	MW08 exceeds ANZECC (2000) marine aquatic ecosystems. Detected in MW4-7 & MW15 at low concentrations.
Anthracene	0	<PQL	None	0	<PQL	None	-
Fluoranthene	0	<PQL	None	0	<PQL	None	-
Phenanthrene	0	<PQL	None	0	<PQL	None	-
Phenolic Compounds	0	<PQL	None	1	<PQL-68	1	2,4-dimethylphenol exceeded ANZECC (2000) marine aquatic ecosystems criteria in MW8
VHCs	0	<PQL	None	0	<PQL	None	-
Arsenic	7	<PQL-28	5	9	2-24	6	Minor exceedance of ANZECC (2000) marine aquatic ecosystems in MW1, exceedance of ADWG (2011) in MW1-4, MW6, MW9-10 & MW13-16.
Cadmium	0	<PQL	None	0	<PQL	None	-
Total Chromium	6	2-6	None	8	<PQL-4	None	-
Copper	0	<PQL	None	5	<PQL-1	None	-
Lead	0	<PQL	None	1	<PQL-13	1	Minor exceedance of ANZECC (2000) marine aquatic ecosystems, aquaculture and ADWG (2011) in MW8
Nickel	2	<PQL-1	None	1	<PQL-2	None	-

Table 9.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L)

Analyte	May 2009 MW1-MW7			November 2012 MW8-MW16			Comments
	No of Detections & Range (µg/L)		n > Criteria	No of Detections & Range (µg/L)		n > Criteria	
Zinc	7	12-218	4	9	2-24	2	MW3 (218µg/L) & MW4 (670µg/L) exceed ANZECC (2000) marine aquatic ecosystems criteria (15µg/L) with minor exceedance in MW1, MW6, MW14 & MW16. Majority of wells exceed aquaculture criterion (5µg/L).
Mercury (inorganic)	0	<PQL	None	0	<PQL	None	-

n number of samples
NA not analysed
- No criteria available/used

A summary of the monitoring well details and TPH (C_{10}-C_{36}) concentrations in each monitoring round is presented in Table 9.2 below. Well locations are shown on Attachments 4 and 7, Appendix A.

Table 9.2: Monitoring Well Details and TPH C_{10}-C_{36} Analytical Results (µg/L)

Well # (MW)	Screened Interval (mbgs)	Date Installed	Location	n	Sept 05	May 09	Nov 12
1	1.4-3.6	Sept 05	S boundary (W) MW11 located 3m NW of former MW1	2	<PQL	1,000	-
11	1.0-3.0	Nov 12		1	-	-	270
2	1.5-4.5	Sept 05	E boundary (S) MW14 located 2m E of former MW2	2	<PQL	200	-
14	1.0-3.0	Nov 12		1	-	-	490
3	1.0-4.5	Sept 05	E boundary	2	<PQL	300	-
4	1.1-4.0	Sept 05	W boundary (adjacent to carwash)	2	444	800	-
8	1.5-4.5	Nov 12	MW8 located 6m S of former MW4	1	-	-	26,800
5	1.0-4.0	May 09	E boundary (N) MW16 located 2m SE of former MW5	1	-	340	-
16	1.0-4.0	Nov 12		1	-	-	190
6	0.5-3.5	May 09	Central area (adjacent to diesel UST)	1	-	540	-
7	0.5-3.5	May 09	W boundary (S)	1	-	3,110	-

Table 9.2: Monitoring Well Details and TPH C_{10}-C_{36} Analytical Results (µg/L)

Well # (MW)	Screened Interval (mbgs)	Date Installed	Location	n	Sept 05	May 09	Nov 12
9	1.0-4.0	Nov 12	NW corner	1	-	-	180
10	1.0-4.0	Nov 12	Central area (beneath former sales building)	1	-	-	170
12	1.0-3.0	Nov 12	Tank farm (footprint of former UST T1)	1	-	-	1,250
13	1.0-3.0	Nov 12	S boundary (E)	1	-	-	460
15	1.0-3.5	Nov 12	E boundary (adjacent to former bowsers)	1	-	-	1,960

n number of times well sampled
italics indicates well has been destroyed
- not sampled on relevant date
N north S south E east W west

All the groundwater samples contained concentrations of TPH (C_{10}-C_{36}) above the laboratory LOR and this was consistent between both the pre (2009) and post remediation (2012) groundwater monitoring. The highest groundwater concentrations were detected in MW8 located adjacent to the carwash area along the western boundary of the site. This was recorded in Nov 2012 immediately after soil remediation works were undertaken at the site.

During the Nov 2012 groundwater monitoring, analysis of total recoverable hydrocarbons (TRH) according to the amended NEPM (1999)[2013] fractions was also undertaken. A summary of the TRH breakdown for the maximum concentrations detected in MW8, MW12 and MW15 (highest TRH concentrations detected across the site) during the Nov 2012 groundwater monitoring is provided in Table 9.3 below.

Table 9.3: Nov 2012 TRH fractions (µg/L)

TRH fraction	MW8 Western boundary	MW12 Downgradient of MW8	MW15 Cross gradient of MW8, Eastern boundary of site
C_6-C_{10}	510	<PQL	1,400
C_{10}-C_{16}	4640	280	1,040
C_{16}-C_{34}	19,300	900	130
C_{34}-C_{40}	4360	<PQL	<PQL
C_{10}-C_{40} (sum)	**28,300**	**1,180**	**1,170**
Benzene	41	<PQL	<PQL

Based on the groundwater monitoring results reported, the primary groundwater contaminant plume occurs along the western boundary of the site in the vicinity of MW8, with similar TRH

ratios, at much lower concentrations, detected in MW12 located downgradient and MW7 located cross gradient.

Concentrations of TRH were detected in MW15 (downgradient of the former bowsers), although the TRH profile is slightly different to that detected in MW8, suggesting a separate localised source in the vicinity of the former bowsers.

Concentrations of dissolved metals were in some cases above the adopted criteria (lead, arsenic and zinc). The distribution of dissolved metals across the site appears to suggest that these are representative of widespread diffuse urban contamination, rather than any point source on the site, although it is noted that the relatively minor lead exceedance at MW8 may be attributable to a petroleum source.

Natural Attenuation

Monitoring wells MW8-MW16 were analysed for natural attenuation parameters during the Nov 2012 monitoring round. Field measurements, in particular for dissolved oxygen, are inconclusive due primarily to the sampling method (bailer) which may have oxygenated the sample during collection. However, analytical results indicate that natural attenuation by anaerobic biodegradation has occurred to some degree in MW8 based on:

- low concentrations of nitrate indicating de-nitrification
- the detection of elevated concentrations of methane indicating methanogenic degradation.

Overall the results indicate that residual petroleum hydrocarbon concentrations in groundwater are likely to reduce further over time due in part to biodegradation as well as physical mechanisms of natural attenuation such as dilution.

10.1 Auditor's Opinion

In the Auditor's opinion, the groundwater assessment undertaken is adequate to characterise on-site residual groundwater concentrations for assessment of risks to future occupants, considered in section 13.

Offsite migration of contamination is considered further in section 12 and associated risks are discussed in section 13.

11 Evaluation of Remediation

11.1 Remediation Required

URS prepared a remediation action plan (RAP) which proposed removal of fuel infrastructure and contaminated soil by excavation. Based on the investigations completed by URS, the extent of remediation required was defined by URS in the RAP as follows:

Table 11.1: Remediation Required and the Preferred Options.

Description	Extent of Remediation Required	Proposed Remediation Options	Selected Remediation Option
Hydrocarbon Impacted Soil	The extent of soil and groundwater remediation was not defined in the RAP due to the inability to identify all contamination prior to the removal of the petroleum infrastructure. Investigation undertaken prior to the remediation indicated that contamination with petroleum hydrocarbons was present. Acid Sulphate Soils (ASS) were not encountered by URS.	<u>Unsaturated Zone</u> – Excavation and on-site landfarming – Excavation and offsite disposal – Soil vapour extraction (SVE).	URS stated that following demolition and infrastructure removal (including USTs), any excavated soil would be backfilled. An estimate of the volumes of impacted soil and contaminant concentrations would be undertaken before a treatment/disposal option was selected.
Hydrocarbon Impacted Groundwater		<u>Saturated Zone</u> – Pump and treat – Air sparging – In-situ chemical oxidation using hydrogen peroxide – Natural attenuation (NA) and enhanced monitored natural attenuation.	Given that primary and likely secondary source removal was proposed and the relatively low hydrocarbon impacts to groundwater, NA was selected as an appropriate management strategy. Noting that if concentrations in new groundwater wells were found to be significantly higher than those encountered during the investigations chemical oxidation or enhanced NA may be required.

It is considered that the remediation approach recommended by URS was appropriate.

11.2 Remediation Works

Remediation of soil within the unsaturated zone has been carried out at the site in three stages as follows:

- **Tank Excavation Works:** Removal of all above ground structures and underground storage tanks (UST) from the site, although some infrastructure remained including triple interceptor trap (TIT), remnant underground pipelines between the former USTs and dispensers and a brick-lined cavity uncovered during the UST removal operations (located along the northern boundary adjacent to former UST T7). Validation sampling (in tank pits) and testpits were undertaken to assess the extent of contamination within

areas previously inaccessible due to service station infrastructure. Asbestos containing materials (ACM, bonded asbestos fragments) were observed mixed with the fill material underneath the pavement across the site. Tank-pits were backfilled with excavated material to allow time for assessment of the extent of contamination and remediation planning.

- **Stage 1 Excavations:** Excavation of southern portion of the site (Attachment 8, Appendix A) due to identified hydrocarbon and ACM contamination. The site was sectioned using a grid. Previously excavated tank-pits were re-excavated to depths consistent with or greater than the previous tank excavation works. The remaining areas of Stage 1 were excavated to depths of between 1.2-1.3mbgs to remove the shallow fill containing ACM. Excavated material was stockpiled prior to waste classification and offsite disposal.
- **Stage 2 Excavations:** Excavation of the northern portion of the site (Attachment 8, Appendix A) due to identified hydrocarbon and ACM contamination. Previously excavated tank-pits were re-excavated to depths consistent with or greater than the previous tank excavation works. Hydrocarbon impact previously identified in MW4, TP07 and TP08 was excavated to a depth of 2mbgs (to top of groundwater table) within grid square D3, E3 and D2. The remaining areas of Stage 2 were excavated to depths of between 0.5-1.5mbgs to remediate the shallow fill containing ACM. Excavated material was stockpiled prior to waste classification and offsite disposal.

Further details of remediation performed and validation results are pr4ovided in Table 11.2, following.

Table 11.2: Remedial Excavations, Soil Investigations and Soil Contamination Detections		
Activity	**Details**	**Validation Results**
Tank Excavation Works: 9 Aug 10 - 4 Sept 10		
URS and its subcontractor removed all above ground structures and USTs from the site. URS confirmed that seven USTs and one waste oil tank were removed from the site in 2010. Tank destruction certificates were provided. Soil validation sampling was undertaken within the tank pit excavations (E3-5, WOT, E7, E4 & E1-2) and 14 testpits (TP01-TP14). Sampling locations, borelogs and analytical result tables were provided to the Auditor by Email. Sample locations are shown in Attachment 9, Appendix A.	Asbestos containing materials (ACM) as bonded cement fragments were observed mixed with the fill material underneath the pavement across the site. Concrete rubble, bricks and wood were also encountered in some shallow soils. Following removal of tanks and validation sampling the tank excavations were immediately backfilled with the excavated material which included backfill sands, fill material, concrete anchors and pavement. Excavations were "topped off" with 70m^3 of imported sand and gravel. This material was subsequently re-excavated and removed from the site as part of the Stage 1 and Stage 2 soil excavation works discussed below. Following completion of the tank excavation works some infrastructure remained including portions of the concrete pavement, the TIT, remnant underground pipelines between the former USTs and dispensers and a brick-lined cavity uncovered during the UST removal operations (located along the northern boundary adjacent to former UST T7). This remaining infrastructure was removed during later stages as discussed below.	Preliminary tank excavation assessment (TEA) results provided to the Auditor by Email indicate the following residual impacts remained at the site: – ACM fragments in shallow fill below concrete slab (near pipelines) in tankpits E1-2, E3-5, E7 and testpits TP02, TP04, TP05, TP06, TP07, TP08, TP12 and within fill around former waste oil tank. – Residual petroleum hydrocarbon impact in the walls and base of the tankpit excavations and within testpit and borehole sampling locations as highlighted on Attachment 9, Appendix A.

Table 11.2: Remedial Excavations, Soil Investigations and Soil Contamination Detections		
Activity	**Details**	**Validation Results**
Stage 1 Soil Excavation Works: 8 Nov 11 -23 Nov 11		
Excavation of southern portion of the site (Attachment 8, Appendix A) due to identified hydrocarbon and ACM contamination. The site was divided into grid sections (alpha numeric) and excavation was recorded with reference to these grid sections. Stage 1 included excavation of grid sections: A4 (to 1.2 mbgs), A5 (to 1.3 mbgs), B4 (to 3.0 mbgs), B5 (to 3.0 mbgs), B6 (to 1.2 mbgs), C4 (to 3.0 mbgs), C5 (to 3.0 mbgs), C6 (to 1.2 mbgs), D4 (to 3.0 mbgs) and D5 (to 2.5 mbgs). A narrow strip ranging in width between 0.5 – 1.0 metres around the boundary of the site was left in place, including concrete surface, to ensure the integrity/stability of the adjoining offsite footpath. This was excavated as part of the Stage 2 works. Collection of 26 validation samples and analysis for TPH/BTEX, PAHs, phenols, metals, VHC, PCBs and asbestos. Validation samples locations are shown in Attachment 10, Appendix A. Excavations were also visually cleared of asbestos by a qualified subcontractor (SWE) and a clearance certificate issued. A copy of the clearance certificate was appended to the SER. Backfill of excavations with imported VENM (see section 11.4 for further details). Disposal offsite of excavated material (see section 11.3.1 for further details).	Large concrete pieces associated with a former tank pit encountered and removed. Groundwater ingress was noted in excavations at approximately 2.5 mbgs. Excavation did not proceed substantially below the groundwater table. Hydrocarbon odour and staining was removed from the excavation wall between reference section grids C5 and C6. 0.3m thick band of dark grey odourous, stained sand encountered and excavated at 2.3 mbgs on the eastern wall of grid B5. Isolated area of impacted soil encountered and removed from northwest corner and rusted drum/container excavated with strong odour noted in soils. Sample D4_3.0 collected beneath location. SWE conducted visual inspections of the excavation faces following excavation of ACM impacted fill material. Visual clearance was provided by SWE confirming that all "*ACM impacted fill had been removed from the SE corner of the site [Stage 1 excavation]".*	Previous residual hydrocarbon impacts (TP09, E4 & E1-2) and identified ACM impacted fill were excavated from the Stage 1 area (excluding boundary strip of fill). Stage 1 area validated, noting that hydrocarbon odours were observed to remain at the base of the excavation in the saturated zone as follows: - B5_3.0 (PID 3.4) - W7_2.3 (PID 4.4) - W8_2.3 (PID 1.8) - C4_2.5 (PID 1.9) - C4_3.0 (PID 0.4) Although visual clearance of the excavation faces was provided by SWE, asbestos (identified by the laboratory as a small fibreboard fragment containing chrysotile asbestos) was detected in one fill sample along the SW wall of the Stage 1 excavation (W10_0.6). This material was excavated and validated as part of the Stage 2 excavations.

Table 11.2: Remedial Excavations, Soil Investigations and Soil Contamination Detections		
Activity	**Details**	**Validation Results**
Stage 2 Soil Excavation Works: 17 Oct 12 – 2 Nov 12		
Excavation of northern portion of the site and narrow strip around the boundary of the southern section of the site (Attachment 8, Appendix A). Excavation of grid sections A1 (to 0.5 mbgs), A2 (to 0.6 mbgs), A3 (to 2.0 mbgs), B1 (to 1.5 mbgs), B2 (to 0.7 mbgs), B3 (to 2.2 mbgs), C1 (to 1.0 mbgs), C2 (to 1.0 mbgs), C3 (to 1.0 mbgs), D1 (to 1.0 mbgs), D2 (to 1.5 mbgs), D3 (to 2.0 mbgs) and E3 (to 2.0 mbgs) and the narrow strip around the southern boundary (to 0.5-1.2 mbgs). Collection of 53 validation samples and analysis for TPH/BTEX, PAHs, phenols, metals VHC, PCBs and asbestos. Validation sample locations are shown in Attachments 11 and 12, Appendix A. Excavations were also visually cleared of asbestos by a qualified subcontractor (JBS) and a clearance certificate issued. A copy of the clearance certificate was appended to the SER. Backfill of excavations with imported VENM (see section 11.4 for further details). Disposal offsite of excavated material (see section 11.3.1 for further details).	– Elevated PID readings were recorded (500 to 4,000 ppm) in grid sections D3 and E3 (during excavation). – Groundwater and weathered PSH globules noted at 2.2 mbgs in grid sections D3, E3 and part of D4. Strong hydrocarbon odour encountered. Former building footing remained in place in grid section D1 as the base is below the depth of ACM impact. Two old brick wells encountered in northwest and centre of grid section D1 and removed (1.5 and 1.4 m deep). TIT was removed from grid section D1 and the former concrete base remained. Underneath the sewer in northwest of site another capped pipe was encountered in grid section D1. Two old brick wells/vaults were encountered and removed in grid section C1. Six car batteries were buried within one of the wells/vaults. Large concrete pieces associated with a former tank pit were encountered and removed. The location of former hoist ram was encountered and excavated to 2.2mbgs in grid section B2. A slight sheen was noted on the groundwater ingress at this location and visual staining was noted and removed from the base	Previous hydrocarbon impacts (in vicinity of MW4, TP07 and TP08) excavated to previous base depth of 2mbgs. Former excavation E3-5 and WOT re-excavated to 2mbgs. Remaining areas of Stage 2 excavated to between 0.5-1.0mbgs. The Auditor is satisfied that ACM impacted fill has been effectively removed and validated within the Stage 2 area, including the narrow strip of land along the SW boundary where ACM had been detected along the wall of the Stage 1 excavation boundary. Overall fill material has been excavated from the entire site area and the risk of ACM remaining at the site is negligible. Hydrocarbon impact has been validated within the saturated zone of Stage 2 with the exception of the following locations identified on Attachment 11 & 12, Appendix A as follows: – E3_1.0 West – (located on western boundary) TPH (C_{10}-C_{36}) 4,040mg/kg – D3_2.0 West – (located adjacent to MW8) TPH (C_{10}-C_{36}) 16,000mg/kg – D3_2.0 Base West – (located adjacent to MW8) TPH (C_{10}-C_{36}) 8,910mg/kg – E3_2.0 Base (adjacent to western boundary) TPH (C_{10}-C_{36}) 10,600mg/kg. These locations were excavated to the extent practicable (either to the saturated zone (approximately 2mbgs) or along the site boundary).

Table 11.2: Remedial Excavations, Soil Investigations and Soil Contamination Detections		
Activity	**Details**	**Validation Results**
	of the pit. JBS conducted progressive visual validation of the excavation faces following removal of asbestos impacted material. Where ACM or building rubble was observed in the excavation face, the on-site excavator removed 100 mm off the area until a clean surface was achieved. Visual clearance was provided by JBS confirming that all excavation surfaces were deemed to be clear of ACM and building rubble.	Hydrocarbon odours were observed in association with these samples and PID readings ranged from 51 to 174ppm.

During the course of the remediation works a total of 79 final soil validation samples were collected from the Stage 1 and 2 excavation areas and analysed for TPH, BTEX, PAHs, phenols, metals, VHC and asbestos. The samples collected during the tank excavation works were subsequently removed by the Stage 1 and 2 excavations. Of the 79 final validation samples, collected after completion of the Stage 1 and 2 excavations, a total of four soil validation samples failed the validation criteria based on TPH (C_{10}-C_{36}) concentrations. The samples were also analysed for total recoverable hydrocarbons (TRH). Table 11.3 summarises the residual soil contamination exceeding criteria.

Table 11.3: Residual Soil Contamination Exceeding Criteria (mg/kg)

Sample Location		E3_1.0 West	D3_2.0 West	D3_2.0 Base West	E3_2.0 Base
Depth (mbgs)		2.0	3.8	1.0	3.0
Analyte	Criteria	Attach 11	Attach 11	Attach 12	Attach 12
TPH (C_6-C_9)	65	<PQL	<PQL	25	16
TPH (C_{10}-C_{36})	1000	4,040	16,000	8,910	10,600
Benzene	1	<PQL	<PQL	<PQL	<PQL
Toluene	1.4	<PQL	<PQL	<PQL	<PQL
Ethylbenzene	3.1	<PQL	<PQL	<PQL	<PQL
Xylenes	14	<PQL	<PQL	<PQL	<PQL
TRH (C_6-C_{10})	-	<PQL	15	42	27
TRH (C_{10}-C_{16})	-	<PQL	210	80	90
TRH (C_{16}-C_{34})	-	3,530	13,800	7,450	8,940
TRH (C_{34}-C_{40})	-	1,100	4170	2,620	3,110

ND Not detected
Shaded values exceed criteria

Overall in consideration of the results reported by URS (including asbestos clearances conducted by JBS and SWE), the Auditor is satisfied that ACM impacted material has been excavated and removed from the entire site area and the residual soils have been adequately validated. Hydrocarbon impacts identified in the unsaturated soils have been remediated and validated with the exception of:

- TPH impact within the vicinity of MW8 adjacent to the former car wash located along the western boundary of the site. This area was excavated to the extent practicable (either to the base of the saturated zone (approximately 2mbgs) or along the site boundary). With the exception of the localised impact in the vicinity of E3_1.0 West, the exceedances are located at around 2m depth and are considered to be associated with the groundwater smear zone.

During excavations in grid sections D3, E3 and part of D4 in the northern area, weathered PSH globules were observed by URS within groundwater ingress at 2.2 mbgs and strong hydrocarbon odours were encountered consistent with impact below the groundwater table in the vicinity of MW08. There is also likely to be contaminated soils below the groundwater table within the groundwater impact plume area in the northeast of site.

URS concluded that the risk from soil impacts within the smear zone should be assessed through consideration of groundwater impacts. The Auditor agrees with this conclusion. The risk from residual soil contamination are addressed in Section 13.

11.3 Excavated Material

As discussed above, following tank excavation works, material was placed back into the tank-pits. This material was re-excavated during the Stage 1 and Stage 2 excavation works. All excavated material from the Stage 1 and 2 excavation works was classified and disposed offsite. URS reported that waste material was "*Transported and disposed off-site the impacted soil in accordance with NSW Department of Environment, Climate Change and Water (DECC) Waste Classification Guidelines (July 2009).*"

URS initially pre-classified the shallow (surface to 300 mm) fill material as "general solid waste containing asbestos. The deeper fill (>300 mm) was classified as general solid waste (non-putrescible). Concrete pavement, the triple interceptor trap and remnant brick and pipe work was classified as "concrete and solid waste".

The Auditor noted that in some of the initial tankpit excavations fill material was backfilled into the tank-pits and surface fill containing asbestos may have been emplaced at depths greater than 300mm bgs. Thus some deeper fill classified as "general solid waste" (>300mm bgs within the former tankpit locations) had the potential to contain ACM. Notwithstanding the pre-classification of waste, during the excavation works, excavated fill material appears to have been disposed as asbestos containing irrespective of the depth of excavations. This is considered appropriate and overall the Auditor is satisfied that the material was suitably classified in accordance with DECC (2009).

11.3.1 Waste Disposal

URS reported disposal of:

- 2,771 tonnes of fill material containing asbestos was disposed to SITA Kemps Creek as "*cont. asb. soil.*" Transport dockets were provided.
- 728 tonnes of other general waste and concrete was disposed to a waste facility in Eden, NSW.
- 34,000L of liquid waste (oily water) and transported under waste transport certificate (Waste Code J120). The waste was delivered to Worth Recycling, South Windsor and Chemsal, St Marys. Transport dockets and waste transport certificates were provided.

Actual volumes of material excavated were not specifically reported by URS. Areas excavated were estimated and no surveyed areas/levels were provided on the drawings. However, based on the site photographs, descriptions of excavations provided by URS and a site visit (conducted by the Auditor 10 November 2011), the Auditor is satisfied that the excavated material was removed from the site.

11.4 Imported Materials

Virgin excavated natural material (VENM) was imported to the site from Kingswood Sandpit, 722 Princes Highway, Kingswood, a sand quarry located on the banks of the River Bega. Site inspections and analytical testing were undertaken prior to importation. A summary of the validation results compared to the criteria discussed in Section 7.1 is as follows.

Table 11.4: Analytical Results for Imported Fill – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > VENM Criteria
Arsenic	3	<PQL	<PQL	None
Cadmium	3	<PQL	<PQL	None
Chromium	3	1	2	None
Copper	3	<PQL	<PQL	None
Lead	3	<PQL	<PQL	None
Nickel	3	<PQL	<PQL	None
Zinc	3	<PQL	<PQL	None
Mercury	3	1	0.2	None
BTEX	3	<PQL	<PQL	None
TPH (C_6-C_9)	3	<PQL	<PQL	None
TPH (C_{10}-C_{36})	3	<PQL	<PQL	None
Total PAHs	3	<PQL	<PQL	None
phenol	3	<PQL	<PQL	None
OCPs/PCBs	3	<PQL	<PQL	None
VCH	3	<PQL	<PQL	None
Asbestos	3	<PQL	<PQL	None

The material was described by URS as "*loose quartzose coarse sand to fine gravel (2-20mm)*". No contaminating activities were observed in the vicinity of the quarry. The material was considered by URS to be VENM.

The results were non-detect for organics and low for metals. These results confirmed the field observations. The Auditor concludes that imported VENM was acceptable for use on the site as backfill.

12 Contamination Migration Potential

As discussed in section 10, some residual petroleum hydrocarbon groundwater impact remains on site in the vicinity of MW8 and MW15. The hydrocarbon concentrations detected the vicinity of MW15 had a slightly different TRH fingerprint to that detected in MW8, and URS considered that the residual hydrocarbon impact detected in these two wells represents separate sources of groundwater contamination. The Auditor has considered the TRH results reported and agrees with this conclusion.

The main residual groundwater plume in the vicinity of MW8 appears to be localised. Hydrocarbon concentrations were reduced by an order of magnitude in monitoring wells MW7 and MW12 located immediately downgradient of MW8 and wells located further downgradient of MW12 and MW7 along the south and eastern boundary (MW11, MW13 and MW14) detected significantly reduced TRH/TPH concentrations, ranging between 240-420ug/L (C_{10}-C_{40}) (with C_6-C_9 and benzene <LOR).

The residual groundwater plume in the vicinity of MW15 is located adjacent to the eastern site boundary and downgradient monitoring wells have not been installed and some migration across the eastern site boundary in the vicinity of MW15 may have occurred.

The Auditor has assessed the potential for significant offsite migration using a multiple lines of evidence approach as summarised below:

- The service station infrastructure and primary sources of soil impact have been excavated and removed from the site.
- Secondary sources of soil impact have been excavated with the exception of some localised hydrocarbon impact in the vicinity of MW8. This area was excavated to the extent practicable although some residual hydrocarbon impact associated with the groundwater ‘smear zone’ remains.
- The groundwater monitoring results indicate that natural attenuation of the groundwater impact in the vicinity of MW8 is occurring.
- The residual groundwater impact in the vicinity of MW15 is of a relatively minor nature, and comprises TRH in the lighter chain fractions (C_6-C_9 650ug/L and C_{10}-C_{14} 1840ug/L). These lighter fraction TRH compounds are susceptible to biodegradation. Significant natural attenuation of the plume is expected to occur especially at the relatively low dissolved phased concentrations reported.

Based on this, in the Auditor’s opinion there is unlikely to be significant offsite migration of impacted groundwater across the eastern site boundary towards Market Street. No concentrations detected in MW15 exceeded the ANZECC (2000) marine aquatic ecosystems or recreational use criteria (refer Section 7.2). Therefore even if these concentrations were to reach Merimbula Lake (located over 50m to the east) the risk to the environment would be low. The majority of wells (including MW15) exceeded the aquaculture criterion for zinc which is more likely representative of background conditions within the aquifer and not representative of a contamination impact from the site.

The potential risks to human health from groundwater impact if it were to extend to offsite locations have been addressed in section 13.

In accordance with section 4.4.2 of NSW DEC (2006), the Auditor has discussed this matter with NSW EPA prior to finalisation of the audit.

In consideration of the remediation works undertaken the potential for offsite migration of contaminants in surface water or dust is considered low. However it is noted that the ACM impacted fill, which has been excavated from the audit site area, may extend to offsite areas under the road and adjacent properties.

13 Assessment of Risk

A groundwater risk assessment (GRA) was completed by URS in December 2012. The objective of the GRA was to *"....assess the potential human health risks to on-site receptors associated with the concentrations of petroleum hydrocarbon chemicals of potential concern (COPCs) measured in groundwater sampled from beneath the site in November 2012."*

As discussed in Section 9, a soil vapour investigation has been undertaken at the site. No analytes were detected above the screening criteria, suggesting that vapour intrusion risks are likely to be low. However, as the measured soil vapour concentrations were considered by URS to potentially underestimate future soil vapour concentrations (particularly if the site were redeveloped to include a large slab that could limit oxygen penetration to the subsurface), a risk assessment was completed on the basis of the concentrations of the COPCs in groundwater. This is considered reasonable.

The Auditor's review of the GRA review has predominantly focused upon issues of data input and quality, regulatory compliance and technical defensibility. Where applicable, the Auditor has assessed the data with respect to the CRC CARE (2011) HSLs (now incorporated into the NEPM (1999)[2013]), completed independent risk calculations for the purposes of validating the vapour intrusion modelling and performed a sensitivity analysis of the inputs which the Auditor considers to be most significant.

13.1 Hazard Assessment

13.1.1 Soil

Soil from across the footprint of the site was excavated from 0.5 – 3.0 m depth between 2011 and 2012 and approximately 79 final validation samples were collected. In some locations of impact, excavations were limited by the groundwater table at approximately 2-2.5 m and the boundaries of the site. With the exception of one sample collected at 1m along the site boundary, the residual soil impacts were generally at the base of the excavation at around 2m depth in the vicinity of the groundwater table and associated smear zone. URS found that:

- The impacts identified around 2m depth are considered to be associated with the groundwater smear zone and are not considered to represent a separate source of contamination. Associated risks are considered to be appropriately assessed through consideration of groundwater concentrations.
- The identified soil impacts are considered to be localised in nature and are not considered to represent an extensive residual mass of soil contamination, particularly given the extent of remedial excavations completed.
- Direct contact with the contamination along the site boundary is considered unlikely given the depth of the contamination and the unstable nature of the soil along the boundary.

Notwithstanding these observations, URS conducted an assessment of the residual soil concentrations (refer Table 11.3 of this SAR) against the CRC CARE (2011) HSLs (Appendix L of the GRA).

The Auditor notes that even if someone was to come into contact with the shallow contamination detected at E3_1.0 West (during gardening or other such activities if the site were used for sensitive uses), that the concentrations are below the CRC CARE (2011) HSL-A screening levels for direct contact. Contact with residual soil contamination at depths greater than 1m are considered unlikely during normal residential activities and this exposure scenario has therefore not been considered by the Auditor.

The Auditor also notes that if the residual contamination (identified at E3_1.0 West, D3-2.0, D3_2.0 Base West, or E3_2 Base) extends westward offsite beneath the adjacent footpath that the concentrations are less than the CRC CARE (2011) HSLs for vapour intrusion and direct contact for an intrusive maintenance worker.

Overall, the Auditor therefore considers that risks from soil, independent of groundwater contamination, do not require further consideration. Management of excavated soil would, however, be required as discussed in section 14.

13.1.2 Groundwater Contamination

Maximum groundwater concentrations detected during the most recent (November 2012) round of groundwater monitoring were used by URS in their assessment of risks. The maximum groundwater concentrations were detected at MW8 and MW15. URS considered the concentrations detected in these two wells to represent separate sources of groundwater contamination and assessed risk from each source separately. The Auditor considers that an assessment using the combined maximum concentrations from both wells is more applicable given the future design of any buildings is unknown but that it could facilitate mixing of vapours from all sources.

URS considered all petroleum hydrocarbons detected above the limit of reporting (LOR) for consideration in the GRA. Some metals were also detected above the LOR but in general (other than lead), these were not included as COPCs as they were not considered to be related to the use of the site as a service station. Lead was not considered as a COPC by URS as they note that lead is not volatile and that dermal absorption of lead is negligible. Other analytes (including phenols and 1,2-dichlorobenzene) detected above the LOR were not considered by URS in the GRA as they were screened out using the USEPA RSLs for tap water. The exclusion of metals not associated with service station usage from the risk assessment does not affect the findings since these metals are not volatile and would not present a dermal contact risk at the concentrations present.

Table 13.1 summarises the maximum concentration of COPCs detected in groundwater from both MW08 and MW15, as well as the CRC CARE (2011) HSL-A criteria for petroleum hydrocarbons in groundwater at 2m in sand as well as the appropriate drinking water / recreational water quality guidelines. It is noted that for intrusive workers or if a basement is constructed at the site, that the HSLs are not applicable. The use of the HSLs has therefore been in consideration of vapour intrusion risks to residents in slab-on-grade constructions only (as a conservative screening measure).

Table 13.1: Maximum Groundwater Concentrations, HSLs and Drinking Water Guidelines (mg/L)

Chemical of Concern in Groundwater	Maximum Concentration (mg/L)	CRC CARE (2011) HSL – A Groundwater in Sand 2-4 m	Drinking Water Guidelines (mg/L)
Benzene	***0.041***	0.78	0.001 [1]
Toluene	0.009	NL	0.8 [1]
Ethylbenzene	0.053	NL	0.3 [1]
Xylenes	0.27	NL	0.6 [1]
Trimethylbenzenes	***0.54***	NA	0.010 – 0.087 [3]
Propylbenzene	0.065	NA	0.53
Isopropylbenzene	0.013	NA	0.39
Naphthalene	0.07	NL	0.07 [4]
TPH C_6-C_9 *	**1.39**	0.98	15 [2]
TPH C_{10}-C_{14}	**3.22**	1.1	0.3 (aliphatic) [2] 0.09 (aromatic) [2]
TPH C_{15}-C_{28}	***11.4***	NA	NA 0.09 (aromatic) [2]
TPH C_{29}-C_{36}	***12.2***	NA	
Lead	0.013	NA	0.1 [5]
Phenol	0.038	NA	4.5
2-methylphenol (o-cresol)	0.013	NA	0.72 [3]
3&4-methylphenol (m & p-cresol)	0.034	NA	0.72 - 1.4 [3]
2,4-dimethylphenol	0.068	NA	0.27
1,2-dichlorobenzene	0.001	NA	0.28

* TPH C_6-C_9 concentration does not include BTEX

1. ADWG (2011) / NEPM (2013)

2. WHO (2008)

3. USEPA RSL Tap Water

4. USEPA RSL RfD for Naphthalene such that DWG = (animal dose x BW x %intake)/(IR x UF) = (RfD x BW x %intake)/(IR)

5. NHMRC (2008) Recreational Water Quality Guidelines which assume 0.2 L / day ingested which is considered conservative for incidental contact with seepage groundwater in a basement. No other exposure pathways for lead in groundwater were identified.

NL – Not Limiting (the groundwater HSL exceeds the water solubility limit)

NA – Not Applicable as no guideline for this analyte

0.041 – value exceeds drinking water guideline

1.39 – value exceeds CRC CARE (2011) HSL-A

The Auditor notes that the based on the CRC CARE (2011) HSLs for groundwater and the drinking water / recreational water quality guidelines, that the maximum concentrations of benzene, trimethylbenzenes and TPH fractions C_{6-36} exceed the screening criteria.

The COPCs identified by the Auditor are consistent with the historical site use as a service station and consistent with the COPCs identified by URS.

13.2 Exposure Assessment

The exposure assessment involves the determination of the receptor populations who may be exposed to the chemicals of concern during normal use of the site and the pathways by which they are exposed.

13.2.1 Exposure Populations

URS identified the following receptor populations:

- Residents living in a slab-on-grade building.
- Residents living in a building with a basement.

URS did not consider risks to an intrusive worker in a shallow trench. This has been done by the Auditor has part of her sensitivity assessment.

13.2.2 Exposure Pathways

URS identified the relevant potential exposure pathways to be:

- Indoor inhalation of volatile COPC from impacted groundwater.
- Incidental dermal contact with COPC in impacted groundwater which may seep into a basement (completed as part of the URS sensitivity analysis).

13.2.3 Exposure Scenarios

The exposure scenarios assessed by URS include:

- Indoor inhalation of groundwater originated vapours by residents in a slab-on-grade home.
- Indoor inhalation of groundwater originated vapours by residents in a home with a basement and incidental dermal contact (by an adult only) with seepage groundwater in the basement. The Auditor notes that the use of the basement (for example car parking use) has not been specified by URS although the exposure time has been limited to two hours.

The Auditor considers the exposure scenarios identified by URS are reasonable although considers that the following exposures are also possible:

- Vapour inhalation risks to intrusive workers.
- Dermal contact with seepage water in a basement by children as well as adults.
- Incidental ingestion of seepage water in a basement by both adults and children.

These exposure scenarios have been considered by the Auditor in her sensitivity analysis.

13.2.4 Exposure Assumptions

The exposure parameters adopted by URS as well as the Auditor's comments are outlined in Table 13.2.

Table 13.2: Significant Exposure Parameters Used by URS and Auditor's Comments

Parameter	Resident	Auditor Comments
Exposure Duration (yrs)	35	Acceptable.
Exposure Frequency Inhalation (events/yr)	365	Acceptable.
Exposure Frequency Direct Contact in Basement (events/yr)	52	URS have assumed exposure to seepage water occurs once per week. This is considered reasonable.
Time of exposure inhalation (hr/day) Slab-on-grade residence Residence with a basement	 20 indoors for slab-on-grade 18 indoors above basement and 2 hours in the basement	 Acceptable. Acceptable.
Time of exposure for dermal contact with seepage water in basement	1 hour (adult) Child exposure not considered by URS	Reasonable Auditor has considered a child exposure in sensitivity analysis
Area of exposed skin	1400 (cm^2) assumed for adults feet only Child exposure not considered by URS	Possible that hands and forearms are also exposure during activities such as cleaning out a basement sump. This has been considered in the Auditor's sensitivity analysis. A child exposure has also been considered in the Auditor's sensitivity analysis.
Incidental ingestion with seepage water	Not considered by URS	Included in the Auditor's sensitivity analysis.

The exposure parameter values adopted by URS are generally considered to be reasonable.

13.3 Toxicity Assessment

The toxicity data adopted by URS are listed in Table 13.3 along with Auditor's comments and are generally acceptable for the identified COPC for the purposes of this assessment.

Table 13.3: Toxicity data used by URS and Auditor's Comments					
Chemical of Concern	**Inhalation Toxicity Value (URS)**	**Inhalation Background (URS)**	**Direct Contact Toxicity Value (URS)**	**Direct Contact Background (URS)**	**Auditor Comment**
Benzene (non Threshold)	6.0×10^{-3} $(mg/m^3)^{-1}$	NA	3.5×10^{-2} $(mg/kg/day)^{-1}$	NA	Acceptable
Benzene (Threshold)	0.03 mg/m^3	10%	0.004 mg/kg/day	10%	Acceptable
Toluene	5 mg/m^3	10%	0.08 mg/kg/day	10%	Acceptable
Ethylbenzene	0.26 mg/m^3	0%	0.097 mg/kg/day	0	Acceptable
Xylenes	0.87 mg/m^3	2%	0.179 mg/kg/day	2%	Acceptable
Trimethylbenzenes	0.044mg/m^3	10%	0.05 mg/kg/day	10%	Notes that a value of 0.22 mg/m^3 is in the CRC CARE PVI (2013) guidance for inhalation risks
TPH C_6-C_9 (aliphatic)	18.4 mg/m^3	10%	5 mg/kg/day	10%	Acceptable
TPH C_{10}-C_{14} (aromatic)	0.2 mg/m^3		0.04 mg/kg/day		Acceptable
TPH C_{10}-C_{14} (aliphatic)	1.0 mg/m^3		0.1 mg/kg/day		Acceptable
TPH C_{16}-C_{34} (aliphatic)	Non-volatile	NA	2 mg/kg/day		Not considered by URS
TPH C_{16}-C_{34} (aromatic)	Non-volatile	NA	0.03 mg/kg/day		Acceptable

NA – Not Applicable

13.4 Acceptable Levels of Risk

With respect to acceptable cancer risks, URS have adopted a total Target Risk value of 1×10^{-5} as indicating conditions that would warrant further assessment and risk values below 1×10^{-5} are representative of acceptable risks.

With respect to acceptable non-cancer risks, URS states that: "*An "acceptable" risk in this assessment has been defined as a Hazard Index of 1*."

The Auditor considers that the acceptable levels of risk defined in the GRA are reasonable.

13.5 Method of Risk Estimation

13.5.1 Modelling Assumptions

For assessing risks into a slab-on-grade building, the Auditor used the Johnson & Ettinger (J&E) model consistent with URS (2012).

Consistent with the sensitivity analysis completed by URS, the Auditor also undertook an independent assessment of potential vapour risk from groundwater seepage into a basement.

The Auditor's approach was consistent with guidance provided by US EPA (1994) *"Air Emissions Models For Waste and Wastewater*". It is noted that this approach is recommended in the recently published CRC CARE (2013) *"Petroleum hydrocarbon vapour intrusion assessment: Australian guidance*" (PVI Guidance) when assessing potential vapour risks due to groundwater seepage into a basement. URS used a "Mass Limited" model (described in Appendix C of the GRA) to predict vapour intrusion risks in a potential future basement. The approach is considered reasonable.

When estimating the seepage rate of water into the basement, the Auditor applied Darcy's Law (i.e. volume of water flow = hydraulic conductivity x permeability x surface area) which is a generalised relationship for the flow of a fluid through a porous medium (i.e. basement concrete). The hydraulic conductivity is related to the difference between the minimum depth to groundwater (2.0 m bgs) and the assumed basement height (3.0m), the permeability adopted was for the average permeability of concrete based on Gomes *et al* (2003)[2], and the surface area related to 40m^2 of the basement walls and 5% of the basement floor. All other model assumptions are presented in Table 13.4 below.

Table 13.4: Summary of main modelling assumptions for a slab-on-grade home and home with a basement

Model Parameter	Value Used by URS	Value Adopted by Auditor	Reference/Comment
Depth to groundwater (slab-on-grade scenario only) (m bgs)	2.0 – 2.2	2.0	Reasonable based on average depth to groundwater
Area of building (m^2)	150	400	Reasonable and consistent with assumptions adopted in derivation of HSLs. Auditor value based on estimated size of basement.
Indoor residential room height (m)	2.4	2.4	Reasonable
Air Exchange Rate	0.6 (residence)	0.6 (residence) 4.0 (basement	Auditor has assumed basement is used as a car

[2] Gomes AM, Costa JO, Albertini H, Eduardo (2003) *Permeability of concrete: a study intended for the in situ valuation using portable instruments and traditional techniques*. Non-Destructive Testing in Civil Engineering. International Symposium (NDT-CE 2003)

Table 13.4: Summary of main modelling assumptions for a slab-on-grade home and home with a basement

Model Parameter	Value Used by URS	Value Adopted by Auditor	Reference/Comment
(exchanges / hour)	0.6 (basement)	assumed car park)	park and adopted Australian standard minimum ventilation rate for car parks
Qsoil: Qbuilding	0.005	0.005	Acceptable and consistent with assumptions used to derive HSLs
Basement height (m)	2.4	3	Reasonable
Percent of basement floor wet (%)	NS	5%	5% recommended value in CRC CARE (2013) PVI guidance
Area of basement walls wet (m^2)	15 m^2	40m^2	Site assumption
Water temperature	NS	17ºC	Site assumption
Percent of vapours in ground floor above basement	50%	10%	Auditor value consistent with CRC CARE (2013) PVI guidance

NS – Not Specified

13.6 Risk Characterisation and Conclusions

A GRA was completed by URS (2012) to assess the potential health risks associated with a petroleum hydrocarbon groundwater plume beneath the site. The GRA focussed on the potential health risks to residential site users given the potentially sensitive landsues allowable at the site under the zoning. Based on modelling of risks from groundwater, URS concluded that *"The assessment of potential risks to human health has indicated that the risks are considered to be low and acceptable for future residents living in buildings with either a slab on grade or basement construction."*

The GRA also concludes that *"...odours derived from the volatile petroleum hydrocarbons associated with the impacts identified in groundwater are unlikely to be of concern."*

Based on the Auditor's independent review of the available data and a multiple lines of evidence approach including:

- Comparison of the soil vapour and groundwater data to the CRC CARE HSL (2011) criteria
- Independent vapour modelling from groundwater

the Auditor agrees with the conclusions made by URS that the identified petroleum hydrocarbon plume beneath the site is unlikely to pose a risk to future site users including residents, assuming groundwater is not extracted for use. The Auditor also considers that

vapour inhalation risks to workers in a shallow trench are likely to be low and acceptable based on the Auditor's independent sensitivity analysis.

URS (2012) did not make any conclusions regarding the risk to offsite receptors from residual groundwater contamination. Given the offsite concentrations are likely to be lower than those onsite and that the offsite receptors (roadway, commercial) are generally less sensitive than the residential scenario considered onsite, it is considered unlikely that offsite migration of contamination in groundwater would pose a potential risk to offsite receptors.

13.7 References

ATSDR online toxicity profiles, Agency for Toxic Substances and Diseases Registry US Department of Health and Human Services, Atlanta Georgia

BCA (2010) Building Codes of Australia, Volume 1 and Volume 2, 2010 Edition. Australian Building Codes Board, Australian Government

CRC Care (2011), Health Screening Levels for petroleum hydrocarbons in soil and groundwater, E. Friebel and P. Nadebaum, Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report Series, no. 10

CRC CARE (2009), Field Assessment of Vapours, G.B. Davis, J. Wright and B.M.Patternson, Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report Series, no. 13

enHealth (2004) Environmental Health Risk Assessment Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and enHealth Council

enHealth (2003), Australian Exposure Factors Handbook – Consultation Draft, Department of Health and Ageing and enHealth Council

ITRC (2007),Vapour Intrusion Pathway: A Practical Guideline, Interstate Technology & Regulatory Council Vapour Intrusion Team, Washington, DC 20001

Johnson, P.C., & Ettinger, R.A. (1991) Heuristic Model for Predicting the Intrusion Rates of Contaminated Vapours into Buildings. Environ.Sci.Technol., 25, 1445-1452

NEPC (1999), National Environment Protection (Assessment of Site Contamination) Measure, National Environmental Protection Council Canberra

Standards Australia (2002), The use of ventilation and air conditioning in buildings Part 2: Ventilation design for indoor air contaminant control, AS 1668.2-2002

TPHCWG (1997), Development of Fraction Specific Reference Doses (RfDs) and Reference Concentrations (RfCs) for Total Petroleum Hydrocarbons, Total Petroleum Hydrocarbon Criteria Working Group, Toxicology Technical Action Group

USEPA (2002), Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, US Environmental Protection Agency, Office of Emergency and Remedial Response

USEPA (2004) User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings, US Environmental Protection Agency, Office of Emergency and Remedial Response

US EPA (2009) Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), United States Environmental Protection Agency, Office of Emergency and Remedial Response

14 Ongoing Site Management

Ongoing management of the residual soil and groundwater impact in the vicinity of MW8 is required through implementation of an environmental management plan (EMP).

URS did not prepare an EMP. Given the relatively minor nature of management required, in accordance with section 3.4.6 of NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)* the Auditor has prepared the EMP. A copy is included in Appendix E.

The Auditor notes that:

- The EMP is a site specific, stand-alone document which is relevant and realistic. Lot and DP information is provided and a site plan is attached.
- The objective of the EMP is to detail the presence of residual groundwater contamination and to document management measures required to be followed in the event that excavations are conducted at the site.
- The contaminants of concern have been identified and the extent of the residual groundwater impact has been clearly identified on a plan included in the EMP.
- The EMP applies to current and future owners of the site.
- The responsibilities and timeframe for implementation of the EMP are included.

Key elements of the EMP include:

- Extraction of groundwater for use should not be undertaken.
- Site workers must prepare a safe work method statement (SWMS) for proposed excavations. This must document the environmental management measures and occupational health & safety requirements in order to protect both human health and the environment during the excavations. Management measures should include the following as a minimum when excavation below 1 m or extraction of groundwater is undertaken during site development:
  - Workers should be made aware of potentially contaminated materials including visually contaminated or odorous soil and/ or groundwater.
  - Appropriate OH&S measures should be developed to mitigate against potential exposure. This should include limiting dermal contact with soil and groundwater and the monitoring of potential gases and vapours.
  - Odorous or other suspect soils should be separated and specialist advice sought from a suitably qualified environmental consultant regarding environmental management measures and disposal.
  - All liquid and solid waste should be disposed in accordance with the requirements of the Protection of the Environment Operations Act 1997 and Protection of the Environment Operations (Waste) Regulation 2005.
- All excavation works must be carried out with due regard to the environment and to all statutory requirements and must comply with the requirements of applicable regulatory Acts, Regulations and Council Policy.

In consideration of the conditions for the implementation of an EMP stated under Section 3.4.6 of NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)* the auditor considers that these have been met, namely:

- Given the relatively minor nature of the management requirements, the Auditor has prepared the EMP.
- The EMP can reasonably be made to be legally enforceable by being made a condition of any future development consent. The Auditor has contacted Council and has confirmed that the EMP would be considered in development assessment and relevant controls would be made conditions of approval of Development Applications.
- The presence of the EMP will be recorded on the site audit statement and an overview of the EMP included in the comments section of the site audit statement. This site audit report and accompanying site audit statement will be provided to Council to allow notification of the site audit statement (and EMP) on the s149 certificate for the relevant lots. This is considered to provide adequate public notification of the EMP.
- The remnant contamination is not considered to pose an unacceptable risk to onsite or offsite environments.

Overall, the Auditor considers that the EMP will provide an adequate framework for the management of the residual hydrocarbon impact remaining at the site.

15 Compliance with Regulatory Guidelines and Directions

A review of the investigation and remediation activities with respect to current national and NSW regulatory guidelines and directions has been conducted and a summary is provided in Table 15.1 below:

Table 15.1: Compliance with Regulatory Guidelines and Directions

Item/ Details	Auditor Comments
NSW DECC (2009) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*	The site has been notified to the EPA under Section 60 of the CLM Act due to groundwater contamination. The site is identified as Category B 'awaiting further information to progress initial assessment' (search date March 2014).
In accordance with section 4.4.2 of NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*, section 4.4.2, the Auditor must advise the client that groundwater contamination is present and discuss with DEC whether any remediation may be required to address potential risks to offsite receptors..	Mobil is aware of the presence of groundwater contamination as evidenced by the Section 60 notification made. The Auditor has discussed the site with EPA prior to finalising the audit (see section 12 for more details).
EPA (1997) *Guidelines for Consultants Reporting on Contaminated Sites*.	IT and URS reported in general accordance with these guidelines. URS did not address offsite risks.
SEPP55 Classification of remediation works and notification to council.	Details of the classification of remediation works or copies of correspondence to Council were not provided by URS. Development consent was granted for site remediation (DA No. 2009.0523 dated 4 January 2010).
Appropriate licences and consents for installation of a groundwater bore must be obtained from NSW Office of Water.	No details provided by URS.
Decommissioning of bores 'any abandoned or disused groundwater works should be decommissioned according to the "Minimum Construction Requirements for Water Bores in Australia" (Land and Water Biodiversity Committee (LWBC), 2003), or otherwise as endorsed by NSW Office of Water.	Details of well decommissioning were not reported by URS.
Work Health and Safety Regulation 2011 and Workcover Authority of NSW requirements: Removal of the ACM impacted soil requires a licensed contractor who has notified Workcover at least 7 days prior to commencement.	URS did not specifically report details of the asbestos removal contractor. Asbestos clearance certificates provided by JBS Pty Ltd (JBS) and Safe Work and Environments Pty Ltd (SWE) indicate that ACM removal works were undertaken by Enviropacific Services Pty Ltd (EPS) and Empire Contracting Pty Ltd (Empire). Details of the relevant asbestos licences were not provided. Air monitoring was conducted by JBS and SWE on the days that excavation work was reportedly undertaken. Details of the notification to Workcover were not provided.

Table 15.1: Compliance with Regulatory Guidelines and Directions	
Item/ Details	**Auditor Comments**
Protection of the Environment Operations Act 1997	
Asbestos waste must be managed in accordance with the *Protection of the Environment Operations (Waste) Regulation 2005.*	Specific details regarding the transportation of the asbestos waste were not provided. Asbestos disposal is discussed below.
<u>Waste Disposal</u> • 2,771 tonnes of fill material containing asbestos was disposed to SITA Kemps Creek as "cont. asb. soil." Transport dockets were provided. • 728 tonnes of other general waste and concrete was disposed to a waste facility in Eden, NSW. • 34,000L of liquid waste (oily water) and transported under waste transport certificate (Waste Code J120). The waste was delivered to Worth Recycling, South Windsor and Chemsal, St Marys. Transport dockets and waste transport certificates were provided.	Based on the information reported by URS, the excavated volumes appear to be consistent with the recorded amounts disposed to landfill. The waste was appropriately disposed in accordance with the waste classification to licensed waste management facilities. Consignment dockets and waste disposal dockets were provided and were acceptable.
<u>Imported Material</u> Approximately 2061 tonnes of VENM was imported to the site from Kingswood Sandpit, 761 Princes Highway, Kingswood.	The Auditor has reviewed the documentation provided and is satisfied that the imported material was VENM.
<u>Underground Petroleum Storage Systems (UPSS)</u> Division 4 Decommissioning of storage systems: Clause 15: Validation report to be prepared after system decommissioned & validation report to be submitted to the relevant local authority, along with any other specified information within 60days. Part 5: Record keeping – validation report to be kept for 7 years.	Details of whether the validation report was forwarded to Council and confirmation of record keeping have not been provided.

16 Conclusions and Recommendations

URS concluded that "…*the site conditions investigated by URS are consistent with the use of the site for current zoned purposes (including low [density] residential use with possibility of a basement…".* Based on the information presented in the IT and URS reports (referenced in section 1.4) and observations made on site, and following the Decision Process for Assessing Urban Redevelopment Sites in DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*, the Auditor concludes that the site is suitable for allowable uses under the current zoning (B2 Local Centre), and noting that the likely site usage is as a road reserve and commercial development, subject to compliance with the following environmental management plan:

- "Environmental Management Plan, 25-27 Market Street, Merimbula NSW (Lot 12 DP567260,Lot 1 DP 163768, Lot 2 DP91361 and Lot A DP201599)" dated 15 April 2014. Prepared by ENVIRON Australia Pty Ltd.

The EMP details the presence of residual soil and groundwater impact remaining at the site and provides management practices to be followed in the event that subsurface excavations are undertaken at the site. Key elements of the EMP include:

- Extraction of groundwater for use should not be undertaken.
- Site workers must prepare a safe work method statement (SWMS) for the proposed excavations. This must document the environmental management measures and occupational health & safety requirements in order to protect both human health and the environment during the excavations. Management measures should include the following as a minimum when excavation below 1 m or extraction of groundwater is undertaken during site development:
  - Workers should be made aware of potentially contaminated materials including visually contaminated or odorous soil and/ or groundwater.
  - Appropriate OH&S measures should be developed to mitigate against potential exposure. This should include limiting dermal contact with soil and groundwater and the monitoring of potential gases and vapours.
  - Odorous or other suspect soils should be separated and specialist advice sought from a suitably qualified environmental consultant regarding environmental management measures and disposal.
  - All liquid and solid waste should be disposed in accordance with the requirements of the Protection of the Environment Operations Act 1997 and Protection of the Environment Operations (Waste) Regulation 2005.
- All excavation works must be carried out with due regard to the environment and to all statutory requirements and must comply with the requirements of applicable regulatory Acts, Regulations and Council Policy.

The presence of the EMP will be recorded on the site audit statement and an overview of the EMP included in the comments section of the site audit statement. Although the audit is non-statutory a copy of the site audit statement and site audit report will be provided to Council so that the presence of the site audit statement and the EMP can be noted on the s149 certificate for the site.

17 Other Relevant Information

This Audit was conducted on the behalf of Mobil for the purpose of assessing whether the land is suitable for the allowable uses under the current zoning (B2 Local Centre) i.e. a “Site Audit” as defined in Section 4 (1) (b) (iii) of the CLM Act.

This summary report may not be suitable for other uses. IT and URS included limitations in their report. The audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which she had some control or is reasonably able to check.

The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing her opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

Appendix A: Attachments

Attachment 1: Site Location Plan
Attachment 2: Lot and DP Information
Attachment 3: General Area Map
Attachment 4: Former Service Station Layout
Attachment 5: IT (2005b) Soil Sampling Locations
Attachment 6: URS (2009) Soil Sampling Locations
Attachment 7: Monitoring well locations (URS, 2009)
Attachment 8: Extent of Excavation
Attachment 9: Sample Locations for Tank Excavation Work
Attachment 10: Stage 1 Validation Sample Results
Attachment 11: Stage 2 Validation sample Results – Wall Samples
Attachment 12: Stage 2 Validation sample Results – Base Samples

Attachment 1: Site Location Plan

MOBIL OIL AUSTRALIA PTY LTD

SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

REGIONAL LOCALITY MAP

Draft

URS

Figure: 1

File No: 43513838-Figure 1.cdr Drawn: AD Approved: CH Date: 03/12/2012 Rev.A A4

NSW Land & Property Information

Cadastral Records Enquiry Report

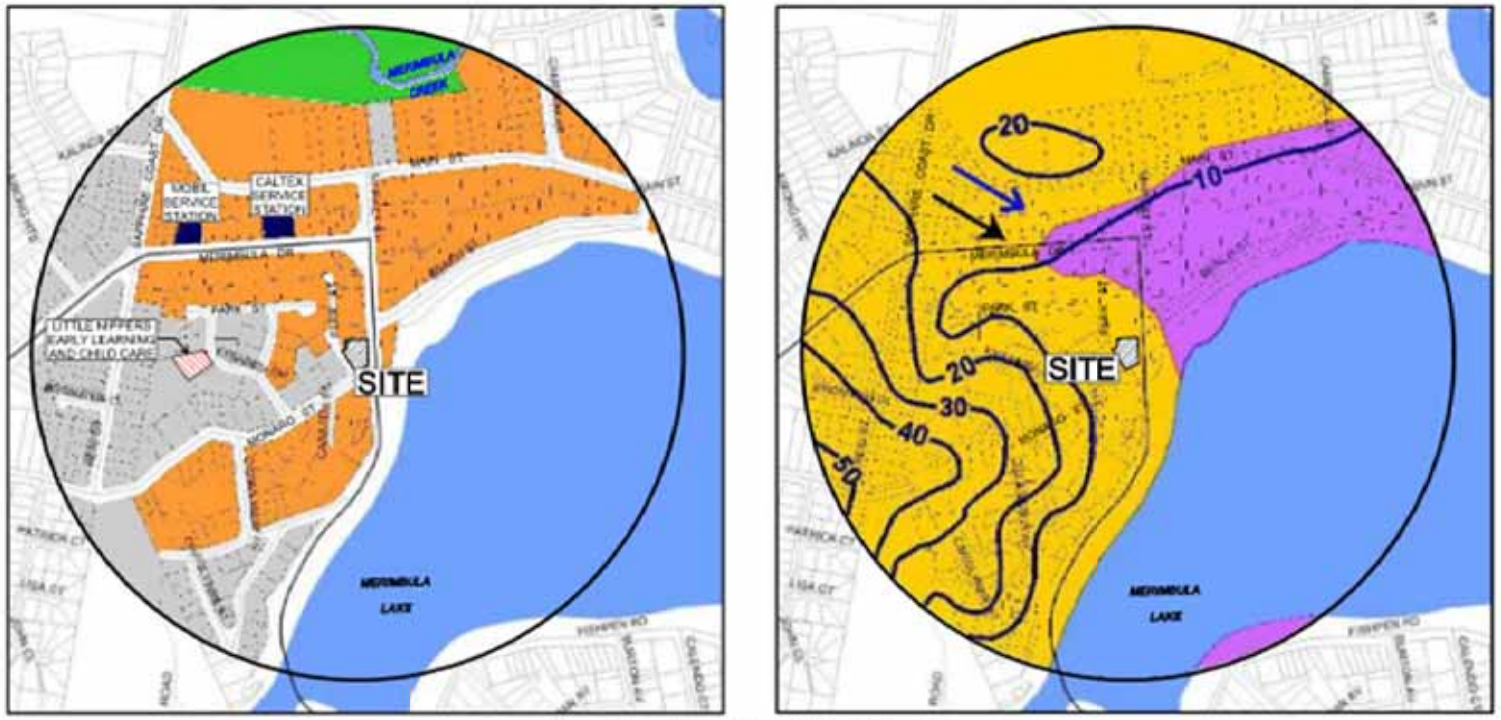
Requested Parcel : Lot 1 DP 163768 **Identified Parcel** : Lot 1 DP 163768

Locality : MERIMBULA **LGA** : BEGA VALLEY **Parish** : PAMBULA **County** : AUCKLAND

Report Generated 11:50:45 AM, 17 April, 2013

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

Attachment 2: Lot and DP Information



100 0 100 200 300 400 500m

1 : 8,800

LEGEND
GENERAL LAND USE

- BUSINESS/COMMERCIAL/INDUSTRIAL
- RESIDENTIAL
- PUBLIC TRANSPORT/RAILWAY
- VACANT LAND/GENERAL RURAL
- NATURAL WATER COURSE
- POTENTIAL SENSITIVE RECEPTOR
- POTENTIAL OFF SITE SOURCE OF HYDROCARBON

LEGEND
GEOLOGY

- DEVONIAN - SANDSTONE, QUARTZITE, CONGLOMERATE, SILTSTONE, MUDSTONE
- QUATERNARY - ALLUVIAL, FLUVIAL DEPOSITS: GRAVEL, SAND, SILT AND CLAY
- INFERRED GROUNDWATER FLOW DIRECTION
- REGIONAL TOPOGRAPHY
- 50 TOPOGRAPHIC CONTOUR m(AHD)

MOBIL OIL AUSTRALIA PTY LTD

SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

GENERAL AREA MAP

Draft

URS

Figure 2

Rev A

Attachment 3: General Area Map

MOBIL OIL AUSTRALIA PTY LTD

SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

DETAILED SITE LAYOUT

Draft

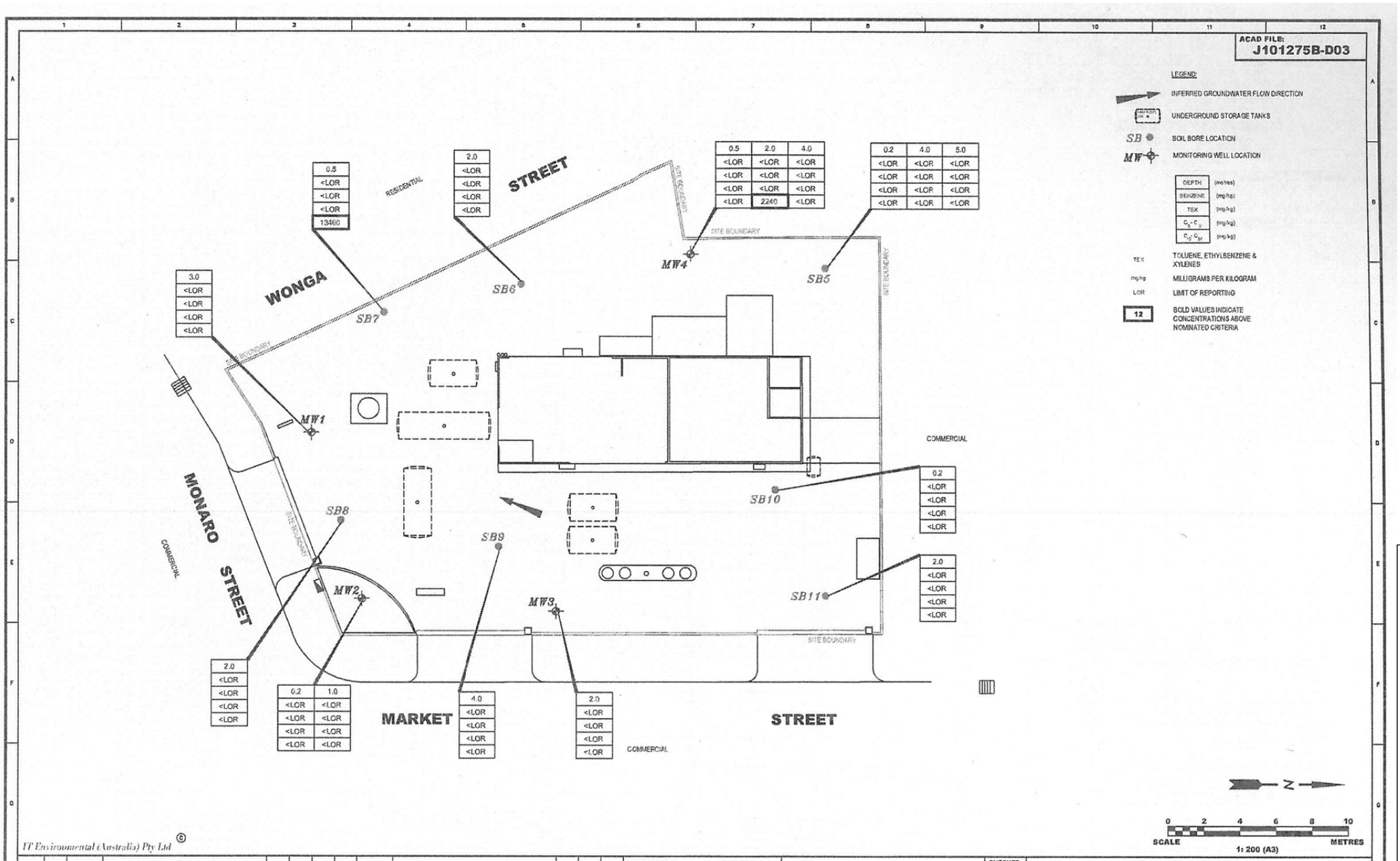
URS

Figure: 3

Rev: A

A3

Attachment 4: Former Service Station Layout



ISSUE	DATE	AMENDMENTS	DRN	CKD	APPD
A	02/08/05	ORIGINAL ISSUE	NHP		

A3

DIMENSIONS IN m
DO NOT SCALE
DRAWING PRACTICE TO AS1100

NOTES: ALL LOCATIONS ARE APPROXIMATE.
SOURCE: IT ENVIRONMENTAL

the Environment Group Australia | IT Environmental
17 Forrester Street
Kingsgrove NSW 2208
Ph: (02) 9502 4944
Fax: (02) 9502 2105

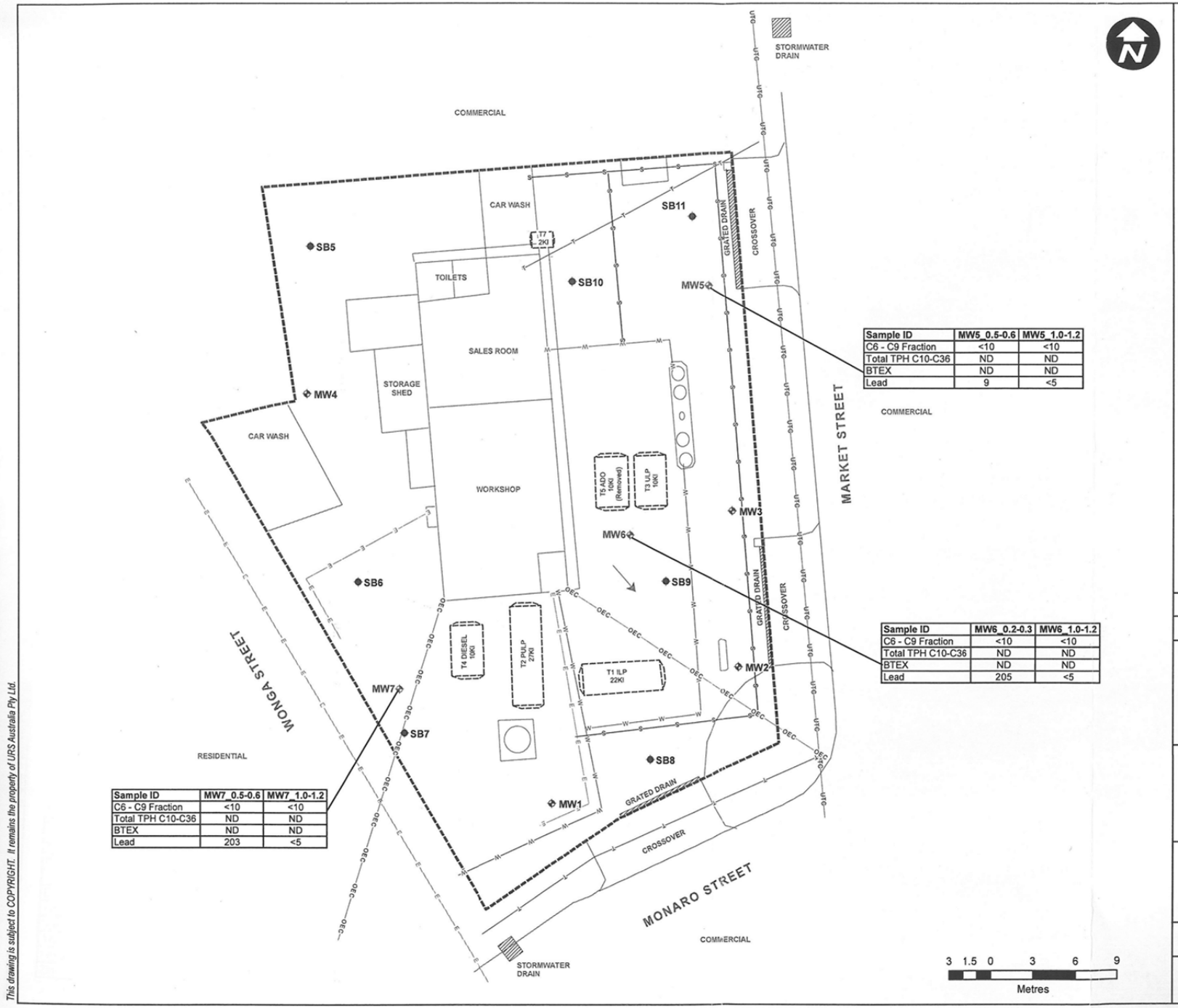
CHECKED: HL
APPROVED: MB

MOBIL SERVICE STATION MERIMBULA
SOIL ANALYTICAL RESULTS (September 2005)

CLIENT: MOBIL OIL AUSTRALIA PTY. LTD.
LOCATION: CNR. PRINCES HIGHWAY & MONARO ST. MERIMBULA, NEW SOUTH WALES

DESIGNED: MB | DATE: 11/10/05 | PROJECT NO.: J101275B | FIGURE: 6
DRAWN: TS | REV. NO: A

Attachment 5: IT (2005b) Soil Sampling Locations



Sample ID	MW5_0.5-0.6	MW5_1.0-1.2
C6 - C9 Fraction	<10	<10
Total TPH C10-C36	ND	ND
BTEX	ND	ND
Lead	9	<5

Sample ID	MW6_0.2-0.3	MW6_1.0-1.2
C6 - C9 Fraction	<10	<10
Total TPH C10-C36	ND	ND
BTEX	ND	ND
Lead	205	<5

Sample ID	MW7_0.5-0.6	MW7_1.0-1.2
C6 - C9 Fraction	<10	<10
Total TPH C10-C36	ND	ND
BTEX	ND	ND
Lead	203	<5

LEGEND:

- Monitoring Well Location (IT Environmental)
- Monitoring Well Location (URS)
- Soil Bore Location
- Electricity
- Overhead Electricity Cable
- Sewer
- Telstra
- Underground Telstra Cable
- Water
- Underground Storage Tanks
- Site Boundary
- Groundwater Flow Direction

Exceeds the adopted acceptance criteria

All soil concentrations in mg/kg

ND = not detected

THIS IS ONE INTERPRETATION ONLY
OTHER INTERPRETATIONS ARE POSSIBLE

Drawn: AO	Approved: TO	Date: 17/07/2009
Job No.: 42424195	File No.: 42424195.007.mxd	

Client

MOBIL OIL AUSTRALIA PTY LTD

Project

MOBIL SERVICE STATION PP2 ESA
27 MARKET STREET MERIMBULA, NSW

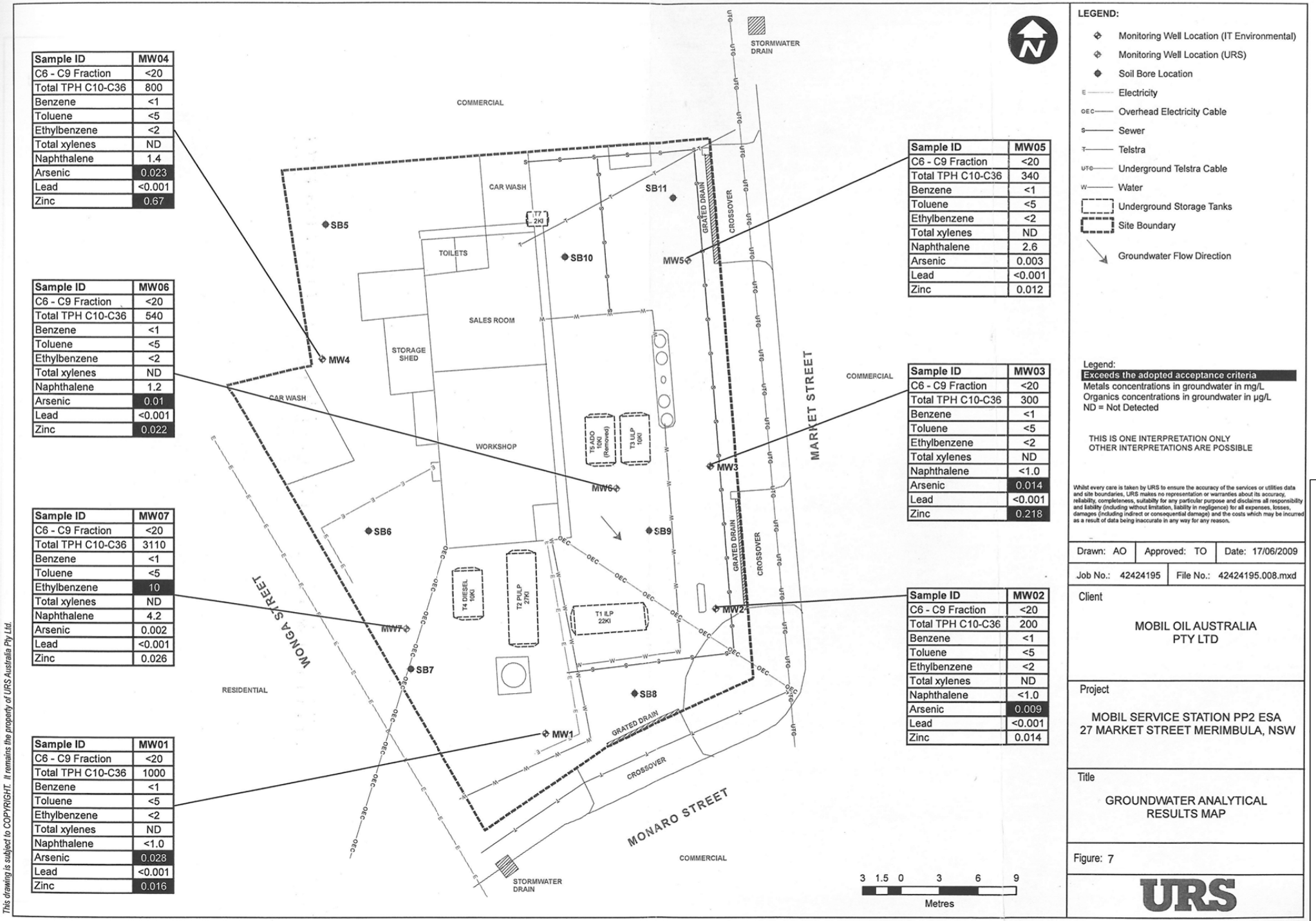
Title

SOIL ANALYTICAL RESULTS MAP

Figure: 6

URS

Attachment 6: URS (2009) Soil Sampling Locations



Sample ID	MW04
C6 - C9 Fraction	<20
Total TPH C10-C36	800
Benzene	<1
Toluene	<5
Ethylbenzene	<2
Total xylenes	ND
Naphthalene	1.4
Arsenic	0.023
Lead	<0.001
Zinc	0.67

Sample ID	MW05
C6 - C9 Fraction	<20
Total TPH C10-C36	340
Benzene	<1
Toluene	<5
Ethylbenzene	<2
Total xylenes	ND
Naphthalene	2.6
Arsenic	0.003
Lead	<0.001
Zinc	0.012

Sample ID	MW06
C6 - C9 Fraction	<20
Total TPH C10-C36	540
Benzene	<1
Toluene	<5
Ethylbenzene	<2
Total xylenes	ND
Naphthalene	1.2
Arsenic	0.01
Lead	<0.001
Zinc	0.022

Sample ID	MW03
C6 - C9 Fraction	<20
Total TPH C10-C36	300
Benzene	<1
Toluene	<5
Ethylbenzene	<2
Total xylenes	ND
Naphthalene	<1.0
Arsenic	0.014
Lead	<0.001
Zinc	0.218

Sample ID	MW07
C6 - C9 Fraction	<20
Total TPH C10-C36	3110
Benzene	<1
Toluene	<5
Ethylbenzene	10
Total xylenes	ND
Naphthalene	4.2
Arsenic	0.002
Lead	<0.001
Zinc	0.026

Sample ID	MW02
C6 - C9 Fraction	<20
Total TPH C10-C36	200
Benzene	<1
Toluene	<5
Ethylbenzene	<2
Total xylenes	ND
Naphthalene	<1.0
Arsenic	0.009
Lead	<0.001
Zinc	0.014

Sample ID	MW01
C6 - C9 Fraction	<20
Total TPH C10-C36	1000
Benzene	<1
Toluene	<5
Ethylbenzene	<2
Total xylenes	ND
Naphthalene	<1.0
Arsenic	0.028
Lead	<0.001
Zinc	0.016

LEGEND:

- Monitoring Well Location (IT Environmental)
- Monitoring Well Location (URS)
- Soil Bore Location
- Electricity
- Overhead Electricity Cable
- Sewer
- Telstra
- Underground Telstra Cable
- Water
- Underground Storage Tanks
- Site Boundary
- Groundwater Flow Direction

Legend:
Exceeds the adopted acceptance criteria
Metals concentrations in groundwater in mg/L
Organics concentrations in groundwater in µg/L
ND = Not Detected

THIS IS ONE INTERPRETATION ONLY
OTHER INTERPRETATIONS ARE POSSIBLE

Drawn: AO	Approved: TO	Date: 17/06/2009
Job No.: 42424195	File No.: 42424195.008.mxd	

Client
MOBIL OIL AUSTRALIA PTY LTD

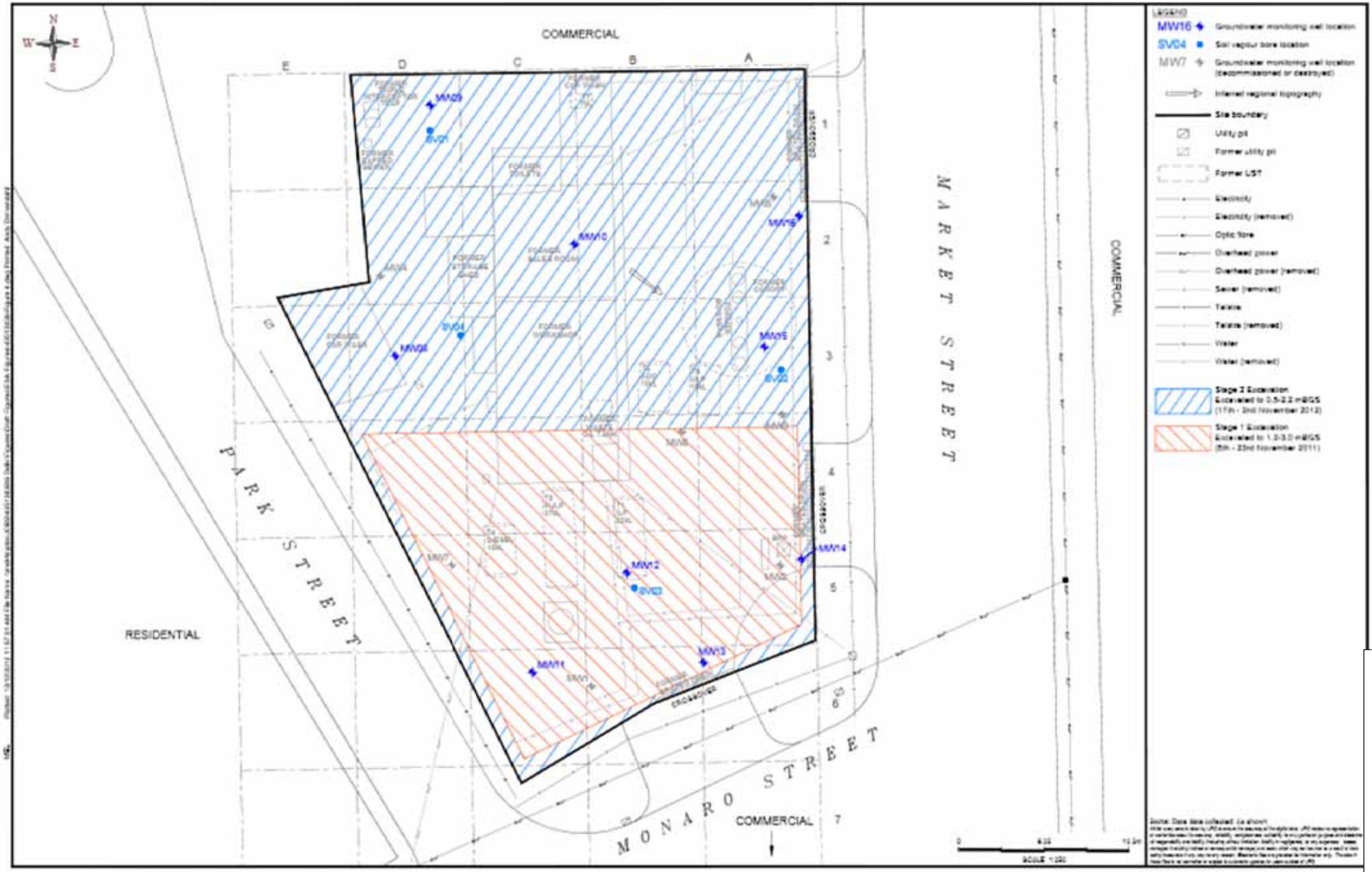
Project
MOBIL SERVICE STATION PP2 ESA
27 MARKET STREET MERIMBULA, NSW

Title
GROUNDWATER ANALYTICAL RESULTS MAP

Figure: 7

URS

Attachment 7: Monitoring well locations (URS, 2009)



MOBIL OIL AUSTRALIA PTY LTD

SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

EXTENT OF EXCAVATIONS

Draft

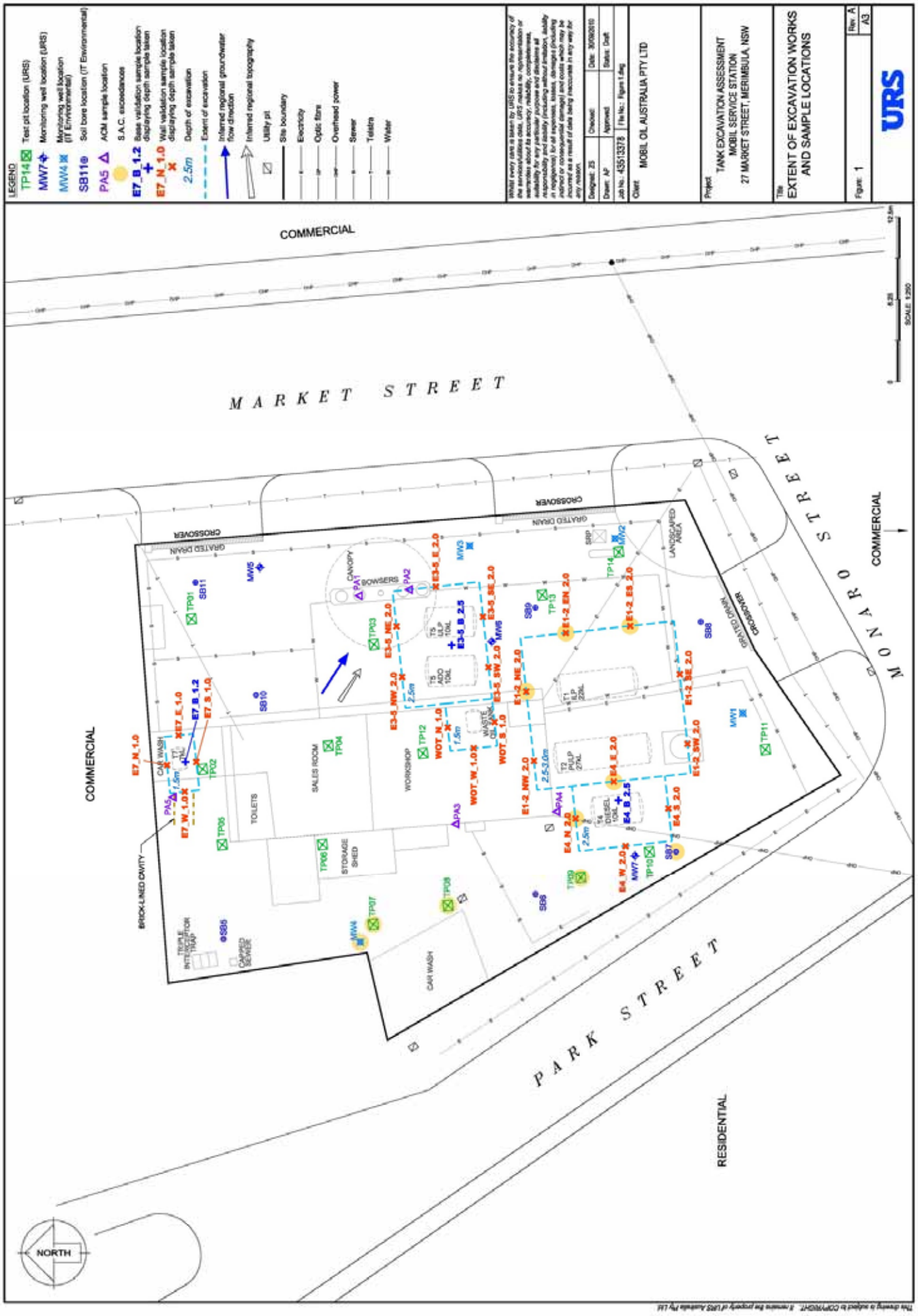
URS

Figure 4

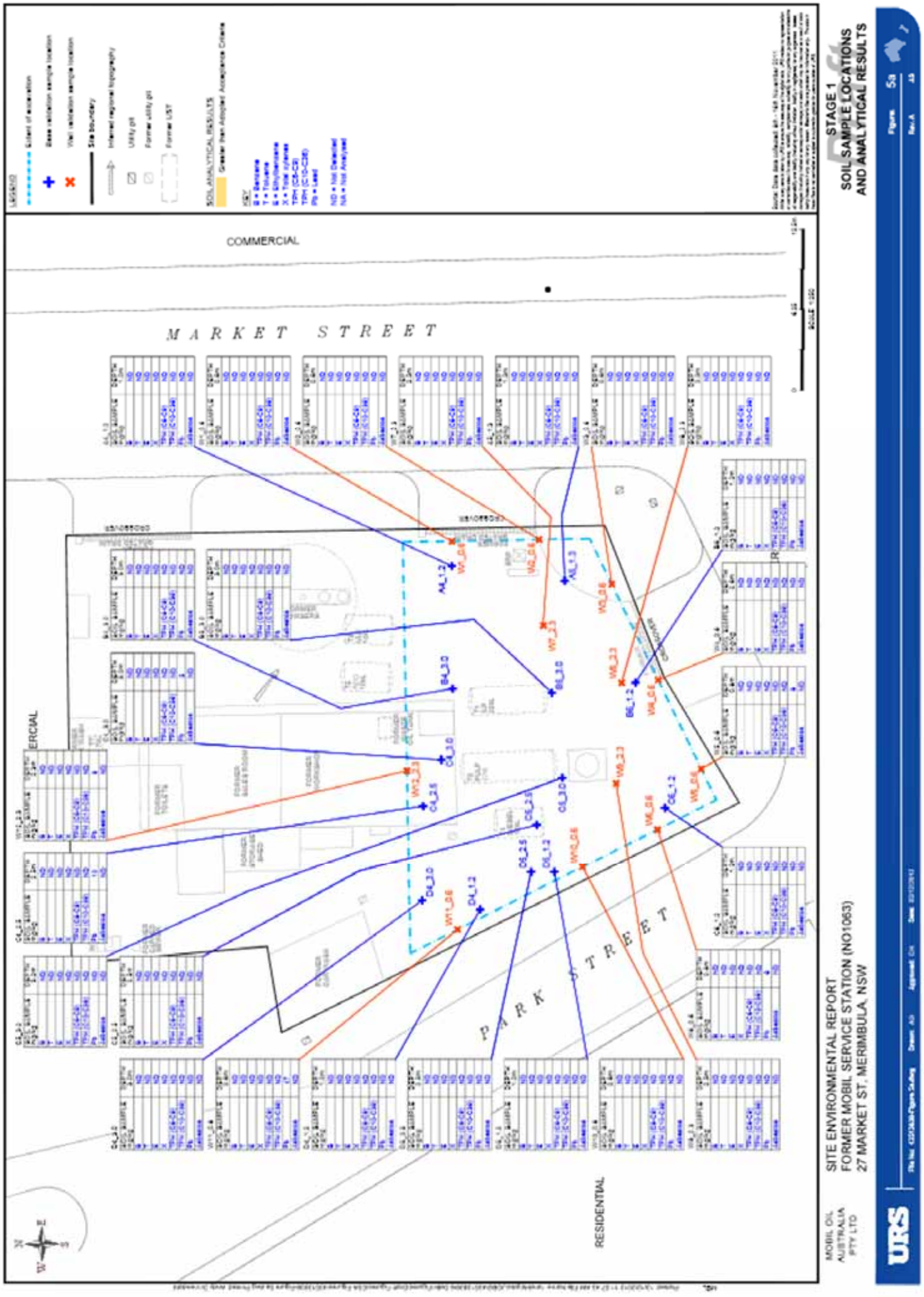
Rev A

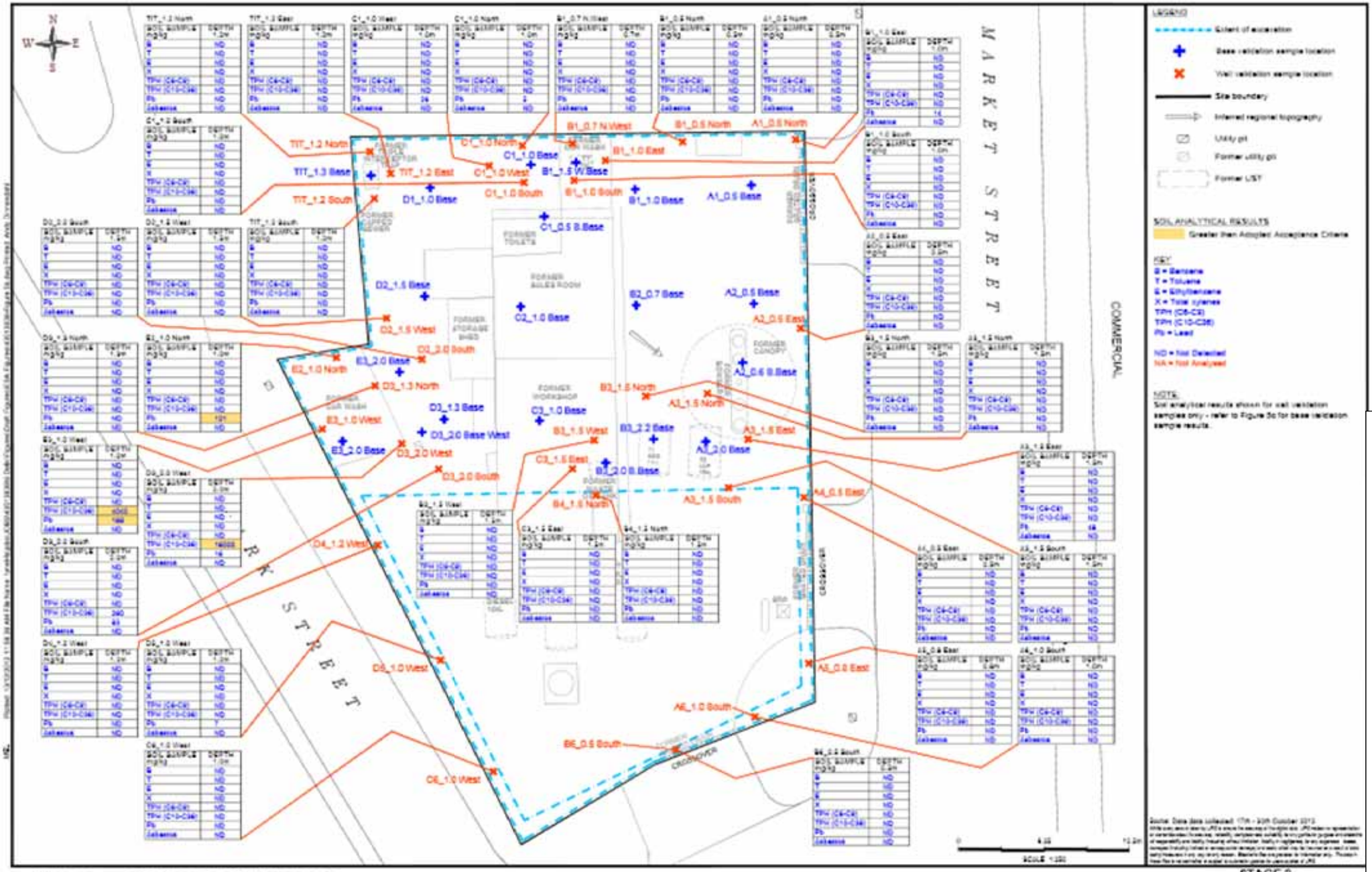
Attachment 8: Extent of Excavation

Attachment 9: Sample Locations for Tank Excavation Work



Attachment 10: Stage 1 Validation Sample Results





MOBIL OIL AUSTRALIA PTY LTD

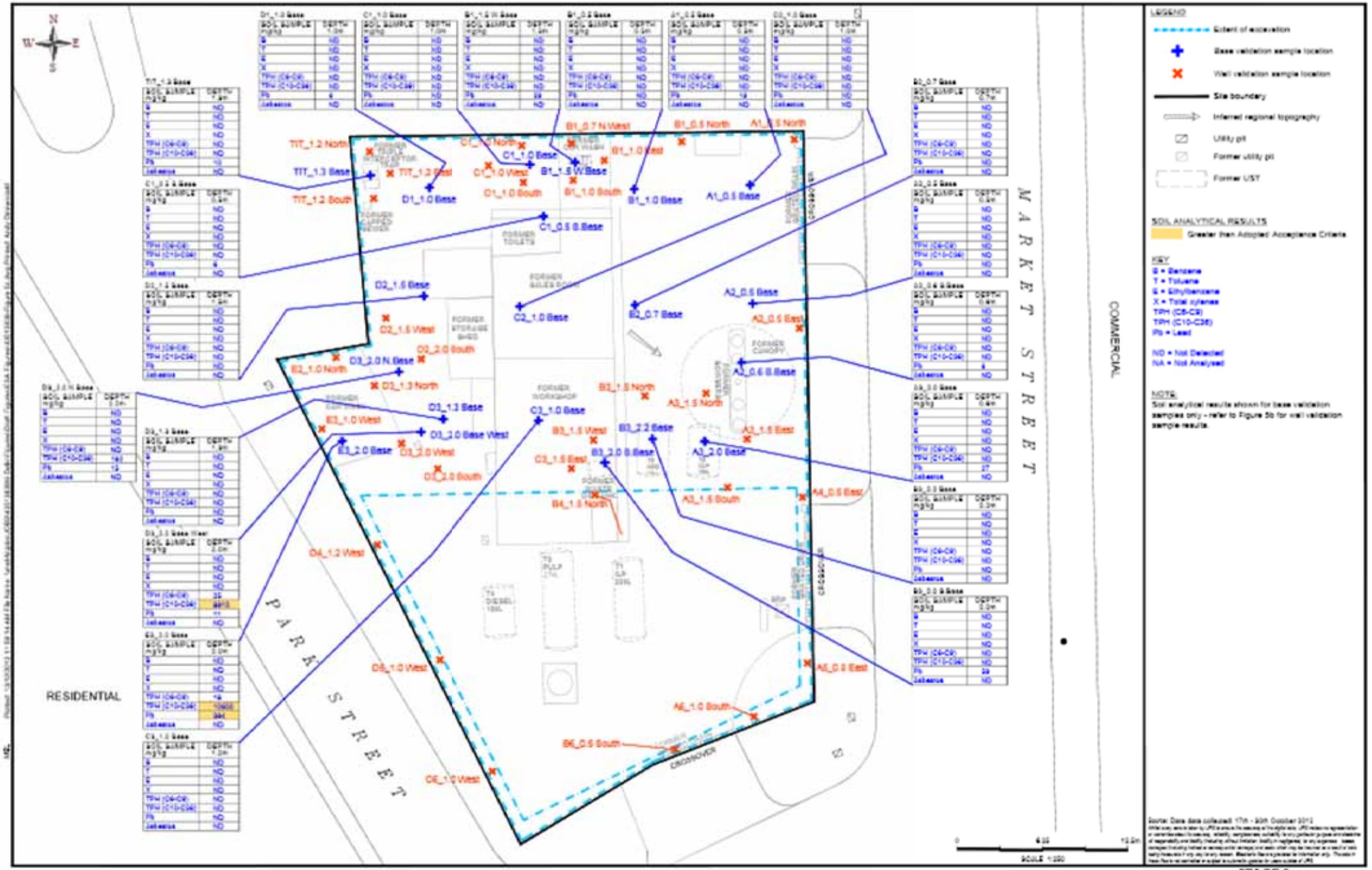
SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

STAGE 2
SOIL SAMPLE LOCATIONS AND ANALYTICAL RESULTS - WALL SAMPLES

URS

Figure: 5b
Rev: A
A3

Attachment 11: Stage 2 Validation sample Results – Wall Samples



MOBIL OIL AUSTRALIA PTY LTD

SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

STAGE 2
SOIL SAMPLE LOCATIONS AND ANALYTICAL RESULTS - BASE SAMPLES

URS

Figure 5c

Rev A A3

Attachment 12: Stage 2 Validation sample Results – Base Samples

Appendix B:
Soil and Groundwater Criteria

Soil investigation levels for urban development sites Department of Environment and Conservation NSW (April 2006)

Substance	Health-based investigation levels[1] (mg/kg)				Provisional phytotoxicity-based investigation levels[2] (mg/kg)
	Residential with gardens and accessible soil (home-grown produce contributing < 10% fruit and vegetable intake; no poultry), including children's day-care centres, preschools, primary schools, townhouses, villas (NEHF A)[3]	Residential with minimal access to soil including high-rise apartments and flats (NEHF D)	Parks, recreational open space, playing fields including secondary schools (NEHF E)	Commercial or industrial (NEHF F)	
	Column 1	Column 2	Column 3	Column 4	Column 5
Metals and metalloids					
Arsenic (total)	100	400	200	500	20
Beryllium	20	80	40	100	–
Cadmium	20	80	40	100	3
Chromium (III)[4]	12%	48%	24%	60%	400
Chromium (VI)	100	400	200	500	1
Cobalt	100	400	200	500	–
Copper	1,000	4,000	2,000	5,000	100
Lead	300	1,200	600	1,500	600
Manganese	1,500	6,000	3,000	7,500	500
Methyl mercury	10	40	20	50	–
Mercury (inorganic)	15	60	30	75	1[5]
Nickel	600	2,400	600	3,000	60
Zinc	7,000	28,000	14,000	35,000	200
Organics					
Aldrin + dieldrin	10	40	20	50	–
Chlordane	50	200	100	250	–
DDT + DDD + DDE	200	800	400	1,000	–
Heptachlor	10	40	20	50	–
PAHs (total)	20	80	40	100	–
Benzo(a)pyrene	1	4	2	5	–
Phenol[6]	8,500	34,000	17,000	42,500	–
PCBs (total)	10	40	20	50	–
Petroleum hydrocarbon components[7]					
> C16–C35 (aromatics)	90	360	180	450	–
> C16–C35	5,600	22,400	11,200	28,000	–
> C35 (aliphatics)	56,000	224,000	112,000	280,000	–
Other					
Boron	3,000	12,000	6,000	15,000	–[8]
Cyanides (complex)	500	2,000	1,000	2,500	–
Cyanides (free)	250	1,000	500	1,250	–

1 The limitations of health-based soil investigation levels are discussed in Schedule B(1) Guidelines on the Investigation Levels for Soil and Groundwater and Schedule B(7a) Guidelines on Health-based Investigation Levels, *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 1999)
2 The provisional phytotoxicity-based investigation levels proposed in this document are single number criteria. Their use has significant limitations because phytotoxicity depends on soil and species parameters in ways that are not fully understood. They are intended for use as a screening guide and may be assumed to apply to sandy loam soils or soils of a closely similar texture for pH 6–8.
3 National Environmental Health Forum (NEHF) is now known as enHealth.
4 Soil discolouration may occur at these concentrations.
5 Total mercury
6 Odours may occur at these concentrations.
7 The carbon number is an 'equivalent carbon number' based on a method that standardises according to boiling point. It is a method used by some analytical laboratories to report carbon numbers for chemicals evaluated on a boiling point GC column.
8 Boron is phytotoxic at low concentrations. A provisional phytotoxicity-based investigation level is not yet available.

Notes:

This table is adapted from Table 5-A in Schedule B(1): Guidelines on Investigation Levels for Soil and Groundwater to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 1999).

Soil investigation levels (SILs) may not be appropriate for the protection of ground water and surface water. They also do not apply to land being, or proposed to be, used for agricultural purposes. (Consult NSW Agriculture and NSW Health for the appropriate criteria for agricultural land.)

SILs do not take into account all environmental concerns (for example, the potential effects on wildlife). Where relevant, these would require further consideration.

Impacts of contaminants on building structures should also be considered.

For assessment of hydrocarbon contamination for residential land use, refer to the *Guidelines for Assessing Service Station Sites* (EPA 1994).

Threshold Concentrations for Sensitive Land Use – Soils Guidelines for Assessing Service Station Sites (NSW EPA 1994)	
Contaminant	**Threshold Concentration (mg/kg)**
TPH (C_6-C_9)	65
TPH (C_{10}-C_{36})	1,000
Benzene	1
Toluene	1.4 / 130
Ethylbenzene	3.1 / 50
Xylenes (total)	14 / 25

Trigger Values (TV) for Screening Marine Water Quality Data (µg/L) for Slightly to Moderately Disturbed Ecosystems (ANZECC 2000)		
Contaminant	**Threshold Concentration (µg/L)**	**Guideline Source**
Metals and Metalloids		
Arsenic – As (III/V)	2.3/4.5	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Cadmium – Cd	0.7	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Mercury – Hg	0.1	
Nickel – Ni	7	ANZECC (2000) 99% protection level due to potential for toxicity.
Manganese – Mn	80	Low reliability trigger values (derived from the mollusc figure) from Volume 2 of ANZECC (2000)
Chromium – Cr (III/VI)	27.4/4.4	ANZECC (2000) 95% protection levels.
Copper – Cu	1.3	
Cobalt – Co	1	
Lead – Pb	4.4	
Zinc – Zn	15	
Aromatic Hydrocarbons		
Benzene	700	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Toluene	180	
Ethylbenzene	5	
o-xylene	350	
m-xylene	75	
p-xylene	200	
Polycyclic Aromatic Hydrocarbons		
Naphthalene	50	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Anthracene	0.01	Low reliability trigger values from Volume 2 of ANZECC (2000) ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Phenanthrene	0.6	
Fluoranthene	1	
Benzo(a)pyrene	0.1	
Chlorinated Alkanes and Alkenes		
Tetrachloroethene (PCE)	70	Low reliability trigger values (95% level of protection)
1,1,2-Trichloroethene (TCE)	330	
Vinyl chloride (chloroethene)	100	
1,1,1-Trichloroethane	270	
1,1-Dichloroethene	700	
1,1-Dichloroethane	250	
1,2-Dichloroethane	1900	
1,1,2-Trichloroethane	1900	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Chloroform	370	Low reliability trigger value (95% level of protection)
Non-Metallic Inorganics		
Ammonia Total – NH_3 (at pH of 8)	910	ANZECC (2000) 95% protection levels.
Cyanide (Free or unionised HCN)	4	

While the low reliability figures should not be used as default guidelines they will be useful for indicating the quality of groundwater migrating offsite.

Appendix C:
EPA Approved Guidelines

Guidelines made or approved by the EPA under section 105 of the *Contaminated Land Management Act 1997*

(*as of 12 July 2012*)

Section 105 of the Contaminated Land Management Act 1997 (CLM Act) allows the Environment Protection Authority (EPA) to make or approve guidelines for purposes connected with the objects of the Act. These guidelines must be taken into consideration by the EPA whenever they are relevant and by accredited site auditors when conducting a site audit. They are also used by contaminated land consultants in undertaking investigation, remediation, validation and reporting on contaminated sites.

Guidelines made by the EPA

- Guidelines for Assessing Service Station Sites (December 1994)
- Guidelines for the Vertical Mixing of Soil on Former Broad-acre Agricultural Land (January 1995)
- Sampling Design Guidelines (September 1995)
- Guidelines for Assessing Banana Plantation Sites (October 1997)
- Guidelines for Consultants Reporting on Contaminated Sites (reprinted August 2011)
- Guidelines for Assessing Former Orchards and Market Gardens (June 2005)
- Guidelines for the NSW Site Auditor Scheme, 2nd edition (April 2006)
- Guidelines for the Assessment and Management of Groundwater Contamination (March 2007)
- Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (June 2009)

Note: All references in the EPA's contaminated sites guidelines to the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, November 1992) are replaced as of 6 September 2001 by references to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, October 2000), subject to the same terms.

Guidelines approved by EPA

ANZECC publications

- Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, published by Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC) (January 1992)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, published by ANZECC and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4 (October 2000)

EnHealth publications (formerly National Environmental Health Forum monographs)

- Composite Sampling, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide
- Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (June 2002)

National Environment Protection Council publications

- National Environment Protection (Assessment of Site Contamination) Measure 1999

The Measure consists of a policy framework for the assessment of site contamination, Schedule A (Recommended General Process for the Assessment of Site Contamination) and Schedule B (Guidelines).

- Schedule B guidelines include:

  B(1) Guideline on Investigation Levels for Soil and Groundwater
  B(2) Guideline on Data Collection, Sample Design and Reporting
  B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils
  B(4) Guideline on Health Risk Assessment Methodology
  B(5) Guideline on Ecological Risk Assessment
  B(6) Guideline on Risk-based Assessment of Groundwater Contamination
  B(7a) Guideline on Health-based Investigation Levels
  B(7b) Guideline on Exposure Scenarios and Exposure Settings
  B(8) Guideline on Community Consultation and Risk Communication
  B(9) Guideline on Protection of Health and the Environment During the Assessment of Site Contamination
  B(10) Guideline on Competencies and Acceptance of Environmental Auditors and Related Professionals

Other documents

- Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental (February 1996)
- Australian Drinking Water Guidelines, NHMRC (2011)

Appendix D:
Analytical Lists and Methods

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Description
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in bulk solids	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (1999) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (1999) Schedule B(3) (Method 506.1)
Volatile Organic Compounds	EP074	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)

Preparation Methods	Method	Matrix	Method Description
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: B6-1.2	C6-1.2	QC201	W7-2.3	W8-2.3
				Client sampling date / time: 09-NOV-2011 15:00	09-NOV-2011 15:00	09-NOV-2011 15:00	10-NOV-2011 15:00	10-NOV-2011 15:00
				EM1112938-013	EM1112938-014	EM1112938-016	EM1112938-018	EM1112938-019
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	4.4	7.9	19.7	21.0	15.0
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Barium	7440-39-3	10	mg/kg	<10	<10	<10	<10	<10
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	<2	<2	<2	<2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Vanadium	7440-62-2	5	mg/kg	<5	<5	<5	<5	<5
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP074A: Monocyclic Aromatic Hydrocarbons								
Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Isopropylbenzene	98-82-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
n-Propylbenzene	103-65-1	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
sec-Butylbenzene	135-98-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
tert-Butylbenzene	98-06-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene	99-87-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
n-Butylbenzene	104-51-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2-Dichloropropane	78-87-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	5	mg/kg	<5	<5	<5	<5	<5
Chloromethane	74-87-3	5	mg/kg	<5	<5	<5	<5	<5
Vinyl chloride	75-01-4	5	mg/kg	<5	<5	<5	<5	<5
Bromomethane	74-83-9	5	mg/kg	<5	<5	<5	<5	<5
Chloroethane	75-00-3	5	mg/kg	<5	<5	<5	<5	<5
Trichlorofluoromethane	75-69-4	5	mg/kg	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: SOIL			Client sample ID	B6-1.2	C6-1.2	QC201	W7-2.3	W8-2.3
			Client sampling date / time	09-NOV-2011 15:00	09-NOV-2011 15:00	09-NOV-2011 15:00	10-NOV-2011 15:00	10-NOV-2011 15:00
Compound	CAS Number	LOR	Unit	EM1112938-013	EM1112938-014	EM1112938-016	EM1112938-018	EM1112938-019
EP074E: Halogenated Aliphatic Compounds - Continued								
1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Iodomethane	74-88-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1-Dichloroethane	75-34-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1-Dichloropropylene	563-58-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromomethane	74-95-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.3-Dichloropropane	142-28-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachloroethane	76-01-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Bromobenzene	108-86-1	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorotoluene	95-49-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chlorotoluene	106-43-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP074G: Trihalomethanes								
Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	124-48-1	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL				Client sample ID	B6-1.2	C6-1.2	QC201	W7-2.3	W8-2.3
				Client sampling date / time	09-NOV-2011 15:00	09-NOV-2011 15:00	09-NOV-2011 15:00	10-NOV-2011 15:00	10-NOV-2011 15:00
Compound	CAS Number	LOR	Unit		EM1112938-013	EM1112938-014	EM1112938-016	EM1112938-018	EM1112938-019
EP074G: Trihalomethanes - Continued									
Bromoform	75-25-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	87-86-5	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: B6-1.2	C6-1.2	QC201	W7-2.3	W8-2.3
				Client sampling date / time: 09-NOV-2011 15:00	09-NOV-2011 15:00	09-NOV-2011 15:00	10-NOV-2011 15:00	10-NOV-2011 15:00
				EM1112938-013	EM1112938-014	EM1112938-016	EM1112938-018	EM1112938-019
EP080/071: Total Petroleum Hydrocarbons - Continued								
C29 - C36 Fraction	---	100	mg/kg	<100	<100	<100	<100	<100
C10 - C36 Fraction (sum)	---	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	---	10	mg/kg	<10	<10	<10	<10	<10
C6 - C10 Fraction minus BTEX (F1)	---	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	---	100	mg/kg	<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	---	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
EP080: BTEXN								
Sum of BTEX	---	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	88.9	80.7	83.7	79.4	90.0
Toluene-D8	2037-26-5	0.1	%	87.4	76.2	84.4	75.7	86.5
4-Bromofluorobenzene	460-00-4	0.1	%	81.8	75.2	81.9	75.8	82.1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	74.5	78.3	72.9	76.5	81.4
2-Chlorophenol-D4	93951-73-6	0.1	%	104	109	98.6	100	107
2.4.6-Tribromophenol	118-79-6	0.1	%	89.7	57.4	53.7	54.2	48.8
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	97.8	98.5	88.3	93.9	98.3
Anthracene-d10	1719-06-8	0.1	%	94.0	93.8	93.0	88.9	106
4-Terphenyl-d14	1718-51-0	0.1	%	94.4	92.3	81.7	86.5	91.9
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	92.2	84.9	85.7	83.4	93.7
Toluene-D8	2037-26-5	0.1	%	89.1	78.1	86.4	78.1	88.7
4-Bromofluorobenzene	460-00-4	0.1	%	84.0	78.2	80.8	78.8	80.7

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	MW09_22/11/12	MW10_22/11/12	MW16_22/11/12	MW15_22/11/12	MW14_22/11/12
				Client sampling date / time	22-NOV-2012 08:00	22-NOV-2012 09:00	22-NOV-2012 10:00	22-NOV-2012 10:45	22-NOV-2012 11:20
					EM1213946-001	EM1213946-002	EM1213946-003	EM1213946-004	EM1213946-005
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		19	47	37	119	56
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.022	0.012	0.008	0.009	0.010
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		0.003	0.002	0.002	0.004	0.002
Copper	7440-50-8	0.001	mg/L		0.001	0.001	<0.001	0.001	0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		0.007	0.007	0.024	0.010	0.018
Iron	7439-89-6	0.05	mg/L		11.8	15.9	5.29	8.44	8.69
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	---	0.05	mg/L		11.8	15.7	4.37	8.65	8.31
EG053FG-MS: Dissolved Ferric Iron by ICPMS and DA									
Ferric Iron	---	0.05	mg/L		<0.05	0.20	0.92	<0.05	0.38
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		0.11	0.14	0.63	0.01	0.82
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	---	1	mg/L		24	27	24	29	27
EP033: C1 - C4 Hydrocarbon Gases									
Methane	74-82-8	10	µg/L		792	176	421	366	726
EP074A: Monocyclic Aromatic Hydrocarbons									
Styrene	100-42-5	5	µg/L		<5	<5	<5	<5	<5
Isopropylbenzene	98-82-8	5	µg/L		<5	<5	<5	13	<5
n-Propylbenzene	103-65-1	5	µg/L		<5	<5	<5	65	<5
1.3.5-Trimethylbenzene	108-67-8	5	µg/L		<5	<5	<5	164	<5
sec-Butylbenzene	135-98-8	5	µg/L		<5	<5	<5	7	<5
1.2.4-Trimethylbenzene	95-63-6	5	µg/L		<5	<5	<5	376	<5
tert-Butylbenzene	98-06-6	5	µg/L		<5	<5	<5	<5	<5
p-Isopropyltoluene	99-87-6	5	µg/L		<5	<5	<5	<5	<5
n-Butylbenzene	104-51-8	5	µg/L		<5	<5	<5	<5	<5
EP074D: Fumigants									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW09_22/11/12	MW10_22/11/12	MW16_22/11/12	MW15_22/11/12	MW14_22/11/12
				Client sampling date / time	22-NOV-2012 08:00	22-NOV-2012 09:00	22-NOV-2012 10:00	22-NOV-2012 10:45	22-NOV-2012 11:20
Compound	CAS Number	LOR	Unit		EM1213946-001	EM1213946-002	EM1213946-003	EM1213946-004	EM1213946-005
EP074D: Fumigants - Continued									
2.2-Dichloropropane	594-20-7	5	µg/L		<5	<5	<5	<5	<5
1.2-Dichloropropane	78-87-5	5	µg/L		<5	<5	<5	<5	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L		<5	<5	<5	<5	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L		<5	<5	<5	<5	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L		<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds									
Dichlorodifluoromethane	75-71-8	50	µg/L		<50	<50	<50	<50	<50
Chloromethane	74-87-3	50	µg/L		<50	<50	<50	<50	<50
Vinyl chloride	75-01-4	50	µg/L		<50	<50	<50	<50	<50
Bromomethane	74-83-9	50	µg/L		<50	<50	<50	<50	<50
Chloroethane	75-00-3	50	µg/L		<50	<50	<50	<50	<50
Trichlorofluoromethane	75-69-4	50	µg/L		<50	<50	<50	<50	<50
1.1-Dichloroethene	75-35-4	5	µg/L		<5	<5	<5	<5	<5
Iodomethane	74-88-4	5	µg/L		<5	<5	<5	<5	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L		<5	<5	<5	<5	<5
1.1-Dichloroethane	75-34-3	5	µg/L		<5	<5	<5	<5	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L		<5	<5	<5	<5	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L		<5	<5	<5	<5	<5
1.1-Dichloropropylene	563-58-6	5	µg/L		<5	<5	<5	<5	<5
Carbon Tetrachloride	56-23-5	5	µg/L		<5	<5	<5	<5	<5
1.2-Dichloroethane	107-06-2	5	µg/L		<5	<5	<5	<5	<5
Trichloroethene	79-01-6	5	µg/L		<5	<5	<5	<5	<5
Dibromomethane	74-95-3	5	µg/L		<5	<5	<5	<5	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L		<5	<5	<5	<5	<5
1.3-Dichloropropane	142-28-9	5	µg/L		<5	<5	<5	<5	<5
Tetrachloroethene	127-18-4	5	µg/L		<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L		<5	<5	<5	<5	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L		<5	<5	<5	<5	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L		<5	<5	<5	<5	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L		<5	<5	<5	<5	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L		<5	<5	<5	<5	<5
Pentachloroethane	76-01-7	5	µg/L		<5	<5	<5	<5	<5
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L		<5	<5	<5	<5	<5
Hexachlorobutadiene	87-68-3	5	µg/L		<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	MW09_22/11/12	MW10_22/11/12	MW16_22/11/12	MW15_22/11/12	MW14_22/11/12
				Client sampling date / time	22-NOV-2012 08:00	22-NOV-2012 09:00	22-NOV-2012 10:00	22-NOV-2012 10:45	22-NOV-2012 11:20
					EM1213946-001	EM1213946-002	EM1213946-003	EM1213946-004	EM1213946-005
EP074E: Halogenated Aliphatic Compounds - Continued									
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	108-90-7	5	µg/L		<5	<5	<5	<5	<5
Bromobenzene	108-86-1	5	µg/L		<5	<5	<5	<5	<5
2-Chlorotoluene	95-49-8	5	µg/L		<5	<5	<5	<5	<5
4-Chlorotoluene	106-43-4	5	µg/L		<5	<5	<5	<5	<5
1.3-Dichlorobenzene	541-73-1	5	µg/L		<5	<5	<5	<5	<5
1.4-Dichlorobenzene	106-46-7	5	µg/L		<5	<5	<5	<5	<5
1.2-Dichlorobenzene	95-50-1	5	µg/L		<5	<5	<5	<5	<5
1.2.4-Trichlorobenzene	120-82-1	5	µg/L		<5	<5	<5	<5	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L		<5	<5	<5	<5	<5
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		<5	<5	<5	<5	<5
Bromodichloromethane	75-27-4	5	µg/L		<5	<5	<5	<5	<5
Dibromochloromethane	124-48-1	5	µg/L		<5	<5	<5	<5	<5
Bromoform	75-25-2	5	µg/L		<5	<5	<5	<5	<5
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	1	µg/L		<1	<1	<1	<1	<1
2-Chlorophenol	95-57-8	1	µg/L		<1	<1	<1	<1	<1
2-Methylphenol	95-48-7	1	µg/L		<1	<1	<1	<1	<1
3- & 4-Methylphenol	1319-77-3	2	µg/L		<2	<2	<2	<2	<2
2-Nitrophenol	88-75-5	1	µg/L		<1	<1	<1	<1	<1
2.4-Dimethylphenol	105-67-9	1	µg/L		<1	<1	<1	<1	<1
2.4-Dichlorophenol	120-83-2	1	µg/L		<1	<1	<1	<1	<1
2.6-Dichlorophenol	87-65-0	1	µg/L		<1	<1	<1	<1	<1
4-Chloro-3-Methylphenol	59-50-7	1	µg/L		<1	<1	<1	<1	<1
2.4.6-Trichlorophenol	88-06-2	1	µg/L		<1	<1	<1	<1	<1
2.4.5-Trichlorophenol	95-95-4	1	µg/L		<1	<1	<1	<1	<1
Pentachlorophenol	87-86-5	2	µg/L		<2	<2	<2	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L		<1	<1	<1	6	<1
Acenaphthylene	208-96-8	1	µg/L		<1	<1	<1	<1	<1
Acenaphthene	83-32-9	1	µg/L		<1	<1	<1	<1	<1
Fluorene	86-73-7	1	µg/L		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	MW09_22/11/12	MW10_22/11/12	MW16_22/11/12	MW15_22/11/12	MW14_22/11/12
				Client sampling date / time	22-NOV-2012 08:00	22-NOV-2012 09:00	22-NOV-2012 10:00	22-NOV-2012 10:45	22-NOV-2012 11:20
					EM1213946-001	EM1213946-002	EM1213946-003	EM1213946-004	EM1213946-005
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Phenanthrene	85-01-8	1	µg/L		<1	<1	<1	<1	<1
Anthracene	120-12-7	1	µg/L		<1	<1	<1	<1	<1
Fluoranthene	206-44-0	1	µg/L		<1	<1	<1	<1	<1
Pyrene	129-00-0	1	µg/L		<1	<1	<1	<1	<1
Benz(a)anthracene	56-55-3	1	µg/L		<1	<1	<1	<1	<1
Chrysene	218-01-9	1	µg/L		<1	<1	<1	<1	<1
Benzo(b)fluoranthene	205-99-2	1	µg/L		<1	<1	<1	<1	<1
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1	<1	<1	<1	<1
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1	<1	<1	<1	<1
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1	<1	<1	<1	<1
Benzo(g.h.i)perylene	191-24-2	1	µg/L		<1	<1	<1	<1	<1
Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L		<0.5	<0.5	<0.5	6.0	<0.5
Benzo(a)pyrene TEQ (WHO)	---	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	---	20	µg/L		<20	<20	<20	650	<20
C10 - C14 Fraction	---	50	µg/L		<50	<50	<50	1840	<50
C15 - C28 Fraction	---	100	µg/L		<100	170	130	120	380
C29 - C36 Fraction	---	50	µg/L		110	<50	60	<50	110
C10 - C36 Fraction (sum)	---	50	µg/L		110	170	190	1960	490
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
C6 - C10 Fraction	---	20	µg/L		<20	<20	<20	1400	<20
C6 - C10 Fraction minus BTEX (F1)	---	20	µg/L		<20	<20	<20	1390	<20
>C10 - C16 Fraction	---	100	µg/L		<100	<100	<100	1040	<100
>C16 - C34 Fraction	---	100	µg/L		180	190	170	130	420
>C34 - C40 Fraction	---	100	µg/L		<100	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	---	100	µg/L		180	190	170	1170	420
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	8	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	MW09_22/11/12	MW10_22/11/12	MW16_22/11/12	MW15_22/11/12	MW14_22/11/12
				Client sampling date / time	22-NOV-2012 08:00	22-NOV-2012 09:00	22-NOV-2012 10:00	22-NOV-2012 10:45	22-NOV-2012 11:20
					EM1213946-001	EM1213946-002	EM1213946-003	EM1213946-004	EM1213946-005
EP080: BTEXN - Continued									
Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	8	<2
Sum of BTEX	---	1	µg/L		<1	<1	<1	8	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	10	<5
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		96.9	106	110	117	110
Toluene-D8	2037-26-5	0.1	%		103	108	121	124	106
4-Bromofluorobenzene	460-00-4	0.1	%		86.8	87.4	121	126	83.6
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.1	%		35.7	41.1	42.4	18.4	41.3
2-Chlorophenol-D4	93951-73-6	0.1	%		59.6	87.1	83.6	61.7	68.8
2.4.6-Tribromophenol	118-79-6	0.1	%		43.7	61.0	57.2	53.1	96.9
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		67.8	71.7	69.9	69.1	51.0
Anthracene-d10	1719-06-8	0.1	%		91.2	98.1	98.6	95.4	68.0
4-Terphenyl-d14	1718-51-0	0.1	%		69.2	73.0	78.6	79.1	64.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		104	114	107	113	117
Toluene-D8	2037-26-5	0.1	%		95.9	103	108	111	99.8
4-Bromofluorobenzene	460-00-4	0.1	%		84.0	85.5	120	123	81.6

Parameter	Units	LOR	Sample Number: ME200388.001 Sample Matrix: Soil Sample Date: 09 Nov 2011 Sample Name: QC29Z	Sample Number: ME200388.002 Sample Matrix: Soil Sample Date: 09 Nov 2011 Sample Name: QC29A
Moisture Content Method: AN234				
% Moisture	%	0.5	15.7	15.9
Total Recoverable Metals in Soil by ICPOES from EPA 200.8 Digest Method: AN040/AN320				
Arsenic, As	mg/kg	3	<3	4
Barium, Ba	mg/kg	0.3	5.1	4.9
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	0.3	3.2
Copper, Cu	mg/kg	0.5	<0.5	0.6
Nickel, Ni	mg/kg	0.5	<0.5	0.7
Lead, Pb	mg/kg	1	<1	2
Vanadium, V	mg/kg	0.5	<0.5	5.6
Zinc, Zn	mg/kg	0.5	3.4	3.7
Mercury in Soil Method: AN312				
Mercury	mg/kg	0.05	<0.05	<0.05
VOC's in Soil Method: AN433/AN434				
Fumigants				
2,2-dichloropropane	mg/kg	0.1	<0.1	<0.1
1,2-dichloropropane	mg/kg	0.1	<0.1	<0.1
cis-1,3-dichloropropene	mg/kg	0.1	<0.1	<0.1
trans-1,3-dichloropropene	mg/kg	0.1	<0.1	<0.1
1,2-dibromoethane (EDB)	mg/kg	0.1	<0.1	<0.1
Halogenated Aliphatics				
Dichlorodifluoromethane (CFC-12)	mg/kg	1	<1	<1
Chloromethane	mg/kg	1	<1	<1
Vinyl chloride (Chloroethene)	mg/kg	0.1	<0.1	<0.1
Bromomethane	mg/kg	1	<1	<1
Chloroethane	mg/kg	1	<1	<1
Trichlorofluoromethane	mg/kg	1	<1	<1
Iodomethane	mg/kg	5	<5	<5
1,1-dichloroethene	mg/kg	0.1	<0.1	<0.1
Dichloromethane (Methylene chloride)	mg/kg	0.5	<0.5	<0.5
Allyl chloride	mg/kg	0.1	<0.1	<0.1
trans-1,2-dichloroethene	mg/kg	0.1	<0.1	<0.1
1,1-dichloroethane	mg/kg	0.1	<0.1	<0.1
cis-1,2-dichloroethene	mg/kg	0.1	<0.1	<0.1
Bromochloromethane	mg/kg	0.1	<0.1	<0.1
1,2-dichloroethane	mg/kg	0.1	<0.1	<0.1
1,1,1-trichloroethane	mg/kg	0.1	<0.1	<0.1
1,1-dichloropropene	mg/kg	0.1	<0.1	<0.1
Carbon tetrachloride	mg/kg	0.1	<0.1	<0.1
Dibromomethane	mg/kg	0.1	<0.1	<0.1
Trichloroethene (Trichloroethylene -TCE)	mg/kg	0.1	<0.1	<0.1
1,1,2-trichloroethane	mg/kg	0.1	<0.1	<0.1
1,3-dichloropropane	mg/kg	0.1	<0.1	<0.1
Tetrachloroethene (Perchloroethylene,PCE)	mg/kg	0.1	<0.1	<0.1
1,1,1,2-tetrachloroethane	mg/kg	0.1	<0.1	<0.1
cis-1,4-dichloro-2-butene	mg/kg	1	<1	<1
1,1,2,2-tetrachloroethane	mg/kg	0.1	<0.1	<0.1
1,2,3-trichloropropane	mg/kg	0.1	<0.1	<0.1
trans-1,4-dichloro-2-butene	mg/kg	1	<1	<1
1,2-dibromo-3-chloropropane	mg/kg	0.1	<0.1	<0.1
Hexachlorobutadiene	mg/kg	0.1	<0.1	<0.1
Halogenated Aromatics				

Parameter	Units	LOR	Sample Number ME200388.001 Sample Matrix Soil Sample Date 09 Nov 2011 Sample Name QC202	Sample Number ME200388.002 Sample Matrix Soil Sample Date 09 Nov 2011 Sample Name QC204
VOC's in Soil Method: AN433/AN434 (continued)				
Chlorobenzene	mg/kg	0.1	<0.1	<0.1
Bromobenzene	mg/kg	0.1	<0.1	<0.1
2-chlorotoluene	mg/kg	0.1	<0.1	<0.1
4-chlorotoluene	mg/kg	0.1	<0.1	<0.1
1,3-dichlorobenzene	mg/kg	0.1	<0.1	<0.1
1,4-dichlorobenzene	mg/kg	0.1	<0.1	<0.1
1,2-dichlorobenzene	mg/kg	0.1	<0.1	<0.1
1,2,4-trichlorobenzene	mg/kg	0.1	<0.1	<0.1
1,2,3-trichlorobenzene	mg/kg	0.1	<0.1	<0.1
Monocyclic Aromatic Hydrocarbons				
Benzene	mg/kg	0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2
Styrene (Vinyl benzene)	mg/kg	0.1	<0.1	<0.1
o-xylene	mg/kg	0.1	<0.1	<0.1
Isopropylbenzene (Cumene)	mg/kg	0.1	<0.1	<0.1
n-propylbenzene	mg/kg	0.1	<0.1	<0.1
1,3,5-trimethylbenzene	mg/kg	0.1	<0.1	<0.1
tert-butylbenzene	mg/kg	0.1	<0.1	<0.1
1,2,4-trimethylbenzene	mg/kg	0.1	<0.1	<0.1
sec-butylbenzene	mg/kg	0.1	<0.1	<0.1
p-isopropyltoluene	mg/kg	0.1	<0.1	<0.1
n-butylbenzene	mg/kg	0.1	<0.1	<0.1
Oxygenated Compounds				
MtBE (Methyl-tert-butyl ether)	mg/kg	0.1	<0.1	<0.1
Surrogates				
Dibromofluoromethane (Surrogate)	%	-	86	78
d4-1,2-dichloroethane (Surrogate)	%	-	89	82
d8-toluene (Surrogate)	%	-	78	75
Bromofluorobenzene (Surrogate)	%	-	77	68
Trihalomethanes				
Chloroform	mg/kg	0.1	<0.1	<0.1
Bromodichloromethane	mg/kg	0.1	<0.1	<0.1
Chlorodibromomethane	mg/kg	0.1	<0.1	<0.1
Bromoform	mg/kg	0.1	<0.1	<0.1
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420				
Naphthalene	mg/kg	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1
Dibenzo(a&h)anthracene	mg/kg	0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1

Parameter	Units	LOR	Sample Number: ME200388.001 Sample Matrix: Soil Sample Date: 09 Nov 2011 Sample Name: QC202	Sample Number: ME200388.002 Sample Matrix: Soil Sample Date: 09 Nov 2011 Sample Name: QC204
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420 (continued)				
Total PAH	mg/kg	0.8	<0.8	<0.8
Surrogates				
2-fluorobiphenyl (Surrogate)	%	-	90	78
d14-p-terphenyl (Surrogate)	%	-	86	101
Speciated Phenols in Soil Method: AN420				
Phenol	mg/kg	0.5	<0.5	<0.5
2-chlorophenol	mg/kg	0.5	<0.5	<0.5
2-methyl phenol (o-cresol)	mg/kg	0.5	<0.5	<0.5
3/4-methyl phenol (m/p-cresol)	mg/kg	1	<1	<1
2-nitrophenol	mg/kg	0.5	<0.5	<0.5
2,4-dimethyl phenol	mg/kg	0.5	<0.5	<0.5
2,4-dichlorophenol	mg/kg	0.5	<0.5	<0.5
2,6-dichlorophenol	mg/kg	0.5	<0.5	<0.5
4-chloro-3-methylphenol	mg/kg	2	<2	<2
2,4,6-trichlorophenol	mg/kg	0.5	<0.5	<0.5
2,4,5-trichlorophenol	mg/kg	0.5	<0.5	<0.5
2,4-dinitrophenol	mg/kg	2	<2	<2
4-nitrophenol	mg/kg	1	<1	<1
2,3,4,6-tetrachlorophenol	mg/kg	0.5	<0.5	<0.5
2-methyl-4,6-dinitrophenol	mg/kg	0.5	<0.5	<0.5
Pentachlorophenol	mg/kg	0.5	<0.5	<0.5
Dinoseb (2,4-dinitro-6-sec-butylphenol)	mg/kg	0.5	<0.5	<0.5
Surrogates				
2,4,6-Tribromophenol (Surrogate)	%	-	89	90
d5-phenol (Surrogate)	%	-	101	84
Volatile Petroleum Hydrocarbons in Soil Method: AN433/AN434				
TRH C6-C9	mg/kg	20	<20	<20
TRH (Total Recoverable Hydrocarbons) in Soil Method: AN403				
TRH C10-C14	mg/kg	50	<50	<50
TRH C15-C28	mg/kg	100	<100	<100
TRH C29-C36	mg/kg	100	<100	<100

METHOD	METHODOLOGY SUMMARY
AN088	Orbital rolling for Organic pollutants are extracted from soil/sediment by transferring an appropriate mass of sample to a clear soil jar and extracting with 1:1 Dichloromethane/Acetone. Orbital Rolling method is intended for the extraction of semi-volatile organic compounds from soil/sediment samples, and is based somewhat on USEPA method 3570 (Micro Organic extraction and sample preparation). Method 3700.
AN234	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with diffential polarity of the elluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependant on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433/AN434	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

mgt LabMark
ENVIRONMENTAL LABORATORIES

Certificate of Analysis

URS Australia
Level 6, 1 Southbank Blvd
Southbank
VIC 3006

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

WORLD RECOGNISED ACCREDITATION

Attention:Jothe Ramesh

Report	**360502-W**
Client Reference	MERIMBULA GME 43513838
Received Date	Nov 23, 2012

Client Sample ID			**QC07_23/11/12**
Sample Matrix			**Water**
mgt-LabMark Sample No.			**M12-No20897**
Date Sampled			**Nov 23, 2012**
Test/Reference	LOR	Unit	
Methane	0.05	mg/L	3.1
Ferric Iron - Fe3+	0.05	mg/L	0.34
Ferrous Iron - Fe2+	0.05	mg/L	0.19
Nitrate (as N)	0.02	mg/L	< 0.02
Sulphate (as S)	5	mg/L	12
Total Organic Carbon	5	mg/L	140
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	0.44
TRH C10-C14	0.05	mg/L	0.68
TRH C15-C28	0.1	mg/L	4.1
TRH C29-C36	0.1	mg/L	2.3
TRH C10-36 (Total)	0.1	mg/L	7.1
BTEX			
Benzene	0.001	mg/L	0.034
Toluene	0.001	mg/L	0.007
Ethylbenzene	0.001	mg/L	0.050
o-Xylene	0.001	mg/L	0.051
Total m+p-Xylenes	0.002	mg/L	0.22
Xylenes(ortho.meta and para)	0.003	mg/L	0.27
Fluorobenzene (surr.)	1	%	103
Halogenated Volatile Organics			
1.1-Dichloroethane	0.001	mg/L	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001
Bromoform	0.001	mg/L	< 0.001
Bromomethane	0.001	mg/L	< 0.001

mgt LabMark
ENVIRONMENTAL LABORATORIES

Client Sample ID			QC07_23/11/12
Sample Matrix			Water
mgt-LabMark Sample No.			M12-No20897
Date Sampled			Nov 23, 2012
Test/Reference	LOR	Unit	
Halogenated Volatile Organics			
Carbon Tetrachloride	0.001	mg/L	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001
Chloroform	0.005	mg/L	< 0.005
Chloromethane	0.001	mg/L	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001
Dibromomethane	0.001	mg/L	< 0.001
Iodomethane	0.001	mg/L	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001
Trichloroethene	0.001	mg/L	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001
Fluorobenzene (surr.)	1	%	103
Monocyclic Aromatic Hydrocarbons			
Benzene	0.001	mg/L	0.034
Ethylbenzene	0.001	mg/L	0.050
Isopropyl benzene (Cumene)	0.001	mg/L	< 0.001
o-Xylene	0.001	mg/L	0.051
Styrene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	0.007
Total m+p-Xylenes	0.002	mg/L	0.22
Xylenes(ortho.meta and para)	0.003	mg/L	0.27
Fluorobenzene (surr.)	1	%	103
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions *			
Naphthalene[N02]	0.02	mg/L	0.07
TRH C6-C10	0.02	mg/L	0.95
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	0.6
TRH >C10-C16	0.05	mg/L	1.2
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	1.1
TRH >C16-C34	0.1	mg/L	5.4
TRH >C34-C40	0.1	mg/L	0.7
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.001	mg/L	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001
Anthracene	0.001	mg/L	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001
Benzo(b)fluoranthene	0.001	mg/L	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001
Chrysene	0.001	mg/L	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001
Fluoranthene	0.001	mg/L	< 0.001
Fluorene	0.001	mg/L	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001
Naphthalene	0.001	mg/L	< 0.001

Client Sample ID			QC07_23/11/12
Sample Matrix			Water
mgt-LabMark Sample No.			M12-No20897
Date Sampled			Nov 23, 2012
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Phenanthrene	0.001	mg/L	< 0.001
Pyrene	0.001	mg/L	< 0.001
Total PAH	0.001	mg/L	< 0.001
p-Terphenyl-d14 (surr.)	1	%	64
2-Fluorobiphenyl (surr.)	1	%	61
Phenols (Halogenated)			
2-Chlorophenol	0.003	mg/L	< 0.003
2.4-Dichlorophenol	0.003	mg/L	< 0.003
2.4.5-Trichlorophenol	0.01	mg/L	< 0.01
2.4.6-Trichlorophenol	0.01	mg/L	< 0.01
2.6-Dichlorophenol	0.003	mg/L	< 0.003
4-Chloro-3-methylphenol	0.01	mg/L	< 0.01
Pentachlorophenol	0.01	mg/L	< 0.01
Tetrachlorophenols - Total	0.03	mg/L	< 0.03
Total Halogenated Phenol	0.01	mg/L	< 0.01
Phenols (non-Halogenated)			
2-Cyclohexyl-4.6-dinitrophenol	0.1	mg/L	< 0.1
2-Methyl-4.6-dinitrophenol	0.03	mg/L	< 0.03
2-Methylphenol (o-Cresol)	0.003	mg/L	< 0.003
2-Nitrophenol	0.01	mg/L	< 0.01
2.4-Dimethylphenol	0.003	mg/L	< 0.003
2.4-Dinitrophenol	0.03	mg/L	< 0.03
3&4-Methylphenol (m&p-Cresol)	0.006	mg/L	< 0.006
4-Nitrophenol	0.03	mg/L	< 0.03
Dinoseb	0.1	mg/L	< 0.1
Phenol	0.003	mg/L	< 0.003
Total Non-Halogenated Phenol	0.1	mg/L	< 0.1
Phenol-d6 (surr.)	1	%	25
Heavy Metals			
Lead (filtered)	0.001	mg/L	0.006
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Arsenic (filtered)	0.001	mg/L	0.003
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	0.002
Copper (filtered)	0.001	mg/L	< 0.001
Zinc (filtered)	0.001	mg/L	0.002
Iron (filtered)	0.05	mg/L	0.53

mgt LabMark
ENVIRONMENTAL LABORATORIES

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Methane - Method: MGT Method 136 Hydrocarbons by headspace.	Melbourne	Nov 26, 2012	14 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Nov 26, 2012	2 Day
Sulphate (as S) - Method: APHA 4500-SO4 (SO4 by Discrete Analyser)	Melbourne	Nov 26, 2012	28 Day
Total Organic Carbon - Method: APHA 5310B Total Organic Carbon	Melbourne	Nov 26, 2012	28 Day
BTEX - Method: USEPA 8260 - MGT 350A Monocyclic Aromatic Hydrocarbons and MGT 100A	Melbourne	Nov 23, 2012	14 Day
Halogenated Volatile Organics - Method: USEPA 8260 MGT 350A Halogenated Volatile Organics	Melbourne	Nov 23, 2012	14 Day
Monocyclic Aromatic Hydrocarbons - Method: USEPA 8260 - MGT 350A Monocyclic Aromatic Hydrocarbons	Melbourne	Nov 23, 2012	14 Day
Polycyclic Aromatic Hydrocarbons - Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons	Melbourne	Nov 26, 2012	7 Day
Heavy Metals (filtered) - Method: USEPA 6020 Heavy Metals	Melbourne	Nov 26, 2012	180 Day
Mobil Metals : Metals M15 - Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury	Melbourne	Nov 23, 2012	28 Day
Ferrous Iron - Fe2+ - Method: APHA 3500-Fe B. (Iron Speciation)	Melbourne	Nov 26, 2012	28 Day
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: TRH C6-C36 - MGT 100A	Melbourne	Nov 26, 2012	7 Day
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions * - Method: LM-LTM-ORG2010	Melbourne	Nov 26, 2012	7 Day
Phenols (IWRG 621)			
Phenols (Halogenated) - Method: USEPA 8270 Phenols	Melbourne	Nov 26, 2012	7 Day
Phenols (non-Halogenated) - Method: USEPA 8270 Phenols	Melbourne	Nov 26, 2012	7 Day

Appendix E:
Environmental Management Plan

15 April 2014

Mobil Oil Australia Pty Ltd
12 Riverside Quay
Southbank VIC 3006

Attn: Nikki Maksimovic

Dear Nikki,

Re: Environmental Management Plan, 25-27 Market Street, Merimbula NSW (Lot 1 DP 163768, Lot 2 DP91361 and Lot A DP201599)

1 Introduction

This environmental management plan (EMP) has been prepared for the site located at 25-27 Market Street, Merimbula, NSW, identified as Lot 1 DP 163768, Lot 2 DP91361 and Lot A DP201599 (the site) (Attachment 1).

The site was previously operated as a service station with mechanics shop and car wash and has been remediated. The remediation works included excavation, removal and validation of the former service station infrastructure. In addition the upper layers of soil/fill (to depths of between 0.5-1.5m) across the entire site area were excavated and disposed off-site due to the presence of asbestos containing material (ACM).

2 Residual Contamination Issues

Validation of the remediation works was undertaken by URS (2012)[1] and confirmed that the site has been successfully remediated and validated with the exception of some residual hydrocarbon impacts within the vicinity of the former car wash located along the western boundary of the site (Attachment 2 & 3). This area was excavated to the extent practicable (to the groundwater table at approximately 2mbgl and to the extent of the site boundary). The exceedances are considered to be associated with the groundwater table smear zone (around 2m depth). During excavations in this area, weathered phase separated hydrocarbon (PSH) globules were observed within groundwater ingress at 2.2 m below ground surface (bgs) and strong hydrocarbon odours were encountered.

Some residual hydrocarbon impact is also present in groundwater at the site. The main residual groundwater plume is located in the vicinity of MW8 along the western boundary of the site (Attachment 4) and appears to be localised. A second localised area of hydrocarbon impacted groundwater was detected in MW15 (downgradient of the former bowsers), and the analytical results suggest a separate localised source in the vicinity of the former bowsers.

[1] URS Australia Pty Ltd “Site Environmental Report, Former Mobil Service Station Merimbula (NO1063), 27 Market Street, Merimbula NSW’’ December 2012. Ref: 43513838.

The URS (2012) results indicate that the residual petroleum hydrocarbon concentrations in groundwater are likely to reduce further over time due in part to biodegradation as well as physical mechanisms of natural attenuation such as dilution.

As the residual soil impact is located within the groundwater smear zone, the risk from soil impacts have been assessed through consideration of groundwater impacts.

A groundwater risk assessment (GRA) was completed by URS (2012) to assess the potential health risks associated with a petroleum hydrocarbon groundwater plume beneath the site. The GRA focussed on the potential health risks to residential site users given the potentially sensitive landuses allowable at the site under the zoning. The results of the modelling indicate that:

- the potential risks to human health are considered to be low and acceptable for future residents living in buildings with either a slab on grade or basement construction (assuming groundwater is not extracted for use); and
- vapour inhalation risks to workers in a shallow trench are likely to be low and acceptable.

3 Objectives

This EMP has been prepared to document the presence of residual petroleum hydrocarbon impact at the site and to provide management controls to be followed in the event that deep excavation works are undertaken at the site which intersect the groundwater table.

4 Implementation

It is intended that this EMP be implemented by the current site owner and any future owners or developers of the site. The site owner must ensure that the EMP is referenced when planning or conducting excavation activities at the site.

This plan is prepared with the assumption that the future works on the site will be undertaken in accordance with relevant regulations and laws in NSW including the Occupational Health and Safety Act (2000), Occupational Health and Safety Regulation (2001), Environmental Planning and Assessment Act (1979), the Protection of the Environment Operations Act (1997), the Contaminated Land Management Act (1997), the NSW Department of Environment, Climate Change and Water (DECCW) Waste Classification Guidelines (2009) and other relevant legislation.

As legislation, regulations and guidelines are periodically reviewed, amended and otherwise updated, the relevant documents applicable at the time of site works should be reviewed and applied.

The EMP can be made to be legally enforceable by being made a condition of any future development consent. Bega Valley Shire Council has confirmed that the requirements of the EMP will be considered in future development assessments for the site.

5 Management Requirements

The quantitative risk assessment indicated that risks to site users and intrusive workers from remnant hydrocarbon impacts are low and acceptable.

Providing that groundwater is not abstracted for use, normal day to day use of the site under the current zoning would not result in users of the site being exposed to the hydrocarbon impacted soil or groundwater and the site in its current condition does not present a risk to human health. If deep excavations at the site are undertaken there is the potential for workers to be exposed to the hydrocarbon impacted soil and groundwater.

This EMP identifies management controls to manage excavation works below 1m which may intersect contaminated soil and groundwater in the impacted area. These are detailed as follows:

- Extraction of groundwater for use should not be undertaken.
- Site workers must prepare a safe work method statement (SWMS) for proposed excavations. This must document the environmental management measures and occupational health & safety requirements in order to protect both human health and the environment during the excavations. Management measures should include as a minimum:
  - Workers should be made aware of potentially contaminated materials including visually contaminated or odorous soil and/ or groundwater.
  - Appropriate OH&S measures should be developed to mitigate against potential exposure. This should include limiting dermal contact with soil and groundwater and the monitoring of potential gases and vapours.
  - Odorous or other suspect soils should be separated and specialist advice sought from a suitably qualified environmental consultant regarding environmental management measures and disposal.
  - All liquid and solid waste should be disposed in accordance with the requirements of the Protection of the Environment Operations Act 1997 and Protection of the Environment Operations (Waste) Regulation 2005.
- All excavation works must be carried out with due regard to the environment and to all statutory requirements and must comply with the requirements of applicable regulatory Acts, Regulations and Council Policy.

6 Time Frame

This EMP applies under the current land use scenario while ever the hydrocarbon impacted soil and groundwater remains at the site as identified on Attachment 3.

Yours faithfully,
ENVIRON Australia Pty Ltd

Rowena Salmon
EPA Accredited Site Auditor 1002

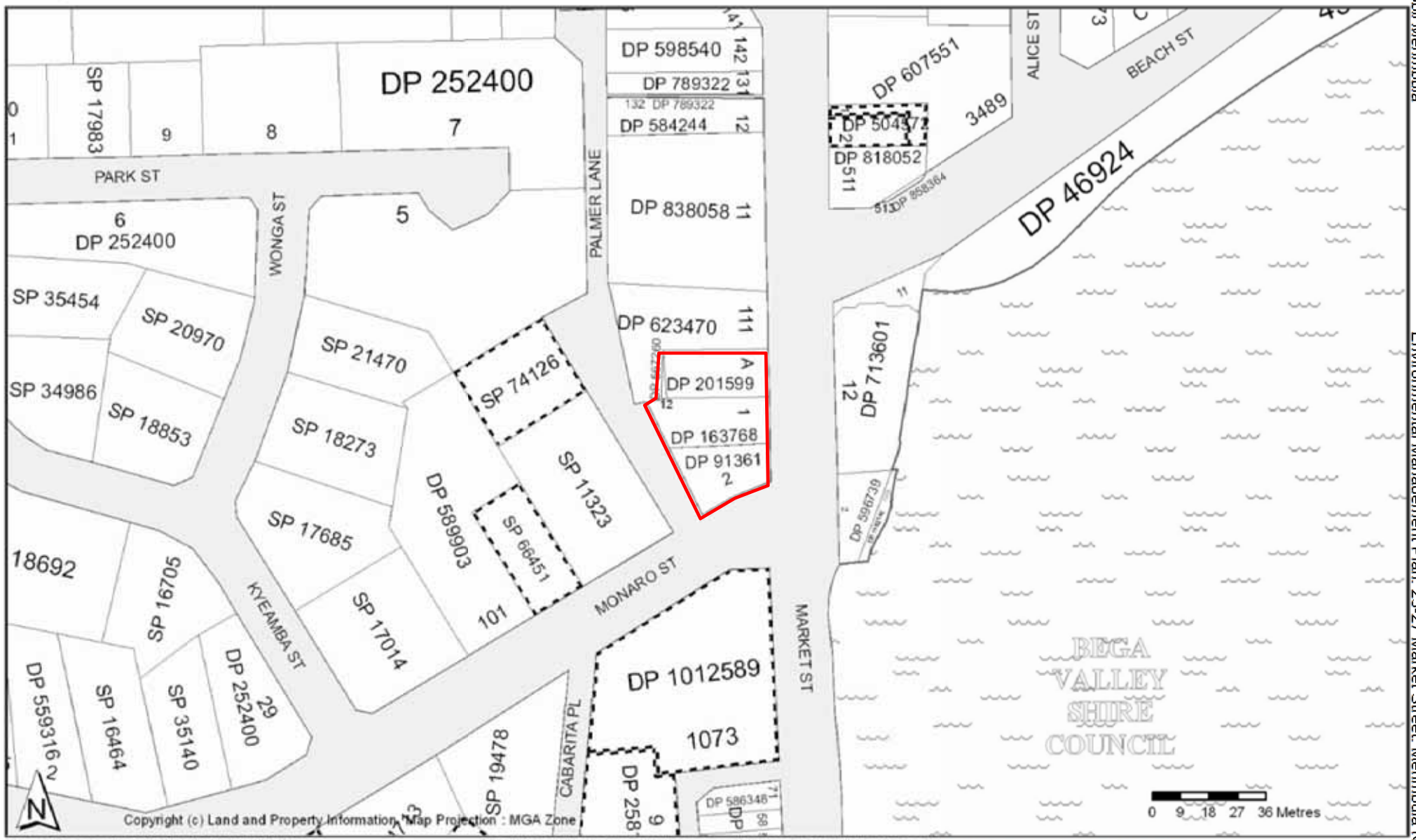
Attachment 1 – Site Location
Attachment 2 – Residual Soil Impact – Wall Samples
Attachment 2 – Residual Soil Impact – Base Samples
Attachment 3 – Residual Groundwater Impact

Land & Property Information

Cadastral Records Enquiry Report

Requested Parcel : Lot 1 DP 163768 **Identified Parcel** : Lot 1 DP 163768

Locality : MERIMBULA **LGA** : BEGA VALLEY **Parish** : PAMBULA **County** : AUCKLAND



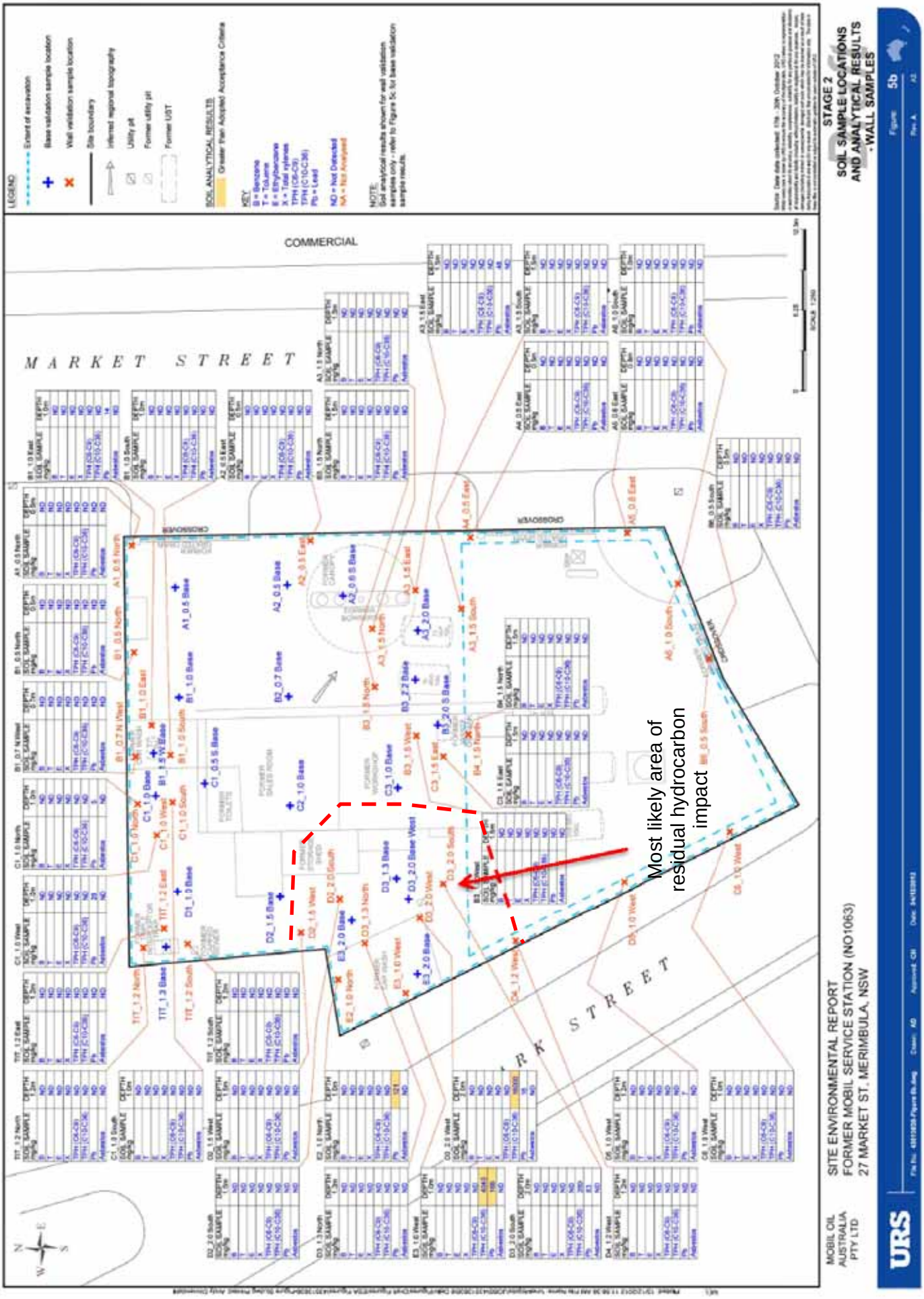
Report Generated 11:50:45 AM, 17 April, 2013

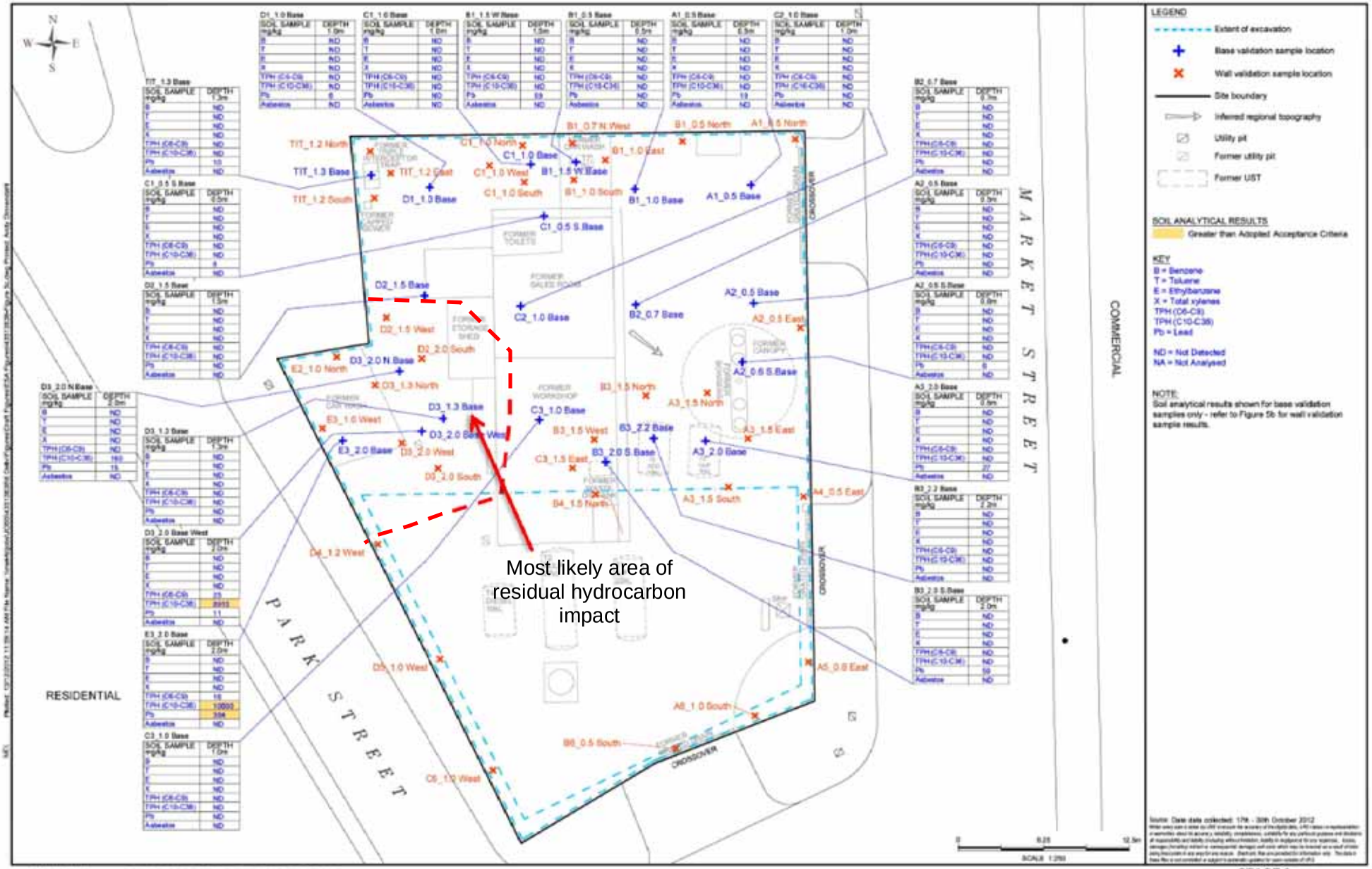
This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

Mobil Merimbula Environmental Management Plan, 25-27 Market Street, Merimbula NSW

Attachment 1: Site Location

Attachment 2: Location of Soil Impact – Wall Samples





MOBIL OIL AUSTRALIA PTY LTD

SITE ENVIRONMENTAL REPORT
FORMER MOBIL SERVICE STATION (NO1063)
27 MARKET ST, MERIMBULA, NSW

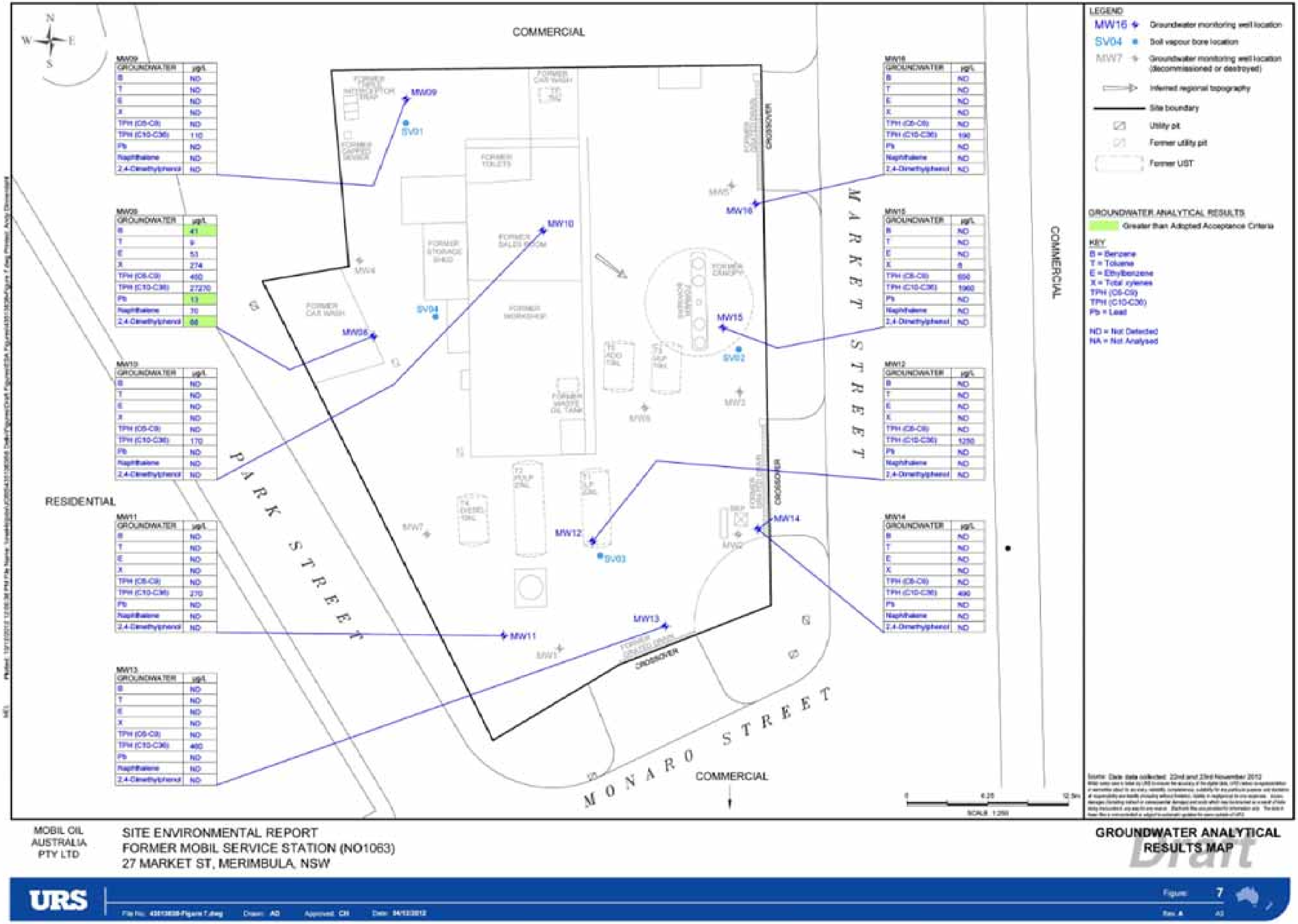
STAGE 2
SOIL SAMPLE LOCATIONS AND ANALYTICAL RESULTS - BASE SAMPLES

URS

Figure: 5c

Attachment 3: Location of Soil Impact – Base Samples

Attachment 4: Residual Groundwater Impact



Appendix F:
Email Correspondence

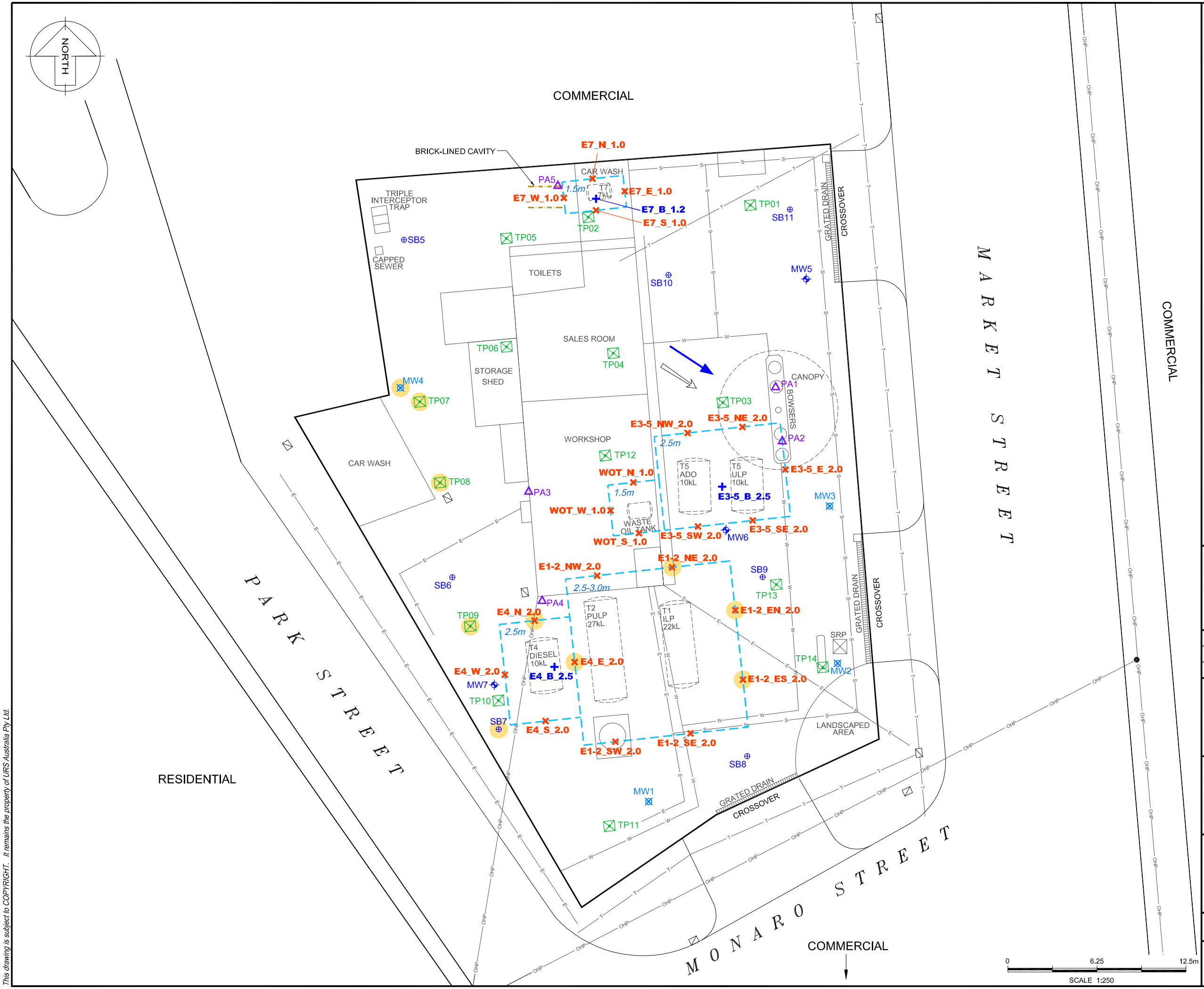
Sharon Coley

From: Dodz_David@URSCorp.com
Sent: Tuesday, 15 February 2011 2:47 PM
To: Rowena Salmon
Subject: Merimbula Figures and Tables from UST removal and Demolition Works
Attachments: Figure 1.pdf; 43513378 tables.pdf

Rowena,

Attached are the figures and tables summarising the results from the demolition, UST removal and test pitting activities last year. I shall forward the test pit logs in a separate email.

Dodz David
Associate Environmental Scientist
URS
Level 6, 1 Southbank Boulevard , Southbank,VIC 3006, Australia
Phone : +61 3 8699 7500 Fax : +61 3 8699 7550
Mobile: +61 4 1557 8383 Direct Phone : +61 3 8699 7523
mailto:dodz_david@urscorp.com visit our website at http://www.ap.urscorp.com



LEGEND

- TP14 — Test pit location (URS)
- MW7 — Monitoring well location (URS)
- MW4 — Monitoring well location (IT Environmental)
- SB11 — Soil bore location (IT Environmental)
- PA5 — ACM sample location
- S.A.C. exceedances
- E7_B_1.2 — Base validation sample location displaying depth sample taken
- E7_N_1.0 — Wall validation sample location displaying depth sample taken
- 2.5m — Depth of excavation
- Extent of excavation
- Inferred regional groundwater flow direction
- Inferred regional topography
- Utility pit
- Site boundary
- E — Electricity
- OP — Optic fibre
- OHP — Overhead power
- S — Sewer
- T — Telstra
- W — Water

Whilst every care is taken by URS to ensure the accuracy of the services/utilities data, URS makes no representation or warranties about its accuracy, reliability, completeness, suitability for any particular purpose and disclaims all responsibility and liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which may be incurred as a result of data being inaccurate in any way for any reason.

Designed: ZS	Checked:	Date: 30/09/2010
Drawn: AP	Approved:	Status: Draft
Job No.: 43513378	File No.: Figure 1.dwg	

Client
MOBIL OIL AUSTRALIA PTY LTD

Project
TANK EXCAVATION ASSESSMENT
MOBIL SERVICE STATION
27 MARKET STREET, MERIMBULA, NSW

Title
EXTENT OF EXCAVATION WORKS AND SAMPLE LOCATIONS

Figure: 1	Rev. A
	A3

URS

Table 1
Soil Analytical Results - UST Excavations
43513378 Merimbula

Location				E1-2	E1-2	E1-2	E1-2	E1-2	E1-2	E1-2	E1-2	E3	E3	E3
Sample ID				E1-2_EN_2.0	E1-2_ES_2.0	E1-2_NE_2.0	QC13	QC14	E1-2_NW_2.0	E1-2_SE_2.0	E1-2_SW_2.0	E3_5_B_2.0	E3_5_E_2.0	E3_5_E_2.0CHK
Date Sampled				31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	28/08/2010	28/08/2010	28/08/2010
Sample Type				Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Triplicate Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Lab Duplicate
Analyte	**LOR**	**Units**	**SAC**											
Total Petroleum Hydrocarbons														
C6-C9 fraction	10	mg/kg	65	<10	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10
C10-C14 fraction	50	mg/kg		**3760**	**70**	**1340**	**1240**	**1400**	<50	<50	<50	<50	<50	**80**
C15-C28 fraction	100	mg/kg		**10600**	**1060**	**3960**	**3390**	**3200**	**130**	<100	<100	<100	<100	<100
C29-C36 fraction	100	mg/kg		**130**	<100	**140**	**160**	**110**	**210**	<100	<100	<100	<100	<100
Total C10-C36		mg/kg	1000	**14490**	**1130**	**5440**	**4790**	**4710**	**340**	-	-	-	-	**80**
BTEX Compounds														
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	mg/kg	130	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-	-	-	-	-	-
Metals (Total)														
Arsenic	5	mg/kg	100	-	<5	-	-	<2	-	<5	<5	-	<5	-
Barium	10	mg/kg		-	<10	-	-	**32**	-	<10	<10	-	<10	-
Cadmium	1	mg/kg	20	-	<1	-	-	<2	-	<1	<1	-	<1	-
Chromium	2	mg/kg	100	-	<2	-	-	**3.4**	-	<2	<2	-	<2	-
Cobalt	2	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-
Copper	5	mg/kg	1000	-	<5	-	-	**14**	-	<5	<5	-	<5	-
Lead	5	mg/kg	300	**46**	**13**	**53**	**57**	**65**	**140**	<5	<5	<5	<5	-
Mercury	0.1	mg/kg	15	-	<0.1	-	-	-	-	<0.1	<0.1	-	<0.1	-
Nickel	2	mg/kg	600	-	<2	-	-	<2	-	<2	<2	-	<2	-
Tin	5	mg/kg		-	-	-	-	-	-	-	-	-	-	-
Vanadium	5	mg/kg		-	<5	-	-	**2.1**	-	<5	<5	-	<5	-
Zinc	5	mg/kg	7000	-	**15**	-	-	**56**	-	<5	**12**	-	**10**	-
Polynuclear Aromatic Hydrocarbons														
Naphthalene	0.5	mg/kg		**8.6**	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	**1.2**	**2.6**
Acenaphthylene	0.5	mg/kg		**1**	<0.5	**0.6**	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5	mg/kg		**3.3**	<0.5	**1**	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5	mg/kg		**6.2**	<0.5	**2.1**	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5	mg/kg		**16.9**	<0.5	**3.8**	**3.5**	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	**1.3**	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.5	mg/kg		**1.1**	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.5	mg/kg		**2.7**	<0.5	**0.7**	**0.7**	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	<5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAHs		mg/kg	20	**39.8**	-	**9.5**	**4.2**	-	-	-	-	-	**1.2**	**2.6**
Phenolic Compounds														
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	**1.1**	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	**1.5**	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<10	<1	<1	<1	<1	**1.6**	<1

Legend:

Exceeds Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 1
Soil Analytical Results - UST Excavations
43513378 Merimbula

Location				E3	E3	E3	E3	E3	E3	E4	E4	E4	E4	E4
Sample ID				E3_5_MW_2.0	E3_5_NE_2.0	E3_5_SE_2.0	E3_5_SW_2.0	E3_5_W_2.0	E3_5_W_2.0CHK	E4_B_2.5	E4_E_2.0	QC05	QC06	E4_N_2.0
Date Sampled				28/08/2010	28/08/2010	28/08/2010	28/08/2010	28/08/2010	28/08/2010	27/08/2010	27/08/2010	27/08/2010	30/08/2010	27/08/2010
Sample Type				Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Lab Duplicate	Primary Sample	Primary Sample	Duplicate Sample	Triplicate Sample	Primary Sample
Analyte	**LOR**	**Units**	**SAC**											
Total Petroleum Hydrocarbons														
C6-C9 fraction	10	mg/kg	65	<10	<10	<10	<10	<10	-	<10	<10	<10	<20	<10
C10-C14 fraction	50	mg/kg		<50	<50	<50	<50	<50	-	<50	**250**	**530**	**1300**	**1120**
C15-C28 fraction	100	mg/kg		<100	<100	<100	<100	<100	-	<100	**1250**	**1880**	**2900**	**3530**
C29-C36 fraction	100	mg/kg		<100	<100	<100	<100	<100	-	<100	<100	<100	**45**	<100
Total C10-C36		mg/kg	1000	-	-	-	-	-	-	-	**1500**	**2410**	**4245**	**4650**
BTEX Compounds														
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.5	<0.2
Toluene	0.5	mg/kg	130	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<1	<0.5
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	**0.5**	<1	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-	-	-	**1**	-	-
Metals (Total)														
Arsenic	5	mg/kg	100	-	-	<5	-	-	-	-	<5	<5	-	<5
Barium	10	mg/kg		-	-	<10	-	-	-	-	**10**	**20**	-	<10
Cadmium	1	mg/kg	20	-	-	<1	-	-	-	-	<1	<1	-	<1
Chromium	2	mg/kg	100	-	-	<2	-	-	-	-	**4**	**3**	-	<2
Cobalt	2	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-
Copper	5	mg/kg	1000	-	-	<5	-	-	-	-	**8**	**8**	-	<5
Lead	5	mg/kg	300	<5	<5	<5	<5	**40**	**30**	**39**	**32**	**51**	**39**	**11**
Mercury	0.1	mg/kg	15	-	-	<0.1	-	-	-	-	<0.1	**0.1**	-	<0.1
Nickel	2	mg/kg	600	-	-	<2	-	-	-	-	<2	<2	-	<2
Tin	5	mg/kg		-	-	-	-	-	-	-	-	-	-	-
Vanadium	5	mg/kg		-	-	<5	-	-	-	-	<5	<5	-	<5
Zinc	5	mg/kg	7000	-	-	**17**	-	-	-	-	**30**	**122**	-	**35**
Polynuclear Aromatic Hydrocarbons														
Naphthalene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	**0.6**	<5	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<5	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	**0.8**	<5	<2
Fluorene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<1	**2.7**	<5	**3.4**
Phenanthrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	**2**	**4.4**	**8.1**	**8.8**
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<5	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<5	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	**0.9**	<5	**1.3**
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	**<5***	<0.5
Total PAHs		mg/kg	20	-	-	-	-	-	-	-	**2**	**9.4**	**8.1**	**13.5**
Phenolic Compounds														
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<5	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<5	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<1	-	<1	<1	<1	<5	<1

Legend:

Exceeds Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 1
Soil Analytical Results - UST Excavations
43513378 Merimbula

Location				E4	E4	E7	E7	E7	E7	E7	E7	WOT	WOT	WOT
Sample ID				E4_S_2.0	E4_W_2.0	E7_B_1.0	E7_E_1.0	E7_N_1.0	E7_N_1.0CHK	E7_S_1.0	E7_W_1.0	WOT_N_1.0	WOT_S_1.0	WOT_W_1.0
Date Sampled				27/08/2010	27/08/2010	27/08/2010	27/08/2010	27/08/2010	27/08/2010	27/08/2010	27/08/2010	1/09/2010	1/09/2010	1/09/2010
Sample Type				Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Lab Duplicate	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**SAC**											
Total Petroleum Hydrocarbons														
C6-C9 fraction	10	mg/kg	65	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C10-C14 fraction	50	mg/kg		<50	<50	**130**	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	100	mg/kg		<100	<100	**130**	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	100	mg/kg		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Total C10-C36		mg/kg	1000	-	-	**260**	-	-	-	-	-	-	-	-
BTEX Compounds														
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	mg/kg	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-	-	-	-	-	-
Metals (Total)														
Arsenic	5	mg/kg	100	-	-	<5	-	<5	<5	<5	-	-	-	-
Barium	10	mg/kg		-	-	<10	-	**20**	<10	<10	-	-	-	-
Cadmium	1	mg/kg	20	-	-	<1	-	<1	<1	<1	-	-	-	-
Chromium	2	mg/kg	100	-	-	**2**	-	**2**	<2	<2	-	-	-	-
Cobalt	2	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-
Copper	5	mg/kg	1000	-	-	<5	-	<5	<5	<5	-	-	-	-
Lead	5	mg/kg	300	<5	<5	<5	**14**	**49**	**8**	<5	<5	**64**	<5	**42**
Mercury	0.1	mg/kg	15	-	-	<0.1	-	<0.1	<0.1	<0.1	-	-	-	-
Nickel	2	mg/kg	600	-	-	**2**	-	<2	<2	<2	-	-	-	-
Tin	5	mg/kg		-	-	-	-	-	-	-	-	-	-	-
Vanadium	5	mg/kg		-	-	<5	-	<5	<5	<5	-	-	-	-
Zinc	5	mg/kg	7000	-	-	**481**	-	**36**	**23**	**8**	-	-	-	-
Polynuclear Aromatic Hydrocarbons														
Naphthalene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAHs		mg/kg	20	-	-	-	-	-	-	-	-	-	-	-
Phenolic Compounds														
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1

Legend:

Exceeds Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 2
Soil Analytical Results - Test Pits
43513378 Merimbula

Location				TP01	TP01	TP02	TP02	TP03	TP03	TP03	TP03	TP04	TP04	TP05	TP05	TP06	TP06
Sample ID				TP01_B_1.5	TP01_W_1.0	TP02_B_1.5	TP02_E_1.0	TP03_B_1.5	TP03_W_1.0	QC03	QC04	TP04_B_1.5	TP04_W_1.0	TP05_B_1.5	TP05_W_1.0	TP06_B_1.5	TP06_W_1.0
Date Sampled				31/08/2010	31/08/2010	24/08/2010	24/08/2010	24/08/2010	24/08/2010	24/08/2010	30/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010
Sample Type				Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Triplicate Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**SAC**														
Total Petroleum Hydrocarbons																	
C6-C9 fraction	10	mg/kg	65	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10
C10-C14 fraction	50	mg/kg		<50	<50	<50	<50	<50	<50	<50	<10	<50	<50	<50	<50	<50	<50
C15-C28 fraction	100	mg/kg		<100	<100	<100	<100	<100	<100	<100	<20	<100	<100	<100	<100	<100	<100
C29-C36 fraction	100	mg/kg		<100	<100	<100	<100	<100	<100	<100	<20	<100	<100	<100	<100	<100	<100
Total C10-C36		mg/kg	1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BTEX Compounds																	
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	mg/kg	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals (Total)																	
Arsenic	5	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	10	mg/kg		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	1	mg/kg	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	2	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	2	mg/kg	100	<2	-	<2	-	-	<2	<2	<2	-	-	-	-	<2	-
Copper	5	mg/kg	1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	5	mg/kg	300	<5	**7**	**117**	**64**	**94**	<5	<5	**9.4**	**8**	**141**	<5	**52**	**23**	**42**
Mercury	0.1	mg/kg	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	2	mg/kg	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	5	mg/kg		**9**	-	<5	-	-	<5	<5	<2	-	-	-	-	**6**	-
Vanadium	5	mg/kg		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	5	mg/kg	7000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polynuclear Aromatic Hydrocarbons																	
Naphthalene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAHs		mg/kg	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenolic Compounds																	
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Legend:

SAC - Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 2
Soil Analytical Results - Test Pits
43513378 Merimbula

Location				TP07	TP07	TP08	TP08	TP08	TP08	TP09	TP09	TP09	TP09	TP10	TP10	TP10
Sample ID				TP07_B_1.5	TP07_W_1.0	TP08_B_1.5	QC17	QC18	TP08_W_1.0	TP09_B_1.5	QC21	QC22	TP09_W_1.0	TP10_B_1.5	TP10_B_1.5CHK	QC19
Date Sampled				31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010
Sample Type				Primary Sample	Primary Sample	Primary Sample	Duplicate Sample	Triplicate Sample	Primary Sample	Primary Sample	Duplicate Sample	Triplicate Sample	Primary Sample	Primary Sample	Lab Duplicate	Duplicate Sample
Analyte	**LOR**	**Units**	**SAC**													
Total Petroleum Hydrocarbons																
C6-C9 fraction	10	mg/kg	65	<10	<10	<10	<10	<20	<10	<10	<10	<20	<10	<10	-	<10
C10-C14 fraction	50	mg/kg		<50	<50	**80**	**150**	**94**	**60**	<50	<50	**140**	<50	<50	-	<50
C15-C28 fraction	100	mg/kg		<100	<100	**2140**	**3170**	**1900**	**1800**	**1550**	**1010**	**2200**	<100	<100	-	<100
C29-C36 fraction	100	mg/kg		<100	<100	**5110**	**7100**	**2000**	**4330**	**3880**	**2510**	**2300**	<100	<100	-	<100
Total C10-C36		mg/kg	1000	-	-	**7330**	**10420**	**3994**	**6190**	**5430**	**3520**	**4640**	-	-	-	-
BTEX Compounds																
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	-	<0.2
Toluene	0.5	mg/kg	130	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	-	<0.5
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	-	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals (Total)																
Arsenic	5	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	10	mg/kg		-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	1	mg/kg	20	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	2	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	2	mg/kg	100	<2	-	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2
Copper	5	mg/kg	1000	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	5	mg/kg	300	**22**	**700**	**28**	**23**	**29**	**23**	**47**	**31**	**20**	<5	**68**	**46**	**26**
Mercury	0.1	mg/kg	15	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	2	mg/kg	600	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	5	mg/kg		**6**	-	<5	**5**	<2	**12**	<5	<5	<2	-	<5	<5	<5
Vanadium	5	mg/kg		-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	5	mg/kg	7000	-	-	-	-	-	-	-	-	-	-	-	-	-
Polynuclear Aromatic Hydrocarbons																
Naphthalene	0.5	mg/kg		<0.5	<0.5	**0.7**	**1.9**	<5	**0.8**	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Fluorene	0.5	mg/kg		<0.5	<0.5	**0.5**	**0.6**	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Phenanthrene	0.5	mg/kg		<0.5	<0.5	**1**	**1.3**	<5	**0.7**	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5	**0.6**	<5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	-	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	**1**	**1.3**	<5	**0.7**	**0.8**	<0.5	<5	<0.5	<0.5	-	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	**<5***	<0.5	<0.5	<0.5	<5*	<0.5	<0.5	-	<0.5
Total PAHs		mg/kg	20	-	-	**3.2**	**5.7**	-	**2.2**	**0.8**	-	-	-	-	-	-
Phenolic Compounds																
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1

Legend:

SAC - Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 2
Soil Analytical Results - Test Pits
43513378 Merimbula

Location				TP10	TP10	TP11	TP11	TP12	TP12	TP13	TP13	TP13	TP14	TP14
Sample ID				QC20	TP10_W_1.0	TP11_B1.5	TP11_W_1.0_	TP12_B_1.5	TP12_W1.0	TP13_B_1.5	TP13_B_1.5CHK	TP13_W_1.0	TP14_B_1.5	TP14_W_1.0
Date Sampled				31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010	31/08/2010
Sample Type				Triplicate Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample	Lab Duplicate	Primary Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**SAC**											
Total Petroleum Hydrocarbons														
C6-C9 fraction	10	mg/kg	65	<20	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
C10-C14 fraction	50	mg/kg		**24**	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 fraction	100	mg/kg		**100**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 fraction	100	mg/kg		<20	**120**	<100	<100	<100	<100	<100	<100	<100	<100	<100
Total C10-C36		mg/kg	1000	**124**	**120**	-	-	-	-	-	-	-	-	-
BTEX Compounds														
Benzene	0.2	mg/kg	1	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	mg/kg	130	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	mg/kg	50	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-	-	-	-	-	-
Metals (Total)														
Arsenic	5	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-
Barium	10	mg/kg		-	-	-	-	-	-	-	-	-	-	-
Cadmium	1	mg/kg	20	-	-	-	-	-	-	-	-	-	-	-
Chromium	2	mg/kg	100	-	-	-	-	-	-	-	-	-	-	-
Cobalt	2	mg/kg	100	<2	<2	-	<2	<2	-	<2	<2	<2	-	-
Copper	5	mg/kg	1000	-	-	-	-	-	-	-	-	-	-	-
Lead	5	mg/kg	300	**35**	**113**	<5	**7**	<5	**29**	**250**	**256**	<5	<5	<5
Mercury	0.1	mg/kg	15	-	-	-	-	-	-	-	-	-	-	-
Nickel	2	mg/kg	600	-	-	-	-	-	-	-	-	-	-	-
Tin	5	mg/kg		<2	<5	-	<5	<5	-	**8**	**10**	**5**	-	-
Vanadium	5	mg/kg		-	-	-	-	-	-	-	-	-	-	-
Zinc	5	mg/kg	7000	-	-	-	-	-	-	-	-	-	-	-
Polynuclear Aromatic Hydrocarbons														
Naphthalene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Fluorene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Phenanthrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
Total PAHs		mg/kg	20	-	-	-	-	-	-	-	-	-	-	-
Phenolic Compounds														
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1

Legend:

SAC - Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 3
Soil Analytical Results - Stockpiles
43513378 Merimbula

Location				SP01	SP03	SP03	SP03	SP04	SP07
Sample ID				SP01_02	SP03_05	QC09	QC10	SP04	SP07
Date Sampled				31/08/2010	28/08/2010	24/08/2010	30/08/2010	27/08/2010	27/08/2010
Sample Type				Primary Sample	Primary Sample	Duplicate Sample	Triplicate Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**	**SAC**						
Total Petroleum Hydrocarbons									
C6-C9 fraction	10	mg/kg	65	<10	<10	<10	<20	<10	<10
C10-C14 fraction	50	mg/kg		<50	<50	<50	<10	<50	<50
C15-C28 fraction	100	mg/kg		<100	<100	<100	<20	<100	<100
C29-C36 fraction	100	mg/kg		<100	<100	<100	<20	<100	<100
Total C10-C36		mg/kg	1000	-	-	-	-	-	-
BTEX Compounds									
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
Toluene	0.5	mg/kg	130	<0.5	<0.5	<0.5	<1	<0.5	<0.5
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<0.5	<1	<0.5	<0.5
Total Xylenes		mg/kg	25	-	-	-	-	-	-
Metals (Total)									
Arsenic	5	mg/kg	100	-	<5	<5	<2	<5	<5
Barium	10	mg/kg		-	**10**	**30**	**12**	**10**	<10
Cadmium	1	mg/kg	20	-	<1	<1	<2	<1	<1
Chromium	2	mg/kg	100	-	**2**	**2**	**2.3**	**4**	<2
Cobalt	2	mg/kg	100	<2	-	-	-	-	-
Copper	5	mg/kg	1000	-	**15**	**11**	**4.6**	**5**	<5
Lead	5	mg/kg	300	**32**	**47**	**29**	**26**	**29**	**6**
Mercury	0.1	mg/kg	15	-	<0.1	**0.2**	**0.02**	<0.1	<0.1
Nickel	2	mg/kg	600	-	<2	<2	<2	<2	<2
Tin	5	mg/kg		<5	-	-	-	-	-
Vanadium	5	mg/kg		-	<5	<5	**2.6**	<5	<5
Zinc	5	mg/kg	7000	-	**123**	**80**	**57**	**37**	**25**
Polynuclear Aromatic Hydrocarbons									
Naphthalene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total PAHs		mg/kg	20	-	-	-	-	-	-
Phenolic Compounds									
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1	<1	<1	<1

Legend:

SAC - Soil Acceptance Critetia

SAC - Soil Acceptance Critetia
- Not Analysed
* LOR Exceeds Guideline Trigger Value

Table 4
Analytical Results - Suspected ACM Fragments
43513378 Merimbula

Location		PA1	PA2	PA3	PA4	PA5
Sample ID		PA1	PA2	PA3	PA4	PA5
Date Sampled		1/09/2010	1/09/2010	1/09/2010	1/09/2010	1/09/2010
Sample Type		Primary Sample	Primary Sample	Primary Sample	Primary Sample	Primary Sample
Analyte	**LOR**	**Units**					
Asbestos							
Sample weight (dry)	0.01	g	**5.6**	**5.06**	**23.2**	**32.4**	**18.8**
Asbestos detected			**No**	**No**	**Yes**	**Yes**	**Yes**
Asbestos type			**-**	**-**	**Ch+Am+Cr**	**Ch**	**Ch+Am+Cr**

Legend:
"Am" Amosite
"Ch" Chrysotile
"Cr" Crocidolite

Table 5
Analytical Results - Concrete Stockpile from UST T5
43513378 Merimbula

Location						CS01	CS01
Sample ID						CS01	CS01CHK
Date Sampled						28/08/2010	28/08/2010
Sample Type						Primary Sample	Lab Duplicate

Analyte	LOR	Units	SAC	CT1	CT2		
Total Petroleum Hydrocarbons							
C6-C9 fraction	10	mg/kg	65	#	#	<10	<10
C10-C14 fraction	50	mg/kg				**180**	**150**
C15-C28 fraction	100	mg/kg				**680**	**610**
C29-C36 fraction	100	mg/kg				<100	<100
Total C10-C36		mg/kg	1000	#	#	**860**	**760**
BTEX Compounds							
Benzene	0.2	mg/kg	1	10	40	<0.2	<0.2
Toluene	0.5	mg/kg	130	288	152	<0.5	<0.5
Ethylbenzene	0.5	mg/kg	50	600	2400	<0.5	<0.5
Total Xylenes		mg/kg	25	1000	4000	-	-
Metals (Total)							
Arsenic	5	mg/kg	100	100	400	**11**	**12**
Barium	10	mg/kg				**40**	**30**
Cadmium	1	mg/kg	20	20	80	<1	**1**
Chromium	2	mg/kg	100			**10**	**7**
Cobalt	2	mg/kg	100			-	-
Copper	5	mg/kg	1000			**8**	**6**
Lead	5	mg/kg	300	100	400	**27**	**24**
Mercury	0.1	mg/kg	15	4	16	**0.1**	<0.1
Nickel	2	mg/kg	600	40	160	**11**	**9**
Tin	5	mg/kg				-	-
Vanadium	5	mg/kg				**15**	**15**
Zinc	5	mg/kg	7000			**64**	**61**
Polynuclear Aromatic Hydrocarbons							
Naphthalene	0.5	mg/kg				<0.5	**0.6**
Acenaphthylene	0.5	mg/kg				<0.5	<0.5
Acenaphthene	0.5	mg/kg				<0.5	<0.5
Fluorene	0.5	mg/kg				<0.5	**0.5**
Phenanthrene	0.5	mg/kg				**1.2**	**1.3**
Anthracene	0.5	mg/kg				<0.5	<0.5
Fluoranthene	0.5	mg/kg				<0.5	<0.5
Pyrene	0.5	mg/kg		#	#	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	0.8	3.2	<0.5	<0.5
Total PAHs		mg/kg	20			**1.2**	**2.4**
Phenolic Compounds							
Phenol	0.5	mg/kg	8500	288	152	<0.5	<0.5
2-Methylphenol	0.5	mg/kg				<0.5	<0.5
3 & 4-Methylphenol	1	mg/kg				<1	<1

Legend:

SAC - Soil Acceptance Critetia

SAC - Soil Acceptance Critetia

CT1 (General Solid Waste) and CT2 (Restricted Solid Waste) Contamination Threshold values are from NSW DECCW Waste Classification Guidelines, July 2009

CT values are not applicable. SCC (Specific Contaminant Concentration) are greater than reported results.

- Not Analysed

* LOR Exceeds Guideline Trigger Value

Table 6
Analytical Results - Imported Sand and Gravel
43513378 Merimbula

Location			ISO1	ISO1	ISO1
Sample ID			ISO1	QC25	QC26
Date Sampled			3/09/2010	31/08/2010	31/08/2010
Sample Type			Primary Sample	Duplicate Sample	Triplicate Sample

Analyte	**LOR**	**Units**	**SAC**			
Total Petroleum Hydrocarbons						
C6-C9 fraction	10	mg/kg	65	<10	<10	<20
C10-C14 fraction	50	mg/kg		<50	<50	<10
C15-C28 fraction	100	mg/kg		<100	<100	<20
C29-C36 fraction	100	mg/kg		<100	<100	<20
Total C10-C36		mg/kg	1000	-	-	-
BTEX Compounds						
Benzene	0.2	mg/kg	1	<0.2	<0.2	<0.5
Toluene	0.5	mg/kg	130	<0.5	<0.5	<1
Ethylbenzene	0.5	mg/kg	50	<0.5	<0.5	<1
Total Xylenes		mg/kg	25	-	-	-
Metals (Total)						
Arsenic	5	mg/kg	100	-	-	-
Barium	10	mg/kg		-	-	-
Cadmium	1	mg/kg	20	-	-	-
Chromium	2	mg/kg	100	-	-	-
Cobalt	2	mg/kg	100	<2	<2	-
Copper	5	mg/kg	1000	-	-	-
Lead	5	mg/kg	300	<5	<5	**2**
Mercury	0.1	mg/kg	15	-	-	-
Nickel	2	mg/kg	600	-	-	-
Tin	5	mg/kg		<5	<5	
Vanadium	5	mg/kg		-	-	-
Zinc	5	mg/kg	7000			
Polynuclear Aromatic Hydrocarbons						
Naphthalene	0.5	mg/kg		<0.5	<0.5	<0.5
Acenaphthylene	0.5	mg/kg		<0.5	<0.5	<0.5
Acenaphthene	0.5	mg/kg		<0.5	<0.5	<0.5
Fluorene	0.5	mg/kg		<0.5	<0.5	<0.5
Phenanthrene	0.5	mg/kg		<0.5	<0.5	<0.5
Anthracene	0.5	mg/kg		<0.5	<0.5	<0.5
Fluoranthene	0.5	mg/kg		<0.5	<0.5	<0.5
Pyrene	0.5	mg/kg		<0.5	<0.5	<0.5
Benzo(a)pyrene	0.5	mg/kg	1	<0.5	<0.5	<0.5
Total PAHs		mg/kg	20	-	-	-
Phenolic Compounds						
Phenol	0.5	mg/kg	8500	<0.5	<0.5	<0.5
2-Methylphenol	0.5	mg/kg		<0.5	<0.5	<0.5
3 & 4-Methylphenol	1	mg/kg		<1	<1	<1

Legend:

SAC - Soil Acceptance Critetia

SAC - Soil Acceptance Critetia
- Not Analysed
* LOR Exceeds Guideline Trigger Value

Sharon Coley

From: Dodz_David@URSCorp.com
Sent: Friday, 18 February 2011 4:42 PM
To: Rowena Salmon
Cc: stewart.frater@exxonmobil.com
Subject: Merimbula Pit Logs
Attachments: Merimbula_TEA_ExcavationLogs.pdf

Rowena,

Attached are the excavation logs as you requested. Please do not hesitate to contact me should you have any question.

I hope you have a good weekend,

Dodz David
Associate Environmental Scientist
URS
Level 6, 1 Southbank Boulevard , Southbank,VIC 3006, Australia
Phone : +61 3 8699 7500 Fax : +61 3 8699 7550
Mobile: +61 4 1557 8383 Direct Phone : +61 3 8699 7523
mailto:dodz_david@urscorp.com visit our website at http://www.ap.urscorp.com

URS

TEST PIT E1-2

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **12 m**
Test Plt Width: **12.5 m**
Test Pit Depth: **2.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, medium to coarse grained, soft, moist. Cave-in issues during excavations. Small, infrequent A.C.M. fragments in soil beneath slab near pipe lines.	M			
	1			Odours along NE area of excavation wall.			0.5	E1-2_SW_2.0
							99.9	E1-2_EN_2.0
	2			Standing water present at 2.0mbgs.		☒	102.9	E1-2_NE_2.0
							8.9	E1-2_ES_2.0
							0.4	E1-2_NW_2.0
							5.0	E1-2_SE_2.0
				End of Hole at 2.5mbgs	W			

TEST PIT E3-5

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **25-8-10**
Date Finished: **25-8-10**

Test Pit Length: **3 m**
Test Pit Width: **4 m**
Test Pit Depth: **2.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey to black, medium grained, loose, very moist. A.C.M. fragments in fill beneath concrete slab particularly in the NW corner and along pipelines No noticable odour or stain.	M/W		1.2	E3-5_NW_2.0
							1.0	E3-5_SE_2.0
	1						2.0	E3-5_SW_2.0
							2.0	E3-5_E_2.0
	2			Increasing water content with depth.			1.4	E3-5_NE_2.0
							1.2	E3-5_W_2.0
				Standing water located at 2.4mbgs				
				End of Hole at 2.5mbgs	W		1.5	E3-5_B_2.5

TEST PIT E4

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **27-8-10**
Date Finished: **27-8-10**

Test Pit Length: **3.5 m**
Test Pit Width: **3 m**
Test Pit Depth: **2.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete	D			
			SW	Sand, tan to black, medium to coarse grained, loose, wet.	M			
	1			Odour on East wall.				
							35.9	E4_N_2.0
	2			Staining on East wall and base.			12.6	E4_S_2.0
							67.7	E4_E_2.0
							3.7	E4_W_2.0
				End of Hole at 2.5mbgs			7.4	E4_B_2.5

TEST PIT E7

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **27-8-10**
Date Finished: **27-8-10**

Test Pit Length: **4 m**
Test Pit Width: **2 m**
Test Pit Depth: **1.2 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey to black, soft, moist	M			
				A.C.M in fill beneath slab				
							1.0	E7_N_1.0
							2.7	E7_S_1.0
							0.5	E7_W_1.0
	1			No obvious staining, but soil is a grey/black mix.		X	0.6	E7_E_1.0
				Strong odour at base.				
				End of Hole at 1.2mbgs		X	397.1	E7_B_1.2
	2							

TEST PIT SRP

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **24-8-10**
Date Finished: **24-8-10**

Test Pit Length: **2 m**
Test Plt Width: **2 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Fill, grey and orange, sandy clay mix, firm, slightly moist. Sand, tan, well sorted medium grained, slightly moist, grey mottling, more grey from 0.2-0.5mbgs, more tan from 0.5-1.2mbgs, more grey again from 1.2-1.5mbgs. Moisture increases with depth, but at no point was it saturated.	M/W			
	1							
				End of Hole at 1.5mbgs				
	2							

TEST PIT TP01

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **24-8-10**
Date Finished: **24-8-10**

Test Pit Length: **2 m**
Test Plt Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete	D			
			SW	Sand, grey to black, soft, moist	M/W			
				Increasing moisture with depth				
				Black looks natural NOT stained				
	1						0.9	TPO1_W_1.0
				Base of test pit at 1.5mbgs			1.6	TP01_B_1.5
	2							

TEST PIT TP02

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **24-8-10**
Date Finished: **24-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Brick/Reo	D			
			SW	Sand, grey to black, medium grained, loose, slightly moist.	D/M			
				A.C.M. fragments, small pieces beneath the slab				
							0.1	TP02_N_1.0
	1						0.3	TP02_S_1.0
							0.9	TP02_E_1.0
				Pockets of orange clay in east well of pit from 0.6-1.5mbgs.			0.2	TP02_W_1.0
				End of Hole at 1.5mbgs			1.4	TP02_B_1.5
	2							

TEST PIT TP03

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **24-8-10**
Date Finished: **24-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey to black, medium grained, soft to loose, moist. Black looks natural NOT stained.	M		0.1	TP03_N_1.0
	1						0.1	TP03_S_1.0
							0.1	TP03_E_1.0
							0.2	TP03_W_1.0
				End of Hole at 1.5mbgs			0.2	TP03_B_1.5
	2							

TEST PIT TP04

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, tan to dark grey, medium grained, moist.	M			
				Frequent A.C.M. fragments beneath slab				
	1						0	TP04_W_1.0
				End of Hole at 1.5mbgs			0	TP04_B_1.5
	2							

TEST PIT TP05

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, tan to 0.3mbgs, dark grey from 0.3-1.5mbgs, medium to coarse grained, moist. Large amount of A.C.M. fragment beneath slab	M			
	1						0	TP05_W_1.0
				End of Hole at 1.5mbgs			0	TP05_B_1.5
	2							

TEST PIT TP06

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey clayey pockets, medium to coarse grained, moist	M			
				A.C.M. fragments beneath slab, frequent, 2-5 cm pieces				
	1			Clay pockets generally to west of test pit.			0.1	TP06_W_1.0
				End of Hole at 1.5mbgs			0.7	TP06_B_1.5
	2							

TEST PIT TP07

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Silty clay with sand, dark grey, moist.	M			
				Infrequent A.C.M. fragments beneath slab				
	1						0.2	TP07_W_1.0
				Very slight odour at base.				
				End of Hole at 1.5mbgs			6.8	TP07_B_1.5
	2							

TEST PIT TP08

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Silty clay, dark grey, coarse grained, moist, odours throughout pit.	M			
				Infrequent A.C.M. fragments beneath slab.				
				Odours noticable.				
	1						21.8	TP08_W_1.0
				End of Hole at 1.5mbgs			42.4	TP08_B_1.5
	2							

TEST PIT TP09

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, tan to 0.3mbgs, grey to dark grey with traces of tan from 0.3-1.5mbgs, medium grained, moist.	M			
	1			Slight odour from base.			0.8	TP09_W_1.0
				End of Hole at 1.5mbgs			36.6	TP09_B_1.5
	2							

TEST PIT TP10

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey to dark grey, medium to coarse grained, moist	M			
	1			Slight odour from base.			2.2	TP10_W_1.0
				End of Hole at 1.5mbgs			15.7	TP10_B_1.5
	2							

TEST PIT TP11

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Plt Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, tan to 0.3mbgs, dark grey to 1.5mbgs, medium grained with traces of fine grains, moist.	M			
	1						1.1	TP11_W_1.0
				End of Hole at 1.5mbgs			0.7	TP11_B_1.5
	2							

TEST PIT TP12

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey, fine to medium grained, moist.	M			
				Frequent 2-5 cm fragments of A.C.M. beneath slab				
	1						0.4	TP12_W_1.0
				End of Hole at 1.5mbgs			1.3	TP12_B_1.5
	2							

TEST PIT TP13

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, grey to dark grey with tan, fine to medium grained, soft, moist.	M			
	1						1.2	TP13_W_1.0
				End of Hole at 1.5mbgs			0.8	TP13_B_1.5
	2							

TEST PIT TP14

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **31-8-10**
Date Finished: **31-8-10**

Test Pit Length: **2 m**
Test Pit Width: **1 m**
Test Pit Depth: **1.5 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, tan to dark grey, medium to coarse grained, soft, moist.	M			
	1						0.6	TP14_W_1.0
				End of Hole at 1.5mbgs			0.5	TP14_B_1.5
	2							

TEST PIT WOT

URS Australia Pty Ltd
Level 6, 1 Southbank Blvd, Southbank VIC 3006
Phone: 8699 7500
Fax: 8699 7550

Excavation Contractor: **Synergy**

Logged By: **Z. Sabatka**
Checked By: **D. David**
Date Started: **1-9-10**
Date Finished: **1-9-10**

Test Pit Length: **3.5 m**
Test Pit Width: **3.5 m**
Test Pit Depth: **1.7 m**

Equipment: **CAT324D**
Bucket Size: **200 mm**
Relative Level: **mRL**
Coordinates: **mN** **mE**
Permit No:

Project Name: **Merimbula Demolition**
Project No.: **43513378**
Client: **Mobil Oil Australia**
Location: **Merimbula, NSW**

Ground Water Data and Comments	Depth (m)	Graphic Log	Classification	DESCRIPTION OF STRATA	Moisture Condition	Sample Interval	PID (ppm)	Sample ID
	0		CON	Concrete/Reo	D			
			SW	Sand, dark grey, fine to medium grained, moist.	M/W			
				A.C.M. noted in fill around former waste oil tank.				
							1.4	WOT_N_1.0
	1						1.0	WOT_S_1.0
							0.8	WOT_W_1.0
				Standing water present in base.				
				End of Hole at 1.7mbgs	W			
	2							

Sharon Coley

From: Maksimovic, Nikki /C <nikki.maksimovic@exxonmobil.com>
Sent: Friday, 28 June 2013 12:06 PM
To: Rowena Salmon
Subject: FW: 25-27 Market Street, Merimbula LTL:[BVS00609]

Follow Up Flag: Follow up
Flag Status: Completed

Hi Rowena,

Please find correspondence from Council's lawyer's confirming Council's intentions for the property.

Thank you,

Nikki Maksimovic | Project Manager | ExxonMobil Environmental Services
On behalf of Mobil Oil Australia Pty Ltd
PO Box 1141 CAMDEN NSW 2570
T +61 2 4636 6654 | F +61 2 4636 6659 | M +61 0 418 965 242

From: Frances, Wing Yee Tse [mailto:Frances.WingYeeTse@lindsaytaylorlawyers.com.au]
Sent: Thursday, 27 June 2013 4:20 PM
To: Maksimovic, Nikki /C
Cc: Megan Hawley
Subject: 25-27 Market Street, Merimbula LTL:[BVS00609]

Dear Nikki,

I refer to our telephone conversation on 21 June 2013 in relation to the intended use of the above property.

Council has instructed that a large portion of the property is intended for use as a road reserve, with the remainder identified for development as commercial property.

Regards,

Frances

Frances, Wing Yee Tse
Senior Lawyer
Lindsay Taylor Lawyers

lindsaytaylorlawyers

D (02) 8235 9711
M 0433 233 225
F (02) 8235 9799
E Frances.WingYeeTse@lindsaytaylorlawyers.com.au
W www.lindsaytaylorlawyers.com.au

Level 9, Suite 3, 420 George Street | Sydney NSW 2000 | Australia

Sharon Coley

From: Maksimovic, Nikki /C <nikki.maksimovic@exxonmobil.com>
Sent: Friday, 26 July 2013 2:47 PM
To: Rowena Salmon
Subject: Response to Auditor comments - Former Mobil Merimbula Service Station Merimbula (NO1063)
Attachments: Tank destruction certificate.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Hi Rowena,

FYI: tank destruction certificates

Thank you,

Nikki Maksimovic | Project Manager | ExxonMobil Environmental Services
On behalf of Mobil Oil Australia Pty Ltd
PO Box 1141 CAMDEN NSW 2570
T +61 2 4636 6654 | F +61 2 4636 6659 | M +61 0 418 965 242

KNIGHT'S SYNDICATE PTY. LTD.

ABN 66 320 664 665

Registered Office/ Quarry Recycling Plant:
105 Schofields Rd. Rouse Hill N.S.W. 2155
Telephone (02) 9629 5564 Fax (02) 9629 5554

27th/31st August/2nd September 2010

KNIGHT'S SYNDICATE PTY LTD, 105 SCHOFIELDS RD ROUSE HILL NSW 2155
ABN 66 320 664 665 (**THE COMPANY**), acknowledges and agrees

Synergy Resources

that all risk and title in the **3 x type 10, 1 x type 2, 1 x type 25, 1 x type 20 & 1 x type 5 ug tanks ex Cnr Monaro & Market St Merimbula**

passes to (**THE COMPANY**) from

Synergy Resources

The tanks were transported by us/you for a safe and legal disposal at our quarry,
105 SCHOFIELDS ROAD ROUSE HILL N.S.W. 2155

They will not be sold for any purpose.

Common
Knight's Syndicate
Pty. Ltd.
A.C.N. 002 947 588
Seal

the company seal of
KNIGHT'S SYNDICATE PTY LTD
was hereunto affixed by
J.T. KNIGHT
27th/31st August/2nd September 2010

Sharon Coley

From: Maksimovic, Nikki /C <nikki.maksimovic@exxonmobil.com>
Sent: Tuesday, 13 August 2013 4:12 PM
To: Rowena Salmon
Subject: Response to Auditor comments - Former Mobil Merimbula Service Station Merimbula (NO1063)
Attachments: Mobil Merimbula response to auditor comments v3.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Hi Rowena,

Please find URS's responses to your comments for the Merimbula site.

Thank you,

Nikki Maksimovic | Project Manager | ExxonMobil Environmental Services
On behalf of Mobil Oil Australia Pty Ltd
PO Box 1141 CAMDEN NSW 2570
T +61 2 4636 6654 | F +61 2 4636 6659 | M +61 0 418 965 242

Auditor Comments

Site Name / Audit:	Former Mobil Service Station Merimbula (NO1063)		
Site Address:	27 Market Street, Merimbula	**Client:**	Mobil Oil Australia Pty Ltd
Document Title / Consultant:	Site Environmental Report 18 Dec 2012 Final	**Consultant / Authors:**	URS Australia Pty Ltd
Auditor:	Rowena Salmon	**Auditor Representative:**	

Item No	Auditor Comments	URS Response
1	There is a reference in section 1.1 which states that *"…URS and it's subcontractor removed all above ground structures and underground storage tanks from the site."* As noted above, I require further information regarding the tank removal works including details of tanks removed, tank destruction certificates, details of subcontractor and details of tank pit backfill process (which was undertaken prior to Stage 1 and 2 excavation works).	Seven fuel USTs plus one waste oil tank were removed from site in 2010. URS understands that Mobil has agreed with the Auditor that a copy of the tank destruction certificates is a sufficient response to this item. See attached destruction certificates.
2	As per my email comments of 15 November 2011, I have assumed that ACM impacted material was placed back into the excavations following tank excavation works. Please advise if any material was removed off-site for disposal during tank excavation works in 2010.	All excavated material was placed at the bottom of each excavation the respective materials originated. The materials included tanks sands, fill material, concrete anchors and pavement. The excavations were topped off with 70 m3of imported sand and gravel. All of these were subsequently excavated and removed from the site during the Stage 1 and Stage 2 works.
3	I note that there are some differences between the location of infrastructure (particularly USTs) between the IT site plan and the later URS site plan. Are these differences based on site observations during URS excavation works?	The figures are based on what URS observed onsite.

Item No	Auditor Comments	URS Response
4	During excavations in grid sections D3, E3 and part of D4 area (in the location of MW8, car wash area), weathered PSH globules were observed by URS within groundwater ingress at 2.2 mbgs and strong hydrocarbon odours were encountered. This, together with residual soil impacts reported in this area suggests that there may still be a localised ongoing source of groundwater impact in this area. This should be considered in items 5 and 6 following.	All infrastructure onsite has been removed and a groundwater risk assessment has been conducted onsite, the results of which are included as Appendix K of the Site Environmental Report (14 December 2012). See associated responses to items 5 and 6 below.
5	Discussion of the potential for off-site impacts (eg migration of impacted groundwater) is specifically excluded, although the "Post Phase II ESA" concludes that dissolved phase impacts have the potential to reach Merimbula Lake (40m east of the site). I note that the current SER concludes (in section 5.6) *that "..there is insufficient information collected over both time and with sufficient background condition documentation to make a conclusion as to the current rate, if any of attenuation."* The SER must include conclusions regarding the potential for and likely extent of off-site migration of contamination and if appropriate an assessment of the potential risks. I note the following: • Groundwater impact in MW8 and MW15 requires an assessment of attenuation potential and potential for off-site migration. • Consider the potential for impact to extend off-site to the west in the vicinity of E3_1.0 West (significantly impacted soils were noted at 2m depth in this area). I note that given the use of this off-site area risks are unlikely, but they should be acknowledged and closed out. • The Risk Assessment specifically excludes off-site risks. This requires revision with respect to the issues discussed above.	The findings of the SER, with regards to the Risk Assessment, given that vapour intrusion pathways are only of concern for assessment of buildings or enclosed spaces, and impacts near site boundaries are only present near roads, assessment of off-site risks was not considered necessary. In addition, the conservative on-site assessment indicated that risks were low and acceptable; therefore, it would follow that off-site risks in areas further away from any residual impacts would also be low and acceptable.
6	Given the residual soil and groundwater contamination, an EMP would appear appropriate for the site, at minimum in the car wash area where contamination would be encountered during the construction of a basement in this area. I note this may be an issue with respect to the sale contract terms for the site, the details of which I am not aware of.	Mobil to respond.

Item No	Auditor Comments	URS Response
7	Table 3a of SER – Validation sample D3_2.0 West Base is marked on the plan, however two later validation samples appear to have been collected in this area (with higher TPH concentrations). These later samples are not marked on the plan (D3_2.0 BASEWEST and D3_2.0 West_B). Were these final excavation samples?	Validation samples were collected during the Stage 2 excavation works. However, additional soil samples were collected while undertaking further drilling works onsite on 13 November 2012 at these locations. The maximum concentration detected from these samples were to be used in the report; however, in the case of the sample in question (D3_2.0 West Base), it appears there may have been an oversight. The Risk Assessment carried out was based on groundwater results, and due to the shallow nature of the groundwater onsite, the risks based on these values are covered off in the risk assessment and does not change the conclusions of the risk assessment.
8	Comment is required on whether acid sulphate soils were encountered/managed during remediation works.	Acid-Sulphate soil analyses were not conducted on the soil samples collected onsite. All impacted soil onsite was removed and disposed to a Mobil-approved landfill. Soil that remained onsite upon the conclusion of the Stage 2 excavation works were either not impacted or saturated.
9	Confirm dates of work for Stage 2 excavations (section 1.4 of SER).	Stage 2 soil excavation works were conducted during 17th October – 2nd November 2012. Drilling works to install monitoring wells and soil vapour bores were conducted during 13th – 15th November 2012. Additional soil samples were collected during this time in grid D3. Groundwater and soil vapour sampling works were conducted during 20th – 23rd November 2012.

Item No	Auditor Comments	URS Response
10	I suggest that in order to be efficient with our review time, that we do not undertake a full technical review of the risk assessment until the issues above have been addressed. I note from our initial review that the "groundwater risk assessment" and soil screening consider high density site usage while I am being asked to sign-off on low density usage. In addition, dermal contact with soil during construction of a future basement has not been considered.	While the report does refer to 'high-density' residential, the scenario modelled (residential with basement used for storage with low air exchange rates, and dermal contact with groundwater in basement) is highly conservative, and would be protective of low density residential developments, which would likely be slab on grade. As there are no remaining soil impacts in shallow soils at the site, pathways of direct contact with soil impacts in a low density land use scenario would be incomplete. Therefore, the current assessment is considered applicable to the assessment of both low and high density residential land uses.