

Remedial Strategy

Incoll Management Pty Ltd

On behalf of
Rail Corporation NSW

Former Macdonaldtown Gasworks
Burren St
Erskineville, NSW

July 2011
JBS 40913 – 15505 Revision 8
JBS Environmental Pty Ltd

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Table of Contents

| | |
|---|----|
| List of Abbreviations | v |
| Executive Summary..... | vi |
| 1 Introduction..... | 1 |
| 1.1 Introduction..... | 1 |
| 1.2 Objectives | 1 |
| 1.3 Structure of the Document..... | 2 |
| 2 Summary of Site Information | 3 |
| 2.1 Geology | 3 |
| 2.1.1 Fill Material | 3 |
| 2.1.2 Natural Soil | 3 |
| 2.1.3 Tar Impacted Fill Material and Natural Soils..... | 4 |
| 2.2 Hydrogeology | 4 |
| 3 Remediation Objectives and Requirements | 6 |
| 3.1 Overview..... | 6 |
| 3.2 Regulations and Approvals..... | 6 |
| 3.3 RAP and SAR | 6 |
| 3.4 Specific RailCorp Requirements..... | 6 |
| 3.4.1 Requirements Near Site Boundaries | 6 |
| 3.4.2 Operational Environmental and Safety Requirements..... | 6 |
| 3.4.3 Closure Requirements | 7 |
| 3.5 Heritage Requirements..... | 7 |
| 3.6 Geotechnical Requirements..... | 8 |
| 3.7 Air Emissions Requirements | 9 |
| 4 Remedial Strategy Refinement | 10 |
| 4.1 Extent of Soil Remediation and Strategy Proposed In RAP | 10 |
| 4.2 Additional Remediation Options Consideration..... | 11 |
| 4.3 Revised Remedial Strategy | 12 |
| 5 Remediation Acceptance Criteria and Validation Plan..... | 16 |
| 5.1 Remediation Acceptance Criteria..... | 16 |
| 5.2 Validation of Soil Remediation Works..... | 18 |
| 5.3 Application of RAC | 19 |
| 5.4 Groundwater Management | 20 |
| 6 Pre-Remedial Documentation | 21 |
| 6.1 Pre-Remedial Studies | 21 |

| | | |
|--------|--|----|
| 6.1.1 | Geotechnical and Dewatering Assessments | 21 |
| 6.2 | Pre Remediation Works Plans | 21 |
| 6.2.1 | Remediation Health and Safety Management Plan (RHSMP) | 21 |
| 6.2.2 | Dilapidation Studies..... | 22 |
| 6.2.3 | Remediation Works and Validation Plan (RWVP)..... | 22 |
| 6.3 | Pre-Remediation Approvals | 22 |
| 7 | Site Establishment and Configuration of Operations | 24 |
| 7.1 | Macdonaldtown | 24 |
| 7.2 | Chullora | 27 |
| 8 | Pre-Treatment Requirements..... | 29 |
| 8.1 | Tar Wells and Northern Gasholder..... | 29 |
| 8.2 | Free Tar and Impacted Fill | 29 |
| 9 | Considerations for the Water Treatment System | 32 |
| 9.1 | Rates of water requiring treatment..... | 32 |
| 9.2 | Anticipated Influent Quality and Required Effluent Quality | 34 |
| 9.3 | Required Effluent Quality | 34 |
| 9.4 | Details of Trialled WTS | 38 |
| 9.5 | WTS Waste..... | 38 |
| 10 | Considerations for Treatment of Contaminated Material..... | 40 |
| 10.1 | Treatment Using Cement Stabilisation (Chullora) | 40 |
| 10.2 | Treatment Using Bioremediation | 41 |
| 10.3 | Off Site Treatment..... | 42 |
| 10.4 | Storage Volume | 42 |
| 10.5 | Treatment Rates | 43 |
| 11 | Considerations for Material Disposal | 44 |
| 11.1 | Treatment Using Bioremediation | 44 |
| 11.2 | Treatment Using Cement Stabilisation | 44 |
| 12 | Indicative Program | 45 |
| 13 | Limitations | 47 |
| A4.5 | Develop a Decision Rule..... | 9 |
| A6.1.3 | Decontamination of Soil Sampling Equipment | 14 |
| A6.1.4 | Stabilisation Testing Procedure..... | 14 |
| A9.5 | Water Treatment Trial..... | 39 |

Figures

| | |
|-----------|---|
| Figure 1 | Site Location (Macdonaldtown) |
| Figure 2 | Current Macdonaldtown Site Plan |
| Figure 3 | Site Areas |
| Figure 4 | Location of Historical Gasworks Infrastructure |
| Figure 5 | Areas of Observed Seepage in Fill |
| Figure 6 | Remediation Stage I Works |
| Figure 7 | Remediation Site Configuration |
| Figure 8 | Remediation Stage II Works |
| Figure 9 | Remediation Stage III Works |
| Figure 10 | Chullora Treatment Site Setup |
| Figure 11 | Components of Water Treatment System |
| Figure 12 | Estimated Extent of Treatment Options (0-2 m below ground level) |
| Figure 13 | Estimated Extent of Treatment Options (2-4 m below ground level) |
| Figure 14 | Estimated Extent of Treatment Options (greater than 4 m below ground level) |
| Figure 15 | Aerial View of Potential Off-Site Treatment Area |

Table

| | |
|---------|--|
| Table A | Remedial Strategy – Areas, Extents and Likely Treatment Requirements |
|---------|--|

Appendices

| | |
|------------|---|
| Appendix A | Pre-Remedial Trials |
| Appendix B | <i>'Site Specific Leachability Criteria, former Macdonaldtown Gasworks, Burren Street Erskineville'</i> JBS Environmental Pty Ltd (2010a) |
| Appendix C | JBS Letter <i>'Results of Water Treatment Trial, former Macdonaldtown Gasworks, Burren Street Erskineville'</i> JBS Environmental Pty Ltd (2010b) |
| Appendix D | Sydney Water Trade Waste Acceptance Criteria Brochure |
| Appendix E | DECC Immobilisation Technical Note 1 |
| Appendix F | Laboratory Certificates of Analysis |
| Appendix G | Tabulated Quality Control Results |
| Appendix H | Test Pit Logs |
| Appendix I | Pump Test Field Sheets |
| Appendix J | Results of Geotechnical Testing and Benchscale Stabilisation Trial |

List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

- As Arsenic
- B(a)P Benzo (a) pyrene
- BTEX Benzene, Toluene, Ethylbenzene and Xylenes
- Cd Cadmium
- Cr Chromium
- Cu Copper
- DECCW NSW Department of Environment, Climate Change and Water
- DoP NSW Department of Planning
- DP Deposited Plan
- DQO Data Quality Objectives
- EMP Environmental Management Plan
- EPA New South Wales Environment Protection Authority
- Hg Mercury
- HIL Health Based Investigation Level
- LOR Limit of Reporting
- MAH Monocyclic Aromatic Hydrocarbon
- Ni Nickel
- NoW NSW Office of Water
- OCP Organochlorine Pesticide
- PAH Polycyclic Aromatic Hydrocarbons
- Pb Lead
- PIL Phytotoxicity Based Investigation Level
- PCB Polychlorinated Biphenyls
- PQL Practical Quantitation Limit
- QA/QC Quality Assurance/Quality Control
- RPD Relative Percentage Difference
- RWVP Remediation Validation Work Plan
- SAR Site Audit Report
- SAS Site Audit Statement
- TPH Total Petroleum Hydrocarbons (C₆-C₉ and C₁₀-C₃₆)
- Zn Zinc

Executive Summary

Introduction

JBS Environmental Pty Ltd was engaged by Incoll Management Pty Ltd (Incoll) on behalf of the Rail Corporation NSW Environmental Projects Unit (RailCorp) to prepare a Remedial Strategy for the proposed remediation of the former Macdonaldtown gasworks, located at Burren Street, Erskineville, NSW. The site is identified as part Lot 50 in Deposited Plan 1001467 and occupies an approximate area of 7750 m².

Background

Several contamination investigations have been completed at, or near, the site which have identified soil and groundwater contamination caused by historic site activities. In August 2000 the Site was declared by the NSW Environment Protection Authority (EPA) to pose a Significant Risk of Harm (SRoH) to human health and the environment. Remediation works will be required on the site to remove and /or manage the source of contamination and to render the site suitable for ongoing industrial land use.

A Remedial Action Plan (RAP) was prepared for the site and documented in '*Remedial Action Plan, Former Macdonaldtown Gasworks, Burren Street, Erskineville*, (CH2M Hill 2007). A Site Audit Report (SAR) was subsequently prepared on the RAP by ENSR Aecom and documented in '*Site Audit Report on Remedial Action Plan, Former Macdonaldtown Gasworks Site, Burren Street, Erskineville, NSW*, (ENSR Aecom 2008) which concluded that, in the opinion of the appointed Site Auditor, "...the remediation approach presented in the RAP could be implemented ...in order for the site to be made suitable for the future use for rail-related activities".

An Environmental Assessment (EA) is being prepared for submission to gain approval for the remedial works under Part 3A (Major Infrastructure and Other Projects) of the *Environmental Planning and Assessment Act 1979*. Consideration as part of the EA process, of the full range of project impacts (e.g. on the heritage significant items present on site, and to residents in the surrounding area), has determined that the range of remediation technologies specified in the RAP may not be ideally suited to the project, despite being technically feasible.

Additionally, since completion of the RAP and SAR, RailCorp has advised that a section of land contained within the Chullora Railway Workshops, located on Worth Street, Chullora, NSW is available for treatment of soil excavated from the site.

Objectives

Further to the RAP prepared for the site, the objectives of this Remedial Strategy document are to:

- refine the consideration of available/suitable remediation methodologies, based on additional information obtained since the completion of the RAP and SAR;
- outline RailCorp's requirements for each identified likely applicable methodology;
- facilitate a thorough assessment of available remedial options; and
- provide additional site and contaminant data to commence detailed remediation planning.

Consideration of RAP and Additional Remedial Options

A re-assessment was undertaken of the preferred remedial methods provided in the RAP and consideration was also given to alternate remedial methods that could be applied to the site. The re-assessment was primarily based on newly available information on the likely project constraints and requirements, commissioned as part of the EA process.

As part of the assessment of possible options, *in-situ* chemical oxidation and thermal treatment, listed in the preferred remedial methods in the RAP, were determined to not be appropriate for the project. *Ex-situ* remediation of material by thermal treatment, while being technically suitable, was ultimately assessed to be cost prohibitive given the anticipated volume requiring treatment. Remediation of impacted areas by *in-situ* chemical oxidation was originally considered given the lesser need for widescale site disturbance, but was ultimately considered to be poorly suited to the tight clay and shale subsurface present, and also poorly suited to remediation of free tar impacted source zones as identified on the site.

Based on the range and distribution of contamination present, the assessment concluded that no single remedial method provided a solution that was cost effective, timely and appropriate to the site as a whole. Rather, based on the characteristics of the material encountered, the assessment identified four methods that could be used in combination on the site. The four applicable methods comprising the remedial strategy are summarised in **Table 1** below, along with the corresponding suitable materials.

Table 1: Summary of remedial strategy and suitable materials

| Remediation Method | Likely Suitable Materials |
|--|---|
| Excavation and off-site disposal of untreated material | Most cost effective on material unlikely to achieve validation criteria through treatment in a timely manner AND classed as 'Restricted Solid Waste' or lower for off-site disposal |
| Excavation and treatment of material for on-site reuse | Most cost effective on material likely to achieve validation criteria through treatment in a timely manner. Onsite treatment method = bioremediation |
| Excavation and treatment of material for off-site disposal | Most cost effective on material unlikely to achieve validation criteria through treatment in a timely manner AND classed as 'Restricted Solid Waste' or higher for off-site disposal. Material may be treated on site or off site. Onsite treatment method = bioremediation, Off-site treatment method = cement stabilisation |
| <i>In-situ</i> capping of impacted material | Only acceptable where excavations have reached their practicable extent |

The two treatment methods considered most appropriate for the project are bioremediation and cement stabilisation. Based on the anticipated quantities of material and indicative program of works, the configuration of treatment works will involve bioremediation of material on the Macdonaldtown site and cement stabilisation works on the off-site treatment area.

Pre Remediation Documents and Requirements

Implementation of the remedial strategy will also require endorsement of the site specific leachability criteria documented in '*Derivation of Site Specific Leachability Criteria – Former Macdonaldtown gasworks, Burren Street, Erskineville, NSW*' JBS Environmental Pty Ltd, by the appointed Site Auditor.

Additionally, prior to the commencement of remedial works, the following documents will require completion:

- Structural Engineers assessment of retaining structures required around Southern Gasholder;
- Geotechnical specification for treated material to be reused on site;
- Dilapidation Studies on adjacent structures as required;
- A Remedial Health and Safety Management Plan (RHSMP); and
- A Remedial Works Validation Plan (RWVP).

1 Introduction

1.1 Introduction

JBS Environmental Pty Ltd (JBS) was engaged by Incoll Management Pty Ltd (Incoll) on behalf of the Rail Corporation NSW Environmental Projects Unit (RailCorp) to prepare a Remedial Strategy, as prescribed in this document, for the proposed remediation of the former Macdonaldtown Gasworks, located at Burren St, Erskineville, NSW (the site).

Several contamination investigations have been completed at or near the site, which have identified soil and groundwater contamination caused by historic site activities. In August 2000 the Site was declared by the NSW Environment Protection Authority (EPA) to pose a Significant Risk of Harm (SRoH) to human health and the environment. Remediation works will be required on the site to remove and /or manage the source of contamination and to render the site suitable for ongoing industrial land use.

A Remedial Action Plan (RAP) was prepared for the site and documented in *'Remedial Action Plan, Former Macdonaldtown Gasworks, Burren Street, Erskineville, (CH2M Hill, 2007)*. A Site Audit Report (SAR) was subsequently prepared on the RAP by ENSR Aecom and documented in *'Site Audit Report on Remedial Action Plan, Former Macdonaldtown Gasworks Site, Burren Street, Erskineville, NSW, (ENSR Aecom, 2008)* which concluded that, in the opinion of the appointed Site Auditor, *"...the remediation approach presented in the RAP could be implemented ...in order for the site to be made suitable for the future use for rail-related activities"*.

An Environmental Assessment (EA) has been prepared for the remedial works under Part 3A (Major Infrastructure and Other Projects) of the *Environmental Planning and Assessment Act 1979*. Consideration as part of the EA process of the full range of project impacts (e.g. on the heritage significant items present on site, and to residents in the surrounding area), has determined that the range of remediation technologies specified in the RAP may not be ideally suited to the project, despite being technically feasible.

Additionally, since completion of the RAP and SAR, RailCorp has advised that a section of land contained within the Chullora Railway Workshops, located on Worth Street, Chullora, NSW is available for treatment of soil excavated from the site.

1.2 Objectives

In light of these additional project considerations, this Remedial Strategy document has been prepared to:

- refine the consideration of available/suitable remediation methodologies, based on additional information obtained since the completion of the RAP and SAR;
- outline RailCorp's requirements for each identified likely applicable methodology;
- facilitate a thorough assessment of available remedial options; and
- provide additional site and contamination data to commence detailed remediation planning.

This Remedial Strategy document provides a brief summary of the characterisation of site contamination as presented in previous investigations completed on the site. Additionally, this document contains the results of additional field investigations conducted by JBS to facilitate planning for remediation of the site, including a water treatment trial; pump tests

on shallow wells; assessment of clay content in soils; analysis of samples for leachable concentrations of contaminants; and a cement stabilisation trial.

1.3 Structure of the Document

This document has been prepared as an addendum to the RAP (CH2M Hill, 2007) prepared for the site. It should be read in conjunction with the RAP. For ease of use and to avoid unnecessary repetition, where no change is proposed to the strategy, reference is made to the relevant section in the original RAP. The purpose of this document is only to provide further information on the options for remediation of the site, and is not intended to address all the requirements of a RAP as specified in '*Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*' (NSW EPA, 1997).

This document is structured as follows:

- Section 2 provides a brief summary of site details and the contamination status;
- Section 3 details RailCorp's objectives for the remediation and required environmental performance and details the geotechnical, heritage and other major constraints of the project;
- Section 4 summarises the remediation approach recommended in the Remedial Action Plan prepared for the site, assessment of other credible options and a revised remedial strategy incorporating these additional options;
- Section 5 summarises the Remediation Acceptance Criteria to be adopted as part of the revised remediation strategy and the validation sampling plan where deviations from the RAP specified program may be acceptable;
- Section 6 details works required prior to the commencement of remediation;
- Section 7 summarises the pre-treatment requirements for remedial works;
- Section 8 details the consideration for management of perched groundwater in fill and use of a Water Treatment System during the remediation works;
- Section 9 details considerations for treatment of soil;
- Section 10 details considerations of off-site disposal of untreated and treated soil; and
- Section 11 details the anticipated remedial timeframe.

2 Summary of Site Information

On the basis of the complete environmental data set available for the site, a site conceptual model has been prepared and is summarised in the following sections. Full details on site description, history and previous results are provided in previous reports.

Figures showing site location, area and sampling locations are provided as **Figures 1 to 5**.

2.1 Geology

Review of the Sydney Geological Series Sheet 9130 (C. Herbert, 1999) indicates that the geological formation underlying the Site is the Wianamatta Group Ashfield Shale comprising black to dark-grey shale and laminite.

Previous investigations on the site as reported in CH2M Hill (2007b) have identified three general soil types on the site including fill materials, natural soils and tar impacted fill and natural soils. Each is described in more detail following.

2.1.1 Fill Material

Based on the findings of previous investigations as reported in CH2M Hill (2007b), the fill materials identified at the Site have been grouped as follows:

- Ash and Coke Gravels – observed across the majority of the Site in surface and near surface layers from ground level to approximately 0.5 m depth;
- Reworked Clays – observed in subsurface layers in some site areas between 0.5m depth to approximately 1.5 m depth. This material was observed in the majority of areas as general filling;
- Sands and Gravels – observed in subsurface layers in some site areas between 0.5m depth to approximately 1.5 m depth. This material was observed in the North East, South Central and Gas Purifier areas;
- Gravelly Sand and Clay with Minor Ash – observed in surface and subsurface layers in some site areas from ground level to approximately 3.5 m depth. This material was predominantly observed in the South West area of the Site as general filling; and
- Gravel, Sand and Demolition Wastes – observed in the fill embankment of the Retaining Wall and inside the annulus of the Northern Gasholder. This material was observed to mainly consist of sandy gravels and some ash gravels. It also consisted of demolition wastes and rubble including bricks, metal pipes, tiles, fibrous cement sheeting and Asbestos Containing Material (ACM) and other building rubble in a gravelly sand matrix.

2.1.2 Natural Soil

Based on the findings of previous investigations as reported in CH2M Hill (2007b), the natural soil materials identified at the Site have been grouped as follows:

- Silty Clay – observed generally from between 1.5 m depth to approximately 2.5 m depth. This material exists across the majority of Site areas. This horizon was predominantly a saturated zone, which sustained the perched groundwater system;
- Red/Grey Mottled Clay – observed generally from between 2.5 m depth to approximately 4.0-6.0 m depth. The soil profile is consistent with a Red

Podzolic soil, being moderately to highly plastic, stiff to very stiff, moist and mottled red/grey; and

- Weathered Shale – observed underlying the natural clay. This material grades from extremely weathered to moderately weathered at depths of up to 10 m depth. At depths beyond 6 m, fracturing of the material is common.

2.1.3 Tar Impacted Fill Material and Natural Soils

A number of areas of fill/natural soil materials were observed to be impacted by tar and were summarised in CH2M Hill (2007b). The tar impacts have been categorised as follows:

- Soil/fill impacted by free tar – consisting of soil and fill materials impacted to a high degree with black ooze, highly odorous, liquor type material;
- Tarry soils – consisting of soil and fill materials with minor tar impacts and moderate odours; and
- Dark Stained Impacts – this material was observed as dark brown to black staining in the deep soils and Weathered Shale within the soil pores and shale fractures zones underneath the Southern Gasholder. This material was also moderately odorous.

Soil/fill impacted by free tar was reported by CH2M Hill (2007b) to be predominately associated with former gasworks infrastructure, which include the:

- Tar Wells – shallow subsurface and deep natural soils immediately adjacent to these two structures;
- Northern Gasholder – deep natural soils immediately adjacent to the brick base annulus; and
- Old gasworks pipework – inside pipes and immediately adjacent fill/natural soils.

Tarry soils are present in localised areas, and given free tar have not migrated significant distances from gasworks infrastructure, there appears to be spatial separation between former gasworks infrastructure and tarry soils. Notably there is a layer of highly impacted soils (free tar impacts) surrounding these structures followed by less impacted tarry soils. Tarry soils are located in the following areas:

- Tar Wells, Northern Gasholder and Gas Purifier – soil and fill surrounding these source areas in surface/subsurface fill and deeper natural soils;
- Retort – fill and deep soil across the majority of this area;
- Gas Purifier – Sandy fill and deeper soils; and
- Localised impacted fill – observed in one localised pocket in the Northeast Area.

Dark stained impacts were also reported in CH2M Hill (2007b) to be associated with deep soils below the base of the annulus of the southern gasholder. The dark stained impacts were considered likely to be secondary sources within the strata in localised areas associated with the Southern Gasholder.

2.2 Hydrogeology

The groundwater system in the proximity of the site was reported in CH2M Hill (2007b) as existing as a shallow perched groundwater layer and a deep bedrock layer. The shallow groundwater exists within fill materials and silty clay above the natural clay (as shallow as

1m below ground surface), and the deeper groundwater exists within the Ashfield Shale bedrock under semi-confinement.

The groundwater flow direction was reported in CH2M Hill (2007b) to be toward the south/southeast for both shallow and deep groundwater systems. However, it was considered that flows were likely to be influenced by underground structures, including the gasholders annuli and underground waste pits and services associated with gasworks sites. It is possible there may be some interconnectivity between the shallow and deep groundwater systems given the similar direction of flow gradient.

Flow velocities within the shallow groundwater were estimated in CH2M Hill (2007b) to be 6.2-13.7 m/year, while within the deep groundwater are 12.2-36.5 m/year. However, these values do not correlate with the lateral extent of the plume, given that gasworks operations began over 100 years ago. With respect to estimated flow velocities for shallow groundwater it is noted that this layer is likely to be a local layer only and, based on review of test pit logs, flow characteristics are likely controlled by layers of high permeability (*i.e.* gravel, sand or poorly compacted materials) interdispersed between predominantly clay fill.

Based on the results of laboratory analysis of groundwater samples collected from on site and off site wells, the SKM (2006) report stated that:

"The shallow plume appears to begin near the northern boundary of the Former Cleaning Shed and Gasworks areas and extend in a south-west direction of some 75m. The data indicate that the down-gradient edge of the plume is located at the East Hills Line at the southern edge of the site boundary. The lateral extent of the plume appears to be confined in the west to the sewer main located adjacent to the rear boundary of the residential properties, while to [sic] the plume is estimated to extend 50m to the east of the former tank area.

The extent of the middle to heavy-end hydrocarbon plume in the deeper aquifer appears to be larger than the shallow aquifer. While the northern, eastern and western boundaries of the plume are similar to the shallow plume, the down-gradient extent of the plume appears to cover a distance of some 160m from the former tar tank area, with its edge near the southern boundary of railway land along Railway Parade. The data indicate that the deep aquifer plume is located entirely on railway owned [sic] land."

Based on the assumption that the gasworks operations commenced more than 100 years ago, the RAP (CH2M Hill, 2007) notes that the flow velocity values provided in SKM (2006) do not correlate with the measured lateral extent of the plume (reported in the above quotation to extend 75m downgradient and 50m laterally in shallow groundwater, and 160 m downgradient in deep groundwater). It is also noted that the SKM (2006) report acknowledges the same point that, based on the measured extent of the shallow and deep groundwater plumes migrating from the site, the permeability rates estimated from slug tests appear to be an order of magnitude greater than actual rates as suggested by the dimensions of the plume. No explanation was provided for the difference in these permeability rates.

3 Remediation Objectives and Requirements

3.1 Overview

The RAP (CH2M Hill 2007) states that RailCorp wish to remediate the Site such that the following long term objectives can be met, including:

- Removal of the health risks to future site users;
- Removal of the risks to environmental receptors; and
- Allow the beneficial use of the Site for rail related activities.

3.2 Regulations and Approvals

Approval for the remedial works are being sought under Part 3A (Major Infrastructure and Other Project) of the *Environmental Planning and Assessment Act 1979*. Adherence must be made to any requirements placed on the works as part of that Approval.

3.3 RAP and SAR

The remedial works must be undertaken in accordance with the requirements of the RAP (CH2M Hill, 2007) and SAR (ENSR Aecom, 2008) prepared for the site.

3.4 Specific RailCorp Requirements

3.4.1 Requirements Near Site Boundaries

RailCorp has indicated the following requirements with regard to excavations near site boundaries:

- The recommendations for structural retentions along the western site boundary, to be specified by the RailCorp appointed Structural Engineer, must be implemented. Use of batters along this boundary may restrict the removal of impacted material, and is considered inadequate at this end of the site given its proximity to both the former Northern Gasholder source area and the neighbouring Burren Street residences; and
- Temporary batters, constructed in accordance with the recommendation provide in the Geotechnical Report, may be used along the northern, eastern and southern boundaries, provided it will not restrict the progress of excavations or adversely impact structures on adjacent properties.

3.4.2 Operational Environmental and Safety Requirements

Any remediation approach undertaken at the site must satisfy the requirements of RailCorp's environmental and safety policies.

RailCorp's Environmental Policy requires commitment to:

- Minimising use of natural resources;
- Adhering to the principles of ecologically sustainable development;
- Complying with applicable environmental legislation and regulations;
- Effectively managing environmental impacts; and
- Implementing environmental risk management at operational and strategic levels to minimise environmental impacts.

RailCorp's Safety Policy requires commitment to:

- Provide employees, contractors and labour-hire employees a safe environment from injury and workplace-related illnesses; and

- Manage risks proactively to minimise incidents.

Remediation methods applicable to the site are discussed in further detail in **Section 5**, and **Table 5.2** includes the environmental performance requirements of each remediation option to comply with RailCorp's environmental and safety policies.

3.4.3 Closure Requirements

Macdonaldtown

At the completion of remediation works RailCorp's long term objectives for the site should be met. The site should be in a condition such that a Site Audit Statement (SAS) can be prepared declaring the site suitable for commercial/industrial land use. Any Environmental Management Plan (EMP) required to achieve the long term objectives, and preparation of the SAS, should limit the commitments placed on RailCorp in terms of the scope of on-going works and restrictions on future use. RailCorp must be consulted prior to finalising the requirements of any EMP for the site.

At the completion of remedial works, a network of monitoring wells is also required on the site, sufficient to enable the completion of a program of Monitored Natural Attenuation (MNA) on the site. MNA will be undertaken in accordance with Section 10.3 of the RAP (CH2M Hill 2007) or an Auditor endorsed Groundwater Management Plan for the site.

Chullora

A baseline assessment of the treatment area to be used within the Chullora Railway Workshops must be completed prior to commencement comprising investigation of the potential chemicals of concern (PCOC) in soil and groundwater in accordance with relevant guidelines. The scope of the groundwater investigation as part of the baseline assessment should be appropriate to the nature of the proposed treatment works and their likelihood to result in contamination reaching the water table. At the completion of works, the treatment area must be restored to its pre-treatment works condition. A post treatment assessment of the area, of the same scope as the baseline assessment, will therefore be required to demonstrate that no adverse impacts have occurred or to determine the scale of restoration works.

3.5 Heritage Requirements

Archaeological assessment was undertaken on the site by City Plan Heritage and documented in the report '*Macdonaldtown Gasworks Archaeological Test Excavation Report for RailCorp*' August 2010 Ch10-009. The recommendations of the report pertinent to the remediation works include:

- machine excavation around the State heritage listed Southern Gasholder, is to be adequately planned and supervised to avoid any damage to the structure;
- in the Northern Gasholder – providing the bricks forming the annulus are not contaminated, where possible, the bricks should remain *in-situ*. Should removal of the bricks be required to remediate contamination, the removal is to be undertaken with care, so that if possible, the bricks can be cleaned and reinstated. Archaeological monitoring to record the removal, the depth of the annulus and its general construction details should be undertaken during excavation and removal of the annulus. Archival recording of the top of the annulus should be carried out prior to any removal - with minimal excavation recommended. If the bricks need to be removed and cannot be reused, the northern gasholder should be represented in some similar form;

- Prior to full scale remediation works an archaeological excavation in the area of the Retort House should be carried out for evidence of the retorts. This would entail machine stripping, hand excavation and recording of the uncovered features to Heritage Branch standards; and
- Prior to full scale remediation works, an archaeological excavation in the area probably containing the footprint of the superintendent's residence should be carried out to record the structural layout of the building. This would entail machine stripping, some hand excavation and recording of the uncovered features to Heritage Branch standards.

3.6 Geotechnical Requirements

Geotechnical testing was undertaken on the site by Pells Sullivan Meynink (PSM) and documented in the draft report '*Macdonaldtown Gasworks Remediation Project Geotechnical Investigation*' July 2010 PSM1444.R1. A summary of recommendations relevant to the completion of the bulk of excavation works is provided below, however, the original report should be referred to for full detail on earthworks and reinstatement requirements.

The report noted that excavation of fill on the site can be undertaken using conventional earth moving equipment, while rock hammers may be required for excavation of shale.

Table 3.1 summarises the recommendations made in relation to acceptable temporary batter slope angles.

Table 3.1: Recommended Temporary Batter Slope Angles

| Distance between crest and structure | Geotechnical unit | Maximum batter height | | |
|--------------------------------------|-------------------|-----------------------|----------|----------|
| | | <4 m | <6 m | <8 m |
| More than the batter height | Fill | 1H: 1V | 1.5H: 1V | 2H: 1V |
| | Residual clay | 1H: 1V | 1H: 1V | 1.5H: 1V |
| Less than the batter height | Fill | 2H: 1V | 2H: 1V | 2.5H: 1V |
| | Residual clay | 2H: 1V | 2H: 1V | 2H: 1V |

The report also noted that:

"Temporary batters where structures are located within 1.0 m of the crest should be inspected by a suitably qualified geotechnical engineer during excavation."

"Staging of construction to limit the plan extent of the excavation may be able to be adopted to result in localised steeper batter slopes. If such steeper slopes are required additional specific advice should be sought."

The remediation works will need to ensure these slopes are maintained at all times. It is noted that the areas of identified contamination may extend below 8 m, and may also extend up to the site boundary. Provision should therefore be made for the installation of retaining structures to support the walls of the excavation in these areas.

The report also states that fill material present on the site, from a geotechnical perspective only, may be developed "...to allow placement of the majority of the excavated and remediated material as engineered fill". Should treated material satisfy contaminant requirements for reuse on site, it will be necessary to demonstrate that the treated material is suitable from a geotechnical perspective for use as engineered fill on land to be used for railway purposes.

The design of the remedial works should also take into consideration any advice provided from the appointed Structural Engineer in relation to requirements for ground stabilisation prior to and during excavation, particularly in the vicinity of the gasholders and underground services on the site.

3.7 Air Emissions Requirements

An assessment of air quality impacts was undertaken by JBS and is documented in the report titled '*Air Quality Assessment, Remediation of Former Macdonaldtown Gasworks*', Revision F, Reference 40913- 15136, dated August 2011 (JBS 2011a).

A summary of recommendations relevant to the completion of the bulk of excavation works on the Macdonaldtown site is provided below in **Table 3.2**, however, the original report should be referred to for full detail on requirements of dust and odour suppression and monitoring:

Table 3.2 Summary of Required Air Quality Controls

| Site Area / Activity | Proposed Air Quality Control |
|---------------------------------|--|
| Surface soil Excavations | Reduction of exposed <i>in-situ</i> materials to 400m ² Dust suppression by hourly watering of all surfaces |
| Retaining Wall fill materials | Reduction of exposed <i>in-situ</i> materials to 25m ² Dust suppression by hourly watering of all surfaces |
| Former gasworks area | Enclosure of excavations works, minimum required extent of enclosure shown on Figure 7 Treatment of enclosure emissions prior to discharge. |
| Soil treatment - bioremediation | Enclosure of treatment works Treatment of enclosure emissions prior to discharge |
| Haulage Road use | Dust suppression by hourly watering of all surfaces |
| Groundwater | Relocation of water treatment plant to central section of the site as far removed from the Burren Street site frontage as possible, recommended location shown on Figure 7 Enclosure of any areas used for splash filling of water treatment plant Ventilation from water treatment plant to be filtered Prevention of groundwater accumulating within excavations on the site. This may be achieved by pumping water out of the excavations as it infiltrates or if possible by pumping groundwater from adjacent wells |

An assessment of air quality impacts on the alternate treatment site was also undertaken by JBS and is documented in the report titled '*Air Quality Assessment, Remediation of Former Macdonaldtown Gasworks – Chullora Material Receipt Facility*', Revision F, Reference 40913- 15137, dated June August (JBS 2011b).

The recommendations provided in JBS (2011b) relevant to the completion of soil treatment works, were that:

- All soil treatment works on the site be undertaken within temporary enclosure, including the storage of soils over the curing period, and that it be operated under negative pressure conditions to enable extraction and treatment of air emissions from the enclosure; and
- "*The extent of exposed coal tar impacted soils is to be minimised to a surface area of 150m². Other coal tar impacted soils stockpiled / bioremediated on the site are to be covered to prevent odour emissions*".

The original report should be referred to for full detail on requirements of dust and odour suppression and monitoring.

4 Remedial Strategy Refinement

4.1 Extent of Soil Remediation and Strategy Proposed In RAP

The anticipated extent of remediation as specified in CH2M Hill (2007) is reproduced in **Table 4.1** following. Active remediation was considered by CH2M Hill to be only required for the free tar and impacted fill and soils on site. Requirements for groundwater remediation were discussed in Section 5.6 of the RAP. Reference should be made to **Figures 3** and **4** for the location of each nominated remediation area.

The proposed remediation is a source removal approach, with the intention that the excavation of source material in each area be completed to the extent practicable. Where heritage or geotechnical constraints are encountered such that the practicable limit is unable to remove the full extent of source material, then an *in-situ* management strategy may be implemented in these areas subject to endorsement by RailCorp and the Site Auditor. Areas where such constraints may be encountered include soil at depth in the vicinity of both the western site boundary and the former northern gasholder. Any strategy to contain source material in-situ will need to be compliant with the requirements of 'Guidelines for the Assessment of On-site Containment of Contaminated Soil' (Australian and New Zealand Environment and Conservation Council, 1999).

The extent of remediation proposed was considered sufficient to protect the health of the future site users by removing or controlling the identified unacceptable health risks.

The contaminants that were considered to drive the health risks were the known carcinogens including benzene and B(a)P. These contaminants were considered to have a direct relationship to the tar source material and the ash/coke surface fill. Therefore, remediation of the tar sources and the ash/coke fill was proposed to mitigate the health risks these contaminants pose to the receptors. This is intended to mitigate the risks by reducing the potential for direct exposure.

Remediation of the tar sources (*e.g.* those accumulated in the Northern Gasholder annulus and the Tar Wells) and remediation of tarry impacted soils (*e.g.* from within the Retort and Gas Purifier areas) was also considered necessary to protect the environmental values of the site groundwater by a reduction in contaminant mass.

Table 4.1: Summary of Remedial Extent and Strategy (as adapted from Table 5.1, CH2M Hill, 2007)

| Remediation Area | Impacted Area | Estimated Volume (m ³) | Description | RAP Preferred Remedial Approach |
|--------------------|---------------------------------|------------------------------------|----------------------------------|---|
| Tar wells | Base annulus and immediate area | 1000 | Soil / fill impacted by free tar | Stabilisation for off-site disposal |
| | Tar well contents | 100 | Tar sludge | Off-site disposal as liquid waste with pre-treatment as required to improve handling |
| Northern gasholder | Base annulus and immediate area | 2100 | Soil / fill impacted by free tar | Stabilisation for off-site-disposal to landfill, with pre-treatment as required to improve handling |
| | Gasholder contents | 640 | Impacted water | Off-site disposal as liquid waste |
| | | 320 | Tar sludge | Off-site disposal as liquid waste with pre-treatment as required to improve |

| Remediation Area | Impacted Area | Estimated Volume (m ³) | Description | RAP Preferred Remedial Approach |
|----------------------|------------------------------|------------------------------------|--|---|
| | | | | handling |
| | Buried wastes inside annulus | 1900 | Demolition materials | Off-site disposal as 'Asbestos/Industrial' ¹ (<i>i.e.</i> with pre-treatment to remove free tar or oversize component) |
| Former gasworks area | Shallow fill / soils | 9225 | Tarry soils – fill and natural clays | Stabilisation for off-site-disposal to landfill, with pre-treatment as required to improve handling |
| | Deeper soils | 2375 | Tarry soils – natural clays and weathered shales | Stabilisation for off-site-disposal to landfill, with pre-treatment as required to improve handling |
| | TP16 Hotspot | 115 | Tarry soils – fill and natural clays | Stabilisation for off-site-disposal to landfill, with pre-treatment as required to improve handling |
| Site surfaces | | 2950 | Ash and coke gravels | Off-site disposal to landfill |
| Retaining wall | | 1765 | Gravel sand and demolition wastes | Off-site disposal to landfill. With processing (<i>i.e.</i> segregating oversized component) recycling or beneficial reuse may also be an option |
| Hotspots | BH14 | 100 | Fill and natural clays | Off-site disposal to landfill |
| | MW13s | 140 | Fill | Offsite disposal to landfill |
| | MW04s | 100 | Fill and natural clays | Off-site disposal to landfill |
| Pipework | Varying across site | Unknown | Tar / scrap metal | Treatment to remove tar from pipework. Tar to be disposed to landfill, scrap metal possibly disposed to landfill as demolition waste |

4.2 Additional Remediation Options Consideration

Further to several detailed studies on the implementation of the RAP, it was decided that based on the range and volume of materials requiring remediation on the site, the proposed strategy should incorporate alternate options for remediating the site to those provided in the RAP. JBS was requested to review the potential for the following additional treatment/management options to be incorporated into the remedial approach for the site:

- Excavation of soil for ex-situ treatment by bioremediation for on site reuse; and
- *In-situ* capping of impacted materials.

An assessment of the technical and overall suitability was undertaken for the additional options listed above, and is summarised in **Table 4.2**.

¹ Asbestos Contaminated Special Waste or Restricted Solid Waste under DECC 2008

Each of the possible remedial options has been assessed for each of the three contamination issues requiring assessment on the site, namely:

- Free tar present in disused infrastructure, in fill, soils and shale underlying the site;
- Ash and tar materials considered to be acting as source material for unacceptable levels of groundwater contamination; and
- Asbestos impact potentially contained throughout fill materials on the site

Table 4.2 also includes assessment of two of the four remedial methods preferred in the RAP (CH2M Hill 2007), specifically:

- excavation and off-site disposal of soil without treatment; and
- excavation and off-site stabilisation of soil for off site disposal.

No further consideration was made of chemical oxidation of material and thermal treatment for off site disposal, despite their inclusion as preferred methods in the RAP (CH2M Hill, 2007). Chemical oxidation was considered unsuited to the particular contaminants of concern, and to the low permeability of the soil and rock units underlying the site. Thermal desorption was considered technically feasible, but less suitable, given the proximity of sensitive land uses to the site (and potential off site treatment location), and likely costs for the low volume of material to be treated.

4.3 Revised Remedial Strategy

Based on the additional data and review of other likely remedial methodologies, the remedial strategy for the site is presented in the following flowchart (**Flowchart 4.1**) and summarised in **Table 4.3**.

Table 4.3: Summary of Remedial Strategy and Suitable Materials

| Remediation Method | Likely Suitable Materials |
|--|---|
| Excavation and off-site disposal of untreated material | Most cost effective on material unlikely to achieve validation criteria through treatment in a timely manner AND classed as 'Restricted Solid Waste' or lower for off-site disposal |
| Excavation and treatment of material for on-site reuse | Most cost effective on material likely to achieve validation criteria through treatment in a timely manner. Onsite treatment method = bioremediation |
| Excavation and treatment of material for off-site disposal | Most cost effective on material unlikely to achieve validation criteria through treatment in a timely manner AND classed as 'Restricted Solid Waste' or higher for off-site disposal. Material may be treated on site or off site. Onsite treatment method = bioremediation, Off-site treatment method = cement stabilisation |
| <i>In-situ</i> capping of impacted material | Only acceptable where excavations have reached their practicable extent |

Further consideration each element of the Remedial Strategy is provided in **Table A**.

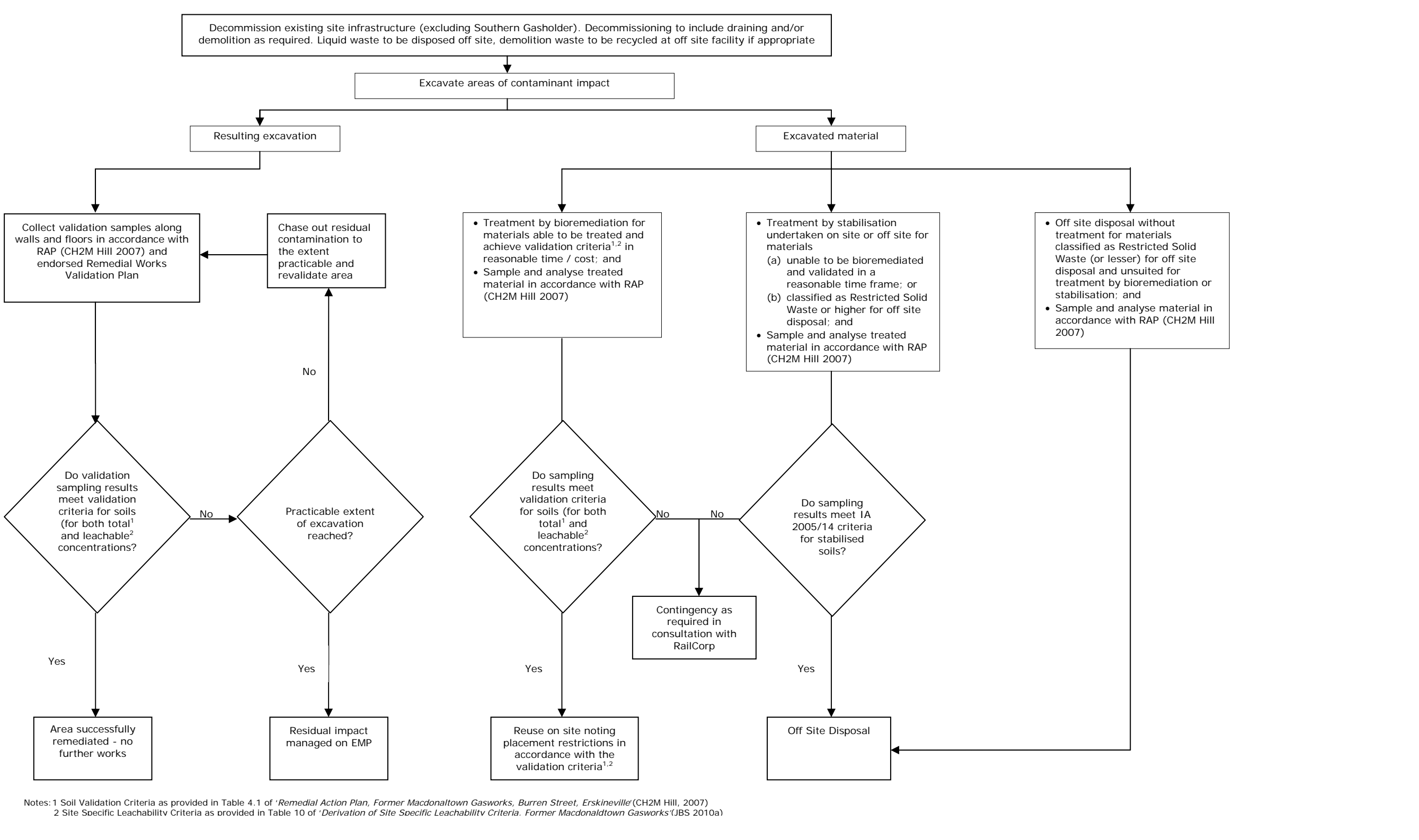
Table 4.2: Evaluation of Soil Treatment and Management Options

| Consideration | Option 1 – Excavation and off site disposal of untreated material | Option 2 – Excavation and on-site treatment for on site reuse (Bioremediation) | Option 3 – Excavation and off-site treatment for off site disposal (stabilisation) | Option 4 – In-situ Capping of Impacted soils |
|---|--|--|--|---|
| Use of permanent solutions & alternative technologies or resource recovery technologies | Permanent solution: Yes Alternate technology: No Resource recovery technology: No | Permanent solution: Yes Alternate technology: No Resource recovery technology: Yes | Permanent solution: Yes Alternate technology: No Resource recovery technology: No | Permanent solution: Yes Alternate technology: No Resource recovery technology: No |
| Satisfy DECC (2006) preference for treatment as a principle element | No | Yes | Yes – although may be undertaken as off site treatment at Chullora ² | No |
| Suitable materials | Only materials that are classed as Restricted Solid Waste, or lower, for off site disposal. | Only materials that are likely to be treated by bioremediation and likely to achieve validation criteria within both a reasonable time frame and cost. Unlikely to be suited to material impacted by free tar or asbestos | Only materials that are classed as Restricted Solid Waste, or higher, for off site disposal. Unlikely to be cost effective on materials classed as General Solid Waste for off site disposal | Only acceptable where excavations have been reached the practicable limits i.e. where remedial excavation cannot removal full extent of source |
| Ability to achieve validation | Validation able to be achieved with certainty | This option has the potential to achieve validation | This option has the potential to achieve validation | Validation able to be achieved with certainty, subject to ongoing management. |
| Ability for treated material to be reused on site | - | This option has the potential to produce material suitable for reuse however, heavily impacted materials may encounter treatment difficulties and potential failure of validation criteria could occur | This option has the potential to produce material suitable for reuse however, the relatively high concentrations and nature of hydrocarbons (heavy end TPH / PAHs) suggests treatment difficulties and potential failure of validation criteria relating to leachability could occur | - |
| OH&S considerations | OH&S issues during remediation able to be reasonably managed. Intensive odour control will be required for nearby site users | OH&S issues during remediation able to be reasonably managed. Intensive odour control will be required for nearby site users | OH&S issues during remediation able to be reasonably managed, intensive odour control will be required for nearby site users | OH&S issues able to be reasonably controlled |
| Timing & staging requirements | No significant time delays | Uncertain – generally extended timeframes required for bioremediation. | Uncertain – generally extended timeframes required for bioremediation. Dependent also on capacity of stabilisation system, and available area as will require 7-10 days for curing of each treatment batch | No significant delays , however program will need to factor in time for construction of capping before remediation is complete |
| Geotechnical requirements | Water table reduction in fill required and stabilisation of Southern Gasholder and any other structures to be retained required (common to all options) | | | |
| Cost effectiveness | Upfront costs: low | Upfront costs: moderate | Upfront costs: low | Upfront costs: moderate |
| | Water Treatment Costs (common to all potential options: uncertain will also depend on costs, if any, for disposal of groundwater generated during dewatering) | | | |
| | Long Term Costs: High, given large areas of the site where material would be classed as Hazardous Waste, Restricted Solid Waste or Special Waste for off-site disposal | Long Term Costs: Uncertain – will be dependent on treatment timeframes | Long Term Costs: Moderate | Long Term Costs: low, however party responsible for on-going management will maintain the liability associated with human health and environmental incidents linked to breach of the containment area |
| | Total Costs: Comparatively High | Total Costs: Uncertain, but likely to be less than disposal of treated material to landfill | Total Costs: Uncertain , but likely to be less than disposal of untreated material to landfill | Total Costs: comparatively low Presence of containment area may reduce value of the land in the future |
| Compliance with applicable or relevant appropriate requirements (ARARs) | Disposal site (<i>i.e.</i> Landfill) will require appropriate EPL ¹ for waste disposal application to land for that class of material | If treated material to be disposed to off site: disposal site (<i>i.e.</i> Landfill) will require Immobilisation Approval from DECCW, disposal site will also need approval to receive waste | Treated material to be disposed to off site: disposal site (<i>i.e.</i> Landfill) will require appropriate EPL ¹ for waste disposal application to land | The consent authority may need to accept the <i>in-situ</i> management of contaminated material and a method will need to be nominated for legal enforcement of the RAP. There will need to be a responsible party suitable to be nominated for on-going management of capping and / or containment cell, approval from Site Auditor required for strategy to determine which materials suitable to remain on site. |
| | | If material to be treated at Chullora an EPL ¹ for treatment of contaminated soil will be required for Chullora | If material to be treated at Chullora EPL ¹ for treatment of contaminated soil required for Chullora | |
| | Water Generated During Dewatering – Trade Waste Agreement with Sydney Water if not suitable for reinjection (common to all methods) | | | |
| On-going Liability Post | None | None | None | Requires on-going management, may limit future commercial use of the site and responsibility if |

| Consideration | Option 1 – Excavation and off site disposal of untreated material | Option 2 – Excavation and on-site treatment for on site reuse (Bioremediation) | Option 3 – Excavation and off-site treatment for off site disposal (stabilisation) | Option 4 – In-situ Capping of Impacted soils |
|----------------------------|--|--|---|--|
| Remediation | | | | breaches occur |
| Protection of Human Health | Overall Good | Overall Good | Overall Average – may not be capable of remediating concentrations present in workable timeframe. | Overall Good but as no reduction in contaminant mass, method requires on-going management, may limit future commercial use of the site. |
| Environment & heritage | Good - reduction in contaminant mass on site Poor - consumes limited landfill resources | Good – reduces the leachable concentration of contaminants If off-site disposal required as a result of failed treatment, poor - option consumes limited landfill resources | Good - reduction in contaminant mass on site Poor - generation of green house gases during remediation Poor - if used without air emission controls then potential for odour generation during remediation Poor - need to segregate asbestos impacted material from treatment process or incorporate mitigation measures in operational procedures to prevent release /exposure to asbestos fibres during and post treatment Disposed to landfill, poor - consumes limited landfill resources | Good – isolated contaminated material from environment Poor- no reduction in contaminant mass on site therefore maintenance of isolation involves ongoing management and liability |
| Reputation / community | Consultation required but assume preferable as only certified clean materials will be used to reinstate site | Consultation required but assume preferable as reduces number of large vehicle movements to and from site | Consultation required but assume preferable as only certified clean materials will be used to reinstate site | Consultation required but assume preferable as less disruption to surrounding area |
| Conclusion | Suited only to material impacted by low levels of contamination. Primary limiting factors include: - No licensed facilities in NSW exist to receive material classed as 'Hazardous Waste' for off site disposal - High cost option - High impact on limited landfill resources Not a complete solution | Suited only to material considered suited to achieve validation criteria by bioremediation in a reasonable timeframe. Primary limiting factors include: - bioremediation unsuited for remediation of inorganic and semi-volatile contaminants - Potential cost of off site disposal if validation criteria cannot be achieved after treatment Not a complete solution | May be used as the complete solution, however costs likely to be prohibitive if used on material capable of being reused on site Cost of undertaking treatment by stabilisation are likely to restrict the suitability of this option only to material considered unsuitable for treatment by bioremediation and/or in untreated form classed as Restricted Solid Waste, or higher, for offsite disposal | Acceptable only where the excavations have reached practicable limits The primary limiting factor is the that source removal is not achieved adopting this option Not a complete solution |

Notes: 1 EPL: Environment Protection Licence issued by DECCW under the *Protection of the Environment Operations Act (1997)*

Flowchart 4.1 Remedial Strategy



5 Remediation Acceptance Criteria and Validation Plan

Validation data are to be collected to verify the effectiveness of the remediation works and document the condition of the site as being suitable for the proposed future use(s).

Given the nature and extent of remediation works, validation data shall verify that:

- the identified contaminated soils (listed in **Table 5.3** of this document and Section 5 of the RAP) were effectively remediated; and
- any soils / fill materials retained on the site (including any materials excavated and treated for reuse) are suitable for on-going industrial land use.

5.1 Remediation Acceptance Criteria

The RAP (CH2M Hill, 2007) produced for the site included site specific validation criteria for total concentration in soil. The calculated values are depth dependent, based on risks to future site users associated with exposure to vapours and present for four distinct depth ranges:

- Surface (0.0m) to 1.5m below ground surface of finished site;
- 1.5 to 2.5m below ground surface of finished site;
- 2.5 to 4.0m below ground surface of finished site; and
- 4.0 to 8.0m below ground surface of finished site.

Soil validation criteria are summarised in **Table 5.1** following.

Table 5.1: Soil Validation Criteria

| Analyte | Depth Range ⁶ | | | |
|--|--|-----------------|-----------------|-----------------|
| | 0-1.5m | 1.5-2.5m | 2.5-4.0m | 4.0-8.0m |
| <i>Heavy metals</i> | | | | |
| As (total) | 500 | - | - | - |
| Cd | 100 | - | - | - |
| Cr | 500 ¹ | - | - | - |
| Cu | 5,000 | - | - | - |
| Hg (inorganic) | 75 | - | - | - |
| Ni | 3,000 | - | - | - |
| Zn | 35,000 | - | - | - |
| <i>Monocyclic Aromatic Hydrocarbons</i> | | | | |
| Benzene | 1 ³ | 1 ³ | 1 ³ | 1 ³ |
| Toluene | 1.4 ² | 2.6 | 4 | 7.9 |
| Ethylbenzene | 3.1 ² | 11.1 | 17.6 | 34.8 |
| Total xylene | 14 ^{2, 3} | 14 ³ | 14 ³ | 14 ³ |
| <i>Polycyclic Aromatic Hydrocarbons (PAHs)</i> | | | | |
| PAHs (total) | 100 | - | - | - |
| Benzo(a)pyrene | 5 | - ⁴ | - ⁴ | - ⁴ |
| Naphthalene | - | 3.8 | 6.0 | 11.8 |
| Acenaphthene | - | - ⁴ | - ⁴ | - ⁴ |
| Fluorene | - | - ⁴ | - ⁴ | - ⁴ |
| Pyrene | - | - ⁴ | - ⁴ | - ⁴ |
| Benzo(b)fluoranthene | - | - ⁴ | - ⁴ | - ⁴ |
| Chrysene | - | - ⁴ | - ⁴ | - ⁴ |
| <i>Other Constituents</i> | | | | |
| Total Phenol | 42,500 | - | - | - |
| Cyanide (complex) | 2,500 | - | - | - |
| Asbestos | No detection of fibres in surface soils (0.5m depth). No visible | | | |

Note: 1. Value is for Cr(VI) and used as a conservative concentration as a preliminary screening value for chromium.

2. Criteria for toluene, ethylbenzene and xylenes at 0-1.5m are ecological health based.
3. Risk based values are lower than laboratory analytical limits of reporting (LORs) and health investigation levels (HILs), therefore less conservative HILs applied to all depths.
4. Not of concern. Based on the outcomes of vapour fate and transport modelling reported in CH2M Hill (2007b) the contaminant was considered to have a low vapour potential at the nominated soil temperature of 15°C.
5. Adopted criteria in CH2M Hill (2007b) on the basis of Australian Contaminated land Consultants Association (2002) 'Asbestos in Soils – Code of Practice'
6. Depth ranges provided in metres below ground level in RAP (CH2M Hill 2007), these will need to be converted to levels relative the required finished ground surface.

Given that the revised strategy allows for material to be reused onsite, site specific leachability criteria were derived in the JBS letter '*Derivation of Site Specific Leachability Criteria – Former Macdonaldtown gasworks, Burren Street, Erskineville, NSW*' Reference JBS 40913-15501, provided as **Appendix B**.

The site specific leachability criteria were derived based on the relevant criteria for protection of groundwater resources in the area, but also incorporating a dilution attenuation factor (DAF) to account for dilution of contaminated groundwater that occurs at the receiving water body, as it becomes mixed with groundwater discharged from the remainder of the catchment. A DAF value of 16.6 was determined for the site, and the resulting site specific leachability criteria for the main contaminants of concern are provided in **Table 5.2** below. The complete list of site specific leachability criteria is presented in **Appendix B**.

Table 5.2: Site Specific Leachability RAC (all units in µg/L)

| Contaminant | Limit of Reporting | Site Specific Criteria for assessment for leachable concentrations in soil ¹ |
|----------------------------------|--------------------|---|
| HEAVY METALS | | |
| Arsenic (III/V) | 0.1 | 38.2 / 74.7 |
| Cadmium | 0.1 | 11.6 |
| Chromium (III) | | 166 |
| Chromium (VI) | 0.1 | 73 |
| Copper | 0.1 | 21.6 |
| Lead | 0.1 | 73 |
| Manganese | 1 | 1328 |
| Mercury | 0.05 | 1.76 |
| Nickel | 1 | 1162 |
| Zinc | 1 | 249 |
| POLYCYCLIC AROMATIC HYDROCARBONS | | |
| Benzo(a)Pyrene | 0.1 | 1.7 |
| Naphthalene | 0.1 | 1162 |
| Phenanthrene | 0.1 | 10.3 |
| Anthracene | 0.1 | 0.2 |
| Fluoranthene | 0.1 | 1.7 |

¹ Adopted criteria – 16.6x ANZECC/ARMCANZ 2000 trigger values, 16.6 x the LOR was adopted where ANZECC/ARMCANZ 2000 trigger values are unlikely to be achieved readily by the laboratories

The values presented in **Table 5.2** were derived to be protective of downgradient receptors in the event that contamination leaches out of subsurface soils, infiltrates the water table and migrates off site (**Appendix B**). They are considered to be the upper limits of allowable leachabilities on site. The actual quality of shallow groundwater on the site (**Table 8.2**), is much better than the upper limits set for leachability. Given that the remediation strategy prescribed will ultimately remove the bulk of contaminant mass from the subsurface it is therefore considered unlikely that

the leachability of material in validated areas of the site, or material to be reinstated after treatment will reach the upper limits provided in **Table 5.2**.

5.2 Validation of Soil Remediation Works

The proposed soil validation sampling and analytical program for the revised remedial strategy is outlined in **Table 5.3**. Validation requirements for material to be imported onto site have been included for completeness, noting that the specified testing requirements will need to be undertaken on the material at its source location and prior to arrival on site.

Table 5.3: Soil Validation Sampling Program

| Item | Sampling Frequency | | | Analytes |
|--|--|--|---|--|
| | Excavation floors | Excavation Walls (from each distinct horizon / material type) | Sampling Density | |
| Remediation Excavation (consistent with RAP) | 1 sample per 8.5 m square grid centres | 1 sample per 10 lineal metres / 10 m – at depths of between 0 and 1.5m, 1.5 and 2.5m, 2.5 and 4.0m, 4.0 and 8.0m and every 2m below 8.0m depth | N/A | 8 metals BTEX PAHs Phenols Cyanide Asbestos |
| Treated materials prior to off-site disposal or on-site reuse (ALTERNATE TO RAP) | N/A | N/A | 7 samples per treatment batch up to 1000 m ³ + 1 additional sample per 200m ³ (or part thereof) in excess of 1000m ³ | 8 metals BTEX PAHs Phenols BTEX (gw leach) ¹ PAH (gw leach) ¹ Heavy metals (gw leach) ¹ |
| Impacted material to be retained in-situ under newly installed site capping | Confirmatory sampling on 8.5 m square grid centres. Samples analysed at 1.0 m intervals to a depth of 1 m below observed depth of impact | | | 8 metals BTEX (total and GW leach) PAHs (total and GW leach) Phenols Cyanide Asbestos |
| Imported material for reinstatement ² : - VENM, ENM soil or material generated and certified under an approved DECCW resource recovery exemption and approved for use by DECCW ² (ALTERNATE TO RAP) | N/A | N/A | Minimum 10 samples per source site to enable calculation of 95%UCL _{avg} concentrations | 8 metals TPH/BTEX PAHs OCs/PCBs (for VENM only) Asbestos Foreign material (ENM only) pH (ENM only) VCH (ENM only) |
| | | | For recovered materials testing should be in accordance with the requirements of the relevant exemption | |

Notes:

- 1 leachability testing shall be undertaken on treated materials using site specific groundwater to simulate likely potential risks to groundwater.
- 2 All imported material must be tested and validated at the source location prior to receipt at the Macdonaldtown Gasworks site.
- 3 any material generated under an approved DECCW resource recovery exemption to be imported to site must be demonstrated as complying with all the requirements of that exemption and must be approved for use in reinstating the site in writing by DECCW.

It is noted that TPH is not included in the analytical suite specified for validation samples, despite the inclusion of petroleum hydrocarbons in the '*principal chemicals of interest at gasworks sites*' in DEC (2005) '*Information for the assessment of former gasworks sites*'. Imray and Langley (Enhealth, 2001)² mention the difficulties in the risk assessment of mixtures such as TPH and refer to two approaches used in a hybrid framework for assessing TPH by The Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG,

² Health-based Soil Investigation Levels, Imray, P. and Langley, A., enHealth (enHealth, 2001).

1997). The first approach investigates the presence of indicator chemicals which are carcinogenic substances such as benzene and PAHs, which if detected require assessment using contaminant specific health investigation levels. The second stage involves assessment against criteria for well defined TPH fractions, which have been derived for >C₁₆-C₃₅ aromatics, >C₁₆-C₃₅ aliphatics and >C₃₅ aliphatics in soil. The analytical suite for the validation program is based on the first approach, i.e. assessing the specific compounds likely to present an unacceptable risk, rather than the TPH mixture itself. This is considered appropriate for the site as the extensive historical dataset indicates that elevated TPH concentrations were primarily comprise of either PAH or BTEX compounds. Conversely TPH concentrations were generally below the detection limit in samples where PAH or BTEX concentrations were low.

Sampling Rationale

The sampling and analytical regime presented in **Table 5.3** is based on the following rationale:

- The wall sampling frequency is based on what is considered to be an adequately conservative lineal frequency capable of detecting residual contamination and being representative of residual materials;
- Treated material sampling frequencies for on site reuse or off-site disposal are designed to ensure reliable 95%UCL_{avg} concentrations are derived; and
- Imported material sampling frequencies exceed the minimum 1 composite sample requirement outlined in EPA 1995, and is based on having sufficient data to generate reliable 95%UCL_{avg} concentrations. Procedure B (EPA 1995) will also be used to confirm that an appropriate number of samples have been obtained from each source type / material type to enable comparison against the appropriate criteria.

Sampling Methodology and Data Quality

Should remain consistent with the requirements of the Section 9 of RAP (CH2M Hill, 2007)

5.3 Application of RAC

The following rules apply to use of RAC in material to be retained on site:

1. For impacted material to be retained *in-situ* due to heritage or geotechnical restrictions on the extent of excavation – soils in the area to be retained on site must be sampled and analysed at the frequency specified in **Section 5.3**, which includes both total and leachable concentrations. Leachable concentrations in all samples must comply with the RAC provided in **Table 5.2** due to the potential for contaminant migration. Consultation should be undertaken with RailCorp/Site Auditor on a case by case basis to determine whether these materials are also required to comply with the RAC for total concentrations at specific locations. Where samples fail to meet these criteria a contingency strategy may be required subject to RailCorp/Site Auditor endorsement prior to implementation. Contingency options may include management by capping and ongoing monitoring;
2. For material used to reinstate the site following treatment by bioremediation- each treated batch is to be sampled and analysed at the frequency specified in **Section 5.3**. Leachable concentrations in all samples must comply with the RAC provided in **Table 5.2**, AND total concentrations in all samples must be compliant with RAC (specified in **Table 5.1**, as adapted from the RAP, CH2M Hill, 2007).

Where samples fail to meet these criteria a contingency strategy may be required subject to RailCorp/Site Auditor endorsement prior to implementation.

Contingency options may include extending the period of remediation, cement stabilisation or disposal to landfill without further treatment; and

3. For material to be treated by cement stabilisation – as this material will require waste classification for off site disposal, each treated batch is to be sampled and analysed in accordance with the requirements of IA 2005/14. Leachable concentrations should be assessed against Specific Contaminant Concentration (SCC) values provided in Waste Classification Guidelines (DECC 2009), AND compliance with the additional criteria listed in **Table 5.4** must be demonstrated. Where samples fail to meet these criteria a contingency strategy may be required and will require RailCorp/Site Auditor endorsement prior to implementation. Contingency options may include retreating of soils to achieve compressive strength or disposal to landfill;

Table 5.4: Soil Criteria (units as specified)

| Property | Requirement (IA 2005/14, NSW EPA) ¹ |
|---|--|
| Maximum allowable concentrations in untreated material | PAHs – 13 000 mg.kg ⁻¹ B(a)P – 500 mg.kg ⁻¹ Non-halogenated phenols – 2000 mg.kg ⁻¹ Total Cyanide 4000 mg.kg ⁻¹ |
| Reagent used for stabilisation | Calcium or Magnesium Oxide |
| Maximum allowable stabilisation ratio | 2:1 (i.e. by mass, 2 parts reagent to 1 part untreated soil) |
| Unconfined compressive strength (UCS) | 1 MPa as the 95% lower confidence limit value (as assessed by AS1012.9-1999) |

Notes: 1. *General Approval of the Immobilisation of Contaminants in Waste* (NSW EPA 2005), Approval Number 2005/14 - Coal Tar Waste from former Gasworks Sites.

5.4 Groundwater Management

No active groundwater remediation is proposed in the RAP (CH2M Hill, 2007). The Monitored Natural Attenuation (MNA) approach is proposed to monitor the concentrations of residual compounds in groundwater following the completion of soil.

It will, therefore, be necessary as part of the soil remediation works to install new groundwater monitoring well on the site in accordance with Section 10.3.3 of the RAP (CH2M Hill, 2007), or any future RailCorp and Auditor endorsed Groundwater Management Plan produced for the site.

Additionally any perched groundwater drained out of the fill material and shallow soil to enable excavation of the areas to be remediated will require treatment prior to off site disposal. Further discussion of the treatment of perched water generated during excavation works is provided in **Section 7**.

6 Pre-Remedial Documentation

A number of pre-remedial studies, plans and approvals are likely to be required for implementation of the RAP (CH2M Hill 2007) and this Remedial Strategies document. These are summarised following.

6.1 Pre-Remedial Studies

The following pre-remedial studies should be completed prior to the detailed consideration and design of remediation works:

6.1.1 Geotechnical and Dewatering Assessments

As the areas requiring remediation extend up to the site boundaries, geotechnical structural retention will be required to secure properties bordering the site. As a minimum it is considered geotechnical controls will be required along the western boundary and in the vicinity of the southern gas holder, but consideration should also be given to the need for retention along the southern and northern site boundaries.

Geotechnical assessment may also be required on treated material proposed for reuse on the site and for disposal to landfill.

Where not included in the existing geotechnical report³ then detailed geotechnical assessments will be required to provide geotechnical parameters for retaining structure design.

Structural engineer design of shoring will be required based on the geotechnical parameters.

Each of the studies shall be undertaken by qualified geotechnical and structural engineers.

6.2 Pre Remediation Works Plans

6.2.1 Remediation Health and Safety Management Plan (RHSMP)

Several potential health and safety hazards are anticipated to be present during the course of the remediation works. These relate to physical hazard posed by the completion of a large scale demolition and earthworks project and chemical hazards associated with the contaminated soils and groundwater underlying the site. A Remediation Health and safety Plan (RHSMP) will be required prior to the commencement of works. As a minimum the RHSMP will need to detail the following items:

- Assessment of potential hazards posed by works including detailed descriptions of potential toxicological impacts from contaminants present in soil and groundwater underlying the site;
- Stipulation of measures to remove hazards (where possible);
- Procedures / controls to be put in place to control hazards where elimination is not possible;
- Any requirement for personal protective equipment to be worn by the site workforce;
- Specific consideration of the PPE and/or operational requirements for maintenance of acceptable working conditions within the proposed enclosure;

³(PSM 2010) 'Macdonaldtown Gasworks Remediation Project Geotechnical Investigation' PSM1444.R1

- Requirements for pre-works training of the site workforce (*i.e.* Occupational Health and Safety General Induction for all personnel, HAZWOPER training for staff potentially directly exposed to contaminants etc);
- Requirements for occupational monitoring to be completed during the remediation works; and
- Evacuation plans and directions for medical assistance / first aid.

Additional requirements for the RHSMP may be identified during the course of remediation.

6.2.2 Dilapidation Studies

There is a potential for proposed remediation works to have structural impacts on adjoining properties. Pre- and post-works dilapidation studies will be required of adjoining properties to assess for dilapidation as caused by the remediation works.

6.2.3 Remediation Works and Validation Plan (RWVP)

The requirements of this document and the RAP may be achieved by a number of methods by the successful remediation contractor. A Remediation Works and Validation Plan (RWVP) will be required prior to the commencement of works and will require endorsement by the appointed Site Auditor. As a minimum the RWVP will need to detail the following items:

- Compliance with the requirements of the RAP, the Environmental Management Plan (EMP) prepared for the site and this Remedial Strategy document will be met;
- Compliance with any additional requirements arising out of the Part 3A approval;
- The validation program (frequencies and analytical suites) to be adopted for material to remain *in-situ*;
- The validation program (frequencies and analytical suites) to be adopted for treated material to be reused on site;
- The preferred off-site disposal location(s) for material to be disposed to landfill;
- Details of the treatment methods to be adopted, both on-site and off-site;
- An indicative layout of the likely treatment operation relative to site boundaries and adjacent land uses, including the proposed infrastructure and drainage plans on both sites, and on the Chullora site waste reception and handling areas;
- Details of the baseline sampling program to be adopted on the treatment site; and
- Details of the post-treatment sampling program and the criteria to be met at the completion of off-site treatment works.

6.3 Pre-Remediation Approvals

A review of the likely scope of remediation works has been completed. The approvals identified as most likely being required include:

- Development consent as an integrated development under the *Environmental Planning and Assessment Act 1979* from City of Sydney Council prior to commencement of any demolition or excavated works associated with the remediation of the site. The works will be classified as a Category 1 remediation works under SEPP 55 'Remediation of Land';

- Should source removal during remediation require dewatering of the major water bearing zone underlying the site, then a Construction Dewatering Permit under the *Water Act 1912* will be required;
- Approval to discharge treated groundwater generated as part of the remediation works. For discharge to sewer, a Trade Waste Agreement must be entered into with Sydney Water. For discharge into stormwater approval will be required from City of Sydney Council. Approval may also be required for the reuse of treated groundwater on the site;
- An Environment Protection Licence from NSW EPA under the *Protection of the Environment Operations Act 1997* may be required where untreated soil is to be transferred off site for treatment;
- Should the stabilisation method adopted deviate from the specification provided in IA 2005/14, then a Specific Immobilisation approval will be required from the NSW DECCW as per NSW DECC (2008). It is likely that correspondence from the proposed landfill disposal location will be required confirming that the premises are licensed to receive immobilised material;
- If it is intended that material treated at Chullora is to be returned to site as treated material, then licensing by NSW EPA under the *Protection of the Environment Operations Act 1997* will be required;
- Where a substantial quantity of materials require removal from the site generating significant vehicle movements then approval may be required under SEPP11 'Traffic Generating Developments'; and
- WorkCover NSW must be provided with notification seven days prior to any demolition works, or asbestos removal works.

7 Site Establishment and Configuration of Operations

Limits on the area available for remediation on the Macdonaldtown site and available for treatment works on the Chullora site are likely to determine the configuration of works undertaken.

7.1 Macdonaldtown

Based on the remedial strategy summarised in **Flowchart 4.1**, a summary of the proposed scope of works on the Macdonaldtown site is presented in **Table 7.1**. **Figures 6 to 9**, nominate the anticipated remediation areas/depths and likely locations for the associated infrastructure.

Table 7.1: Summary of Remediation Works

| Stage | Task | Comments |
|-----------------------|--|--|
| Preliminary | Project planning and licensing | - |
| Site Establishment I | Setup of site offices, sediment and erosion controls | - |
| Remediation Stage I | 1A – assessment/soil sampling of northern boundary retaining wall 1B- construction of internal turning circle, vegetation removal | Blue area forming the northern boundary of the site as shown on Figure 5 (does not include fill material within the former Northern gasholder) |
| | 1C – excavation/validation of the top 0.5m of fill material of the entire site surface. Transfer of excavated soil to Chullora for treatment prior to disposal to landfill | Yellow areas on Figure 5 (ash & coke gravel fill) do not have a malodorous potential. These soils will be excavated by standard excavation practice to typical depth of 0.5m. Consideration may be given to supplementary sampling through this layer prior to excavation, for comparison to remediation acceptance criteria as defined in the RAP (CH2M Hill 2007) |
| | 1D – excavation/validation of hotspots to depths of 1-2m | Hot-spot 'A' at north-east portion of the site (Figure 5) in proximity of former sample location BH14; Benzene impact. Hot-spot 'B' at eastern portion of the site (Figure 5) in proximity of former sample location TP16; Free tar impact. Hot-spot 'C' at eastern portion of the site (Figure 5) in proximity of former sample location MW04 (Figure 3); Benzene impact. Hot-spot 'D' at south-western portion of the site (Figure 5) in proximity of former sample location MW13; Ash and coke impacts Excavation/validation of any other hotspot locations identified during the preceding stages |
| Site Establishment II | Installation of temporary enclosure, associated air extraction/treatment system and water treatment system | Proposed locations shown on Figure 7 . |
| Remediation Stage II | 2A- commission air and water treatment system | - |
| | 2B – excavate/validate areas within enclosure. Transfer of excavated soil to Chullora for treatment prior to disposal to landfill | Pink and orange areas on Figure 5 as present within the boundaries of the enclosure |
| | 2C – reinstate enclosure excavation with imported material certified as suitable for the proposed land use and compliant with the | - |

| Stage | Task | Comments |
|-----------------------|--|--|
| | relevant legislation | |
| Remediation Stage III | 3A – excavate/validate areas external to the enclosure. Excavated material unsuited for onsite bioremediation within enclosure to be transferred to Chullora for treatment prior to disposal to landfill | Orange areas on Figure 5 as present external to the boundaries of the enclosure During completion of Task 3A the water treatment may require location based on the extent of chase out excavation required. |
| | 3B –Material assessed as suitable for remediation by bioremediation to be stockpiled for treatment within enclosure | Stockpiles of material awaiting bioremediation within the enclosure will be placed in the areas designated for soil stockpiling as shown on Figure 5 and be maintained in accordance with the EMP for the works (JBS 2011c) |
| | 3C – reinstatement of site using imported material certified as suitable for the proposed land use and compliant with the relevant legislation | - |
| Disestablishment | Decommissioning of air and water treatment plants, disestablishment of enclosure and site offices | - |

A program of controls for odours, gas and dust emissions from the Site and routine monitoring has been designed to mitigate the impact of the proposed works on the surrounding community and environment. Full details of the required management controls and monitoring program are provided in '*Environmental Management Plan, Demolition and Remediation, Former Macdonaldtown Gasworks, Burren Street, Erskineville, NSW*', (JBS 2011c).

The major control to be adopted is for excavation of primary source zones to be completed within an enclosed area. Use of an enclosed area was a recommendation of the Air Quality Impact Assessment (JBS 2011a) required for the control of odour and gas emissions from heavily impacted areas. **Figure 7** shows the likely position of the enclosure. The enclosure shall be a purpose built metal clad or fabric structure sufficiently sized to allow the internal operation of tippers, excavators and associated equipment as required for the stockpiling and handling of soils and any associated equipment. Openings in the enclosure shall be minimised so as to reduce potential for uncontrolled releases. A temporary purpose-built enclosure has been nominated rather than a more permanent engineered constructed building given the:

- need for remediation to occur in a large purpose built structure which can optimise use of space without limiting remediation works or requiring substantial pre-construction design and site preparation or post-remediation demolition and waste;
- need to minimise disruption to the normal operations of the adjacent Macdonaldtown Stabling Yards; and
- post-remediation concept plan for the site is for open space land absent of any new buildings.

It is anticipated that a purpose built temporary enclosure operated under negative pressure conditions that is demonstrated effective through routine monitoring (in accordance with JBS 2011c) will provide control equal to that of an engineered building.

The recommendations provided in '*Air Quality Assessment, Remediation of Former Macdonaldtown Gasworks*', Revision F, Reference 40913- 15136, (JBS 2011a) require that the temporary enclosure be maintained under a constant negative pressure during working

hours. To this end it will be necessary for the enclosure to be fitted with an emissions control system that will allow for controlled extraction and treatment of air.

The emissions control system will comprise two main elements:

- The collection system - which must be capable of maintaining adequate ventilation rates throughout the enclosure under negative pressure conditions. With the exception of fugitive emission that may occur when the enclosure entry points are momentarily opened and closed, the collection system must be capable of extracting emissions out of the enclosure through one central and controlled point; and
- The treatment system – external to the enclosure and must be capable of receiving and treating air extracted from within the enclosure. The treatment system should utilise granular activated carbon (GAC) filter(s) with appropriate sizing to remove potentially malodorous or harmful constituents. **Figure 7** shows the likely location of the air treatment system.

Any bioremediation proposed as part of the remediation program is to be conducted within the temporary enclosure. Spreading, turning and stockpiling of soil undergoing bioremediation within the zone of influence of the emissions control system will mitigate the potential for offensive odours to migrate beyond the boundaries of the Site. Construction of windrows or biopiles of soil for bioremediation will need to be appropriately sized as per the dimensions of the enclosure. It is proposed that bioremediation occurs after the completion of excavation works within the enclosure, therefore consideration should be given to changes in the air treatment system that may be required to accommodate likely increases in emission and particulate loading rates. In the event that increased loading rates are expected during bioremediation, re-commissioning of the air treatment system will be required. Design of the emissions control system should ensure an efficiency capable of meeting OH&S requirements for air quality within the enclosure, and/or specify requirement for personal protective equipment (PPE) requirements for the exposed workforce. Any requirements for PPE within the tent will need to be included in the RHSMP, as detailed in **Section 6.2.1**.

Based on the available dataset it is not anticipated that free tar will be encountered external to the temporary enclosure. However as a precaution, a contingency has been included in JBS (2011c) for such an occurrence and requires that the following is completed prior to the disturbance of free tar impacts external to the enclosure:

- Works in the area cease until the Remediation Consultant has determined the appropriate controls for that location, including OH& considerations for the remediation workforce;
- The free tar material remains securely covered for the duration between the first encounter with the material and the remedial excavation works. Plastic sheeting, soil, steel plates or other appropriate cover may be used for this purpose;
- Wherever possible any sampling required to characterise the free tar and adjacent material should be undertaken prior to the commencement of remedial excavations for the free tar. Appropriate disposal locations should also be confirmed prior to commencement; and
- Where free tar is encountered external to the temporary enclosure the material will need to be excavated and transported to a licensed landfill for treatment or disposal.

JBS (2011c) notes that the controls required are likely to be specific to the occurrence of the free tar, however lists the following as possible contingency actions:

- Temporary windscreens installed around the perimeter of the free tar area prior to remediation, in conjunction with wetting of the exposed surfaces during remediation; or
- Delineation of the area, relocation (and operation) of the enclosure over each occurrence, as required, once all remediation works inside the original footprint have been completed to the extent practicable.

Additionally these contingencies may also require execution in those areas within the enclosure footprint where the excavation cannot be safely extended to the point of successful validation without impacting the stability of the enclosure. This includes where the excavation begins to impinge upon allowable batter slopes, as summarised in **Section 3.6**, or past the line of temporary shoring.

Any additional infrastructure on the treatment site required by the contractor to meet the conditions of the RAP (CH2M Hill 2007), the REMP (JBS 2011c) and this Remedial Strategy document will need to be documented in the RWP to be prepared as per **Section 6.2.3**.

7.2 Chullora

A summary of the proposed scope of works on the Chullora site is presented in **Table 7.2** including likely plant required. **Figure 10** nominates the anticipated site setup.

Table 7.2: Summary of Treatment Works

| Stage | Task | Comments |
|--------------------|---|--|
| Preliminary | Project planning and licensing | - |
| Site Establishment | Conduct baseline environmental assessment of treatment site | - |
| | Setup of site offices, sediment and erosion controls | - |
| | Installation of temporary enclosure and associated air extraction/treatment system. Installation of cement stabilisation plant within the enclosure | Proposed locations shown on Figure 10 . |
| Treatment | A- commission air and water treatment system | - |
| | B – receive materials for treatment. Onsite stockpiling until minimum treatment volume achieved | Proposed areas for stockpiling of shown on Figure 10 and soils in this area to be maintained in accordance with the EMP for the works (JBS 2011c) |
| | C – once minimum volume achieved treatment/validation of soils by cement stabilisation within the enclosure | Treated soil is to remain within the enclosure for the duration of the curing period and until validation results confirm successful stabilisation has occurred. |
| Disestablishment | D- stockpiling of treated/validated soil external to enclosure until removal off-site is possible | Any treated material removed from site to be transferred directly to a an appropriately licenced landfill for disposal. Proposed areas for stockpiling of shown on Figure 10 and soils awaiting transfer in this area to be maintained in accordance with the EMP for the works (JBS 2011c) |
| | Decommissioning of air treatment plants, disestablishment of enclosure and site offices | - |
| | Conduct post works environmental assessment of treatment area | - |

A program of controls for odours, gas and dust emissions from the Site and routine monitoring has been designed to mitigate the impact of the proposed works on the surrounding community and environment. Full details of the required management controls and monitoring program are provided in the EMP (JBS 2011c).

The major control to be adopted is for the treatment of impacted soil to be undertaken within an enclosed area, including storage of treated soil over the curing period. Use of an enclosed area was a recommendation of the Air Quality Impact Assessment (JBS 2011b) required for the control of odour and gas emissions from the cement stabilisation process. **Figure 10** shows the likely position of the enclosure. The enclosure shall be a purpose-built metal clad or fabric structure sufficiently sized to allow the internal operation of tippers, excavators and associated equipment as required for the stockpiling and handling of soils and any associated equipment. Openings in the enclosure shall be minimised so as to reduce potential for uncontrolled releases. A temporary purpose-built enclosure has been nominated rather than a more permanent engineered constructed building given the:

- need for treatment to occur in a large purpose built structure which can optimise use of space without limiting remediation works or requiring substantial pre-construction design and site preparation or post-remediation demolition and waste;
- need to minimise disruption to the normal operations of the adjacent Chullora Rail Yards; and
- need for the area to be restored to its original condition on completion of the treatment program.

The recommendations provided in (JBS 2011b) require that the temporary enclosure be maintained under a constant negative pressure during working hours. To this end it will be necessary for the enclosure to be fitted with an emissions control system that will allow for controlled extraction and treatment of air. The emissions control system will need to comprise a collection system and treatment system consistent with that required on the Macdonaldtown site as described in **Section 7.1**.

It is anticipated that a purpose built temporary enclosure operated under negative pressure conditions and one that is demonstrated through routine monitoring (in accordance with JBS 2011c) will provide effective control equal to that of an engineered building.

Table 7.3: Summary of Treatment Works

| Stage | Description of Works | Major Equipment |
|-------|--|---|
| - | Receipt, Stockpiling, Treatment and Disposal of Soil | Pug Mill – size to be determined 20T excavators – external to enclosure 20T excavator – internal to enclosure Air treatment system, including: <ul style="list-style-type: none"> - Diesel generator - Extraction Fan (2 x 1.5m diameter) - Granular activated carbon filter Semi trailers arriving and departing from site Water Truck Tipper trucks |

Any additional infrastructure on the treatment site required by the contractor to meet the conditions of the RAP (CH2M Hill 2007), the REMP (JBS 2011c) and this Remedial Strategy document will need to be documented in the RWP to be prepared as per **Section 6.2.3**.

8 Pre-Treatment Requirements

Table 8.1 provides additional detail on the requirements of the various elements of the revised remedial strategy and identifies the following pre-treatment works potentially required for the remediation of site:

- Pre-treatment of tar sludge for off-site disposal by either heating or inclusion of additives such as fly ash to improve handling;
- Extraction of tar contents from gasworks pipes manually or by other methods such as using heat or chemicals;
- Lowering moisture content, crushing and/or homogenisation of fill, soil and shale impacted by free tar or displaying other tar impacts;
- Segregation of oversized materials in demolition waste and fill obtained from existing retaining walls and in the vicinity of hotspots at BH14, MW13S and MW04S;
- Removal of impacted water in below ground infrastructure on the site (Northern and Southern Gasholders, tar wells etc) and as required in areas to be excavated.

8.1 Tar Wells and Northern Gasholder

Tar sludge present in the tar wells and Northern Gasholder will most likely be removed from site by specialised vacuum trucks licensed to transport liquid waste. Under these circumstances the tar sludge may be treated *in situ* to improve handling and be pumped directly into the vacuum trucks without the need for a separate above ground treatment area. The heating or requirement for additives to enable pump out of tar sludge will be dependent on several site specific conditions at the time of remediation including volume and depth of tar sludge, proportion of soil or other inclusions, size and power of pump utilised and capability of the disposal truck to maintain the handling properties of the sludge during transport. The Contractor will be responsible for ensuring that OH&S, environmental and/or planning controls are adequately addressed for the proposed tasks.

Extraction of tar contents from gasworks pipes may be undertaken as follows:

- Where the pipes require preservation, then treatment in the form of heating or additives to mobilise and extract the contents; or
- Where the pipes need not be preserved, and assuming proper soil and water controls are in place, then it may be possible to sever the pipes into smaller sections for manual extraction of the contents.

The Contractor will be responsible for ensuring that OH&S, environmental and/or planning controls are adequately addressed for the proposed task.

8.2 Free Tar and Impacted Fill

Pre-treatment works on free tar and tar impacted fill, on either site, will need to be undertaken in a contained area to prevent the uncontrolled spread of contamination and release of vapours. As a minimum sediment and erosion controls should be provided to achieve this end. Additionally where the disturbance of tar sludge occurs outside the tented enclosure (as discussed below and in **Section 3.7**), management controls will also be required to prevent unacceptable releases of contaminants in air or odour. This may include capture of emissions and treatment if necessary.

Pre-treatment of free tar and tar impacted fill soil and bedrock may require lowering the moisture content of the material, crushing the excavated material and/or homogenisation

to enable stabilisation. The pre-treatment works are capable of completion using conventional earthmoving equipment such as excavators and backhoe loaders.

The following applies to any pre-treatment works required on materials excavated from the Northern Gas holder and tar wells further north, and all other coal tar impacted areas, (as described in the Air Quality Assessment completed for the works, JBS 2010a):

- Pre-treatment works undertaken on the Macdonaldtown site on free tar and tar impacted soils will need to be enclosed to prevent unacceptable odour impacts beyond the boundary of the site;
- Pre-treatment works undertaken within the boundaries of the designated treatment area within the Chullora Railway workshops, must ensure that no more than 150m² of coal tar impacted soil is uncovered at any one time. The restriction of exposed surface area of soil on the Chullora treatment site is required in order to prevent unacceptable odour impacts on the surrounding area in accordance with the Air Quality Assessment for the Chullora treatment site (JBS 2010b); and
- The clay content of soil successfully remediated through cement stabilisation generally lies between 60 and 80 % by mass. One of the three soil samples tested in the recent benchscale stabilisation trial contained a clay content of 87%, and when treated with 5, 12.5 and 20 % cement, failed to achieve the required compressive strength specified in IA 2005/14 (NSW EPA 2005) for cement stabilisation. Based on the results of the benchscale trial, it is considered that the materials containing a clay content greater than 80% are likely to occur in natural soil layers encountered at depth. Therefore it may be necessary to obtain a specific immobilisation approval from DECCW for cement stabilisation to allow a lower UCS value to be adopted for the process. Alternately some of the material capable of being treated may require homogenisation prior to treatment. Any material used in the homogenisation process to achieve the required composition in the material for treatment must be derived from the Macdonaldtown site.

Segregation of oversized particles will be required on those materials to be treated by cement stabilisation or bioremediation, and is generally completed through mechanical screening. However, consideration should be given to optimising any segregation works to minimise the amount of handling required of the coal tar impacted material prior to treatment. Consideration should be given to:

- The OH&S and PPE requirements for mechanical screening of fill potentially containing asbestos;
- Management of odour impacts;
- Off –site disposal requirements of the segregated oversized particles, which may not be suitable for disposal as building and demolition waste in accordance with DECC (2008) if impacted by free tar or other contaminants post sorting. Segregated oversized materials that as assessed as ‘impacted’ may require a waste classification for off site disposal.
- The attachment of high speed shredders on the screening plant, given that much of the fill and residual soil underlying the site is predominantly clay. The high speed shredder would be faster than a conventional shaker screen under these conditions and would simultaneously cause the break up of clay clumps in the screened material.

Requirements of the pre-treatment of impacted water from within the northern gas holder and tar wells is discussed in **Section 8**.

Table 8.1: Revised Remedial Strategy - Requirements of Pre – Treatment and Primary Treatment

| Site Area | Material Type | Extent of Impact | Expected Quantity (m ³) | Remediation Method | Pre-treatment Requirements | | Primary Treatment Requirements | |
|---|---|--|-------------------------------------|---|--|--|---|--|
| | | | | | Possible Pre-treatment Required | Waste Classification (subsequent to pre-treatment if required) | Primary Treatment Options | Anticipated Waste Classification Subsequent to Treatment / Immobilisation Approval |
| Northern gasholder | Tar Sludge | Contained within Base of Gasholder | 320 | Liquid Waste Disposal | Potential pre-treatment to improve handling – heating or use of additive such as fly ash | Hazardous Waste (Liquid) | - | - |
| | Impacted Water | Contained within Gasholder | 640 | Liquid Waste Disposal, disposal to sewer or on site reuse | Extraction from gasholder | Liquid Waste | Pass through on site water treatment plant | Suitable for disposal to sewer or on site beneficial reuse |
| | Soil / fill impacted by free tar | Base annulus and proximate soils (within pink shaded area on Figure 4 to a depth of 8m-10m) | 2100 | Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Potential options to improve handling if required - lowering moisture content, breakdown clay clods to expose higher surface area | Hazardous | Stabilisation or bioremediation treatment– Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) |
| | Demolition Waste | Buried inside Gasholder annulus (blue shaded area on Figure 4) | 1900 | Landfill disposal or Recycling | - | Special Waste (asbestos) | Segregation of free tar, asbestos containing materials and oversize particles | Hazardous Waste (free tar) Special Waste (asbestos) General Solid Waste (Non-Putrescible) |
| Retort and Surrounding Former Gasworks Source Areas | Shallow Tar Impacted Soil and Fill | Lateral extent of orange shaded area on Figure 4 to a depth of at least 4m | 9225 | Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Physical amendment to break down material with high clay content (<i>i.e.</i> lowering moisture content, breakdown clay clods to expose higher surface area) Likely alternative site for pre-treatment and remedial treatment | Hazardous or Restricted Solid Waste | Stabilisation or bioremediation treatment Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) |
| | Deep Tar Impacted Natural Soil | Lateral extent of pink shaded area on Figure 4 in the vicinity of boreholes BHE and BHF to a depth of 8m-10m | 2375 | | | Hazardous or Restricted Solid Waste | | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) |
| | Tar Impacted Contamination hotspot at TP16 location | Lateral extent of green shaded area on Figure 4 to a depth of 1 m-2 m | 115 | | | Hazardous or Restricted Solid Waste | | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) |
| Existing Site Surfaces | Ash/ Coke Fill | Lateral extent of shaded area on Figure 4 to a depth of at least 0.5 m | 2950 | Stabilisation or bioremediation treatment for onsite reuse or landfill disposal. Application of NSW DEC Immobilisation approval (Approval #1999/05) | Potential options to improve handling if required - lowering moisture content, breakdown clay clods to expose higher surface area | Hazardous | Stabilisation or bioremediation treatment Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) |
| Retaining Wall | General Fill and demolition waste | Entire Northern boundary (shaded blue on Figure 4) | 1765 | Landfill disposal, Beneficial Reuse or Recycling | segregation of oversize materials | General Solid Waste | - | - |
| Contamination Hotspots | Impacted Fill at locations BH14, MW13s and MW04s | Lateral extent shown as green shaded area on Figure 4 to a depth of 1 m-2 m | 340 | Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | segregation of oversize materials | Hazardous | Stabilisation or bioremediation treatment Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste |
| Site Wide | Old Gasworks Pipes | Varied | Unknown | Separate landfill disposal of empty pipework and tar contents | Chemical or manual extraction of tar contents, steam, or other cleaning of pipe work | Hazardous (tar) and General Soil Waste Non-Putrescible (clean pipe sections) | - | - |
| Site Wide | Fill and natural soil materials | NA | Unknown | Beneficial reuse, or as required: Stabilisation or bioremediation treatment for onsite reuse or landfill disposal. | segregation of oversize materials | Hazardous | Stabilisation or bioremediation treatment Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste |
| Deep excavations proximal to source area | Residual tar sources – subsequent to source removal | Unknown | Unknown | Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Potential options to improve handling if required - grinding to expose higher surface area | Hazardous | Stabilisation or bioremediation treatment Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste |

9 Considerations for the Water Treatment System

Based on observations recorded during previous testing on the site, excavation of fill material as part of the remediation program may encounter significant volumes of perched groundwater. A water treatment system (WTS) is proposed as part of the remediation strategy to process groundwater generated either during excavation, or pumped out of the fill prior to excavation. The objective of using the WTS would be to treat the collected groundwater to an acceptable level, such that it may be discharged to stormwater, to sewer or used in operation *e.g.* as wheel wash water or for dust suppression.

9.1 Rates of water requiring treatment

Test locations encountering significant seepage in testpits are summarised in **Table 9.1** and displayed on **Figure 11**. Flow velocities within the shallow groundwater were estimated in CH2M Hill (2007) to be between 6.2 and 13.7 m/year, determined through slug tests conducted in shallow groundwater wells on the site.

Table 9.1: Summary of Observed Seepage in Fill

| Test Location | Termination Depth (m BGL) | Depth Extent of Fill (m BGL) | Fill description | Depth of Apparent seepage zone (m) |
|--|---------------------------|------------------------------|---|------------------------------------|
| TPA (CH2M Hill Phase I & II ESA 2000) | 2.0 (R) | 0 - 2.0 | 0 - 1.5: FILL, Light brown medium grained sand with some gravel, loose unconsolidated moist. 1.5 - 2.0: FILL, Free tar product migrating out of bricks seams, some clay, plastic, wet, tarry type odour. | 1.5 - 2.0 |
| TPC (CH2M Hill Phase I & II ESA 2000) | 1.6 (R) | 0 - 1.6 | 0 - 1.6: FILL, Bricks, minor clay, sand, very wet, visible hydrocarbon sheen, hydrocarbon odour, tar visible on bricks. (BRICK WALL TP EASTERN SIDE) | 0 - 1.6 |
| TP03 (CH2M Hill 2006) | 4 | 0 - 2.8 | 0- 0.3: FILL gravelly Sand, brown, dark brown, dark grey, ash and crushed sandstone, ballast, clinker, ash 0.3 - 1.5: FILL gravelly Clay, firm, medium plasticity, dry, orange and grey, fine to coarse gravel, subround to subangular, ballast, coke. Water ingres at 0.6m, fast 1.5 - 2.8: FILL clayey Silt (original surface?), low plasticity, dark grey, wet | 0.6 - 2.8 |
| TP06 (CH2M Hill 2006) | 2.7 | 0 - 2.3 | 0 - 0.3: FILL gravelly Sand, ash, clinker and coke, gravel subround to angular, fine to coarse grained 0.3 - 0.5 FILL sandy Clay, light brown to orange, firm, low plasticity, some clinker 0.5 - 1.4: FILL (original surface?) clayey gravel, orange/brown, medium to coarse grained, sandstone, grey-black subangular clinker GROUNDWATER INGRES AT 0.6m 1.4 - 2.3: FILL clayey Silt (original surface?) dark grey/brown, wet | 0.6 - 2.3 |
| TP07 (CH2M Hill 2006) | 2.2 | 0.2 - 1.7 | 0.2 - 0.5: FILL gravelly Sand, black to dark grey, dry, ash and coke, gravel fine to medium grained, of ash, coke, clinker 0.5 - 0.9: FILL clayey Sand, brown, slightly gravelly, wet, half bricks, gravel fine to coarse grained, subround to subangular, sandstone, shale 0.9 - 1.3: FILL gravelly Clay, grey and red mottles, very firm, subangular to subround sandstone and shale 1.3 - 1.7: FILL clayey Silt (original surface?), soft | 0.5 - 0.9 |

| | | | | |
|-----------------------------|-----|---------|--|-------------|
| TP10 (CH2M Hill 2006) | 4.1 | 0 - 3.2 | 0 - 0.8: FILL gravelly Sand, dark brown, dark grey or black, of ash, coke, coal, gravel medium to coarse grained, angular to subangular of same material, presence of bricks, round cobbles 0.8 - 0.95: FILL single layer of red brick 0.95 - 1.25: FILL Sand, dry medium grained, yellow sand, massive concrete boulder at 1.1 m BGS 1.25 - 1.75: FILL gravelly Clay, orange with grey mottles, dry, medium to coarse grained, subangular to subround, of shale (WATER INGRESS at 1.7m) 1.75 - 2.25: FILL sandy Gravel, grey, wet, of shale 2.25 - 3.2: FILL possibly reworked natural material, orange with grey mottles, very firm, gravel medium to coarse grained, angular shale | 1.75 - 2.25 |
| TP11 (CH2M Hill 2006) | 4 | 0 - 3.2 | 0 - 0.3: FILL gravelly Sand, brown, black, dry, ash and coke, rootlets in top 0.1 m 0.3 - 0.8: clayey Sand, yellow, orange, wet 0.8 - 3.2 FILL clayey Sand, interbedded with grey and red mottles, firm clay at 0.8 - 0.9 mBGS and 1.2 - 1.3 m BGS, reworked natural material | 0.3 - 0.8 |
| TP15 (CH2M Hill 2006) | 4.1 | 0 - 2.5 | 0 - 0.3: FILL gravelly Sand, loose 0.3 - 1.7 FILL ash and gravel water and free tar at 1.1m bgs at brickwork footing 1.7 - 2.5 FILL sandy Clay (original surface?), brown to green, high plasticity | 1.0 - 1.7 |
| TP16 (CH2M Hill 2006) | 3.8 | 0 - 1.5 | 0 - 0.2: FILL gravelly Sand, dark grey, black, dry, ash and coke 0.2 - 1.5: FILL gravelly Sand, orange and light brown, dry, with cobbles, sandstone GROUNDWATER INGRESS at 0.2 m | 0.2 - ? |

Results of recent pump testing by JBS, detailed in **Appendix A**, determined the hydraulic conductivities at MW37S and MW42S, to be between 5.09×10^{-6} m/s and 6.65×10^{-6} m/s.

Anticipated inflows along the north boundary of the site based on recent pump test results may be as high as between 300 m³ per day and 400 m³ per day at the commencement of excavation works, based on the following conservative assumptions:

- saturated fill is present between 1 and 6 m depth across the entire site;
- continuous hydraulic connectivity in groundwater present in fill across the site; and
- excavation of fill material would require pumping along the entire northern boundary of the site (approximately 140m in length).

The PSM (2010) Geotechnical Report provides no assessment on the impact of draining the perched water table on settlement on the site and surrounding properties. Based on the water bearing zones listing in **Table 9.1** it appears that the zones containing significant volumes of perched groundwater are restricted to layers of fill. As these layers are likely to be limited to the extent of the site, the volume of inflows are anticipated to reduce over time. In the event that no reduction of inflows occurs, the remediation works should consider the impacts of settlement on the site and surrounding area.

Additionally, surface water is likely to have accumulated in underground infrastructure associated with the former gasworks including the Southern Gasholder and Tar Wells. Estimates of likely volumes of impacted water contained in subsurface structures are estimated as follows:

- Northern Gasholder – 640 m³ (CH2M Hill, 2007);
- Southern Gasholder – 1875 m³ (based on a diameter of 20 m and assumed depth of 6 m, filled with water); and
- Tar Wells- 50 m³ (conservative assumption allows for half of 100 m³ of tar well contents, reported in CH2M Hill 2007, to be filled with impacted water).

Some allowance should also be made for impacted water contained in disused service trenches, pits and pipeworks that may remain *in-situ*.

9.2 Anticipated Influent Quality and Required Effluent Quality

Table 9.2 summarises the range of contaminant concentrations detected in groundwater sampled from the site. In viewing **Table 9.2** it should be noted that the majority of groundwater generated from remedial works at the site is likely to be derived from the fill layers, where contaminant concentrations were generally less than those detected in samples of groundwater collected from the underlying natural shale.

Table 9.2: Summary of Groundwater Contamination

| Analyte | Criteria | Shallow Groundwater Concentrations | | | Deep Groundwater Concentrations | | |
|-------------------------|------------------------------|------------------------------------|---------------------|------------------|---------------------------------|---------------------|------------------|
| | ANZECC 2000 | Range (µg/L) | Location of Maximum | Site Area | Range (µg/L) | Location of Maximum | Site Area |
| Electrical Conductivity | 200-300 ¹ (µS/cm) | 442 - 2010 (µS/cm) | MW35S | Central northern | 717 – 3820 (µS/cm) | MW03D | Central Southern |
| Cd | 0.2 | nd - 2.6 | MW13s | Southwest | nd - 1.5 | MW06d | Gasholders |
| Cr(total) | - | nd – 15 | MW04s | South Central | nd - 7 | MW04d | South Central |
| Cu | 1.4 | nd – 220 | MW42s | Northeast | 0.001 - 208 | MW42d | Northeast |
| Pb | 3.4 | nd – 174 | MW42s | | nd - 140 | MW03d | South Central |
| Ni | 11 | nd – 10 | MW04s | South Central | nd - 92 | MW36d | Offsite |
| Zn | 8 | 0.033 - 1,570 | MW13s | Southwest | 0.015 - 869 | MW42d | Northeast |
| Cyanide (total) | 7 | 0.02 - 0.479 | MW20s | Gasholders | nd - 14.9 | MW03d | South Central |
| Benzene | 950 | nd – 704 | MW07s | | nd - 14,000 | MW03d | |
| Toluene | - | nd – 117 | MW07s | | nd - 792 | MW03d | |
| Ethylbenzene | - | nd - 213 | MW07s | | nd - 317 | MW03d | |
| Total Xylenes | 550 (o & p) | nd - 417 | MW07s | | nd - 5,010 | MW03d | |
| Total PAHs | 16 (naphthalene) | nd - 1,677 (naphthalene 1,460) | MW07s | | nd - 4,208 (naphthalene 3,840) | MW07d | Gasholders |

Note: 1 typical range of EC in NSW lowland rivers as provided in ANZECC 2000 Table 3.3.3

9.3 Required Effluent Quality

Table 9.3 summarises the acceptable concentrations for disposal to sewer under an Industrial 'Trade Waste' Agreement with Sydney Water as provided in the Sydney Water Brochure '*Industrial Customers – Acceptance Standards and Charging Rates for 2010-11*'. A copy of this brochure is provided as **Appendix D**. These criteria are likely to be the required performance criteria for any WTS used on site, noting that in providing approval for discharge into sewer Sydney Water may alter allowable concentrations based on the estimated rates and TDS concentrations. All notes associated with **Table 9.3** should also be considered in determining the requirements of the systems performance.

Discussions with City of Sydney (CoS) staff indicate that should it be necessary to discharge treated groundwater to stormwater, then an application must be made to CoS demonstrating that the water to be discharged:

- Is clear (i.e. turbidity of less than 20 NTU);
- Is free of visible suspended sediment (i.e. total suspended solids concentration less than 50 mg/L);
- Has no visible oil or grease film (i.e. oil and grease less than 10 mg/L);
- Has a pH value between 6.5 and 8.5; and

- Has been assessed to not adversely impact the visual character of the receiving water body i.e. concentrations of any other contaminants of concern occur at levels which do not represent a risk to the receiving water body (i.e. Alexandra Canal).

For treated groundwater to be reused on site *e.g.* as wheelwash water or for dust suppression, compliance with the criteria provided in **Table 9.3** should be sufficient. Consideration may also be given to the use of site specific values, or modified site specific values where appropriate. The current values for site specific leachability criteria are provided in the JBS letter '*Derivation of Site Specific Leachability Criteria – Former Macdonaldtown gasworks, Burren Street, Erskineville, NSW*' Reference JBS 40913-15501, provided as **Appendix B**.

A WTS was trialled on the site, with the methods and results documented in the JBS Letter Report '*Groundwater Treatment Trial, Former Macdonaldtown Gasworks*', dated 05 August 2010 Reference 40913 - 15534. A copy of this letter is included as **Appendix C**.

Overall it was noted that samples of the treatment system effluent were reported to contain very low concentrations of all contaminants of concern at the site. The average concentration of all WTS effluent samples is included in **Table 9.3**, and indicates that with the exception of arsenic, the concentrations in treated water samples complies with the relevant 'Trade Waste' acceptance criteria where available, noting, however, that the full suite of analytes listed in **Table 9.3** was beyond the scope of the trial. With respect to arsenic it was considered that used of an acid washed granular activated carbon (GAC) filter could result in arsenic concentrations within acceptable limits.

Notwithstanding this difference, it appears that the WTS used in the treatment trial could be scaled up for use in the remediation process to enable discharge of treated groundwater to sewer. While the specifics of the system to be used during the remediation program will require on site refinement based on the actual groundwater quality and quantity encountered, the details of the successfully implemented trial system are summarised in the following sections.

It is also noted that when applying for the trade waste agreement, justification should be provided for not undertaking analysis for the full suite of analytes listed in **Table 9.3**, rather a reduced testing suite should be recommended comprising the contaminants of concern at the site i.e. PAHs, heavy metals and water quality parameters and others as required based on the site historical groundwater data.

Table 9.3: Summary of WTS Performance Criteria (all concentrations in mg/L)

| Contaminant | DISPOSAL TO SEWER – Trade Waste Acceptance Criteria ^{1,3,4,18} |
|---|---|
| Acetaldehyde | 5 |
| Acetone | 400 |
| Aluminium | 100 |
| Ammonia | 100 ⁵ |
| Arsenic | 1 |
| Barium | 5 |
| Biological Oxygen Demand (soluble) | 100 ¹⁷ |
| Boron | 100 |
| Bromine | 5 |
| Cadmium | 1 |
| Chlorinated Phenolics | 0.05 ⁸ |
| Chlorine | 10 |
| Chromium | 3 ⁹ |
| Cobalt | 5 |
| Copper | 5 |
| Cyanide | 1 ¹⁰ |
| Fluoride | 20 ⁶ |
| Formaldehyde | 30 |
| General pesticides (excludes OC and OP) | 0.1 ¹¹ |
| Herbicides and defoliant | 0.1 |
| Iron | 50 |
| Lead | 2 |
| Lithium (Specified Systems only) | 10 ¹² |
| Manganese | 10 |
| Mercaptans | 1 |
| Mercury | 0.03 |
| Methyl Ethyl Ketone | 100 |
| Molybdenum | 100 |
| Nickel | 3 |
| Organoarsenic compounds | 0.1 |
| pH | 7 to 10 |
| Petroleum Hydrocarbons (flammable) | 10 ^{20, 13, 16} |
| Benzene | 0.1 ⁷ |
| Toluene | 0.5 |
| Ethylbenzene | 1 |
| Xylene | 1 |
| Phenolic Compounds | 1 ⁸ |
| Polynuclear aromatic hydrocarbons | 5 |
| Benzo(a)pyrene | - |
| Naphthalene | - |
| Phenanthrene | - |
| Anthracene | - |
| Fluoranthene | - |
| Propionaldehyde | 5 |
| Selenium (total) | 5 |
| Silver | 5 |
| Sulphide | 5 |
| Sulphite | 50 |
| Temperature | 38°C |
| Thiosulphate | 300 |
| Tin | 10 |
| Total Dissolved Solids | 500 ^{14, 18} |
| Uranium | 10 |
| Volatile halocarbons | 1 ^{15, 19} |
| Chloroform | 0.1 |
| Perchloroethylene | 0.3 |
| Trichloroethylene | 0.1 |
| Zinc | 5 |

Notes: **BOLD** exceeds performance criteria

1 All concentrations in mg/L

2 LOR: limit of reporting

3 Sydney Water will introduce acceptance standards for a substance on a sub-system specific basis as determined by:

- how much the receiving system can transport and treat
- how corroded the sub-system is
- how sewage treatment products will be used.

4. Discrete oil, fat or grease must not be discharged.
5. Where ammonia is present with other nitrogenous compounds, the amount of nitrogen in the ammonia is deducted from the Total nitrogen as measured by Total Kjeldahl Nitrogen, before calculating the charge for nitrogen.
6. Fluoride, phosphorus and nitrogen limits don't apply where the customer's sewerage system is connected to a sewage treatment plant that discharges to the ocean.
7. Acceptance standards also apply to concentrations of ammonia, benzene, bromine, chlorine, cyanide, formaldehyde, petroleum hydrocarbons, sulphide and volatile halocarbons in discrete samples.
8. Sydney Water will determine acceptance standards for individual chlorinated phenolics on a catchment basis, following pollution reduction targets set by the DECCW NSW for the sewage treatment plant effluent. The concentration limit is a guide only and we may set lower limits for individual chlorinated phenolic compounds.
9. Sydney Water do not allow discharge from comfort air conditioning cooling towers and evaporative condensers using products containing hexavalent chromium (chromate) or organometallic algicides, if the blow down (or 'bleed-off') is connected to the sewer. Comfort cooling towers are defined as cooling towers dedicated to heating, ventilation, air-conditioning or refrigeration systems.
10. Cyanide is defined as labile cyanide amenable to alkaline chlorination. This includes free cyanide as well as those complex cyanides that are particularly dissociable, almost wholly, or in a large degree, and therefore potentially toxic in low concentrations.
11. Sydney Water will not consent to any discharge of organochlorine pesticides (including chlordane, dieldrin and heptachlor), or organophosphorus pesticides (including chlorpyrifos, diazinon and malathion) into the sewerage system.
12. The limit for lithium applies only to the Rouse Hill sewage catchment.
13. Where flammable and/or explosive substances may be present, the customer must demonstrate to us that there is no possibility of explosions or fires in the sewerage system. We will discuss limits and charges with individual customers, before a trade waste agreement is negotiated. The flammability of the discharge must never exceed five per cent of the Lower Explosive Limit (LEL) of hexane at 25 OC. In some cases a customer may be required to install an LEL meter.
14. Sydney Water will determine acceptance standards for total dissolved solids on a catchment-specific basis. A limit of 500 mg/L may apply to customers discharging to an inland sewage treatment plant or to a sewage treatment plant that is part of a designated reuse system. Acceptance standards will only apply to those customers discharging in excess of 100kg/d of total dissolved solids (TDS) or greater than one per cent of the total catchment TDS load (whichever is the lesser).
15. Analysis of volatile halocarbons must at a minimum include methylene chloride, chloroform, trichloroethylene and perchloroethylene.
16. This substance is made up of several substances including benzene, toluene, ethylbenzene, (m+p)-xylene and o-xylene.
17. As at 1 July 2010, the limit for soluble BOD applies only to the Smithfield sewage and SPS 67 catchments, due to corrosion.
18. This is a guide only. Exact allowable levels are determined on a system-specific basis.
19. Charges will apply for total volatile halocarbons
20. Charges will apply for total petroleum hydrocarbons (flammable)

9.4 Details of Trialled WTS

The following WTS was trialled on site:

- Equalization/storage – initial influent collection tanks to allow consistent loading to the WTP under variable conditions in the collection system and to optimize the size of the treatment system;
- Pre-treatment System – comprising an oil/water separator to remove any free oily materials prior to treatment;
- Filtration System comprising;
 - Bag filters – to remove particulate matter and to protect the downstream filtration processes;
 - Activated Carbon Filters – to remove dissolved organics and some inorganic components;
- Ancillary tanks, pumps, control and monitoring equipment.

A process flow diagram of the treatment system is presented in **Figure 11**.

Consideration should be given to the inclusion of influent tanks in the full scale system used for the remediation works given inflow rates from the fill layers are likely to vary across the site and over the duration of the works.

Influent into the system was restricted to 72 litres / min using a control valve. The flow rate adopted was equivalent to a contact time with the carbon filter of 8 minutes.

With the exception of arsenic, the effluent water generated by the system was generally compliant with ANZECC/ARMCANZ 2000 95% trigger values. The result of the trial indicated that arsenic concentrations increased following contact with the activated carbon filter. It was considered that this impact can readily be minimised by the selection of acid washed GAC filter for use in the operational WTP.

9.5 WTS Waste

A number of waste streams will be generated through use of a WTS and planning for the remediation works must consider the disposal requirements for these materials as follows.

- Free oil removed in the oil/water separator will require collection, most likely to be discharge to a 'drum' collection system. Any drums should be used and stored within a containment area to collect any spills. The collection system will be equipped with a level switch to advise the operator when the drums are full and require disposal, or systems shall be in place such that overflow of the drums does not occur;
- The filter bags in the sand bag filter system will have to be replaced and disposed of once the filters become filled with sediment. Testing of the filter bag was not conducted as part of the water treatment trial. It is possible that these filter bags are classified as a hazardous waste due to the presence of hydrocarbons and/or metals, and will require appropriate disposal to landfill; and
- The activated carbon filter media will become fully loaded over time and require disposal. The replacement frequency will depend on the contaminant load in the water for treatment. In adopting a sustainable approach to the works it is recommended that where possible the spent activated carbon media be returned to the supplier for regeneration, rather than disposal.

Appropriate disposal of wastes generated by the WTS may require sampling and analysis to determine the appropriate disposal location.

10 Considerations for Treatment of Contaminated Material

The revised remedial strategy for the site incorporates options for managing material containing exceedances of the acceptance criteria, including soil treatment by cement stabilisation (at Chullora) or bioremediation (on site).

One of two objectives exist for the inclusion of this option:

1. Treating coal tar contaminated material such that a reduced waste classification may be achieved for disposal off site to landfill, in accordance with NSW EPA 'General Immobilisation of Contaminants in Waste – Coal tar Contaminated Waste From Former Gasworks Sites' approval number 2005/14 (IA 2005/14). Excavated material that requires off site disposal as Hazardous Waste will need to be treated in this manner. The Contractor may choose to similarly treat material that requires off site disposal as Restricted Solid Waste should their cost benefit analysis indicate worthwhile savings can be achieved in the project timeline or budget; or
2. Treating coal tar contaminated material such that it can be reused on site. This will require demonstration of the following for the material undergoing treatment by bioremediation on site – compliance with the site specific total concentrations (as provided in Table 4.1 of the RAP) AND the material does not pose a risk to groundwater migrating off-site and is compliant with the site specific leachability criteria for the site.

Figures 12, 13 and 14 provide an estimate of the areas suited to treatment by cement stabilisation or bioremediation. Each figure relates to a particular soil depth interval. The areas and values provided in **Figures 12 to 14** should be viewed as indicative only and have been based on an assessment of the available historical data, including borelogs describing the prevalence of free tar impacts in soil and fill. Actual conditions encountered during bulk excavation of the site may vary.

Furthermore the volume of material suited to each treatment option after excavation will be heavily influenced by the methods adopted and strict implementation of site controls to prevent cross contamination.

10.1 Treatment Using Cement Stabilisation (Chullora)

In the benchscale immobilisation trial conducted by JBS (**Appendix A**) the results indicated that two of the three materials tested were capable of achieving the required UCS value of 1 MPa (NSW EPA 2005) with a minimum addition of 12.5% cement. The other parameters tested in these materials also showed full compliance with the requirements of IA 2005/14, and under this order would be suitable for off site disposal to landfill as General Solid Waste. The third material failed to meet the required UCS value even with 20% cement addition, and was assessed to be not stabilised. The failure was assumed to be related to the clay content of this material, which was noted to be 87% and well above the general range of 60% to 80% material considered suitable for cement stabilisation. As all other parameters in the failed material showed full compliance with the requirements of IA 2005/14, the stabilisation issue may be overcome by using an increased ratio of cement in the treatment process provided the mixing ratio provided in IA2004/14 Condition 1.3 is not exceeded.

It is noted that bioremediation will not be applicable to all excavated source materials from the site. Bioremediation should only be undertaken on material impacted by volatile contaminants, i.e. areas of the site impacted with heavy metal contamination cannot be bioremediated. Additionally where excavated material requires remediation of PAHs the decision to bioremediate should consider the form of the contamination and proportion of individual compounds present, noting that:

- Bioremediation of material impacted by free tar is unlikely to be practicable; and
- Bioremediation is applicable to material impacted with lighter end PAHs such as naphthalene, while bioremediation of the heavy end PAHs may not at all be possible in a reasonable timeframe or may require the application of additives for breakdown.

The effectiveness of the bioremediation process will also be dependent on the layout of the bioremediation area and the frequency of turning adopted.

10.3 Off Site Treatment

Given the proximity of the Macdonaldtown site to residents, and likely space restrictions during excavation of contaminated soils, an alternate site has been identified by RailCorp for ex-situ treatment of soils. Approval is being sought for treatment to occur on an approximate 2 ha parcel of land contained within the RailCorp owned Chullora Railway Workshops, located on Worth Street, Chullora, NSW. A plan showing the likely maximum area to be made available for treatment works is provided as **Figure 15**. Material treated off site must be disposed to an appropriately licensed facility.

10.4 Storage Volume

Storage volumes for Macdonaldtown have not been estimated given the inherent variability in how remedial excavations may be staged.

The volume of material capable of being stored and or treated within the designated area at Chullora will depend on several project specific factors including the treatment method to be adopted, the area required for truck loading areas, plant and supplies, and the size of the allocated area for treatment.

To aid with planning for the site **Table 10.1** provides indicative estimates of volumes of material that can be handled on the Chullora site. Each process has been assessed individually *i.e.* volume of soil if all treatment area use for either storage, curing of stabilised material or bioremediation windrows. The values assume minimal area only is required for truck loading, supply and plant storage. The approximate volume of material treatable is likely to be easily estimated by determining what percentage of the site is to be used for each task.

Table 10.1 – Estimated Volume of Material Capable of being stored in Chullora Treatment Area

| Process | Area Occupied | Indicative Volume capable of storage on site at one time | Comments/ Assumptions |
|---|---------------------|---|---|
| Storage | 0.5 ha ¹ | 8,250 m ³ | Stockpile max 5 m high, 10m wide, in 5 rows running lengthwise across area |
| Treated Stabilised soil – layed out for curing period | 0.5 ha ¹ | 2,500 m ³ | Treated soil placed in 0.5m high blocks for curing |
| Soil in wind rows for bioremediation | 0.5 ha ¹ | 1250 m ³ (storage on site at any one time) approximately 50 m ³ uncovered (i.e. being treated at any one | Soil for bioremediation place in 1 m high windrows in 8 rows running lengthwise across site. Assumes that the maximum number of rows that can be uncovered at any one time should be consistent with the requirements of the air quality |

| | | | |
|--|--|-------|---|
| | | time) | management plan that no more than 150 m ² of material should be exposed to the atmosphere. A one metre length of one metre high windrow will contain approximately 0.5m ³ of soil and have an exposed surface area of 1.4m ³ |
|--|--|-------|---|

Notes: 1 actual volumes will depend of dimensions of available area

10.5 Treatment Rates

Table 10.2 presents possible treatment rates achievable based on discussions with remediation contractors. It is noted that the rate at which material can be treated either on the Macdonaldtown or Chullora sites, will be entirely dependent the manner in which treatment is undertaken, including the method adopted, plant utilised and site configuration.

Table 10.2 – Indicative Estimated Treatment Rates

| Process | Likely treatment rate | Comments/ Assumptions |
|-----------------------------------|--|---|
| Treatment by Cement Stabilisation | 1000 T per day ¹ , can be streamlined to achieve up to 1400 T per day | Daily excavation rates are unlikely to match treatment of 1000 tonnes per day. Considerations should be given to either use of smaller mixing plants in line with excavation rates, or if large daily treatment volumes are planned whether sufficient space exists for pre-treatment stockpiling and post treatment curing |
| Treatment by bioremediation | 500 m ³ per 3 weeks (average) ^{2,3} | Bioremediation may not be applicable to all contaminants requiring remediation |

Notes: 1 achieved using semi-trailer sized mixing plant

2 assumes maximum volume possible stored on treated site, staggered such that all 500 m³ is subject to daily exposure, with no more than 150m² uncovered at any one time.

3 treatment rates will vary if bioremediation to be completed within tented enclosure.

11 Considerations for Material Disposal

Table 8.1 includes summary of the range of materials likely to require management during the remediation program. Materials anticipated to be classed as Restricted Solid Waste or General Solid Waste will be suitable for direct disposal to appropriately licensed landfills.

As no landfills within NSW are currently licensed to dispose of Hazardous Waste, should these materials require off site disposal, the following will be required:

- treatment to achieve a lower Waste Classification prior to disposal (to a landfill licensed to receive treated material of that class of treated material); or
- delivery to an off-site facility licensed to store the material, prior to treatment for disposal to an appropriately licensed landfill.

The requirements of treatment and disposal to landfill are discussed in the Sections below.

11.1 Treatment Using Bioremediation

The objective of pre-treatment of materials classed as 'Hazardous Waste' by bioremediation would be to reduce the classification to Restricted Solid Waste or General Solid Waste. As the method should reduce contaminant mass, successful treatment should allow for unrestricted disposal of the material at an appropriately licensed landfill.

11.2 Treatment Using Cement Stabilisation

If material is to be pre-treated using cement stabilisation, the works will require completion in accordance with the DECC '*Immobilisation Technical Note 1 - Process Equipment for Treatment of Contaminated Soil and Sludge Waste.*' A copy of this document is provided in **Appendix E**.

If the material is to be disposed to landfill following cement stabilisation, disposal must be in accordance with the requirements of NSW EPA IA 2005/14, specifically that:

- The treated waste can only be disposed of at a landfill that has '*currently operating leachate management systems*' and which are licensed by DECCW to receive that particular class of waste;
- The landfill licence allows the site to receive '*waste subject to immobilisation approvals with this type of disposal restriction*';
- If the total concentration in the waste exceeds either the Specific Contaminant Concentration (SCC)2 or SCC3 values (Waste Classification Guidelines 2009), the landfill monitors leachate and groundwater for PAHs or B(a)P; and
- The landfill must be advised in writing that the material has been treated and classified in accordance with the requirements of IA #2005/14.

If material is to be treated by cement stabilisation for disposal to landfill in accordance with IA2005/14, all the requirements of this general immobilisation approval must be satisfied, including, but not limited to:

- Ensuring the proposed location of cement stabilisation is lawfully able to treat the waste, and in consultation with RailCorp, obtaining any permits or licences deemed necessary for the works;
- Providing notification to the DECCW of the intention to treat and dispose of material in accordance with IA2005/14 at least 28 days prior to the commencement of these works;
- Use of calcium or magnesium oxide based cement;
- Ratio of reagent to untreated waste must not exceed 2:1; and
- The UCS of the treated waste must be measured in accordance with NSW Roads and Traffic Authority (RTA) Test Method T131 of T116. The use of equivalent methods will require receipt of written approval from DECCW.

Furthermore if material is to be treated by cement stabilisation, the works will require completion in accordance with the DECC Immobilisation Technical Note 1 - *Process Equipment for Treatment of Contaminated Soil and Sludge Waste*. A copy of this document is provided as **Appendix E**.

It is noted that the conditions listed in IA 2005/14 preclude use of the approval on materials containing Total PAH concentrations in excess of 13 000 mg/kg or B(a)P concentrations in excess of 500 mg/kg. Review of historical site data indicates that the total concentrations in three samples analysed from the site exceeded these limits, specifically:

- free tar impacted clay at MG08/1.5 m (Total PAH 15 237 mg/kg);
- two pipe contents samples labelled as 'RP' and 'Service Pipe' and described as coal tar material sampled from a pipe (Total PAH of 20 890 mg/kg and 26 805.3 mg/kg);

The last two samples are likely to represent the concentrations in free tar present in residual underground infrastructure. This material is likely to be disposed off site as liquid waste (as described in **Section 8**), and is unlikely to require treatment for stabilisation.

The sample collected from MG08 represents clay material heavily impacted by free tar. Review of the borelog for this location indicates that the material sampled at 1.5 m was a thin band of impacted soil. When considered in isolation this thin band of soil is unsuitable for treatment by cement stabilisation, and may require transfer to a licensed off-site storage site (discussed further in **Section 11**). However, given that the great majority of all other soil samples analysed from the site contained total PAH concentrations less than half of the MG08/1.5 m concentration, it is considered unlikely that when this area is bulk excavated and handled during treatment that PAH concentrations consistently in excess of 13,000 mg/kg would be detected.

10.2 Treatment Using Bioremediation

No bioremediation trials were undertaken as part of the pre-remedial investigations. However bioremediation has been demonstrated as an effective remediation technology on former gasworks sites when used in conjunction with other technologies. Use of bioremediation wherever possible, as an auxiliary process in the proposed works, has the potential to realise significant cost savings and reductions in the volume of material disposed to landfill.

12 Indicative Program

The anticipated program for the remediation works is summarised in **Table 12.1**. The proposed program is based on the following assumptions:

- Excavation of 350 m³ of soil on average per day from the site to the designated Chullora Treatment Area or directly to landfill over an initial three month period;
- Treatment of excavated soil as received, and for a further month after all remedial excavations completed at Macdonaldtown; and
- Site reinstatement occurring once validation of excavations completed, and continuing for a further three months after completion of treatment works.

The actual time required for completion will be dependent on the specifics of the remedial option adopted and time required for any additional administrative requirements specified by RailCorp.

Table 12.1 – Anticipated Program of Remediation Works

| Stage | Month Number | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Pre-Remedial works ¹ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Planning and site Establishment | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Excavation of Contaminated soil (up to 23 000 m³) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Validation of excavations, review of interim results by RailCorp + Site Auditor | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Disposal to landfill of untreated material (estimate up to 5300 m3) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Treatment of soils by stabilization (assume up to 9800 m³) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Treatment of soils by bioremediation (assume 50% of up to 5300 m³) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reinstatement to pre remediation levels ³ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Post remediation studies and monitoring ³ | | | | | | | | | | | | | | | | | | | | | | | | | | |

Notes: 1 includes time for site preparation of project site specific management plans including occupation health and safety

2 includes all heritage surveys, vegetations management plans and structural surveys required

3 includes landscaping and revegetation, completion of validation reports and post remediation EMP for the site

4 duration of groundwater monitoring to be determined in the post remediation EMP for the site

13 Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS Environmental Pty Ltd accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS Environmental Pty Ltd, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

Figures

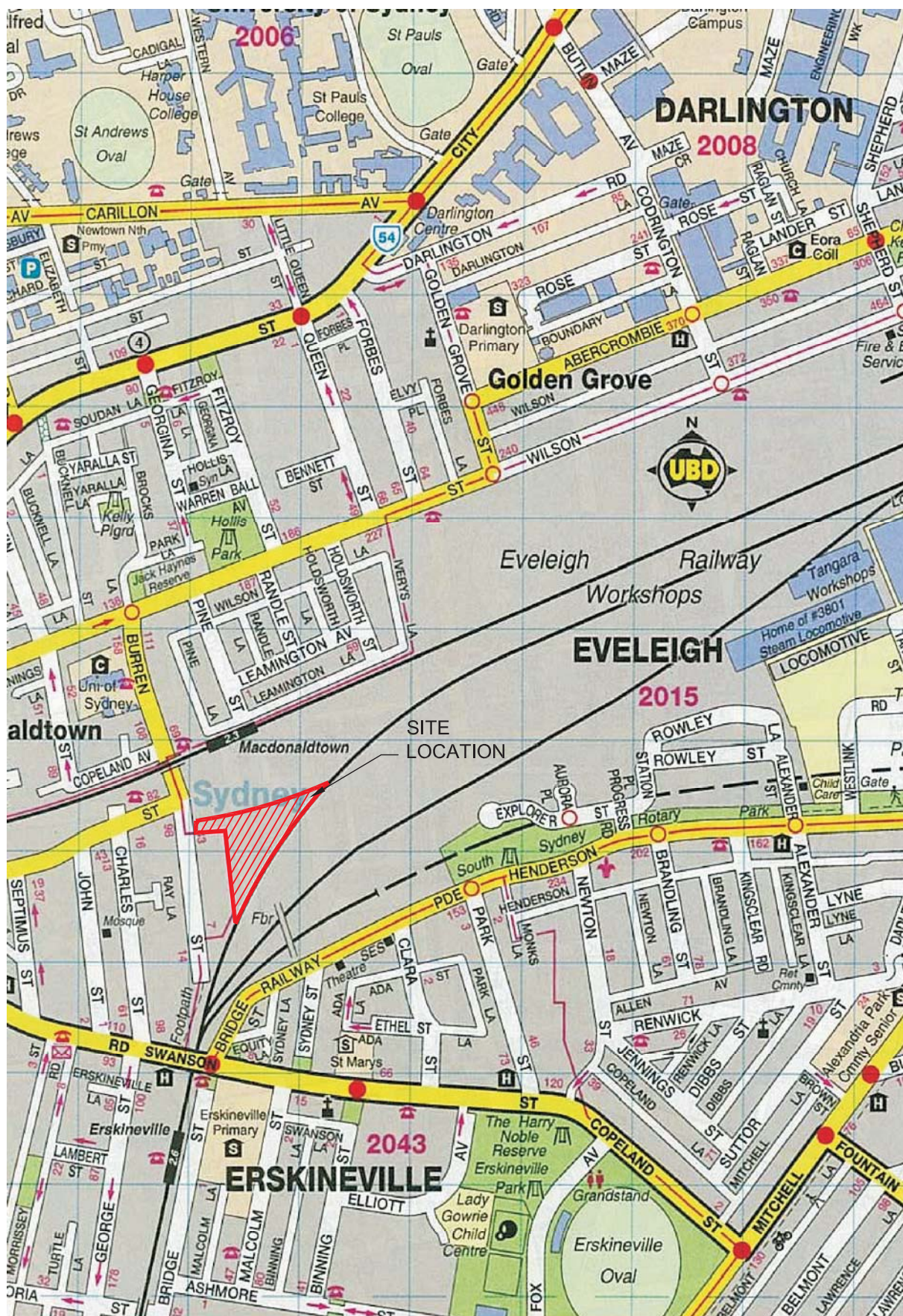
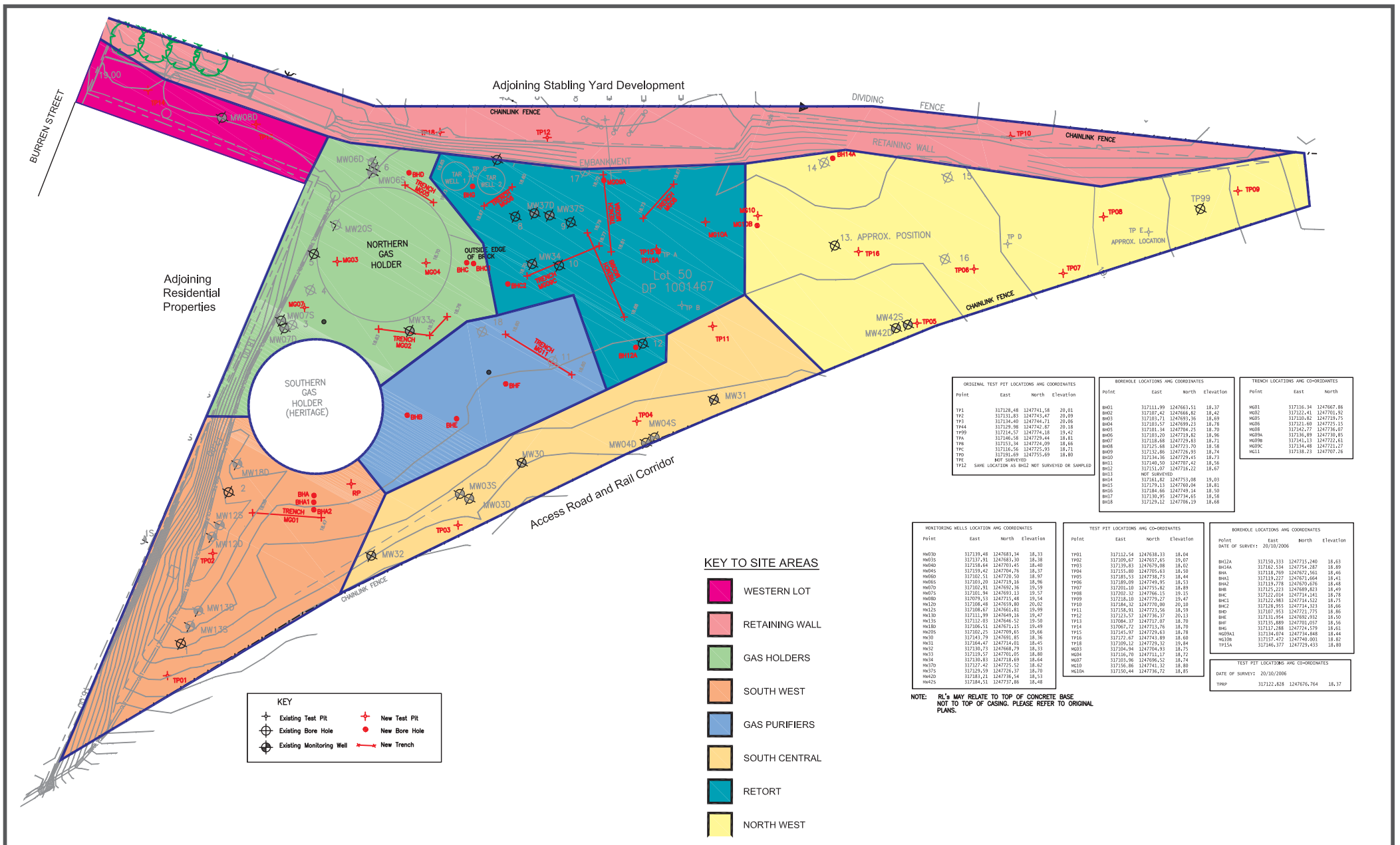


Figure 1 Site Location (Macdonaldtown)



Figure 2 **Current Macdonaldtown Site Plan**

CH2M Hill (2007)
Note- All locations shown are approximate only



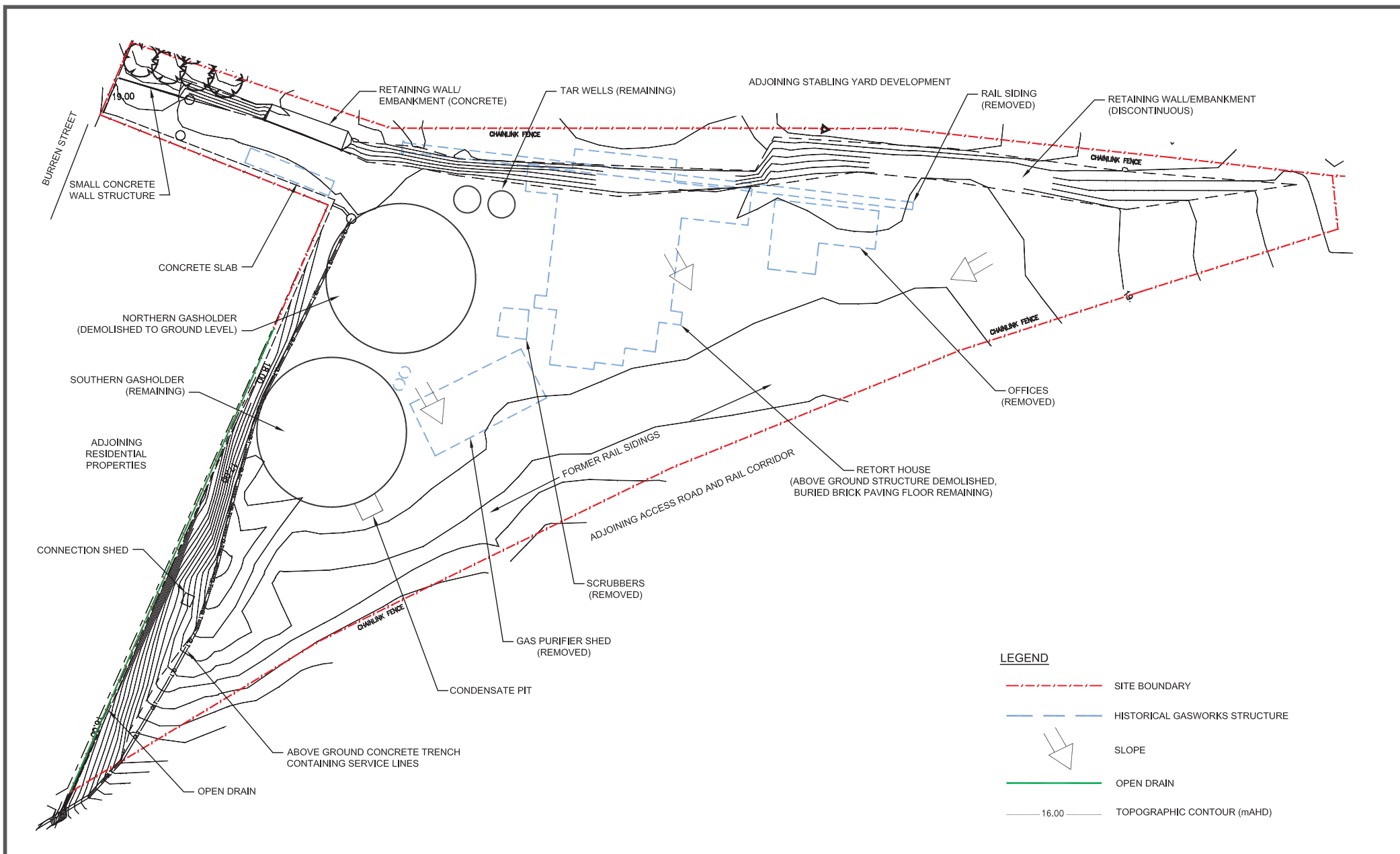


Figure 4 **Location of Historical Gasworks Infrastructure**

CH2M Hill (2007)
Note- All locations shown are approximate only

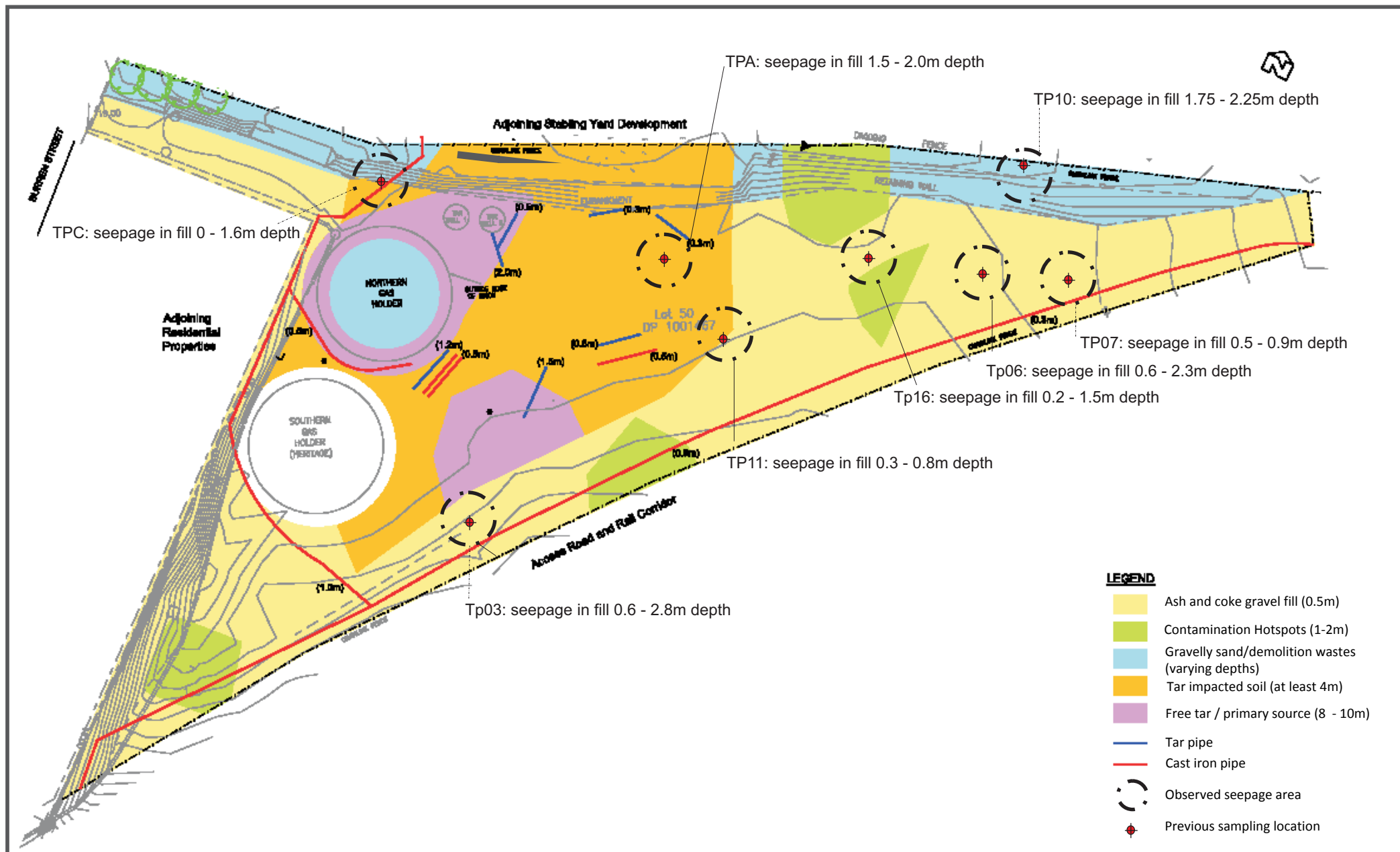
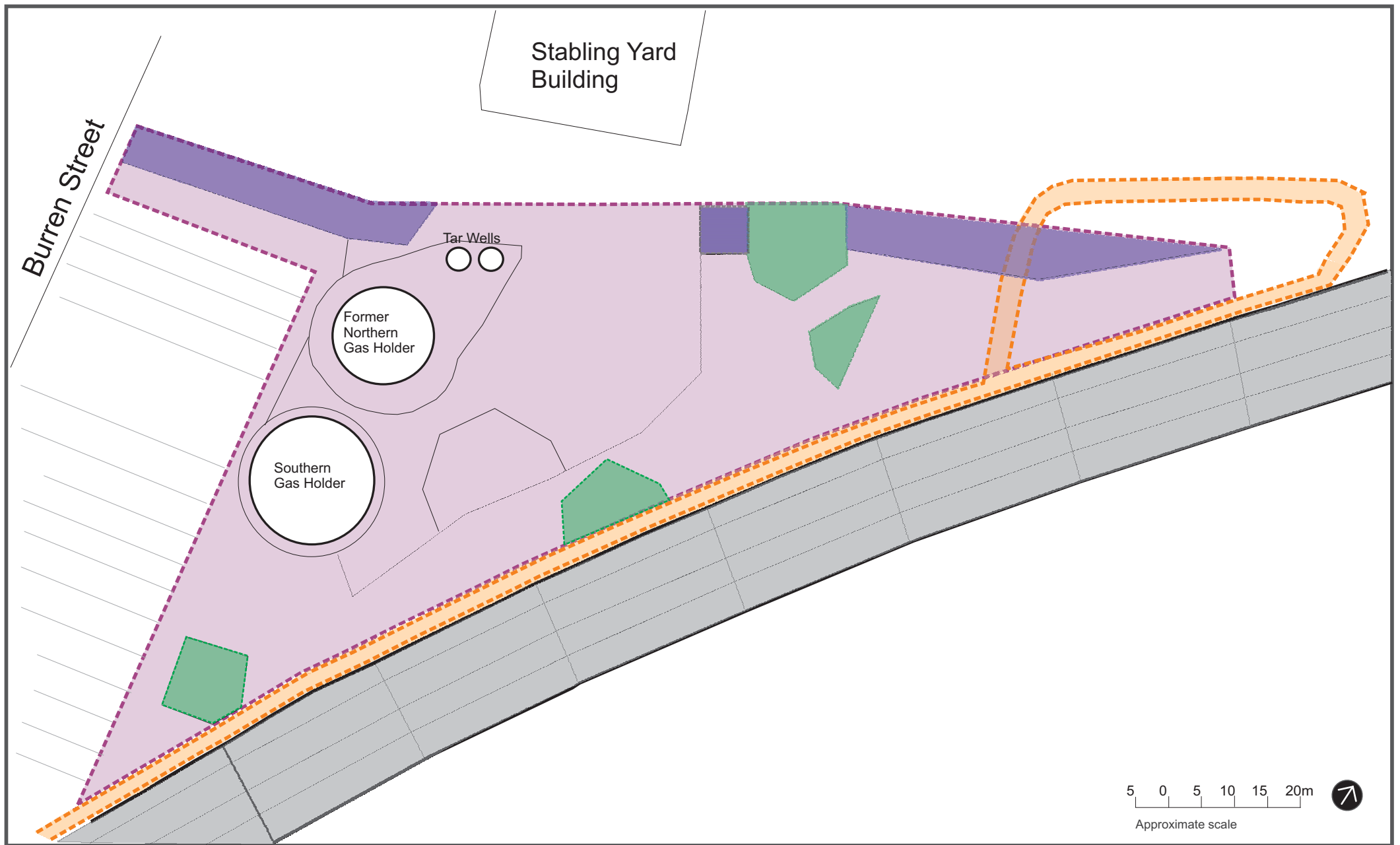


Figure 5 **Remediation Areas and Locations of Observed Seepage**

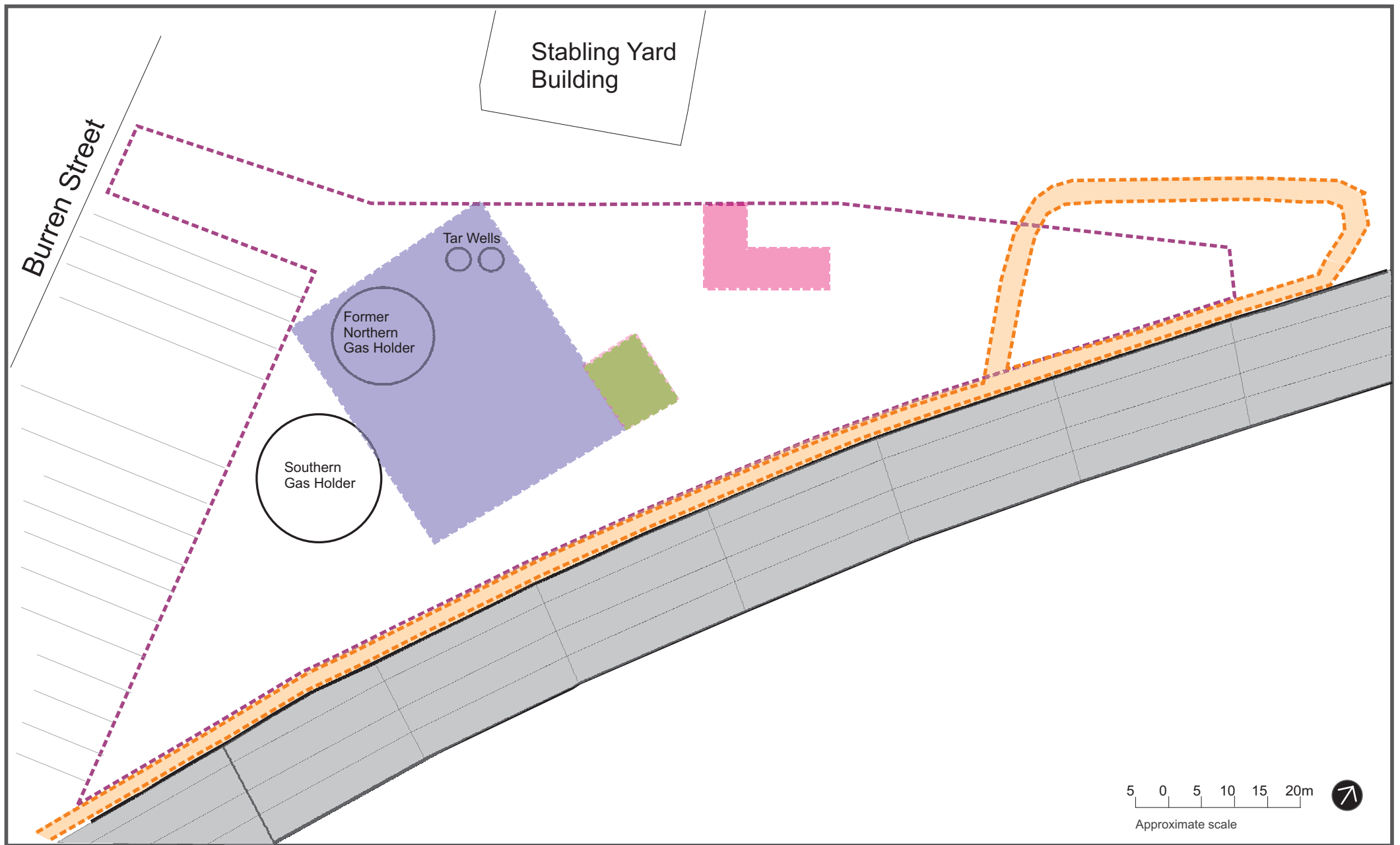
CH2M Hill (2007)
Note- All locations shown are approximate only



- Site Boundary
- Task 1A - assessment of blue area for suitability to remain on site
- Task 1B - installation of access road turning circle
- Task 1C - strip off top 0.5 of fill (for remediation by cement stabilisation)
- Task 1D - Excavate and validate hotspots (for remediation by cement stabilisation)

Figure 6 Former Macdonaldtown Gasworks - Remediation Stage One Works

As adapted from Figure 4 CH2M Hill 2007



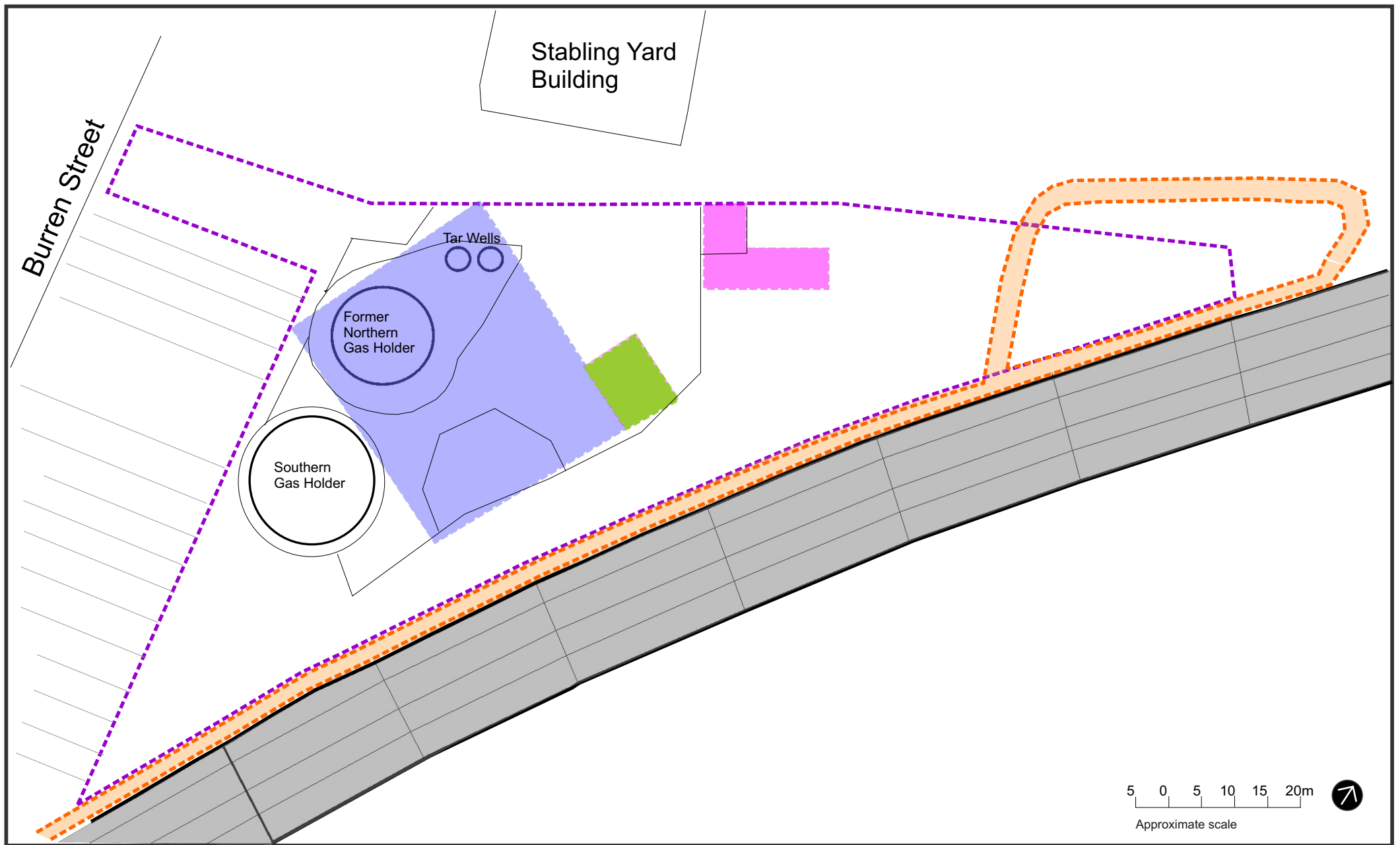
- Site Boundary
- Temporary Enclosure
- Air Emissions Treatment System
- Water Treatment System

- Site Access Road
- Water Treatment System

Figure 7

Macdonaldtown Remediation Proposed Site Setup

As adapted from Figure 4 CH2M Hill 2007

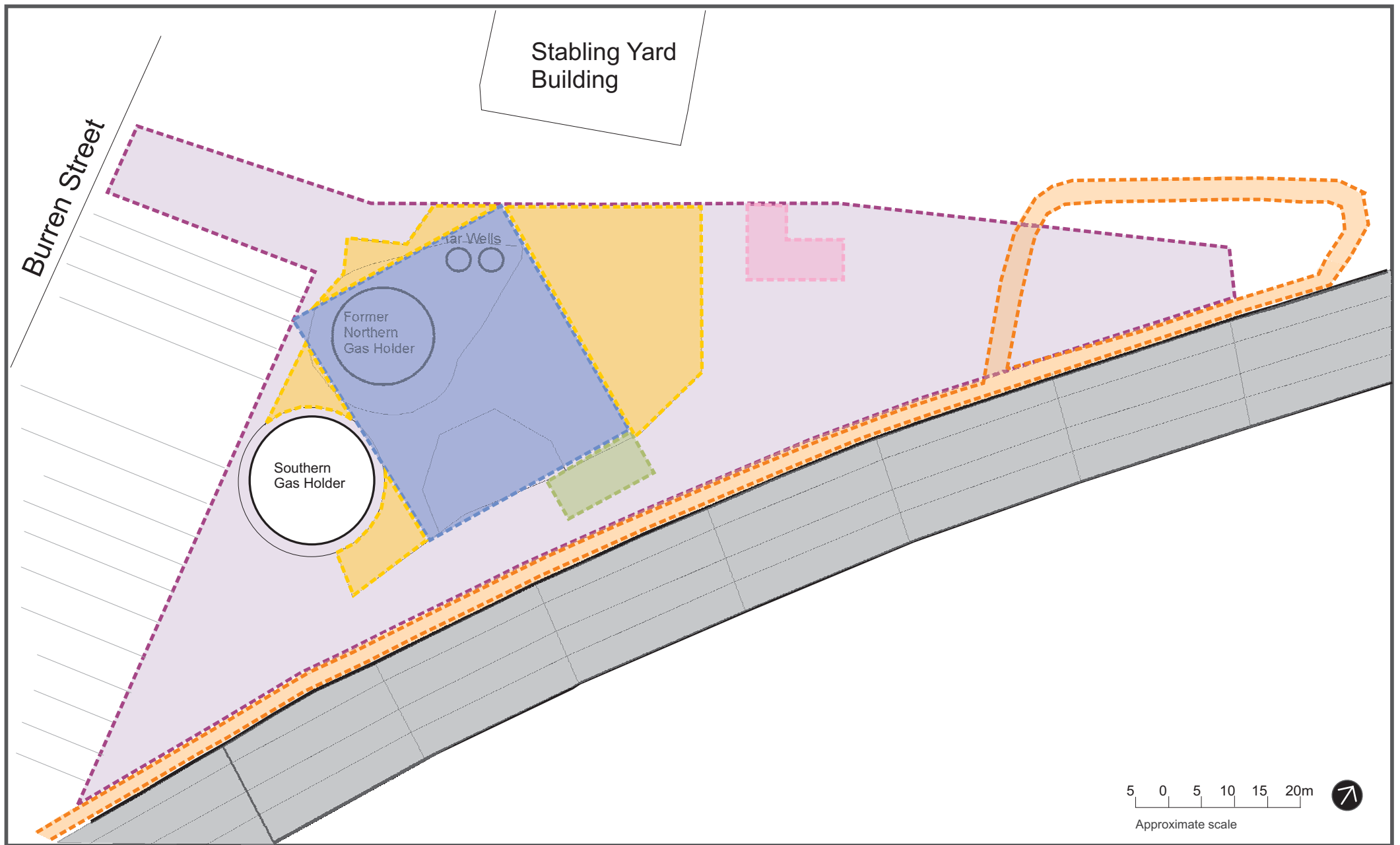


- Site Boundary
- ■ Task 2A - install & commission enclosure, water treatment plant and air emissions treatment system
- Task 2B - excavate and validate area within enclosure
- Task 2C - reinstate with VENM of imported materials to site level external to enclosure

Figure 8

Former Macdonaldtown Gasworks - Remediation Stage 2

As adapted from Figure 4 CH2M Hill 2007



- Site Boundary
- Task 3A - excavate areas of impact and assess potential for bioremediation
- Potential Stockpiling areas

Figure 9

Former Macdonaldtown Gasworks - Remediation Stage Three Works

As adapted from Figure 4 CH2M Hill 2007



Source: Base Image - © 2011 Lynton Surveyors Pty Ltd - 2011C107_DET.dwg

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| | | | |
|----------------------------|----------------------|------|------------|
| 0 7.5 15 30 m | | | |
| Scale: Approximate | | | |
| Datum: MGA94 Zone 56 - AHD | Doc. No: Preliminary | | |
| A4 | | | |
| | | | |
| | | | |
| A | Original Issue - | RF | 19-05-2011 |
| Rev | Description | Drm. | Date |

Legend:

- New Temporary Fence
- Air Treatment System
- Temporary Enclosure
- Area for Stockpiling
- Decontamination Area / Wheel Wash



Figure 10: Proposed Setup of Treatment Area (Chullora)

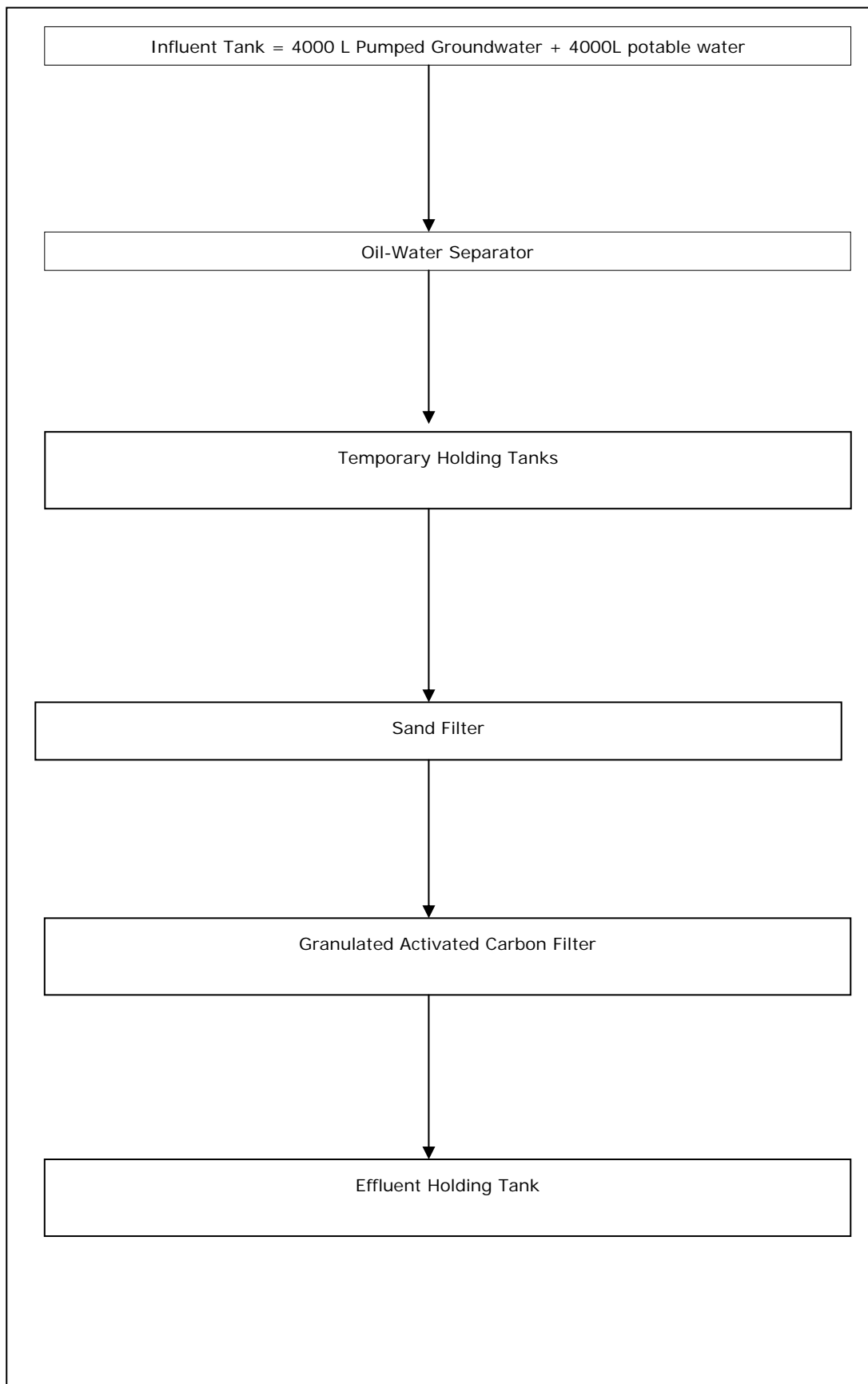
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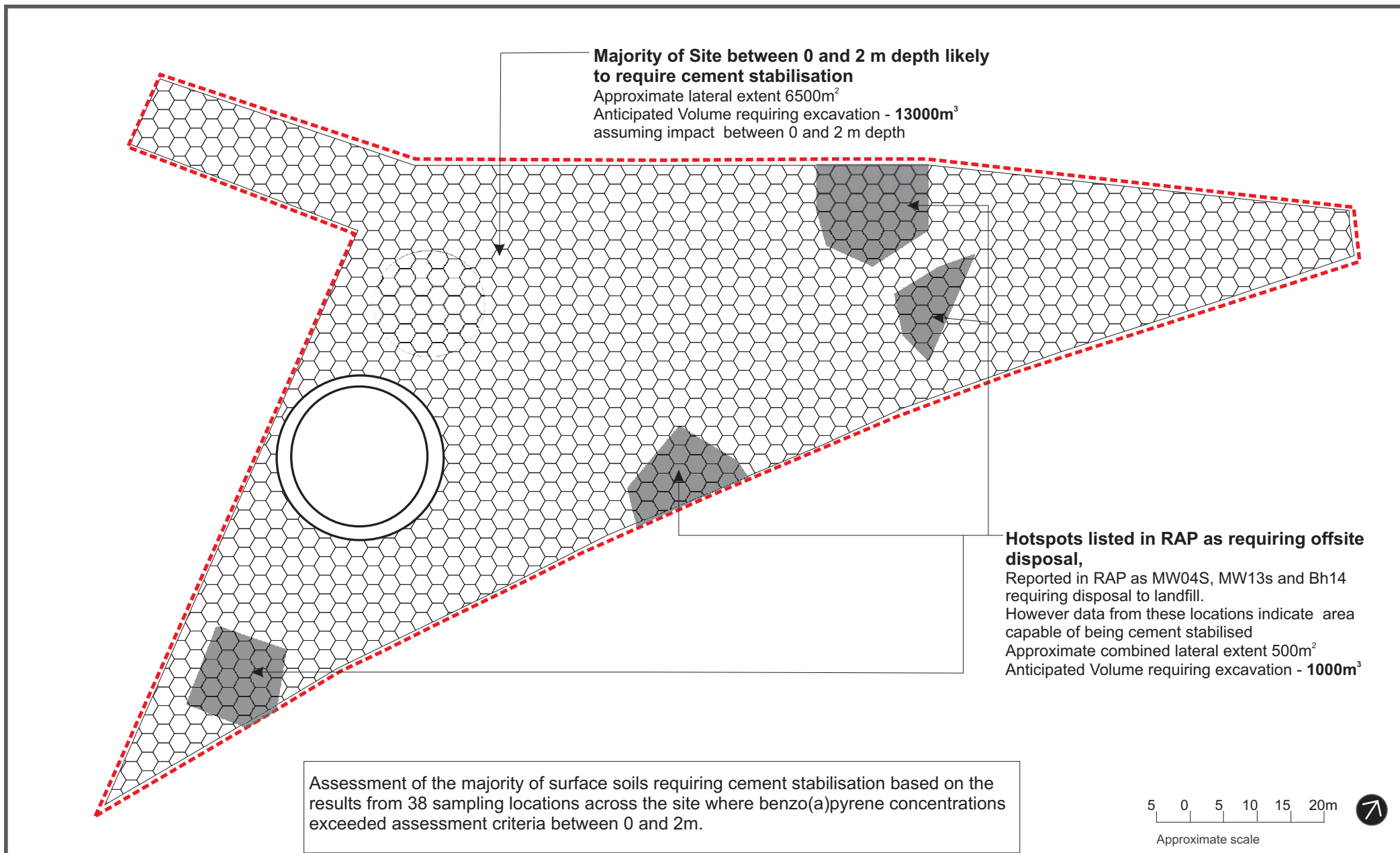
Project: RailCorp Macdonaldtown Approvals

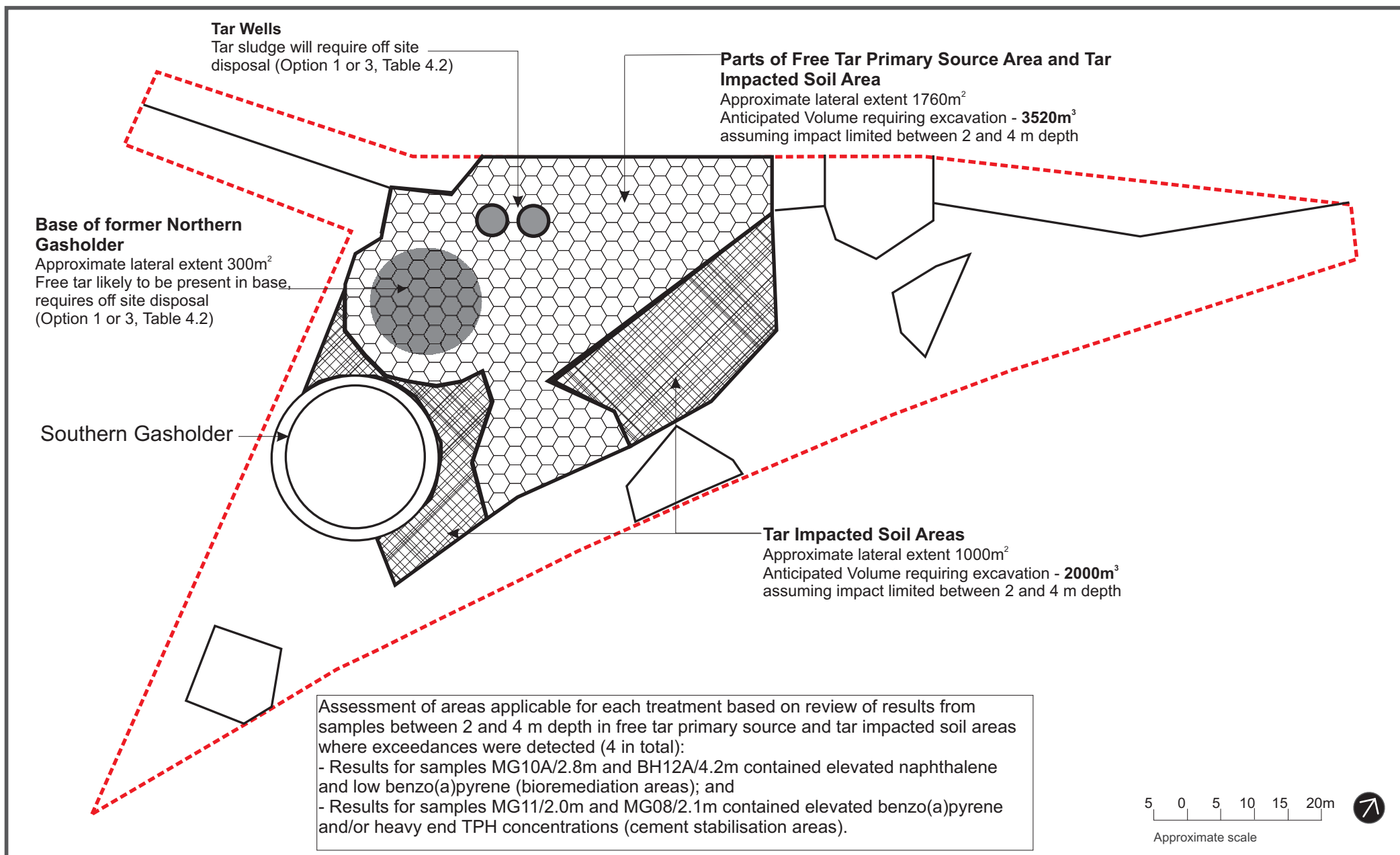
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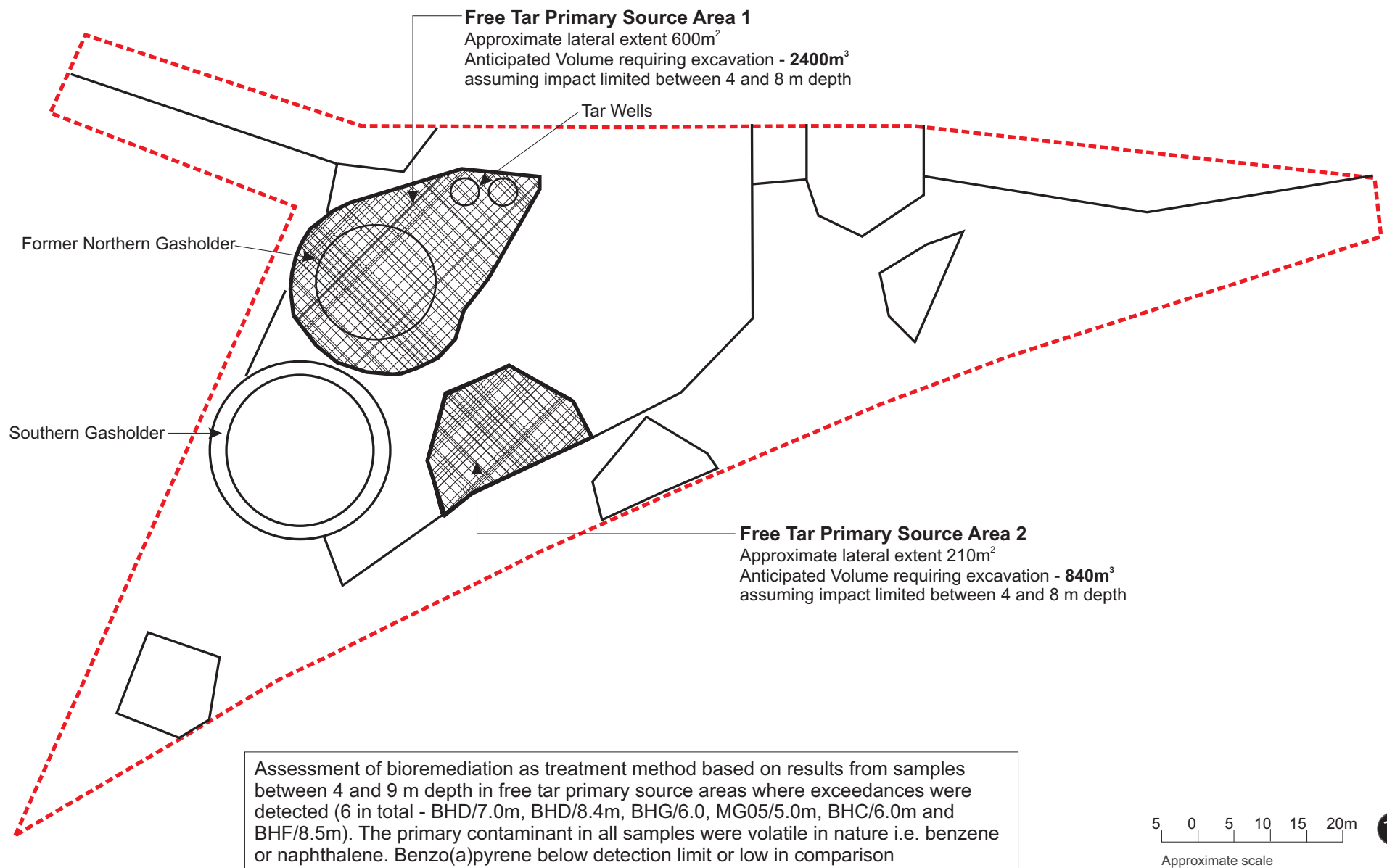
File Name: 40913_02

Figure 11: Water Treatment Trial Setup and Components











LEGEND

 Proposed Site Area Available
for Treatment Works



0 50m
Approximate scale

Figure 15 **Chullora Treatment Area Site Plan**

Department of Lands (2010)
Note- All locations shown are approximate only

Tables

Table A: Revised Remedial Strategy – Areas, Extents and Likely Treatment Requirements

| Site Area | Material Type | Extent of Impact | Expected Quantity (m ³) | Contaminants (Maximum reported concentration) | Primary Treatment | | Licencing Requirements |
|---|---|--|-------------------------------------|--|---|--|---|
| | | | | | Treatment Options (1,2, 3 or 4 from Table 4.2) | Anticipated Waste Classification Subsequent to Treatment / Immobilisation Approval | |
| Northern gasholder | Tar Sludge | Contained within Base of Gasholder | 320 | Benzo(a)pyrene (595 mg/kg) Total PAHs (26 805.3 mg/kg) TPH C6-C9 (3770 mg/kg) TPH C10-C14 (1 180 000 mg/kg) Benzene (814 mg/kg) Ethylbenzene (254 mg/kg) Total Xylenes (3170 mg/kg) | Option 1: Liquid Waste Disposal | - | No premises based licence required for on-site handling Licenced Liquid Waste contractor required for transport and ultimate treatment/disposal of free tar |
| | Impacted Water | Contained within Gasholder | 640 | Naphthalene (1 460 µg/L) Total PAHs (1 6774 µg/L) TPH C6-C9 (2170 µg/L) TPH C10-C14 (9495 µg/L) Benzene (704 µg/L) Ethylbenzene (213 µg/L) Toluene (117 µg/L) Total Xylenes (417 µg/L)) | Option 1: Liquid Waste Disposal; or disposal to sewer or on site reuse | Suitable for disposal to sewer or on site beneficial reuse | Disposal to sewer requires trade waste agreement with Sydney Water |
| | Soil / fill impacted by free tar | Base annulus and proximate soils (within pink shaded area on Figure 5 to a depth of 8m-10m) | 2100 | Benzo(a)pyrene (17.6 mg/kg) Total PAHs (1906.4 mg/kg) TPH C6-C9 (559 mg/kg) TPH C10-C14 (8760 mg/kg) Benzene (5.4 mg/kg) Ethylbenzene (40.8 mg/kg) Total Xylenes (246.7 mg/kg) | Options 2 or 3: Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) | For treatment - Cement stabilisation may be undertaken in accordance with NSW DEC general immobilisation approval (Approval #2005/14), Deviations from this method may require a specific immobilisation approval to be obtained from DECCW For off-site disposal – landfill receiving treated material must: - be licensed the class of waste the treated material is assessed as; - have an operational leachate collection system - monitor leachate and groundwater on site for B(a)P and Total PAHs |
| | Demolition Waste | Buried inside Gasholder annulus (blue shaded area on Figure 5) | 1900 | Benzo(a)pyrene (17.6 mg/kg) Total PAHs (1906.4 mg/kg) TPH C6-C9 (559 mg/kg) TPH C10-C14 (8760 mg/kg) Benzene (5.4 mg/kg) Ethylbenzene (40.8) Total Xylenes (246.7) Asbestos present | Landfill disposal or Recycling | Hazardous Waste (free tar) | No premises based licence required for on-site handling Licensed Liquid Waste contractor required for transport and ultimate treatment/disposal of free tar |
| | | | | | | Special Waste (asbestos) | For site removal works – if more than 10m ² of ACM encountered, works must be undertaken by a licencedAS1 contractor For off-site disposal – landfill must be licensed to received asbestos waste |
| | | | | | | General Solid Waste (Non-Putrescible) | For off-site disposal – landfill must be licensed to received General Solid Waste (non-putrescible) For recycling – premises must be licenced for appropriate waste recovery category |
| Retort and Surrounding Former Gasworks Source Areas | Shallow Tar Impacted Soil and Fill | Lateral extent of orange shaded area on Figure 5 to a depth of at least 4m | 9225 | Benzo(a)pyrene (444 mg/kg) Total PAHs (15 237.6 mg/kg) TPH C6-C9 (51 mg/kg) TPH C10-C14 (435 100 mg/kg) Benzene (0.3 mg/kg) Ethylbenzene (12.3 mg/kg) Total Xylenes (10.6 mg/kg) | Options 2 or 3: Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) | For treatment - Cement stabilisation may be undertaken in accordance with NSW DEC general immobilisation approval (Approval #2005/14), Deviations from this method may require a specific immobilisation approval to be obtained from DECCW For off-site disposal – landfill receiving treated material must: - be licensed to receive the class of waste the treated material is assessed as; - have an operational leachate collection system - monitor leachate and groundwater on site for B(a)P and Total PAHs |
| | Deep Tar Impacted Natural Soil | Lateral extent of pink shaded area on Figure 5 in the vicinity of boreholes BHE and BHF to a depth of 8m-10m | 2375 | Benzo(a)pyrene (13.9 mg/kg) Total PAHs (515.6 mg/kg) TPH C6-C9 (228 mg/kg) TPH C10-C14 (5350 mg/kg) Benzene (20 mg/kg) Ethylbenzene (8.3 mg/kg) Total Xylenes (94.9 mg/kg) | | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) | |
| | Tar Impacted Contamination hotspot at TP16 location | Lateral extent of green shaded area on Figure 5 to a depth of 1m-2m | 115 | Benzo(a)pyrene (39.4 mg/kg) Total PAHs (425.1 mg/kg) TPH C6-C9 (166 mg/kg) TPH C10-C14 (7640 mg/kg) Benzene (3.1 mg/kg) Ethylbenzene (6.4 mg/kg) Total Xylenes (61.2 mg/kg) | | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) | |
| Existing Site Surfaces | Ash/ Coke Fill | Lateral extent of shaded area on Figure 5 to a depth of at least 0.5 m | 2950 | Benzo(a)pyrene (39 mg/kg at BH13) Total PAHs (413.2mg/kg at BH13) TPH C10-C14 (7100 mg/kg at BH13) Lead (2140 mg/kg at VP01 surface) | Options 2 or 3: Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste (may also be assessed for suitability for on site reuse) | For treatment - Cement stabilisation may be undertaken in accordance with NSW DEC general immobilisation approval (Approval #2005/14), Deviations from this method may require a specific immobilisation approval to be obtained from DECCW For off-site disposal – landfill receiving treated material must: - be licensed to accept the class of waste the treated material is assessed as; - have an operational leachate collection system - monitor leachate and groundwater on site for B(a)P and Total PAHs |
| Retaining Wall | General Fill and demolition waste | Entire Northern boundary (shaded blue on Figure 5) | 1765 | Benzo(a)pyrene 150 mg/kg) Total PAHs (2472.4 mg/kg) Benzene (15.0 mg/kg) Total Xylenes (1.7 mg/kg) | Landfill disposal, Beneficial Reuse or Recycling | - | For removal works – if more than 10 m ² of ACM encountered, works must be undertaken by a licenced AS1 contractor For off-site disposal – landfill must be licensed to received General Solid Waste (non-putrecible) and /or Special Waste (Asbestos Waste) |

| Site Area | Material Type | Extent of Impact | Expected Quantity (m ³) | Contaminants (Maximum reported concentration) | Primary Treatment | | Licencing Requirements |
|---|---|---|-------------------------------------|--|--|--|---|
| | | | | | Treatment Options (1,2, 3 or 4 from Table 4.2) | Anticipated Waste Classification Subsequent to Treatment / Immobilisation Approval | |
| | | | | | | | as appropriate For recycling – premises must be licenced for appropriate waste recovery category |
| Contamination Hotspots | Impacted Fill at locations BH14, MW13s and MW04s | Lateral extent shown as green shaded area on Figure 5 to a depth of 1 m-2 m | 340 | At BH14: Benzo(a)pyrene (5 mg/kg) Benzene (4.6 mg/kg) Total Xylenes (48 mg/kg) At MW13: Naphthalene Benzo(a)pyrene (34.9 mg/kg) Total PAHs (346 mg/kg) TPH C10-C14 (6444 mg/kg) At MW04: Benzene (4 mg/kg) | Options 2 or 3: Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation or Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste | For treatment - Cement stabilisation may be undertaken in accordance with NSW DEC general immobilisation approval (Approval #2005/14), Deviations from this method may require a specific immobilisation approval to be obtained from DECCW For off-site disposal – landfill receiving treated material must: - be licensed to receive to accept the class of waste the treated material is assessed as; - have an operational leachate collection system - monitor leachate and groundwater on site for B(a)P and Total PAHs |
| Site Wide | Old Gasworks Pipes | varied | Unknown | Benzo(a)pyrene (595 mg/kg) Total PAHs (26 805.3 mg/kg) TPH C6-C9 (3770 mg/kg) TPH C10-C14 (1180 000 mg/kg) Benzene (814 mg/kg) Ethylbenzene (254 mg/kg) Total Xylenes (3170 mg/kg) | Option 1: Separate landfill disposal of empty pipework and tar contents | - | No premises based licence required for on-site handling Licenced Liquid Waste contractor required for transport and ultimate treatment/disposal of free tar |
| Site Wide | Fill and natural soil materials | NA | Unknown | unknown | Option 2 or 3: Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation or Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste | For treatment - Cement stabilisation may be undertaken in accordance with NSW DEC general immobilisation approval (Approval #2005/14), Deviations from this method may require a specific immobilisation approval to be obtained from DECCW For off-site disposal – landfill receiving treated material must: - be licensed to accept the class of waste the treated material is assessed as; - have an operational leachate collection system - monitor leachate and groundwater on site for B(a)P and Total PAHs |
| Deep excavations proximate to source area | Residual tar sources – subsequent to source removal | Unknown | Unknown | Unknown | Option 2 or 3: Treatment by bioremediation treatment for onsite reuse or landfill disposal OR Treatment by stabilisation or Stabilisation to apply NSW DEC immobilisation approval (Approval #2005/14) | Restricted Solid Waste or General Solid Waste | For treatment - Cement stabilisation may be undertaken in accordance with NSW DEC general immobilisation approval (Approval #2005/14), Deviations from this method may require a specific immobilisation approval to be obtained from DECCW For off-site disposal – landfill receiving treated material must: - be licensed to accept the class of waste the treated material is assessed as; - have an operational leachate collection system - monitor leachate and groundwater on site for B(a)P and Total PAHs |

Appendix A
Pre-Remedial Investigations

A1 Pre-Remedial Investigations -Methods

The short list of most remedial options applicable to the site has been determined as follows:

- Excavation and off-site disposal to landfill of all material containing contaminant concentrations above the site acceptance criteria;
- Excavation and treatment of all possible material containing contaminants concentrations above the site acceptance criteria, for either:
 - off-site disposal to landfill; or
 - on site reuse.
- Assessment of leachability and contaminant source zones on the site. Excavation of all accessible source zone materials and treatment, as required, for off-site site disposal to landfill and/or on-site reuse. Capping and on-site management of impacted areas assessed to be either:
 - inaccessible due to heritage or geotechnical constraints; and/or
 - outside of source zones and not posing an unacceptable risk to groundwater migrating offsite.

Based on the available dataset there were several items that required additional information to enable design of a remedial strategy. The following gaps /areas requiring resolution were identified:

- Can tar impacted soils be stabilised, and if so what pre-treatment works may be required? Specifically, it is noted that while the RAP recommends that much of the impacted material be remediated by stabilisation or thermal treatment for off-site treatment, no assessment has been undertaken on the potential applicability of either treatment method. As the stabilisation of soil is likely to be the more cost effective treatment method of the two specified, it was considered prudent to run a bench scale trial of the required methodology, in accordance with NSW EPA (2005), to verify its suitability for application at the site;
- If it can be demonstrated that tar impacted soils can be stabilised, what is the suitability the stabilised material to be retained on site? Specifically what are the maximum leachable concentrations of the contaminants of concern (COC) in soil that will not have an adverse impact on the surrounding environment? Results of the bench scale trial could be used to assess the maximum leachable concentrations in soils (treated or untreated) that can be retained on site. These concentrations, incorporating factors of dilution that may occur as leached contamination mixes with groundwater, and fate and transport modelling on the mixed water, could be incorporated into the remedial strategy as clean-up criteria;
- What are the quantities of water likely to be generated during dewatering of the site for remediation? Previous investigations of the site have reported that contaminated soil is present at depths below the level of the perched water table in fill. Additionally, significant volumes of seepage have occurred in test pits excavated into the site. Efficient completion of the proposed remediation will therefore, require dewatering of fill materials in areas requiring remediation;
- What on site technologies will be suited to treatment of water generated during dewatering? Water samples collected from the perched water table in fill were reported to contain elevated concentrations of TPH and PAHs that would preclude reinjection of this water down-gradient of the dewatering area. An on site

treatment plant may be capable of reducing TPH and PAH concentrations in this water such that reinjection or disposal to sewer, as part of a trade waste agreement with Sydney Water, may be applicable. A pilot trial of possible treatment technologies was required to finalise the required approach;

A2 Scope of Works

In order to address the uncertainties listed in the previous Section, the following scope of work was completed at the site:

- Derivation of site specific assessment criteria for leachable concentrations that are considered suitable for the protection of environmental values;
- Assessment of the suitability of impacted material at the site to be remediated by stabilisation, through:
 - the excavation of testpits and sampling of impacted material representative of that at the site;
 - bench scale treatment of cement stabilisation on impacted material; and
 - analysis of treated material for leachable concentrations and unconfined compressive strength (UCS).
- Further characterisation of leachable contaminant concentrations through the collection and analysis of up to nine samples of impacted fill or soil from potential source areas;
- Assessment of the expected rate of dewatering required on site by completion of short interval pump tests at representative locations across the site; and
- Assessment of suitable disposal locations for water generated during dewatering and required treatment, if any, by:
 - Completion of a water treatment trial on water collected during the pump tests. Three treatment technologies are to be trialled, namely an oil/water separator, a sand filter and a granulated activated carbon (GAC) filter; and
 - Collection and analysis of samples of influent and effluent from each treatment method.

The methods and results of the pre-remediation testing program developed to address these data gaps are detailed in the subsequent sections.

A.3 Derivation of Site Specific Leachability Criteria

In preparing the revised remediation strategy for the site, it is proposed that both the total and leachable concentrations of the contaminants of concern are assessed in treated material prior to determining its suitability for on site reuse.

Determination of acceptable total concentrations in treated material is expected to be straightforward and based on human health related investigation levels for commercial land use.

Site specific leachability criteria were derived by the site specific criteria in the JBS letter *'Derivation of Site Specific Leachability Criteria – Former Macdonaldtown gasworks, Burren Street, Erskineville, NSW'* Reference JBS 40913-1550, provided as **Appendix B**.

The site specific leachability criteria were derived based on the relevant criteria for protection of groundwater resources in the area, but also incorporating a dilution attenuation factor (DAF) to account for dilution of contaminated groundwater that occurs at the receiving water body, as it becomes mixed with groundwater discharged from the remainder of the catchment. A DAF value of 16.6 was determined for the site, and the resulting site specific leachability criteria for the site are provided in **Table A3.1** below.

Full details of the DAF and criteria derivation methods are provided in **Appendix B**.

Table A3.1: Site Specific Leachability Assessment Criteria (all units in µg/L)

| Contaminant | Limit of Reporting | Aquatic Ecosystems ¹ | Site Specific Criteria for assessment for leachable concentrations in soil ³ |
|----------------------------------|--------------------|--|---|
| Arsenic (III/V) | 0.1 | 2.3 ² / 4.5 ^{2, 5} | 36.8 |
| Cadmium | 0.1 | 0.7 ¹ | 11.36 |
| Chromium (III) | 1 | 10 | 160 |
| Chromium (VI) | 0.1 | 4.4 | 70.4 |
| Copper | 0.1 | 1.3 | 20.8 |
| Lead | 0.1 | 4.4 | 70.4 |
| Manganese | 1 | 80 ² | 1280 |
| Mercury | 0.05 | 0.1 ¹ | 1.76 |
| Nickel | 1 | 70 | 1120 |
| Zinc | 1 | 15 | 240 |
| VOLATILE ORGANIC COMPOUNDS | | | |
| Benzene | | 500 | 8000 |
| Toluene | | 180 ² | 2880 |
| Ethylbenzene | | 5 ² | 80 |
| Xylene (M+O+P) | | 625 ² | 10000 |
| Styrene | | 1600 | 25600 |
| Phenols | | 400 | 6400 |
| POLYCYCLIC AROMATIC HYDROCARBONS | | | |
| Benzo(a)Pyrene | 0.1 | 0.1 ² | 1.6 |
| Naphthalene | 0.1 | 70 | 1162 |
| Phenanthrene | 0.1 | 0.6 ² | 9.6 |
| Anthracene | 0.1 | 0.01 ² | 0.16 |
| Fluoranthene | 0.1 | 0.1 ² | 1.6 |

¹ 95% protection levels (marine ecosystems) have been used. When these levels fail to protect key test species, the 99% protection levels were used - ANZECC/ARMCANZ (2000). The 99% protection levels have been adopted in line with recommendations in Section 8.3.7 of ANZECC/ARMCANZ 2000.

² Insufficient data to derive a reliable trigger value. In these instances, reference has been made to low reliability trigger levels contained in ANZECC/ARMCANZ (2000).

³ Adopted criteria – 16x ANZECC/ARMCANZ 2000 trigger values, which is equivalent to 16.6x the LOR where applicable

⁴ Where no ANZECC/ARMCANZ 2000 trigger values, LOR used prior to applying dilution attenuation factor of 16

A.4 Sampling and Analysis Plan

Data Quality Objectives (DQOs) were developed for the remainder of the pre-remedial assessment works, as discussed in the following sections.

A4.1 State the Problem

RailCorp are committed to undertaking remediation works on the former Macdonaldtown Gasworks site. Contamination has been identified on the site consisting of free tar present in the abandoned gasworks infrastructure (tar wells, retort pipes etc.) and elevated concentrations of lead, B(a)P, Total PAH, TPH C₆-C₉, TPH C₁₀-C₃₆ and BTEX compounds in soils present from the surface to depths in excess of 10 m below ground level (bgl). Samples of groundwater collected from both the perched water table present in fill and from the bedrock aquifer underlying the site were reported to contain elevated concentrations of heavy metals, B(a)P, Total PAH, TPH C₆-C₉, TPH C₁₀-C₃₆ and BTEX. In accordance with the land use zoning, the objective of the proposed remediation program would be to render the site suitable for commercial land use with no unacceptable risk to the environment.

The pre-remedial assessment works were conducted to provide additional detail on the likely manner in which remediation is to be undertaken.

The team at JBS utilised for the project comprised:

- Andrew Lau – Principal Contaminated Land, was the Project Director, responsible for client liaison and program design;
- Matthew Parkinson – Principal Contaminated Land, provided specialist technical input to program design and assessment of results;
- Sumi Dorairaj – Senior Environmental Consultant, was the Project Manager responsible for client liaison, site work planning and design, health and safety management, site work co-ordination, subcontractor management and reporting; and
- Tim Davis – Senior Field Scientist, was responsible for completion of site works including subcontractor management, health and safety management and reporting.

The conceptual site model, prior to the completion of the pre-remedial assessment works, has been summarised in **Sections 2** of the main body of this report.

A4.2 Identify the Decision

The following decisions were made:

- For impacted material that remains *in-situ*, or that has been remediated through stabilisation, what are the maximum leachable concentrations of COC that present no additional risk to future users or to the surrounding environment via groundwater?
- For the coal tar impacted fill or soil to be remediated, what proportion (by mass) of calcium or magnesium based oxide cement must be added during treatment for immobilisation to be successful in reducing the leachable concentrations to acceptable levels?
- For the coal tar impacted fill or soil to be remediated, what proportion (by mass) of calcium or magnesium based oxide cement must be added during treatment to satisfy the requirements for disposal under the DECCW General Approval of the

Immobilisation of Contaminants in Waste 2005/14 (Coal Tar Wastes from Former Gas Works sites)?

- What are conservative and reasonable estimates of the dewatering rates that will be required on site during remediation of fill and/or soil?
- Out of an oil/water separator, sand filter and granular activated carbon (GAC) filter, which technology (or combination thereof) is best suited to treat the water generated on site during dewatering?

A4.3 Identify Inputs to the Decision

Inputs to the decisions were:

- A site conceptual model provided in the RAP(CH2M Hill, 2007);
- Existing groundwater data consisting of gauging, survey and limited analysis of groundwater samples;
- Soil environmental data collected by soil sampling and analysis;
- Stabilisation trial data comprising treated soil analysis and geotechnical strength testing for a range of treatment conditions;
- Groundwater pump test results from a representative number of wells on site consisting of gauging and pumping rate results to allow estimate rates of inflow into excavations;
- Treated groundwater environmental data generated by processing the water generated during the pump test through a trial scale water treatment plant, with sampling and analysis of recovered effluent;
- Soil criteria to be selected on the site based on a range of potential environmental values as defined by assessment criteria prepared in **Section A7.2**;
- Waste assessment criteria specified for Non-Liquid Waste in '*Waste Classification Guidelines, Part 1: Classifying Waste*' (DECC, 2009) and also the '*General Approval of the Immobilisation of Contaminants in Waste*' (NSW EPA 2005);
- Groundwater criteria selected on the site to be protective of current and potential future environmental values permitted under the site zoning, as defined by assessment criteria prepared in **Section A7.4**;
- Confirmation that data generated by sample analysis are of a sufficient quality to allow reliable comparison to assessment criteria as undertaken by assessment of quality assurance / quality control as per the data quality indicators established in **Section 6.4**; and
- Qualitative assessment of remediation methods commenced in **Section A9**.

A4.4 Define the Study Boundaries

The conditions to which the decisions applied and within which data were collected are summarised following:

- The lateral boundaries of the site are consistent with the boundaries of Part Lot 50 in Deposited Plan 1004167 that comprises the site;
- Risk goals as required to be met for on-going industrial use of the site and the future user populations that may be potentially impacted by contaminated material retained on the former Macdonaldtown gasworks site;

- Future site occupants and occupants in the proximity of the site, who have been assumed to be potentially exposed to groundwater present in the upper-most water bearing zone only; and
- Background groundwater quality was collected from the hydraulically upgradient boundary of the site, interpreted as being the western boundary of the former gasworks site.

A4.5 Develop a Decision Rule

The requirements for future remedial Strategy with respect to fill/soil stabilisation and groundwater treatment were proposed to be assessed by:

- Comparison of environmental data, from untreated and treated soil or fill, to criteria provided for the off site disposal of waste as available within '*General Approval of the Immobilisation of Contaminants in Waste*' (NSW EPA 2005), Approval Number 2005/14 - *Coal Tar Waste from Former Gasworks Sites*;
- Comparison of environmental data, from treated water and leachable concentrations in stabilised soil, to criteria provided for the protection of ecological ecosystems as available within:
 - 95% protection values for marine water ecosystems provided in ANZECC/ARMCANZ (2000) '*Australian and New Zealand Guidelines for Fresh and Marine Water Quality*';
 - Dutch intervention levels provided for TPH to Netherlands Ministry of Housing, Spatial Planning and Environment (2000) '*Circular on target values and intervention values for soil remediation*'; and
 - Site specific leachability criteria as provided in **Appendix B**;

as assessed at the location of the nearest potentially impacted marine ecosystems, *i.e.* Alexandra Canal.

A4.6 Specify Limits of Decision Error

There are two types of decision error identified in AS4482.1-2005 'Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds'. These include:

- a) Deciding that the site is acceptable when it actually is not; and
- b) Deciding that the site is unacceptable when it is.

Limits are required to be set on each type of error presented here. AS4482.1-2005 nominates that a 5% probability of (a) and 20% probability of (b). These were adopted for this investigation.

To assess the usability of the data prior to making decisions, the data were assessed against pre-determined Data Quality Indicators (DQIs) for precision, accuracy, representativeness, completeness and comparability. The acceptable limit on decision error is 100% compliance with DQIs.

The pre-determined Data Quality Indicators (DQIs) established for the project are discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCC parameters), and are shown in **Table A4.1**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is

assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.

- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.

Table A4.1 Summary of Quality Assurance / Quality Control Program

| Data Quality Indicators | Frequency | Data Quality Criteria |
|---|----------------------|--|
| Precision | | |
| Blind duplicates (intra laboratory) | 1 / 20 samples | <30-50% RPD ¹ |
| Blind duplicates (inter laboratory) | 1 / 20 samples | <30-50% RPD ¹ |
| Accuracy | | |
| Surrogate spikes | All organic samples | 60-140% |
| Laboratory control samples | 1 per lab batch | 60-140% |
| Matrix spikes | 1 per lab batch | 60-140% |
| Representativeness | | |
| Sampling appropriate for media and analytes | - | - |
| Samples extracted and analysed within holding times. | - | pH (7 days), organics (14 days), inorganics (6 months) |
| Trip spike | 1 per sampling event | 70-130% recovery |
| Trip blank | 1 per sampling event | <LOR |
| Comparability | | |
| Standard operating procedures for sample collection & handling | All Samples | All samples |
| Standard analytical methods used for all analyses | All Samples | All samples |
| Consistent field conditions, sampling staff and laboratory analysis | All Samples | All samples |
| Limits of reporting appropriate and consistent | All Samples | All samples |
| Completeness | | |
| Soil description and COCs completed and appropriate | All Samples | All samples |
| Appropriate documentation | All Samples | All samples |
| Satisfactory frequency and result for QC samples | All QA/QC samples | - |
| Data from critical samples is considered valid | - | Critical samples valid |

If any of the DQIs were not met, further assessment was necessary to determine whether the non-conformance significantly affected the usefulness of the data. Corrective actions include requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, collection of replacement data.

A4.7 Optimise the Design for Obtaining Data

The objectives of the works were to provide initial clarity on:

- Whether stabilisation will be a suitable remedial method to render the site suitable for commercial land use;
- Whether stabilised soil will be suitable for disposal off site in accordance with the requirements of IA 2005/14 (NSW EPA, 2005);
- whether the treated soil will be capable of being retained on site from both human health and environmental perspectives; and
- what allowances will need to be made for treatment of water generated during dewatering, in terms of the magnitude of water requiring treatment and type of treatment required.

All works were undertaken as per the methods specified in **Section A6**. The results of all additional work were assessed against historical results for contaminant concentrations in soil and slug test results in shallow wells. The results obtained are to be used to direct the design of the remediation programme for the site. Where the results of the trial works were inconclusive or inconsistent with the historical dataset, then to enable resolution, additional works have been included in the finalised remedial strategy for the site.

A.5 Sample Locations

As discussed in **Section A.2**, the pre-remedial trials were undertaken by a staged program of works. The program was staged to minimise the scale of subsurface disturbance to occur prior to remediation. The scope of works was as follows:

- Sampling of test pits excavated in the footprints of the Archaeological Research program pits:
 - In the vicinity of three former sampling locations, namely BHC, MG02 and MG10A, glass jar and bulk samples were collected at JBS TP3 4.0-4.2m, JBS TP3 1.3-1.7 m and JBS TP1 0.3-0.4 m depth respectively. Sampling depths were targeted to horizons previously demonstrated to be impacted by CoC. A duplicate bulk sample was collected at JBS TP3 4.0-4.2 m for analysis as a stabilisation trial control sample ; and
 - In the footprints of the remaining archaeological test pits, three samples were analysed from JBS TP2, JBS TP4 and JBS TP5;
- Completion of short interval pump tests at MW04S, MW06S, MW37S and MW42S
- Completion of a water treatment trial on water collected during the pump tests. Three treatment technologies are to be trialled, namely an oil/water separator, a sand filter and a GAC filter.

The methods to be employed in the collection and assessment of these data are detailed in **Section A.6**.

A.6 Assessment Methods - Soil Stabilisation Trials and Additional Leachability Testing

A6.1 Soil Sample Collection

JBS test pit locations are presented on **Figure A1**. All test pit locations were dug using a backhoe loader under the direction of trained JBS field staff. Soil/fill from the test pit above the target layer was stockpiled on plastic sheeting during excavation. Once the top of the target layer was identified, the material from this layer was stockpiled separately for sample collection. Proposed target layer depths were described in **Section A.5**, the actual sample collection depth was based on observed field conditions and are also summarised in **Section A.9**. Test pits were terminated at the base of the target layer or prior refusal.

For test pits where stabilisation testing was required, a 250 mL glass jar sample for analytical testing and a bulk sample (approximately 50kg) for treatment were collected from cuttings from the segregated target layer stockpile(s), placed in the appropriate sampling containers and sealed. Field duplicate jar samples and one duplicate bulk sample were also collected and analysed at the required frequency.

For test pits where samples were to be collected for analytical testing only, a 250 mL glass jar sample was collected directly from the excavator bucket, taking care to avoid collecting material in contact with the bucket walls.

A6.1.1 Soil Sample Containers

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination were noted on field reporting sheets.

Test pit cuttings from the sampling layer were immediately transferred to sample containers of appropriate composition. For the bulk samples this comprised new, clean, plastic, bulk bags capable of containing up to 15 kg of soil without breach. For the analytical testing sample this comprised new, laboratory prepared, acid washed glass sample jars with Teflon lined screw closures. Labels on all sample containers were completed to record JBS job number; sample identification number; and date and time of sampling.

Filled, glass jar sample containers were sealed and transferred to a chilled ice box for preservation prior to and during shipment to the analytical laboratory. Bulk samples were maintained in cool, sheltered conditions at the JBS Office until delivery to the testing laboratory was possible. A chain-of-custody form was completed and forwarded with the samples to the laboratories. The following information was included on the chain-of-custody form:

- Sample identification;
- Signature of sampler;
- Date and time of collection;
- Place of collection;
- Type of sample;
- Number and type of container;
- Inclusive dates of possession; and
- Signature of receiver.

A6.1.2 Duplicate and Triplicate Sample Preparation

Field soil duplicate and triplicate samples were obtained during sampling using the following methods. Soil samples were divided into three samples with minimal disturbance to reduce the potential for loss of volatiles and placed in three laboratory prepared glass jars. All jars were filled with no headspace to reduce the potential for loss of volatiles and separately labelled as the primary, duplicate and triplicate samples before being placed in the same chilled ice box for transport to the laboratory.

A6.1.3 Decontamination of Soil Sampling Equipment

Soil sampling equipment used by JBS comprised only disposable gloves. The gloves were discarded following collection of each sample and a clean, new pair donned prior to handling the next sample material.

Test pits were excavated in order of the 'least likely contaminated' location to 'most likely contaminated' location to minimise the potential for cross contamination. At the completion and reinstatement of each testpit, the backhoe bucket was assessed for visible contamination and/or odours, and scrubbed and rinsed as appropriate.

A6.1.4 Stabilisation Testing Procedure

The glass jar sample of the untreated soil at each location was submitted to a NATA accredited laboratory for the analysis of total and leachable concentrations of heavy metals, B(a)P, cresol, BTEX, styrene and phenol.

A bench scale stabilisation trial was completed on the bulk sample collected at each test pit location. The samples were delivered to two laboratories for testing. Enviropacific Services Pty Ltd (Enviropacific) was subcontracted by JBS for completion of the stabilisation trial, and Cardno Bowler (Cardno) was subcontracted for completed of the clay content analysis, as follows:

- Preparation of a 20 kg subsample for clay content analysis by wet sieve analysis in accordance with *AS 3686-1993 Test Sieve Analysis*;
- Preparation of the remainder into 10 kg subsamples by removing the oversize components (*i.e.* passing the sample through at 20mm sieve) and noting descriptions of any oversize particles removed, foreign materials etc or other works required to complete the sieving;
- Subsamples were then divided and weighed out to form 5 kg samples per material. The subsampled material was sampled for laboratory analysis;
- Each 5 kg subsample was combined with calcium oxide based cement at the ratios of 5%, 12.5% and 20% (by mass) and mixed by hand for approximately 5 minutes;
- Water was added accordingly to achieve the moisture content required for the complete hydration of cement, noting the sample mass pre and post water addition;
- Samples were further mixed by hand for another 5 minutes;
- Mixed samples were cast into cylinders in accordance with *AS 1012.8.1-2000 Methods of testing concrete – Method of making and curing concrete – Compression and indirect tensile test specimens*;

- Cast cylinders were left to stand for approximately 24 hrs prior to wrapping and if required, transport to another NATA accredited laboratory, for curing in a fog room at 23°C for a further 6 days;
- All samples (*i.e.* 2 x 5 kg subsamples) shall be then tested in accordance with *AS1012.9-1999 Methods for testing concrete – Determination of the compressive strength of concrete specimens*, providing duplicate results for each treatment strength;
- Results of compressive strength analysis were compared to the requirements of NSW EPA General Immobilisation Approval 2005-14;
- A subsample of the treated material at each of the 5%, 12.5% and 20% cement strengths was collected and submitted to a NATA accredited laboratory for total and leachable concentrations of heavy metals, B(a)P, cresol, BTEX, styrene and phenol. ASLP testing was conducted on the treated soil samples to provide an indication of treated material performance under on site conditions; and
- Results of the analytical testing on treated and untreated samples were compared against the requirements of DECCW General Immobilization Approval 2005-14.

A6.2 Assessment Methods - Groundwater Pump Testing

The proposed pump test locations, MW03S, MW06S, MW07S and MW31 are shown on **Figure A1**. The proposed test methodology was a modified pumping test based on the procedure provided in MacDonald A, Barker J and Davies J (September 2008) '*The bailer test: a simple effective pumping test for assessing borehole success*' in Hydrogeology Journal. Data analysis was completed using the AquiferWin32 analysis package. The test was undertaken in the field by the following method:

- Install water level logger within monitoring well set up to record readings every second;
- Install groundwater pump to the lowest depth possible;
- Allow water level in well to stabilise for two minutes;
- Pump well for 10 minutes at maximum flow rate, or until pump is heard to go dry. Record time of pumping using stop watch;
- Maintain logger in position during well recovery, and remove once water level has recovered to 87% of pre-test level; and
- Remove pump and logger from well.

A 12V submersible electric pump was used for the tests. The maximum flow rates for pumps of this nature range from approximately 17 L.min⁻¹ at 1m depth to between 12 and 16 L.min⁻¹ at 6 m depth. The achieved flow rates, were however, dependent on the well and formation characteristics, and the stable maximum flow rates achieved are provided in **Section A.11**.

Given that the pump tests were targeted to the shallow perched aquifer, and the existing well network on the site is widely spaced and not systematic, the pumping well was used as the observation well for each of the tests in accordance with the modified pumping test method.

A6.3 Assessment Method - Groundwater Treatment Trial

Total Environmental Solutions Pty Ltd (TES) was subcontracted by JBS to construct a trial water treatment system (WTS) for site comprising an oil water separator, a sand filter and GAC filter. The WTS was constructed with taps in the pipe work connecting each treatment component to enable easy collection of water samples through the treatment process.

Samples of the trial water were collected at the influent and effluent points of each WTP component and submitted for analysis for TPH, PAHs, VOCs, Phenols and heavy metals. Measurements of water quality parameters, specifically Electrical Conductivity (EC), pH, temperature, dissolved oxygen (DO) and oxidation-reduction potential (ORP), were also collected for each water sample.

A6.3.1 Water Treatment Trial Sample Collection

The trial water was collected as grab samples for laboratory analysis. Sample bottles were filled directly from the influent and effluent taps installed on the system. A subsample was passed into a clean beaker for field filtering of samples for metals analysis. Bottles were filled to the top, and sealed tightly with the provided lids as soon as possible.

Immediately after sample collection, another subsample of the water was passed through a flow cell to allow for the measurement of water quality parameters.

During the collection of treatment trial samples, characteristics of the water such as colour, odour and apparent turbidity or any indications of contamination were noted on field reporting sheets. Phase separated hydrocarbons (PSH) were not observed during the groundwater pumping or treatment process.

Filled and sealed sample bottles were transferred to a chilled ice box for preservation prior to and during shipment to the analytical laboratory. A chain-of-custody form was completed and forwarded with the samples to the laboratories. The following information will be included on the chain-of-custody form:

- Sample identification;
- Signature of sampler;
- Date and time of collection;
- Place of collection;
- Type of sample;
- Number and type of container;
- Inclusive dates of possession; and
- Signature of receiver.

A6.3.2 Duplicate Sample Preparation

One duplicate sample was obtained during the field sampling event using the following methods. Two sets of sample bottles were filled with the sample water. Once full, samples were sealed with zero headspace to reduce the potential for loss of volatiles and separately labelled as the primary, duplicate and triplicate samples before being placed in the same chilled ice box for laboratory transport.

A6.3.3 Laboratory and Field Analyses

NATA accredited laboratories were used for all laboratory analysis and testing of soil and groundwater samples. The schedule of analysis undertaken on samples of soils and groundwater is summarised in **Table A6.1**.

Table A6.1: Summary of Proposed Analysis Regime

| Media | Analysis Frequency | Analytes |
|-------|---|---|
| Soil | For each stabilisation treatment test pit sample (including one control sample): | |
| | 1 sample untreated soil or fill | Total and leachable (TCLP) heavy metals(As, Cd, Cr, Pb, Mn, Hg and Ni), PAHs, BTEX, cresol, styrene and phenol Clay Content by wet sieve analysis ² |
| | subsample soil to be treated with 5% cement addition by mass | Total and leachable (ASLP ¹) heavy metals (As, Cd, Cr, Pb, Mn, Hg and Ni), PAHs, BTEX, cresol, styrene and phenol; and Unconfined Compressive Strength (UCS) on cured sample ² |
| | subsample soil to be treated with 12.5% cement addition by mass | |
| | subsample soil to be treated with 20% cement addition by mass | |
| | For each leachability sampling test pits location | |
| | Maximum of 3 samples per pit | Total and leachable (TCLP) heavy metals(As, Cd, Cr, Pb, Mn, Hg and Ni), PAHs, BTEX, cresol, styrene and phenol |
| Water | For each water treatment technology tested: | |
| | 1 sample of influent water; 1 sample of water resident in the system; and 1 sample of effluent water. | Water quality parameters (EC, DO, pH, temperature and ORP) TPH PAHs (at 0.1 µg.L ⁻¹) detection limits VOCs Phenols; Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) |

Notes

1: ASLP testing to be undertaken using a sample of groundwater collected from an upgradient unimpacted well as the leaching media, test performed as per standard ASLP method.

2: Tests will be undertaken by a geotechnical laboratory subcontracted by JBS. Given the known contamination status of the material under assessment, any of the subcontractors' personnel who will come in contact with the samples will be inducted onto the JBS Job Risk Assessment for the works, and briefed regarding the necessary health and safety requirements.

A6.4 Laboratory Analyses

EnviroLab Services Pty Ltd (EnviroLab) at Chatswood, NSW was contracted as the primary laboratory for the required analyses. The secondary laboratory was SGS Australia Pty Ltd (SGS) at Alexandria, NSW. Both laboratories are NATA registered for the required analyses. In addition, the laboratories were required to meet JBS internal QA/QC requirements.

Geotechnical testing of bulk and treated samples was completed by Cardno and Douglas Partners Pty Ltd. Both laboratories are NATA accredited for the testing undertaken.

A7. Assessment Criteria

A7.1 Regulatory Guidelines

The investigation was undertaken with consideration to aspects of the following guidelines, as relevant:

- *Contaminated Sites: Guidelines for Assessing Service Station Sites*, NSW EPA, 1994 (EPA 1994)
- *Contaminated Sites: Sampling Design Guidelines*, NSW EPA, 1995 (EPA 1995)
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*, NSW EPA, 1997 (EPA 1997)
- *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Edition*, NSW EPA, 2006 (DEC 2006)
- *National Environment Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council, 1999 (NEPC 1999)
- *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*, Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council, 1992 (ANZECC/NHMRC 1992)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, 2000 (ANZECC/ARMCANZ 2000)
- *Australian Drinking Water Guidelines*, National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, 2004 (NHMRC/NRMMC 2004)
- *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 (EnHealth 2002)
- *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*, NSW DEC, March 2007 (DEC 2007)
- *Contaminated Sites: Guidelines on Duty to Report Contamination under the Contaminated Land Management Act 1997*, NSW DECC, June 2009 (DECC 2009)

A7.2 Soil Criteria

Assessing the success of stabilisation in remediating soil is a two stage process, as follows:

1. Results of geotechnical testing on treated material and results of total contaminant concentrations on untreated soil were assessed against the '*Conditions of Approval*' as specified in '*General Approval of the Immobilisation of Contaminants in Waste*' (NSW EPA 2005), Approval Number 2005/14 - *Coal Tar Waste from former Gasworks Sites*. The conditions are summarised in **Table A7.1** and
2. Results of TCLP and ASLP testing on untreated and treated material were assessed against groundwater assessment criteria discussed in **Section 4.3**.

Table A7.1: Soil Criteria (units as specified)

| Property | Requirement (IA 2005/14, NSW EPA) ¹ |
|--|--|
| Concentrations in untreated material do not exceed | PAHs – 13 000 mg.kg ⁻¹ B(a)P – 500 mg.kg ⁻¹ Non-halogenated phenols – 2000 mg.kg ⁻¹ Total Cyanide 4000 mg.kg ⁻¹ |
| Reagent used for stabilisation | Calcium or Magnesium Oxide |
| Maximum allowable stabilisation ratio | 2:1 (i.e. by mass, 2 parts reagent to 1 part untreated soil) |
| UCS | 1 MPa as the 95% lower confidence limit value (as assessed by AS1012.9-1999) |

Additionally, the results of clay content testing on the untreated material were assessed to determine whether this property is likely to affect the efficacy of stabilisation as the remediation method.

Should the treated material fail to comply with the requirements of **Table A7.1**, the material will need to be assessed against the criteria provided for off site disposal of waste as available within *Waste Classification Guidelines, Part 1: Classifying Waste* (DECC, 2009);

A7.3 Soil Leachability Data

Soil leachability data was assessed against the :

- the site specific leachability criteria specified in **Table A3.1**; and
- criteria provided for off site disposal of waste as available within *Waste Classification Guidelines, Part 1: Classifying Waste* (DECC, 2009).

A7.4 Treated Groundwater Criteria

Treated groundwater data were assessed against groundwater investigation levels (GILs). DEC (2007) '*Guidelines for the Assessment and Management of Groundwater Contamination*' instructs that GILs adopted for a site are required to take into consideration groundwater environmental values.

Environmental values are defined in ANZECC / ARMCANZ (2000) as '*...particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health which require protection from the effects of pollution, waste discharges and deposits*'.

The site lies within the lower estuaries of the Sydney Harbour and Parramatta River catchment boundary established by the DECC

(<http://www.environment.nsw.gov.au/ieo/SydneyHarbour/map.htm>, as on 17 June 2010).

The interim water quality objectives established in NSW Government (2006) '*Environmental Objectives for Water Quality and River Flow*' for waterways affected by urban development in the Sydney Harbour and Parramatta River catchment include:

- Protection of aquatic ecosystems;
- Protection of visual amenity;
- Protection of secondary contact recreation; and
- Protection of primary contact recreation in the long term, *i.e.* in 10 years or more.

These water quality objectives are required to be applied at the point of ecological discharge, which previous investigations have stated would include Alexandra Canal located to the south-east of the site.

A discussion of the use of groundwater in urban areas for drinking or agricultural purposes is provided in Sydney Coastal Councils Group (September 2006) 'Groundwater Management Handbook' (SCCG, 2006). It is stated there that "*DNR advises that groundwater from individual domestic bores or spearpoints in urban areas should never be considered suitable as a drinking water supply. The health risk posed by untreated water from these installations can be significant. DNR also recommends that groundwater should not be used for watering edible produce (i.e. vegetables and fruits), nor for filling swimming pools and spas in an urban area. Any of these proposed uses requires frequent rigorous testing and treatment of groundwater to confirm its suitability for the intended purpose*".

Drinking water will be considered as a potential future use in the event that economical yields from the bedrock may one day be achievable. However, noting the commentary provided in SCCG (2006) it is considered inappropriate to strictly assess concentrations of contaminants in groundwater collected from the Site against drinking water criteria. Similarly, strict assessment of concentrations of contaminants in groundwater collected from the site against primary and secondary contact recreation is inappropriate.

The following criteria were considered to allow each of these beneficial uses to be assessed:

- 95% protection levels for marine waters provided in ANZECC/ARMCANZ (2000) to be assessed at the nearest down gradient receptor;
- Recreational water quality criteria provided in Section 5.2.3 of ANZECC/ARMCANZ (2000) to be assessed at the nearest down gradient receptor;
- Recreational and aesthetic water quality criteria provided in Section 5.2.3.3 of ANZECC/ARMCANZ (2000) to be assessed at the nearest down gradient receptor;
- Irrigation water quality criteria provided in Section 9.2.5 of ANZECC / ARMCANZ (2000) to be applied as a long term objective on the site boundary; and
- Drinking water criteria provided in NHMRC NRMCC (2004) '*Australian Drinking Water Guidelines*' to be applied as a long term objective at the site boundary and in consideration of the discussion provided earlier.

It is noted that the above summarised Australian guidelines do not provide guidelines for several substances. In these cases, DEC (2007) instructs that laboratory detection limits should be used as preliminary investigation levels. For substances with no drinking water criteria, reference may also be made to 'tap water criteria' provided to US EPA Region 9 (2004) 'Preliminary Remediation Goals'. It is noted that these are intended as screening level (preliminary) criteria, and may be based on toxicological data and exposure

parameters that may be less conservative than those which may be endorsed for use in Australia. The criteria used for assessment of soil leachability and groundwater data are summarised in **Table A7.2**.

Table A7.2: Assessment Criteria for Treated Groundwater(µg/l)

| | Aquatic Ecosystems ¹ | Recreation ³ | Visual Amenity ⁴ | Drinking Water ⁹ | Irrigation ¹⁰ | LOR ⁷ |
|---|--|-------------------------|-----------------------------|-----------------------------|--------------------------|------------------|
| Total Petroleum Hydrocarbons | | | | | | |
| TPH (C ₆ – C ₃₆) | 7 ² | - | No sheen or odour | 90 ¹¹ | - | 250 ⁷ |
| Monocyclic Aromatic Hydrocarbons | | | | | | |
| Benzene | 500 | 10 | - | 1 | - | 1 |
| Toluene | 180 ² | - | - | 800 | - | |
| Ethylbenzene | 5 ² | - | - | 300 | - | |
| Xylene (M+O+P) | 625 ² | - | - | 600 | - | |
| Isopropylbenzene | 30 ² | - | - | 660 ⁶ | - | |
| n-propylbenzene | - | - | - | 240 ⁶ | - | |
| 1,3,5-trimethylbenzene | - | - | - | 12 ⁶ | - | |
| 1,2,4-trimethylbenzene | - | - | - | 12 ⁶ | - | |
| Tert-butylbenzene | - | - | - | 240 ⁶ | - | |
| p-isopropyltoluene | - | - | - | - | - | |
| n-butylbenzene | - | - | - | 240 ⁶ | - | |
| Trihalomethanes | | | | | | |
| Bromodichloromethane | - | - | - | 250 | - | |
| Halogenated Aromatic Compounds | | | | | | |
| 1,2-Dichlorobenzene | 160 | - | - | 1,500 | - | |
| 1,4-Dichloeobenzene | 60 | - | - | 40 | - | |
| Halogenated Aliphatic Compounds | | | | | | |
| Vinyl chloride | 100 | - | - | 0.3 | - | 1 |
| 1,1-Dichloroethane | 250 ² | - | - | 810 ⁶ | - | 1 |
| 1,1-Dichloroethene | 700 ² | - | - | 30 | - | |
| Cis-1,2-dichloroethene | 700 ² | - | - | 60 | - | |
| Trans-1,2-dichloroethene | 700 ² | - | - | | - | |
| 1,1,1-Trichloroethane | 270 ² | - | - | 3200 ⁶ | - | |
| Trichloroethene | 330 ² | 30 | - | 0.028 ⁶ | - | |
| Tetrachloroethene | 70 ² | 10 | - | 50 | - | |
| 1,2,3-trichloropropane | - | - | - | 0.0056 ⁶ | - | |
| Heavy Metals | | | | | | |
| Arsenic (III/V) | 2.3 ² / 4.5 ^{2, 5} | 50 | - | 7 | 100 | |
| Cadmium | 0.7 ¹ | 5 | - | 2 | 10 | |
| Chromium (III) | 10 | 50 | - | - | - | |
| Chromium (VI) | 4.4 | | - | 50 | 100 | |
| Copper | 1.3 | 1000 | - | 2,000 | 200 | |
| Lead | 4.4 | 50 | - | 10 | 2000 | |
| Manganese | 80 ² | 100 | - | 500 | 200 | |
| Mercury | 0.1 ¹ | 1 | - | 1 | 2 | |
| Nickel | 70 | 100 | - | 20 | 200 | |
| Zinc | 15 | 5000 | - | 3000 ⁸ | 2000 | |
| Polycyclic Aromatic Hydrocarbons | | | | | | |
| Naphthalene | 50 | - | - | 6.2 ⁶ | - | 0.1 |
| Acenaphthylene | - | - | - | - | - | |
| Acenapthene | - | - | - | 370 ⁶ | - | |
| Fluorene | - | - | - | 240 ⁶ | - | |

| | Aquatic Ecosystems¹ | Recreation³ | Visual Amenity⁴ | Drinking Water⁹ | Irrigation¹⁰ | LOR⁷ |
|--------------------------|---------------------------------------|-------------------------------|-----------------------------------|-----------------------------------|--------------------------------|------------------------|
| Phenanthrene | 0.6 | - | - | - | - | 0.1 |
| Anthracene | 0.01 ² | - | - | 1800 ⁶ | - | |
| Fluoranthene | 1 ² | - | - | 1500 ⁶ | - | |
| Pyrene | - | - | - | 180 ⁶ | - | |
| Benzo(a)anthracene | - | - | - | 0.092 ⁶ | - | |
| Chrysene | - | - | - | 9.2 ⁶ | - | |
| Benzo(b&k)fluoranthene | - | - | - | 0.092 ⁶ | - | |
| Indeno(1,2,3-cd)perylene | - | - | - | 0.092 ⁶ | - | |
| Benzo(g,h,i)perylene | - | - | - | - | - | 0.1 |
| Dibenz(a,h)anthracene | - | - | - | - | - | 0.1 |
| Benzo(a)pyrene | 0.1 ² | 0.01 | - | 0.01 | - | 0.1 |

1. 95% protection levels (marine ecosystems) have been used. When these levels fail to protect key test species, the 99% protection levels were used - ANZECC/ARMCANZ (2000).
2. Insufficient data to derive a reliable trigger value. In these instances, reference has been made to low reliability trigger levels contained in ANZECC/ARMCANZ (2000).
3. Recreational purposes - Table 5.2.3 ANZECC/ARMCANZ (2000)
4. Recreational water quality and aesthetics – s.5.2.3.3 ANZECC/ARMCANZ (2000)
5. Criteria for As (V) selected
6. US EPA Region 9 (2004) tap water criteria
7. Laboratory limit of reporting provided for substances with insufficient published ecological / health investigation guidelines, or where published guidelines fall below laboratory limit of detection.
8. Based on aesthetic considerations. No Health based guideline published.
9. NHMRC NRMCM (2004) 'Australian Drinking Water Guidelines'
10. ANZECC / ARMCANZ (2000) Section 9.2.5., long term vales used.
11. Lowest of fraction specific criteria provided to WHO (2005) 'Petroleum Products in Drinking Water'

A.8 Pre-Remedial Investigations - Quality Assurance / Quality Control

A8.1 Soil QA/QC Results

The QA/QC results for soil samples collected at the site are summarised in **Table A8.1** and discussed in **Section A8.2** below. Detailed laboratory QA/QC results are included in the laboratory reports in **Appendix F** of the Revised Remedial Strategy document. Tabulated QA/QC results are provided in **Appendix G** of the Revised Remedial Strategy document.

Table A8.1 - Soil QA/QC Results Summary

| Data Quality Indicator | Frequency | Results | DQI met? |
|---|--|---|----------------------|
| Precision | | | |
| Soil Blind duplicates (intra laboratory) | 1 field duplicate analysed – 9% of total samples >5% acceptable | 0 - 121% RPD | Partial ¹ |
| Soil Blind replicates (inter laboratory) | 1 blind replicates analysed – 9% of total samples >5% acceptable | 0-159% RPD | Partial ¹ |
| Laboratory Duplicates | 1 laboratory duplicate analysed depending upon analyte – 9% of total samples >5% acceptable | 0-29% RPD | yes |
| Trip spike | 1/1 batches (<LOR) | 96-100% | Yes |
| Trip blank | 1/1 batches (<LOR) | <LOR | Yes |
| Accuracy | | | |
| Surrogate spikes | All organic samples | 39-130% recovery | Partial ¹ |
| Matrix spikes | 2/11 – 18% >5% acceptable | 42-130% recovery | Partial ¹ |
| Laboratory control samples | 2/11 – 18% >5% acceptable | 60-130% recovery | Yes |
| Representativeness | | | |
| Sampling appropriate for media and analytes | All samples | All sampling conducted in accordance with JBS procedures | Yes |
| Laboratory blanks | 1/batch | <LOR | Yes |
| Samples extracted and analysed within holding times. | All | All samples were extracted and analysed within holding times for the target analytes. | Yes |
| Comparability | | | |
| Standard operating procedures used for sample collection & handling | All | A team of three field staff used same standard operating procedures throughout works | Yes |
| Standard analytical methods used | All | Standard analytical methods used | Yes |
| Consistent field conditions, sampling staff and laboratory analysis | All | Sampling was conducted by one field staff using standard operating procedures in the same conditions throughout the works. The primary lab and secondary labs remained consistent throughout the investigation. | Yes |
| Limits of reporting appropriate and consistent | All | Limits of reporting were consistent and appropriate. | Yes |
| Completeness | | | |
| Soil description & COCs completed | All | All bore logs and COCs were completed appropriately. | Yes |
| Appropriate documentation | All | All appropriate field documentation is included in the Appendices. | Yes |
| Satisfactory frequency/result for QC samples | All | The QC results are considered adequate for the purposes of the investigation. | Yes |
| Data from critical samples is considered valid | All | Data from critical samples are considered valid. | Yes |

¹ See discussion of DQI outliers below.

A8.2 Soil QA/QC Discussion

A8.2.1 Precision

With the following exceptions, all field duplicates recorded relative percentage differences (RPDs) within the acceptable range of less than 30-50%:

- In field replicate pair JBS TP1/0.3-0.4 m and QC2, Cd of 1.1 and 2.1 mg/kg respectively (RPD, 63%);
- in field duplicate pair JBS TP1/0.3-0.4 m and QA2 all individual PAH compounds with the exception fluorene, had RPDs in the range of 80 and 129 %;
- in field replicate pair JBS TP1/0.3-0.4 m and QC2 all individual PAH compounds with the exception acenaphthene, reported RPDs in the range of 51 and 159 %

The elevated RPDs appear to be due to the heterogeneity of the fill material sampled at these locations. The elevated RPDs are considered not to significantly affect the reliability of the data set because the concentrations reported for these analytes in the duplicate pairs were either both significantly higher or both significantly lower than the assessment criteria. In no field duplicate pair exceeding allowable RPDs, did the assessment criteria value lie between the two reported concentrations. Therefore the difference in concentrations in these field duplicate pairs did not affect the assessment of site suitability at these locations. As a further level of conservatism, only the higher of the two values reported in each field duplicate pair was used in the assessment dataset.

A8.2.2 Accuracy

With the exception of the following, all surrogate spike recoveries reported were all within the acceptable range:

- Phenol-d6: 55% recovery in JBS TP2/0.4-0.5 m and 57% recovery in JBS TP2/1.4-1.5 m;
- 2-fluorophenol: 59% recovery in JBS TP1/0.3-0.4 m and 57% recovery in JBS TP2/1.4-1.5 m;
- Phenol-d6: 55% recovery in JBS TP2/0.4-0.5 m and 57% recovery in JBS TP2/1.4-1.5 m; and
- 2,4,6-Tribromophenol: 59% recovery in JBS TP1/0.3-0.4 m, 39% in JBTP4/1.6-1.7 m and 55% recovery in JBS TP4/1.0 m

With the exception of 34% and 42% recoveries for 4-nitrophenol, all matrix spike recoveries reported were all within the acceptable range.

These spike exceedances are considered not to significantly affect the accuracy of the dataset given that phenol concentrations were below the laboratory detection limit in all field samples analysed.

A8.3 Groundwater Treatment Trial QA/QC Results

The QA/QC results for groundwater samples collected at the site are summarised in **Table A8.2** and discussed in **Section A8.4** below. Detailed laboratory QA/QC results are included in the laboratory reports in **Appendix F**.

Table 8.2 – Groundwater QA/QC Results Summary

| Data Quality Indicator | Frequency | Results | DQI met? |
|---|--|--|-----------------|
| Precision | | | |
| Groundwater Blind duplicates (intra laboratory) | 0 field duplicates analysed –0% of total samples >5% acceptable | - | No ¹ |
| Groundwater Blind replicates (inter laboratory) | 1 blind replicates analysed – 9% of total samples >5% acceptable | 0-13% RPD | Yes |
| Laboratory Duplicates | No batch specific duplicates analysed | - | Yes |
| Trip spike | 1/1 batch (<LOR) | 95-129% | Yes |
| Trip blank | 1/1 batch (<LOR) | <LOR | Yes |
| Accuracy | | | |
| Surrogate spikes | All organic samples | 60-140% recovery | Yes |
| Matrix spikes | 1 sample - acceptable | 95-120% | No ¹ |
| Laboratory control samples | 2 analysed – acceptable | 70-130% recovery | Yes |
| Representativeness | | | |
| Sampling appropriate for media and analytes | All samples | All sampling conducted in accordance with JBS procedures | Yes |
| Laboratory blanks | 1/batch | <LOR | Yes |
| Samples extracted and analysed within holding times. | All | All samples were extracted and analysed within holding times for the target analytes. | Yes |
| Comparability | | | |
| Standard operating procedures used for sample collection & handling | All | One staff member used same standard operating procedures throughout works | Yes |
| Standard analytical methods used | All | Standard analytical methods used | Yes |
| Consistent field conditions, sampling staff and laboratory analysis | All | Sampling was conducted by one staff member using standard operating procedures in the same conditions throughout the works. The primary lab and secondary labs remained consistent throughout the investigation. | Yes |
| Limits of reporting appropriate and consistent | All | Limits of reporting were consistent and appropriate. | Yes |
| Completeness | | | |
| Sample description & COCs completed | All | All field data sheets and COCs were completed appropriately. | Yes |
| Appropriate documentation | All | All appropriate field documentation is included in the Appendices. | Yes |
| Satisfactory frequency/result for QC samples | All | The QC results are considered adequate for the purposes of the investigation. | Yes |
| Data from critical samples is considered valid | All | Data from critical samples are considered valid. | Yes |

¹ See discussion of DQI outliers below.

A8.4 Groundwater Treatment Trial QA/QC Discussion

A8.4.1 Precision

The field replicates recorded relative percentage differences (RPDs) within the acceptable range of less than 30 to 50%. It is noted that no field duplicate sample was analysed a part of the assessment, due to a shortage of sample containers on the day of the water treatment trial. Given that the data collected was used to assess treatment technologies,

and is not intended to characterise the site the lack of a field duplicate is considered not to affect the precision of the treated waste data set.

A8.4.2 Accuracy

All surrogate recovery results and matrix spike results were within the acceptable range.

A8.4.3 QA/QC Conclusion

The field sampling and handling procedures produced QA/QC results which indicated that the soil and water data are of an acceptable quality and suitable for use in site characterisation.

The NATA certified laboratory Certificates of Analysis indicated that the project laboratory was generally achieving levels of performance within its recommended control limits during the period when the samples from this program were analysed.

On the basis of the results of the field and laboratory QA/QC program, the soil and groundwater data are assessed to be of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site, within the limitations of this study.

A.9 Pre-Remedial Assessment Results

Results of laboratory analysis on samples collected from the site are discussed in the following section. Sample location identifiers comprise the letters 'TP' (test pit) or 'MW' (monitoring well) as a prefix and a number as a suffix. A second suffix of 'S' or 'D' has been assigned to samples collected from shallow or deep wells respectively.

A9.1 Deviations from the Sampling, Analysis, Quality Plan

A Sampling, Analysis, Quality Plan (SAQP) was prepared for the Pre-Remedial Investigations documenting the proposed strategy and methods. During completion of the site works certain changes were made based on observed conditions on site and are discussed below.

Changes to depth of bulk sample collect for cement stabilisation trial. The proposed sampling depths listed in the SAQP were based on layers of fill/soil reported to contain highly elevated contaminant concentrations in previous assessments of the site. The actual sampling depth required in the current works was assessed by comparing the previous bore logs with the field observed material until a close match was apparent. **Table A9.1** summarises the proposed and actual bulk sample collection depths.

Table A9.1: Proposed and Actual Bulk Sample Collection Depths

| Proposed location | | Actual Location | |
|-----------------------------------|---|-------------------------------|--|
| Former Location ID / sample depth | Layer description (CH2M Hill, 2007) | New testpit ID / sample depth | Layer description (JBS, 2010) |
| MG10A/0.7m | Fill – black ash, and coke gravel | JBS TP1/0.3-0.4m | Fill- silty gravelly sand comprising coke, ash and slag, dark brown to black, dry to damp, some ballast gravel and cobble inclusions (irregular, basalt, hard) |
| MG02/ 1.8m | Fill – silty clay (original surface (?), spongy, wet, dark brown to black, low plasticity, black ooze, tar | JBS TP3/1.3-1.7m | Fill – silty clay dark brown, low plasticity, wet, heterogeneous with coke gravel and black tar ooze inclusions, strong PAH odours and black sheen on material |
| BHC (angled borehole)/ 6.0m | Fill – mixture of ironstone gravels and clays, black stains, wet sloppy, pierced through brick base annulus, free tar in bricks, saturated soil | JBS TP3/4.0 – 4.2m | Fill – silty clay yellow red with grey mottles, medium plasticity, very strong, wet PAHs odours, black ooze seepage throughout |

It is noted that while co-ordinates of the original sampling locations were used to generally locate the new test pit positions, heritage restrictions prevented placement of JBS TP3 close enough to the northern gasholder such that material at the base of the brick annulus could be sampled (as described in the original BHC bore log). The material sampled at depth in JBS TP3 was, however, considered to be consistent with tar impacted material likely to have originated from material used to fill the northern gasholder.

Changes to groundwater wells to be used for pump tests and water collection for the treatment trial. The SAQP nominated that wells MW07S, MW06S, MW03S and MW31 be used for pump tests and to collect groundwater for the water treatment trial. On commencement of site works the following was noted in relation to these wells:

- MW03S was unable to be located. Site plan indicated the well was placed in the vicinity of several large soil stockpiles, and it is uncertain whether this well remains viable;
- MW06S ran dry after extraction of approximately 40 L on both 7 and 9 July 2010;
- MW07S ran dry after extraction of approximately 50 L on both 7 and 9 July 2010; and

- MW31 was unable to be located at the time of the trial and it is likely this well has been destroyed.

Given the limited time available for completion of the trial, the majority of water for the trial was pumped from MW04S and MW37S. A total of 4000 L was pumped over the trial period from these two wells.

A9.2 Field Observations

Visual and/or olfactory indicators of contamination were noted at all sampling locations on the site. At the test pit locations:

- Ash, coke and slag inclusions were observed in JBS TP1 in shallow fill between 0 and 0.6 m depth;
- Ash, coke and slag inclusions were observed in JBS TP2 in shallow fill between 0 and 0.9 m depth. Coal tar odours were noted in all material encountered at this location to the termination depth of 1.8m, and a black oily sheen/ooze was observed on material between 1.3 and 1.8 m depth;
- Coke gravels, coal tar odours and a black sheen were noted on materials JBS TP3 from 1.3 m depth to the test pit termination depth of 4.3 m;
- Ash, slag and potential ACM inclusions were observed in JBS TP4 in shallow fill between 0 and 0.6 m depth. Coal tar odours were noted in fill between 0.9 and 1.4 m depth at this location; and
- Ash, coke and slag inclusions were observed in JBS TP5 in shallow fill between 0 and 0.5 m depth. Below this depth, coal tar odours were noted in all material encountered to the termination depth of 2.1 m.

In the shallow wells pumped for the water treatment trial, groundwater on the site was noted to be black grey in colour, highly turbid and having strong coal tar odours.

Test pit logs are included in **Appendix H**. Field notes from the pump tests are provided in **Appendix I**.

A9.3 Stratigraphy

The profile encountered across the site comprised fill overlying natural clay soils. The profile encountered is summarised in **Table A9.2** below.

Table A9.2 – Summary of subsurface profile encountered during testpitting

| Layer | Locations | Description | Depth Encountered (m bgl) |
|------------------|---------------|--|---------------------------|
| Fill | All boreholes | Dark brown, grey and black, gravelly silty ash, coke and slag inclusions, some materials | 0 – 4.3 |
| Free Groundwater | JBS TP2 | 0.9-1.0 m seepage entering pit | 0.9-1.8m ⁺ |
| | JBS TP3 | From 1.0m onward material wet Materials wet from 0.4m onwards | 0.4—4.3m ⁺ |

Notes: + wet material extended beyond test pit termination depth.

The fill encountered in all test pits excavated on the site comprised layers of heterogeneous silty sand and gravelly silty sand, generally containing ash, slag and coke inclusions. Fill present in the top metre appeared to be highly heterogeneous with the majority of this top layer comprising anthropogenic materials. Generally with depth the portion of inclusions present in fill appeared to decrease, while moisture content and the intensity of coal tar odours appeared to increase. Black sheen or ooze was only encountered in fill material at depth.

A9.4 Soil Analytical Results

The soil sampling locations are shown on **Figure A.1** and summarised laboratory results are presented in **Tables A9.3 to A9.10**. Detailed analytical laboratory reports and chain of custody documentation are provided in **Appendix E**. Results of the stabilisation trial are presented in **Appendix I**. Results of clay content analysis are presented in **Appendix J**.

Laboratory results are discussed in the following sections.

A9.4.1 Concentrations in Soil in Untreated Material

Total and leachable concentrations in selected untreated soil samples are provided in **Tables A9.3 to A9.5**. Only detected contaminants have been tabulated, with full results for all undetected compounds contained in the laboratory certificate.

Despite having similar material descriptions, the concentrations contained in the samples analysed as part of the current program (JBS TP1 and JBS TP3) were less than the concentrations detected in the original test locations samples (BHC, MG10A and MG02 from CH2M Hill 2000). While part of this difference may be attributable to variations in the contaminant profile across the site, the major factor is considered likely to be a result of the difference in testing methods adopted. Specifically that the original samples were collected from drilled boreholes, while the current samples were collected from test pits. As the original samples appear to have been collected from thin, highly impacted layers it is likely that these concentrations over state the requirements of remediation. During remediation it is likely that these thin highly impacted layers will undergo some dilution/homogenisation while being excavated and stockpiled with less impacted material. The current samples, collected from test pits cuttings, are therefore considered more likely to represent the condition of free tar impacted materials during bulk excavation.

All heavy metals concentrations were less than the remediation acceptance criteria to be applied to the site. Phenols were also below detection limit in all samples and asbestos was not identified in any soil samples.

Concentrations of Total PAHs, B(a)P and /or naphthalene exceeded the remediation acceptance criteria in samples collected from JBS TP2/0.4-0.5 m, JBS TP2/1.4-1.5 m, JBS TP3/1.7 m, JBS TP4/1.6-1.7 m and JBS TP5/0.5 m.

In general the current results indicate that B(a)P concentrations were highest at shallow depths. The highest concentration of B(a)P was detected in sample JBS TP2/0.4-0.5 m comprising shallow fill with coke and slag inclusions, containing a total concentration of B(a)P of 64 mg/kg. Despite the high total concentration the leachable B(a)P concentration in this sample was below the laboratory detection limit. Furthermore, as the leachable concentrations of B(a)P all samples were below the laboratory detection limit, the data suggests that some degree of natural immobilisation is occurring. Review of historical site data presented in the RAP (CH2M Hill, 2007) indicates that only 10 other samples collected from the site contained B(a)P concentrations in excess of 64 mg/kg.

The most prominent feature of the detected PAH concentrations, are the relatively high naphthalene values, which are consistent with by-products resulting from the generation of gas from coal. Highest detected concentrations were generally associated with material observed to contain 'black ooze' and/or have a sheen present, and the elevated naphthalene concentrations were considered the source of the strong 'coal tar' odours noted during sampling. While the current dataset is limited, the results suggest the prevalence of naphthalene in soils may be linked to former use of the site. Naphthalene accounted for more than half of the total PAH concentration in samples JBS TP2/1.4-1.5 m and JBS TP3/1.7 m, collected from the anticipated tar source area in the vicinity of the

Northern Gasholder and retort area. In samples collected from the areas external to the Northern Gasholder and Retort (from TP1, TP4 and TP5), naphthalene accounted for a much lower portion of the Total PAH concentration. This appears consistent with PAH results for the site provided in Tables 1 to 8 of *'Delineation & Characterisation Sampling and review of Remedial Options, Former Macdonaldtown Gasworks - Burren Street, Erskineville'* (CH2M Hill, March 2007). Results in Tables 1 and 2 of that document (samples from the gasholder and retort area) indicate that where PAHs were detected, naphthalene was detected at much higher concentrations than any of the other PAH compounds. Results in Tables 3 to 8 of that document, providing results from the other areas of the site, show that naphthalene concentrations in these areas account for a small percentage of the Total PAH concentrations.

Additionally, it is noted that while the elevated total concentrations of naphthalene that exceeded the remediation were detected in samples JBS TP2/0.4-0.5 m, JBS TP2/1.4-1.5 m, JBS TP3/1.7 m, JBS TP4/1.6-1.7 m and JBS TP5/0.5 m, the corresponding leachable concentrations were all less than the JBS site specific leachability criteria with the exception of 2.8 mg/L in sample JBS TP2/1.4-1.5 m and 3.6 mg/L in sample JBS TP3/1.7 m.

BTEX compounds may also be generated during gas production from coal, however only low BTEX compounds were detected in the samples analysed from the site. Only one sample JBS TP2/1.4-1.5m contained a concentration above the assessment criteria, a total xylene concentration of 66 mg/kg. It is noted that the corresponding leachable concentration in this sample was below the laboratory detection limit.

A9.4.2 Conclusions Relating to Treatment Suitability

In samples exceeding the assessment criteria for B(a)P, naphthalene and/or total PAHs, the concentrations were less than the allowable limits for cement stabilisation provided in IA 2005/14. This suggests that the material present at JBS TP2/0.4-0.5 m, JBS TP2/1.4-1.5 m, JBS TP3/1.7 m, JBS TP4/1.6-1.7 m and JBS TP5/0.5 m are suitable for treatment by stabilisation and, once treated, suitable to be assessed under IA 2005/14.

The presence of total benzo(a)pyrene above the site assessment criteria in samples JBS TP2/0.4-0.5 m, JBS TP2/1.4-1.5 m, JBS TP4/1.6-1.7 m and JBS TP5/0.5 m, suggests that bioremediation is unlikely to effectively treat these materials for on site reuse.

Bioremediation may however be conducted on these materials such that a reduced waste classification is achieved for off-site disposal.

The presence of elevated total xylenes in the sample JBS TP2/1.4-1.5 m is suitable for treatment by either cement stabilisation or bioremediation.

A9.4.2 Soil Treatment Trial

Following sample collection, material were delivered to Enviropacific for treatment by cement stabilisation. On receipt, the materials were processed, *i.e.* particles over 20 mm in diameter removed, with the remaining sample homogenised, subdivided and then treated with either 5, 12.5 or 20 % cement. At the request of the site Auditor, subsamples of each material were analysed after processing and subdivision, prior to the addition of cement. Samples were also analysed at the completion of the treatment trial. Contaminant concentrations in the soil through the treatment process are presented in **Appendix J**.

Mean values for each of the treated material samples are summarised in **Tables A9.6 and A9.7**. Full results are included in **Appendix J**.

Table A9.3 PAH, Phenol and Asbestos Concentrations in Untreated Soil Samples (units as specified)

| Sample ID (summarised material description) | Total B(a)P (mg/kg) | Leachable B(a)P (mg/L) | Total Naphthalene (mg/kg) | Leachable naphthalene (mg/L) | Total PAHs (mg/kg) | Leachable PAHs (mg/L) | Total Phenols (mg/kg) | Total Phenols (mg/L) | Asbestos |
|---|---------------------|------------------------|---------------------------|------------------------------|--------------------|-----------------------|-----------------------|----------------------|----------------|
| JBS TP1/ 0.3-0.4m ¹ Fill sandy gravel some ash, coal and slag (Material 1) | 3 | <0.001 | 0.6 | <0.001 | 30.1 | BDL | BDL | BDL | Not identified |
| JBS TP2/ 0.4-0.5m Fill – silty gravelly sand, coal tar odour, coke and slag inclusions | 64 | <0.001 | 13 | 0.022 | 770.2 | 0.037 | BDL | BDL | Not identified |
| JBS TP2/1.4-1.5m Fill – silty clay, with black tar ooze inclusions coal tar odour, coke and slag inclusions | 7.7 | <0.001 | 350 | 2.8 | 467.7 | 2.9 | BDL | BDL | Not identified |
| JBS TP3/1.7m ¹ Fill - silty clay dark brown, s with coke gravel and black tar ooze inclusions, strong PAH odours and black sheen on material (Material 2) | 0.6 | <0.001 | 310 | 3.6 | 330.2 | 3.742 | BDL | BDL | Not identified |
| JBS TP3/4.0-4.2m ¹ Fill - very strong PAHs odours, wet, black ooze seepage throughout (Material 3) | 4.5 | <0.001 | 1.7 | 0.066 | 30.6 | 0.089 | BDL | BDL | Not identified |
| JBS TP4/0.5m Fill – silty sand, ash slag and glass fragments, suspected ACM fragment | 4.4 | <0.001 | <0.1 | 0.002 | 33.2 | 0.002 | BDL | BDL | Not identified |
| JBS TP4/1.0m Fill – silty clay slight coal tar odour | <0.05 | <0.001 | <0.1 | <0.001 | BDL | BDL | BDL | BDL | Not identified |
| JBS TP4/1.6-1.7m Fill – silty clay | 30 | <0.001 | 6.3 | <0.001 | 349.8 | 0.003 | BDL | BDL | Not identified |
| JBS TP5/0.5m Fill – silty clay, with strong coal tar odours | 30 | <0.001 | 250 | 0.64 | 724.3 | 0.707 | BDL | BDL | Not identified |
| JBS TP5/1.5m Fill - silty clay, with strong coal tar odours | 1.5 | <0.001 | 9.2 | 0.18 | 25.1 | 0.191 | BDL | BDL | Not identified |
| JBS TP5/2.0m Fill - silty clay, with strong coal tar odours | | | | | | | BDL | BDL | Not identified |
| Assessment Criteria | | | | | | | | | |
| CH2M Hill RAP² (maximum of depth dependent values) | 5 | - | 11.8 | | 100 | - | 42 500 | - | |
| JBS 2010 Site Specific Leachability³ | - | 1.7 | - | 1.162 | - | - | - | 6.4 | |

Notes:

1 Bulk sample of same material collected for benchscale immobilisation trial

2 Remediation Acceptance Criteria for Total Concentrations in soil, site specific based on exposure to vapours

3 Site Specific leachability criteria for materials to remain on site

BDL = below laboratory detection limit

Table A9.4: VOC Concentrations in Untreated Soil Samples (units as specified)

| Sample ID | Depth (m) | Total Benzene (mg/kg) | Leachable Benzene (µg/L) | Total Toluene (mg/kg) | Leachable Toluene (µg/L) | Total Ethyl Benzene (mg/kg) | Leachable Ethyl benzene (µg/L) | Total Xylene (mg/kg) | Leachable Xylene (µg/L) | Total 1,3,5 trimethylbenzene (mg/kg) | Leachable 1,3,5 trimethylbenzene (µg/L) | Total 1,2,4 trimethylbenzene (mg/kg) | Leachable 1,2,4 trimethylbenzene (µg/L) |
|--|-----------|-----------------------|--------------------------|-----------------------|--------------------------|-----------------------------|--------------------------------|----------------------|-------------------------|--------------------------------------|---|--------------------------------------|---|
| JBS TP1 | 0.3-0.4 | <0.5 | <1 | <0.5 | <1 | <1.0 | <1 | <3.0 | <1 | <1 | <1 | <1 | <1 |
| JBS TP2 | 0.4-0.5 | <0.5 | <1 | <0.5 | <1 | <1.0 | <1 | <3.0 | <1 | <1 | 1.5 | <1 | 2.7 |
| JBS TP2 | 1.4-1.5 | 1.4 | <1 | 2.4 | <1 | 26 | <1 | 66 | <1 | 25 | 340 | 15 | 820 |
| JBS TP3 | 1.7 | 0.9 | <1 | 0.72 | <1 | 22 | <1 | 31 | <1 | 54 | 260 | 36 | 640 |
| JBS TP3 | 4-4.2 | <0.5 | <1 | <0.5 | <1 | <1.0 | <1 | <3.0 | <1 | <1 | <1 | 2.2 | <1 |
| JBS TP4 | 0.5 | <0.5 | <1 | <0.5 | <1 | <1.0 | <1 | <3.0 | <1 | <1 | <1 | <1 | <1 |
| JBS TP4 | 1 | <0.5 | <1 | <0.5 | <1 | <1.0 | <1 | <3.0 | <1 | <1 | <1 | <1 | <1 |
| JBS TP4 | 1.6-1.7 | <0.5 | <1 | <0.5 | <1 | <1.0 | 2.1 | <3.0 | <1 | <1 | <1 | <1 | 2.8 |
| JBS TP5 | 0.5 | <0.5 | <1 | <0.5 | <1 | <1.0 | 2.0 | <3 | <1 | <1 | 19 | <1 | 5.2 |
| JBS TP5 | 1.5 | <0.5 | <1 | <0.5 | 35 | <1.0 | 17 | 8.6 | <1 | 4.1 | 170 | 8.5 | 380 |
| JBS TP5 | 2.0 | <0.5 | 3.7 | <0.5 | 4.8 | <1.0 | 12 | <3 | <1 | <1 | 11 | <1 | 31 |
| Assessment Criteria | | | | | | | | | | | | | |
| CH2M Hill RAP (maximum of depth dependent values) | 1 | - | - | 7.9 | - | 34.8 | - | 14 | - | - | - | - | - |
| JBS Site Specific Leachability | - | 8000 | - | 2880 | - | - | 80 | - | 10 000 | - | - | - | - |

Table A9.5: Heavy Metal Concentrations in Untreated Soil Samples (units as specified)

| Sample ID | Depth (m) | Total Arsenic (mg/kg) | Leachable Arsenic (µg/L) | Total Cadmium (mg/kg) | Leachable Cadmium (µg/L) | Total Chromium (mg/kg) | Leachable Chromium (µg/L) | Total Copper (mg/kg) | Leachable Copper (µg/L) | Total Lead (mg/kg) | Leachable Lead (µg/L) | Total Nickel (mg/kg) | Leachable Nickel (µg/L) | Total Zinc (mg/kg) | Leachable Zinc (µg/L) |
|--|-----------|-----------------------|--------------------------|-----------------------|--------------------------|------------------------|---------------------------|----------------------|-------------------------|--------------------|-----------------------|----------------------|-------------------------|--------------------|-----------------------|
| JBS TP1 | 0.3-0.4 | 30 | <0.05 | 1.1 | <0.01 | 26 | <0.01 | 230 | 0.1 | 220 | <0.03 | 20 | 0.02 | 260 | 1.6 |
| JBS TP2 | 0.4-0.5 | 13 | <0.05 | <0.5 | <0.01 | 19 | <0.01 | 80 | 0.04 | 220 | 0.09 | 26 | <0.02 | 220 | 1.7 |
| JBS TP2 | 1.4-1.5 | <4 | <0.05 | <0.5 | <0.01 | 14 | <0.01 | 4 | 0.04 | 58 | <0.03 | 5 | <0.02 | 200 | 0.5 |
| JBS TP3 | 1.7 | <4 | <0.05 | <0.5 | <0.01 | 12 | <0.01 | 1 | 0.02 | 14 | <0.03 | 2 | <0.02 | 3 | 1 |
| JBS TP3 | 4-4.2 | 5 | <0.05 | <0.5 | <0.01 | 22 | <0.01 | 6 | 0.02 | 24 | <0.03 | 3 | <0.02 | 9 | 0.2 |
| JBS TP4 | 0.5 | 8 | <0.05 | <0.5 | <0.01 | 22 | <0.01 | 46 | 0.1 | 260 | 0.05 | 10 | <0.02 | 4 | 1.4 |
| JBS TP4 | 1 | 9 | <0.05 | <0.5 | <0.01 | 35 | <0.01 | 51 | 0.06 | 61 | 0.04 | 3 | <0.02 | 14 | 0.2 |
| JBS TP4 | 1.6-1.7 | 6 | <0.05 | <0.5 | <0.01 | 7 | <0.01 | 65 | 0.4 | 100 | 0.06 | 4 | <0.02 | 47 | 1.4 |
| JBS TP5 | 0.5 | 6 | <0.05 | <0.5 | <0.01 | 18 | <0.01 | 18 | 0.02 | 58 | 0.05 | 5 | <0.02 | 35 | 0.3 |
| JBS TP5 | 1.5 | 5 | <0.05 | <0.5 | <0.01 | 23 | <0.01 | 16 | 0.02 | 50 | <0.03 | 13 | <0.02 | 93 | 1.3 |
| JBS TP5 | 2.0 | 6 | <0.05 | <0.5 | <0.01 | 2.5 | <0.01 | 9 | 0.02 | 36 | 0.03 | 7 | <0.02 | 27 | 0.09 |
| Assessment Criteria | | | | | | | | | | | | | | | |
| CH2M Hill RAP (maximum of depth dependent values) | 1 | - | - | 7.9 | - | 34.8 | - | 14 | - | - | - | - | - | - | - |
| JBS Site Specific Leachability | - | 8000 | - | - | 2880 | - | 80 | - | 10 000 | - | - | - | - | - | - |

Table A9.6 Mean Results of Soil Treatment Trial (units as specified) – Assessment of Compliance to IA 2005/14

| Sample ID (JBS/Enviropacific) | | Cement ratio | Total B(a)P (mg/kg) | Leachable B(a)P (mg/L) ¹ | Total PAHs (mg/kg) | Leachable PAHs (mg/L) ¹ | Total TPH C ₁₀ -C ₃₆ (mg/kg) | Leachable TPH C ₁₀ -C ₃₆ (µg/L) ¹ | Mean UCS 7-day curing (MPa) | Compliant with IA 2005/14 | Waste Classification under IA 2005/14 |
|--|-----------------------|--------------|---------------------|-------------------------------------|--------------------|------------------------------------|--|--|-----------------------------|---------------------------|---------------------------------------|
| Control Sample | | untreated | 1.7 | <0.001 | 51 | 0.083 | 500 | 680 | ND | - | - |
| JBS TP1/ 0.3-0.4m | Material 1 Post 5% | 1:20 | 4.7 | <0.001 | 44 | <0.001 | 360 | 400 | 2.18 | Y | General Solid |
| | Material 1 Post 12.5% | 1:8 | 3.8 | <0.001 | 34 | <0.001 | 320 | 280 | 3.10 | Y | General Solid |
| | Material 1 Post 20% | 1: 5 | 3.9 | <0.001 | 43 | <0.001 | 300 | 290 | 5.85 | Y | General Solid |
| JBS TP3/1.7m | Material 2 Post 5% | 1:20 | 2.0 | <0.001 | 171 | 2.6 | 810 | 6700 | 0.35 | N | - |
| | Material 2 Post 12.5% | 1:8 | 1.6 | <0.001 | 117 | 1.9 | 450 | 5700 | 1.00 | Y | General Solid |
| | Material 2 Post 20% | 1: 5 | 1.6 | <0.001 | 101 | 1.5 | 420 | 4900 | 1.55 | Y | General Solid |
| JBS TP3/4.0-4.2m | Material 3 Post 5% | 1:20 | 0.8 | <0.001 | 17 | 0.26 | <250 | 1420 | 0.13 | N | - |
| | Material 3 Post 12.5% | 1:8 | 0.8 | <0.001 | 20 | 0.33 | <280 | 1300 | 0.43 | N | - |
| | Material 3 Post 20% | 1: 5 | 1.7 | <0.001 | 48 | 0.48 | 460 | 1950 | 0.60 | N | - |
| Assessment Criteria | | | | | | | | | | | |
| IA 2005/14, NSW EPA² | | 2:1 | 500 | - | 13 000 | - | - | - | 1 | - | - |
| General Solid Waste (DECC 2009) | | - | 10 | 40 | 200 | - | 10 000 | - | - | - | - |
| Restricted Solid Waste (DECC 2009) | | - | 23 | 160 | 800 | - | 40 000 | - | - | - | - |
| Site Specific Leachability (JBS 2010) | | - | - | 1.6 | | | | | | | |

Notes 1. Leachability testing by ASLP, unless otherwise specified

2. NSW EPA 'General Immobilisation of Contaminants in Waste – Coal tar Contaminated Waste From Former Gasworks Sites' approval number 2005/14 (IA 2005/14).

Table A9.7: Mean Results of Soil Treatment Trial (units as specified) – Assessment of Additional Compound Results

| Sample ID (JBS/Enviropacific) | Cement ratio | Total Naphthalene (mg/kg) | Leachable naphthalene (mg/L) ¹ | Total Toluene (mg/kg) | Leachable Toluene (µg/L) ¹ | Total Ethyl Benzene (mg/kg) | Leachable Ethyl benzene (µg/L) ¹ | Total Benzene (mg/kg) | Leachable Benzene (µg/L) ¹ | Total Xylene (mg/kg) | Leachable Xylene (µg/L) ¹ |
|--|-----------------------|---------------------------|---|-----------------------|---------------------------------------|-----------------------------|---|-----------------------|---------------------------------------|----------------------|--------------------------------------|
| Control Sample | untreated | 18 | 0.059 | <0.5 | 0.083 | <0.5 | 1.5 | <0.5 | <1 | <3 | <3 |
| JBS TP1/ 0.3-0.4m | Material 1 Post 5% | 1:20 | 0.6 | 0.001 | <0.5 | <0.001 | <0.5 | <1 | <0.5 | <1 | <3 |
| | Material 1 Post 12.5% | 1:8 | 0.5 | <0.001 | <0.5 | <0.001 | <0.5 | <1 | <0.5 | <1 | <3 |
| | Material 1 Post 20% | 1: 5 | 0.4 | <0.001 | <0.5 | <0.001 | <0.5 | <1 | <0.5 | <1 | <3 |
| JBS TP3/1.7m | Material 2 Post 5% | 1:20 | 120 | 2.4 | <0.5 | <1 | 2.8 | 70 | <0.5 | <1 | 4.7 |
| | Material 2 Post 12.5% | 1:8 | 74 | 1.7 | <0.5 | <1 | 1.4 | 44 | <0.5 | <1 | 1.2 |
| | Material 2 Post 20% | 1: 5 | 60 | 1.3 | <0.5 | <1 | <1 | 30 | <0.5 | <1 | <3 |
| JBS TP3/4.0- 4.2m | Material 3 Post 5% | 1:20 | 2.7 | 0.2 | <0.5 | 0.26 | <0.5 | 4.4 | <0.5 | <1 | <3 |
| | Material 3 Post 12.5% | 1:8 | 5.0 | 0.27 | <0.5 | 0.33 | <0.5 | <1 | <0.5 | <1 | <3 |
| | Material 3 Post 20% | 1: 5 | 16 | 0.42 | <0.5 | 0.48 | <0.5 | 2.6 | <0.5 | <1 | <3 |
| Assessment Criteria | | | | | | | | | | | |
| IA 2005/14, NSW EPA² | 2:1 | - | - | - | - | - | - | - | - | - | - |
| General Solid Waste (DECC 2009) | - | - | - | - | - | - | - | - | - | - | - |
| Restricted Solid Waste (DECC 2009) | - | - | - | - | - | - | - | - | - | - | - |
| Site Specific Leachability (JBS 2010) | - | - | 1.16 | - | 2880 | - | 80 | - | 8000 | - | 10 000 |

Notes 1. Leachability testing by ASLP, unless otherwise specified

2. NSW EPA 'General Immobilisation of Contaminants in Waste – Coal tar Contaminated Waste From Former Gasworks Sites' approval number 2005/14 (IA 2005/14).

The results in **Table A9.6** indicate that two of the three materials tested are suitable for treatment by cement stabilisation with the addition of at least 12.5% cement. Material 3, collected from JBS TP3/ 4.0 – 4.3 m, failed to meet the required UCS value, which is likely to be related to the clay content of this material. The results for this material however show that the UCS value increased as the percentage of cement added increased, which suggests that cement stabilisation may be possible using a higher percentage of cement.

Results for the remaining two samples after treatment show full compliance with the requirements of IA 2005/14, and under this order would be suitable for off site disposal to landfill as General Solid Waste at a landfill licenced to receive immobilised material.

With regards to on site reuse, the treated material must be compliant with all the requirements of IA/2005 (to demonstrate contaminants have been stabilised) and the leachable concentrations must be less the site specific leachability criteria. The results in **Table A9.6** indicate that only Material 1 complies with all these requirements. As discussed previously Material 3, collected from JBS TP3/ 4.0 – 4.3 m, failed to meet the required UCS value, however this may be rectified using a higher portion of cement. Leachable concentrations of naphthalene in the Material 3 treated samples exceeded site specific leachability criteria, and would therefore be considered unsuitable for reuse on the site. We note that the methods currently accepted for determining leachable concentrations will greatly overestimate leachable concentrations in stabilised material. The Enviropacific report (Appendix I) for the stabilisation trial notes that '*...current leachate methods (TCLP, ASLP and MEP are the only leachate tests currently used by regulatory authorities in Australia) have important limitations. For example, each of these methods require particle size reduction to either 9.5 mm (TCLP and MEP) or 2.4 mm (ASLP), which effectively contravenes the assessment of encapsulated wastes as the integrity of the monolithic structure is compromised, and each of these methods employ vigorous end-over-end agitation of the sample. In fact in AS4439.3- 1997 (ASLP) the Scope states that "The procedure is not applicable to encapsulated wastes which cannot be reduced to the specified maximum particle size without breaking the integrity of encapsulation". For this reason, in the General IA, the DECCW is in effect relying on the UCS measurement as an indicator of the stability of cement stabilised waste, whilst still requiring B(a)P leachability (TCLP) for cement stabilised samples to be below the Waste Classification Guidelines criteria (and from previous EPS experience with other gasworks projects B(a)P leachability has typically been non-detectable in both the untreated and cement stabilised samples using TCLP).*

If a more appropriate leach test (e.g. a diffusion-based or column leach test on a moulded/monolithic sample) was adopted for assessing the leachability of cement stabilised materials destined for on-site placement, the optimum UCS required to minimise contaminant leachability could be more accurately determined, and a different leachability data set may result, that might be more appropriately applied to acceptance criteria for on-site placement of cement stabilised material.'

The results of the treatment trial suggest that some cement stabilised soils may be suitable for on-site reuse. The limited sample size suggests that material containing total naphthalene concentrations over 50 mg/kg may not be suitable for on site reuse following stabilisation, or use of column leach tests in addition to ASLP testing may be required to determine the leachable concentrations in cement stabilised material. A column leach test, although not an approved method, would avoid grinding of the treated material and be more representative of leaching conditions that may occur on site. TCLP testing would still likely be required for assessment of the material against IA 2005/14, and determining the waste classification of the treated material if off site disposal is required.

At the request of the Site Auditor samples of untreated material were also analysed after the materials had been sorted (*i.e.* oversize particles removed) and prior to the addition of water and/or cement. Full tabulated pre and post treatment analytical results are presented in **Appendix J**.

As expected, for each of the bulk samples supplied, the range of total concentrations in the subsampled material shows minor variation. Generally the total concentrations in the three subsample prepared from each bulk material were within 20 percent of each other.

With the exception of B(a)P, total concentrations generally showed only minor reductions between the pre and post treatment samples. The slight reduction is considered to be the result of the addition of cement to the material, essentially diluting the original concentrations. Contaminant reductions above those noted were not expected as the trialled treatment method is not intended to remove contamination only reduce its mobility.

To assess the ability of the treatment method to reduce mobility the leachable concentrations were compared in the pre and post treatment samples. It is noted that pre treatment leachable concentrations were determined using the TCLP method to assess the likely waste classification of these materials assuming no treatment occurs. Leachable concentrations in the post treatment samples were determined using the ASLP method, to assess the suitability of cement stabilised material to be reinstated on site. The following paragraphs generally discuss the variation in leachable concentrations between pre and post treatment samples as an indication of the likely performance of the material, although readers should be aware of the different leachability methods used in determining these results.

BTEX compounds and naphthalene were noted as the main contaminants of concern in groundwater migrating off site. The following was noted in relation to leachable concentrations in the samples untreated and treated from the trial.

In general the leachable concentrations of all BTEX compounds, where detected, were reduced by an order of magnitude in the treated material samples. It is however noted that all leachable BTEX concentrations in the samples of untreated material were less than the site specific leachability criteria.

For naphthalene mixed results were obtained, the leachable concentrations in Material 1 (JBS TP1/0.3-0.4m) were less than the laboratory detection limit in both the untreated and treated material. For Material 2 (JBS TP1.7 m), naphthalene concentrations on average reduced by only 1 mg/L between the pre and post treatment samples. This may be due to a number of factors including the elevated total concentrations of naphthalene, the use of the ASLP method (rather than column leach tests) as discussed above. In Material 3 (JBS TP3/4.0-4.2 m) the leachable concentrations in the treated material were an order of magnitude less than concentrations detected in the untreated material. It is noted that leachable naphthalene concentrations in all Material 3 samples, both untreated and treated exceeded the site specific leachability criteria. These results suggest that where material is being treated by cement stabilisation for on site reuse additional refinement of the treatment process is required to reduce the ASLP determined leachable concentration. Alternately consideration should be given to use of method to determine the leachable concentration that does not require crushing or grinding of the stabilised material.

While B(a)P was not listed as a contaminant of concern in groundwater it is noted that the leachable concentrations in all untreated and treated samples were less than the laboratory detection limit, consistent with the results discussed in **Section A9.3**.

A9.5 Water Treatment Trial

The methods and results of the water treatment trial conducted on the site were documented in the JBS Letter Report '*Groundwater Treatment Trial, Former Macdonaldtown Gasworks*', dated 05 August 2010 Reference 40913 - 15534. A copy of that letter is included as **Appendix C**.

The results of the water treatment trial are summarised in **Tables A9.8** and **A9.9** below. Overall it is noted that samples of the treatment system effluent (*i.e.* all 'Sample 4' results, collected post GAC filter) were reported to contain very low concentrations of all contaminants of concern at the site. Based on these results it appears that a water treatment plant could be used as part of the remediation process to enable discharge of collected groundwater as follows:

- To stormwater following receipt of relevant approvals from City of Sydney Council; or
- To sewer should a 'trade waste agreement' be entered into with Sydney Water.

Additionally the results indicate that the treated effluent was of a suitable quality for reinjection into the subsurface. The feasibility of this option, is however, uncertain, given the required discharge rates during remediation are likely to exceed the infiltration potential of the clay soils underlying the site. This option would also require licensing by the NSW Office of Water.

Table A9.8: Summary of Water Treatment Trial Results – VOCs, TPH and Heavy Metals

| Sample ID | pH | Analyte | | | | | | | | | | | | |
|-------------------------|--|-----------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|--------------|----------------|--------------|--------------|--------------|----------------|--------------|--------------|
| | | VOCs | | | TPH | | Heavy Metals | | | | | | | |
| | | Chloro- form | Bromo- dichloro- methane | Dibromo- chloro- methane | C ₆ -C ₉ | C ₁₀ -C ₃₆ | As | Cd | Cr | Cu | Pb | Hg | Ni | Zn |
| MW04S | Pumped groundwater holding tank | 21 | 25 | 18 | <10 | 6,200 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 1 | 110 |
| Sample 1 – Run 1 | Influent (15 mins) | 14 | 8.9 | 2.7 | <10 | 1,100 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 1 | 110 |
| Sample 2 – Run 1 | Post oil-water separator / pre sand filter (15 mins) | 9.8 | 5.8 | 1.7 | <10 | 170 | <1 | <0.1 | <1 | 1 | <1 | <0.5 | 2 | 100 |
| Sample 3 – Run 1 | Post sand filter/ pre GAC (15 mins) | 12 | 7.6 | 2.2 | <10 | 3,210 | <1 | <0.1 | <1 | 10 | <1 | <0.5 | 8 | 63 |
| Sample 4 – Run 1 | Post GAC Effluent (15 mins) | <1 | <1 | <1 | <10 | <250 | 16 | <0.1 | <1 | <1 | <1 | <0.5 | <1 | 1 |
| Sample 1 – Run 2 | Influent (30 mins) | 12 | 2.1 | 2.1 | <10 | 3,600 | <1 | <0.1 | <1 | 3 | <1 | <0.5 | 7 | 170 |
| Sample 2 – Run 2 | Post oil-water separator / pre sand filter (30 mins) | 11 | 6.6 | 2.0 | <10 | 322 | <1 | <0.1 | <1 | 4 | <1 | <0.5 | 9 | 91 |
| Sample 3 – Run 2 | Post sand filter/ pre GAC (30 mins) | 9.7 | 6.3 | 2.0 | <10 | 190 | <1 | <0.1 | <1 | 7 | <1 | <0.5 | 8 | 48 |
| Sample 4 – Run 2 | Post GAC Effluent (30 mins) | <1 | <1 | <1 | <10 | <250 | 17 | <0.1 | <1 | <1 | <1 | <0.5 | <1 | <1 |
| Sample 1 – Run 3 | Influent (40 mins) | 9.6 | 5.9 | 1.8 | <10 | 5,700 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 2 | 160 |
| Sample 2 – Run 3 | Post oil-water separator / pre sand filter (40 mins) | 10 | 5.5 | 1.7 | <10 | <250 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 2 | 140 |
| Sample 3 – Run 3 | Post sand filter/ pre GAC (40 mins) | 11 | 5.2 | 1.6 | <10 | 1230 | <1 | <0.1 | <1 | 4 | 1 | <0.5 | 2 | 49 |
| Sample 4 – Run 3 | Post GAC Effluent (40 mins) | <1 | <1 | <1 | <10 | <250 | 24 | <0.1 | <1 | <1 | <1 | <0.5 | <1 | <1 |

Table A9.9: Summary of Water Treatment Trial Results - PAHs

| Sample ID | Component or sampling stage (time after system commencement) | Analyte - PAHs | | | | | | | | | | | | | | |
|-------------------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|-----------------|------------------------|-----------------|-------------------------|------------------------|----------------------|
| | | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benzo(a)anthracene | Chrysene | Benzo(b+k)fluoranthene | Benzo(a)pyrene | Indeno(1,2,3-c,d)pyrene | Dibenzo(a,h)anthracene | Benzo(g,h,i)perylene |
| MW04S | Pumped groundwater holding tank | 5.6 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 1 – Run 1 | Influent (15 mins) | 2.2 | <0.1 | 0.7 | 0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 2 – Run 1 | Post oil-water separator / pre sand filter (15 mins) | 0.3 | <0.1 | 0.4 | 0.4 | 0.4 | <0.1 | 0.2 | 0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 3 – Run 1 | Post sand filter/ pre GAC (15 mins) | 0.2 | <0.1 | 0.3 | 0.2 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 4 – Run 1 | Post GAC (15 mins) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Sample 1 – Run 2 | Influent (30 mins) | 3.4 | <0.1 | 0.5 | 0.4 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 2 – Run 2 | Post oil-water separator / pre sand filter (30 mins) | 0.2 | <0.1 | 0.5 | 0.5 | 1 | 0.2 | 0.7 | 0.4 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 3 – Run 2 | Post sand filter/ pre GAC (30 mins) | 0.2 | <0.1 | 0.4 | 0.4 | 0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 4 – Run 2 | Post GAC (30 mins) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Sample 1 – Run 3 | Influent (45 mins) | 3.8 | <0.1 | 0.8 | 0.6 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 2 – Run 3 | Post oil-water separator / pre sand filter (40 mins) | 0.2 | <0.1 | 0.6 | 0.5 | 0.1 | <0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 3 – Run 3 | Post sand filter/ pre GAC (40 mins) | 0.2 | <0.1 | 0.6 | 0.5 | 0.6 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 4 – Run 3 | Post GAC (40 mins) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 |

A9.6 Pump Tests

The groundwater wells pumped to generate water for the treatment trials were also subject to small scale pump tests, conducted in line with the method provided in MacDonald A, Barker J and Davies J (September 2008) '*The bailer test: a simple effective pumping test for assessing borehole success*' in Hydrogeology Journal.

The following locations were subject to pump tests:

- MW04S;
- MW07S;
- MW37S; and
- MW42S.

Data loggers were used to record the drawdown in these wells during the pumping and recovery phases of the tests. Line graphs of the raw data collected from each well over the duration of the pump test are presented in **Figures A2 to A3**, as time versus height of water above the logger.

Based on this inspection of the raw data, no further analysis was conducted on the results from MW04S and MW07S. The plots from these two locations show that both wells were unable to sustain pumping rates of 1 - 2.4 Litres per minute (L/min), with both running dry over the duration of pumping. While these results reflect the spatial variability in the volume of perched groundwater present under the site, and permeability of the formation, they were considered to not provide meaningful data for remediation planning.

The results from MW37S and MW42S were used to estimate the hydrologic properties of fill material underlying the site. The pump test data from both locations were used to estimate the transmissivity of the screened formation using three methods of analysis as follows:

- Papodopulos and Copper (1967) –using the active pumping data only;
- Cooper and Jacob (1946) – using the active pumping data only; and
- Theis Recovery Method (1946) – using the well recovery data only.

The methods selected have been assessed as suitable for analysis of constant discharge, single well tests (*i.e.* no use of observation wells during the pump test) in unconfined aquifers (Kruseman & De Ridder, 2000). Kruseman & De Ridder (2000) also indicates that as storage in the well may influence drawdown at the commencement of pumping and recovery phases of the test, then only the latter stages of data should be used for curve matching.

Curve matching and data analysis were undertaken using the AquiferWin32 software package. The transmissivity values calculated using all three tests are summarised in **Table A9.10** below, with the corresponding AquiferWin32 output files and curve matching analysis provided in **Appendix I**.

The hydraulic conductivity of the formation surrounding the pumped wells was estimated from the calculated transmissivity values using the following equation:

$$K = T/b \quad \text{Where} \quad T = \text{aquifer transmissivity}$$

$$b = \text{aquifer thickness (assumed to be the length of the saturated screen interval in the well);}$$

$$K = \text{hydraulic conductivity of the formation.}$$

Table A9.10 – Summary of Hydraulic Conductivity Testing Results

| Well ID | SWL* (m below TOC) | Screen Interval (m below TOC) | Transmissivity ($\text{m}^2.\text{s}^{-1}$) | | | Mean transmissivity ($\text{m}^2.\text{s}^{-1}$) | Hydraulic conductivity ($\text{m}.\text{s}^{-1}$) |
|---------|-----------------------|----------------------------------|---|-----------------------|------------------------------|---|--|
| | | | Papodopulos & Copper (1967) | Cooper & Jacob (1946) | Theis Recovery Method (1946) | | |
| MW37S | 0.931 | 1.5-4.5 | 9.89×10^{-6} | 1.23×10^{-6} | 3.47×10^{-5} | 1.55×10^{-5} | 5.09×10^{-6} |
| MW42S | 1.19 | 1.5-4.5 | 9.70×10^{-6} | 1.32×10^{-6} | 4.88×10^{-5} | 1.99×10^{-5} | 6.65×10^{-6} |

Notes: * Standing Water Level

From the values estimated in **Table A9.10**, hydraulic conductivity values for the screened intervals within the wells tested range between $5.09 \times 10^{-6} \text{ m}.\text{s}^{-1}$ and $6.65 \times 10^{-6} \text{ m}.\text{s}^{-1}$.

Very few published values are available for fill layers, given the inherent variability of groundwater flow characteristics in these materials, it is, however, noted that the estimated values of hydraulic conductivity are in the range of values listed in Freeze and Cherry (1979), for silts, sand and fine grained sand.

The hydraulic conductivities reported in **Table A9.10** are equivalent to an order of magnitude less than the average value of $1.4 \times 10^{-5} \text{ m}.\text{s}^{-1}$ reported for clay soils in (SKM 2006). In relation to the slug test determined conductivity value, it is noted that the SKM report noted that '*...based on the measured extent of the shallow and deep groundwater plumes migrating from the site, the permeability rates estimated from the slug tests appear to be an order of magnitude greater than actual rates*'. The JBS calculated conductivity values therefore, appear to be consistent with rate of off-site migration of contaminated groundwater.

Adopting a maximum hydraulic gradient of 3.1×10^{-2} the SKM report estimated flow velocities in shallow groundwater to be on the order of 6.2 and 13.7 metres per year. Using the same hydraulic gradient value, the conductivities reported in **Table A9.10** equate to flow velocities between 5 and 6.5 metres per year.

The difference in estimated hydraulic conductivities may be attributable to the use of a pump test in the recent work by JBS, compared to slug tests by SKM in 2006. The pump test undertaken by JBS enabled estimates of conductivity to be made from both the pumping and recovery periods, while the slug test only allows for assessment of recovery.

Given that two of the four shallow wells ran dry over the duration of pumping, it is considered that the values provided in **Table A9.10** are likely to represent the upper end of hydraulic conductivities in fill on the site.

Figures A1 to A3

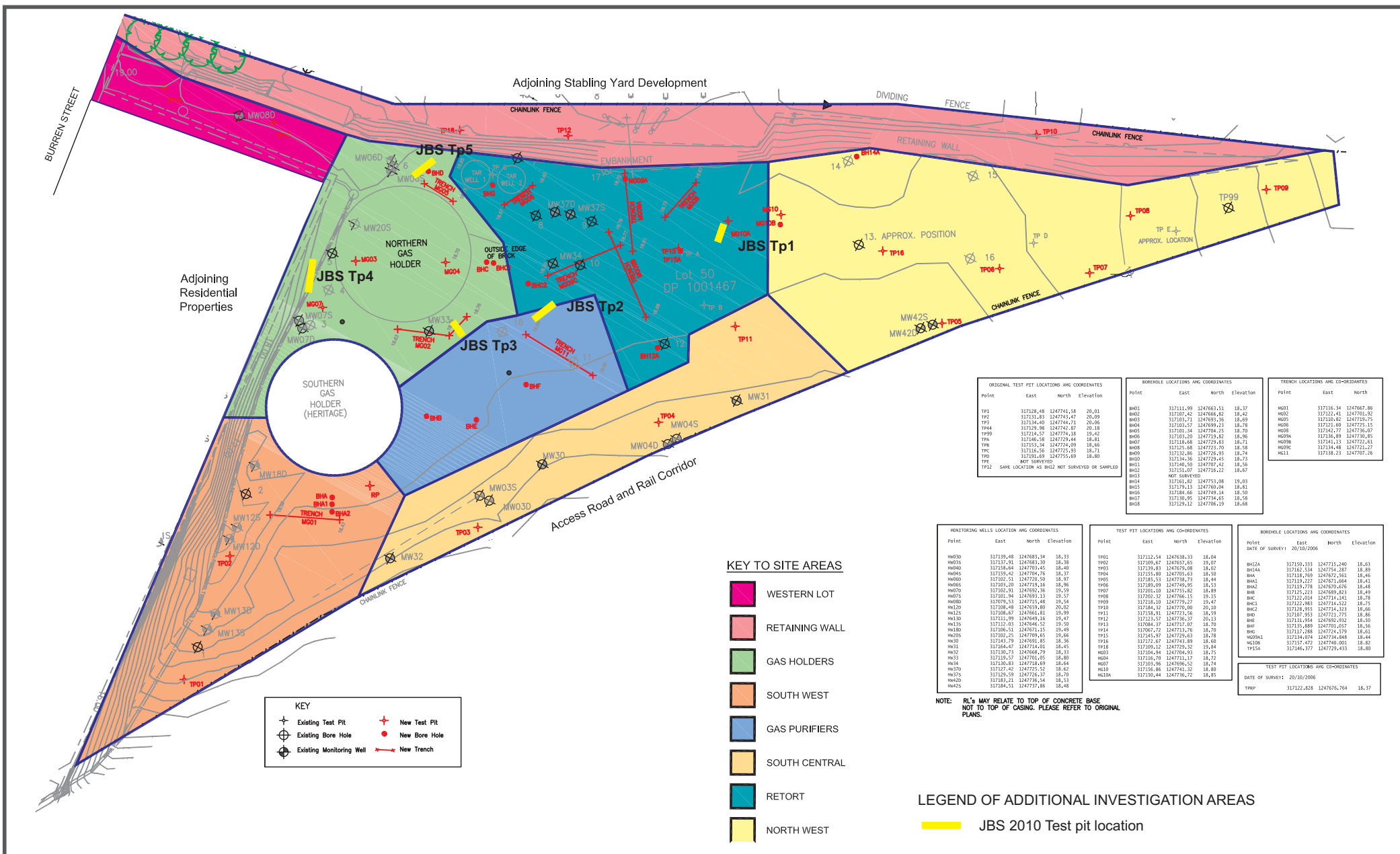
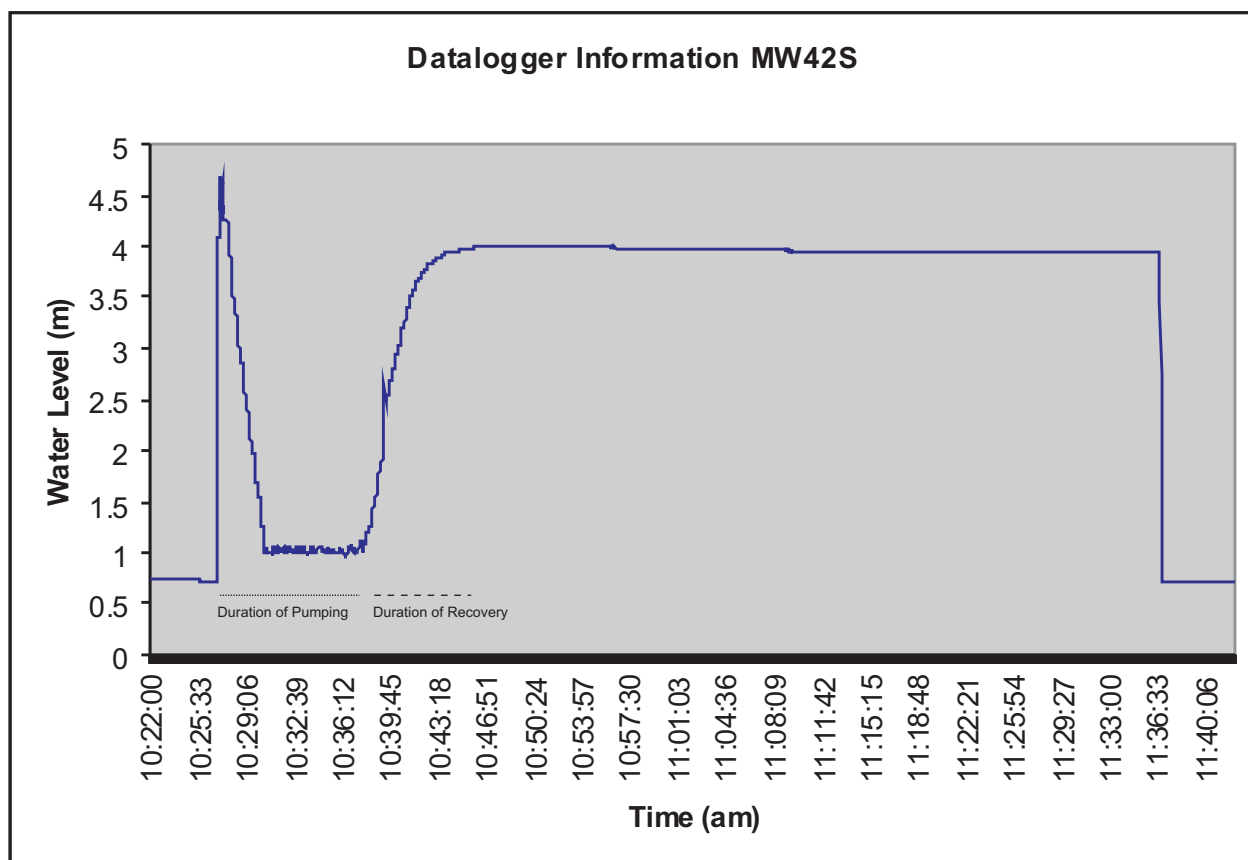
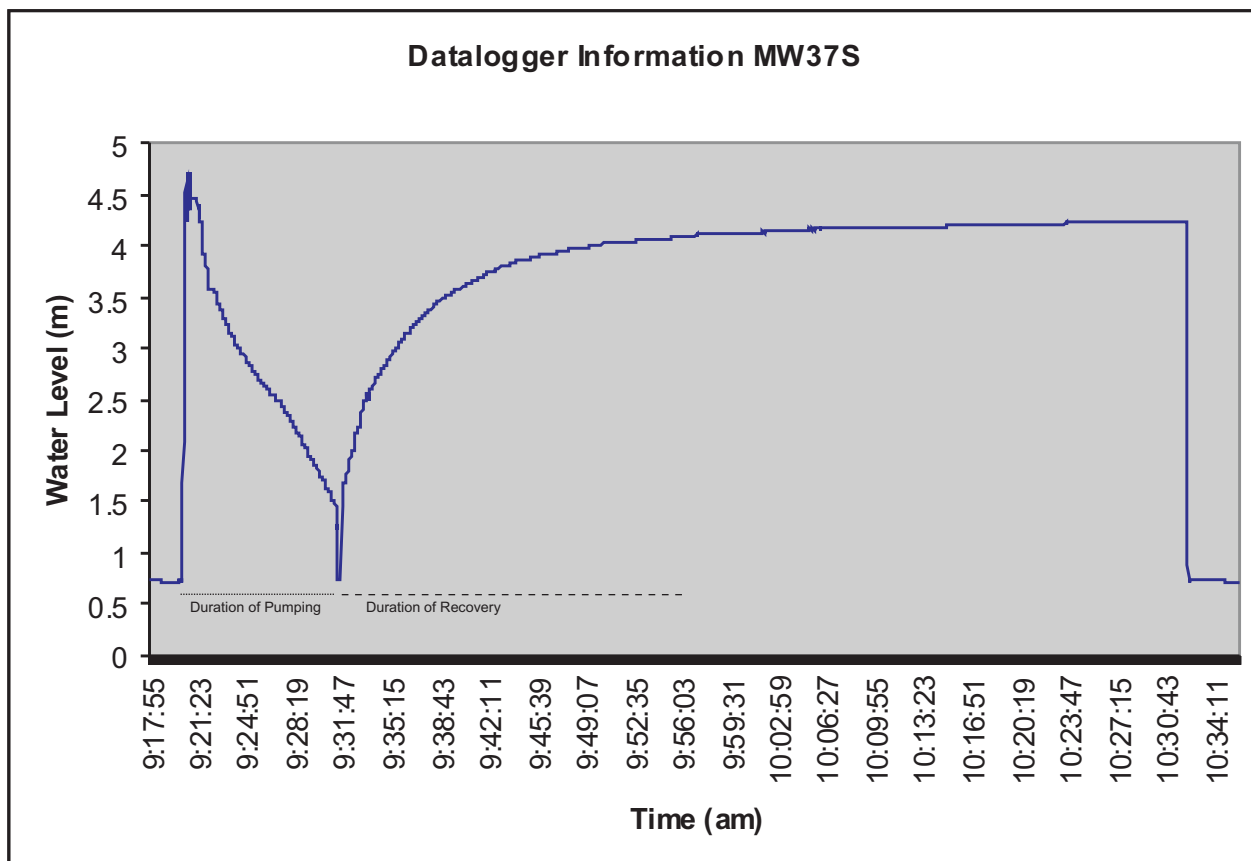
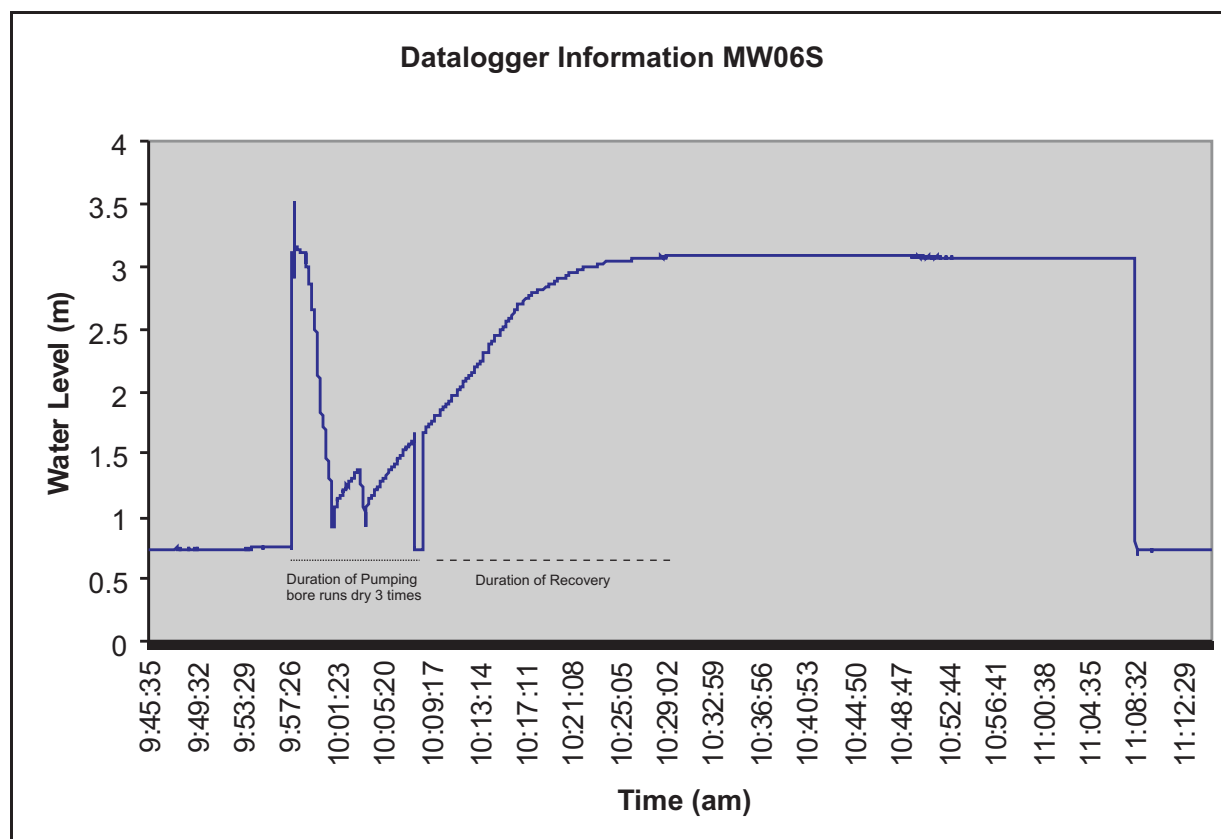
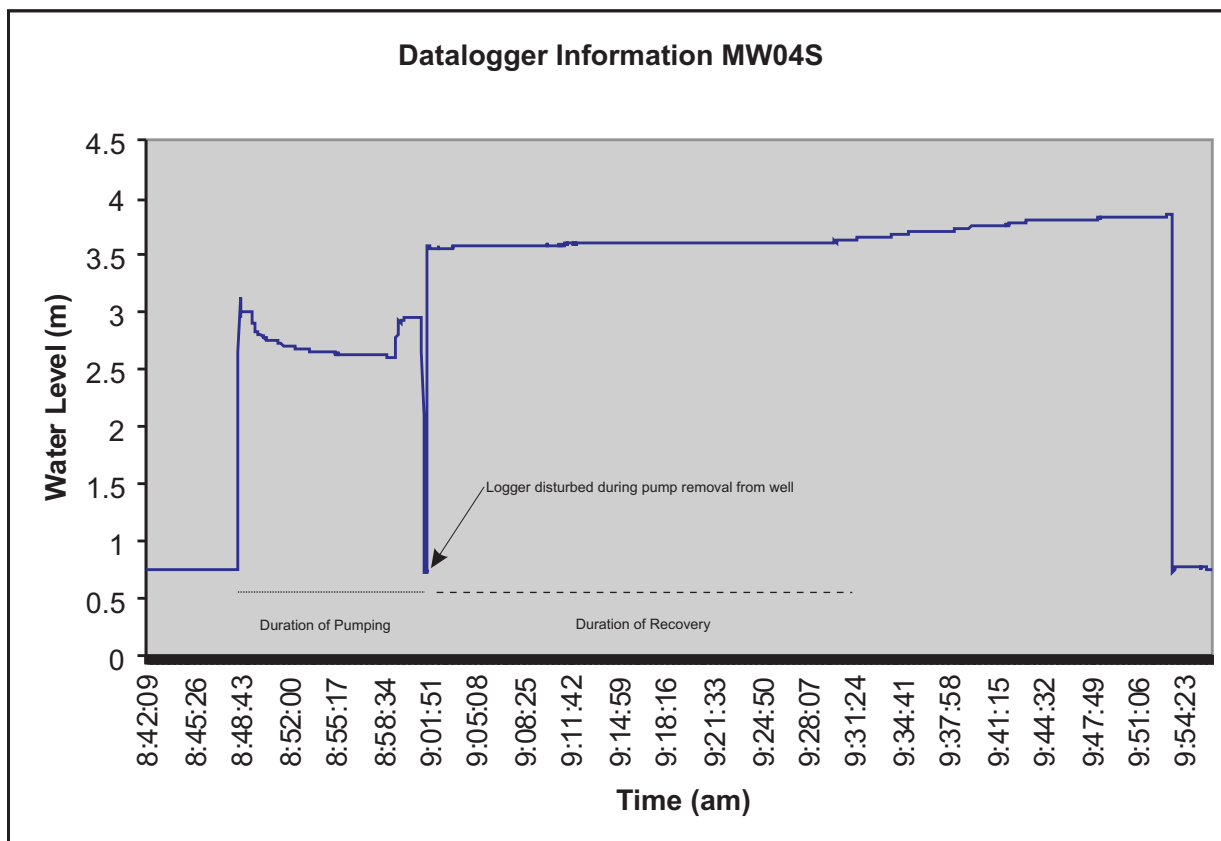


Figure A1 Location of Additional Investigation Areas

CH2M Hill (2007)
Note- All locations shown are approximate only





Appendix B

'Site Specific Leachability Criteria, former Macdonaldtown Gasworks, Burren Street Erskineville' JBS Environmental Pty Ltd (2010a)

JBS40913-15507

23 August 2010

John Dawson
Project Director
Incoll Management Pty Ltd
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(Sent Via email: jdawson@incoll.com.au)

Development of Site Specific Soil Leachability Criteria – Former Macdonaldtown Gasworks, Burren Street, Erskineville, NSW

Dear John,

JBS Environmental Pty Ltd (JBS) was commissioned by Incoll Management Pty Ltd (Incoll), to undertake additional environmental assessment works to inform the revision of the remedial strategy prepared for the former Macdonaldtown Gasworks site, on behalf of the site owner, Rail Corporation NSW Environment Projects Unit (RailCorp). This letter has been prepared as part of those works and documents the derivation of site specific criteria for leachable concentrations of contaminants in soil. These are proposed to be used for the proposed remediation of the site.

The site is located between Erskineville and Macdonaldtown railway stations. The site is roughly triangular in shape, being part of the area commonly referred to as the Macdonaldtown Triangle. The site location is shown in **Figure 1**.

A Remedial Action Plan (RAP) has been prepared for the site and is documented in CH2M Hill (December 2007) '*Remedial Action Plan, Former Macdonaldtown Gasworks – Burren Street, Erskineville, NSW*'. Based on review of the RAP it is considered that while a range of technologies may be applicable to the site, the remedial program is likely to be a combination of the following methods:

- Dewatering of impacted areas to enable excavation of fill / soil as required;
- On-site treatment of water generated during dewatering for groundwater recharge, discharge to stormwater or discharge to sewer, as appropriate;
- Removal / excavation of free tar as required for disposal off site to an appropriately licenced landfill or treatment facility;
- Excavation of impacted soil and for treatment by stabilisation, thermal desorption or other appropriate method; and
- Reuse of stabilised material on the Macdonaldtown site, if suitable, otherwise disposal off site to an appropriately licenced landfill.

In order to implement such a remedial approach, in addition to health based assessment criteria for protection of future site users, it will also be necessary to derive site specific acceptance criteria for leachable concentrations in soil that are considered suitable for protection of the environment. Once derived it is considered these site specific criteria can then be applied (in combination with human health based soil criteria as total concentrations) at two levels;

- Initially on *in-situ* impacted materials - to assess whether excavation / remediation is required for protection of environmental values; and
- Secondly on treated materials – to assess whether they are suitable for reuse on the site.

This letter has been prepared to document the derivation of the site specific criteria for leachable concentrations in treated material for use during remediation of the site.

1. Site Background

Calculation of site specific leachability criteria requires the input of site specific data relating to the hydrogeological conditions and contamination present. This Section provides a summary of this information and is based on a review of the following documents prepared for the site:

- Rail Services Australia (November 1999) '*Eveleigh Gasworks – Site History*';
- CH2M Hill (December 2001) '*Soil and Groundwater Investigations of the former Gasworks Area and Offsite*';
- Sinclair Knight Merz (April 2006) '*Macdonaldtown Triangle (Former Gasworks Site) – Human Health and Ecological Risk Assessment*';
- CH2M Hill (March 2007) '*Delineation & Characterisation Sampling and review of Remedial Options*'; and
- CH2M Hill (December 2007) '*Remedial Action Plan*'.

A summary of the subsurface profile encountered on the site is provided in **Table 1**.

2. Hydrogeology

The review of the hydrogeological conditions at the site included in the RAP (CH2M Hill, 2007) states that the groundwater exists as a shallow perched groundwater 'layer' and a deep bedrock 'layer'. The shallow groundwater, encountered as shallow as 1m below ground level in some areas, was reported to be present within fill materials and silty clay overlying the mottled clay layer as describes in **Table 1**, while the deeper groundwater was reported to exist within the Ashfield Shale bedrock under semi-confined conditions.

A summary of estimates of the hydrogeological properties of the subsurface is provided in **Table 2**, and is based on data provided in SKM (2006).

All previous reports acknowledge that while shallow groundwater underlying the site appears to be restricted to the fill and clay layers, and deep groundwater to the shale bedrock, it is possible there may be some interconnectivity between the two water bearing zones given the apparent similar direction of flow gradient.

Table 1: Summary of Subsurface Profile and Contamination Impacts

| Layer | Observed Depth (m below ground level) | Nature of Material | Nature of Impact | | |
|-----------------------|---|---|---|---|-----------------------------------|
| | | | Free Tar ¹ | Tarry Soils ² | Dark stained impacts ³ |
| Fill | 0 to 3.5 | Ash and coke gravels to 0.5m depth across much of the site | ✓ Limited to immediate vicinity of tar wells and gas works pipes | ✓ Limited to areas of former gasworks footprints | - |
| | | Reworked clay 0.5m to 1.5m depth across the majority of the site | ✓ Limited to immediate vicinity of tar wells and gas works pipes | ✓ Limited to areas of former gasworks footprints | - |
| | | Sands and gravels 0.5m to 1.5m depth in north-east, south central and gas purifier areas | ✓ Limited to immediate vicinity of tar wells and gas works pipes | ✓ Limited to areas of former gasworks footprints | - |
| | | Gravelly Sand and Clay with minor ash to depths of 3.5m in the south west area of the site | - | ✓ Limited to areas of former gasworks footprints | - |
| | | Gravelly sand and demolition waste in the northern retaining wall and inside annulus of northern gas holder | - | ✓ Limited to areas of former gasworks footprints | - |
| Silty clay | 1.5-2.5 | Saturated silty clay layer present underlying fill across the majority of the site | ✓ near tar wells and northern gasholder | ✓ near tar wells and northern gasholder | - |
| Red/grey mottled clay | 2.5 to 4.0-6.0 | Highly plastic, stiff to very stiff, moist and consistent with red podzolic soil | ✓ near tar wells and northern gasholder | ✓ | ✓ under southern gasholder |
| Shale | 4 m onwards | Underlies natural clays and grades from extremely weathered to moderately weathered at 10 m depth. Fractures assessed to be common beyond depths of 6m. | ✓ near tar wells and northern gasholder | - | ✓ under southern gasholder |

- Notes:
1. 'Free tar' as defined in RAP (CH2M Hill, 2007) is 'soil impacted by free tar, consisting of soil and fill material impacted to a high degree with black ooze, highly odourous, liquor type material';
 2. 'Tarry soils' as defined in RAP (CH2M Hill, 2007) is 'soil and fill materials with minor tar impacts and moderate odours'
 3. 'Dark Stained impacts' as defined in RAP (CH2M Hill, 2007) is 'dark brown to black staining in the deep soils and Weathered Shale within the soil pores and shale fracture zones underneath the Southern Gasholder. The material as moderately odourous';
- ✓ = present in layer
- = not present in layer

Table 2: Summary of Hydrogeological Data Available for the site

| Parameter | Value | Details | Sources |
|---|---|---|---|
| Flow direction | South to south-easterly | noting significant variation in shallow groundwater flow due to subsurface obstructions | |
| Permeability | $1.4 \times 10^{-5} \text{ ms}^{-1}$ | Shallow well | Slug test conducted by SKM in 2005 |
| | $1.0 \times 10^{-5} \text{ to } 3.0 \times 10^{-5} \text{ ms}^{-1}$ | Deep wells | |
| Hydraulic Gradient | 3.1×10^{-2} | Between shallow wells MW17S and MW12S | Groundwater gauging by SKM in 2005 |
| | 1.3×10^{-2} | Between shallow wells MW20S and MW03S | |
| Flow velocities | 6.2 to 13.7 m/yr | Shallow wells | Determined by SKM from gradient and permeability data |
| Averaging Time – Threshold ¹ | 12.2 to 36.5 m/yr | Deeper wells | |

3. Groundwater Quality

The most recent round of groundwater sampling completed at the site was conducted by SKM in 2005 (SKM, 2006). The maximum concentrations of contaminants exceeding the assessment criteria in the 'on site' wells is summarised in **Table 3**. In general the maximum concentrations in samples collected from the shallow wells were less than concentrations in samples collected from the deeper wells.

Table 3: Summary of Groundwater Contamination

| Analyte | Criteria ANZECC 2000 | Shallow Groundwater | | | Deep Groundwater | | |
|-----------------|----------------------|--------------------------------|---------------------------------|---------------|--------------------------------|---------------------------------|---------------|
| | | Concentration Range | Well ID - highest concentration | Site Area | Concentration Range | Well ID - highest concentration | Site Area |
| Cd | 0.2 | nd - 2.6 | MW13s | Southwest | nd - 1.5 | MW06d | Gasholders |
| Cr(total) | - | nd - 15 | MW04s | South Central | nd - 7 | MW04d | South Central |
| Cu | 1.4 | nd - 220 | MW42s | | 0.001 - 208 | MW42d | Northeast |
| Pb | 3.4 | nd - 174 | MW42s | Northeast | nd - 140 | MW03d | South Central |
| Ni | 11 | nd - 10 | MW04s | South Central | nd - 92 | MW36d | Offsite |
| Zn | 8 | 0.033 - 1,570 | MW13s | Southwest | 0.015 - 869 | MW42d | Northeast |
| Cyanide (total) | 7 | 0.02 - 0.479 | MW20s | Gasholders | nd - 14.9 | MW03d | South Central |
| Benzene | 950 | nd - 704 | MW07s | Gasholders | nd - 14,000 | MW03d | South Central |
| Toluene | - | nd - 117 | MW07s | Gasholders | nd - 792 | MW03d | South Central |
| Ethylbenzene | - | nd - 213 | MW07s | Gasholders | nd - 317 | MW03d | South Central |
| Total Xylenes | 550 (o & p) | nd - 417 | MW07s | Gasholders | nd - 5,010 | MW03d | South Central |
| Total PAHs | 16 (naphthalene) | nd - 1,677 (naphthalene 1,460) | MW07s | Gasholders | nd - 4,208 (naphthalene 3,840) | MW07d | Gasholders |

Note: "nd" is 'Non Detect', or less than the laboratory Limit of Reporting (<LOR).

All concentrations in µg/L

Water quality parameters measured in samples from the site in 2005 indicated that groundwater underlying the site was of low salinity, 'slightly variable' pH and highly oxygenated (SKM, 2006) which was considered to be indicative of recharge occurring primarily through rainfall infiltration.

With respect to heavy metals, elevated concentrations of cadmium, copper, nickel and lead and zinc were detected in both the deep and shallow wells located along the northern site boundary. The discussion provided in the SKM report indicated that elevated heavy metals concentrations were representative of background conditions. The only exception noted was a zinc concentration of 1570 µg/L in the sample from MW13S, which is located in the south-western portion of the site and was the highest zinc concentration detected in the available dataset.

The highest concentrations of Total Petroleum Hydrocarbons (TPH) C₆–C₉, benzene, toluene, ethylbenzene and xylene (BTEX) and volatile organic carbons (VOCs) on site were detected in the deep wells located in the vicinity of the southern gasholder and central southern site boundary at wells MW03D, MW04D, MW07D and MW12D.

Elevated concentrations of TPH C₁₀–C₃₆, polycyclic aromatic hydrocarbons (PAHs), primarily being naphthalene, were generally detected in the deep wells located in the vicinity of the southern gasholder and central southern site boundary at wells MW03D, MW04D and MW07D. It is noted that speciated 'indicator' compounds have been identified in each sample where significant levels of TPH have been reported.

Phase separated hydrocarbons were not observed in any wells forming the monitoring well network.

Based on the available data it is considered that the primary levels of contaminants of concern in groundwater at the site are BTEX and naphthalene. Elevated TPH concentrations are consequent of elevated concentrations of BTEX and PAH compounds.

4. Contaminant Hydrogeology

Based on the results of laboratory analysis of groundwater samples collected from on site and off site wells, the SKM (2006) report stated that:

'The shallow plume appears to begin near the northern boundary of the Former Cleaning Shed and Gasworks areas and extend in a south-west direction of some 75m. The data indicate that the down-gradient edge of the plume is located at the East Hills Line at the southern edge of the site boundary. The lateral extent of plume appears to be confined in the west to the sewer main located adjacent to the rear boundary of the residential properties, while to [sic] the plume is estimated to extent 50m to the east of the former tank area.'

The extent of the middle to heavy-end hydrocarbon plume in the deeper aquifer appears to be larger than the shallow aquifer. While the northern, eastern and western boundaries of the plume are similar to the shallow plume, the down-gradient extent of the plume appears to cover a distance of some 160m from the former tar tank area, with its edge near the southern boundary of railway land along Railway Parade. The data indicate that the deep aquifer plume is located entirely on railway owned [sic] land.'

In relation to the estimated flow velocities for the site, as summarised in **Table 2**, the RAP CH2M Hill, (2007) notes that the flow velocity values provided in SKM 2006, do not correlate with the measured lateral extent of the plume, based on gasworks operations commencing more than 100 years prior. It is also noted that the SKM report states that, based on the measured extent of the shallow and deep groundwater plumes migrating from the site, the permeability rates estimated from the slug tests appear to be an order of magnitude greater than actual rates.

5. Site Specific Environmental Investigations for Leachable Soils Concentrations

In preparing the revised remediation strategy for the site, it is proposed that both the total and leachable concentrations of the contaminants of concern are assessed.

Acceptable total concentrations of contaminants in site soils have been set on human health based criteria in SKM (2006).

The principal potential main environmental exposure pathway for the site is groundwater. Assessment criteria for leachable concentrations of contaminants in soil should be consistent with groundwater ecological criteria. These criteria are considered not appropriate for direct comparison to laboratory measurement of soil leachability. The laboratory testing method for leachable concentrations of soil constituents involves an extended period of tumbling the sample in the media to be analysed. This is highly unlikely to ever be replicated in the environment. Additional correction factors need to be considered to allow comparison of soil leachabilities to groundwater based ecological protection criteria.

Leachability criteria determined for the site should be based on the available criteria used for protection of groundwater resources and incorporate a dilution attenuation factor (DAF). A range of DAF calculation methods currently exist and account for either:

- The dilution of contaminated leachate that occurs as it reaches a water bearing zone which is assumed to be unimpacted, as per methods published by the United States Environmental Protection Agency (USEPA, 1996) and the Center for Research in Water Resources (CRWR, 2003); or
- The dilution of contaminated groundwater that occurs within the overall catchment prior to discharge at the receiving water body. Dilution occurs by mixing with groundwater present across the remainder of the catchment. The basis and calculation of this factor is detailed in the method published by the Commonwealth Scientific and Industrial Research Organisation (CSIRO, 2009).

6. Background

The method used to determine the site specific leaching criteria is as follows:

1. Review of the site and surrounding area to identify the nearest potentially sensitive ecological receptor as associated environmental values, as described in **Section 6.1**;
2. Determine Groundwater Investigation Levels (GILs) for the site by consideration of the environmental values of the surrounding catchment / nearest potentially sensitive receptor, as described in **Section 6.1**;
3. Estimate an approximate DAF value based on the likely discharge of groundwater sourced from beneath the site to the nearest potentially impacted environmental receptor, as described in **Section 6.3**;
4. Calculate the site specific criteria for leachable concentrations in treated material by multiplying the GIL by the DAF for each of the groundwater contaminants of concern, as described in **Section 6.4**.

6.1. Nearest Potential Sensitive Ecological Receptor

The NSW DEC (2007) '*Guidelines for the Assessment and Management of Groundwater Contamination*' requires groundwater investigation levels to be developed to protect environmental values of the surrounding catchment area. This includes consideration of current and potential future uses of groundwater and related ecosystems.

The site lies within the Alexandra Canal sub-catchment of the Cooks River catchment boundary as established by DECCW. The interim water quality objectives established by DECCW for tributaries within the Cooks River catchment¹ include:

- Aquatic ecosystem;
- Visual amenity;
- Secondary contact recreation;
- Primary contact recreation (for achievement in 10 years or more); and
- Aquatic foods to be cooked before eating (for achievement in 5-10 years).

Groundwater discharges from the site need to be protective of these water quality objectives. These beneficial uses will occur at groundwater discharge point nearest to the site, which is most likely the Munni Street Creek which discharges into Alexandra Canal. Shallow groundwater migrating off site may flow directly into the Munni Street Creek or enter piped stormwater drains that flow into the Creek, located approximately 50 m from the site, along Railway Parade to the south.

Of the water quality objectives listed for the overall Cooks River catchment, only 'protection of aquatic ecosystems' are considered applicable to the nearest surface water discharge point (i.e. Munni Street Creek then Alexandra Canal), noting that:

- Visual amenity has been severely degraded below the 'pristine' condition of this waterway;
- Secondary contact recreation is unlikely to occur given the degraded visual amenity; and
- Primary contact activities and consumption of aquatic foods are also unlikely to occur.

Aquatic ecosystems at the discharge point have been adopted as the environmental values requiring protection from groundwater discharging from the site. The GILs applicable to this value are summarised in **Table 3** and are based on ANZECC/ARMCANZ (2000) water quality trigger values for protection of 95 % of species in marine water.

6.2. Determination of DAF Values

When leachate from soil reaches a water bearing zone, it is mixed with the existing water present in that saturated layer and is diluted as it becomes groundwater. Once part of the groundwater system, it is again diluted at the discharge point, where it becomes mixed with the groundwater discharge from the remainder of the catchment.

In the derivation of soil clean-up criteria for a site that allows for protection of ecological values a DAF is used to account for these processes.

¹ Source: <http://www.dec.nsw.gov.au/ieo/CooksRiver/caag.htm>

Several methods exist for calculation of the DAF value. A review of the various methods was undertaken as part of this assessment. DAF calculation methods described in the following documents are the most widely used and/or most appropriate methods for use at the site:

- USEPA Soil Screening Level (SSL) Method (USEPA 1996);
- Center for Research in Water Resources, University of Austin Texas (2003); and
- Method described in CSIRO (2009).

DAF values calculated for the site using each of the listed methods are discussed in the following sections.

USEPA Soil Screening Level (SSL) Method (USEPA 1996)

USEPA *Soil Screening Level* (USEPA, 1996) provides a default DAF value of 20 for sites occupying an area greater than 0.5 acres, however states that site specific DAF can be used in various options for calculating impact to groundwater soil cleanup criteria, including calculation of the Leachate Criterion (LC). A site specific DAF is calculated using Equation 1 below (taken from the USEPA 1996 guidance document Equation 37). Equation 1 requires a value for the mixing zone depth in the aquifer, which is calculated using Equation 2 (taken from the USEPA 1996 guidance document Equation 45).

$$DAF = 1 + (Kid/IL) \quad (Equation 1)$$

Where

| | | |
|-----|---|---|
| i | = | gradient (m/m) |
| d | = | mixing zone depth (m), calculated below (Equation 2) |
| I | = | infiltration rate (m/yr) |
| L | = | length of area of concern parallel to ground water flow (m) |
| K | = | aquifer hydraulic conductivity (m/yr) |

$$d = (0.0112L^2)^{0.5} + d_a \{1 - \exp[(-LI)/(Kid_a)]\} \quad (Equation 2)$$

Where

| | | |
|------|---|--|
| da | = | aquifer thickness (m) – (USEPA, 1996) notes that if the calculated aquifer mixing zone depth is greater than the aquifer thickness, then the mixing zone depth should be set to equal to the aquifer thickness |
|------|---|--|

It is noted that this method provides a DAF value that applies to leachate as it enters water bearing zones on the site, rather than at the discharge point, given the absence of any parameters that incorporate the overall catchment size or distance to the ultimate discharge point.

Major assumptions inherent to this method include:

- Dilution of the contaminant due to transport through the unsaturated soil zone is not included, the chemical in soil is assumed to be immediately adjacent to the water table; and
- Chemical degradation is also not included in this model at the soil contaminant source zone or in the resulting impacted groundwater, the calculations assume that the groundwater quality requirements must be achieved in the short term.

The above equations have been used to determine a DAF value for the site, based on site specific values for gradient, length of area parallel to groundwater flow direction and hydraulic conductivity. The calculated DAF value for the site using Equation 1 is presented in **Table 4**, along with the values used for determination.

Table 4: Summary of DAF Calculation – USEPA 1996

| Parameter | Value | Reference |
|--------------------------------|-------------------|--|
| i , hydraulic gradient (m/m) | 3.1×10^2 | SKM 2006, highest gradient value reported for shallow wells |
| da , aquifer thickness (m) | 5 | Estimated thickness of shallow water bearing zone based on SKM 2006 observations that groundwater in fill occurs as shallow as 1 m bgl, and that clay extends to approximately 6 m depth |
| d , mixing zone depth (m) | 5 | Using equation 2 a value of 8.2 m was calculated for d . The aquifer thickness was therefore set as 5, adopting the recommendation in the method |

| Parameter | Value | Reference |
|---|------------|---|
| I, infiltration rate (m/yr) | 1.214 | Bureau of Meteorology – Historical Annual Average Rainfall for Sydney (bom website on 28/07/10)- worst case scenario that 100% of rainfall infiltrates subsurface |
| L, length of area of concern parallel to groundwater flow (m) | 68 | Maximum length of site running south-east |
| K, aquifer conductivity (m/yr) | 441.5 | Based on maximum value of $1.4 \times 10^{-5} \text{ ms}^{-1}$ reported in SKM 2006 for shallow wells |
| Calculated DAF | 1.8 | Using Equation 1 adopting the values listed above |

Given the low DAF calculated and the range of input data available for the site, DAFs were calculated for a range of scenarios, the results of which are summarised **Table 5** below. These values also provided as assessment of the sensitivity of the method.

Table 5: Alternate DAF Calculations – adopting USEPA 1996

| Calculated DAF | % change | Scenarios |
|----------------|----------|---|
| 3.76 | 109 | Assuming only 30% of all rainfall on site infiltrates soil profile. Using a value of 0.3642 for I with all other values as per Table 4 . |
| 1.08 | 40 | Assumes conductivity values are 1 order of magnitude below slug test calculated value, based on SKM 2006 report. Using a value of 44.15 m/yr for K with all other values as per Table 4 . |
| 1.01 | 44 | Using a hydraulic gradient value of 4.41×10^{-5} in the direction of groundwater flow. Based on the water levels reported in SKM 2006, at two shallow wells (17.57 m AHD at MW07S and 17.54 m AHD at MW03s) placed 68m apart |

Variation of the input values used in Equation 1 suggests that of all the parameters estimated for the site, the DAF calculated is most sensitive to the value adopted for infiltration.

The two main limitations of the USEPA (1996) method for the current application include:

- The method is intended to estimate the magnitude of dilution that occurs as soil leachate enters a water bearing zone on the site, rather than at the discharge point. Application of such a DAF to produce site specific criteria, is intended to result in GIL compliant groundwater migrating off site. Any parameters that incorporate the second stage of dilution that occurs between the site and the final discharge point, such as the overall catchment size or distance to the ultimate discharge point, are notably absent. For the current project this absence is considered to result in overly conservative DAF values. The site is located in an area where groundwater is unlikely to be utilised for primary contact, secondary contact or irrigation purposes. Under these circumstances, the environmental values of the catchment, or health impacts to future site users, will not be impacted if compliance with the GILs occurs at the site boundary or further along at the ultimate discharge point; and
- The limited sensitivity analysis conducted on the method focused on the parameters with the greatest potential for variation. The results indicated that the calculated DAF showed the greatest change as the value for the infiltration rate was altered (the DAF increased by 108% when the infiltration rate was reduced to 30% of the original input value, as opposed to only 40-44% change in the calculated DAF when values for hydraulic conductivity and hydraulic gradient were varied). As infiltration rate is governed by soil properties which are likely to be highly variable in shallow soils on the site, the approach of using literature review sourced values for input is also considered to be insufficiently robust for the current purpose.

Center for Research in Water Resources, University of Austin Texas (CRWR, 2003)

A report prepared by the Center for Research in Water Resources, University of Austin Texas (CRWR, 2003) describes the DAF calculation method used in the groundwater assessment component of the Texas Source Water Assessment Program. The Texas Source Water Assessment Program, was undertaken to determine the susceptibility of individual water sources to contamination.

The DAF applied to each water source was determined using the following series of equations:

$$DAF = DF \times AF$$

(Equation 3)

Where DF = Dilution Factor, as calculated by Equation 4 below
 AF = Attenuation Factor, as calculated by Equation 6 below

$$DF = C_w/C_{soil} = \{[\rho_b/(\theta_{ws} + K_d\rho_b + H'\theta_{as})] / LDF\} \times (L1/L2) \quad (\text{Equation 4})$$

Where C_w = Contaminant concentration in groundwater (g/cm³)
 C_{soil} = Contaminant concentration in soil (g/g-soil)
 ρ_b = Soil bulk density (kg/L)
 θ_{ws} = the volumetric water content in the vadose zone (cm³-water/cm³-soil)
 K_d = the soil water partitioning coefficient (cm³-water/g-soil)
 H' = Henrys Law constant
 θ_{as} = the volumetric air content in the vadose zone (cm³-air/cm³-soil)
 LDF = the Lateral Dilution Factor, as calculated by Equation 5 below
 $L1$ = thickness of affected soil
 $L2$ = Depth from the top of the affected soil to the groundwater table

$$LDF = 1 + \{(U_{gw} \delta_{gw})/(I_f W_s)\} \quad (\text{Equation 5})$$

Where U_{gw} = groundwater Darcy velocity (cm/year)
 δ_{gw} = groundwater mixing zone thickness (m)
 I_f = net infiltration rate (cm/year)
 W_s = the lateral width of the affected vadose zone in the direction of groundwater flow(m)

$$AF = \exp[(L_{gw}/2a_x) * (1 - \sqrt{1 + 4 * (D_g a_x / v_{coc})})] \times \text{erf}[W/4 \sqrt{a_y L_{gw}}] \times \text{erf}[D/4 \sqrt{a_z L_{gw}}] \quad (\text{Equation 6})$$

Where L_{gw} = down gradient distance from the contamination source to the water supply well or discharge point (m)
 D_g = first order decay constant (day⁻¹)
 v_{coc} = the contaminant retarded velocity (m/day)
 W = source zone width (m)
 D = source zone depth (m)
 $a_{x,y,z}$ = the longitudinal(a_x), transverse (a_y) and vertical (a_z) groundwater dispersivities

Of all the DAF calculation methods considered, the CRWR method, requires the most input data, both in terms of volume and detail. Given the limited information on site hydrogeological conditions, and in particular on the fill layers, DAF calculations undertaken in this assessment have set the value of AF to 1. An AF value of 1, input into Equation 3, assumes that no attenuation processes are occurring within the water bearing zones, and any reduction in contaminant concentration that occurs is due to dilution only. This was considered to be suitably conservative for the current purpose.

The remaining values used as input into Equations 3 to 5 are presented in **Table 6**.

Table 6: CRWR (2003) Method DAF Calculation Input Values

| Parameter | Value | Reference |
|---|-----------------------|---|
| i , hydraulic gradient (m/m) | 3.1×10^2 | SKM 2006, highest gradient value reported for shallow wells |
| ρ_b , soil bulk density | 1.67 | CRWR 2003, density value quoted for clayey soils |
| θ_{ws} | 0.16 | CRWR 2003, value quoted for clayey soils |
| θ_{as} | 0.21 | CRWR 2003, value quoted for clayey soils |
| k_d , the soil water partitioning coefficient ($\text{cm}^3\text{-water/g-soil}$) | Contaminant dependent | Used formula $k_d = f_{oc} \times K_{oc}$ Where f_{oc} value set to 0.002 g-carbon/ g-soil (CRWR, 2003), and K_{oc} values taken from (RAIS, 2010 ²) 1540 for naphthalene, 146 for benzene, 234 for toluene, 446 for ethylbenzene and 338 for xylene (all K_{oc} values in $\text{cm}^3\text{-water/g soil}$) |
| H' , Henrys Law constant | Contaminant dependent | Values taken from (RAIS, 2010 ³) 0.018 for naphthalene, 0.322 for benzene, 0.271 for toluene, 0.322 for ethylbenzene and 0.212 for xylene (Henry's constant values unitless) |
| L_1 , thickness of affected soil (m) | 6 | Estimated thickness of shallow fill and clay soils based on (CH2M Hill, 2007) |
| L_2 , Depth from top of affected soil to groundwater table (m) | 1 | Based on SKM 2006 observations that groundwater in fill occurs as shallow as 1 m bgl |
| I_r , infiltration rate (m/yr) | 1.214 | Bureau of Meteorology – Historical Annual Average Rainfall for Sydney (bom website on 28/07/10)- worst case scenario that 100% of rainfall infiltrates subsurface |
| δ_{gw} , groundwater mixing zone thickness (m) | 5 | Estimated thickness of shallow water bearing zone from SKM 2006 observations that groundwater in fill occurs as shallow as 1 m bgl, and clay extends to approximately 6 m depth |
| W_s , lateral width of affected vadose zone in direction of groundwater flow | 68 | Maximum length of site running south-east |

Table 7 presents the spreadsheet calculations using the above values for the groundwater COPC identified in Section 3. **Table 8** provides the DAF calculated for naphthalene using alternate input parameters.

The two main limitations of the CRWR (2003) method for the current application include:

- The model formulas require the input of values for detailed hydrogeological properties at the site, e.g. volumetric water content, volumetric air contents, 'retarded contaminant velocity', which have not been determined for the site. While values can be, and have been, assumed for these properties based on literature reviews, this approach is considered to be insufficiently robust for the variable shallow water bearing zone under assessment; and
- The limited sensitivity analysis, focused on the parameters with the greatest potential for variation, indicated that the calculated DAF value showed the greatest change as the value for the fraction organic carbon content was increased. The value of this parameter is governed by soil properties which are likely to be highly variable in shallow soils on the site and potentially in soils located off-site. Insufficient data is available of catchment organic carbon levels to allow robust application for the current purpose.

² The Risk Assessment Information System (RAIS) website, Chemical Specific Parameters, http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem_spef as on 29 July 2010

³ The Risk Assessment Information System (RAIS) website, Chemical Specific Parameters, http://rais.ornl.gov/cgi-bin/tools/TOX_search?select=chem_spef as on 29 July 2010

Table 7: CRWR Method DAF Calculations

| Contaminant | AF - | Ugw Cm/yr | δgw m | If Cm/yr | Ws m | LDF - | ρb Kg/L | θws - | Foc g-carbon / g-soil | Koc Cm ³ -water /g soil | Kd Cm ³ -water /g soil | H' - | θas - | L1 m | L2 m | DF - |
|--------------|---------|--------------|----------|-------------|---------|----------|------------|----------|-----------------------------|--|---|---------|----------|---------|---------|---------|
| naphthalene | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.67 | 0.16 | 0.002 | 1540 | 3.08 | 0.018 | 0.21 | 6 | 1 | 0.038 |
| Benzene | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.67 | 0.16 | 0.002 | 146 | 0.292 | 0.322 | 0.21 | 6 | 1 | 0.283 |
| Toluene | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.67 | 0.16 | 0.002 | 234 | 0.468 | 0.271 | 0.21 | 6 | 1 | 0.203 |
| ethylbenzene | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.67 | 0.16 | 0.002 | 446 | 0.892 | 0.322 | 0.21 | 6 | 1 | 0.118 |
| Xylenes | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.67 | 0.16 | 0.002 | 383 | 0.766 | 0.212 | 0.21 | 6 | 1 | 0.136 |

Table 8: CRWR method DAF Calculations for Naphthalene with Altered Input Values

| Contaminant | AF - | Ugw Cm/yr | δgw m | If Cm/yr | Ws m | LDF - | ρb Kg/L | θws - | Foc g-carbon / g-soil | Koc Cm ³ - water /g soil | Kd Cm ³ - water /g soil | H' - | θas - | L1 m | L2 m | DF - | % change |
|-------------|---------|-------------------------|----------|--------------------------|---------|----------|------------------------|----------|-----------------------------|--|---|---------|----------|---------|---------|---------|-------------|
| naphthalene | 1 | 620 | 5 | 36.42¹ | 68 | 2.252 | 1.67 | 0.16 | 0.002 | 1540 | 3.08 | 0.018 | 0.21 | 6 | 1 | 0.0233 | 38.9 |
| naphthalene | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.8² | 0.16 | 0.002 | 1540 | 3.08 | 0.018 | 0.21 | 6 | 1 | 0.0382 | 0.2 |
| naphthalene | 1 | 620 | 5 | 121.4 | 68 | 1.376 | 1.67 | 0.16 | 0.02³ | 1540 | 30.8 | 0.018 | 0.21 | 6 | 1 | 0.0039 | 89.7 |
| naphthalene | 1 | 1370⁴ | 5 | 121.4 | 68 | 1.830 | 1.67 | 0.16 | 0.002 | 1540 | 3.08 | 0.018 | 0.21 | 6 | 1 | 0.0287 | 24.8 |

Notes:

1. Assuming only 30% of all rainfall on site infiltrates soil profile.
2. Assuming greater soil bulk density of 1.8 kg/L.
3. Assumes conductivity values are 1 order of magnitude below slug test calculated value, based on SKM 2006 report.
4. Using a hydraulic gradient value of 4.41×10^5 in the direction of groundwater flow. Based on the water levels reported in SKM 2006, at two shallow wells (17.57 m AHD at MW07S and 17.54 m AHD at MW03s) placed 68m apart

Commonwealth Scientific and Industrial Research Organisation (CSIRO, 2009).

A report prepared by CSIRO (CSIRO, 2009)⁴ describes the National Environment Protection Council (NEPC) and Environment Protection and Heritage Council (EPHC) accepted and endorsed Australian method for deriving ecological investigation levels (EILs). The endorsed Australian method for deriving EILs is reported to be included as part of the revised National Environment Protection (Assessment of Site Contamination) Measure for public comment (CSIRO, 2009).

Appendix C of the CSIRO report (CSIRO, 2009) includes an endorsed method for deriving EILs that protect aquatic ecosystems. The method provides a means of calculating a dilution attenuation factor (DAF) for use in EIL calculations, which takes into account that groundwater catchments will most likely contain both contaminated and uncontaminated soils and pore water concentrations will not always equal groundwater concentrations of specific contaminants. The fraction of contaminated land to the total area of the groundwater/aquifer catchment is used to calculate the DAF as follows:

$$DAF = 100 \div \text{percentage of contaminated soil in catchment} \quad (\text{Equation 7})$$

It is noted that in calculating a DAF the size of the whole catchment should be taken into consideration.

In calculating a DAF for the site using Equation 7, JBS has run two total catchment size scenarios to allow for the different discharge conditions that apply to shallow and deep groundwater from the site:

- Deep groundwater migrating south-east and discharging directly into Munni Street Creek and then Alexandra Canal; and
- Shallow perched water migrating south east off site and discharging into the piped stormwater channels along Railway Parade.

The DAF calculated for each catchment size scenario are provided in **Table 9** below. Adopting a conservative approach it was assumed that the areas of 'contaminated soil' comprised the entire site area.

Table 9: CSIRO (2009) Method - Summary of DAF Calculations

| Parameter | Alexandra Canal – deep groundwater | Reference | Railway Parade stormwater channel – shallow groundwater | Reference |
|---|------------------------------------|-----------------------------|---|-----------------------------|
| Total Area of Catchment (m ²) | 16.6 x 10 ⁷ | PPK 1999 ¹ | 117 600 | PPK 1999 ¹ |
| Site Area (m ²) | 7732 | CH2M Hill 2007 ² | 7732 | CH2M Hill 2007 ² |
| Ratio of 'Contaminated Soil' Area to Total Catchment Area | 4.66 x 10 ⁻⁴ | - | 0.065748 | - |
| Percentage of Contaminated Soil in Catchment | 0.05 | - | 7 | - |
| DAF | 2000 | - | 16.6 | - |

Notes: 1 Catchment area estimated from PPK 1999 'Cooks River Stormwater Management Plan' Figure 2.4: Existing Stormwater Infrastructure, and Department of Lands Six Viewer website. Both figures included are as **Figure 2** and **Figure 3** respectively

2 CH2M Hill (December 2007) 'Remedial Action Plan'.

While the CSIRO (2009) method appears to be the most simplistic of all the three methods considered, the basis of the method i.e. assessing the DAF at the point of discharge, rather than the site boundary, is considered to be the most appropriate for the project. The DAF value of 16.6 was calculated in a suitably conservative manner, i.e. assuming the nearest discharge point for shallow groundwater is the piped stormwater channel 50m south of the site on Railway Parade, and therefore reducing the catchment area size to less than 12 Ha. It is also noted that this calculated DAF is less than the USEPA (1996) default DAF value of 20 for site greater than 0.5 acres in area.

⁴ The Australian Methodology to Derive Ecological Investigation levels in Contaminated Soils. CSIRO Land and Water Science Report 43/09, prepared for the National Environment Protection Council, (CSIRO, 2009).

7. Calculation of Site Specific Criteria for the Site

The three different approaches to DAF calculation have produced a range of results varying by four orders of magnitude. The CRWR method yields the most conservative results, which if adopted, would result in leachable concentrations criteria being only a small fraction of the corresponding GIL. The CSIRO method produces seemingly, the least conservative results. Consideration of the model assumptions and the anticipated context of application, has confirmed that the CSIRO (2009) method to be most suitable to be adopted for the site.

A value of 16.6 as determined by the CSIRO (2009) method, is the most appropriate DAF value for the site.

The DAF value of 16.6 has been used with the adopted GILs to derive of leachability criteria, as summarised in **Table 10**. The site specific leachability criteria assume the background concentrations of the contaminants of concern are zero, and that the leachable concentration in the treated material accounts for the total contaminant load at the discharge point. With the exception of heavy metals, this assumption is considered valid given the low concentrations of organic contaminants in wells located on the upper hydraulic gradient end of the site. While some heavy metal impact was noted in the groundwater migrating onto the site, this impact was considered to be representative of local conditions, and therefore it is considered adoption of the site specific values in **Table 10** for these contaminants would not adversely impact the environmental values at the point of discharge.

Table 10: Leachate Assessment Criteria (all units in µg/L)

| | Limit of Reporting | Aquatic Ecosystems ¹ | Site Specific Criteria for assessment for leachable concentrations in soil ³ |
|----------------------------------|--------------------|--|---|
| Arsenic (III/V) | 0.1 | 2.3 ² / 4.5 ^{2, 5} | 38.2 / 74.7 |
| Cadmium | 0.1 | 0.7 ¹ | 11.6 |
| Chromium (III) | 1 | 10 | 166 |
| Chromium (VI) | 0.1 | 4.4 | 73 |
| Copper | 0.1 | 1.3 | 21.6 |
| Lead | 0.1 | 4.4 | 73 |
| Manganese | 1 | 80 ² | 1328 |
| Mercury | 0.05 | 0.1 ¹ | 1.76 |
| Nickel | 1 | 70 | 1162 |
| Zinc | 1 | 15 | 249 |
| VOLATILE ORGANIC COMPOUNDS | | | |
| Benzene | | 500 | 8300 |
| Toluene | | 180 ² | 2988 |
| Ethylbenzene | | 5 ² | 83 |
| Xylene (M+O+P) | | 625 ² | 10 375 |
| Styrene | | 1600 | 26560 |
| Phenols | | 400 | 6640 |
| POLYCYCLIC AROMATIC HYDROCARBONS | | | |
| Benzo(a)Pyrene | 0.1 | 0.1 ² | 1.7 |
| Naphthalene | 0.1 | 50 | 830 |
| Phenanthrene | 0.1 | 0.6 ² | 10.3 |
| Anthracene | 0.1 | 0.01 ² | 0.2 |
| Fluoranthene | 0.1 | 0.1 ² | 1.7 |

¹ 95% protection levels (marine ecosystems) have been used. When these levels fail to protect key test species, the 99% protection levels were used - ANZECC/ARMCANZ (2000). The 99% protection levels have been adopted in line with recommendations in Section 8.3.7 of ANZECC/ARMCANZ 2000.

² Insufficient data to derive a reliable trigger value. In these instances, reference has been made to low reliability trigger levels contained in ANZECC/ARMCANZ (2000).

It is noted that TPH has not been included in **Table 10**, as the more prevalent indicator contaminants have been included.

It is concluded that the site specific criteria provided are over protective of the existing aquatic ecosystems of Alexandra Canal and can be used for future decision making for the site.

Prepared by,



Sumi Dorairaj
Senior Environmental Consultant
JBS Environmental Pty Ltd

Attachments: (1) Limitations
 (2) Figures

Reviewed by,



Matthew Parkinson
Principal - Contaminated Land
JBS Environmental Pty Ltd

Attachment 1 - Limitations

This report has been prepared for use by Incoll Management Pty Ltd who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS Environmental Pty Ltd accepts no liability for use or interpretation by any person or body other than Incoll Management Pty Ltd or the appointed Site Auditor. This report should not be reproduced without prior approval by Incoll Management Pty Ltd, or amended in any way without prior approval by JBS Environmental Pty Ltd, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited sampling and laboratory analyses were undertaken as part of the investigations, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the sites, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

Attachment 2 Figures



Figure 2
Cooks River Catchment
Existing Stormwater
Infrastructure

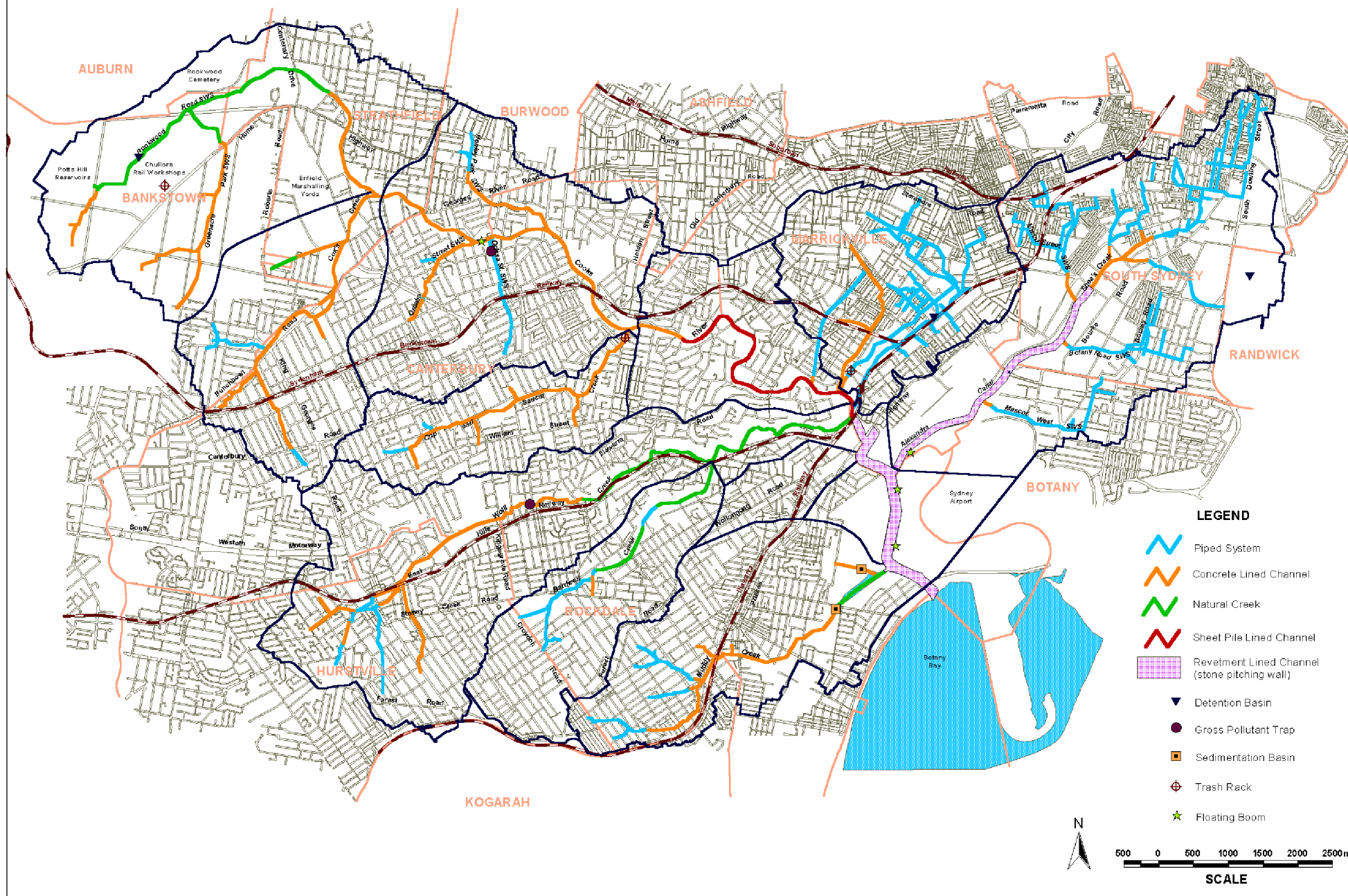
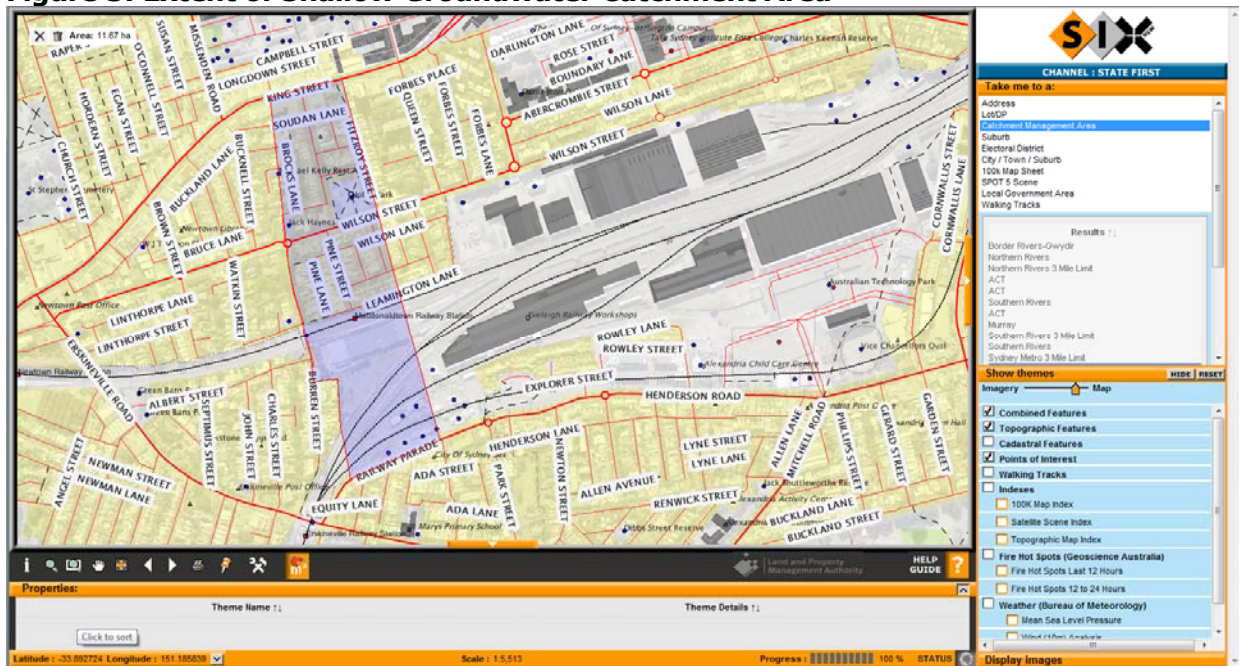


Figure 3: Extent of Shallow Groundwater Catchment Area



Purple shaded area showing extent of site catchment discharging into piped stormwater system leading to Munni Creek.

Appendix C

**JBS Letter '*Results of Water Treatment Trial, former Macdonaldtown Gasworks,
Burren Street Erskineville*' JBS Environmental Pty Ltd (2010b)**

JBS40913-15434 Rev 1

25 November 2010

John Dawson
Project Director
Incoll Management Pty Ltd
Level 1, 73 Miller Street
North Sydney NSW 2060
(Sent Via email: jdawson@incoll.com.au)

Groundwater Treatment Trial, Former Macdonaldtown Gasworks, Revision 1

Dear John,

1. Introduction and Objectives

JBS Environmental Pty Ltd (JBS) was engaged by Incoll Management Pty Ltd (Incoll), on behalf of Rail Corporation NSW Environment Projects Unit (RailCorp), to undertake works for the revision of the remedial strategy prepared for the former Macdonaldtown Gasworks site. This letter details the trial operation of a water treatment system on the site to assess the potential discharge locations for water collected during dewatering operations.

The former Macdonaldtown gasworks site has previously been the subject of environmental investigations which have identified a number of soil and groundwater contamination issues which require remediation and/or management in order to make the site suitable for ongoing commercial use. A remedial action plan (CH2M Hill 2007¹) for the site, has previously been prepared to document the procedures that will be undertaken to remediate and/or manage the identified issues at the site.

Excavation works proposed for the site include remedial works to remove contamination associated with naphthalene, benzo(a)pyrene (BaP) and Total Petroleum Hydrocarbons (TPH) within groundwater underlying the site. It is understood that proposed remedial excavations will extend to below the depth of groundwater underlying the site.

As a result of the contamination identified on the site, any groundwater collected during dewatering of the site for remediation is considered unsuitable to be disposed directly to stormwater. This 'dewater' will therefore require treatment prior to off-site disposal. JBS has undertaken a groundwater treatment trial, using a water treatment plant (WTP) transported to the site, to provide an indicative assessment of the 'treatability' of potential dewater from the site and an indicative assessment of treatment steps that will be required to manage the 'dewater'.

2. Methodology

Groundwater was extracted from existing monitoring wells MW37S, MW07S, MW06S and MW04S (**Figure 1**) from 05 July to 09 July 2010. The majority of water for the trial was pumped from MW04S and MW37S, which differed from the wells nominated for extraction in SAQP² for the works, as follows:

- SAQP nominated well MW03S was unable to be located at the time of the trial. The well was located in the vicinity of several large soil stockpiles, and it is uncertain whether this well remains viable;
- SAQP nominated well MW06S ran dry after extraction of approximately 40L on both 7 and 9 July 2010;
- SAQP nominated well MW07S ran dry after extraction of approximately 50L on both 7 and 9 July 2010;

¹ Remedial Action Plan, Former Macdonaldtown Gasworks Site, Burren Street, Erskineville NSW 2007 (CH2M Hill, 2007)

² Sampling, Analysis and Quality Plan, Pre-Remedial Investigations, Former Macdonaldtown Gasworks, JBS 2010

- SAQP nominated well MW31 was unable to be located at the time of the trial and it is likely this well has been destroyed.

Given the limited time available for completion of the trial, a total of only 4000L was pumped over the trial period from wells MW37S and MW04S. While not located within the source zones identified on site the groundwater pumped from MW37S and MW04S these wells is considered to be representative of impacted water.

Groundwater was extracted using bottom filling air operated in-well pumps installed to the base of the monitoring wells. Extracted groundwater was transferred to a new 9,000L storage poly tank. Approximately 4,000L of dewater was collected within the storage tanks during the pumping period.

The treatment system in use required a minimum of 8,000L of water to operate efficiently i.e. run for a sufficient length of time, and complete a meaningful trial i.e. allow for collection of sufficient samples. Consequently a further 4,000 L of water, sourced from on site fire hydrant was added to the 'dewater' in the influent tank on 9 July 2010. This approach was considered necessary because:

- Two of the four wells nominated for use in the trial were unable to be located and were presumed destroyed;
- The yield of groundwater in the two wells pumped in the vicinity of shallow groundwater plume was low, with a total of 4,000L pumped from both wells over the duration of the pumping trial.

The addition of water to influent tank for completion of the trial was considered not to impact the findings of the trial, given that the main objective of the trial was to assess the system's ability to remove the contaminants of concern from the 'dewater'. Provided the system is appropriate for the contaminants, treatment of water with higher concentrations will simply be a process of 'scaling up' the trialled components to the requirements of the remediation works. The findings of the trial are not intended to provide detailed design of the water treatment system, but rather to provide proposed remediation tenderers with sufficient information to anticipate the requirements of the remediation program.

The WTP used for the trial included the following components (listed in order of installation and water treatment):

- Oil / water separators;
- Multi-media (i.e. sand) filter (see **Attachment 4**); and
- Five 150L granular activated carbon (GAC) filters. Commercially available GAC was used in the filters. The amount of GAC used in the trial, equates to a GAC contact time during water treatment of 8 minutes.

Water flow through the WTP was controlled by the 92L/min flow restrictor provided to the oil-water separator. Effluent was discharged to an additional new sealed water storage tank. The water treatment trial was undertaken on the 9 July 2010.

Water sampling was undertaken at three intervals during the WTP operation (i.e. 'Run 1' collected 15 minutes after commencement, 'Run 2' collected 30mins after commencement and 'Run 3' collected 40 minutes after commencement). This series of runs was adopted to provide a 'snapshot' of water quality in the system between treatment components. The sampling strategy is listed in **Table 1** and depicted as a flow chart in **Figure 2**. Samples were collected from sampling 'taps' installed in pipe lines connecting the system components.

Table 1: Summary of Water Treatment Trial Sampling

| Sample ID | Sample Description |
|------------------|---|
| MW04S | Collected from undiluted groundwater held within storage tank prior to trial commencement. |
| Sample 1 – Run 1 | Collected from water pumped out of influent tank, 15 minutes after trial commencement |
| Sample 1 – Run 2 | Collected from water pumped out of influent tank, 30 minutes after trial commencement |
| Sample 1 – Run 3 | Collected from water pumped out of influent tank, 40 minutes after trial commencement |
| Sample 2 – Run 1 | Collected from water in WTP at outlet of oil / water separator at 15 minutes after trial commencement |
| Sample 2 – Run 2 | Collected from water in WTP at outlet of oil / water separator at 30 minutes after trial commencement |
| Sample 2 – Run 3 | Collected from water in WTP at outlet of oil / water separator at 40 minutes after trial commencement |
| Sample 3 – Run 1 | Collected from water in WTP at outlet of air stripper at 15 minutes after trial commencement |
| Sample 3 – Run 2 | Collected from water in WTP at outlet of air stripper at 30 minutes after trial commencement |
| Sample 3 – Run 3 | Collected from water in WTP at outlet of air stripper 40 minutes after trial commencement |
| Sample 4 – Run 1 | Collected from WTP effluent at 15 minutes. Additional treatment stages include sand filter, iron filter and GAC filter. |
| Sample 4 – Run 2 | Collected from WTP effluent at 30 minutes. Additional treatment stages include sand filter, iron filter and GAC filter. |
| Sample 4 – Run 3 | Collected from WTP effluent at 40 minutes. Additional treatment stages include sand filter, iron filter and GAC filter. |

All samples were analysed for:

- Field parameters;
- Volatile organic compounds (VOCs);
- Total petroleum hydrocarbons (TPH);
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Heavy metals (including As, Cd, Cr, Cu, Pb, Hg, Ni and Zn) subsequent to field filtering.

3. Quality Assurance / Quality Control

A program of quality assurance / quality control (QA/QC) was undertaken with the sampling and analysis works conducted during the water treatment trial. QA/QC assessment included:

- Sampling and analysis of one inter-laboratory duplicate sample;
- Preparation and analysis of trip spike and trip blank samples;
- Conducting all sampling and sample preservation in accordance with JBS procedures;
- Use of NATA accredited laboratories for all analysis; and

- Assessment of laboratory QA/QC.

QA/QC has been assessed by reference to JBS standard quality protocols.

Based on the assessment of QA/QC, the environmental data generated during the water treatment trial are considered sufficiently representative to assess potential water treatment of groundwater underlying the site.

4. Results

Analytical results for the water treatment trial have been summarised in **Table 2**. Only COPCs which have been recorded above laboratory detection limits are summarised in **Table 2**. Laboratory result certificates are provided as **Attachment 3**.

From review of **Table 2**, observations during field works and the objectives of the water treatment trial the following points are observed:

- With the exception of arsenic, the concentrations of all heavy metals were significantly reduced by the system. Consistent reductions in these heavy metals concentrations were recorded after passing through each of the system components in all 3 'runs' conducted, with the heavy metals concentrations in the final effluent samples from all runs (i.e. the Number 4 samples) less than the laboratory detection limits. ;
- Levels of arsenic and suspended solids increased slightly in effluent samples. GAC commonly has trace levels of arsenic contamination present which can become apparent in treated water. GAC also commonly releases fines, which can be recorded as suspended solids. This can be minimised by the selection of acid washed GAC filter for use in the operational WTP;
- Phase Separated Hydrocarbons (PSH) were not observed in the
- In Run 2, the majority of TPH C₁₀-C₃₆ removal was achieved by the oil-water separator. The significantly reduced level achieved at the 'Sample No. 2' location was further reduced to a concentrations less than the detection limits by the GAC filters;
- The results for Runs 1 and 3 indicate that the TPH C₁₀-C₃₆ concentrations in the Sample 3 locations exceeded the Sample 2 values. As the plant operation and sampling methods used were consistent for the trial it is considered that these results are a reflection of the variable nature of groundwater under treatment, even after dilution. It is noted that regardless of this variation the concentrations of TPH C₁₀-C₃₆ in the final effluent sample of both Runs 1 and 3 were less than the laboratory detection limits, and indicates the system provides an effective treatment process for these contaminants;
- The majority of PAH removal was achieved by the oil-water separator. This is most notable in naphthalene concentrations dropping by an order of magnitude between Sample 1 and Sample 2 locations for all three runs. Ultra-trace analysis was completed on the final effluent samples collected during the trial and in all three 'runs', all PAH concentrations were further reduced to concentrations less than the detection limits by the GAC filters;
- The majority of VOC removal was achieved by the GAC filters. GAC materials used in GAC filters are noted to have design lives, often measured as a 'breakthrough point'. Water treatment completed during dewatering will require to be cognisant of the mass of contaminants removed by the GAC and the relative absorption capacity; and
- Water used from the trial was removed from developed groundwater monitoring wells and had low levels of suspended solids. Levels of suspended solids from dewater generated during excavation works would be anticipated to have higher levels of dissolved solids.

Table 2: Summary of Water Treatment Trial Results (all units in µg/L unless otherwise specified)

| Sample ID | pH | Analyte | | | | | | | | | | | | |
|-------------------------|--|--------------|------------------------|------------------------|--------------------------------|----------------------------------|--------------|----------------|--------------|--------------|--------------|----------------|--------------|--------------|
| | | VOCs | | | TPH | | Heavy Metals | | | | | | | |
| | | Chloro-form | Bromo-dichloro-methane | Dibromo-chloro-methane | C ₆ -C ₉ | C ₁₀ -C ₃₆ | As | Cd | Cr | Cu | Pb | Hg | Ni | Zn |
| MW04S | Pumped groundwater holding tank | 21 | 25 | 18 | <10 | 6,200 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 1 | 110 |
| Sample 1 – Run 1 | Influent (15 mins) | 14 | 8.9 | 2.7 | <10 | 1,100 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 1 | 110 |
| Sample 2 – Run 1 | Post oil-water separator / pre sand filter (15 mins) | 9.8 | 5.8 | 1.7 | <10 | 170 | <1 | <0.1 | <1 | 1 | <1 | <0.5 | 2 | 100 |
| Sample 3 – Run 1 | Post sand filter/ pre GAC (15 mins) | 12 | 7.6 | 2.2 | <10 | 3,210 | <1 | <0.1 | <1 | 10 | <1 | <0.5 | 8 | 63 |
| Sample 4 – Run 1 | Post GAC Effluent (15 mins) | <1 | <1 | <1 | <10 | <250 | 16 | <0.1 | <1 | <1 | <1 | <0.5 | <1 | 1 |
| Sample 1 – Run 2 | Influent (30 mins) | 12 | 2.1 | 2.1 | <10 | 3,600 | <1 | <0.1 | <1 | 3 | <1 | <0.5 | 7 | 170 |
| Sample 2 – Run 2 | Post oil-water separator / pre sand filter (30 mins) | 11 | 6.6 | 2.0 | <10 | 322 | <1 | <0.1 | <1 | 4 | <1 | <0.5 | 9 | 91 |
| Sample 3 – Run 2 | Post sand filter/ pre GAC (30 mins) | 9.7 | 6.3 | 2.0 | <10 | 190 | <1 | <0.1 | <1 | 7 | <1 | <0.5 | 8 | 48 |
| Sample 4 – Run 2 | Post GAC Effluent (30 mins) | <1 | <1 | <1 | <10 | <250 | 17 | <0.1 | <1 | <1 | <1 | <0.5 | <1 | <1 |
| Sample 1 – Run 3 | Influent (40 mins) | 9.6 | 5.9 | 1.8 | <10 | 5,700 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 2 | 160 |
| Sample 2 – Run 3 | Post oil-water separator / pre sand filter (40 mins) | 10 | 5.5 | 1.7 | <10 | <250 | <1 | <0.1 | <1 | <1 | <1 | <0.5 | 2 | 140 |
| Sample 3 – Run 3 | Post sand filter/ pre GAC (40 mins) | 11 | 5.2 | 1.6 | <10 | 1230 | <1 | <0.1 | <1 | 4 | 1 | <0.5 | 2 | 49 |
| Sample 4 – Run 3 | Post GAC Effluent (40 mins) | <1 | <1 | <1 | <10 | <250 | 24 | <0.1 | <1 | <1 | <1 | <0.5 | <1 | <1 |

Table 2: Summary of Water Treatment Trial Results (all units in µg/L unless otherwise specified)

| Sample ID | Component or sampling stage (time after system commencement) | Analyte - PAHs | | | | | | | | | | | | | | |
|-------------------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|-----------------|------------------------|-----------------|-------------------------|------------------------|----------------------|
| | | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Fluoranthene | Pyrene | Benzo(a)anthracene | Chrysene | Benzo(b+k)fluoranthene | Benzo(a)pyrene | Indeno(1,2,3-c,d)pyrene | Dibenzo(a,h)anthracene | Benzo(g,h,i)perylene |
| MW04S | Pumped groundwater holding tank | 5.6 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 1 – Run 1 | Influent (15 mins) | 2.2 | <0.1 | 0.7 | 0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 2 – Run 1 | Post oil-water separator / pre sand filter (15 mins) | 0.3 | <0.1 | 0.4 | 0.4 | 0.4 | <0.1 | 0.2 | 0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 3 – Run 1 | Post sand filter/ pre GAC (15 mins) | 0.2 | <0.1 | 0.3 | 0.2 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 4 – Run 1 | Post GAC (15 mins) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Sample 1 – Run 2 | Influent (30 mins) | 3.4 | <0.1 | 0.5 | 0.4 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 2 – Run 2 | Post oil-water separator / pre sand filter (30 mins) | 0.2 | <0.1 | 0.5 | 0.5 | 1 | 0.2 | 0.7 | 0.4 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 3 – Run 2 | Post sand filter/ pre GAC (30 mins) | 0.2 | <0.1 | 0.4 | 0.4 | 0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 4 – Run 2 | Post GAC (30 mins) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 |
| Sample 1 – Run 3 | Influent (45 mins) | 3.8 | <0.1 | 0.8 | 0.6 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 2 – Run 3 | Post oil-water separator / pre sand filter (40 mins) | 0.2 | <0.1 | 0.6 | 0.5 | 0.1 | <0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 3 – Run 3 | Post sand filter/ pre GAC (40 mins) | 0.2 | <0.1 | 0.6 | 0.5 | 0.6 | 0.1 | 0.1 | 0.1 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 |
| Sample 4 – Run 3 | Post GAC (40 mins) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.02 | <0.01 | <0.01 | <0.01 | <0.01 |

Overall it is noted that samples of the treatment system effluent (i.e. all 'Sample 4' results, collected post GAC filter) were reported to contain very low concentrations of all contaminants of concern at the site. Based on these results it appears that a water treatment plant could be used as part of the remediation process to enable discharge of collected groundwater as follows:

- To stormwater following receipt of relevant approvals from City of Sydney Council; or
- To sewer should a 'trade waste agreement' be entered into with Sydney Water.

Additionally, the results indicate that the treated effluent was of a suitable quality for reinjection into the subsurface. The feasibility of this option is however uncertain, given the required discharge rates during remediation are likely to exceed the infiltration potential of the clay soils underlying the site. This option would also require licensing by the NSW Office of Water.

If you wish to discuss any part of this letter further, then please free to contact Sumi Dorairaj on (02) 8338 1011. If you wish to discuss specifics of the WTP used during the works, or possible supply of water treatment components, Cameron Grant of Total Environmental Solutions (who supplied and operated the WTP during the trial) can be contacted on 0400 993 112.

Prepared by:



Sumi Dorairaj
Senior Environmental Consultant
JBS Environmental Pty Ltd

Peer Review by:



Charlie Furr
Principal, Contaminated Land
JBS Environmental Pty Ltd

Attachments: (1) Limitations
 (2) Figures
 (3) Laboratory Analysis Report and COC documentation
 (4) WTP media specifications

Attachment 1 – Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

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Attachment 2 – Figures

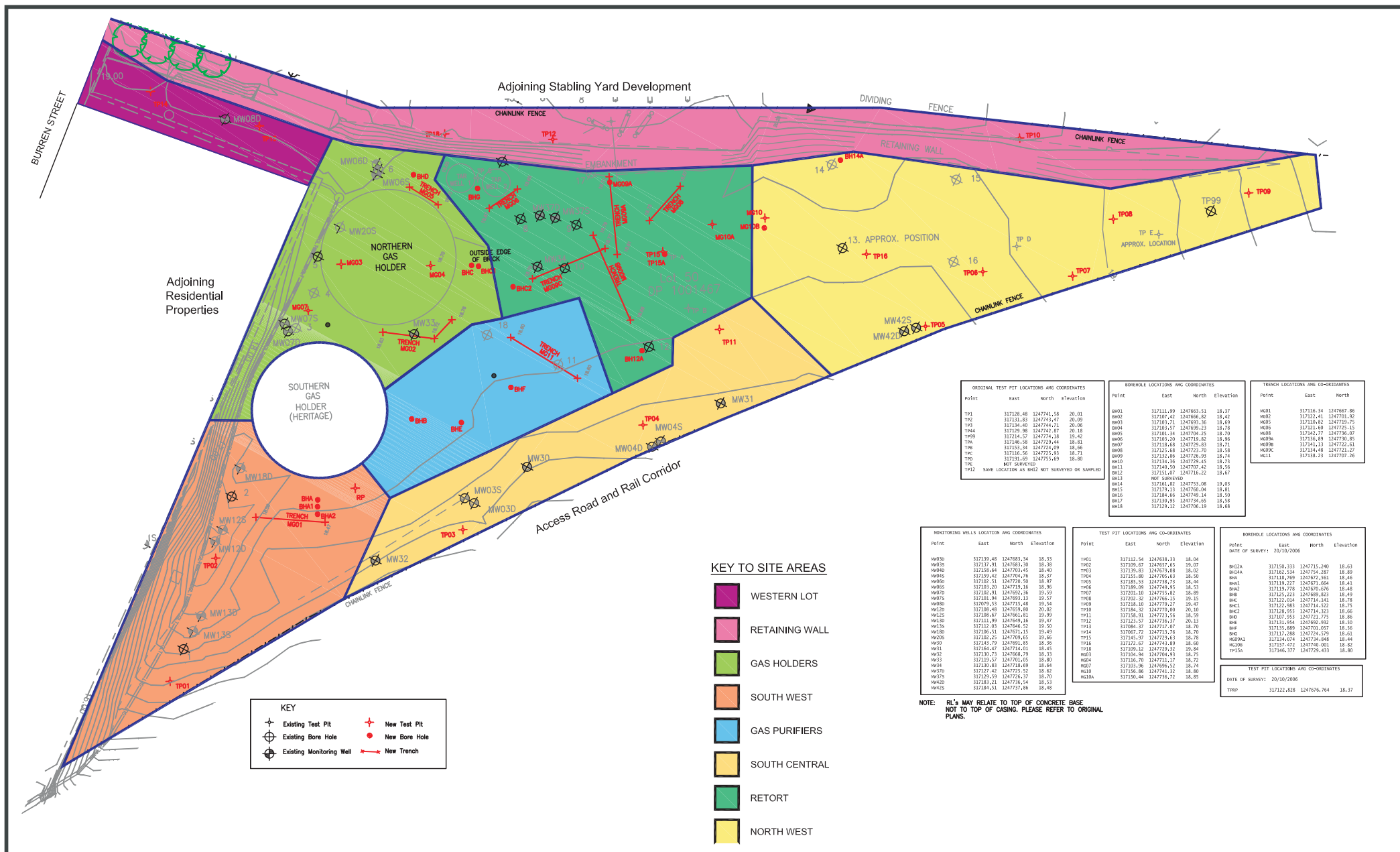
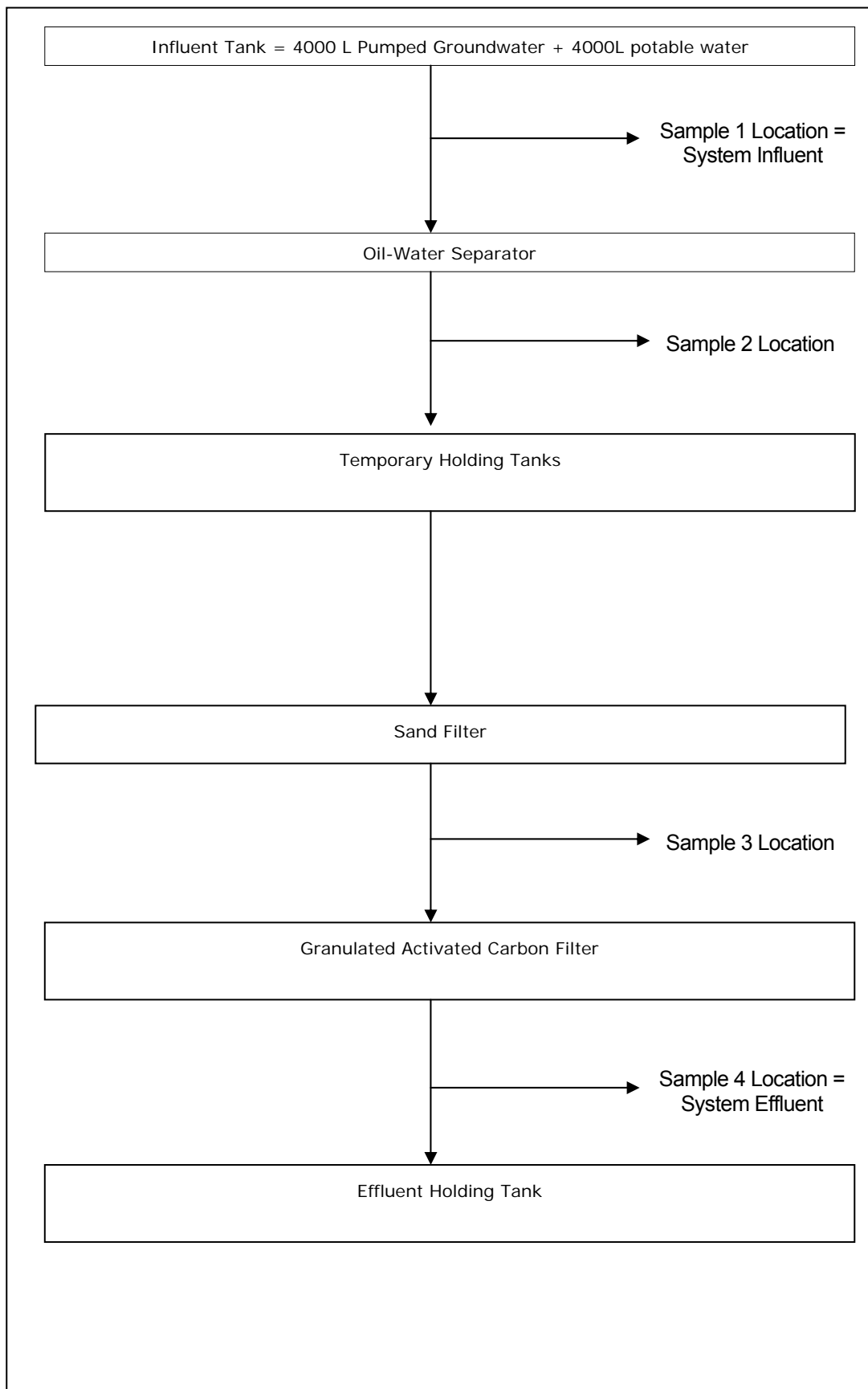


Figure 2: Water Treatment Trial - Sampling Strategy



Attachment 3 - Laboratory Results



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12 Ashley St Chatswood NSW 2067
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CERTIFICATE OF ANALYSIS 43277

Client:

JBS Environmental
P.O. Box 940
MASCOT
NSW 1460

Attention: Tim Davis / Sumi Dorairaj

Sample log in details:

| | |
|---------------------------------------|------------------------------------|
| Your Reference: | <u>40913, Macdonaldtown</u> |
| No. of samples: | 15 Waters |
| Date samples received: | 09/07/10 |
| Date completed instructions received: | 09/07/10 |

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

| | |
|-----------------------------|------------|
| Date results requested by: | 20/07/10 |
| Date of Preliminary Report: | Not issued |
| Issue Date: | 23/07/10 |

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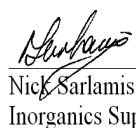
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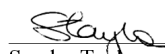
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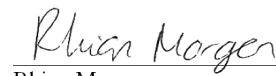
Tests not covered by NATA are denoted with *.

Results Approved By:


Jacinta Hurst
Laboratory Manager


Nick Sarlamis
Inorganics Supervisor


Sandra Taylor
Senior Organic Chemist


Rhian Morgan
Metals Supervisor

Envirolab Reference: 43277
Revision No: R 01



| VOCs in water Our Reference: Your Reference | UNITS ----- | 43277-1 Sample 1 - Run 1 | 43277-2 Sample 2 - Run 1 | 43277-3 Sample 3 - Run 1 | 43277-4 Sample 4 - Run 1 | 43277-5 Sample 1 - Run 2 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Dichlorodifluoromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Chloromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Vinyl Chloride | µg/L | <10 | <10 | <10 | <10 | <10 |
| Bromomethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Chloroethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Trichlorofluoromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromochloromethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroform | µg/L | 14 | 9.8 | 12 | <1.0 | 12 |
| 2,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cyclohexane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Dibromomethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromodichloromethane | µg/L | 8.9 | 5.8 | 7.6 | <1.0 | 7.1 |
| trans-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Dibromochloromethane | µg/L | 2.7 | 1.7 | 2.2 | <1.0 | 2.1 |
| 1,2-dibromoethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromoform | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | µg/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Styrene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| VOCs in water Our Reference: Your Reference | UNITS ----- | 43277-1 Sample 1 - Run 1 | 43277-2 Sample 2 - Run 1 | 43277-3 Sample 3 - Run 1 | 43277-4 Sample 4 - Run 1 | 43277-5 Sample 1 - Run 2 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| o-xylene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Isopropylbenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-propyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Tert-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | 96 | 104 | 99 | 108 | 104 |
| Surrogate toluene-d8 | % | 108 | 109 | 115 | 110 | 108 |
| Surrogate 4-BFB | % | 105 | 103 | 106 | 105 | 106 |

| VOCs in water Our Reference: Your Reference | UNITS ----- | 43277-6 Sample 2 - Run 2 | 43277-7 Sample 3 - Run 2 | 43277-8 Sample 4 - Run 2 | 43277-9 Sample 1 - Run 3 | 43277-10 Sample 2 - Run 3 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Dichlorodifluoromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Chloromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Vinyl Chloride | µg/L | <10 | <10 | <10 | <10 | <10 |
| Bromomethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Chloroethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Trichlorofluoromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromochloromethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroform | µg/L | 11 | 9.7 | <1.0 | 9.6 | 10 |
| 2,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cyclohexane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Dibromomethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromodichloromethane | µg/L | 6.6 | 6.3 | <1.0 | 5.9 | 5.5 |
| trans-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Dibromochloromethane | µg/L | 2.0 | 2.0 | <1.0 | 1.8 | 1.7 |
| 1,2-dibromoethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromoform | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | µg/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Styrene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| VOCs in water Our Reference: Your Reference | UNITS ----- | 43277-6 Sample 2 - Run 2 | 43277-7 Sample 3 - Run 2 | 43277-8 Sample 4 - Run 2 | 43277-9 Sample 1 - Run 3 | 43277-10 Sample 2 - Run 3 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| o-xylene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Isopropylbenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-propyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Tert-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | 98 | 97 | 102 | 100 | 101 |
| Surrogate toluene-d8 | % | 108 | 112 | 109 | 108 | 92 |
| Surrogate 4-BFB | % | 106 | 105 | 106 | 106 | 105 |

| VOCs in water Our Reference: Your Reference | UNITS ----- | 43277-11 Sample 3 - Run 3 | 43277-12 Sample 4 - Run 3 | 43277-13 MW04s |
|---|----------------|---------------------------------|---------------------------------|-------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Dichlorodifluoromethane | µg/L | <10 | <10 | <10 |
| Chloromethane | µg/L | <10 | <10 | <10 |
| Vinyl Chloride | µg/L | <10 | <10 | <10 |
| Bromomethane | µg/L | <10 | <10 | <10 |
| Chloroethane | µg/L | <10 | <10 | <10 |
| Trichlorofluoromethane | µg/L | <10 | <10 | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 | <1.0 | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 |
| Bromochloromethane | µg/L | <1.0 | <1.0 | <1.0 |
| Chloroform | µg/L | 11 | <1.0 | 21 |
| 2,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 |
| Cyclohexane | µg/L | <1.0 | <1.0 | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 | <1.0 | <1.0 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 |
| Dibromomethane | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 |
| Trichloroethene | µg/L | <1.0 | <1.0 | <1.0 |
| Bromodichloromethane | µg/L | 5.2 | <1.0 | 25 |
| trans-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,3-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 |
| Dibromochloromethane | µg/L | 1.6 | <1.0 | 18 |
| 1,2-dibromoethane | µg/L | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 |
| Chlorobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | <1.0 | <1.0 | <1.0 |
| Bromoform | µg/L | <1.0 | <1.0 | <1.0 |
| m+p-xylene | µg/L | <2.0 | <2.0 | <2.0 |
| Styrene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 |

| VOCs in water Our Reference: Your Reference | UNITS ----- | 43277-11 Sample 3 - Run 3 | 43277-12 Sample 4 - Run 3 | 43277-13 MW04s |
|---|----------------|---------------------------------|---------------------------------|-------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water |
| o-xylene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichloropropane | µg/L | <1.0 | <1.0 | <1.0 |
| Isopropylbenzene | µg/L | <1.0 | <1.0 | <1.0 |
| Bromobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| n-propyl benzene | µg/L | <1.0 | <1.0 | <1.0 |
| 2-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | <1.0 | <1.0 | <1.0 |
| Tert-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,3-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| n-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | 95 | 100 | 101 |
| Surrogate toluene-d8 | % | 77 | 76 | 108 |
| Surrogate 4-BFB | % | 105 | 105 | 104 |

| | | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| vTPH & BTEX in Water Our Reference: Your Reference | UNITS ----- | 43277-1 Sample 1 - Run 1 | 43277-2 Sample 2 - Run 1 | 43277-3 Sample 3 - Run 1 | 43277-4 Sample 4 - Run 1 | 43277-5 Sample 1 - Run 2 |
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| TPH C ₆ - C ₉ | µg/L | <10 | <10 | <10 | <10 | <10 |
| Surrogate Dibromofluoromethane | % | 96 | 104 | 99 | 108 | 104 |
| Surrogate toluene-d8 | % | 108 | 109 | 115 | 110 | 108 |
| Surrogate 4-BFB | % | 105 | 103 | 106 | 105 | 106 |

| | | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| vTPH & BTEX in Water Our Reference: Your Reference | UNITS ----- | 43277-6 Sample 2 - Run 2 | 43277-7 Sample 3 - Run 2 | 43277-8 Sample 4 - Run 2 | 43277-9 Sample 1 - Run 3 | 43277-10 Sample 2 - Run 3 |
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| TPH C ₆ - C ₉ | µg/L | <10 | <10 | <10 | <10 | <10 |
| Surrogate Dibromofluoromethane | % | 98 | 97 | 102 | 100 | 101 |
| Surrogate toluene-d8 | % | 108 | 112 | 109 | 108 | 92 |
| Surrogate 4-BFB | % | 106 | 105 | 106 | 106 | 105 |

| | | | | | | |
|--|----------------|---------------------------------|---------------------------------|--------------------|------------------------|------------------------|
| vTPH & BTEX in Water Our Reference: Your Reference | UNITS ----- | 43277-11 Sample 3 - Run 3 | 43277-12 Sample 4 - Run 3 | 43277-13 MW04s | 43277-14 Trip Blank | 43277-15 Trip Spike |
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| TPH C ₆ - C ₉ | µg/L | <10 | <10 | <10 | [NA] | [NA] |
| Benzene | µg/L | [NA] | [NA] | [NA] | <1.0 | 108% |
| Toluene | µg/L | [NA] | [NA] | [NA] | <1.0 | 129% |
| Ethylbenzene | µg/L | [NA] | [NA] | [NA] | <1.0 | 97% |
| m+p-xylene | µg/L | [NA] | [NA] | [NA] | <2.0 | 95% |
| o-xylene | µg/L | [NA] | [NA] | [NA] | <1.0 | 96% |
| Surrogate Dibromofluoromethane | % | 95 | 100 | 100 | 96 | 91 |
| Surrogate toluene-d8 | % | 77 | 76 | 107 | 109 | 124 |
| Surrogate 4-BFB | % | 105 | 105 | 104 | 105 | 103 |

| | | | | | | |
|-------------------------|-------|---------------------|---------------------|---------------------|---------------------|---------------------|
| sTPH in Water (C10-C36) | | | | | | |
| Our Reference: | UNITS | 43277-1 | 43277-2 | 43277-3 | 43277-4 | 43277-5 |
| Your Reference | ----- | Sample 1 - Run 1 | Sample 2 - Run 1 | Sample 3 - Run 1 | Sample 4 - Run 1 | Sample 1 - Run 2 |
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| TPH C10 - C14 | µg/L | <50 | <50 | <50 | <50 | <50 |
| TPH C15 - C28 | µg/L | 1,100 | 170 | 810 | <100 | 2,100 |
| TPH C29 - C36 | µg/L | <100 | <100 | 2,400 | <100 | 1,500 |
| Surrogate o-Terphenyl | % | 96 | 87 | # | 100 | 80 |

| | | | | | | |
|-------------------------|-------|---------------------|---------------------|---------------------|---------------------|---------------------|
| sTPH in Water (C10-C36) | | | | | | |
| Our Reference: | UNITS | 43277-6 | 43277-7 | 43277-8 | 43277-9 | 43277-10 |
| Your Reference | ----- | Sample 2 - Run 2 | Sample 3 - Run 2 | Sample 4 - Run 2 | Sample 1 - Run 3 | Sample 2 - Run 3 |
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| TPH C10 - C14 | µg/L | 52 | <50 | <50 | <50 | <50 |
| TPH C15 - C28 | µg/L | 270 | 190 | <100 | 3,500 | <100 |
| TPH C29 - C36 | µg/L | <100 | <100 | <100 | 2,200 | <100 |
| Surrogate o-Terphenyl | % | 92 | 77 | 86 | 99 | 86 |

| | | | | |
|-------------------------|-------|---------------------|---------------------|------------|
| sTPH in Water (C10-C36) | | | | |
| Our Reference: | UNITS | 43277-11 | 43277-12 | 43277-13 |
| Your Reference | ----- | Sample 3 - Run 3 | Sample 4 - Run 3 | MW04s |
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water |
| Date extracted | - | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| TPH C10 - C14 | µg/L | <50 | <50 | <50 |
| TPH C15 - C28 | µg/L | 410 | <100 | 3,800 |
| TPH C29 - C36 | µg/L | 820 | <100 | 2,800 |
| Surrogate o-Terphenyl | % | 96 | 93 | 73 |

| PAHs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43277-1 Sample 1 - Run 1 9/07/2010 Water | 43277-2 Sample 2 - Run 1 9/07/2010 Water | 43277-3 Sample 3 - Run 1 9/07/2010 Water | 43277-5 Sample 1 - Run 2 9/07/2010 Water | 43277-6 Sample 2 - Run 2 9/07/2010 Water |
|---|-----------------------------|--|--|--|--|--|
| Date extracted | - | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 |
| Date analysed | - | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 |
| Naphthalene | µg/L | 2.2 | 0.3 | 0.2 | 3.4 | 0.2 |
| Acenaphthylene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthene | µg/L | 0.7 | 0.4 | 0.3 | 0.5 | 0.5 |
| Fluorene | µg/L | 0.5 | 0.4 | 0.2 | 0.4 | 0.5 |
| Phenanthrene | µg/L | <0.1 | 0.4 | 0.1 | <0.1 | 1.0 |
| Anthracene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | 0.2 |
| Fluoranthene | µg/L | <0.1 | 0.2 | <0.1 | <0.1 | 0.7 |
| Pyrene | µg/L | <0.1 | 0.1 | <0.1 | <0.1 | 0.4 |
| Benzo(a)anthracene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chrysene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Benzo(b+k)fluoranthene | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Benzo(a)pyrene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Indeno(1,2,3-c,d)pyrene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dibenzo(a,h)anthracene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Benzo(g,h,i)perylene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Surrogate p-Terphenyl-d14 | % | 129 | 111 | 129 | 123 | 99 |

| PAHs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43277-7 Sample 3 - Run 2 9/07/2010 Water | 43277-9 Sample 1 - Run 3 9/07/2010 Water | 43277-10 Sample 2 - Run 3 9/07/2010 Water | 43277-11 Sample 3 - Run 3 9/07/2010 Water | 43277-13 MW04s 9/07/2010 Water |
|---|-----------------------------|--|--|---|---|---|
| Date extracted | - | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 |
| Date analysed | - | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 | 13/7/2010 |
| Naphthalene | µg/L | 0.2 | 3.8 | 0.2 | 0.2 | 5.6 |
| Acenaphthylene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthene | µg/L | 0.4 | 0.8 | 0.6 | 0.6 | <0.1 |
| Fluorene | µg/L | 0.4 | 0.6 | 0.5 | 0.5 | <0.1 |
| Phenanthrene | µg/L | 0.5 | <0.1 | 0.1 | 0.6 | <0.1 |
| Anthracene | µg/L | <0.1 | <0.1 | <0.1 | 0.1 | <0.1 |
| Fluoranthene | µg/L | <0.1 | <0.1 | 0.1 | 0.1 | 0.2 |
| Pyrene | µg/L | <0.1 | <0.1 | <0.1 | 0.1 | 0.2 |
| Benzo(a)anthracene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chrysene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Benzo(b+k)fluoranthene | µg/L | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Benzo(a)pyrene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Indeno(1,2,3-c,d)pyrene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dibenzo(a,h)anthracene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Benzo(g,h,i)perylene | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Surrogate p-Terphenyl-d ₁₄ | % | 84 | 127 | 111 | 127 | 87 |

| PAH low level in Water Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43277-4 Sample 4 - Run 1 9/07/2010 Water | 43277-8 Sample 4 - Run 2 9/07/2010 Water | 43277-12 Sample 4 - Run 3 9/07/2010 Water |
|--|-------------------------|--|--|---|
| Date extracted | - | 22/07/2010 | 22/07/2010 | 22/07/2010 |
| Date analysed | - | 23/7/2010 | 23/7/2010 | 23/7/2010 |
| Naphthalene | µg/L | <0.01 | <0.01 | <0.01 |
| Acenaphthylene | µg/L | <0.01 | <0.01 | <0.01 |
| Acenaphthene | µg/L | <0.01 | <0.01 | <0.01 |
| Fluorene | µg/L | <0.01 | <0.01 | <0.01 |
| Phenanthrene | µg/L | <0.01 | <0.01 | <0.01 |
| Anthracene | µg/L | <0.01 | <0.01 | <0.01 |
| Fluoranthene | µg/L | <0.01 | <0.01 | <0.01 |
| Pyrene | µg/L | <0.01 | <0.01 | <0.01 |
| Benz(a)anthracene | µg/L | <0.01 | <0.01 | <0.01 |
| Chrysene | µg/L | <0.01 | <0.01 | <0.01 |
| Benzo(b)&(k)fluoranthene | µg/L | <0.02 | <0.02 | <0.02 |
| Benzo(a)pyrene | µg/L | <0.01 | <0.01 | <0.01 |
| Indeno(1,2,3-cd)pyrene | µg/L | <0.01 | <0.01 | <0.01 |
| Dibenz(ah)anthracene | µg/L | <0.01 | <0.01 | <0.01 |
| Benzo(ghi)perylene | µg/L | <0.01 | <0.01 | <0.01 |

| | | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Total Phenolics in Water Our Reference: Your Reference | UNITS ----- | 43277-1 Sample 1 - Run 1 | 43277-2 Sample 2 - Run 1 | 43277-3 Sample 3 - Run 1 | 43277-4 Sample 4 - Run 1 | 43277-5 Sample 1 - Run 2 |
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 |
| Date analysed | - | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 |
| Total Phenolics (as Phenol) | mg/L | <0.050 | <0.050 | <0.050 | 0.080 | <0.050 |

| | | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| Total Phenolics in Water Our Reference: Your Reference | UNITS ----- | 43277-6 Sample 2 - Run 2 | 43277-7 Sample 3 - Run 2 | 43277-8 Sample 4 - Run 2 | 43277-9 Sample 1 - Run 3 | 43277-10 Sample 2 - Run 3 |
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 |
| Date analysed | - | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 | 14/7/2010 |
| Total Phenolics (as Phenol) | mg/L | <0.050 | <0.050 | <0.050 | 0.12 | <0.050 |

| | | | | |
|--|----------------|---------------------------------|---------------------------------|--------------------|
| Total Phenolics in Water Our Reference: Your Reference | UNITS ----- | 43277-11 Sample 3 - Run 3 | 43277-12 Sample 4 - Run 3 | 43277-13 MW04s |
| Date Sampled Type of sample | ----- | 9/07/2010 Water | 9/07/2010 Water | 9/07/2010 Water |
| Date extracted | - | 14/7/2010 | 14/7/2010 | 14/7/2010 |
| Date analysed | - | 14/7/2010 | 14/7/2010 | 14/7/2010 |
| Total Phenolics (as Phenol) | mg/L | <0.050 | <0.050 | <0.050 |

| HM in water - dissolved Our Reference: Your Reference | UNITS ----- | 43277-1 Sample 1 - Run 1 | 43277-2 Sample 2 - Run 1 | 43277-3 Sample 3 - Run 1 | 43277-4 Sample 4 - Run 1 | 43277-5 Sample 1 - Run 2 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date prepared | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Arsenic-Dissolved | µg/L | <1 | <1 | <1 | 16 | <1 |
| Cadmium-Dissolved | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium-Dissolved | µg/L | <1 | <1 | <1 | <1 | <1 |
| Copper-Dissolved | µg/L | <1 | 1 | 10 | <1 | 3 |
| Lead-Dissolved | µg/L | <1 | <1 | <1 | <1 | <1 |
| Mercury-Dissolved | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nickel-Dissolved | µg/L | 1 | 2 | 8 | <1 | 7 |
| Zinc-Dissolved | µg/L | 110 | 100 | 63 | 1 | 170 |

| HM in water - dissolved Our Reference: Your Reference | UNITS ----- | 43277-6 Sample 2 - Run 2 | 43277-7 Sample 3 - Run 2 | 43277-8 Sample 4 - Run 2 | 43277-9 Sample 1 - Run 3 | 43277-10 Sample 2 - Run 3 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water | Water | Water |
| Date prepared | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Arsenic-Dissolved | µg/L | <1 | <1 | 17 | <1 | <1 |
| Cadmium-Dissolved | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium-Dissolved | µg/L | <1 | <1 | <1 | <1 | <1 |
| Copper-Dissolved | µg/L | 4 | 7 | <1 | <1 | <1 |
| Lead-Dissolved | µg/L | <1 | <1 | <1 | <1 | <1 |
| Mercury-Dissolved | µg/L | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Nickel-Dissolved | µg/L | 9 | 8 | <1 | 2 | 2 |
| Zinc-Dissolved | µg/L | 91 | 48 | <1 | 160 | 140 |

| | | | | |
|-------------------------|-------|------------|------------|------------|
| HM in water - dissolved | | | | |
| Our Reference: | UNITS | 43277-11 | 43277-12 | 43277-13 |
| Your Reference | ----- | Sample 3 - | Sample 4 - | MW04s |
| | | Run 3 | Run 3 | |
| Date Sampled | ----- | 9/07/2010 | 9/07/2010 | 9/07/2010 |
| Type of sample | | Water | Water | Water |
| Date prepared | - | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Date analysed | - | 13/07/2010 | 13/07/2010 | 13/07/2010 |
| Arsenic-Dissolved | µg/L | <1 | 24 | <1 |
| Cadmium-Dissolved | µg/L | <0.1 | <0.1 | <0.1 |
| Chromium-Dissolved | µg/L | <1 | <1 | <1 |
| Copper-Dissolved | µg/L | 4 | <1 | 9 |
| Lead-Dissolved | µg/L | 1 | <1 | <1 |
| Mercury-Dissolved | µg/L | <0.5 | <0.5 | <0.5 |
| Nickel-Dissolved | µg/L | 2 | <1 | 3 |
| Zinc-Dissolved | µg/L | 49 | <1 | 45 |

| Method ID | Methodology Summary |
|-----------------------------|--|
| GC.13 | Water samples are analysed directly by purge and trap GC-MS. |
| GC.16 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. |
| GC.3 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. |
| GC.12 subset | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| Ext-020 | Analysis subcontracted to Australian Government - National Measurement Institute. NATA Accreditation No: 198 |
| LAB.30 | Total Phenolics - determined colorimetrically following disitillation. |
| Metals.22 ICP-MS | Determination of various metals by ICP-MS. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| VOCs in water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 13/07/2010 | [NT] | [NT] | LCS-W1 | 13/07/2010 |
| Date analysed | - | | | 13/07/2010 | [NT] | [NT] | LCS-W1 | 13/07/2010 |
| Dichlorodifluoromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Chloromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Vinyl Chloride | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Bromomethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Chloroethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Trichlorofluoromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Trans-1,2-dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1-dichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 112% |
| Cis-1,2-dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromochloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Chloroform | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 110% |
| 2,2-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 105% |
| 1,1,1-trichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 105% |
| 1,1-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Cyclohexane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Carbon tetrachloride | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Dibromomethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Trichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 114% |
| Bromodichloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 111% |
| trans-1,3-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| cis-1,3-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2-trichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Dibromochloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 113% |
| 1,2-dibromoethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Tetrachloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 110% |
| 1,1,1,2-tetrachloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Chlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Ethylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromoform | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| m+p-xylene | µg/L | 2 | GC.13 | <2.0 | [NT] | [NT] | [NR] | [NR] |
| Styrene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|-----|--------|-------|---------------|---------------------------|-----------|------------------|
| VOCs in water | | | | | | Base II Duplicate II %RPD | | |
| 1,1,2,2-tetrachloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| o-xylene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-trichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Isopropylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| n-propyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 2-chlorotoluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 4-chlorotoluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3,5-trimethyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Tert-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-trimethyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Sec-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,4-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 4-isopropyl toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| n-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dibromo-3-chloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-trichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Hexachlorobutadiene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-trichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Surrogate | % | | GC.13 | 102 | [NT] | [NT] | LCS-W1 | 114% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.13 | 101 | [NT] | [NT] | LCS-W1 | 107% |
| Surrogate 4-BFB | % | | GC.13 | 101 | [NT] | [NT] | LCS-W1 | 100% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-------------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| vTPH & BTEX in Water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 13/07/2010 | [NT] | [NT] | LCS-W1 | 13/07/2010 |
| Date analysed | - | | | 13/07/2010 | [NT] | [NT] | LCS-W1 | 13/07/2010 |
| TPH C ₆ - C ₉ | µg/L | 10 | GC.16 | <10 | [NT] | [NT] | LCS-W1 | 113% |
| Benzene | µg/L | 1 | GC.16 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Toluene | µg/L | 1 | GC.16 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Ethylbenzene | µg/L | 1 | GC.16 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| m+p-xylene | µg/L | 2 | GC.16 | <2.0 | [NT] | [NT] | [NR] | [NR] |
| o-xylene | µg/L | 1 | GC.16 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Surrogate | % | | GC.16 | 102 | [NT] | [NT] | LCS-W1 | 110% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.16 | 101 | [NT] | [NT] | LCS-W1 | 104% |
| Surrogate 4-BFB | % | | GC.16 | 101 | [NT] | [NT] | LCS-W1 | 101% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| sTPH in Water (C10-C36) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 13/07/2010 | [NT] | [NT] | LCS-W2 | 13/07/2010 |
| Date analysed | - | | | 13/07/2010 | [NT] | [NT] | LCS-W2 | 13/07/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 50 | GC.3 | <50 | [NT] | [NT] | LCS-W2 | 69% |
| TPH C ₁₅ - C ₂₈ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W2 | 83% |
| TPH C ₂₉ - C ₃₆ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W2 | 86% |
| Surrogate o-Terphenyl | % | | GC.3 | 94 | [NT] | [NT] | LCS-W2 | 100% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|-----|--------------|-----------|---------------|---------------------------|-----------|------------------|
| PAHs in Water - Low Level | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 13/7/2010 | [NT] | [NT] | LCS-W2 | 13/7/2010 |
| Date analysed | - | | | 13/7/2010 | [NT] | [NT] | LCS-W2 | 13/7/2010 |
| Naphthalene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 96% |
| Acenaphthylene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluorene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 112% |
| Phenanthrene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 104% |
| Anthracene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------------|-------|---------------|---------------------------|-----------|------------------|
| PAHs in Water - Low Level | | | | | | Base II Duplicate II %RPD | | |
| Fluoranthene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 104% |
| Pyrene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 110% |
| Benzo(a)anthracene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 117% |
| Benzo(b+k)fluoranthene | µg/L | 0.2 | GC.12 subset | <0.2 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-W2 | 131% |
| Indeno(1,2,3-c,d)pyrene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | µg/L | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 subset | 75 | [NT] | [NT] | LCS-W2 | 77% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------|-------|------|---------|------------|---------------|---------------------------|-----------|------------------|
| PAH low level in Water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 22/07/2010 | [NT] | [NT] | LCS-W1 | 22/7/2010 |
| Date analysed | - | | | 23/07/2010 | [NT] | [NT] | LCS-W1 | 23/7/2010 |
| Naphthalene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | LCS-W1 | 90% |
| Acenaphthylene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Fluorene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | LCS-W1 | 92% |
| Phenanthrene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | LCS-W1 | 89% |
| Anthracene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Pyrene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Benz(a)anthracene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | LCS-W1 | 91% |
| Benzo(b)&(k)fluoranthene | µg/L | 0.02 | Ext-020 | <0.02 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | LCS-W1 | 79% |
| Indeno(1,2,3-cd)pyrene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |
| Dibenz(ah)anthracene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | LCS-W1 | 89% |
| Benzo(ghi)perylene | µg/L | 0.01 | Ext-020 | <0.01 | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|------|--------|-----------|---------------|---------------------------|-----------|------------------|
| Total Phenolics in Water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 14/7/2010 | 43277-1 | 14/7/2010 14/7/2010 | 43277-1 | 14/7/2010 |
| Date analysed | - | | | 14/7/2010 | 43277-1 | 14/7/2010 14/7/2010 | 43277-1 | 14/7/2010 |
| Total Phenolics (as Phenol) | mg/L | 0.05 | LAB.30 | <0.050 | 43277-1 | <0.050 <0.050 | 43277-1 | 87% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-------------------------|-------|-----|------------------|------------|---------------|---------------------------|-----------|------------------|
| HM in water - dissolved | | | | | | Base II Duplicate II %RPD | | |
| Date prepared | - | | | 13/07/2010 | 43277-1 | 13/07/2010 13/07/2010 | LCS-W1 | 13/07/2010 |
| Date analysed | - | | | 13/07/2010 | 43277-1 | 13/07/2010 13/07/2010 | LCS-W1 | 13/07/2010 |
| Arsenic-Dissolved | µg/L | 1 | Metals.22 ICP-MS | <1 | 43277-1 | <1 <1 | LCS-W1 | 106% |
| Cadmium-Dissolved | µg/L | 0.1 | Metals.22 ICP-MS | <0.1 | 43277-1 | <0.1 <0.1 | LCS-W1 | 109% |
| Chromium-Dissolved | µg/L | 1 | Metals.22 ICP-MS | <1 | 43277-1 | <1 <1 | LCS-W1 | 96% |
| Copper-Dissolved | µg/L | 1 | Metals.22 ICP-MS | <1 | 43277-1 | <1 <1 | LCS-W1 | 93% |
| Lead-Dissolved | µg/L | 1 | Metals.22 ICP-MS | <1 | 43277-1 | <1 <1 | LCS-W1 | 101% |
| Mercury-Dissolved | µg/L | 0.5 | Metals.21 CV-AAS | <0.5 | 43277-1 | <0.5 <0.5 | LCS-W1 | 117% |
| Nickel-Dissolved | µg/L | 1 | Metals.22 ICP-MS | <1 | 43277-1 | 1 1 RPD: 0 | LCS-W1 | 93% |
| Zinc-Dissolved | µg/L | 1 | Metals.22 ICP-MS | <1 | 43277-1 | 110 110 RPD: 0 | LCS-W1 | 99% |

| QUALITY CONTROL | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|----------|-----------------------------------|-----------|------------------|
| Total Phenolics in Water | | | | | |
| Date extracted | - | 43277-11 | 14/7/2010 14/7/2010 | 43277-2 | 14/7/2010 |
| Date analysed | - | 43277-11 | 14/7/2010 14/7/2010 | 43277-2 | 14/7/2010 |
| Total Phenolics (as Phenol) | mg/L | 43277-11 | <0.050 <0.050 | 43277-2 | 98% |
| QUALITY CONTROL | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| HM in water - dissolved | | | | | |
| Date prepared | - | 43277-11 | 13/07/2010 13/07/2010 | 43277-2 | 13/07/2010 |
| Date analysed | - | 43277-11 | 13/07/2010 13/07/2010 | 43277-2 | 13/07/2010 |
| Arsenic-Dissolved | µg/L | 43277-11 | <1 <1 | 43277-2 | 116% |
| Cadmium-Dissolved | µg/L | 43277-11 | <0.1 <0.1 | 43277-2 | 120% |
| Chromium-Dissolved | µg/L | 43277-11 | <1 <1 | 43277-2 | 102% |
| Copper-Dissolved | µg/L | 43277-11 | 4 4 RPD: 0 | 43277-2 | 95% |
| Lead-Dissolved | µg/L | 43277-11 | 1 <1 | 43277-2 | 102% |
| Mercury-Dissolved | µg/L | 43277-11 | <0.5 <0.5 | 43277-2 | 115% |

Client Reference: 40913, Macdonaldtown

| QUALITY CONTROL HM in water - dissolved | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|--|-------|----------|--------------------------------------|-----------|------------------|
| Nickel-Dissolved | µg/L | 43277-11 | 2 2 RPD: 0 | 43277-2 | 96% |
| Zinc-Dissolved | µg/L | 43277-11 | 49 49 RPD: 0 | 43277-2 | 105% |

Report Comments:

Total Petroleum Hydrocarbons in water (semivol):# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

PAH's in water analysed by NMI. Report No.RN806180.

Asbestos was analysed by Approved Identifier: Not applicable for this job

Asbestos was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for

1851

CHAIN OF CUSTODY - Client



ENVIROLAB SERVICES

| | | |
|---|---|---|
| Client: JBS | Client Project Name and Number: Macdonaldtown | Envirolab Services 12 Ashley St, Chatswood, NSW, 2067 |
| Project Mgr: S. DORAIRAG | PO No.: 40913 | Phone: 02 9958 5801 |
| Sampler: T. DAVIS | Envirolab Services Quote No.: | Fax: 02 9958 5803 |
| Address: 128 O'RIORDAN ST, MASCOT | Date results required: | E-mail: tnotaras@envirolabservices.com.au |
| Email: tnotaras@envirolabservices.com.au, sdorairag@envirolabservices.com.au | Or choose: <u>standard</u> / 1 day / 2 day / 3 day | Contact: Tania Notaras |
| Phone: 83381011 Fax: 83381700 | <small>Note: Inform lab in advance if urgent turnaround is required - surcharge applies</small> | |

| Envirolab Sample ID | Client Sample ID | Date sampled | Type of sample | 8 HEAVY METALS | TPH | LOW LEVEL PAHs | VOCs | BTEX | Phenols | TRACE PAHs | | | | | | | | | | Provide as much information about the sample as you can |
|---------------------|------------------|--------------|----------------|----------------|-----|----------------|------|------|---------|------------|--|--|--|--|--|--|--|--|--|---|
| 1 | Sample 1 - Run 1 | 9/7/10 | WATER | X | X | X | X | | X | | | | | | | | | | | |
| 2 | Sample 2 - Run 1 | | | X | X | X | X | | X | | | | | | | | | | | |
| 3 | Sample 3 - Run 1 | | | X | X | X | X | | X | | | | | | | | | | | |
| 4 | Sample 4 - Run 1 | | | X | X | | X | | X | X | | | | | | | | | | |
| 5 | Sample 1 - Run 2 | | | X | X | X | X | | X | | | | | | | | | | | |
| 6 | Sample 2 - Run 2 | | | X | X | X | X | | X | | | | | | | | | | | |
| 7 | Sample 3 - Run 2 | | | X | X | X | X | | X | | | | | | | | | | | |
| 8 | Sample 4 - Run 2 | | | X | X | | X | | X | X | | | | | | | | | | |
| 9 | Sample 1 - Run 3 | | | X | X | X | X | | X | | | | | | | | | | | |
| 10 | Sample 2 - Run 3 | | | X | X | X | X | | X | | | | | | | | | | | |
| 11 | Sample 3 - Run 3 | | | X | X | X | X | | X | | | | | | | | | | | |
| 12 | Sample 4 - Run 3 | | | X | X | | X | | X | X | | | | | | | | | | |
| 13 | MW04s | | | X | X | X | X | | X | | | | | | | | | | | |
| 14 | TRIP BLANK | | | | | | | X | | | | | | | | | | | | |
| 15 | TRIP SPIKE | ✓ | ✓ | | | | | X | | | | | | | | | | | | |

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: 8910 8200

Job No: 43277
Date received: 9/7/10
Time received: 5:30
Received by: SS
Temp: Cool/Ambient
Cooling: Icepack
Security: Intact/Broken/None

| | | |
|---------------------------------------|-----------------------------------|---|
| Relinquished by (company): JBS | Received by (company): ELS | Samples Received: Cool or Ambient (circle one) |
| Print Name: T. DAVIS | Print Name: SS | Temperature Received at: (if applicable) |
| Date & Time: 9/7/10 | Date & Time: 9/7/10 | Transported by: Hand delivered / courier |
| Signature: <i>T. Davis</i> | Signature: <i>SS</i> | Page No: |

Attachment 4 – WTP Filter Specifications

For Removal Of Suspended Matter

MODELS: FMA-A, FMA-F, FMA-F40 & FMA-F50

The multi layered media filter has advantages over conventional filters :

- * Greater Dirt Holding Capacity
- * Higher Flow Rates
- * Greater ability to handle surges
- * Reduced Backwash Rates

SPECIFICATIONS:

Operating Pressure..... 100 to 700 kPa.
 Operating Temperature..... 5 to 40°C.
 Electrical Requirement..... 240V 50Hz.
 Tank Filament Wound FRP.

All units automatically backwash and rinse on a periodic basis in order to cleanse and reclassify the filter media. This is normally accomplished by an adjustable timer.

Sediment filters incur an increase pressure loss between inlet and outlet as filtered particles collect in the bed.

OPTIONS:

- * Backwash Only
- * Flush after Backwash
- * Choice of Timers or Signal Start
- * Custom Design
- * Pressure Gauges
- * Pressure Limiting & Relief Valves



FMA 550F40

FMA - A & FMA - F PIPE SIZE: 25mm - Maximum Flowrate 110L/min

| Model | FLOW RATES | | | | DIMENSIONS | | | Shipping Weight |
|-----------------|-----------------------------------|--------------------------------|---------------------------------|----------------------------------|----------------------------|---------------------|--------------|-----------------|
| | Difficult ⁽¹⁾ L/min | Normal ⁽²⁾ L/min | Maximum ⁽³⁾ L/min | Backwash ⁽⁴⁾ L/min | Bed Area m ² | Cylinder Dia. mm | Height mm | |
| FMA 200A | 12 | 16 | 28 | 19 | 0.032 | 200 | 1200 | 50 |
| FMA 250A | 19 | 24 | 44 | 29 | 0.050 | 250 | 1200 | 65 |
| FMA 300F or A-P | 29 | 36 | 65 | 43 | 0.074 | 300 | 1200 | 80 |
| FMA 325F or A-P | 33 | 42 | 75 | 50 | 0.086 | 325 | 1500 | 86 |
| FMA 350F or A-P | 39 | 49 | 87 | 58 | 0.100 | 350 | 1500 | 90 |
| FMA 400F or A-P | 49 | 62 | 110 | 74 | 0.126 | 400 | 1200 | 160 |
| FMA 550F | 97 | 110 | 110 | 120 ⁽⁵⁾ | 0.250 | 550 | 1400 | 200 |

FMA - F40 PIPE SIZE: 40mm - Maximum Flowrate 254L/min

| Model | FLOW RATES/PRESSURE DROPS | | | | DIMENSIONS | | | Shipping Weight |
|------------|---------------------------------------|------------------------------------|-------------------------------------|----------------------------------|----------------------------|---------------------|--------------|-----------------|
| | Difficult ⁽¹⁾ L/min/kPa | Normal ⁽²⁾ L/min/kPa | Maximum ⁽³⁾ L/min/kPa | Backwash ⁽⁴⁾ L/min | Bed Area m ² | Cylinder Dia. mm | Height mm | |
| FMA 400F40 | 49/20 | 62/30 | 110/60 | 74 | 0.12 | 400 | 1900 | 150 |
| FMA 550F40 | 97/50 | 122/60 | 219/140 | 146 | 0.25 | 550 | 1400 | 200 |
| FMA 600F40 | 113/55 | 142/80 | 254/185 | 170 | 0.29 | 600 | 2200 | 350 |
| FMA 750F40 | 175/100 | 220/140 | 254/185 | 182 | 0.45 | 750 | 2600 | 700 |

FMA - F50 PIPE SIZE: 50mm - Maximum Flowrate 580L/min

| | | | | | | | | |
|------------|--------|---------|---------|-----|------|-----|------|------|
| FMA 900F50 | 257/50 | 323/120 | 577/200 | 380 | 0.66 | 900 | 2600 | 1000 |
|------------|--------|---------|---------|-----|------|-----|------|------|

- (1) Removal of compressible solids eg. Floc carryover at feed concentrations to 300gm/L.
 Reduces pressure loss and increases period between backwashes. Based on 390L/min/m².
 (2) Removal of incompressible suspended solids above 10 microns at feed concentrations to 300gm/L.
 Based on 490L/min/m².
 (3) Not recommended for continuous use. Based on 875L/min/m².
 (4) Based on 585L/min/m².
 (5) Special limit minimum pressure 450 kPa.

* **SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
 IF ANY DIMENSIONS ARE CRITICAL CONFIRM WHEN PLACING ORDER.**

Abtech Environmental Services Pty Ltd
 6 - 10 Leith Street

Wingfield South Australia 5013
 Phone : (08) 8243 0633 Fax : (08) 8347 1398

Web Page : www.abtech.net.au E-mail : abtech@abtech.net.au

Appendix D
Sydney Water Trade Waste Acceptance Criteria Brochure

Industrial customers

Acceptance standards and charging rates for 2010-11

Sydney Water accepts trade wastewater to the sewer, if it meets certain acceptance standards.

What are acceptance standards?

Acceptance standards are generally limits to the concentration of substances, in composite samples of trade wastewater discharge. For substances that pose a particular health and safety risk, acceptance standards also apply to the concentration of substances in a discrete sample of trade wastewater discharge.

These substances are highlighted in **bold** print in the tables in this fact sheet.

The acceptance standards for domestic substances are listed in Table 1, and for non-domestic in Table 2. Table 1 also lists the value of the domestic equivalent concentrations, which we deduct when calculating charges.

The Independent Pricing and Regulatory Tribunal (IPART) determined that all trade waste fees and charges will be adjusted from 1 July (under Determination No.1, 2008)

Testing

Customers must make sure substances specified in trade waste agreements or permits are only analysed in laboratories registered by the National Association of Testing Authorities (NATA), for the class of test(s) or specific test(s).

The approved analytical methods may be downloaded from sydneywater.com.au

What are they based on?

Acceptance standards are based on:

- safe levels of substances that may otherwise pose a health risk to workers in and around the sewerage system
- safe levels of substances to protect public health
- pollution reduction targets and discharge licence conditions set by the Department of Environment, Climate Change and Water NSW (DECCW NSW)
- the need to protect our assets and treatment processes
- the capability of the sewerage system to transport 'domestic substances', ie suspended solids, grease and BOD
- concentrations obtainable by using proven pre-treatment technology (provision is made to trial new technology)
- quality specifications for biosolids and reuse water
- reuse considerations, including the need to provide wastewater that does not interfere with reuse treatment processes, or limit reuse opportunities
- national acceptance criteria published as *Guidelines for Sewerage Systems, Acceptance of Trade Waste (Industrial Waste)*, (ARMCANZ & ANZECC, November 1994).

Table 1: Acceptance standards, domestic equivalents and charging rates for domestic substances

| Substance | Acceptance standard (mg/L) | Domestic equivalent (mg/L) | Note | Charging rate (\$/kg) |
|---|----------------------------|----------------------------|-------------|--|
| Suspended solids | 600 | 200 | | 0.862 |
| BOD5 - primary treatment | | 230 | 1 | $0.120 + \{0.0178 \times (\text{BOD}/600)\}$ |
| BOD5 - secondary treatment | | 230 | 1 | $0.678 + \{0.0178 \times (\text{BOD}/600)\}$ |
| Soluble BOD | 100 | Not applicable | 15 | $0.120 + \{0.0178 \times (\text{BOD}/600)\}$ |
| Grease – primary treatment | 110 | 50 | 2 | 1.214 |
| Grease – secondary treatment | 200 | 50 | 2 | 1.214 |
| Ammonia | 100 | 35 | 3, 5 | 2.014 |
| Nitrogen | 150 | 50 | 4 | 0.170 |
| Phosphorus | 50 | 10 | 4 | 1.347 |
| Sulphate | 2000 | 50 | | $0.133 \times (\text{SO}_4/2000)$ |
| Total dissolved solids (ocean systems, no discharge limitation) | 10000 | 450 | 12 | 0.0058 |
| Total dissolved solids (inland and ocean systems with limitation) | 500 | 450 | 12 | 0.0058 |
| Total dissolved solids (inland and ocean systems with advanced treatment to remove TDS) | 10000 | 450 | 12, 16 | $0.173 \times \text{fraction of average dry weather flow treated}$ |

Trade waste requirements

- Sydney Water will determine standards for colour and interference with ultra violet disinfection on a system-specific basis.
- There must be no fibrous material in the trade wastewater, if we believe it could obstruct or block the sewerage system.
- Non-faecal gross solids must have a maximum linear dimension of less than 20 mm, a maximum cross section of 6 mm and must have a quiescent settling velocity of less than 3 m/hr.
- Sydney Water will negotiate radioactive material activity rates for sewer discharge on a site-specific basis.

- The Manager, Business Customer Delivery will determine acceptance standards for substances other than those listed in Tables 1 and 2. Sydney Water does not accept substances (or mixtures of substances) that cannot mix with water.

Provisional standards

Where we determine that an additional substance should be included on our list of acceptance standards, the new acceptance standard will be declared provisional.

The substance will be provisional for six months. During this time, the customer must test for the substance, but no charges will be levied.

There are currently no provisional standards.

Table 2 Acceptance standards and charging rates for non-domestic substances

| Substance | Acceptance standard (mg/L) | Note | Charging rate (\$/kg) |
|---|----------------------------|----------------------|-----------------------|
| Acetaldehyde | 5 | 5 | 13.502 |
| Acetone | 400 | 5 | 0.127 |
| Aluminium | 100 | | 0.677 |
| Arsenic | 1 | | 67.574 |
| Barium | 5 | | 13.502 |
| Boron | 100 | | 0.677 |
| Bromine | 5 | 5 | 13.502 |
| Cadmium | 1 | | 67.574 |
| Chlorinated phenolics | 0.05 | 6 | 1351.675 |
| Chlorine | 10 | 5 | 6.756 |
| Chromium | 3 | 7 | 22.281 |
| Cobalt | 5 | | 13.502 |
| Copper | 5 | | 13.502 |
| Cyanide | 1 | 5, 8 | 67.574 |
| Fluoride | 20 | 4 | 3.346 |
| Formaldehyde | 30 | 5 | 2.234 |
| General pesticides (excludes OC and OP) | 0.1 | 9 | 675.811 |
| Herbicides and defoliants | 0.1 | | 675.811 |
| Iron | 50 | | 1.344 |
| Lead | 2 | | 33.750 |
| Lithium (specified systems only) | 10 | 10 | 6.756 |
| Manganese | 10 | | 6.756 |
| Mercaptans | 1 | | 67.574 |
| Mercury | 0.03 | | 2230.222 |
| Methyl Ethyl Ketone | 100 | 5 | 0.677 |
| Molybdenum | 100 | | 0.677 |
| Nickel | 3 | | 22.281 |
| Organoarsenic compounds | 0.1 | | 675.811 |
| pH | 7-10 units | 1 | |
| Petroleum hydrocarbons (flammable) | 10 | 5, 11, 14, 18 | 6.756 |
| - Benzene | 0.1 | 5, 18 | |
| - Toluene | 0.5 | 5, 18 | |
| - Ethylbenzene | 1 | 5, 18 | |
| - Xylene | 1 | 5, 18 | |
| Phenolic compounds (non-chlorinated) | 1 | | 67.574 |
| Polynuclear aromatic hydrocarbons | 5 | | 13.502 |
| Propionaldehyde | 5 | 5 | 13.502 |
| Selenium | 5 | | 13.502 |
| Silver | 5 | | 13.502 |
| Sulphide | 5 | 5 | 13.502 |
| Sulphite | 50 | | 1.344 |
| Temperature | 38°C | 1 | |
| Thiosulphate | 300 | | 0.243 |
| Tin | 10 | | 6.756 |
| Uranium | 10 | | 6.756 |
| Volatile halocarbons | 1 | 5, 13, 17 | 67.574 |
| - Chloroform | 0.1 | 5, 17 | |
| - Perchloroethylene | 0.3 | 5, 17 | |
| - Trichloroethylene | 0.1 | 5, 17 | |
| Zinc | 5 | | 13.502 |

Notes to acceptance standards

1. Sydney Water will introduce acceptance standards for a substance on a sub-system specific basis as determined by:
 - how much the receiving system can transport and treat
 - how corroded the sub-system is
 - how sewage treatment products will be used.
2. Discrete oil, fat or grease must not be discharged.
3. Where ammonia is present with other nitrogenous compounds, the amount of nitrogen in the ammonia is deducted from the total nitrogen as measured by Total Kjeldahl Nitrogen, before calculating the charge for nitrogen.
4. Fluoride, phosphorus and nitrogen limits don't apply where the customer's sewerage system is connected to a sewage treatment plant that discharges to the ocean.
5. **Acceptance standards also apply to concentrations of ammonia, benzene, bromine, chlorine, cyanide, formaldehyde, petroleum hydrocarbons, sulphide and volatile halocarbons in discrete samples.**
6. We will determine acceptance standards for individual chlorinated phenolics on a catchment basis, following pollution reduction targets set by the DECCW NSW for the sewage treatment plant effluent. The concentration limit is a guide only and we may set lower limits for individual chlorinated phenolic compounds.
7. We do not allow discharge from comfort air conditioning cooling towers and evaporative condensers using products containing hexavalent chromium (chromate) or organometallic algicides, if the blow down (or 'bleed-off') is connected to the sewer. Comfort cooling towers are defined as cooling towers dedicated to heating, ventilation, air-conditioning or refrigeration systems.
8. Cyanide is defined as labile cyanide amenable to alkaline chlorination. This includes free cyanide as well as those complex cyanides that are particularly dissociable, almost wholly, or in a large degree, and therefore potentially toxic in low concentrations.
9. We will not consent to any discharge of organochlorine pesticides (including chlordane, dieldrin and heptachlor), or organophosphorus pesticides (including chlorpyrifos, diazinon and malathion) into the sewerage system.
10. The limit for lithium applies only to the Rouse Hill sewage catchment.
11. Where flammable and/or explosive substances may be present, the customer must demonstrate to us that there is no possibility of explosions, or fires in the sewerage system. We will discuss limits and charges with individual customers, before a trade waste agreement is negotiated. The flammability of the discharge must never exceed five per cent of the Lower Explosive Limit (LEL) of hexane at 25 °C. In some cases a customer may be required to install an LEL meter.
12. We will determine acceptance standards for total dissolved solids on a catchment-specific basis. A limit of 500 mg/L may apply to customers discharging to an inland sewage treatment plant or to a sewage treatment plant that is part of a designated reuse system. Acceptance standards will only apply to those customers discharging in excess of 100kg/d of total dissolved solids (TDS) or greater than one per cent of the total catchment TDS load (whichever is the lesser).
13. Analysis of volatile halocarbons must at a minimum include methylene chloride, chloroform, trichloroethylene and perchloroethylene.
14. This substance is made up of several substances including benzene, toluene, ethylbenzene, (m+p)-xylene and o-xylene.
15. As at 1 July 2010, the limit for soluble BOD applies only to the Smithfield sewage and SPS 67 catchments, due to corrosion.
16. This is a guide only. Exact \$/kg rates are determined on a system-specific basis.
17. Charges will apply for total volatile halocarbons
18. Charges will apply for total petroleum hydrocarbons (flammable)

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Appendix E
DECC Immobilisation Technical Note 1



You are here: [Home](#) > [Waste and resource recovery](#) > [Regulating waste in NSW](#) > [Waste immobilisation](#) > [Technical notes](#) > Note 1



Immobilisation Technical Note 1

Process Equipment for Treatment of Contaminated Soil and Sludge Waste

In the context of hazardous waste treatment under the POEO Act, it is imperative that the responsible person uses proper process plant and equipment competently to conduct the treatment. This approach would help assure that the favourable treatment results achieved at the laboratory or pilot scale trials can be repeated consistently at the full scale treatment and high treatment standards are maintained at all times.

Industry may practise either or both of the following methods in the immobilisation treatment of contaminated soil and sludge waste:

1. **Chemical fixation:** Chemical reagents are used to convert the target contaminants contained in the waste to a chemically stable form(s) suitable for landfill disposal.
2. **Stabilisation/solidification:** Cement and/or pozzolans reagents are used to transform the waste into a stable monolithic substance suitable for landfill disposal.

Unlike washed and clean aggregates used in cement concrete, contaminated soil and sludge waste including river sediments can be very heterogeneous with a mixture of materials of different particle size distributions, shapes, densities and surface properties (eg clayey and plastic). Such dissimilar characteristics and rheological properties can compromise the immobilisation treatment.

The responsible person must use a properly designed and engineered treatment plant that is adequately equipped with automatic or semi automatic control in respect of waste and chemical reagents handling. Avoid or prohibit any manual operation which is prone to human error and may be unreliable. A typical process flow diagram for the treatment of contaminated soil and sludge waste is in [Annex A](#).

The mechanical mixer functions as the chemical reactor of the immobilisation treatment process. It should be equipped with a stationary mixing compartment and an agitator fitted with heavy duty mixing paddles/blades; and it can perform the following mixing duties:

- Provide positive agitation/stirring of the mix and achieve rigorous mixing e.g. turbulent flow within the mixing compartment.
- Adequately handle homogeneous and heterogeneous solids including soil, aggregates and sludges, and materials exhibiting plastic properties e.g. silt and clay.
- Capable of achieving a homogenous mix within minutes of mixing.

As a matter of DECC policy the tumbler type mixer e.g. small DIY rotating concrete mixer, rotating mixer mounted on a delivery truck, rotary hoe or bull dozer are not acceptable mixing devices for the immobilisation treatment of contaminated soil and sludge waste. Such machineries cannot discharge the above mixing duties for processing hazardous waste or sludge.

The following types of mixer (Perry, Chemical Engineers Handbook, McGraw Hill) could attain the above mixing duties and are considered suitable for the purposes of the immobilisation treatment of contaminated soil or sludge waste. They are commonly used in industry operations.

1. Pug mill mixer.
2. Paddle type mixer including Ribbon mixer and Turbine/Pan mixer.

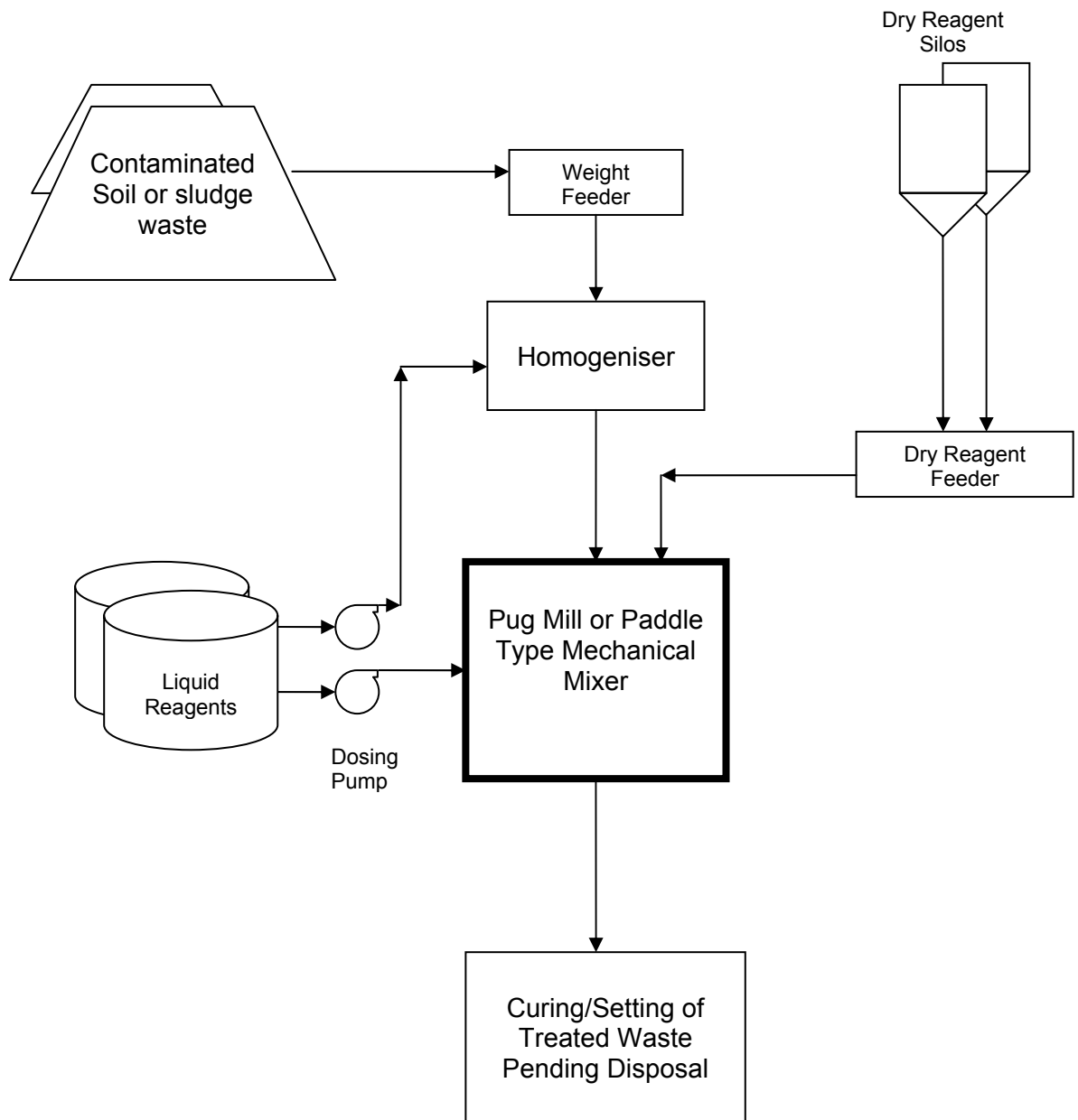
However, the choice of mixer is a waste specific issue and the responsible person should conduct a test run before adopting the equipment for full scale treatment. The DECC would consider and approve other types of mechanical mixing device on merits.

[Annex A: Typical Process Flow Diagram for Contaminated Soil Treatment Plant](#)

Page last updated: 26 February 2008

DECC WASTE TECHINICAL NOTE 1: ANNEX A

Typical Process Flow Diagram for Contaminated Soil Treatment Plant



Appendix F
Laboratory Certificates of Analysis



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 42976

Client:

JBS Environmental
P.O. Box 940
MASCOT
NSW 1460

Attention: Tim Davis / Sumi Dorairoj

Sample log in details:

| | |
|---------------------------------------|------------------------------------|
| Your Reference: | <u>40913, Macdonaldtown</u> |
| No. of samples: | 21 Soils, 1 Water |
| Date samples received: | 02/07/10 |
| Date completed instructions received: | 02/07/10 |

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

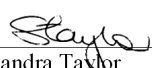
| | |
|-----------------------------|------------|
| Date results requested by: | 9/07/10 |
| Date of Preliminary Report: | Not issued |
| Issue Date: | 9/07/10 |

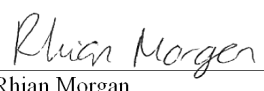
NATA accreditation number 2901. This document shall not be reproduced except in full.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.

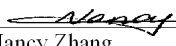
Tests not covered by NATA are denoted with *.

Results Approved By:


David Springer
Business Development & Quality Manager


Sandra Taylor
Senior Organic Chemist


Rhian Morgan
Metals Supervisor


Nancy Zhang
Chemist


Matt Mansfield
Approved Signatory

Envirolab Reference: 42976
Revision No: R 00



| VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-1 JBS TP1 0.3-0.4 2/07/2010 Soil | 42976-2 JBS TP2 0.4-0.5 2/07/2010 Soil | 42976-5 JBS TP2 1.4-1.5 2/07/2010 Soil | 42976-6 JBS TP3 1.7 2/07/2010 Soil | 42976-7 JBS TP4 0.5 2/07/2010 Soil |
|---|-------------------------|--|--|--|--|--|
| Date extracted | - | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Dichlorodifluoromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Vinyl Chloride | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromomethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trichlorofluoromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-Dichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,2-dichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,2-dichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| bromochloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| chloroform | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,2-dichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1-trichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloropropene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cyclohexane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| carbon tetrachloride | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Benzene | mg/kg | <0.5 | <0.5 | 1.4 | 0.9 | <0.5 |
| dibromomethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| bromodichloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,3-dichloropropene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,3-dichloropropene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2-trichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Toluene | mg/kg | <0.5 | <0.5 | 2.4 | 0.72 | <0.5 |
| 1,3-dichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| dibromochloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dibromoethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| tetrachloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| chlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | mg/kg | <1.0 | <1.0 | 26 | 22 | <1.0 |
| bromoform | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | mg/kg | <2.0 | <2.0 | 44 | 13 | <2.0 |
| styrene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-1 JBS TP1 0.3-0.4 2/07/2010 Soil | 42976-2 JBS TP2 0.4-0.5 2/07/2010 Soil | 42976-5 JBS TP2 1.4-1.5 2/07/2010 Soil | 42976-6 JBS TP3 1.7 2/07/2010 Soil | 42976-7 JBS TP4 0.5 2/07/2010 Soil |
|---|-------------------------|--|--|--|--|--|
| o-Xylene | mg/kg | <1.0 | <1.0 | 22 | 18 | <1.0 |
| 1,2,3-trichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| isopropylbenzene | mg/kg | <1.0 | <1.0 | 4.4 | 3.3 | <1.0 |
| bromobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-propyl benzene | mg/kg | <1.0 | <1.0 | 5.7 | 3.2 | <1.0 |
| 2-chlorotoluene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-chlorotoluene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | mg/kg | <1.0 | <1.0 | 25 | 15 | <1.0 |
| tert-butyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | mg/kg | <1.0 | <1.0 | 54 | 36 | <1.0 |
| 1,3-dichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| sec-butyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,4-dichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-isopropyl toluene | mg/kg | <1.0 | <1.0 | 2.7 | 2.5 | <1.0 |
| 1,2-dichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-butyl benzene | mg/kg | <1.0 | <1.0 | 3.2 | 1.9 | <1.0 |
| 1,2-dibromo-3-chloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| hexachlorobutadiene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 110 | 108 | 106 | 110 | 106 |
| Surrogate aaa-Trifluorotoluene | % | 110 | 112 | 90 | 109 | 122 |
| Surrogate Toluene-d8 | % | 89 | 83 | 69 | 86 | 86 |
| Surrogate 4-Bromofluorobenzene | % | 100 | 100 | 118 | 105 | 101 |

| VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-8 JBS TP4 1.0 2/07/2010 Soil | 42976-9 JBS TP4 1.6-1.7 2/07/2010 Soil | 42976-14 JBS TP5 0.5 2/07/2010 Soil | 42976-16 JBS TP5 1.5 2/07/2010 Soil | 42976-17 JBS TP5 2.0 2/07/2010 Soil |
|---|-------------------------|--|--|---|---|---|
| Date extracted | - | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Dichlorodifluoromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Vinyl Chloride | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromomethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trichlorofluoromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-Dichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,2-dichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,2-dichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| bromochloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| chloroform | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,2-dichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1-trichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloropropene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cyclohexane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| carbon tetrachloride | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Benzene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| dibromomethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trichloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| bromodichloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,3-dichloropropene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,3-dichloropropene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2-trichloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| 1,3-dichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| dibromochloromethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dibromoethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| tetrachloroethene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| chlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| bromoform | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | mg/kg | <2.0 | <2.0 | <2.0 | 5.3 | <2.0 |
| styrene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-8 JBS TP4 1.0 2/07/2010 Soil | 42976-9 JBS TP4 1.6-1.7 2/07/2010 Soil | 42976-14 JBS TP5 0.5 2/07/2010 Soil | 42976-16 JBS TP5 1.5 2/07/2010 Soil | 42976-17 JBS TP5 2.0 2/07/2010 Soil |
|---|-------------------------|--|--|---|---|---|
| o-Xylene | mg/kg | <1.0 | <1.0 | <1.0 | 3.3 | <1.0 |
| 1,2,3-trichloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| isopropylbenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| bromobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-propyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-chlorotoluene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-chlorotoluene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | 4.1 | <1.0 |
| tert-butyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | 8.5 | 1.7 |
| 1,3-dichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| sec-butyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,4-dichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-isopropyl toluene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-butyl benzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dibromo-3-chloropropane | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| hexachlorobutadiene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 112 | 113 | 104 | 112 | 114 |
| Surrogate aaa-Trifluorotoluene | % | 104 | 92 | 87 | 90 | 108 |
| Surrogate Toluene-d8 | % | 76 | 66 | 66 | 66 | 78 |
| Surrogate 4-Bromofluorobenzene | % | 100 | 100 | 100 | 101 | 100 |

| VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-19 QA2 - 2/07/2010 Soil | 42976-21 JBS TP3 4.0-4.2 2/07/2010 Soil |
|---|-------------------------|---|---|
| Date extracted | - | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 |
| Dichlorodifluoromethane | mg/kg | <1.0 | <1.0 |
| Chloromethane | mg/kg | <1.0 | <1.0 |
| Vinyl Chloride | mg/kg | <1.0 | <1.0 |
| Bromomethane | mg/kg | <1.0 | <1.0 |
| Chloroethane | mg/kg | <1.0 | <1.0 |
| Trichlorofluoromethane | mg/kg | <1.0 | <1.0 |
| 1,1-Dichloroethene | mg/kg | <1.0 | <1.0 |
| trans-1,2-dichloroethene | mg/kg | <1.0 | <1.0 |
| 1,1-dichloroethane | mg/kg | <1.0 | <1.0 |
| cis-1,2-dichloroethene | mg/kg | <1.0 | <1.0 |
| bromochloromethane | mg/kg | <1.0 | <1.0 |
| chloroform | mg/kg | <1.0 | <1.0 |
| 2,2-dichloropropane | mg/kg | <1.0 | <1.0 |
| 1,2-dichloroethane | mg/kg | <1.0 | <1.0 |
| 1,1,1-trichloroethane | mg/kg | <1.0 | <1.0 |
| 1,1-dichloropropene | mg/kg | <1.0 | <1.0 |
| Cyclohexane | mg/kg | <1.0 | <1.0 |
| carbon tetrachloride | mg/kg | <1.0 | <1.0 |
| Benzene | mg/kg | <0.5 | <0.5 |
| dibromomethane | mg/kg | <1.0 | <1.0 |
| 1,2-dichloropropane | mg/kg | <1.0 | <1.0 |
| trichloroethene | mg/kg | <1.0 | <1.0 |
| bromodichloromethane | mg/kg | <1.0 | <1.0 |
| trans-1,3-dichloropropene | mg/kg | <1.0 | <1.0 |
| cis-1,3-dichloropropene | mg/kg | <1.0 | <1.0 |
| 1,1,2-trichloroethane | mg/kg | <1.0 | <1.0 |
| Toluene | mg/kg | <0.5 | <0.5 |
| 1,3-dichloropropane | mg/kg | <1.0 | <1.0 |
| dibromochloromethane | mg/kg | <1.0 | <1.0 |
| 1,2-dibromoethane | mg/kg | <1.0 | <1.0 |
| tetrachloroethene | mg/kg | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | mg/kg | <1.0 | <1.0 |
| chlorobenzene | mg/kg | <1.0 | <1.0 |
| Ethylbenzene | mg/kg | <1.0 | <1.0 |
| bromoform | mg/kg | <1.0 | <1.0 |
| m+p-xylene | mg/kg | <2.0 | <2.0 |
| styrene | mg/kg | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | mg/kg | <1.0 | <1.0 |

| VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-19 QA2 - 2/07/2010 Soil | 42976-21 JBS TP3 4.0-4.2 2/07/2010 Soil |
|---|-------------------------|---|---|
| o-Xylene | mg/kg | <1.0 | <1.0 |
| 1,2,3-trichloropropane | mg/kg | <1.0 | <1.0 |
| isopropylbenzene | mg/kg | <1.0 | <1.0 |
| bromobenzene | mg/kg | <1.0 | <1.0 |
| n-propyl benzene | mg/kg | <1.0 | <1.0 |
| 2-chlorotoluene | mg/kg | <1.0 | <1.0 |
| 4-chlorotoluene | mg/kg | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | mg/kg | <1.0 | <1.0 |
| tert-butyl benzene | mg/kg | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | mg/kg | <1.0 | 2.2 |
| 1,3-dichlorobenzene | mg/kg | <1.0 | <1.0 |
| sec-butyl benzene | mg/kg | <1.0 | <1.0 |
| 1,4-dichlorobenzene | mg/kg | <1.0 | <1.0 |
| 4-isopropyl toluene | mg/kg | <1.0 | <1.0 |
| 1,2-dichlorobenzene | mg/kg | <1.0 | <1.0 |
| n-butyl benzene | mg/kg | <1.0 | <1.0 |
| 1,2-dibromo-3-chloropropane | mg/kg | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | mg/kg | <1.0 | <1.0 |
| hexachlorobutadiene | mg/kg | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | mg/kg | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 116 | 110 |
| Surrogate aaa-Trifluorotoluene | % | 111 | 89 |
| Surrogate Toluene-d8 | % | 86 | 66 |
| Surrogate 4-Bromofluorobenzene | % | 101 | 100 |

| | | | |
|---|-------------------------|--|--|
| BTEX in Soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-11 Trip Spike - 2/07/2010 Soil | 42976-12 Trip Blank - 2/07/2010 Soil |
| Date extracted | - | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 |
| Benzene | mg/kg | 98 | <0.5 |
| Toluene | mg/kg | 100 | <0.5 |
| Ethylbenzene | mg/kg | 96 | <1.0 |
| m+p-xylene | mg/kg | 96 | <2.0 |
| o-Xylene | mg/kg | 100 | <1.0 |
| Surrogate aaa-Trifluorotoluene | % | 132 | 137 |

| PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-1 JBS TP1 0.3-0.4 2/07/2010 Soil | 42976-2 JBS TP2 0.4-0.5 2/07/2010 Soil | 42976-5 JBS TP2 1.4-1.5 2/07/2010 Soil | 42976-6 JBS TP3 1.7 2/07/2010 Soil | 42976-7 JBS TP4 0.5 2/07/2010 Soil |
|---|-------------------------|--|--|--|--|--|
| Date extracted | - | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Naphthalene | mg/kg | 0.6 | 13 | 350 | 310 | 0.3 |
| Acenaphthylene | mg/kg | 0.7 | 25 | 6.0 | 1.3 | 0.8 |
| Acenaphthene | mg/kg | 0.1 | 3.8 | 3.7 | 3.1 | <0.1 |
| Fluorene | mg/kg | 0.5 | 22 | 9.9 | 2.7 | 0.2 |
| Phenanthrene | mg/kg | 3.4 | 110 | 23 | 4.6 | 1.4 |
| Anthracene | mg/kg | 0.8 | 32 | 6.7 | 1.3 | 0.5 |
| Fluoranthene | mg/kg | 4.4 | 110 | 14 | 1.8 | 3.1 |
| Pyrene | mg/kg | 4.9 | 130 | 19 | 2.3 | 5.1 |
| Benzo(a)anthracene | mg/kg | 2.6 | 75 | 7.5 | 0.7 | 2.8 |
| Chrysene | mg/kg | 2.6 | 63 | 6.2 | 0.7 | 3.1 |
| Benzo(b+k)fluoranthene | mg/kg | 3.8 | 79 | 8.0 | 0.7 | 5.6 |
| Benzo(a)pyrene | mg/kg | 3.0 | 64 | 7.7 | 0.6 | 4.4 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 1.3 | 20 | 2.6 | 0.2 | 2.5 |
| Dibenzo(a,h)anthracene | mg/kg | 0.3 | 6.4 | 0.7 | <0.1 | 0.6 |
| Benzo(g,h,i)perylene | mg/kg | 1.1 | 17 | 2.7 | 0.2 | 2.8 |
| Surrogate p-Terphenyl-d ₁₄ | % | 97 | 100 | 96 | 97 | 99 |

| PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-8 JBS TP4 1.0 2/07/2010 Soil | 42976-9 JBS TP4 1.6-1.7 2/07/2010 Soil | 42976-14 JBS TP5 0.5 2/07/2010 Soil | 42976-16 JBS TP5 1.5 2/07/2010 Soil | 42976-17 JBS TP5 2.0 2/07/2010 Soil |
|---|-------------------------|--|--|---|---|---|
| Date extracted | - | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Naphthalene | mg/kg | <0.1 | <0.1 | 6.3 | 250 | 9.2 |
| Acenaphthylene | mg/kg | <0.1 | <0.1 | 9.7 | 22 | 0.9 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | 2.0 | 6.4 | 0.3 |
| Fluorene | mg/kg | <0.1 | <0.1 | 10 | 31 | 0.6 |
| Phenanthrene | mg/kg | <0.1 | <0.1 | 39 | 94 | 1.7 |
| Anthracene | mg/kg | <0.1 | <0.1 | 11 | 29 | 0.5 |
| Fluoranthene | mg/kg | <0.1 | <0.1 | 54 | 64 | 1.9 |
| Pyrene | mg/kg | <0.1 | <0.1 | 65 | 73 | 2.8 |
| Benzo(a)anthracene | mg/kg | <0.1 | <0.1 | 36 | 37 | 1.4 |
| Chrysene | mg/kg | <0.1 | <0.1 | 30 | 32 | 1.3 |
| Benzo(b+k)fluoranthene | mg/kg | <0.2 | <0.2 | 36 | 35 | 1.8 |
| Benzo(a)pyrene | mg/kg | <0.05 | <0.05 | 30 | 30 | 1.5 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | <0.1 | <0.1 | 9.4 | 9.4 | 0.5 |
| Dibenzo(a,h)anthracene | mg/kg | <0.1 | <0.1 | 3.0 | 2.9 | 0.2 |
| Benzo(g,h,i)perylene | mg/kg | <0.1 | <0.1 | 8.4 | 8.6 | 0.5 |
| Surrogate p-Terphenyl-d ₁₄ | % | 93 | 92 | 103 | 91 | 94 |

| | | | |
|---|-------------------------|---|---|
| PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-19 QA2 - 2/07/2010 Soil | 42976-21 JBS TP3 4.0-4.2 2/07/2010 Soil |
| Date extracted | - | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 |
| Naphthalene | mg/kg | 2.8 | 4.5 |
| Acenaphthylene | mg/kg | 1.7 | 0.6 |
| Acenaphthene | mg/kg | 0.2 | 0.4 |
| Fluorene | mg/kg | 0.7 | 0.8 |
| Phenanthrene | mg/kg | 7.9 | 4.1 |
| Anthracene | mg/kg | 2.1 | 1.0 |
| Fluoranthene | mg/kg | 15 | 4.4 |
| Pyrene | mg/kg | 20 | 5.1 |
| Benzo(a)anthracene | mg/kg | 10 | 2.2 |
| Chrysene | mg/kg | 9.1 | 2.1 |
| Benzo(b+k)fluoranthene | mg/kg | 14 | 2.3 |
| Benzo(a)pyrene | mg/kg | 11 | 1.7 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 4.6 | 0.6 |
| Dibenzo(a,h)anthracene | mg/kg | 1.2 | 0.2 |
| Benzo(g,h,i)perylene | mg/kg | 4.4 | 0.6 |
| Surrogate p-Terphenyl-d ₁₄ | % | 95 | 98 |

| Speciated Phenols in Soil | | | | | | |
|--------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 |
| Phenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <20 | <2.0 | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <100 | <10 | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <100 | <10 | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <10 | <1.0 | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <100 | <10 | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <100 | <10 | <10 | <10 |
| Surrogate 2-fluorophenol | % | 59 | 68 | 57 | 69 | 81 |
| Surrogate Phenol-d6 | % | 65 | 55 | 57 | 89 | 79 |
| Surrogate 2,4,6-Tribromophenol | % | 52 | 85 | 107 | 74 | 66 |
| Surrogate p-Terphenyl-d14 | % | 103 | 119 | 99 | 103 | 103 |

| Speciated Phenols in Soil | | | | | | |
|--------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 |
| Phenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 | <20 | <20 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 | <100 | <100 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 | <100 | <100 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 | <100 | <100 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 | <100 | <100 | <10 |
| Surrogate 2-fluorophenol | % | 88 | 79 | 78 | 76 | 61 |
| Surrogate Phenol-d6 | % | 77 | 84 | 80 | 88 | 77 |
| Surrogate 2,4,6-Tribromophenol | % | 55 | 39 | 103 | 99 | 60 |
| Surrogate p-Terphenyl-d14 | % | 98 | 101 | 108 | 111 | 101 |

| Speciated Phenols in Soil | | | |
|---------------------------------------|-------|------------|------------|
| Our Reference: | UNITS | 42976-19 | 42976-21 |
| Your Reference | ----- | QA2 | JBS TP3 |
| Depth | ----- | - | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil |
| Date extracted | - | 06/07/2010 | 06/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 |
| Phenol | mg/kg | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 |
| Surrogate 2-fluorophenol | % | 76 | 74 |
| Surrogate Phenol-d ₆ | % | 87 | 73 |
| Surrogate 2,4,6-Tribromophenol | % | 68 | 69 |
| Surrogate p-Terphenyl-d ₁₄ | % | 103 | 106 |

| Acid Extractable metals in soil | | | | | | |
|---------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Arsenic | mg/kg | 30 | 13 | <4 | <4 | 8 |
| Cadmium | mg/kg | 1.1 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 26 | 19 | 14 | 12 | 22 |
| Copper | mg/kg | 230 | 80 | 4 | 1 | 46 |
| Lead | mg/kg | 220 | 220 | 58 | 14 | 260 |
| Mercury | mg/kg | 0.3 | 0.4 | 0.1 | <0.1 | 0.2 |
| Nickel | mg/kg | 20 | 26 | 5 | 2 | 10 |
| Zinc | mg/kg | 260 | 220 | 200 | 3 | 24 |

| Acid Extractable metals in soil | | | | | | |
|---------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Arsenic | mg/kg | 9 | 6 | 6 | 5 | 6 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 35 | 7 | 18 | 23 | 25 |
| Copper | mg/kg | 51 | 65 | 18 | 16 | 9 |
| Lead | mg/kg | 61 | 100 | 58 | 50 | 36 |
| Mercury | mg/kg | <0.1 | <0.1 | 0.1 | 0.3 | <0.1 |
| Nickel | mg/kg | 3 | 4 | 5 | 13 | 7 |
| Zinc | mg/kg | 14 | 47 | 35 | 93 | 27 |

| | | | |
|---------------------------------|-------|------------|------------|
| Acid Extractable metals in soil | | | |
| Our Reference: | UNITS | 42976-19 | 42976-21 |
| Your Reference | ----- | QA2 | JBS TP3 |
| Depth | ----- | - | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil |
| Date digested | - | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 07/07/2010 | 07/07/2010 |
| Arsenic | mg/kg | 30 | 5 |
| Cadmium | mg/kg | 1.1 | <0.5 |
| Chromium | mg/kg | 21 | 22 |
| Copper | mg/kg | 260 | 6 |
| Lead | mg/kg | 280 | 24 |
| Mercury | mg/kg | 0.4 | <0.1 |
| Nickel | mg/kg | 24 | 3 |
| Zinc | mg/kg | 330 | 9 |

| | | | | | | |
|----------------|-------|-----------|-----------|-----------|-----------|-----------|
| Moisture | | | | | | |
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 |
| Date analysed | - | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 |
| Moisture | % | 13 | 10 | 25 | 23 | 16 |

| | | | | | | |
|----------------|-------|-----------|-----------|-----------|-----------|-----------|
| Moisture | | | | | | |
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date prepared | - | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 |
| Date analysed | - | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 | 6/7/2010 |
| Moisture | % | 23 | 17 | 19 | 23 | 27 |

| | | | |
|----------------|-------|-----------|-----------|
| Moisture | | | |
| Our Reference: | UNITS | 42976-19 | 42976-21 |
| Your Reference | ----- | QA2 | JBS TP3 |
| Depth | ----- | - | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil |
| Date prepared | - | 6/7/2010 | 6/7/2010 |
| Date analysed | - | 6/7/2010 | 6/7/2010 |
| Moisture | % | 17 | 25 |

| | | | | | | |
|---------------------|-------|---|---|---|---|---|
| Asbestos ID - soils | | | | | | |
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 9/7/2010 | 9/7/2010 | 9/7/2010 | 9/7/2010 | 9/7/2010 |
| Sample Description | - | Approx 40g Soil | Approx 40g Soil | Approx 40g Soil | Approx 40g Soil | Approx 40g Soil |
| Asbestos ID in soil | - | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg |
| Trace Analysis | - | Respirable fibres not detected | Respirable fibres not detected | Respirable fibres not detected | Respirable fibres not detected | Respirable fibres not detected |

| | | | | | | |
|---------------------|-------|---|---|---|---|---|
| Asbestos ID - soils | | | | | | |
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-16 | 42976-17 | 42976-21 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP3 |
| Depth | ----- | 1.0 | 1.6-1.7 | 1.5 | 2.0 | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date analysed | - | 9/7/2010 | 9/7/2010 | 9/7/2010 | 9/7/2010 | 9/7/2010 |
| Sample Description | - | Approx 40g Soil | Approx 40g Soil | Approx 40g Soil | Approx 40g Soil | Approx 40g Soil |
| Asbestos ID in soil | - | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg | No asbestos found at reporting limit of 0.1g/kg |
| Trace Analysis | - | Respirable fibres not detected | Respirable fibres not detected | Respirable fibres not detected | Respirable fibres not detected | Respirable fibres not detected |

| VOCs in Zero Headspace | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
|---------------------------|-------|-----------|-----------|-----------|-----------|-----------|
| Our Reference: | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Your Reference | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Depth | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Date Sampled | | Soil | Soil | Soil | Soil | Soil |
| Type of sample | | | | | | |
| Date extracted | - | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 |
| Date analysed | - | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 |
| Dichlorodifluoromethane | µg/L | <10 | <10 | <100 | <100 | <10 |
| Chloromethane | µg/L | <10 | <10 | <100 | <100 | <10 |
| Vinyl Chloride | µg/L | <10 | <10 | <100 | <100 | <10 |
| Bromomethane | µg/L | <10 | <10 | <100 | <100 | <10 |
| Chloroethane | µg/L | <10 | <10 | <100 | <100 | <10 |
| Trichlorofluoromethane | µg/L | <10 | <10 | <100 | <100 | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 | <1.0 | <100 | <100 | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <100 | <100 | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Bromochloromethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Chloroform | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 2,2-dichloropropane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Benzene | µg/L | <1.0 | <1.0 | 72 | 32 | <1.0 |
| Dibromomethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Trichloroethene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Bromodichloromethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| trans-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Toluene | µg/L | <1.0 | 1.7 | 110 | 20 | <1.0 |
| 1,3-dichloropropane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Dibromochloromethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,2-dibromoethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Tetrachloroethene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Chlorobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Ethylbenzene | µg/L | <1.0 | 2.3 | 630 | 490 | <1.0 |
| Bromoform | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| m+p-xylene | µg/L | <2.0 | 5.2 | 980 | 300 | <2.0 |
| Styrene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| o-xylene | µg/L | <1.0 | 2.1 | 510 | 430 | <1.0 |

| VOCs in Zero Headspace Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-1 JBS TP1 0.3-0.4 2/07/2010 Soil | 42976-2 JBS TP2 0.4-0.5 2/07/2010 Soil | 42976-5 JBS TP2 1.4-1.5 2/07/2010 Soil | 42976-6 JBS TP3 1.7 2/07/2010 Soil | 42976-7 JBS TP4 0.5 2/07/2010 Soil |
|---|-------------------------|--|--|--|--|--|
| 1,2,3-trichloropropane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Isopropylbenzene | µg/L | <1.0 | <1.0 | 72 | 58 | <1.0 |
| Bromobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| n-propyl benzene | µg/L | <1.0 | <1.0 | 73 | 51 | <1.0 |
| 2-chlorotoluene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | <1.0 | 1.5 | 340 | 260 | <1.0 |
| Tert-butyl benzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | <1.0 | 2.7 | 820 | 640 | <1.0 |
| 1,3-dichlorobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 | <1.0 | 21 | 28 | 1.7 |
| 1,2-dichlorobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| n-butyl benzene | µg/L | <1.0 | <1.0 | 14 | 16 | <1.0 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 | <1.0 | <10 | <10 | <1.0 |
| Surrogate Dibromofluoromethane | % | 115 | # | 117 | 118 | # |
| Surrogate toluene-d8 | % | 86 | 125 | 93 | 88 | 137 |
| Surrogate 4-BFB | % | 104 | 106 | 105 | 104 | 115 |

| VOCs in Zero Headspace | | | | | | |
|---------------------------|-------|-----------|-----------|-----------|-----------|-----------|
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 |
| Date analysed | - | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 | 8/7/2010 |
| Dichlorodifluoromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Chloromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Vinyl Chloride | µg/L | <10 | <10 | <10 | <10 | <10 |
| Bromomethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Chloroethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| Trichlorofluoromethane | µg/L | <10 | <10 | <10 | <10 | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromochloromethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroform | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | 3.7 |
| Dibromomethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trichloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromodichloromethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 | 35 | 4.8 |
| 1,3-dichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Dibromochloromethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-dibromoethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | <1.0 | 1.2 | 2.0 | 17 | 12 |
| Bromoform | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | µg/L | <2.0 | 2.1 | <2.0 | 350 | 21 |
| Styrene | µg/L | <1.0 | <1.0 | <1.0 | 2.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| o-xylene | µg/L | <1.0 | <1.0 | 1.6 | 220 | 19 |

| VOCs in Zero Headspace Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-8 JBS TP4 1.0 2/07/2010 Soil | 42976-9 JBS TP4 1.6-1.7 2/07/2010 Soil | 42976-14 JBS TP5 0.5 2/07/2010 Soil | 42976-16 JBS TP5 1.5 2/07/2010 Soil | 42976-17 JBS TP5 2.0 2/07/2010 Soil |
|---|-------------------------|--|--|---|---|---|
| 1,2,3-trichloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Isopropylbenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | 1.1 |
| Bromobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-propyl benzene | µg/L | <1.0 | <1.0 | <1.0 | 1.2 | 1.5 |
| 2-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | <1.0 | <1.0 | 1.9 | 170 | 11 |
| Tert-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | <1.0 | 2.8 | 5.2 | 380 | 31 |
| 1,3-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 | <1.0 | <1.0 | 15 | 1.1 |
| 1,2-dichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| n-butyl benzene | µg/L | <1.0 | <1.0 | <1.0 | 2.1 | <1.0 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | # | # | # | # | 111 |
| Surrogate toluene-d8 | % | 111 | 94 | 116 | 112 | 89 |
| Surrogate 4-BFB | % | 105 | 113 | 112 | 122 | 108 |

| VOCs in Zero Headspace | UNITS | 42976-19 | 42976-21 |
|---------------------------|-------|-----------|-----------|
| Our Reference: | ----- | QA2 | JBS TP3 |
| Your Reference | ----- | - | 4.0-4.2 |
| Depth | | 2/07/2010 | 2/07/2010 |
| Date Sampled | | Soil | Soil |
| Type of sample | | | |
| Date extracted | - | 8/7/2010 | 8/7/2010 |
| Date analysed | - | 8/7/2010 | 8/7/2010 |
| Dichlorodifluoromethane | µg/L | <10 | <10 |
| Chloromethane | µg/L | <10 | <10 |
| Vinyl Chloride | µg/L | <10 | <10 |
| Bromomethane | µg/L | <10 | <10 |
| Chloroethane | µg/L | <10 | <10 |
| Trichlorofluoromethane | µg/L | <10 | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 | <1.0 |
| Bromochloromethane | µg/L | <1.0 | <1.0 |
| Chloroform | µg/L | <1.0 | <1.0 |
| 2,2-dichloropropane | µg/L | <1.0 | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 | <1.0 |
| Benzene | µg/L | <1.0 | 1.0 |
| Dibromomethane | µg/L | <1.0 | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 | <1.0 |
| Trichloroethene | µg/L | <1.0 | <1.0 |
| Bromodichloromethane | µg/L | <1.0 | <1.0 |
| trans-1,3-dichloropropene | µg/L | <1.0 | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 |
| 1,3-dichloropropane | µg/L | <1.0 | <1.0 |
| Dibromochloromethane | µg/L | <1.0 | <1.0 |
| 1,2-dibromoethane | µg/L | <1.0 | <1.0 |
| Tetrachloroethene | µg/L | <1.0 | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 | <1.0 |
| Chlorobenzene | µg/L | <1.0 | <1.0 |
| Ethylbenzene | µg/L | 1.7 | 17 |
| Bromoform | µg/L | <1.0 | <1.0 |
| m+p-xylene | µg/L | 2.7 | 7.5 |
| Styrene | µg/L | <1.0 | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 | <1.0 |
| o-xylene | µg/L | 1.6 | 11 |

| VOCs in Zero Headspace Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-19 QA2 - 2/07/2010 Soil | 42976-21 JBS TP3 4.0-4.2 2/07/2010 Soil |
|---|-------------------------|---|---|
| 1,2,3-trichloropropane | µg/L | <1.0 | <1.0 |
| Isopropylbenzene | µg/L | <1.0 | 2.8 |
| Bromobenzene | µg/L | <1.0 | <1.0 |
| n-propyl benzene | µg/L | <1.0 | 3.3 |
| 2-chlorotoluene | µg/L | <1.0 | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | 1.4 | 29 |
| Tert-butyl benzene | µg/L | <1.0 | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | 3.6 | 57 |
| 1,3-dichlorobenzene | µg/L | <1.0 | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 | 3.4 |
| 1,2-dichlorobenzene | µg/L | <1.0 | <1.0 |
| n-butyl benzene | µg/L | <1.0 | 3.3 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | 120 | 114 |
| Surrogate toluene-d8 | % | 91 | 90 |
| Surrogate 4-BFB | % | 106 | 111 |

| Metals in TCLP USEPA1311 | | | | | | |
|---------------------------------------|----------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 |
| pH of soil for fluid# determ. | pH units | 7.40 | 7.50 | 7.40 | 7.50 | 6.70 |
| pH of soil for fluid # determ. (acid) | pH units | 1.40 | 1.40 | 1.40 | 1.60 | 1.40 |
| Extraction fluid used | - | 1 | 1 | 1 | 1 | 1 |
| pH of final Leachate | pH units | 5.30 | 5.00 | 5.00 | 5.10 | 5.00 |
| Arsenic in TCLP | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Cadmium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chromium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Copper in TCLP | mg/L | 0.1 | 0.04 | 0.04 | 0.02 | 0.1 |
| Lead in TCLP | mg/L | <0.03 | 0.09 | <0.03 | <0.03 | 0.05 |
| Mercury in TCLP | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Nickel in TCLP | mg/L | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Zinc in TCLP | mg/L | 1.6 | 1.7 | 0.5 | 1.0 | 1.4 |

| Metals in TCLP USEPA1311 | | | | | | |
|---------------------------------------|----------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 |
| pH of soil for fluid# determ. | pH units | 5.90 | 6.10 | 6.00 | 6.60 | 7.00 |
| pH of soil for fluid # determ. (acid) | pH units | 1.40 | 1.40 | 1.30 | 1.30 | 1.40 |
| Extraction fluid used | - | 1 | 1 | 1 | 1 | 1 |
| pH of final Leachate | pH units | 4.90 | 5.00 | 5.00 | 5.10 | 5.00 |
| Arsenic in TCLP | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Cadmium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chromium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Copper in TCLP | mg/L | 0.06 | 0.4 | 0.02 | 0.02 | 0.02 |
| Lead in TCLP | mg/L | 0.04 | 0.06 | 0.05 | <0.03 | 0.03 |
| Mercury in TCLP | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Nickel in TCLP | mg/L | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Zinc in TCLP | mg/L | 0.2 | 1.4 | 0.3 | 1.3 | 0.09 |

| | | | |
|---------------------------------------|----------|------------|------------|
| Metals in TCLP USEPA1311 | | | |
| Our Reference: | UNITS | 42976-19 | 42976-21 |
| Your Reference | ----- | QA2 | JBS TP3 |
| Depth | ----- | - | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil |
| Date extracted | - | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 |
| pH of soil for fluid# determ. | pH units | 6.50 | 5.90 |
| pH of soil for fluid # determ. (acid) | pH units | 1.40 | 1.40 |
| Extraction fluid used | - | 1 | 1 |
| pH of final Leachate | pH units | 5.20 | 5.00 |
| Arsenic in TCLP | mg/L | <0.05 | <0.05 |
| Cadmium in TCLP | mg/L | <0.01 | <0.01 |
| Chromium in TCLP | mg/L | <0.01 | <0.01 |
| Copper in TCLP | mg/L | 0.1 | 0.02 |
| Lead in TCLP | mg/L | 0.07 | <0.03 |
| Mercury in TCLP | mg/L | <0.0005 | <0.0005 |
| Nickel in TCLP | mg/L | 0.05 | <0.02 |
| Zinc in TCLP | mg/L | 1.8 | 0.2 |

| PAHs in TCLP (USEPA 1311) | | | | | | |
|---------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 |
| Naphthalene in TCLP | mg/L | <0.001 | 0.022 | 2.8 | 3.6 | 0.002 |
| Acenaphthylene in TCLP | mg/L | <0.001 | 0.002 | 0.02 | 0.02 | <0.001 |
| Acenaphthene in TCLP | mg/L | <0.001 | 0.001 | 0.014 | 0.047 | <0.001 |
| Fluorene in TCLP | mg/L | <0.001 | 0.004 | 0.020 | 0.027 | <0.001 |
| Phenanthrene in TCLP | mg/L | <0.001 | 0.005 | 0.018 | 0.020 | <0.001 |
| Anthracene in TCLP | mg/L | <0.001 | 0.001 | 0.003 | 0.004 | <0.001 |
| Fluoranthene in TCLP | mg/L | <0.001 | 0.001 | 0.002 | 0.002 | <0.001 |
| Pyrene in TCLP | mg/L | <0.001 | 0.001 | 0.002 | 0.003 | <0.001 |
| Benzo(a)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chrysene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 |
| Benzo(b+k)fluoranthene in TCLP | mg/L | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzo(a)pyrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 124 | 119 | 112 | 115 | 122 |

| PAHs in TCLP (USEPA 1311) | | | | | | |
|---------------------------------------|-------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 | 08/07/2010 |
| Naphthalene in TCLP | mg/L | <0.001 | <0.001 | 0.001 | 0.64 | 0.18 |
| Acenaphthylene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.02 | 0.003 |
| Acenaphthene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.008 | 0.002 |
| Fluorene in TCLP | mg/L | <0.001 | <0.001 | 0.001 | 0.020 | 0.002 |
| Phenanthrene in TCLP | mg/L | <0.001 | <0.001 | 0.001 | 0.014 | 0.002 |
| Anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 |
| Fluoranthene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 |
| Pyrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.001 | 0.001 |
| Benzo(a)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chrysene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in TCLP | mg/L | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzo(a)pyrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 130 | 76 | 133 | 123 | 129 |

| | | | |
|--------------------------------|-------|------------|------------|
| PAHs in TCLP (USEPA 1311) | | | |
| Our Reference: | UNITS | 42976-19 | 42976-21 |
| Your Reference | ----- | QA2 | JBS TP3 |
| Depth | ----- | - | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil |
| Date extracted | - | 07/07/2010 | 07/07/2010 |
| Date analysed | - | 08/07/2010 | 08/07/2010 |
| Naphthalene in TCLP | mg/L | 0.030 | 0.066 |
| Acenaphthylene in TCLP | mg/L | <0.001 | 0.001 |
| Acenaphthene in TCLP | mg/L | 0.001 | 0.004 |
| Fluorene in TCLP | mg/L | 0.001 | 0.006 |
| Phenanthrene in TCLP | mg/L | 0.001 | 0.009 |
| Anthracene in TCLP | mg/L | 0.001 | 0.001 |
| Fluoranthene in TCLP | mg/L | <0.001 | 0.001 |
| Pyrene in TCLP | mg/L | <0.001 | 0.001 |
| Benzo(a)anthracene in TCLP | mg/L | <0.001 | <0.001 |
| Chrysene in TCLP | mg/L | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in TCLP | mg/L | <0.002 | <0.002 |
| Benzo(a)pyrene in TCLP | mg/L | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in TCLP | mg/L | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in TCLP | mg/L | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d14 | % | 117 | 122 |

| | | | | | | |
|-----------------------------|-------|-----------|-----------|-----------|-----------|-----------|
| Phenols in TCLP extract | | | | | | |
| Our Reference: | UNITS | 42976-1 | 42976-2 | 42976-5 | 42976-6 | 42976-7 |
| Your Reference | ----- | JBS TP1 | JBS TP2 | JBS TP2 | JBS TP3 | JBS TP4 |
| Depth | ----- | 0.3-0.4 | 0.4-0.5 | 1.4-1.5 | 1.7 | 0.5 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Total Phenolics (as Phenol) | mg/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |

| | | | | | | |
|-----------------------------|-------|-----------|-----------|-----------|-----------|-----------|
| Phenols in TCLP extract | | | | | | |
| Our Reference: | UNITS | 42976-8 | 42976-9 | 42976-14 | 42976-16 | 42976-17 |
| Your Reference | ----- | JBS TP4 | JBS TP4 | JBS TP5 | JBS TP5 | JBS TP5 |
| Depth | ----- | 1.0 | 1.6-1.7 | 0.5 | 1.5 | 2.0 |
| Date Sampled | | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Total Phenolics (as Phenol) | mg/L | <0.050 | <0.050 | <0.050 | <0.050 | <0.050 |

| | | | |
|-----------------------------|-------|-----------|-----------|
| Phenols in TCLP extract | | | |
| Our Reference: | UNITS | 42976-19 | 42976-21 |
| Your Reference | ----- | QA2 | JBS TP3 |
| Depth | ----- | - | 4.0-4.2 |
| Date Sampled | | 2/07/2010 | 2/07/2010 |
| Type of sample | | Soil | Soil |
| Total Phenolics (as Phenol) | mg/L | <0.050 | <0.050 |

| | | |
|--|-------------------------|--|
| VOCs in water Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-13 Rinsate - 2/07/2010 Water |
| Date extracted | - | 6/7/2010 |
| Date analysed | - | 6/7/2010 |
| Dichlorodifluoromethane | µg/L | <10 |
| Chloromethane | µg/L | <10 |
| Vinyl Chloride | µg/L | <10 |
| Bromomethane | µg/L | <10 |
| Chloroethane | µg/L | <10 |
| Trichlorofluoromethane | µg/L | <10 |
| 1,1-Dichloroethene | µg/L | <1.0 |
| Trans-1,2-dichloroethene | µg/L | <1.0 |
| 1,1-dichloroethane | µg/L | <1.0 |
| Cis-1,2-dichloroethene | µg/L | <1.0 |
| Bromochloromethane | µg/L | <1.0 |
| Chloroform | µg/L | <1.0 |
| 2,2-dichloropropane | µg/L | <1.0 |
| 1,2-dichloroethane | µg/L | <1.0 |
| 1,1,1-trichloroethane | µg/L | <1.0 |
| 1,1-dichloropropene | µg/L | <1.0 |
| Cyclohexane | µg/L | <1.0 |
| Carbon tetrachloride | µg/L | <1.0 |
| Benzene | µg/L | <1.0 |
| Dibromomethane | µg/L | <1.0 |
| 1,2-dichloropropane | µg/L | <1.0 |
| Trichloroethene | µg/L | <1.0 |
| Bromodichloromethane | µg/L | <1.0 |
| trans-1,3-dichloropropene | µg/L | <1.0 |
| cis-1,3-dichloropropene | µg/L | <1.0 |
| 1,1,2-trichloroethane | µg/L | <1.0 |
| Toluene | µg/L | <1.0 |
| 1,3-dichloropropane | µg/L | <1.0 |
| Dibromochloromethane | µg/L | <1.0 |
| 1,2-dibromoethane | µg/L | <1.0 |
| Tetrachloroethene | µg/L | <1.0 |
| 1,1,1,2-tetrachloroethane | µg/L | <1.0 |
| Chlorobenzene | µg/L | <1.0 |
| Ethylbenzene | µg/L | <1.0 |
| Bromoform | µg/L | <1.0 |
| m+p-xylene | µg/L | <2.0 |
| Styrene | µg/L | <1.0 |
| 1,1,2,2-tetrachloroethane | µg/L | <1.0 |

| | | |
|--|-------------------------|--|
| VOCs in water Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-13 Rinsate - 2/07/2010 Water |
| o-xylene | µg/L | <1.0 |
| 1,2,3-trichloropropane | µg/L | <1.0 |
| Isopropylbenzene | µg/L | <1.0 |
| Bromobenzene | µg/L | <1.0 |
| n-propyl benzene | µg/L | <1.0 |
| 2-chlorotoluene | µg/L | <1.0 |
| 4-chlorotoluene | µg/L | <1.0 |
| 1,3,5-trimethyl benzene | µg/L | <1.0 |
| Tert-butyl benzene | µg/L | <1.0 |
| 1,2,4-trimethyl benzene | µg/L | <1.0 |
| 1,3-dichlorobenzene | µg/L | <1.0 |
| Sec-butyl benzene | µg/L | <1.0 |
| 1,4-dichlorobenzene | µg/L | <1.0 |
| 4-isopropyl toluene | µg/L | <1.0 |
| 1,2-dichlorobenzene | µg/L | <1.0 |
| n-butyl benzene | µg/L | <1.0 |
| 1,2-dibromo-3-chloropropane | µg/L | <1.0 |
| 1,2,4-trichlorobenzene | µg/L | <1.0 |
| Hexachlorobutadiene | µg/L | <1.0 |
| 1,2,3-trichlorobenzene | µg/L | <1.0 |
| Surrogate Dibromofluoromethane | % | 113 |
| Surrogate toluene-d8 | % | 98 |
| Surrogate 4-BFB | % | 103 |

| | | |
|--|-------------------------|--|
| PAHs in Water Our Reference: Your Reference Depth Date Sampled Type of sample | UNITS ----- ----- | 42976-13 Rinsate - 2/07/2010 Water |
| Date extracted | - | 08/07/2010 |
| Date analysed | - | 08/07/2010 |
| Naphthalene | µg/L | <1 |
| Acenaphthylene | µg/L | <1 |
| Acenaphthene | µg/L | <1 |
| Fluorene | µg/L | <1 |
| Phenanthrene | µg/L | <1 |
| Anthracene | µg/L | <1 |
| Fluoranthene | µg/L | <1 |
| Pyrene | µg/L | <1 |
| Benzo(a)anthracene | µg/L | <1 |
| Chrysene | µg/L | <1 |
| Benzo(b+k)fluoranthene | µg/L | <2 |
| Benzo(a)pyrene | µg/L | <1 |
| Indeno(1,2,3-c,d)pyrene | µg/L | <1 |
| Dibenzo(a,h)anthracene | µg/L | <1 |
| Benzo(g,h,i)perylene | µg/L | <1 |
| Surrogate p-Terphenyl-d ₁₄ | % | 119 |

| | | |
|---------------------------------------|-------|------------|
| Speciated Phenols in water | | |
| Our Reference: | UNITS | 42976-13 |
| Your Reference | ----- | Rinsate |
| Depth | ----- | - |
| Date Sampled | | 2/07/2010 |
| Type of sample | | Water |
| Date extracted | - | 08/07/2010 |
| Date analysed | - | 08/07/2010 |
| Phenol | µg/L | <10 |
| 2-Chlorophenol | µg/L | <10 |
| 2-Methylphenol | µg/L | <10 |
| 3/4-Methylphenol | µg/L | <20 |
| 2-Nitrophenol | µg/L | <10 |
| 2,4-Dimethylphenol | µg/L | <10 |
| 2,4-Dichlorophenol | µg/L | <10 |
| 2,6-Dichlorophenol | µg/L | <10 |
| 2,4,5-Trichlorophenol | µg/L | <10 |
| 2,4,6-Trichlorophenol | µg/L | <10 |
| 2,4-Dinitrophenol | µg/L | <100 |
| 4-Nitrophenol | µg/L | <100 |
| 2,3,4,6-Tetrachlorophenol | µg/L | <10 |
| 2-methyl-4,6-dinitrophenol | µg/L | <100 |
| Pentachlorophenol | µg/L | <100 |
| Surrogate 2-fluorophenol | % | 43 |
| Surrogate Phenol-d ₆ | % | 31 |
| Surrogate 2,4,6-Tribromophenol | % | 95 |
| Surrogate p-Terphenyl-d ₁₄ | % | 126 |

| | | |
|-----------------------------|-------|------------|
| Metals in Water - Dissolved | | |
| Our Reference: | UNITS | 42976-13 |
| Your Reference | ----- | Rinsate |
| Depth | ----- | - |
| Date Sampled | | 2/07/2010 |
| Type of sample | | Water |
| Date digested | - | 09/07/2010 |
| Date analysed | - | 09/07/2010 |
| Arsenic - Dissolved | mg/L | <0.05 |
| Cadmium - Dissolved | mg/L | <0.01 |
| Chromium - Dissolved | mg/L | <0.01 |
| Copper - Dissolved | mg/L | <0.01 |
| Lead - Dissolved | mg/L | <0.03 |
| Mercury - Dissolved | mg/L | <0.0005 |
| Nickel - Dissolved | mg/L | <0.02 |
| Zinc - Dissolved | mg/L | <0.02 |

| Method ID | Methodology Summary |
|------------------------------|--|
| GC.14 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. |
| GC.16 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. |
| GC.12 subset | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| GC.12 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| Metals.20 ICP-AES | Determination of various metals by ICP-AES. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| LAB.8 | Moisture content determined by heating at 105 deg C for a minimum of 4 hours. |
| AS4964-2004 | Asbestos ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques. |
| GC.13 | Water samples are analysed directly by purge and trap GC-MS. |
| LAB.4 | Toxicity Characteristic Leaching Procedure (TCLP). |
| EXTRACT.7 | Toxicity Characteristic Leaching Procedure (TCLP). |
| LAB.1 | pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+. |
| Metals.20 ICP-AES | Determination of various metals by ICP-AES. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| GC.12 subset | Leachates are extracted with Dichloromethane and analysed by GC-MS. |
| LAB.30 | Total Phenolics - determined colorimetrically following distillation. |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| VOCs in soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 06/07/2010 | 42976-1 | 06/07/2010 06/07/2010 | LCS-2 | 06/07/2010 |
| Date analysed | - | | | 07/07/2010 | 42976-1 | 07/07/2010 07/07/2010 | LCS-2 | 07/07/2010 |
| Dichlorodifluoromethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Chloromethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Vinyl Chloride | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Bromomethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Chloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Trichlorofluoromethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,1-Dichloroethene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| trans-1,2-dichloroethene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,1-dichloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 91% |
| cis-1,2-dichloroethene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| bromochloromethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| chloroform | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 102% |
| 2,2-dichloropropane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2-dichloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 97% |
| 1,1,1-trichloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 95% |
| 1,1-dichloropropene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Cyclohexane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| carbon tetrachloride | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Benzene | mg/kg | 0.5 | GC.14 | <0.5 | 42976-1 | <0.5 <0.5 | [NR] | [NR] |
| dibromomethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2-dichloropropane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| trichloroethene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 98% |
| bromodichloromethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 88% |
| trans-1,3-dichloropropene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| cis-1,3-dichloropropene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,1,2-trichloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Toluene | mg/kg | 0.5 | GC.14 | <0.5 | 42976-1 | <0.5 <0.5 | [NR] | [NR] |
| 1,3-dichloropropane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| dibromochloromethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 65% |
| 1,2-dibromoethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| tetrachloroethene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 86% |
| 1,1,1,2-tetrachloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| chlorobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Ethylbenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| bromoform | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| m+p-xylene | mg/kg | 2 | GC.14 | <2.0 | 42976-1 | <2.0 <2.0 | [NR] | [NR] |
| styrene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,1,2,2-tetrachloroethane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-------------------------------------|-------|-----|--------|-------|---------------|---------------------------|-----------|------------------|
| VOCs in soil | | | | | | Base II Duplicate II %RPD | | |
| o-Xylene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2,3-trichloropropane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| isopropylbenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| bromobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| n-propyl benzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2-chlorotoluene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 4-chlorotoluene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,3,5-trimethyl benzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| tert-butyl benzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2,4-trimethyl benzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,3-dichlorobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| sec-butyl benzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,4-dichlorobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 4-isopropyl toluene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2-dichlorobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| n-butyl benzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2-dibromo-3-chloropropane | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2,4-trichlorobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| hexachlorobutadiene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 1,2,3-trichlorobenzene | mg/kg | 1 | GC.14 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| Surrogate Dibromofluorometha | % | | GC.14 | 109 | 42976-1 | 110 104 RPD: 6 | LCS-2 | 101% |
| Surrogate aaa-Trifluorotoluene | % | | GC.14 | 102 | 42976-1 | 110 119 RPD: 8 | LCS-2 | 117% |
| Surrogate Toluene-d ₈ | % | | GC.14 | 86 | 42976-1 | 89 88 RPD: 1 | LCS-2 | 85% |
| Surrogate 4-Bromofluorobenzene | % | | GC.14 | 102 | 42976-1 | 100 101 RPD: 1 | LCS-2 | 103% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| BTEX in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 06/07/2010 | [NT] | [NT] | LCS-2 | 06/07/2010 |
| Date analysed | - | | | 06/07/2010 | [NT] | [NT] | LCS-2 | 06/07/2010 |
| Benzene | mg/kg | 0.5 | GC.16 | <0.5 | [NT] | [NT] | LCS-2 | 105% |
| Toluene | mg/kg | 0.5 | GC.16 | <0.5 | [NT] | [NT] | LCS-2 | 88% |
| Ethylbenzene | mg/kg | 1 | GC.16 | <1.0 | [NT] | [NT] | LCS-2 | 95% |
| m+p-xylene | mg/kg | 2 | GC.16 | <2.0 | [NT] | [NT] | LCS-2 | 99% |
| o-Xylene | mg/kg | 1 | GC.16 | <1.0 | [NT] | [NT] | LCS-2 | 105% |
| Surrogate aaa-Trifluorotoluene | % | | GC.16 | 102 | [NT] | [NT] | LCS-2 | 126% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-------------------------|-------|------|--------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 06/07/2010 | [NT] | [NT] | LCS-2 | 06/07/2010 |
| Date analysed | - | | | 07/07/2010 | [NT] | [NT] | LCS-2 | 07/07/2010 |
| Naphthalene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-2 | 92% |
| Acenaphthylene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-2 | 104% |
| Phenanthrene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-2 | 97% |
| Anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-2 | 91% |
| Pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-2 | 96% |
| Benzo(a)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-2 | 107% |
| Benzo(b+k)fluoranthene | mg/kg | 0.2 | GC.12 subset | <0.2 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 0.05 | GC.12 subset | <0.05 | [NT] | [NT] | LCS-2 | 108% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--|-------|-----|-----------------|-------|---------------|---------------------------|-----------|------------------|
| PAHs in Soil | | | | | | Base II Duplicate II %RPD | | |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 subset | 108 | [NT] | [NT] | LCS-2 | 102% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| Speciated Phenols in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 06/07/2010 | 42976-1 | 06/07/2010 06/07/2010 | LCS-2 | 06/07/2010 |
| Date analysed | - | | | 08/07/2010 | 42976-1 | 08/07/2010 08/07/2010 | LCS-2 | 08/07/2010 |
| Phenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 93% |
| 2-Chlorophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | LCS-2 | 95% |
| 2-Methylphenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 3/4-Methylphenol | mg/kg | 2 | GC.12 | <2.0 | 42976-1 | <2.0 <2.0 | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,6-dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,5-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,6-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 42976-1 | <10 <10 | [NR] | [NR] |
| 4-nitrophenol | mg/kg | 10 | GC.12 | <10 | 42976-1 | <10 <10 | LCS-2 | 34% |
| 2,3,4,6-tetrachlorophenol | mg/kg | 1 | GC.12 | <1.0 | 42976-1 | <1.0 <1.0 | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 42976-1 | <10 <10 | [NR] | [NR] |
| pentachlorophenol | mg/kg | 10 | GC.12 | <10 | 42976-1 | <10 <10 | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 37 | 42976-1 | 59 59 RPD: 0 | LCS-2 | 83% |
| Surrogate Phenol-d ₆ | % | | GC.12 | 63 | 42976-1 | 65 70 RPD: 7 | LCS-2 | 91% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 58 | 42976-1 | 52 66 RPD: 24 | LCS-2 | 53% |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 | 92 | 42976-1 | 103 105 RPD: 2 | LCS-2 | 95% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------|-------|-----|-------------------|------------|---------------|---------------------------|-----------|------------------|
| Acid Extractable metals in soil | | | | | | Base II Duplicate II %RPD | | |
| Date digested | - | | | 07/07/2010 | 42976-1 | 07/07/2010 07/07/2010 | LCS-1 | 07/07/2010 |
| Date analysed | - | | | 07/07/2010 | 42976-1 | 07/07/2010 07/07/2010 | LCS-1 | 07/07/2010 |
| Arsenic | mg/kg | 4 | Metals.20 ICP-AES | <4 | 42976-1 | 30 34 RPD: 12 | LCS-1 | 106% |
| Cadmium | mg/kg | 0.5 | Metals.20 ICP-AES | <0.5 | 42976-1 | 1.1 1.3 RPD: 17 | LCS-1 | 103% |
| Chromium | mg/kg | 1 | Metals.20 ICP-AES | <1 | 42976-1 | 26 29 RPD: 11 | LCS-1 | 105% |
| Copper | mg/kg | 1 | Metals.20 ICP-AES | <1 | 42976-1 | 230 290 RPD: 23 | LCS-1 | 93% |
| Lead | mg/kg | 1 | Metals.20 ICP-AES | <1 | 42976-1 | 220 260 RPD: 17 | LCS-1 | 112% |
| Mercury | mg/kg | 0.1 | Metals.21 CV-AAS | <0.1 | 42976-1 | 0.3 0.4 RPD: 29 | LCS-1 | 115% |
| Nickel | mg/kg | 1 | Metals.20 ICP-AES | <1 | 42976-1 | 20 21 RPD: 5 | LCS-1 | 108% |
| Zinc | mg/kg | 1 | Metals.20 ICP-AES | <1 | 42976-1 | 260 270 RPD: 4 | LCS-1 | 97% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank |
|-----------------|-------|-----|--------|----------|
| Moisture | | | | |
| Date prepared | - | | | 6/7/2010 |
| Date analysed | - | | | 6/7/2010 |
| Moisture | % | 0.1 | LAB.8 | <0.10 |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank |
|---------------------|-------|-----|--------|-------|
| Asbestos ID - soils | | | | |
| Date analysed | - | | | [NT] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| VOCs in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 8/7/2010 | [NT] | [NT] | LCS-W1 | 8/7/2010 |
| Date analysed | - | | | 8/7/2010 | [NT] | [NT] | LCS-W1 | 8/7/2010 |
| Dichlorodifluoromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Chloromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Vinyl Chloride | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Bromomethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Chloroethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Trichlorofluoromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|-----|--------|-------|---------------|---------------------------|-----------|------------------|
| VOCs in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| 1,1-Dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Trans-1,2-dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1-dichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 107% |
| Cis-1,2-dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromochloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Chloroform | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 113% |
| 2,2-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 104% |
| 1,1,1-trichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 108% |
| 1,1-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Carbon tetrachloride | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Dibromomethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Trichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 101% |
| Bromodichloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 122% |
| trans-1,3-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| cis-1,3-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2-trichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Dibromochloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 109% |
| 1,2-dibromoethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Tetrachloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 83% |
| 1,1,1,2-tetrachloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Chlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Ethylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromoform | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| m+p-xylene | µg/L | 2 | GC.13 | <2.0 | [NT] | [NT] | [NR] | [NR] |
| Styrene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2,2-tetrachloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| o-xylene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-trichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Isopropylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| n-propyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 2-chlorotoluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 4-chlorotoluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3,5-trimethyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Tert-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |

Client Reference: 40913, Macdonaldtown

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|-----|--------|-------|---------------|---------------------------|-----------|------------------|
| VOCs in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| 1,2,4-trimethyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Sec-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,4-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 4-isopropyl toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| n-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dibromo-3-chloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-trichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Hexachlorobutadiene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-trichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Surrogate | % | | GC.13 | 109 | [NT] | [NT] | LCS-W1 | 118% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.13 | 86 | [NT] | [NT] | LCS-W1 | 86% |
| Surrogate 4-BFB | % | | GC.13 | 102 | [NT] | [NT] | LCS-W1 | 100% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------|-------|--------|-------------------|------------|---------------|---------------------------|-----------|------------------|
| Metals in TCLP USEPA1311 | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 07/07/2010 | 42976-2 | 07/07/2010 07/07/2010 | LCS-W1 | 07/07/2010 |
| Date analysed | - | | | 08/07/2010 | 42976-2 | 08/07/2010 08/07/2010 | LCS-W1 | 08/07/2010 |
| Arsenic in TCLP | mg/L | 0.05 | Metals.20 ICP-AES | <0.05 | 42976-2 | <0.05 <0.05 | LCS-W1 | 103% |
| Cadmium in TCLP | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | 42976-2 | <0.01 <0.01 | LCS-W1 | 99% |
| Chromium in TCLP | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | 42976-2 | <0.01 <0.01 | LCS-W1 | 98% |
| Copper in TCLP | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | 42976-2 | 0.04 0.04 RPD: 0 | LCS-W1 | 100% |
| Lead in TCLP | mg/L | 0.03 | Metals.20 ICP-AES | <0.03 | 42976-2 | 0.09 0.1 RPD: 11 | LCS-W1 | 94% |
| Mercury in TCLP | mg/L | 0.0005 | Metals.21 CV-AAS | <0.0005 | 42976-2 | <0.0005 <0.0005 | LCS-W1 | 114% |
| Nickel in TCLP | mg/L | 0.02 | Metals.20 ICP-AES | <0.02 | 42976-2 | <0.02 <0.02 | LCS-W1 | 97% |
| Zinc in TCLP | mg/L | 0.02 | Metals.20 ICP-AES | <0.02 | 42976-2 | 1.7 1.6 RPD: 6 | LCS-W1 | 99% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-------|--------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in TCLP (USEPA 1311) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 07/07/2010 | [NT] | [NT] | LCS-W1 | 07/07/2010 |
| Date analysed | - | | | 08/07/2010 | [NT] | [NT] | LCS-W1 | 08/07/2010 |
| Naphthalene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 92% |
| Acenaphthylene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluorene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 106% |
| Phenanthrene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 101% |
| Anthracene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 95% |
| Pyrene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 101% |
| Benzo(a)anthracene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Chrysene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 111% |
| Benzo(b+k)fluoranthene in TCLP | mg/L | 0.002 | GC.12 subset | <0.002 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 112% |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 120 | [NT] | [NT] | LCS-W1 | 124% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|------|--------|--------|---------------|---------------------------|-----------|------------------|
| Phenols in TCLP extract | | | | | | Base II Duplicate II %RPD | | |
| Total Phenolics (as Phenol) | mg/L | 0.05 | LAB.30 | <0.050 | 42976-1 | <0.050 <0.050 | LCS-W1 | 91% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| VOCs in water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 6/7/2010 | [NT] | [NT] | LCS-W1 | 6/7/2010 |
| Date analysed | - | | | 6/7/2010 | [NT] | [NT] | LCS-W1 | 6/7/2010 |
| Dichlorodifluoromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Chloromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Vinyl Chloride | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Bromomethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Chloroethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| Trichlorofluoromethane | µg/L | 10 | GC.13 | <10 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Trans-1,2-dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1-dichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 100% |
| Cis-1,2-dichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromochloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Chloroform | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 103% |
| 2,2-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 102% |
| 1,1,1-trichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 94% |
| 1,1-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Cyclohexane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Carbon tetrachloride | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Dibromomethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Trichloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 98% |
| Bromodichloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 77% |
| trans-1,3-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| cis-1,3-dichloropropene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2-trichloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3-dichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Dibromochloromethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 64% |
| 1,2-dibromoethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Tetrachloroethene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 90% |
| 1,1,1,2-tetrachloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|-----|--------|-------|---------------|---------------------------|-----------|------------------|
| VOCs in water | | | | | | Base II Duplicate II %RPD | | |
| Chlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Ethylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromoform | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| m+p-xylene | µg/L | 2 | GC.13 | <2.0 | [NT] | [NT] | [NR] | [NR] |
| Styrene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2,2-tetrachloroethane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| o-xylene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-trichloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Isopropylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Bromobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| n-propyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 2-chlorotoluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 4-chlorotoluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3,5-trimethyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Tert-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-trimethyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,3-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Sec-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,4-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 4-isopropyl toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| n-butyl benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2-dibromo-3-chloropropane | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-trichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Hexachlorobutadiene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-trichlorobenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Surrogate | % | | GC.13 | 106 | [NT] | [NT] | LCS-W1 | 108% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.13 | 87 | [NT] | [NT] | LCS-W1 | 89% |
| Surrogate 4-BFB | % | | GC.13 | 102 | [NT] | [NT] | LCS-W1 | 96% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------------|-------|-----|--------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in Water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 08/07/2010 | [NT] | [NT] | LCS-W1 | 08/07/2010 |
| Date analysed | - | | | 08/07/2010 | [NT] | [NT] | LCS-W1 | 08/07/2010 |
| Naphthalene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 92% |
| Acenaphthylene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Fluorene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 105% |
| Phenanthrene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 85% |
| Anthracene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 90% |
| Pyrene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 100% |
| Benzo(a)anthracene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 107% |
| Benzo(b+k)fluoranthene | µg/L | 2 | GC.12 subset | <2 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | LCS-W1 | 105% |
| Indeno(1,2,3-c,d)pyrene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | µg/L | 1 | GC.12 subset | <1 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | | GC.12 subset | 131 | [NT] | [NT] | LCS-W1 | 133% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| Speciated Phenols in water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 08/07/2010 | [NT] | [NT] | LCS-W1 | 08/07/2010 |
| Date analysed | - | | | 08/07/2010 | [NT] | [NT] | LCS-W1 | 08/07/2010 |
| Phenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 38% |
| 2-Chlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 83% |
| 2-Methylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol | µg/L | 20 | GC.12 | <20 | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,6-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| 4-Nitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | LCS-W1 | 42% |
| 2,3,4,6-Tetrachlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Pentachlorophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 48 | [NT] | [NT] | LCS-W1 | 50% |
| Surrogate Phenol-d6 | % | | GC.12 | 31 | [NT] | [NT] | LCS-W1 | 37% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 92 | [NT] | [NT] | LCS-W1 | 103% |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 116 | [NT] | [NT] | LCS-W1 | 113% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|----------|-------------------|-------------------------|---------------|---------------------------|------------------|------------------|
| Metals in Water - Dissolved | | | | | | Base II Duplicate II %RPD | | |
| Date digested | - | | | 09/07/2010 | [NT] | [NT] | LCS-W1 | 09/07/2010 |
| Date analysed | - | | | 09/07/2010 | [NT] | [NT] | LCS-W1 | 09/07/2010 |
| Arsenic - Dissolved | mg/L | 0.05 | Metals.20 ICP-AES | <0.05 | [NT] | [NT] | LCS-W1 | 94% |
| Cadmium - Dissolved | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | [NT] | [NT] | LCS-W1 | 97% |
| Chromium - Dissolved | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | [NT] | [NT] | LCS-W1 | 94% |
| Copper - Dissolved | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | [NT] | [NT] | LCS-W1 | 95% |
| Lead - Dissolved | mg/L | 0.03 | Metals.20 ICP-AES | <0.03 | [NT] | [NT] | LCS-W1 | 94% |
| Mercury - Dissolved | mg/L | 0.0005 | Metals.21 CV-AAS | <0.0005 | [NT] | [NT] | LCS-W1 | 102% |
| Nickel - Dissolved | mg/L | 0.02 | Metals.20 ICP-AES | <0.02 | [NT] | [NT] | LCS-W1 | 96% |
| Zinc - Dissolved | mg/L | 0.02 | Metals.20 ICP-AES | <0.02 | [NT] | [NT] | LCS-W1 | 95% |
| QUALITY CONTROL | UNITS | Dup. Sm# | | Duplicate | | Spike Sm# | Spike % Recovery | |
| Speciated Phenols in Soil | | | | Base + Duplicate + %RPD | | | | |
| Date extracted | - | [NT] | | [NT] | | 42976-2 | 06/07/2010 | |
| Date analysed | - | [NT] | | [NT] | | 42976-2 | 08/07/2010 | |
| Phenol | mg/kg | [NT] | | [NT] | | 42976-2 | 113% | |
| 2-Chlorophenol | mg/kg | [NT] | | [NT] | | 42976-2 | 99% | |
| 2-Methylphenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 3/4-Methylphenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2-Nitrophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4-Dimethylphenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4-Dichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,6-dichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4,5-trichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4,6-trichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4-dinitrophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 4-nitrophenol | mg/kg | [NT] | | [NT] | | 42976-2 | 42% | |
| 2,3,4,6-tetrachlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2-methyl-4,6-dinitrophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| pentachlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| Surrogate 2-fluorophenol | % | [NT] | | [NT] | | 42976-2 | 70% | |
| Surrogate Phenol-d6 | % | [NT] | | [NT] | | 42976-2 | 88% | |
| Surrogate 2,4,6-Tribromophenol | % | [NT] | | [NT] | | 42976-2 | 122% | |

| QUALITY CONTROL Speciated Phenols in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|-------|----------|--------------------------------------|-----------|------------------|
| <i>Surrogate</i> p-Terphenyl-d14 | % | [NT] | [NT] | 42976-2 | 104% |
| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date digested | - | [NT] | [NT] | 42976-2 | 07/07/2010 |
| Date analysed | - | [NT] | [NT] | 42976-2 | 07/07/2010 |
| Arsenic | mg/kg | [NT] | [NT] | 42976-2 | 95% |
| Cadmium | mg/kg | [NT] | [NT] | 42976-2 | 95% |
| Chromium | mg/kg | [NT] | [NT] | 42976-2 | 95% |
| Copper | mg/kg | [NT] | [NT] | 42976-2 | 83% |
| Lead | mg/kg | [NT] | [NT] | 42976-2 | 107% |
| Mercury | mg/kg | [NT] | [NT] | 42976-2 | 111% |
| Nickel | mg/kg | [NT] | [NT] | 42976-2 | 89% |
| Zinc | mg/kg | [NT] | [NT] | 42976-2 | 94% |
| QUALITY CONTROL Phenols in TCLP extract | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Total Phenolics (as Phenol) | mg/L | [NT] | [NT] | 42976-2 | 115% |
| QUALITY CONTROL Metals in Water - Dissolved | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date digested | - | [NT] | [NT] | 42976-13 | 09/07/2010 |
| Date analysed | - | [NT] | [NT] | 42976-13 | 09/07/2010 |
| Arsenic - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 96% |
| Cadmium - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 99% |
| Chromium - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 94% |
| Copper - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 96% |
| Lead - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 95% |
| Mercury - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 102% |
| Nickel - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 97% |
| Zinc - Dissolved | mg/L | [NT] | [NT] | 42976-13 | 96% |

Report Comments:

Phenols in soil:PQL has been raised due to the sample matrix requiring dilution.

Asbestos was analysed by Approved Identifier: Matt Mansfield

Asbestos was authorised by Approved Signatory: Matt Mansfield

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

SAMPLE RECEIPT ADVICE

Client:

JBS Environmental
P.O. Box 940
MASCOT NSW 1460

ph: 8338 1013
Fax: 8338 1700

Attention: Tim Davis / Sumi Dorairoj

Sample log in details:

Your reference:
Envirolab Reference:
Date received:
Date results expected to be reported:

40913, Macdonaldtown
42976
02/07/10
9/07/10

| | |
|---|-------------------|
| Samples received in appropriate condition for analysis: | YES |
| No. of samples provided | 21 Soils, 1 Water |
| Turnaround time requested: | Standard |
| Temperature on receipt | Cool |
| Cooling Method: | Ice |

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

4125

CHAIN OF CUSTODY - Client



ENVIROLAB SERVICES

| | | |
|---|--|--|
| Client: JBS Environmental | Client Project Name and Number: 40913 | Envirolab Services 12 Ashley St, Chatswood, NSW, 2067 Phone: 02 9958 5801 Fax: 02 9958 5803 E-mail: tnotaras@envirolabservices.com.au Contact: Tania Notaras |
| Project Mgr: Dorairaj | PO No.: | |
| Sampler: Tim Davis | Envirolab Services Quote No.: | |
| Address: 128 O'Riordan St Mascot NSW 2020 | Date results required: | |
| Email: sdorairaj@jbsgroup.com.au / tdavis@jbsgroup.com.au | Or choose <u>standard</u> / 1 day / 2 day / 3 day | |
| Phone: 8338 1011 Fax: 8338 1700 | Note: Inform lab in advance if urgent turnaround is required - surcharge applies | |

| Envirolab Sample ID | Client Sample ID | Date sampled | Type of sample | Heavy Metals | PAHs | VOCs | Speciated phenols | TCLP Heavy Metals | TCLP PAHs | TCLP VOCs | TCLP Phenols | Co-Cg + BTEX | HOLD | Asbestos | Provide as much information about the sample as you can |
|---------------------|---------------------|--------------|----------------|--------------|------|------|-------------------|-------------------|-----------|-----------|--------------|--------------|------|----------|---|
| 1 | JBS TP1 / 0.3-0.4 m | 02/7/10 | Soil | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | Expect high PAHs in all samples |
| 2 | JBS TP2 / 0.4-0.5 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| 3 | JBS TP2 / 0.8-0.9 m | | | | | | | | | | | | ✓ | | |
| 4 | JBS TP2 / 1.2-1.3 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | |
| 5 | JBS TP2 / 1.4-1.5 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| 6 | JBS TP3 / 1.7 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| 7 | JBS TP4 / 0.5 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| 8 | JBS TP4 / 1.0 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| 9 | JBS TP4 / 1.6-1.7 m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| 10 | JBS TP4 / 1.9-2.0 m | ✓ | | | | | | | | | | | ✓ | | |
| 11 | Trip Spike | | | | | | | | | | | ✓ | | | |
| 12 | Trip Blank | | ✓ | | | | | | | | | ✓ | | | |
| 13 | Rinseate | 02/07/10 | W | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 14 | JBS TP5 / 0.5 m | | S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| 15 | JBS TP5 / 1.0 m | ✓ | S | | | | | | | | | | | | |

Envirolab Services
 12 Ashley St
 Chatswood NSW 2067
 Ph: 9958 5200

Job No: 42976
 Date Received: 2.7
 Time received: 18.30
 Received by: ES
 Temp: Cool/Ambient
 Cooling: () / ()
 Facility: () / ()

| | | |
|--------------------------------|----------------------------|---|
| Relinquished by (company): JBS | Received by (company): ELS | Samples Received: Cool or Ambient (circle one) Temperature Received at: (if applicable) Transported by: Hand delivered / courier Page No: 1 of 2 |
| Print Name: Semi Dorairaj | Print Name: ES | |
| Date & Time: 02/07/10 15:30 | Date & Time: 2.7 1830 | |
| Signature: [Signature] | Signature: [Signature] | |

CHAIN OF CUSTODY - Client



ENVIROLAB SERVICES

| | | |
|---|---|--|
| Client: JBS Environmental | Client Project Name and Number: | Envirolab Services |
| Project Mgr: Dorairaj | 40913 Macdonalltown | 12 Ashley St, Chatswood, NSW, 2067 |
| Sampler: Tim Davis | PO No.: | Phone: 02 9958 5801 |
| Address: 128 O'Riordan St Mascot NSW 2020 | Envirolab Services Quote No. : | Fax: 02 9958 5803 |
| Email: sdorairaj@jbsgroup.com.au / tcdavis@jbsgroup.com.au | Date results required: | E-mail: tnotaras@envirolabservices.com.au |
| Phone: 8338 1011 Fax: 8338 1700 | Or choose <u>standard</u> / 1 day / 2 day / 3 day <i>Note: Inform lab in advance if urgent turnaround is required - surcharge applies</i> | Contact: Tania Notaras |

[illegible]

| | | |
|--------------------------------|----------------------------|--|
| Relinquished by (company): JRS | Received by (company): ELS | Samples Received: Cool or Ambient (circle one) |
| Print Name: Sumi Doraisay | Print Name: ELSA + JRS | Temperature Recieved at: (if applicable) |
| Date & Time: 02/07/10 15:30 | Date & Time: 2-7 15:30 | Transported by: Hand delivered / courier |
| Signature: [Signature] | Signature: [Signature] | Page No: 2 of 2 |

ANALYTICAL REPORT

14 July 2010

JBS Environmental Pty Ltd

PO Box 940

MASCOT

NSW 1460

Attention: Sumi Dorairaj

Your Reference: 40913 - Macdonaldtown

Our Reference: SE79619

Samples: 1 Soil

Received: 5/7/10

Preliminary Report Sent: 12/07/2010

These samples were analysed in accordance with your written instructions.

For and on Behalf of:

SGS ENVIRONMENTAL SERVICES

Sample Receipt: Angela Mamalicos

AU.SampleReceipt.Sydney@sgs.com

Production Manager: Huong Crawford

Huong.Crawford@sgs.com

Results Approved and/or Authorised by:



Edward Ibrahim
Laboratory Manager



Ly Kim Ha
Organics Signatory



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Page 1 of 27

| | | |
|-----------------------------------|-------|-----------|
| VOCs in Soil - 72 List | | |
| Our Reference: | UNITS | SE79619-1 |
| Your Reference | ----- | QC2 |
| Sample Matrix | ----- | Soil |
| Date Sampled | | 2/07/2010 |
| Date Extracted | | 8/07/2010 |
| Date Analysed | | 8/07/2010 |
| Dichlorodifluoromethane(CFC-12) | mg/kg | <1 |
| Chloromethane | mg/kg | <1 |
| Vinyl Chloride (chloroethene) | mg/kg | <0.1 |
| Bromomethane | mg/kg | <1 |
| Chloroethane | mg/kg | <1 |
| Trichlorofluoromethane | mg/kg | <1 |
| Acetone (2-propanone) | mg/kg | <10 |
| 1,1-Dichloroethene | mg/kg | <0.1 |
| Methyl Iodine (iodomethane) | mg/kg | <5 |
| Acrylonitrile | mg/kg | <0.1 |
| Methylene Chloride (DCM) | mg/kg | <0.5 |
| Allyl Chloride | mg/kg | <0.1 |
| Carbon Disulphide | mg/kg | <0.5 |
| <i>trans</i> -1,2-Dichloroethene | mg/kg | <0.1 |
| Methyl-tert-butyl ether (MtBE) | mg/kg | <0.5 |
| 1,1-Dichloroethane | mg/kg | <0.1 |
| 2-Butanone (MEK) | mg/kg | <10 |
| <i>cis</i> -1,2-Dichloroethene | mg/kg | <0.1 |
| Bromochloromethane | mg/kg | <0.1 |
| Chloroform | mg/kg | <0.1 |
| 2,2-Dichloropropane | mg/kg | <0.1 |
| 1,2-Dichloroethane | mg/kg | <0.1 |
| 1,1,1-Trichloroethane | mg/kg | <0.1 |
| 1,1-Dichloropropene | mg/kg | <0.1 |
| Carbon tetrachloride | mg/kg | <0.1 |
| Benzene | mg/kg | <0.1 |
| Dibromomethane | mg/kg | <0.1 |
| 1,2-Dichloropropane | mg/kg | <0.1 |
| Trichloroethene (TCE) | mg/kg | <0.1 |
| 2-Nitropropane | mg/kg | <10 |
| Bromodichloromethane | mg/kg | <0.1 |
| <i>cis</i> -1,3-Dichloropropene | mg/kg | <0.1 |
| 4-Methyl-2-Pentanone (MIBK) | mg/kg | <1 |
| <i>trans</i> -1,3-Dichloropropene | mg/kg | <0.1 |
| 1,1,2-Trichloroethane | mg/kg | <0.1 |
| Toluene | mg/kg | <0.1 |



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| | | |
|---|-------------------------|---------------------------------------|
| VOCs in Soil - 72 List Our Reference: Your Reference Sample Matrix Date Sampled | UNITS ----- ----- | SE79619-1 QC2 Soil 2/07/2010 |
| 1,3-Dichloropropane | mg/kg | <0.1 |
| 2-Hexanone (MBK) | mg/kg | <5 |
| Dibromochloromethane | mg/kg | <0.1 |
| 1,2-Dibromoethane (EDB) | mg/kg | <0.1 |
| Tetrachloroethene (PCE-perchloroethylen) | mg/kg | <0.1 |
| 1,1,1,2-Tetrachloroethane | mg/kg | <0.1 |
| Chlorobenzene | mg/kg | <0.1 |
| Ethyl benzene | mg/kg | 0.1 |
| Bromoform | mg/kg | <0.1 |
| <i>m/p</i> -Xylenes | mg/kg | 0.2 |
| Cis-1,4-dichloro-2-butene | mg/kg | <1 |
| Styrene (vinyl benzene) | mg/kg | <0.1 |
| 1,1,2,2-Tetrachloroethane | mg/kg | <0.1 |
| <i>o</i> -Xylene | mg/kg | 0.1 |
| 1,2,3-Trichloropropane | mg/kg | <0.1 |
| Trans-1,4-dichloro-2-butene | mg/kg | <1 |
| Isopropylbenzene (Cumene) | mg/kg | <0.1 |
| Bromobenzene | mg/kg | <0.1 |
| <i>n</i> -Propylbenzene | mg/kg | <0.1 |
| 2-Chlorotoluene | mg/kg | <0.1 |
| 4-Chlorotoluene | mg/kg | <0.1 |
| 1,3,5-Trimethylbenzene | mg/kg | 0.1 |
| <i>tert</i> -Butylbenzene | mg/kg | <0.1 |
| 1,2,4-Trimethylbenzene | mg/kg | 0.3 |
| <i>sec</i> -Butylbenzene | mg/kg | <0.1 |
| 1,3-Dichlorobenzene | mg/kg | <0.1 |
| 1,4-Dichlorobenzene | mg/kg | <0.1 |
| <i>p</i> -Isopropyl toluene | mg/kg | <0.1 |
| 1,2-Dichlorobenzene | mg/kg | <0.1 |
| <i>n</i> -Butylbenzene | mg/kg | <0.1 |
| 1,2-Dibromo-3-chloropropane | mg/kg | <0.1 |
| 1,2,4-Trichlorobenzene | mg/kg | <0.1 |
| Naphthalene | mg/kg | 5.2 |
| Hexachlorobutadiene | mg/kg | <0.1 |
| 1,2,3-Trichlorobenzene | mg/kg | <0.1 |
| Vinyl acetate | mg/kg | <10 |
| Dibromofluoromethane | % | 94 |
| 1,2-Dichloroethane-d4 | % | 97 |
| Toluene- <i>d</i> 8 Surrogate 2 | % | 83 |



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| | | |
|---|-------------------------|---------------------------------------|
| VOCs in Soil - 72 List Our Reference: Your Reference Sample Matrix Date Sampled | UNITS ----- ----- | SE79619-1 QC2 Soil 2/07/2010 |
| 4-Bromofluorobenzene <i>Surrogate 3</i> | % | 78 |

| | | |
|---|-------------------------|---------------------------------------|
| PAHs in Soil Our Reference: Your Reference Sample Matrix Date Sampled | UNITS ----- ----- | SE79619-1 QC2 Soil 2/07/2010 |
| Date Extracted | | 8/07/2010 |
| Date Analysed | | 8/07/2010 |
| Naphthalene | mg/kg | 3.1 |
| 2-Methylnaphthalene | mg/kg | 1.5 |
| 1-Methylnaphthalene | mg/kg | 1.1 |
| Acenaphthylene | mg/kg | 2.4 |
| Acenaphthene | mg/kg | 0.23 |
| Fluorene | mg/kg | 0.92 |
| Phenanthrene | mg/kg | 5.7 |
| Anthracene | mg/kg | 2.6 |
| Fluoranthene | mg/kg | 12 |
| Pyrene | mg/kg | 13 |
| Benzo[a]anthracene | mg/kg | 11 |
| Chrysene | mg/kg | 6.3 |
| Benzo[b,k]fluoranthene | mg/kg | 12 |
| Benzo[a]pyrene | mg/kg | 6.7 |
| Indeno[123-cd]pyrene | mg/kg | 4.3 |
| Dibenzo[a,h]anthracene | mg/kg | 1.2 |
| Benzo[ghi]perylene | mg/kg | 4.6 |
| Total PAHs (sum) | mg/kg | 89 |
| Nitrobenzene-d5 | % | 107 |
| 2-Fluorobiphenyl | % | 103 |
| <i>p</i> -Terphenyl-d14 | % | 114 |



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| | | |
|--|-------|-----------|
| Speciated Phenols in Soil | | |
| Our Reference: | UNITS | SE79619-1 |
| Your Reference | ----- | QC2 |
| Sample Matrix | ----- | Soil |
| Date Sampled | | 2/07/2010 |
| Date Extracted (Spec. Phenols) | | 8/07/2010 |
| Date Analysed (Spec. Phenols) | | 8/07/2010 |
| Phenol | mg/kg | <0.5 |
| 2-Methylphenol (o-cresol) | mg/kg | <0.5 |
| 3/4-Methylphenol (m/p-cresol) | mg/kg | <1 |
| 2-Chlorophenol | mg/kg | <0.5 |
| 2,4-Dimethylphenol | mg/kg | <0.5 |
| 2,6-Dichlorophenol | mg/kg | <0.5 |
| 2,4-Dichlorophenol | mg/kg | <0.5 |
| 2-Nitrophenol | mg/kg | <0.5 |
| 2,4,6-Trichlorophenol | mg/kg | <0.5 |
| 4-Nitrophenol | mg/kg | <0.5 |
| 2,4,5-Trichlorophenol | mg/kg | <0.5 |
| 2,3,4,6-Tetrachlorophenol | mg/kg | <0.5 |
| Pentachlorophenol | mg/kg | <0.5 |
| 4-Chloro-3-methylphenol | mg/kg | <1 |
| 2,4-Dinitrophenol | mg/kg | <0.5 |
| Acetophenone | mg/kg | <0.5 |
| 2,4,6-Tribromophenol- (<i>Surrogate</i>) | % | 64 |
| d5-phenol (<i>Surrogate</i>) | % | 61 |



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| | | |
|---------------------------|-------|------------|
| Metals in Soil by ICP-OES | | |
| Our Reference: | UNITS | SE79619-1 |
| Your Reference | ----- | QC2 |
| Sample Matrix | ----- | Soil |
| Date Sampled | | 2/07/2010 |
| Date Extracted (Metals) | | 12/06/2010 |
| Date Analysed (Metals) | | 12/06/2010 |
| Arsenic | mg/kg | 45 |
| Cadmium | mg/kg | 2.1 |
| Chromium | mg/kg | 23 |
| Copper | mg/kg | 380 |
| Lead | mg/kg | 290 |
| Nickel | mg/kg | 24 |
| Zinc | mg/kg | 370 |

| | | |
|--------------------------------|-------|-----------|
| Mercury Cold Vapor/Hg Analyser | | |
| Our Reference: | UNITS | SE79619-1 |
| Your Reference | ----- | QC2 |
| Sample Matrix | ----- | Soil |
| Date Sampled | | 2/07/2010 |
| Date Extracted (Mercury) | | 8/07/2010 |
| Date Analysed (Mercury) | | 8/07/2010 |
| Mercury | mg/kg | 0.26 |

| | | |
|---|-------------------------|---------------------------------------|
| VOCs by ZHE TCLP - 72 List Our Reference: Your Reference Sample Matrix Date Sampled | UNITS ----- ----- | SE79619-1 QC2 Soil 2/07/2010 |
| Date Extracted-ZHE TCLP Prep | | 8/07/2010 |
| pH of soil for fluid# determ. | pH units | 8.03 |
| pH of soil for fluid # determ. (acid) | pH units | 1.76 |
| Extraction fluid used | - | 1 |
| pH of final Leachate | pH units | 5.13 |
| Date extracted (VOCs) | | 8/07/2010 |
| Date analysed (VOCs) | | 8/07/2010 |
| Dichlorodifluoromethane(CFC-12) | µg/L | <5 |
| Chloromethane | µg/L | <5 |
| Vinyl Chloride (chloroethene) | µg/L | <0.3 |
| Bromomethane | µg/L | <10 |
| Chloroethane | µg/L | <5 |
| Trichlorofluoromethane | µg/L | <1 |
| Acetone (2-propanone) | µg/L | <10 |
| 1,1-Dichloroethene | µg/L | <0.5 |
| Methyl Iodine (iodomethane) | µg/L | <5 |
| Acrylonitrile | µg/L | <0.5 |
| Methylene Chloride (DCM) | µg/L | <5 |
| Allyl Chloride | µg/L | <0.5 |
| Carbon Disulphide | µg/L | <0.5 |
| <i>trans</i> -1,2-Dichloroethene | µg/L | <0.5 |
| Methyl-tert-butyl ether (MtBE) | µg/L | <2 |
| 1,1-Dichloroethane | µg/L | <0.5 |
| 2-Butanone (MEK) | µg/L | <10 |
| <i>cis</i> -1,2-Dichloroethene | µg/L | <0.5 |
| Bromochloromethane | µg/L | <0.5 |
| Chloroform | µg/L | <0.5 |
| 2,2-Dichloropropane | µg/L | <0.5 |
| 1,2-Dichloroethane | µg/L | <0.5 |
| 1,1,1-Trichloroethane | µg/L | <0.5 |
| 1,1-Dichloropropene | µg/L | <0.5 |
| Carbon tetrachloride | µg/L | <0.5 |
| Benzene | µg/L | <0.5 |
| Dibromomethane | µg/L | <0.5 |
| 1,2-Dichloropropane | µg/L | <0.5 |
| Trichloroethene (TCE) | µg/L | <0.5 |
| 2-Nitropropane | µg/L | <100 |
| Bromodichloromethane | µg/L | <0.5 |



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| VOCs by ZHE TCLP - 72 List Our Reference: Your Reference Sample Matrix Date Sampled | UNITS ----- ----- | SE79619-1 QC2 Soil 2/07/2010 |
|---|-------------------------|---------------------------------------|
| <i>cis</i> -1,3-Dichloropropene | µg/L | <0.5 |
| 4-Methyl-2-Pentanone (MIBK) | µg/L | <5 |
| <i>trans</i> -1,3-Dichloropropene | µg/L | <0.5 |
| 1,1,2-Trichloroethane | µg/L | <0.5 |
| Toluene | µg/L | 1.1 |
| 1,3-Dichloropropane | µg/L | <0.5 |
| 2-Hexanone (MBK) | µg/L | <5 |
| Dibromochloromethane | µg/L | <0.5 |
| 1,2-Dibromoethane (EDB) | µg/L | <0.5 |
| Tetrachloroethene (PCE-perchloroethylen) | µg/L | <0.5 |
| 1,1,1,2-Tetrachloroethane | µg/L | <0.5 |
| Chlorobenzene | µg/L | <0.5 |
| Ethyl benzene | µg/L | 4.1 |
| Bromoform | µg/L | <0.5 |
| <i>m/p</i> -Xylenes | µg/L | 9 |
| Cis-1,4-dichloro-2-butene | µg/L | <1 |
| Styrene (vinyl benzene) | µg/L | <0.5 |
| 1,1,2,2-Tetrachloroethane | µg/L | <0.5 |
| <i>o</i> -Xylene | µg/L | 6.1 |
| 1,2,3-Trichloropropane | µg/L | <0.5 |
| Trans-1,4-dichloro-2-butene | µg/L | <1 |
| Isopropylbenzene (Cumene) | µg/L | 0.7 |
| Bromobenzene | µg/L | <0.5 |
| n-Propylbenzene | µg/L | <0.5 |
| 2-Chlorotoluene | µg/L | <0.5 |
| 4-Chlorotoluene | µg/L | <0.5 |
| 1,3,5-Trimethylbenzene | µg/L | 4.3 |
| <i>tert</i> -Butylbenzene | µg/L | <0.5 |
| 1,2,4-Trimethylbenzene | µg/L | 13 |
| <i>sec</i> -Butylbenzene | µg/L | <0.5 |
| 1,3-Dichlorobenzene | µg/L | <0.5 |
| 1,4-Dichlorobenzene | µg/L | <0.3 |
| <i>p</i> -Isopropyl toluene | µg/L | <0.5 |
| 1,2-Dichlorobenzene | µg/L | <0.5 |
| n-Butylbenzene | µg/L | <0.5 |
| 1,2-Dibromo-3-chloropropane | µg/L | <0.5 |
| 1,2,4-Trichlorobenzene | µg/L | <0.5 |
| Naphthalene | µg/L | 45 |
| Hexachlorobutadiene | µg/L | <1 |



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| | | |
|----------------------------------|-------|-----------|
| VOCs by ZHE TCLP - 72 List | | |
| Our Reference: | UNITS | SE79619-1 |
| Your Reference | ----- | QC2 |
| Sample Matrix | ----- | Soil |
| Date Sampled | | 2/07/2010 |
| 1,2,3-Trichlorobenzene | µg/L | <0.5 |
| Vinyl acetate | µg/L | <10 |
| Dibromofluoromethane | % | 91 |
| 1,2-Dichloroethane-d4 | % | 88 |
| Toluene-d8 Surrogate 2 | % | 104 |
| 4-Bromofluorobenzene Surrogate 3 | % | 99 |

| | | |
|---------------------------------------|----------|------------|
| PAHs in TCLP (USEPA 1311) | | |
| Our Reference: | UNITS | SE79619-1 |
| Your Reference | ----- | QC2 |
| Sample Matrix | ----- | Soil |
| Date Sampled | | 2/07/2010 |
| Date Extracted (TCLP Preparation) | | 8/07/2010 |
| pH of soil for fluid# determ. | pH units | 8.03 |
| Extraction fluid used | - | 1 |
| pH of soil for fluid # determ. (acid) | pH units | 1.76 |
| pH of final Leachate | pH units | 5.13 |
| Date Extracted | | 12/07/2010 |
| Date Analysed | | 12/07/2010 |
| Naphthalene | µg/L | 2.1 |
| 2-Methylnaphthalene | µg/L | <0.5 |
| 1-Methylnaphthalene | µg/L | <0.5 |
| Acenaphthylene | µg/L | <0.50 |
| Acenaphthene | µg/L | <0.50 |
| Fluorene | µg/L | <0.50 |
| Phenanthrene | µg/L | <0.50 |
| Anthracene | µg/L | <0.50 |
| Fluoranthene | µg/L | <0.50 |
| Pyrene | µg/L | <0.50 |
| Benzo[a]anthracene | µg/L | <0.50 |
| Chrysene | µg/L | <0.50 |
| Benzo[b,k]fluoranthene | µg/L | <1.0 |
| Benzo[a]pyrene | µg/L | <0.50 |
| Indeno[123-cd]pyrene | µg/L | <0.50 |
| Dibenzo[ah]anthracene | µg/L | <0.50 |
| Benzo[ghi]perylene | µg/L | <0.50 |
| Total PAHs (sum) | µg/L | <9 |
| Nitrobenzene-d5 | % | 118 |
| 2-Fluorobiphenyl | % | 126 |
| p -Terphenyl-d14 | % | 130 |



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| | | |
|---|-------------------------|---------------------------------------|
| Metals in TCLP Our Reference: Your Reference Sample Matrix Date Sampled | UNITS ----- ----- | SE79619-1 QC2 Soil 2/07/2010 |
| Date Extracted (Metals) | | 9/07/2010 |
| Date Analysed (Metals) | | 9/07/2010 |
| Date Extracted (Mercury) | | 9/07/2010 |
| Date Analysed (Mercury) | | 9/07/2010 |
| Arsenic | mg/L | <0.05 |
| Cadmium | mg/L | <0.005 |
| Chromium | mg/L | <0.005 |
| Copper | mg/L | 0.06 |
| Mercury | mg/L | <0.0001 |
| Nickel | mg/L | 0.018 |
| Lead | mg/L | <0.02 |
| Zinc | mg/L | 0.42 |



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| | | |
|--------------------------|-------|-----------|
| Moisture | UNITS | SE79619-1 |
| Our Reference: | ----- | QC2 |
| Your Reference | ----- | Soil |
| Sample Matrix | | 2/07/2010 |
| Date Sampled | | |
| Date Analysed (moisture) | | 7/06/2010 |
| Moisture | % | 17 |

| Method ID | Methodology Summary |
|------------------------|---|
| AN433 | Volatile Organic Compounds - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B. |
| SEO-019 | Volatile Organic Compounds - Soil samples are extracted with methanol, purged and concentrated by a purge and trap apparatus, and then analysed using GC/MS technique. Water samples undergo the same analysis without the extraction step. Based on USEPA 5030B and 8260B. |
| SEO-030 | Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode. |
| AN420 | Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates, and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD/FID technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D). |
| USEPA 8270 | USEPA 8270 GCMS. |
| SEM-010 | Determination of elements by ICP-OES following appropriate sample preparation / digestion process. Based on USEPA 6010C / APHA 21st Edition, 3120B. |
| SEM-005 | Mercury - determined by Cold-Vapour AAS following appropriate sample preparation or digestion process. Based on APHA 21st Edition, 3112B. |
| AN006 | Toxicity Characteristic Leaching Procedure (TCLP) - Preparation of leachates for assessing the mobility of both organic and inorganic contaminants present in liquid, solid, and multiphase wastes. Based on USEPA 1311. For volatile analytes, Zero-Headspace Extraction Vessel (ZHE) is used. This method also meets the requirements of Australian Standard Leaching Procedure (ASLP) AS 4439.3-1997 Part 3. |
| AN101 | pH - Measured using pH meter and electrode based on APHA 21st Edition, 4500-H+. For water analyses the results reported are indicative only as the sample holding time requirement specified in APHA was not met (APHA requires that the pH of the samples are to be measured within 15 minutes after sampling). |
| SEO-019/SEP-004 | Volatile organic contaminants are leached out of the waste with a selected leaching solution in a Zero Headspace Extractor vessel. The leachate is then analysed by Purge and Trap GC/MS technique. |
| SEO-030 | Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode. Total PAH is the sum of all positive PAH(s) assuming non-quantifiable PAH(s) (<LOR) do not contribute to the total. LOR for Total PAH is based on 50% of the sum of 16 PAH LORs. |
| AN002 | Preparation of soils, sediments and sludges undergo analysis by either air drying, compositing, subsampling and 1:5 soil water extraction where required. Moisture content is determined by drying the sample at 105 ± 5°C. |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|----------------------------------|-------|-----|--------|------------|---------------|---|-----------|--|
| VOCs in Soil - 72 List | | | | | | | | |
| Date Extracted | | | | 08/07/2010 | [NT] | [NT] | LCS | 08/07/2010 |
| Date Analysed | | | | 08/07/2010 | [NT] | [NT] | LCS | 08/07/2010 |
| Dichlorodifluoromethane (CFC-12) | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Chloromethane | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Vinyl Chloride (chloroethene) | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Bromomethane | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Chloroethane | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Trichlorofluoromethane | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Acetone (2-propanone) | mg/kg | 10 | AN433 | <10 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloroethene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 107% |
| Methyl Iodine (iodomethane) | mg/kg | 5 | AN433 | <5 | [NT] | [NT] | [NR] | [NR] |
| Acrylonitrile | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Methylene Chloride (DCM) | mg/kg | 0.5 | AN433 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Allyl Chloride | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Carbon Disulphide | mg/kg | 0.5 | AN433 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| <i>trans</i> -1,2-Dichloroethene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Methyl-tert-butyl ether (MtBE) | mg/kg | 0.5 | AN433 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloroethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 2-Butanone (MEK) | mg/kg | 10 | AN433 | <10 | [NT] | [NT] | [NR] | [NR] |
| <i>cis</i> -1,2-Dichloroethene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Bromochloromethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Chloroform | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 79% |
| 2,2-Dichloropropane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dichloroethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 123% |
| 1,1,1-Trichloroethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloropropene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Carbon tetrachloride | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Benzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 128% |
| Dibromomethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dichloropropane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Trichloroethene (TCE) | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 102% |
| 2-Nitropropane | mg/kg | 10 | AN433 | <10 | [NT] | [NT] | [NR] | [NR] |
| Bromodichloromethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|--|-------|-----|--------|-------|---------------|---|-----------|--|
| VOCs in Soil - 72 List | | | | | | | | |
| <i>cis</i> -1,3-Dichloropropene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 4-Methyl-2-Pentanone (MIBK) | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| <i>trans</i> -1,3-Dichloropropene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2-Trichloroethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Toluene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 116% |
| 1,3-Dichloropropane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 2-Hexanone (MBK) | mg/kg | 5 | AN433 | <5 | [NT] | [NT] | [NR] | [NR] |
| Dibromochloromethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dibromoethane (EDB) | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Tetrachloroethene (PCE-perchloroethylen) | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,1,1,2-Tetrachloroethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Chlorobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 121% |
| Ethyl benzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 100% |
| Bromoform | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>m/p</i> -Xylenes | mg/kg | 0.2 | AN433 | <0.2 | [NT] | [NT] | LCS | 94% |
| <i>Cis</i> -1,4-dichloro-2-butene | mg/kg | 1 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Styrene (vinyl benzene) | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2,2-Tetrachloroethane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>o</i> -Xylene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | LCS | 92% |
| 1,2,3-Trichloropropane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>Trans</i> -1,4-dichloro-2-butene | mg/kg | 1.0 | AN433 | <1 | [NT] | [NT] | [NR] | [NR] |
| Isopropylbenzene (Cumene) | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Bromobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>n</i> -Propylbenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 2-Chlorotoluene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 4-Chlorotoluene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,3,5-Trimethylbenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>tert</i> -Butylbenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-Trimethylbenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>sec</i> -Butylbenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,3-Dichlorobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,4-Dichlorobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| <i>p</i> -Isopropyl toluene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|----------------------------------|-------|-----|---------|-------|---------------|--------------------------------------|-----------|---|
| VOCs in Soil - 72 List | | | | | | | | |
| 1,2-Dichlorobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| n-Butylbenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dibromo-3-chloropropane | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-Trichlorobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Naphthalene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Hexachlorobutadiene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-Trichlorobenzene | mg/kg | 0.1 | AN433 | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Vinyl acetate | mg/kg | 10 | AN433 | <10 | [NT] | [NT] | [NR] | [NR] |
| Dibromofluoromethane | % | 0 | SEO-019 | 104 | [NT] | [NT] | LCS | 115% |
| 1,2-Dichloroethane-d4 | % | 0 | SEO-019 | 113 | [NT] | [NT] | LCS | 118% |
| Toluene-d8 Surrogate 2 | % | 0 | SEO-019 | 77 | [NT] | [NT] | LCS | 101% |
| 4-Bromofluorobenzene Surrogate 3 | % | 0 | SEO-019 | 89 | [NT] | [NT] | LCS | 73% |

| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|------------------------|-------|------|---------|-----------|---------------|--------------------------------------|-----------|---|
| PAHs in Soil | | | | | | | | |
| Date Extracted | | | | 8/07/2010 | [NT] | [NT] | LCS | 8/07/2010 |
| Date Analysed | | | | 8/07/2010 | [NT] | [NT] | LCS | 8/07/2010 |
| Naphthalene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 86% |
| 2-Methylnaphthalene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| 1-Methylnaphthalene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthylene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 93% |
| Acenaphthene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 102% |
| Fluorene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| Phenanthrene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 93% |
| Anthracene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 98% |
| Fluoranthene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 104% |
| Pyrene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | LCS | 107% |
| Benzo[a]anthracene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| Benzo[b,k]fluoranthene | mg/kg | 0.2 | SEO-030 | <0.20 | [NT] | [NT] | [NR] | [NR] |
| Benzo[a]pyrene | mg/kg | 0.05 | SEO-030 | <0.05 | [NT] | [NT] | LCS | 95% |
| Indeno[123-cd]pyrene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo[ah]anthracene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|--------------------|-------|------|---------|-------|---------------|--------------------------------------|-----------|---|
| PAHs in Soil | | | | | | | | |
| Benzo[ghi]perylene | mg/kg | 0.1 | SEO-030 | <0.10 | [NT] | [NT] | [NR] | [NR] |
| Total PAHs (sum) | mg/kg | 1.75 | SEO-030 | <1.7 | [NT] | [NT] | [NR] | [NR] |
| Nitrobenzene-d5 | % | 0 | SEO-030 | 109 | [NT] | [NT] | LCS | 96% |
| 2-Fluorobiphenyl | % | 0 | SEO-030 | 96 | [NT] | [NT] | LCS | 93% |
| p -Terphenyl-d 14 | % | 0 | SEO-030 | 114 | [NT] | [NT] | LCS | 118% |

| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|-----------------------------------|-------|-----|------------|-----------|---------------|--------------------------------------|-----------|---|
| Speciated Phenols in Soil | | | | | | | | |
| Date Extracted (Spec. Phenols) | | | | 8/07/2010 | [NT] | [NT] | LCS | 8/07/2010 |
| Date Analysed (Spec. Phenols) | | | | 8/07/2010 | [NT] | [NT] | LCS | 8/07/2010 |
| Phenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | LCS | 75% |
| 2-Methylphenol (o-cresol) | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol (m/p-cresol) | mg/kg | 1.0 | AN420 | <1 | [NT] | [NT] | [NR] | [NR] |
| 2-Chlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2,6-Dichlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | LCS | 94% |
| 2,4-Dichlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-Trichlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | LCS | 72% |
| 4-Nitrophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-Trichlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2,3,4,6-Tetrachlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Pentachlorophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | LCS | 86% |
| 4-Chloro-3-methylphenol | mg/kg | 1 | AN420 | <1 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dinitrophenol | mg/kg | 0.5 | AN420 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Acetophenone | mg/kg | 0.5 | USEPA 8270 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-Tribromophenol- (Surrogate) | % | 10 | AN420 | 110 | [NT] | [NT] | LCS | 116% |
| d5-phenol (Surrogate) | % | 10 | AN420 | 110 | [NT] | [NT] | LCS | 116% |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|---------------------------|-------|-----|---------|------------|---------------|--------------------------------------|-----------|---|
| Metals in Soil by ICP-OES | | | | | | | | |
| Date Extracted (Metals) | | | | 12/06/2010 | [NT] | [NT] | LCS | 12/06/2010 |
| Date Analysed (Metals) | | | | 12/06/2010 | [NT] | [NT] | LCS | 12/06/2010 |
| Arsenic | mg/kg | 3 | SEM-010 | <3 | [NT] | [NT] | LCS | 99% |
| Cadmium | mg/kg | 0.3 | SEM-010 | <0.3 | [NT] | [NT] | LCS | 102% |
| Chromium | mg/kg | 0.3 | SEM-010 | <0.3 | [NT] | [NT] | LCS | 103% |
| Copper | mg/kg | 0.5 | SEM-010 | <0.5 | [NT] | [NT] | LCS | 103% |
| Lead | mg/kg | 1 | SEM-010 | <1 | [NT] | [NT] | LCS | 102% |
| Nickel | mg/kg | 0.5 | SEM-010 | <0.5 | [NT] | [NT] | LCS | 102% |
| Zinc | mg/kg | 0.5 | SEM-010 | <0.5 | [NT] | [NT] | LCS | 97% |

| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|--------------------------------|-------|------|---------|-----------|---------------|--------------------------------------|-----------|---|
| Mercury Cold Vapor/Hg Analyser | | | | | | | | |
| Date Extracted (Mercury) | | | | 8/07/2010 | [NT] | [NT] | LCS | 8/07/2010 |
| Date Analysed (Mercury) | | | | 8/07/2010 | [NT] | [NT] | LCS | 8/07/2010 |
| Mercury | mg/kg | 0.05 | SEM-005 | <0.05 | [NT] | [NT] | LCS | 108% |

| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|---------------------------------------|----------|-----|------------------|------------|---------------|--------------------------------------|-----------|---|
| VOCs by ZHE TCLP - 72 List | | | | | | | | |
| pH of soil for fluid# determ. | pH units | 0 | AN101 | [NT] | [NT] | [NT] | [NR] | [NR] |
| pH of soil for fluid # determ. (acid) | pH units | 0 | AN101 | [NT] | [NT] | [NT] | [NR] | [NR] |
| Extraction fluid used | - | | AN006 | [NT] | [NT] | [NT] | [NR] | [NR] |
| pH of final Leachate | pH units | 0 | AN101 | [NT] | [NT] | [NT] | [NR] | [NR] |
| Date extracted (VOCs) | | | | 08/07/2010 | [NT] | [NT] | LCS | 08/07/2010 |
| Date analysed (VOCs) | | | | 08/07/2010 | [NT] | [NT] | LCS | 08/07/2010 |
| Dichlorodifluoromethane (CFC-12) | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| Chloromethane | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| Vinyl Chloride (chloroethene) | µg/L | 0.3 | SEO-019/S EP-004 | <0.3 | [NT] | [NT] | [NR] | [NR] |
| Bromomethane | µg/L | 10 | SEO-019/S EP-004 | <10 | [NT] | [NT] | [NR] | [NR] |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|----------------------------------|-------|-----|------------------|-------|---------------|--------------------------------------|-----------|---|
| VOCs by ZHE TCLP - 72 List | | | | | | | | |
| Chloroethane | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| Trichlorofluoromethane | µg/L | 1 | SEO-019/S EP-004 | <1 | [NT] | [NT] | [NR] | [NR] |
| Acetone (2-propanone) | µg/L | 10 | SEO-019/S EP-004 | <10 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloroethene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 104% |
| Methyl Iodine (iodomethane) | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| Acrylonitrile | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Methylene Chloride (DCM) | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| Allyl Chloride | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Carbon Disulphide | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| <i>trans</i> -1,2-Dichloroethene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Methyl-tert-butyl ether (MtBE) | µg/L | 2 | SEO-019/S EP-004 | <2 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloroethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2-Butanone (MEK) | µg/L | 10 | SEO-019/S EP-004 | <10 | [NT] | [NT] | [NR] | [NR] |
| <i>cis</i> -1,2-Dichloroethene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Bromochloromethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Chloroform | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 94% |
| 2,2-Dichloropropane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dichloroethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 105% |
| 1,1,1-Trichloroethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,1-Dichloropropene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Carbon tetrachloride | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Benzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 97% |
| Dibromomethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|--|-------|-----|---------------------|-------|---------------|---|-----------|--|
| VOCs by ZHE TCLP - 72 List | | | | | | | | |
| 1,2-Dichloropropane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Trichloroethene (TCE) | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 108% |
| 2-Nitropropane | µg/L | 100 | SEO-019/S EP-004 | <100 | [NT] | [NT] | [NR] | [NR] |
| Bromodichloromethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| cis-1,3-Dichloropropene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 4-Methyl-2-Pentanone (MIBK) | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| trans-1,3-Dichloropropene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,1,2-Trichloroethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Toluene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 112% |
| 1,3-Dichloropropane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2-Hexanone (MBK) | µg/L | 5 | SEO-019/S EP-004 | <5 | [NT] | [NT] | [NR] | [NR] |
| Dibromochloromethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dibromoethane (EDB) | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Tetrachloroethene (PCE-perchloroethylen) | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,1,1,2-Tetrachloroethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Chlorobenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 126% |
| Ethyl benzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 125% |
| Bromoform | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| m/p-Xylenes | µg/L | 1 | SEO-019/S EP-004 | <1 | [NT] | [NT] | LCS | 132% |
| Cis-1,4-dichloro-2-butene | µg/L | 1 | SEO-019/S EP-004 | <1 | [NT] | [NT] | [NR] | [NR] |
| Styrene (vinyl benzene) | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,1,1,2-Tetrachloroethane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| o-Xylene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | LCS | 119% |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|------------------------------|-------|-----|---------------------|-------|---------------|---|-----------|--|
| VOCs by ZHE TCLP - 72 List | | | | | | | | |
| 1,2,3-Trichloropropane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Trans-1,4-dichloro-2-butene | µg/L | 1 | SEO-019/S EP-004 | <1 | [NT] | [NT] | [NR] | [NR] |
| Isopropylbenzene (Cumene) | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Bromobenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| n-Propylbenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 2-Chlorotoluene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 4-Chlorotoluene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,3,5-Trimethylbenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| <i>tert</i> -Butylbenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-Trimethylbenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| <i>sec</i> -Butylbenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,3-Dichlorobenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,4-Dichlorobenzene | µg/L | 0.3 | SEO-019/S EP-004 | <0.3 | [NT] | [NT] | [NR] | [NR] |
| p-Isopropyl toluene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dichlorobenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| n-Butylbenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,2-Dibromo-3-chloropropane | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1,2,4-Trichlorobenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Naphthalene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Hexachlorobutadiene | µg/L | 1 | SEO-019/S EP-004 | <1 | [NT] | [NT] | [NR] | [NR] |
| 1,2,3-Trichlorobenzene | µg/L | 0.5 | SEO-019/S EP-004 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Vinyl acetate | µg/L | 10 | SEO-019/S EP-004 | <10 | [NT] | [NT] | [NR] | [NR] |
| Dibromofluoromethane | % | 0 | SEO-019/S EP-004 | 90 | [NT] | [NT] | LCS | 88% |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|----------------------------------|-------|-----|------------------|-------|---------------|--------------------------------------|-----------|---|
| VOCs by ZHE TCLP - 72 List | | | | | | | | |
| 1,2-Dichloroethane-d4 | % | 0 | SEO-019/S EP-004 | 83 | [NT] | [NT] | LCS | 86% |
| Toluene-d8 Surrogate 2 | % | 0 | SEO-019/S EP-004 | 101 | [NT] | [NT] | LCS | 101% |
| 4-Bromofluorobenzene Surrogate 3 | % | 0 | SEO-019/S EP-004 | 85 | [NT] | [NT] | LCS | 85% |

| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|---------------------------------------|----------|-----|---------|------------|---------------|--------------------------------------|-----------|---|
| PAHs in TCLP (USEPA 1311) | | | | | | | | |
| pH of soil for fluid# determ. | pH units | 0 | AN101 | [NT] | [NT] | [NT] | [NR] | [NR] |
| Extraction fluid used | - | | AN006 | [NT] | [NT] | [NT] | [NR] | [NR] |
| pH of soil for fluid # determ. (acid) | pH units | 0 | AN101 | [NT] | [NT] | [NT] | [NR] | [NR] |
| pH of final Leachate | pH units | 0 | AN101 | [NT] | [NT] | [NT] | [NR] | [NR] |
| Date Extracted | | | | 12/07/2010 | [NT] | [NT] | LCS | 12/07/2010 |
| Date Analysed | | | | 12/07/2010 | [NT] | [NT] | LCS | 12/07/2010 |
| Naphthalene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 83% |
| 2-Methylnaphthalene | µg/L | 0.5 | SEO-030 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| 1-Methylnaphthalene | µg/L | 0.5 | SEO-030 | <0.5 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthylene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 86% |
| Acenaphthene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 95% |
| Fluorene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | [NR] | [NR] |
| Phenanthrene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 88% |
| Anthracene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 95% |
| Fluoranthene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 94% |
| Pyrene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 96% |
| Benzo[a]anthracene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | [NR] | [NR] |
| Benzo[b,k]fluoranthene | µg/L | 1 | SEO-030 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Benzo[a]pyrene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | LCS | 86% |
| Indeno[123-cd]pyrene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo[ah]anthracene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | [NR] | [NR] |
| Benzo[ghi]perylene | µg/L | 0.5 | SEO-030 | <0.50 | [NT] | [NT] | [NR] | [NR] |
| Total PAHs (sum) | µg/L | 9 | SEO-030 | <9 | [NT] | [NT] | [NR] | [NR] |
| Nitrobenzene-d5 | % | 0 | SEO-030 | 96 | [NT] | [NT] | LCS | 87% |



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| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|-------------------------------------|-------|-----|---------|-------|---------------|--------------------------------------|-----------|---|
| PAHs in TCLP (USEPA 1311) | | | | | | | | |
| 2-Fluorobiphenyl | % | 0 | SEO-030 | 84 | [NT] | [NT] | LCS | 83% |
| <i>p</i> -Terphenyl- <i>d</i> 14 | % | 0 | SEO-030 | 95 | [NT] | [NT] | LCS | 92% |

| QUALITY CONTROL | UNITS | LOR | METHOD | Blank | Duplicate Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Matrix Spike % Recovery Duplicate + %RPD |
|--------------------------|-------|--------|---------|-----------|---------------|--------------------------------------|-----------|---|
| Metals in TCLP | | | | | | | | |
| Date Extracted (Metals) | | | | 9/07/2010 | [NT] | [NT] | LCS | 9/07/2010 |
| Date Analysed (Metals) | | | | 9/07/2010 | [NT] | [NT] | LCS | 9/07/2010 |
| Date Extracted (Mercury) | | | | 9/07/2010 | [NT] | [NT] | LCS | 9/07/2010 |
| Date Analysed (Mercury) | | | | 9/07/2010 | [NT] | [NT] | LCS | 9/07/2010 |
| Arsenic | mg/L | 0.05 | SEM-010 | <0.05 | [NT] | [NT] | LCS | 92% |
| Cadmium | mg/L | 0.005 | SEM-010 | <0.005 | [NT] | [NT] | LCS | 97% |
| Chromium | mg/L | 0.005 | SEM-010 | <0.005 | [NT] | [NT] | LCS | 100% |
| Copper | mg/L | 0.01 | SEM-010 | <0.01 | [NT] | [NT] | LCS | 98% |
| Mercury | mg/L | 0.0001 | SEM-005 | <0.0001 | [NT] | [NT] | LCS | 102% |
| Nickel | mg/L | 0.01 | SEM-010 | <0.010 | [NT] | [NT] | LCS | 96% |
| Lead | mg/L | 0.02 | SEM-010 | <0.02 | [NT] | [NT] | LCS | 96% |
| Zinc | mg/L | 0.01 | SEM-010 | <0.010 | [NT] | [NT] | LCS | 91% |



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| | | | | |
|-----------------------------|-------|-----|--------|-------|
| QUALITY CONTROL Moisture | UNITS | LOR | METHOD | Blank |
| Date Analysed (moisture) | | | | [NT] |
| Moisture | % | 1 | AN002 | <1 |



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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting

[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.

Date Organics extraction commenced:

NATA Corporate Accreditation No. 2562, Site No 4354

Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.

Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.

Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.

Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.

Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: <http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf>



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Client Details

Requested By : **Sumi Dorairaj**
 Client : JBS Environmental Pty Ltd
 Contact : Sumi Dorairaj
 Address : PO Box 940
 MASCOT NSW 1460

Email : sdorairaj@jbsgroup.com.au
 Telephone : 02 8338 1013
 Facsimile : 02 8338 1700

Project : 40913 - Macdonaldtown
 Order Number :
 Samples : 1 Soil

Laboratory Details

Laboratory : SGS Environmental Services
 Manager : Edward Ibrahim
 Address : Unit 16, 33 Maddox Street
 Alexandria NSW 2015

Email : au.samplerreceipt.sydney@sgs.com
 Telephone : 61 2 8594 0400
 Facsimile : 61 2 8594 0499

Report No : **SE79619**
 No. of Samples : 1
 Due Date : 12/07/2010

Date Instructions Received : 5/07/2010
 Sample Receipt Date : 5/7/10

| | | | |
|------------------------------------|-------------|--|------------|
| Samples received in good order | : YES | Samples received in correct container: | YES |
| Samples received without headspace | : YES | Sufficient quantity supplied | : YES |
| Upon receipt sample temperature | : Cool | Cooling Method | : Ice Pack |
| Sample containers provided by | : Other Lab | Samples clearly Labelled | : YES |
| Turnaround time requested | : Standard | Completed documentation received | : YES |

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liability and to the clauses of indemnification.

The signed chain of custody will be returned to you with the original report.



SAMPLE RECEIPT ADVICE (SRA) - continued

Client : JBS Environmental Pty Ltd

Report No : SE79619

Project : 40913 - Macdonaldtown

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.

Please indicate ASAP if your request differs from these details.

Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

Note that a small X in the table below indicates some testing has not been requested in the package.

| Sample No. | Description | Metals Prep & Inorganics - All | VOCs in Soil-SGS Nat. 72 List | PAHs in Soil | Speciated Phenols in Soil | Metals in Soil by ICP-OES | Mercury Cold Vapor/Hg Analyser | VOCsZHE TCLP-SGS Nat. 72 List | PAHs in TCLP USEPA 1311 | Metals in TCLP | Moisture |
|------------|-------------|--------------------------------|-------------------------------|--------------|---------------------------|---------------------------|--------------------------------|-------------------------------|-------------------------|----------------|----------|
| 1 | QC2 | X | X | X | X | X | X | X | X | X | X |

| Sample No. | Description |
|------------|-------------|
| 1 | QC2 |

4126

CHAIN OF CUSTODY - Client



ENVIROLAB SERVICES

| | | | | | | | | | | | |
|---|--|--|--|---|--|--|--|--|--|--|--|
| Client: JBS Environmental | | | | Client Project Name and Number: 40913 Macdonaldtown | | | | Envirolab Services 12 Ashley St, Chatswood, NSW, 2067 | | | |
| Project Mgr: Darraaj | | | | PO No.: | | | | Phone: 02 9958 5801 | | | |
| Sampler: Tim Davis | | | | Envirolab Services Quote No.: | | | | Fax: 02 9958 5803 | | | |
| Address: 128 O'Riordan St Moscat NSW 2020 | | | | Date results required: | | | | E-mail: tnotaras@envirolabservices.com.au | | | |
| Email: sataraj@jbsenv.com.au / tnotaras@jbsenv.com.au | | | | Or choose (standard) 1 day / 2 day / 3 day | | | | Contact: Tania Notaras | | | |
| Phone: 8338 1011 | | | | Fax: 8338 1700 | | | | Note: Inform lab in advance if urgent turnaround is required - surcharge applies | | | |

| Envirolab Sample ID | Client Sample ID | Date sampled | Type of sample | Tests Required | | | | | | | | Comments | | | | |
|---------------------|-------------------|--------------|----------------|----------------|------|------|-------------------|-------------|-----------|-----------|--------------|----------|------------|------|----------|--|
| | | | | Heavy Metals | PAHs | VOCs | speciated phenols | TCLP metals | TCLP PAHs | TCLP VOCs | TCLP phenols | | C6-C9 BTEX | HOLD | Asbestos | |
| 16 | JBS TP5 / 15m | 02/07/10 | S | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 17 | JBS TP5 / 2.0m | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 18 | QA1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 19 | QA2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 20 | QC2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 21 | JBS TP3 / 4.0-4.2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 22 | PS1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |

Received by (company): JBS
Print Name: Sam Darraaj
Date & Time: 02/07/10 15:30
Signature: [Signature]

Received by (company): ELS
Print Name: ELS
Date & Time: 2-7 18:30
Signature: [Signature]

Samples Received: Cool or Ambient (circle one)
Temperature Received at: (if applicable)
Transported by: Hand delivered / courier
Page No: 2 of 2

AU.SampleReceipt.Sydney (Sydney)

From: Blackman, Daniel (Sydney)
Sent: Friday, 9 July 2010 2:56 PM
To: sdorairaj@jbgroup.com.au
Cc: AU.SampleReceipt.Sydney (Sydney)
Subject: SE79619-1 - 40913 Macdonaldtown - Sample QC2
Attachments: COC_SE79619.zip

Dear Sumi,

As instructed SGS will go ahead will TCLP PAHs. Note that we will not be able to test for TCLP speciated phenols due to the limited volume and 'rocky' nature of the soil sample.

Kind

Daniel Blackman
Environmental Services
Client Services Officer

SGS Australia Pty Ltd
Unit 16, 33 Maddox St
Alexandria, NSW, 2015
Phone: +61 (0)2 8594 0400
Fax: +61 (0)2 8594 0499
E-mail: daniel.blackman@sgs.com

SGS DataNet: [View Results Online](#)

9/07/2010

Appendix G
Tabulated Quality Control Results

Field Duplicates (soil)
Filter: SDG in('42976')

| SDG | 42976 | 42976 | | 42976 | Interlab_D | |
|-------------------|-----------|-----------|-----|-----------|------------|-----|
| Field_ID | JBS TP1 | QA2 | RPD | JBS TP1 | QC2 | RPD |
| Sampled Date-Time | 2/07/2010 | 2/07/2010 | | 2/07/2010 | 2/07/2010 | |

| Chem_Group | ChemName | Units | EQL | | | | | | |
|--------------------------|-------------------------------------|-------|-------------------------------|---------|---------|-----|---------|-----------|-----|
| BTEx | Benzene | mg/kg | 0.5 (Primary): 0.1 (Interlab | <0.5 | <0.5 | 0 | <0.5 | <0.1 | 0 |
| | Ethylbenzene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | 1.7 | 52 | <1.0 | 4.1 | 122 |
| | Toluene | mg/kg | 0.5 (Primary): 0.1 (Interlab | <0.5 | <0.5 | 0 | <0.5 | <0.1 | 0 |
| | Xylene (m & p) | µg/L | 2 (Primary): 1 (Interlab | <2.0 | 2.7 | 30 | <2.0 | 9.0 | 127 |
| | Xylene (o) | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | 0.1 | 0 |
| Chlorinated Hydrocarbons | 1,1,1,2-tetrachloroethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,1,1-trichloroethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,1,2,2-tetrachloroethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,1,2-trichloroethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,1-dichloroethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,1-dichloroethene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,1-dichloropropene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,2,3-trichloropropane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,2-dibromo-3-chloropropane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,2-dichloroethane | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 1,2-dichloropropane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,3-dichloropropane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 2,2-dichloropropane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Bromochloromethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Bromodichloromethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Bromoform | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Carbon tetrachloride | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Chlorodibromomethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Chloroethane | mg/kg | 1 | <1.0 | <1.0 | 0 | <1.0 | <1.0 | 0 |
| | Chloroform | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Chloromethane | mg/kg | 1 | <1.0 | <1.0 | 0 | <1.0 | <1.0 | 0 |
| | cis-1,2-dichloroethene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | cis-1,3-dichloropropene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | Dibromomethane | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Hexachlorobutadiene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Trichloroethene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Tetrachloroethene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | trans-1,2-dichloroethene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | trans-1,3-dichloropropene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | Vinyl chloride | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| Halogenated Benzenes | 1,2,3-trichlorobenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,2,4-trichlorobenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,2-dichlorobenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,3-dichlorobenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 1,4-dichlorobenzene | µg/L | 1 (Primary): 0.3 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.3 | 0 |
| | 2-chlorotoluene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | 4-chlorotoluene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | Bromobenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Chlorobenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| Halogenated Hydrocarbons | 1,2-dibromoethane | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | Bromomethane | mg/kg | 1 | <1.0 | <1.0 | 0 | <1.0 | <1.0 | 0 |
| | Dichlorodifluoromethane | mg/kg | 1 | <1.0 | <1.0 | 0 | <1.0 | <1.0 | 0 |
| | Trichlorofluoromethane | mg/kg | 1 | <1.0 | <1.0 | 0 | <1.0 | <1.0 | 0 |
| Halogenated Phenols | 2,3,4,6-tetrachlorophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2,4,5-trichlorophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2,4,6-trichlorophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2,4-dichlorophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2,6-dichlorophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2-chlorophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | Pentachlorophenol | mg/kg | 10 (Primary): 0.5 (Interlab | <10.0 | <10.0 | 0 | <10.0 | <0.5 | 0 |
| Inorganics | Moisture | % | 0.1 (Primary): 1 (Interlab | 13.0 | 17.0 | 27 | 13.0 | 17.0 | 27 |
| Lead | Lead | mg/kg | 1 | 220.0 | 280.0 | 24 | 220.0 | 290.0 | 27 |
| Lead (leached) | Lead (Filtered) | mg/l | 0.03 | <0.03 | 0.07 | 80 | <0.03 | | |
| MAH | 1,2,4-trimethylbenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | 0.3 | 0 |
| | 1,3,5-trimethylbenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | 0.1 | 0 |
| | Isopropylbenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | n-butylbenzene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | n-propylbenzene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | p-isopropyltoluene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | sec-butylbenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| | Styrene | µg/L | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | tert-butylbenzene | mg/kg | 1 (Primary): 0.1 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.1 | 0 |
| Metals | Arsenic | mg/kg | 4 (Primary): 3 (Interlab) | 30.0 | 30.0 | 0 | 30.0 | 45.0 | 40 |
| | Cadmium | mg/kg | 0.5 (Primary): 0.3 (Interlab | 1.1 | 1.1 | 0 | 1.1 | 2.1 | 63 |
| | Chromium (III+VI) | mg/kg | 1 (Primary): 0.3 (Interlab | 26.0 | 21.0 | 21 | 26.0 | 23.0 | 12 |
| | Copper | mg/kg | 1 (Primary): 0.5 (Interlab | 230.0 | 260.0 | 12 | 230.0 | 380.0 | 49 |
| | Mercury | mg/kg | 0.1 (Primary): 0.05 (Interlab | 0.3 | 0.4 | 29 | 0.3 | 0.26 | 14 |
| | Nickel | mg/kg | 1 (Primary): 0.5 (Interlab | 20.0 | 24.0 | 18 | 20.0 | 24.0 | 18 |
| | Zinc | mg/kg | 1 (Primary): 0.5 (Interlab | 260.0 | 330.0 | 24 | 260.0 | 370.0 | 35 |
| Metals (leached) | Arsenic (Filtered) | mg/l | 0.05 | <0.05 | <0.05 | 0 | <0.05 | | |
| | Cadmium (Filtered) | mg/l | 0.01 | <0.01 | <0.01 | 0 | <0.01 | | |
| | Chromium (III+VI) (Filtered) | mg/l | 0.01 | <0.01 | <0.01 | 0 | <0.01 | | |
| | Copper (Filtered) | mg/l | 0.01 | 0.1 | 0.1 | 0 | 0.1 | | |
| | Mercury (Filtered) | mg/l | 0.0005 | <0.0005 | <0.0005 | 0 | <0.0005 | | |
| | Nickel (Filtered) | mg/l | 0.02 | 0.02 | 0.05 | 86 | 0.02 | | |
| | Zinc (Filtered) | mg/l | 0.02 | 1.6 | 1.8 | 12 | 1.6 | | |
| PAH/Phenols | 2,4-dimethylphenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2,4-dinitrophenol | mg/kg | 10 (Primary): 0.5 (Interlab | <10.0 | <10.0 | 0 | <10.0 | <0.5 | 0 |
| | 2-methylphenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 2-nitrophenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | 4,6-Dinitro-2-methylphenol | mg/kg | 10 | <10.0 | <10.0 | 0 | <10.0 | | |
| | 4-methylphenol | mg/kg | 2 | <2.0 | <2.0 | 0 | <2.0 | | |
| | 4-nitrophenol | mg/kg | 10 (Primary): 0.5 (Interlab | <10.0 | <10.0 | 0 | <10.0 | <0.5 | 0 |
| | Acenaphthene | mg/kg | 0.1 | 0.1 | 0.2 | 67 | 0.1 | 0.23 | 79 |
| | Acenaphthylene | mg/kg | 0.1 | 0.7 | 1.7 | 83 | 0.7 | 2.4 | 110 |
| | Anthracene | mg/kg | 0.1 | 0.8 | 2.1 | 90 | 0.8 | 2.6 | 106 |
| | Benz(a)anthracene | mg/kg | 0.1 | 2.6 | 10.0 | 117 | 2.6 | 11.0 | 124 |
| | Benzo(a) pyrene | mg/kg | 0.05 | 3.0 | 11.0 | 114 | 3.0 | 6.7 | 76 |
| | Benzo(b)&(k)fluoranthene | mg/kg | 0.2 | 3.8 | 14.0 | 115 | 3.8 | 12.0 | 104 |
| | Benzo(g,h,i)perylene | mg/kg | 0.1 | 1.1 | 4.4 | 120 | 1.1 | 4.6 | 123 |
| | Chrysene | mg/kg | 0.1 | 2.6 | 9.1 | 111 | 2.6 | 6.3 | 83 |
| | Dibenz(a,h)anthracene | mg/kg | 0.1 | 0.3 | 1.2 | 120 | 0.3 | 1.2 | 120 |
| | Fluoranthene | mg/kg | 0.1 | 4.4 | 15.0 | 109 | 4.4 | 12.0 | 93 |
| | Fluorene | mg/kg | 0.1 | 0.5 | 0.7 | 33 | 0.5 | 0.92 | 59 |
| | Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | 1.3 | 4.6 | 112 | 1.3 | 4.3 | 107 |
| | Naphthalene | mg/kg | 0.1 | 0.6 | 2.8 | 129 | 0.6 | 3.1 - 5.2 | 159 |
| | Phenanthrene | mg/kg | 0.1 | 3.4 | 7.9 | 80 | 3.4 | 5.7 | 51 |
| | Phenol | mg/kg | 1 (Primary): 0.5 (Interlab | <1.0 | <1.0 | 0 | <1.0 | <0.5 | 0 |
| | Pyrene | mg/kg | 0.1 | 4.9 | 20.0 | 121 | 4.9 | 13.0 | 91 |
| PAH/Phenols (leached) | Acenaphthene (Filtered) | µg/l | 1 | <1.0 | 1.0 | 0 | <1.0 | | |
| | Acenaphthylene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Anthracene (Filtered) | µg/l | 1 | <1.0 | 1.0 | 0 | <1.0 | | |
| | Benz(a)anthracene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Benzo(a) pyrene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Benzo(b)&(k)fluoranthene (Filtered) | µg/l | 2 | <2.0 | <2.0 | 0 | <2.0 | | |
| | Benzo(g,h,i)perylene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Chrysene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Dibenz(a,h)anthracene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Fluoranthene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Fluorene (Filtered) | µg/l | 1 | <1.0 | 1.0 | 0 | <1.0 | | |
| | Indeno(1,2,3-c,d)pyrene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| | Naphthalene (Filtered) | µg/l | 1 | <1.0 | 30.0 | 187 | <1.0 | | |
| | Phenanthrene (Filtered) | µg/l | 1 | <1.0 | 1.0 | 0 | <1.0 | | |
| | Phenolics Total | µg/l | 50 | <50.0 | <50.0 | 0 | <50.0 | | |
| | Pyrene (Filtered) | µg/l | 1 | <1.0 | <1.0 | 0 | <1.0 | | |
| Solvents | Cyclohexane | mg/kg | 1 | <1.0 | <1.0 | 0 | <1.0 | | |

Field Duplicates (soil)
Filter: SDG in('42976')

| SDG | 42976 | 42976 | | 42976 | Interlab_D | |
|-------------------|-----------|-----------|-----|-----------|------------|-----|
| Field_ID | JBS TP1 | QA2 | RPD | JBS TP1 | QC2 | RPD |
| Sampled Date-Time | 2/07/2010 | 2/07/2010 | | 2/07/2010 | 2/07/2010 | |

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (4-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary labor.

Field Blanks (water)
Filter: SDG in('42976')

| | |
|-------------------|-----------|
| SDG | 42976 |
| Field_ID | Rinsate |
| Sampled_Date-Time | 2/07/2010 |
| Sample_Type | Rinsate |

| Chem_Group | ChemName | Units | EQL | | |
|--------------------------|------------------------------|-------|--------|---------|--|
| BTEX | Benzene | µg/L | 1 | <1 | |
| | Ethylbenzene | µg/L | 1 | <1 | |
| | Toluene | µg/L | 1 | <1 | |
| | Xylene (m & p) | µg/L | 2 | <2 | |
| | Xylene (o) | µg/L | 1 | <1 | |
| | | | | | |
| Chlorinated Hydrocarbons | 1,1,1,2-tetrachloroethane | µg/L | 1 | <1 | |
| | 1,1,1-trichloroethane | µg/L | 1 | <1 | |
| | 1,1,2,2-tetrachloroethane | µg/L | 1 | <1 | |
| | 1,1,2-trichloroethane | µg/L | 1 | <1 | |
| | 1,1-dichloroethane | µg/L | 1 | <1 | |
| | 1,1-dichloroethene | µg/L | 1 | <1 | |
| | 1,1-dichloropropene | µg/L | 1 | <1 | |
| | 1,2,3-trichloropropane | µg/L | 1 | <1 | |
| | 1,2-dibromo-3-chloropropane | µg/L | 1 | <1 | |
| | 1,2-dichloroethane | µg/L | 1 | <1 | |
| | 1,2-dichloropropane | µg/L | 1 | <1 | |
| | 1,3-dichloropropane | µg/L | 1 | <1 | |
| | 2,2-dichloropropane | µg/L | 1 | <1 | |
| | Bromochloromethane | µg/L | 1 | <1 | |
| | Bromodichloromethane | µg/L | 1 | <1 | |
| | Bromoform | µg/L | 1 | <1 | |
| | Carbon tetrachloride | µg/L | 1 | <1 | |
| | Chlorodibromomethane | µg/L | 1 | <1 | |
| | Chloroethane | µg/L | 10 | <10 | |
| | Chloroform | µg/L | 1 | <1 | |
| | Chloromethane | µg/L | 10 | <10 | |
| | cis-1,2-dichloroethene | µg/L | 1 | <1 | |
| | cis-1,3-dichloropropene | µg/L | 1 | <1 | |
| | Dibromomethane | µg/L | 1 | <1 | |
| | Hexachlorobutadiene | µg/L | 1 | <1 | |
| | Trichloroethene | µg/L | 1 | <1 | |
| | Tetrachloroethene | µg/L | 1 | <1 | |
| | trans-1,2-dichloroethene | µg/L | 1 | <1 | |
| | trans-1,3-dichloropropene | µg/L | 1 | <1 | |
| | Vinyl chloride | µg/L | 10 | <10 | |
| | | | | | |
| Halogenated Benzenes | 1,2,3-trichlorobenzene | µg/L | 1 | <1 | |
| | 1,2,4-trichlorobenzene | µg/L | 1 | <1 | |
| | 1,2-dichlorobenzene | µg/L | 1 | <1 | |
| | 1,3-dichlorobenzene | µg/L | 1 | <1 | |
| | 1,4-dichlorobenzene | µg/L | 1 | <1 | |
| | 2-chlorotoluene | µg/L | 1 | <1 | |
| | 4-chlorotoluene | µg/L | 1 | <1 | |
| | Bromobenzene | µg/L | 1 | <1 | |
| | Chlorobenzene | µg/L | 1 | <1 | |
| | | | | | |
| | | | | | |
| Halogenated Hydrocarbons | 1,2-dibromoethane | µg/L | 1 | <1 | |
| | Bromomethane | µg/L | 10 | <10 | |
| | Dichlorodifluoromethane | µg/L | 10 | <10 | |
| | Trichlorofluoromethane | µg/L | 10 | <10 | |
| | | | | | |
| Halogenated Phenols | 2,3,4,6-tetrachlorophenol | µg/L | 10 | <10 | |
| | 2,4,5-trichlorophenol | µg/L | 10 | <10 | |
| | 2,4,6-trichlorophenol | µg/L | 10 | <10 | |
| | 2,4-dichlorophenol | µg/L | 10 | <10 | |
| | 2,6-dichlorophenol | µg/L | 10 | <10 | |
| | 2-chlorophenol | µg/L | 10 | <10 | |
| | Pentachlorophenol | µg/L | 100 | <100 | |
| | | | | | |
| Lead | Lead (Filtered) | mg/l | 0.03 | <0.03 | |
| | | | | | |
| MAH | 1,2,4-trimethylbenzene | µg/L | 1 | <1 | |
| | 1,3,5-trimethylbenzene | µg/L | 1 | <1 | |
| | Isopropylbenzene | µg/L | 1 | <1 | |
| | n-butylbenzene | µg/L | 1 | <1 | |
| | n-propylbenzene | µg/L | 1 | <1 | |
| | p-isopropyltoluene | µg/L | 1 | <1 | |
| | sec-butylbenzene | µg/L | 1 | <1 | |
| | Styrene | µg/L | 1 | <1 | |
| | tert-butylbenzene | µg/L | 1 | <1 | |
| | | | | | |
| Metals | Arsenic (Filtered) | mg/l | 0.05 | <0.05 | |
| | Cadmium (Filtered) | mg/l | 0.01 | <0.01 | |
| | Chromium (III+VI) (Filtered) | mg/l | 0.01 | <0.01 | |
| | Copper (Filtered) | mg/l | 0.01 | <0.01 | |
| | Mercury (Filtered) | mg/l | 0.0005 | <0.0005 | |

Field Blanks (water)
Filter: SDG in('42976')

| | | | SDG Field_ID Sampled_Date-Time Sample_Type | 42976 Rinsate 2/07/2010 Rinsate |
|-------------|----------------------------|------|---|--|
| | Nickel (Filtered) | mg/l | 0.02 | <0.02 |
| | Zinc (Filtered) | mg/l | 0.02 | <0.02 |
| | | | | |
| PAH/Phenols | 2,4-dimethylphenol | µg/L | 10 | <10 |
| | 2,4-dinitrophenol | mg/l | 0.1 | <0.1 |
| | 2-methylphenol | µg/L | 10 | <10 |
| | 2-nitrophenol | µg/L | 10 | <10 |
| | 4,6-Dinitro-2-methylphenol | µg/L | 100 | <100 |
| | 4-methylphenol | mg/l | 0.02 | <0.02 |
| | 4-nitrophenol | µg/L | 100 | <100 |
| | Acenaphthene | µg/L | 1 | <1 |
| | Acenaphthylene | µg/L | 1 | <1 |
| | Anthracene | µg/L | 1 | <1 |
| | Benz(a)anthracene | µg/L | 1 | <1 |
| | Benzo(a) pyrene | µg/L | 1 | <1 |
| | Benzo(b)&(k)fluoranthene | µg/L | 2 | <2 |
| | Benzo(g,h,i)perylene | µg/L | 1 | <1 |
| | Chrysene | µg/L | 1 | <1 |
| | Dibenz(a,h)anthracene | µg/L | 1 | <1 |
| | Fluoranthene | µg/L | 1 | <1 |
| | Fluorene | µg/L | 1 | <1 |
| | Indeno(1,2,3-c,d)pyrene | µg/L | 1 | <1 |
| | Naphthalene | µg/L | 1 | <1 |
| | Phenanthrene | µg/L | 1 | <1 |
| | Phenol | µg/L | 10 | <10 |
| | Pyrene | µg/L | 1 | <1 |
| | | | | |
| Solvents | Cyclohexane | mg/l | 0.001 | <0.001 |

Appendix H

Test Pit Logs



Borehole No.: JBS TP1

Location: Burren St, Erskenville

Project: Macdonaldtown Gasworks

Total Hole Depth: 1.0 m

Operator and Co.: Anthony Colluso

Project No.: 40913

Eastings: -

Excavation Method: Backhoe

Client: Incoll Management

Northings: -

Log By: Sumi Dorairaj

Project Manager: Sumi Dorairaj

Date: 02/07/2010

Excavation Width: 450 mm

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|--------------------|--------|---|-----------------------|-----------|-----------|-----------------------|
| Depth | Visual | Description | Number | Condition | PID (ppm) | Observations |
| 0.0 | | Ground Surface | | | | |
| | | FILL Silty Gravelly Sand, comprising black coke and slag and grey ash, dry to damp, ballast gravels and cobbles (irregular, hard basalt) inclusions | JBS TP1-0.3-0.4+QA/C2 | D | | Bulk sample collected |
| 1.0 | | FILL Silty Clay, orange mottled grey with red ironstone gravels, well compacted, moist | | | | |
| | | End of test pit at 1.0 m. Target depth reached. | | | | |
| 2.0 | | | | | | |
| 3.0 | | | | | | |
| 4.0 | | | | | | |

| Sample Method | Sample Condition | | |
|--|--|--|--|
| HA - Hand Auger SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tubing | U - undisturbed tube sample D - disturbed sample CS - core sample | | |



Borehole No.: JBS TP2

Location: Burren St, Erskenville

Project: Macdonaldtown Gasworks

Total Hole Depth: 1.8 m

Operator and Co.: Anthony Colluso

Project No.: 40913

Eastings: -

Excavation Method: Backhoe

Client: Incoll Management

Northings: -

Log By: Sumi Dorairaj

Project Manager: Sumi Dorairaj

Date: 02/07/2010

Excavation Width: 450 mm

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|--------------------|--------|--|-------------------|-----------|-----------|--------------|
| Depth | Visual | Description | Number | Condition | PID (ppm) | Observations |
| 0.0 | | Ground Surface | | | | |
| | | FILL Silty Gravelly Sand, dark brown to black, coke and slag inclusions (black, angular, hard, fine to coarse), 'coal tar' like odour, large 'coke' boulders, dry to damp, asphalt layer at 0.15m, steel plate below (1500 mm x 450 mm x 6 mm thick) | JBS TP2-0.4 - 0.5 | D | | |
| | | | JBS TP2-0.8 - 0.9 | D | | |
| 1.0 | | FILL Silty Clay, orange mottled grey, well compacted with red streaks, slight 'coal tar' like odour, damp | JBS TP2-1.2 - 1.3 | D | | |
| | | Seepage into pit (brown, water, localised to 0.9 - 0.95m) | JBS TP2-1.4 - 1.5 | D | | |
| | | FILL Grades to brown mottled orange, wet, slight 'coal tar' like odour | | | | |
| 2.0 | | Fill Silty Clay, dark grey with black, oily sheen / ooze, strong 'coal' like odour, wet | | | | |
| | | End of test pit at 1.8 m. Refusal possibly on concrete. | | | | |
| 3.0 | | | | | | |
| 4.0 | | | | | | |

| Sample Method | Sample Condition | | |
|--|---|--|--|
| HA - Hand Auger SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tubing | U - undisturbed tube sample D - disturbed sample CS - core sample | | |



Borehole No.: JBS TP3

Location: Burren St, Erskenville

Project: Macdonaldtown Gasworks

Total Hole Depth: 4.3 m

Operator and Co.: Anthony Colluso

Project No.: 40913

Eastings: -

Excavation Method: Backhoe

Client: Incoll Management

Northings: -

Log By: Sumi Dorairaj

Project Manager: Sumi Dorairaj

Date: 02/07/2010

Excavation Width: 450 mm

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|--------------------|--------|---|-----------------|-----------|-----------|---|
| Depth | Visual | Description | Number | Condition | PID (ppm) | Observations |
| 0.0 | | Ground Surface | | | | Grass cover |
| | | FILL Silty Sandy Gravel, dark black coarse, medium grain, damp, heterogeneous with rootlets and road base gravels | | | | |
| | | FILL Silty Clay, red orange mottled with grey and yellow, medium plasticity, damp - wet, heterogeneous with slight coal tar odour | | | | |
| 1.0 | | | | | | |
| | | FILL Silty Clay, dark brown, low plasticity, wet, heterogeneous with coke gravels and tar, strong coal tar odours and sheen | JBS TP3-1.3-1.7 | D | | Bulk sample collected |
| 2.0 | | | | | | |
| | | FILL Silty Clay, yellow red with grey mottles, medium plasticity, damp, heterogeneous, coal tar odours and moisture content increasing with depth | | | | |
| 3.0 | | | | | | |
| | | FILL As Above, very strong coal tar odours, wet, seepage of black ooze throughout | JBS TP3-4.0-4.2 | U | | Bulk and Bulk control samples collected |
| 4.0 | | | | | | |
| | | End of test pit at 4.3 m. | | | | |
| | | Equipment refusal. | | | | |

| Sample Method | Sample Condition | | |
|--|--|--|--|
| HA - Hand Auger SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tubing | U - undisturbed tube sample D - disturbed sample CS - core sample | | |



Borehole No.: JBS TP4

Location: Burren St, Erskenville

Project: Macdonaldtown Gasworks

Total Hole Depth: 2.1 m

Operator and Co.: Anthony Colluso

Project No.: 40913

Eastings: -

Excavation Method: Backhoe

Client: Incoll Management

Northings: -

Log By: Tim Davis

Project Manager: Sumi Dorairaj

Date: 02/07/2010

Excavation Width: 450 mm

| SUBSURFACE PROFILE | | | SAMPLE | | | |
|--------------------|--------|--|----------------------|-----------|-----------|---------------------|
| Depth | Visual | Description | Number | Condition | PID (ppm) | Observations |
| 0.0 | | Ground Surface | | | | Grass cover |
| | | FILL Silty Sand, dark brown, fine to medium grain, dry to damp, heterogeneous with inclusions of sandstone pieces, few suspected ACM fragments, timber, ash/slag, glass fragments, slight PAH odour at 0.5 m | JBSTP4-0.4-0.5 + QA1 | D | | No sample collected |
| 1.0 | | FILL Silty Sand with crushed sandstone boulders, grey white mix | JBSTP4-0.9-1.0 | D | | |
| | | FILL Silty Clay, red orange with grey mottles, medium plasticity, damp, heterogeneous, very slight PAH odour | JBSTP4-1.6-1.7 | D | | |
| 2.0 | | FILL Silty Clay, grey brown, medium plasticity, damp, heterogeneous, inclusion of shale pieces to sheets, few plastic pieces | JBSTP4-1.9-2.0 | D | | |
| | | End of borehole at 2.1 m. Target depth reached. | | | | |
| 3.0 | | | | | | |
| 4.0 | | | | | | |

| Sample Method | Sample Condition | | |
|--|--|--|--|
| HA - Hand Auger SFA - Solid Flight Auger HFA - Hollow Flight Auger PT - Push Tubing | U - undisturbed tube sample D - disturbed sample CS - core sample | | |

Appendix I
Pump Test Field Sheets

Field Reporting Cover Sheet



| | |
|--|---------------------------|
| PROJECT NAME: Macdonaldtown siding | PROJECT NO: 40913 |
| FIELD DATES: 6 th - 9 th / 7/2010 | JBS PM: S. DORAJAJ |
| FIELD STAFF: T. DAVIS | |
| WEATHER: RAIN | |
| PROPOSED WORKS: | |
| SUMMARY OF FIELDWORK: - commission of trial water treatment plant - water pumped from wells MW045 & MW373 - total volume ~4000L as described in field notes mixed with 4000L on tap water to increase pump volume | |
| IMPORTANT OUTCOMES TO NOTE: - Datalogging trials to be conducted in coming week | |
| COC SENT? yes | |
| DATE SAMPLES SENT: 9/7/10 | |
| PRIMARY LAB: ENVIROLAB | SECONDARY LAB: NA |

| |
|---|
| POST-FIELDWORK CHECKLIST |
| <input type="checkbox"/> COC checked with PM |
| <input type="checkbox"/> Site map updated and attached |
| <input type="checkbox"/> Field data sheets attached (bore logs, well monitoring sheets) |
| <input type="checkbox"/> Calibration and decontamination sheets attached |
| <input type="checkbox"/> Field notes attached |
| <input type="checkbox"/> Photos downloaded to file |
| <input type="checkbox"/> Electronic bore logs completed and checked |
| OUTSTANDING ACTIONS: |

CLIENT/SITE:

DATE:

PARTICIPANTS:

PAGE: OF:

MW425

Depth to water - 1.020

Depth to water after pumping - 2.290

Total Depth - 4.344

Pump rate

0 - 1 min = 4.4 L/min

2 - 3 min = 2.7 L/min

4 - 5 min = 1.8 L/min

6 - 7 min = 1.8 L/min

8 - 9 min = 1.7 L/min

X Turn Pump off after 10 min @ 10.37

X Remove datalogger after 1 hr @ 11.37

CLIENT/SITE:

DATE: 11/8/10

PARTICIPANTS:

PAGE: OF:

MW045

Depth to water before pumping - 1.351

Total Depth - 4.263

Depth to water after pumping - 1.421 after 13 mins after pump test

Start pumping 8.50am

0-1min = 3.9 L/min

2-3min = 4.2 L/min

4-5min = 4.4 L/min

6-7mins = 4.3 L/min

8-9mins = 4.2 L/min

Pump removed after 12mins

Remove datalogger 9.50am

$$T = kb$$

$$\therefore k = \frac{T}{b}$$

CLIENT/SITE:

DATE: 11/8/10

PARTICIPANTS:

PAGE: OF:

MWOGS

Depth to water - 2.081

Depth to water after pumping - 3.139

Total Depth - 4.374

Pump Rate

0-1min = 3L/min

2-3min = 2L/min

4-5min = 1.1L/min

6-7min = 0/min

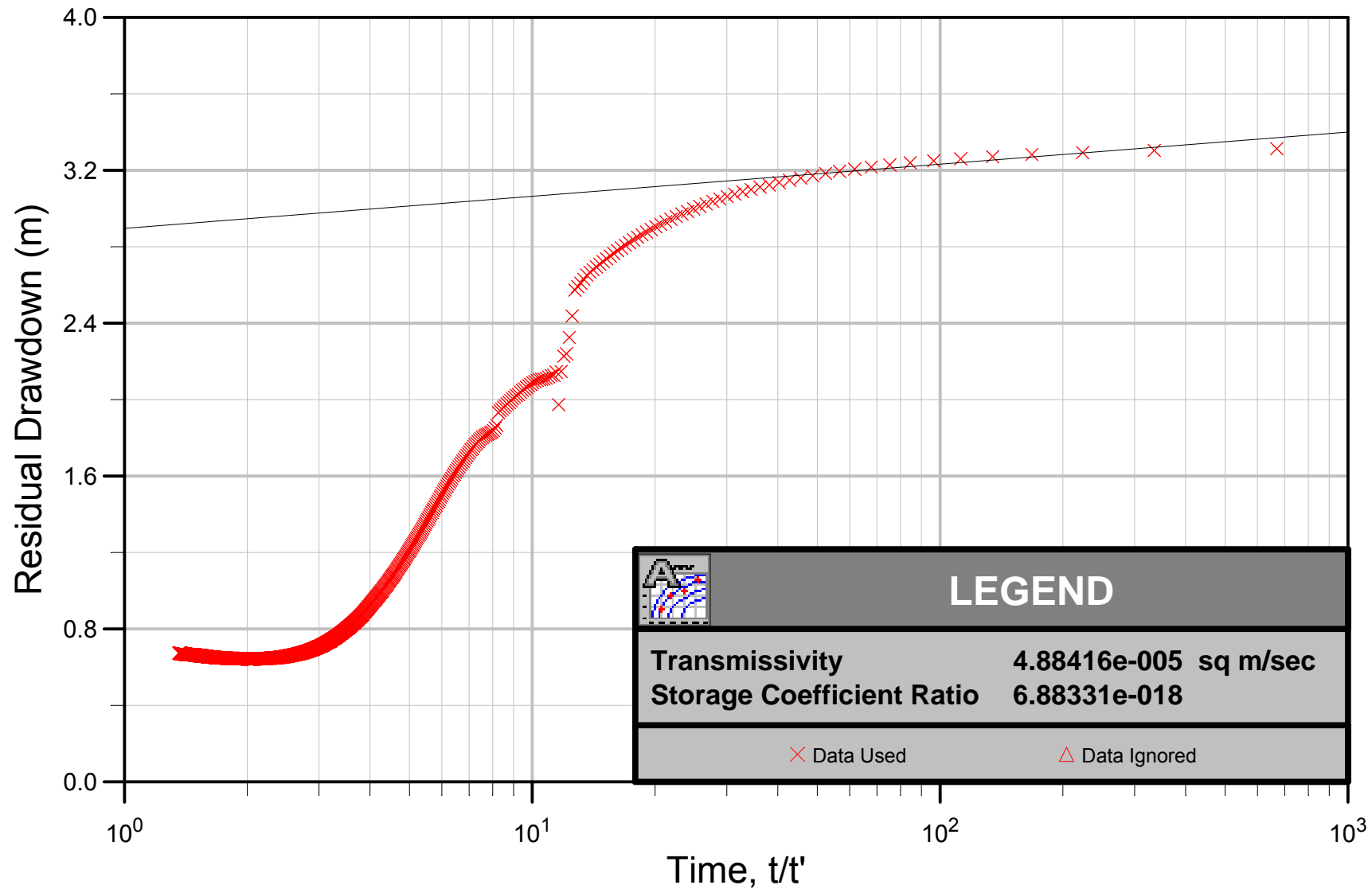
8-9mins = 0L/min

* pump removed after 10 mins @ 10.08

* Datalogger removed after 1hr @ 11.08

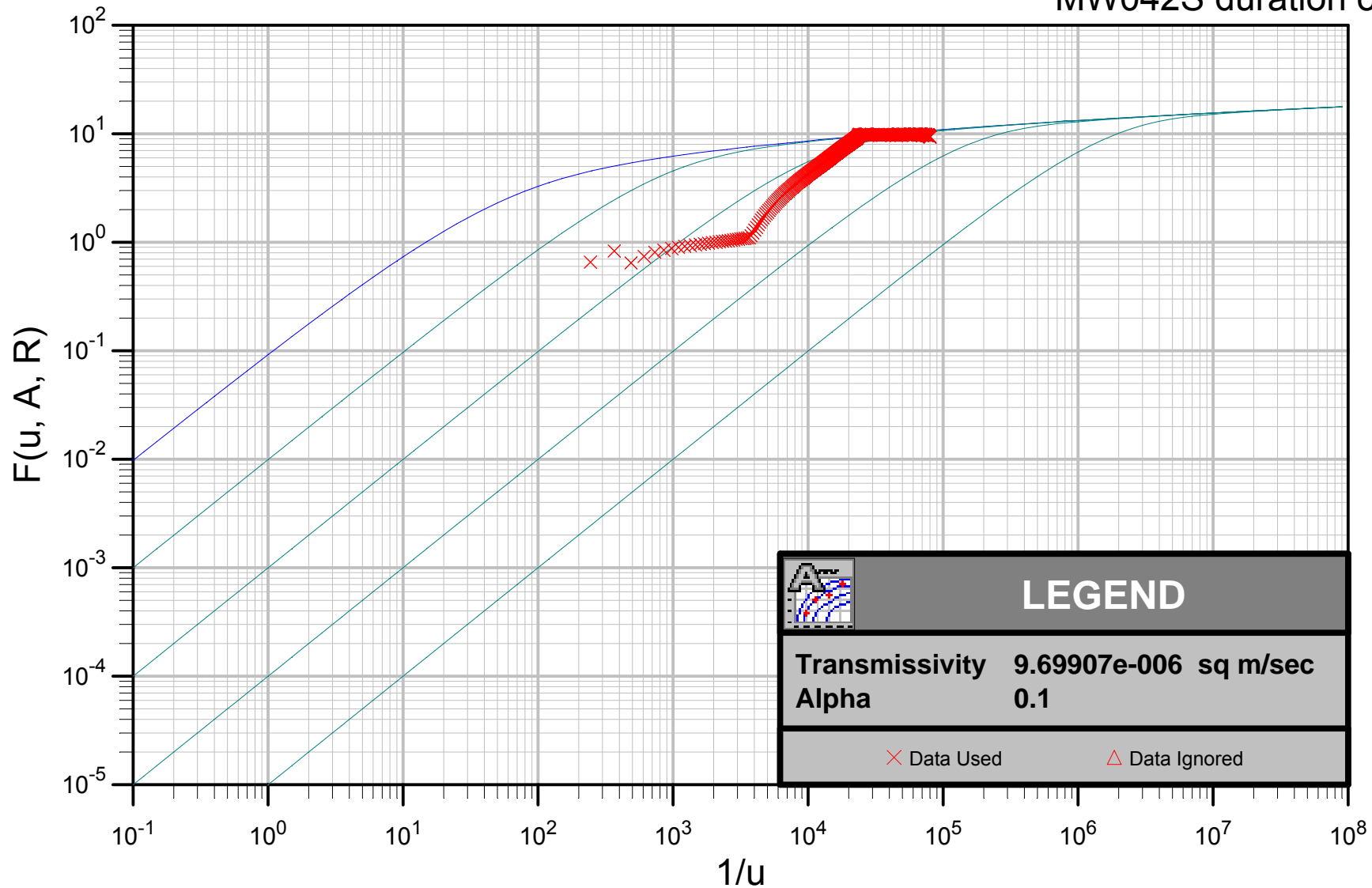
MW042S

Theis Recovery



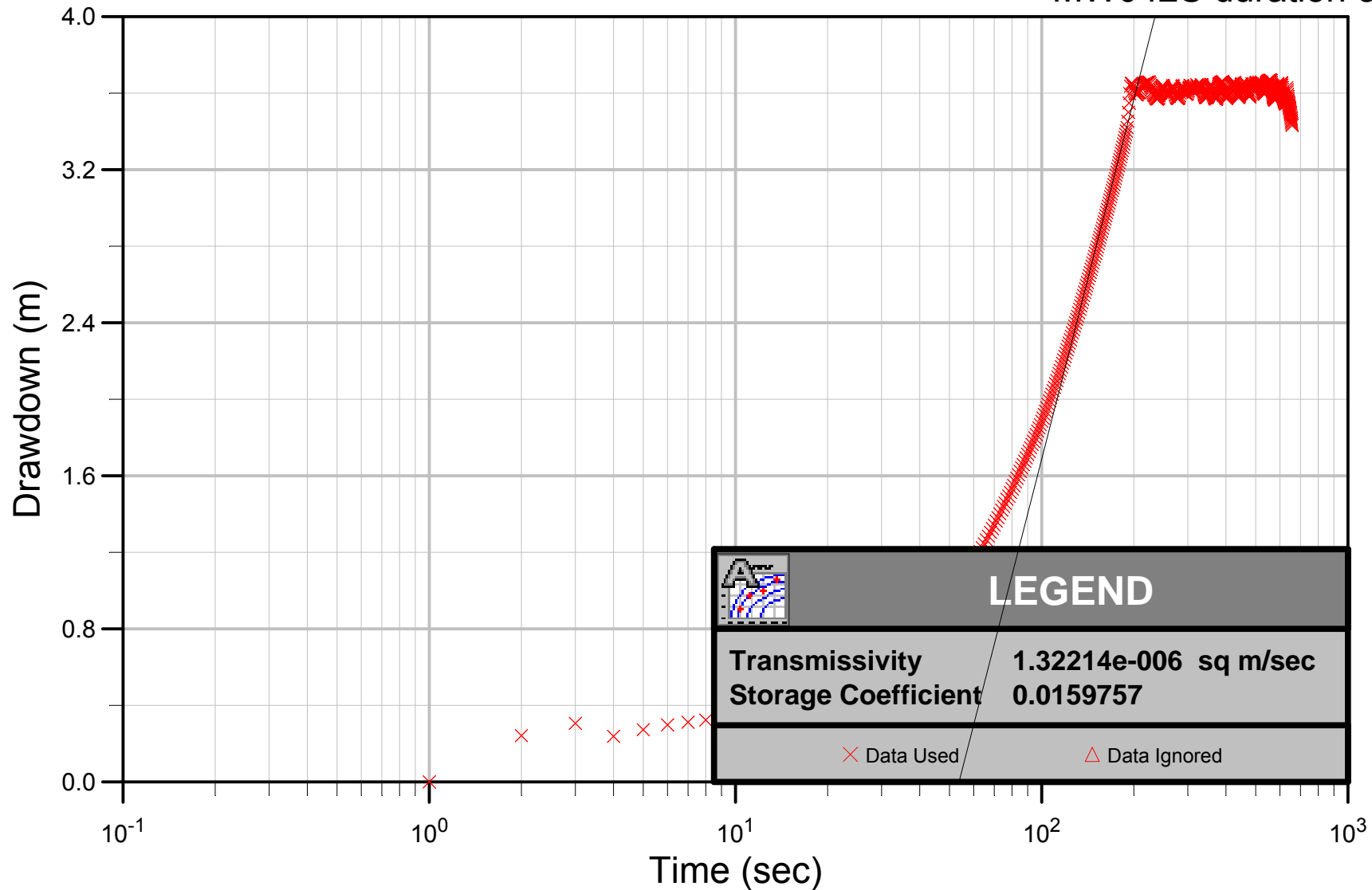
Papadopoulos and Cooper

MW042S duration of pumping only



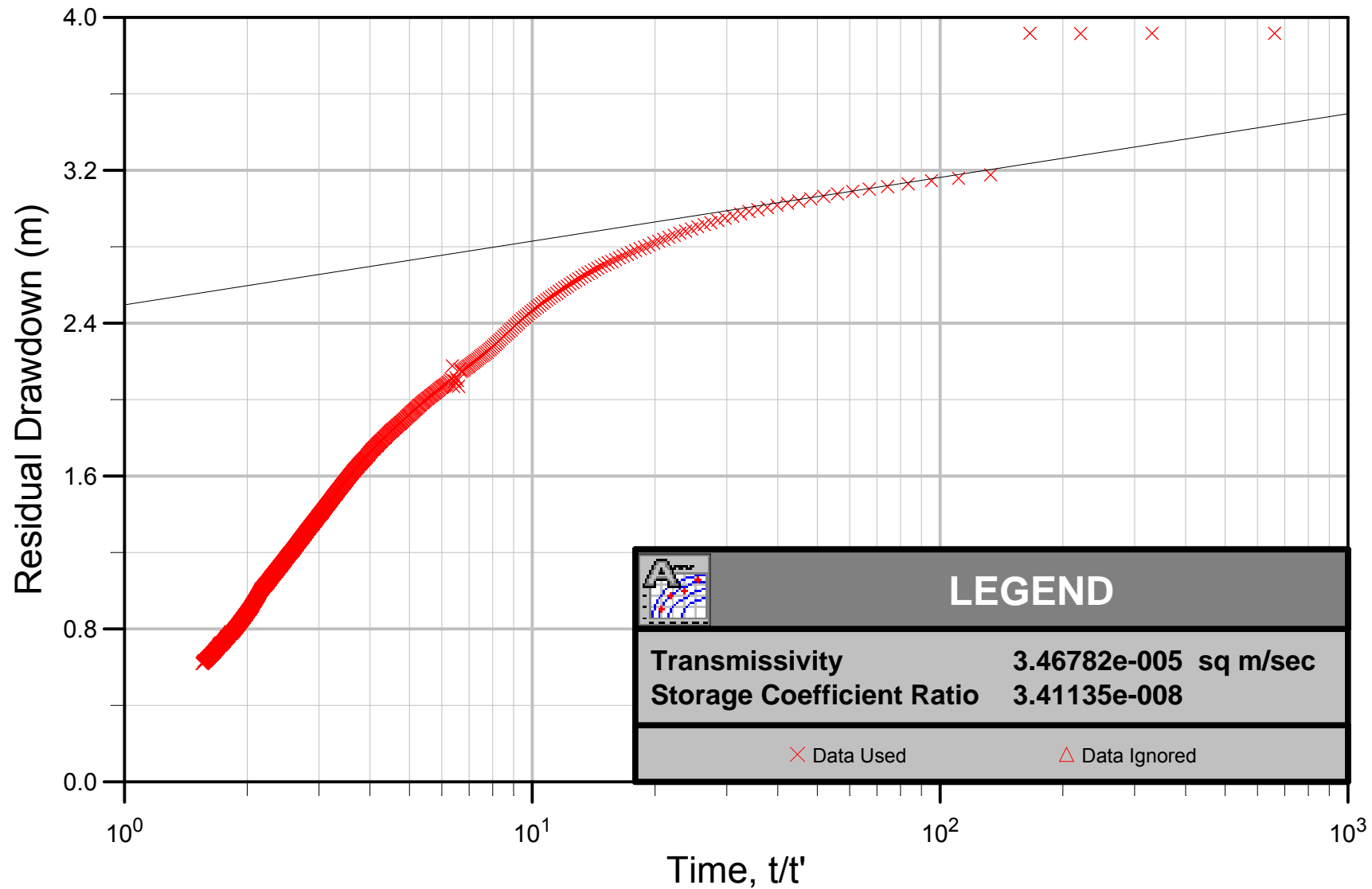
Cooper and Jacob

MW042S duration of pumping only



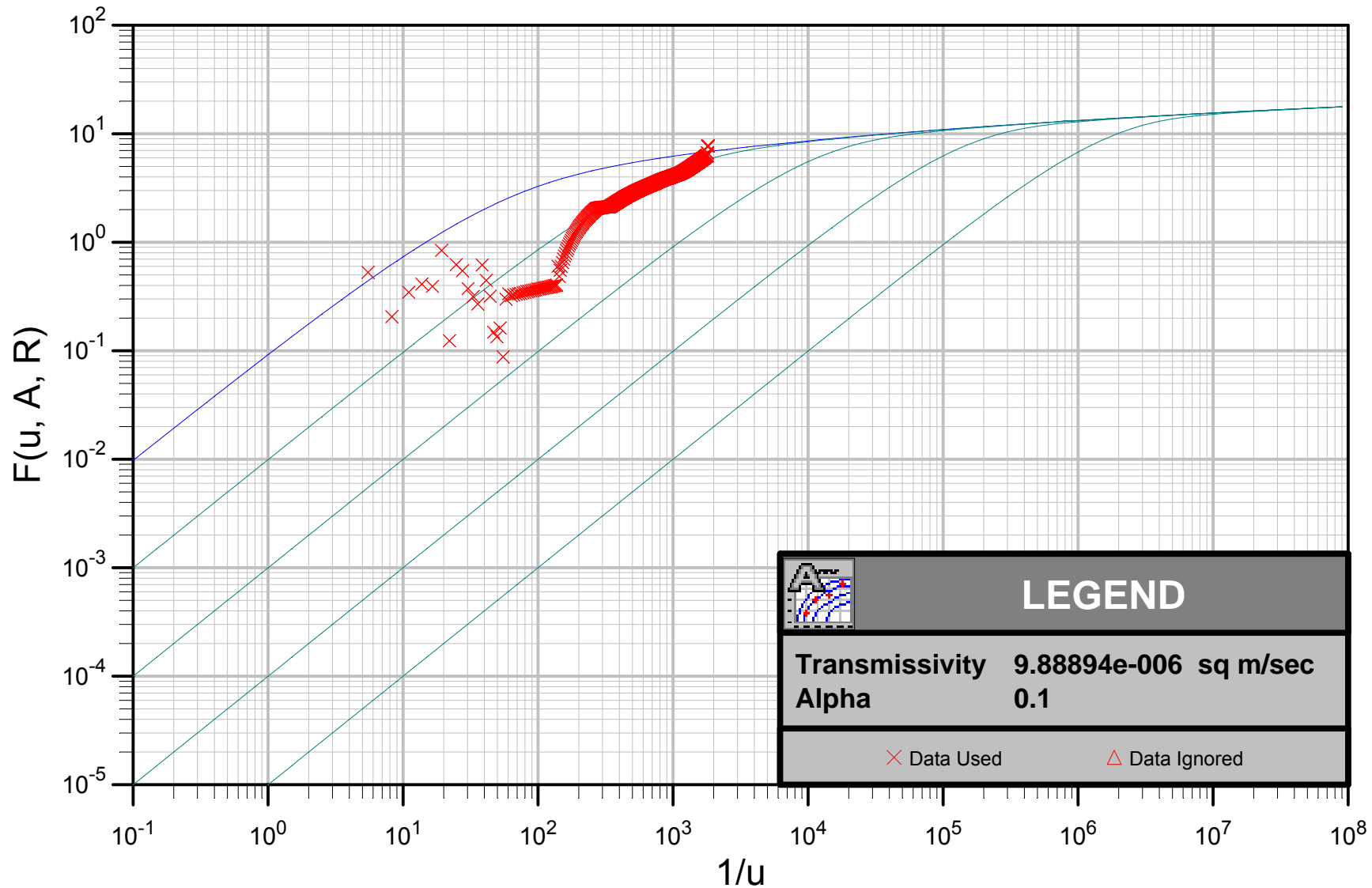
Theis Recovery

MW37S



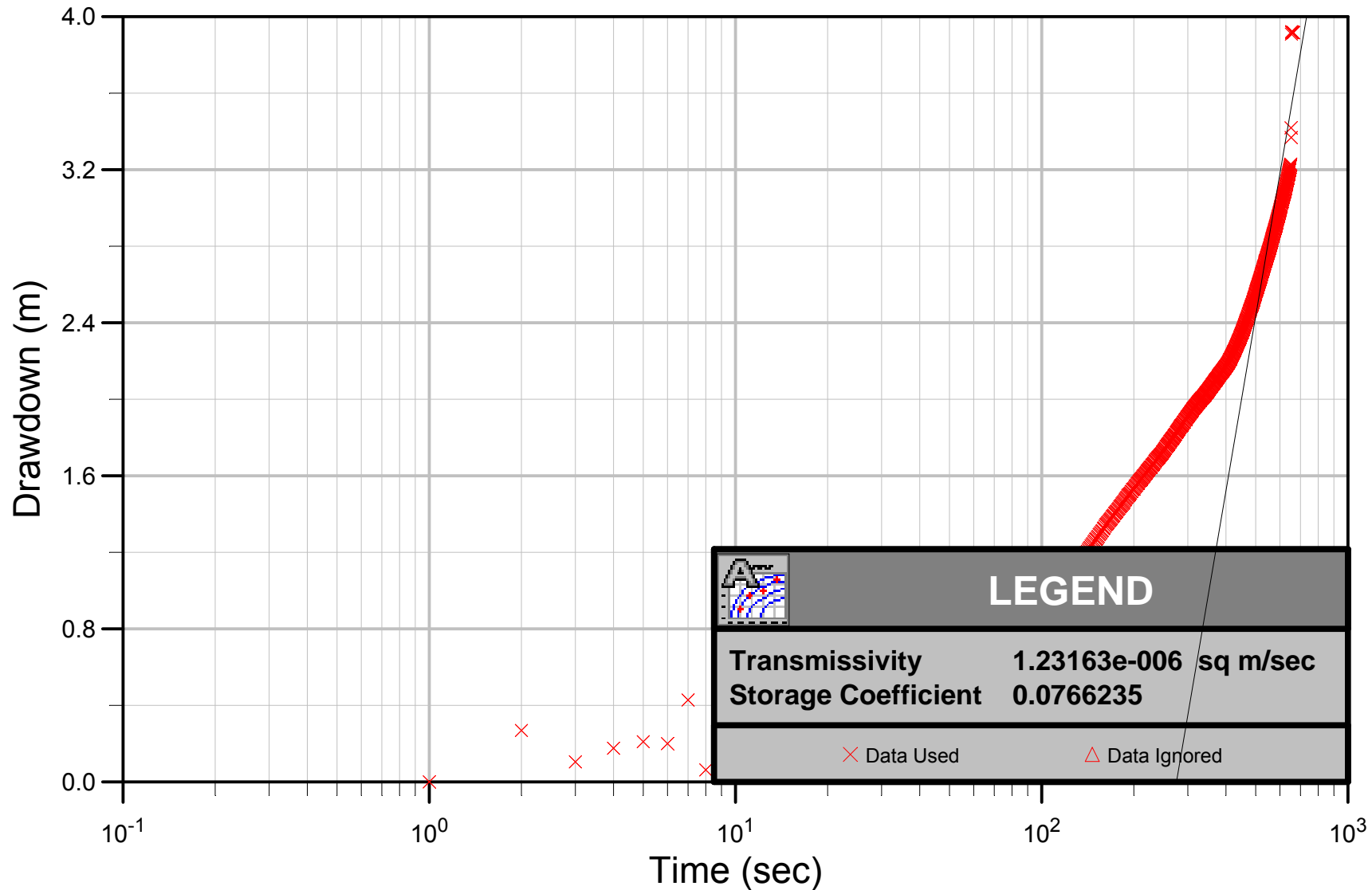
Papadopoulos and Cooper

MW37S Duration of pumping onl



Cooper and Jacob

MW37S Duration of pumping onl



Appendix J

Results of Geotechnical Testing and Benchscale Stabilisation Trial

JBS Environmental Pty Ltd
128 O'Riordan Street
Mascot, NSW 2028
Email: SDorairaj@jbsenvironmental.com.au

16 August, 2010

Attention: Sumi Dorairaj

RE: MACDONALDTOWN GASWORKS TREATMENT TRIAL

Dear Sumi,

Enviropacific Services Pty Ltd (EPS) is pleased to provide JBS Environmental Pty Ltd (JBS) with this report on the above works. Client satisfaction is the highest priority on all our projects and accordingly, we pride ourselves on our ability to offer innovative and flexible project delivery approaches to ensure client needs are satisfied. We also place the highest importance on OHS&R, environmental management, integrity and compliance with relevant laws and regulations. This commitment to quality is evidenced through obtaining third party accreditation of our Management System to ISO9001-2008 and accreditation for OHS&R and Environmental System to AS4801 and ISO14001 respectively.

Definitions

- ASLP – Leachable Concentration assessed by the Australian Standard Leaching Procedure (AS 4439.3-1997 Wastes, Sediments and Contaminated Soils - Preparation of Leachates - Bottle Leaching Procedures)
- BaP – Benzo(a)pyrene
- DECCW – NSW Department of Environment, Climate Change and Water
- EPS – Enviropacific Services Pty Ltd
- General IA – DECC General Approval for the Immobilisation of Contaminants in Waste, # 2005/14 Stabilisation of Coal Tar Contaminated Soil
- IA –Immobilisation Approval
- JBS – JBS Environmental Pty Ltd
- PAH – Polycyclic Aromatic Hydrocarbon
- SCC – Specific Contaminant Concentration
- TCLP – Leachable Concentration assessed by the Toxicity Characteristic Leaching Procedure

- TPH – Total Petroleum Hydrocarbon
- UCS – Unconfined Compressive Strength measured by NSW RTA Test Method T131
- Waste Classification Guidelines – Refers to Table 2 of DECCW Waste Classification Guidelines, Part 1: Classifying Waste (2009)

Scope of work

Enviropacific was engaged by JBS to conduct an immobilisation treatment trial using Portland cement to immobilise three different materials originating from the former Macdonaldtown Gasworks.

The treatment trial included the following tasks:

1. Subsamples of each material were blended and homogenised in accordance with the flowchart shown below in Figure 1.
2. Each material was prepared in accordance with NSW RTA Test Method T131.
3. Three samples from each prepared material (total 9) were collected for pre-treatment chemical analysis. Each sample was analysed for the following:
 - As, Cd, Cr, Pb, Hg, Ni (SCC and TCLP)
 - Benzo(a)pyrene and PAHs (SCC and TCLP)
 - Phenols (SCC and TCLP)
 - BTEX and styrene (SCC and TCLP)
 - TPHs (C10-C36) (SCC and TCLP)
4. Each material was split into 12 kg subsamples for treatment.
5. Subsamples (12 kg) of each material were treated with 5%, 12.5% and 20% cement (by weight). The cement was mixed into the materials by hand, which has previously been demonstrated to replicate a pugmill or equivalent at full-scale treatment.
6. Two cylinders were cast per treatment per material (3 materials x 3 treatments x 2 replicates/treatment = 18 cylinders total).
7. A sufficient quantity of each treated material was separated and stored in tightly sealed plastics bags for five days prior to submitting them for post-treatment chemical analysis.
8. Each cast cylinder was cured and tested in accordance with NSW RTA Test Method T131, in accordance with DECCW General Immobilisation Approval for Coal Tar.
9. One sample from each treatment (total 9) plus 1 untreated control (Material 3) was collected and submitted for chemical analysis. Each sample was analysed for the following:
 - As, Cd, Cr, Pb, Hg, Ni (SCC and ASLP)
 - Benzo(a)pyrene and PAHs (SCC and ASLP)
 - Phenols (SCC and ASLP)
 - BTEX and styrene (SCC and ASLP)
 - TPHs (C10-C36) (SCC and TCLP)

10. JBS were unable to provide bulk groundwater samples for the ASLP tests, therefore DI water was used for the ASLP tests.

All chemical analyses were conducted by Envirolab Services and all UCS cylinders were prepared and tested by Douglas Partners Geotechnical Laboratory. Envirolab and Douglas Partners are NATA accredited and conducted the testing in accordance with laboratory testing quality assurance protocols. Laboratory reports are provided in Attachments 1-4.

SYDNEY 1/28 Barcoo Street, Chatswood, NSW 2144
T (02) 9882 4200 F (02) 9882 4250

NEWCASTLE 6/27 Annie Street, Wickham NSW 2293
T (02) 4961 7100 F (02) 4961 7150

ADELAIDE 62 King William St, Kent Town SA 5057
T (08) 8362 0171 F (08) 8363 4806

BRISBANE 2/50 Parker Court, Pinkenba, QLD 4008
T (07) 3637 2900 F (07) 3637 2950

MELBOURNE 2/3 Southpark close, Keysborough, VIC
T (03) 8769 6100 F (03) 8769 6150

MAIL PO Box 295 Wickham, NSW 2293

ABN 43 111 372 064

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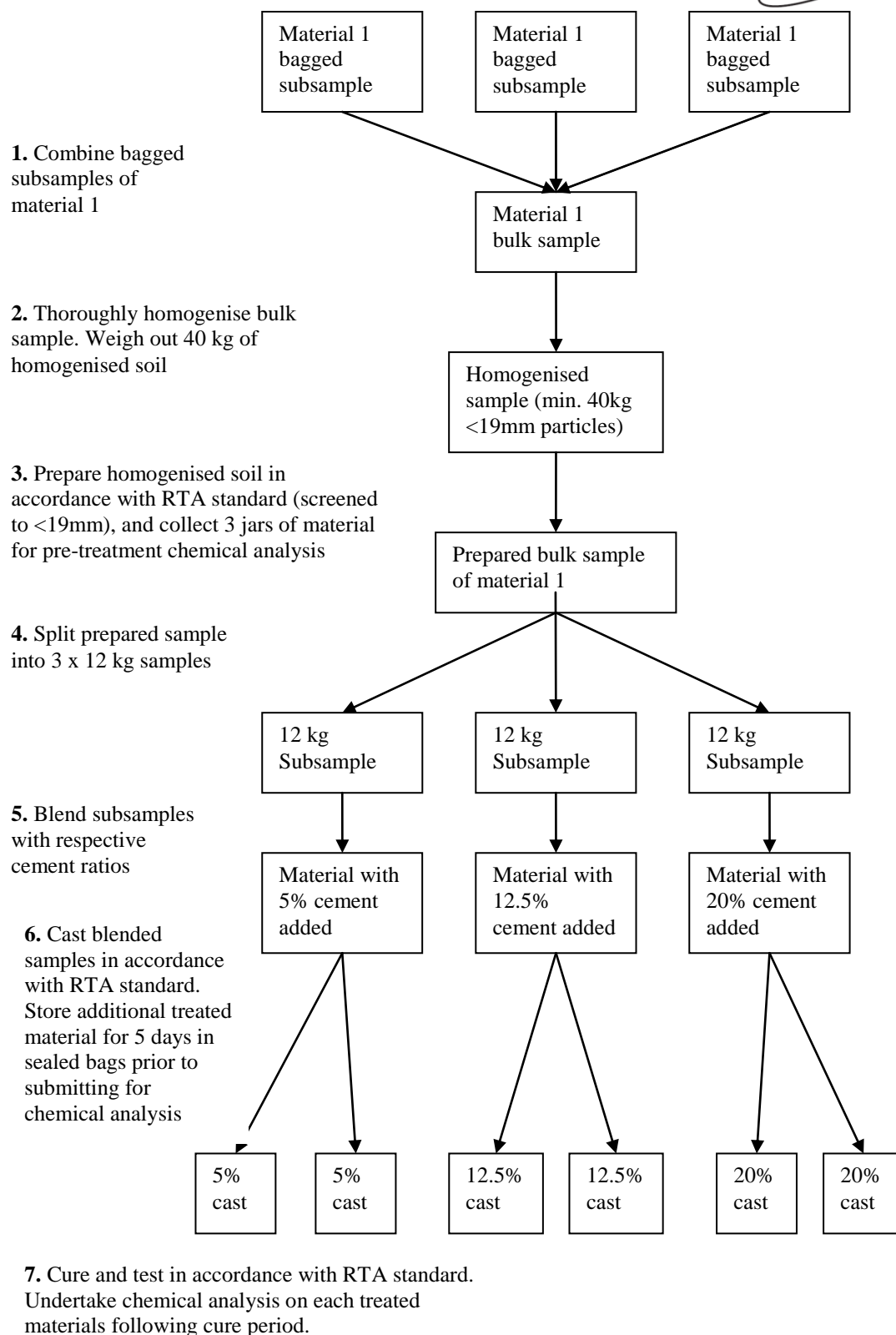


Figure 1. Procedural flowchart followed for each material.

Sample Collection

Bulk sample collection at Macdonaldtown was conducted on 2nd July, 2010 by JBS and subsequently transferred to Enviropacific's Sydney office. Three types of material were targeted:

- Material 1: TP1 at 0.3 – 0.4 m depth
- Material 2: TP3 at 1.3 – 1.7 m depth
- Material 3: TP3 at 4.0 – 4.2 m depth

Material Description

- Material 1 was a silty, gravelly sand fill (refer to Fig 2).
- Material 2 was a silty clay fill (refer to Fig 3).
- Material 3 was a silty clay fill (refer to Fig 4).



Figure 2.



Figure 3.



Figure 4.

SYDNEY 1/28 Barcoo Street, Chatswood, NSW 2144
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Results/Discussion

A detailed summary of the chemical analysis and UCS testing results is included in Attachment 5. The total and leachable (TCLP for pre-treated material and ASLP-DI water for post-treated material) concentrations for the main contaminants of concern (BaP, total PAHs and TPH-C10-C36) and UCS results are summarised in Table 1 below. A discussion of the results is provided below.

Table 1. Summary of total and leachable results (TCLP for pre-treated material and ASLP-DI water for post-treated material) for BaP, PAHs and TPH (C10-C36) (ND = Not Determined).

| Sample ID | Total BaP (mg/kg) | Leachable BaP TCLP/ASLP (mg/L) | Total PAHs (mg/kg) | Leachable PAHs TCLP/ASLP (mg/L) | Total TPH C10-C36 (mg/kg) | Leachable TPH C10-C36 TCLP/ASLP (µg/L) | Mean UCS 7-day curing (MPa) |
|-------------------------------|-------------------|--------------------------------|--------------------|---------------------------------|---------------------------|--|-----------------------------|
| General Solid Criteria | 10 | 40 | 200 | - | 10,000 | - | |
| Restricted Solid Criteria | 23 | 160 | 800 | - | 40,000 | - | |
| Pre-treated materials | | | | | | | |
| Material 1 Pre 1 | 4.4 | <0.001 | 34 | <0.001 | 700 | 120 | ND |
| Material 1 Pre 2 | 4.5 | <0.001 | 35 | <0.001 | 700 | 110 | ND |
| Material 1 Pre 3 | 5.6 | <0.001 | 53 | <0.001 | 760 | <250 | ND |
| Mean | 4.8 | <0.001 | 41 | <0.001 | 720 | 115 | |
| Material 2 Pre 1 | 0.9 | <0.001 | 276 | 3.5 | 650 | 8740 | ND |
| Material 2 Pre 2 | 1.1 | <0.001 | 292 | 2.8 | 780 | 7060 | ND |
| Material 2 Pre 3 | 1.0 | <0.001 | 331 | 2.7 | 790 | 6150 | ND |
| Mean | 1.0 | <0.001 | 299 | 3.0 | 740 | 7317 | |
| Material 3 Pre 1 | 0.2 | <0.001 | 5 | 3.3 | <250 | 2120 | ND |
| Material 3 Pre 2 | 2.1 | <0.001 | 39 | 3.0 | 370 | 6960 | ND |
| Material 3 Pre 3 | 1.7 | <0.001 | 36 | 1.2 | 450 | 1480 | ND |
| Mean | 1.3 | <0.001 | 27 | 2.5 | 410 | 3520 | |
| Post-treated materials | | | | | | | |
| Control - Material 3 | 1.7 | <0.001 | 51 | 0.083 | 500 | 680 | ND |
| Material 1 Post 5% | 4.7 | <0.001 | 44 | <0.001 | 360 | 400 | 2.18 |
| Material 1 Post 12.5% | 3.8 | <0.001 | 34 | <0.001 | 320 | 280 | 3.10 |
| Material 1 Post 20% | 3.9 | <0.001 | 43 | <0.001 | 300 | 290 | 5.85 |
| Material 2 Post 5% | 2.0 | <0.001 | 171 | 2.6 | 810 | 6700 | 0.35 |
| Material 2 Post 12.5% | 1.6 | <0.001 | 117 | 1.9 | 450 | 5700 | 1.00 |
| Material 2 Post 20% | 1.6 | <0.001 | 101 | 1.5 | 420 | 4900 | 1.55 |
| Material 3 Post 5% | 0.8 | <0.001 | 17 | 0.26 | <250 | 1420 | 0.13 |
| Material 3 Post 12.5% | 0.8 | <0.001 | 20 | 0.33 | <280 | 1300 | 0.43 |
| Material 3 Post 20% | 1.7 | <0.001 | 48 | 0.48 | 460 | 1950 | 0.60 |

Total (SCC) results - untreated samples:

The main contaminants of concern in the materials are total PAHs. The total PAHs in the Material 2 would result in this untreated material being classified as Restricted solid waste, whereas total PAHs in Materials 1 and 3 would result in these untreated materials being classified as General solid waste. Notably, naphthalene comprised ~1%, 90% and 30% of the total PAHs in Materials 1-3, respectively. Generally the percentage of small-ring PAHs in the material reflects both the aging and nature of the material (e.g. the percentage increases as the amount of coal tar material increases). All other contaminants of concern were well below the General solid waste criteria.

Total (SCC) results – cement treated samples:

The total contaminant results for treated samples for each of the materials were generally similar to the untreated sample. Any observed differences appear to be related more to the heterogeneity of the material, rather than dilution of the sample with treatment reagents. The total PAHs in treated samples of Material 2 however decreased by 43% (at 5% cement), 61% (at 12.5% cement) and 66% (at 20% cement), and is mainly attributable to decreased naphthalene in the treated samples of Material 2, which decreased from ~90% of total PAHs to 70% (at 5% cement), 63% (at 12.5% cement) and 59% (at 20% cement). This is most likely related to increased volatilisation of naphthalene with the amount of cement added, resulting from the heat of reaction (i.e. heat of hydration). The percentages of naphthalene in Material 1 and 3 were similar in the treated samples to the untreated samples.

Leachable results – General Comments/Limitations

With the exception of BaP, there are currently no criteria for the leachability of total PAHs or TPHs in either the Waste Classification Guidelines or the General IA for gasworks waste (2005/14). Hence there is no point of reference for the leachability of total PAHs and TPHs provided by the DECCW. The leachable PAHs and TPHs are discussed in this report in the context that this information is considered to be relevant to the retention of treated material on site. With regards to assessing the leachability of contaminants from cement stabilised waste, it is worth noting that current leachate methods (TCLP, ASLP and MEP are the only leachate tests currently used by regulatory authorities in Australia) have important limitations. For example, each of these methods require particle size reduction to either 9.5 mm (TCLP and MEP) or 2.4 mm (ASLP), which effectively contravenes the assessment of encapsulated wastes as the integrity of the monolithic structure is compromised, and each of these methods employ vigorous end-over-end agitation of the sample. In fact in AS4439.3-1997 (ASLP) the Scope states that "The procedure is not applicable to encapsulated wastes which cannot be reduced to the specified maximum particle size without breaking the

integrity of encapsulation". For this reason, in the General IA, the DECCW is in effect relying on the UCS measurement as an indicator of the stability of cement stabilised waste, whilst still requiring BaP leachability (TCLP) for cement stabilised samples to be below the Waste Classification Guidelines criteria (and from previous EPS experience with other gasworks projects BaP leachability has typically been non-detectable in both the untreated and cement stabilised samples using TCLP).

If a more appropriate leach test (e.g. a diffusion-based or column leach test on a moulded/monolithic sample) was adopted for assessing the leachability of cement stabilised materials destined for on-site placement, the optimum UCS required to minimise contaminant leachability could be more accurately determined, and a different leachability data set may result, that might be more appropriately applied to acceptance criteria for on-site placement of cement stabilised material.

Leachable results (TCLP) – untreated samples

Leachable results for the large-ring PAHs (>pyrene and including BaP) for all untreated materials were below laboratory detection limits. However, total PAH leachability was relatively high in Materials 2 and 3 (mean results of 3.0 and 2.5 mg/L, respectively) and was mainly attributable to leachable naphthalene (98%). Notably, total naphthalene in these two materials was significantly different (270 mg/kg for Material 2 compared to 6.7 mg/kg for Material 3). The ASLP-DI water total PAH leachability for the untreated control (Material 3) submitted with the treated samples was significantly lower (0.083 mg/L). The leachabilities of all other contaminants of concern for the untreated materials were well below the General solid waste criteria.

Leachable results (ASLP-DI water) – cement treated samples

BaP leachability remained non-detectable in all three materials for all ratios of cement addition. Total PAH leachability remained relatively high in Material 2 (max 2.6 mg/L at 5% cement, min 1.5 mg/L at 20% cement), and was again mainly attributable to leachable naphthalene (~91%). Given the lower total naphthalene in the treated samples for Material 2, there is little evidence of reduced leachability of naphthalene (and other PAHs) in the cement treated samples using the ASLP method, despite achieving UCS strengths of >1 MPa for Material 2 (refer Table 1). In fact, for Material 3 all three cement treated samples demonstrated higher total PAH leachability (up to six times higher for 20% cement) than for the control (untreated Material 3) using ASLP-DI water. Similarly, leachable TPHs for treated samples of Material 3 increased by at least two-fold compared to the untreated control using ASLP-DI water. Increased leachability of organic contaminants from cement stabilised

samples (and hence lack of evidence of their immobilisation) has been previously observed by EPS in other gasworks projects using TCLP and/or ASLP, and clearly demonstrates the limitations of these methods for assessing the leachability of cement stabilised materials, as mentioned above.

Notably, the leachability of some inorganic contaminants (e.g. arsenic, chromium) were higher in the treated ASLP results compared to untreated TCLP results, which is related to the amphoteric nature of these contaminants where their solubility increases at higher pH. However the leachabilities of all inorganic contaminants in the treated samples were well below the General solid waste criteria.

UCS Results – cement treated samples

UCS testing is currently required by DECCW as part of the General IA for gasworks waste for assessing the stability of cement stabilised wastes destined for off-site landfill disposal with a target of 1 MPa. UCS results for the cement treated materials (refer Table 1) showed that >1 MPa was readily achieved for Material 1 using 5% cement (mean result 2.2 MPa). For Material 2, a higher ratio of cement was required (12.5% cement resulted in 1.0 MPa UCS), which would be related to the higher level of organic contamination in this material and/or the higher clay content. For Material 3, treatment with 20% cement resulted in a UCS of only 0.6 MPa. This sample was observed to have very high clay content, providing very little aggregate for the cement curing process. The low level of organic contaminants observed in Material 3 indicates that the contaminants did not have had a significant effect on the UCS results for this material.

Summary

The level of contamination in the three materials was relatively low for gasworks waste. Total PAHs in the Material 2 would result in the untreated material being classified as Restricted solid waste. All other contaminants of concern were well below the General solid waste criteria. UCS measurements of >1 MPa were achieved for Materials 1 and 2, whereas a maximum UCS of 0.6 MPa was achieved for Material 3.

The results from this trial show that there is no direct relationship between the UCS measurement and the leachability of contaminants from cement stabilised materials. In fact, cement treatment appears to increase the leachability of organic contaminants, as assessed using ASLP-DI water. If a more appropriate (alternative) test was used to assess the leachability of contaminants from stabilised waste to be placed on-site, the optimum UCS required to minimise leachability of contaminants could be more accurately determined.

Historically in NSW some degree of macroencapsulation of gasworks waste with cement has been undertaken for waste being disposed of to landfill, in order to provide a sufficient level of confidence in the long-term stability of the treated waste.

Attachments

Attachments 1-3 – Laboratory reports from Envirolab Services

Attachment 4 – Laboratory reports from Douglas Partners

Attachment 5 – Macdonaldtown Results Summary

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sydney@douglaspartners.com.au

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 D |
| | | Report Date: | 04/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 27/07/10 |
| | | Date of Test: | 27/07/10 |
| | | Page: | 1 of 1 |

| | |
|--|---|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 1 + 5% cement |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +5°C |

| | Specimen A | Specimen B |
|---|----------------------|----------------------|
| Moisture Content at Compaction: | 14.5% | 14.0% |
| Load at failure kN: | 16.576% | 21.042% |
| Dry Density of test specimens: | 1.83t/m ³ | 1.86t/m ³ |
| Unconfined Compressive Strength: | 1.90MPa | 2.45MPa |

Test Method(s): RTA T446, T131
Sampling Method(s): Sampled by client – compacted in laboratory
Remarks:

Approved Signatory:

Norman Weimann
Laboratory Manager

Tested: MBG
Checked: NW



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 E |
| | | Report Date: | 04/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 27/07/10 |
| | | Date of Test: | 27/07/10 |
| | | Page: | 1 of 1 |

| | |
|---|---|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 1 + 12.5% cement |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +5°C |

| | Specimen C | Specimen D |
|----------------------------------|----------------------|----------------------|
| Moisture Content at Compaction: | 12.5% | 12.5% |
| Load at failure kN: | 28.914% | 25.484% |
| Dry Density of test specimens: | 1.86t/m ³ | 1.84t/m ³ |
| Unconfined Compressive Strength: | 3.30MPa | 2.90MPa |

Test Method(s): RTA T446, T131

Sampling Method(s): Sampled by client – compacted in laboratory

Remarks:

Approved Signatory:

Tested: MBG
Checked: NW

Norman Weimann
Laboratory Manager



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 F |
| | | Report Date: | 04/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 27/07/10 |
| | | Date of Test: | 27/07/10 |
| | | Page: | 1 of 1 |

| | | |
|---|---|----------------------|
| Material Retained on 19mm sieve: | 0% | |
| Material Description: | Material 1 + 20.0% cement | |
| Elapsed time between addition of binder and compaction: | 15 mins | |
| Method of Compaction: | Standard | |
| No. of layers | 3 | |
| Curing Details: | 7 day accelerated curing at 65°C & +5°C | |
| | Specimen E | Specimen F |
| Moisture Content at Compaction: | 11.5% | 11.5% |
| Load at failure kN: | 53.145% | 47.990% |
| Dry Density of test specimens: | 1.82t/m ³ | 1.85t/m ³ |
| Unconfined Compressive Strength: | 6.15MPa | 5.55MPa |

Test Method(s): RTA T416, T131
Sampling Method(s): Sampled by client – compacted in laboratory
Remarks:

Approved Signatory:

Norman Weimann
Laboratory Manager

Tested: MBG
Checked: NW



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|---------------------------------|----------------------|-----------|
| Client: | Enviro Pacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 G |
| | | Report Date: | 06/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 30/07/10 |
| | | Date of Test: | 30/07/10 |
| | | Page: | 1 of 1 |

| | |
|---|---|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 2 + 5% |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +5°C |

| | Specimen A | Specimen B |
|----------------------------------|----------------------|----------------------|
| Moisture Content at Compaction: | 16.5% | 17.0% |
| Load at failure kN: | 3.008% | 3.018% |
| Dry Density of test specimens: | 1.76t/m ³ | 1.74t/m ³ |
| Unconfined Compressive Strength: | 0.35MPa | 0.35MPa |

Test Method(s): RTA T146, T131
Sampling Method(s): Sampled by client – compacted in laboratory
Remarks:

Approved Signatory:

Norman Weimann
Laboratory Manager

Tested: MBG
Checked: NW



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 H |
| | | Report Date: | 06/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 30/07/10 |
| | | Date of Test: | 30/07/10 |
| | | Page: | 1 of 1 |

| | |
|---|---|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 2 + 12.5% |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +/-5°C |

| | Specimen C | Specimen D |
|----------------------------------|----------------------|----------------------|
| Moisture Content at Compaction: | 15.5% | 15.0% |
| Load at failure kN: | 8.928% | 8.353% |
| Dry Density of test specimens: | 1.77t/m ³ | 1.72t/m ³ |
| Unconfined Compressive Strength: | 1.05MPa | 0.95MPa |

Test Method(s): RTA T446, T131

Sampling Method(s): Sampled by client – compacted in laboratory

Remarks:

Approved Signatory:

Tested: MBG
Checked: NW

Norman Weimann
Laboratory Manager



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 I |
| | | Report Date: | 06/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 30/07/10 |
| | | Date of Test: | 30/07/10 |
| | | Page: | 1 of 1 |

| | |
|---|---|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 2 + 20.0% |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +5°C |

| | Specimen E | Specimen F |
|----------------------------------|----------------------|----------------------|
| Moisture Content at Compaction: | 14.5% | 13.5% |
| Load at failure kN: | 14.184% | 12.705% |
| Dry Density of test specimens: | 1.76t/m ³ | 1.76t/m ³ |
| Unconfined Compressive Strength: | 1.65MPa | 1.45MPa |

Test Method(s): RTA T416, T131

Sampling Method(s): Sampled by client – compacted in laboratory

Remarks:

Approved Signatory:

Tested: MBG
Checked: NW

Norman Weimann
Laboratory Manager



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|---------------------------------------|----------------------|------------------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 A |
| | | Report Date: | 04/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 27/07/10 |
| | | Date of Test: | 27/07/10 |
| | | Page: | 1 of 1 |

| | |
|--|--|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 3 + 5% cement |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +5°C |

| | | |
|---|----------------------------|----------------------------|
| | Specimen A | Specimen B |
| Moisture Content at Compaction: | 27.5% | 26.5% |
| Load at failure kN: | 0.894% | 1.417% |
| Dry Density of test specimens: | 1.57t/m³ | 1.58t/m³ |
| Unconfined Compressive Strength: | 0.10MPa | 0.15MPa |

Test Method(s): RTA T446, T131
Sampling Method(s): Sampled by client – compacted in laboratory
Remarks:

Approved Signatory:

Norman Weimann
Laboratory Manager

Tested: MBG
Checked: NW



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Envlo Pacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 B |
| | | Report Date: | 04/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 27/07/10 |
| | | Date of Test: | 27/07/10 |
| | | Page: | 1 of 1 |

| | |
|---|--|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 3 + 12.5% cement |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +/- 5°C |

| | Specimen C | Specimen D |
|----------------------------------|----------------------|----------------------|
| Moisture Content at Compaction: | 26.0% | 26.0% |
| Load at failure kN: | 3.991% | 3.395% |
| Dry Density of test specimens: | 1.60t/m ³ | 1.59t/m ³ |
| Unconfined Compressive Strength: | 0.45MPa | 0.40MPa |

Test Method(s): RTA T446, T131
Sampling Method(s): Sampled by client – compacted in laboratory
Remarks:

Approved Signatory:

Norman Weimann
Laboratory Manager

Tested: MBG
Checked: NW



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DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS

| | | | |
|------------------|--------------------------------|----------------------|-----------|
| Client: | Enviropacific Services Pty Ltd | Project No: | 66360 |
| Project: | Macdonaldtown Gasworks | Report No: | S10-006 C |
| | | Report Date: | 04/08/10 |
| Location: | Macdonaldtown | Date Sampled: | 27/07/10 |
| | | Date of Test: | 27/07/10 |
| | | Page: | 1 of 1 |

| | |
|---|--|
| Material Retained on 19mm sieve: | 0% |
| Material Description: | Material 3 + 20% cement |
| Elapsed time between addition of binder and compaction: | 15 mins |
| Method of Compaction: | Standard |
| No. of layers | 3 |
| Curing Details: | 7 day accelerated curing at 65°C & +-5°C |

| | Specimen E | Specimen F |
|----------------------------------|----------------------|----------------------|
| Moisture Content at Compaction: | 22.0% | 24.0% |
| Load at failure kN: | 4.879% | 5.588% |
| Dry Density of test specimens: | 1.62t/m ³ | 1.60t/m ³ |
| Unconfined Compressive Strength: | 0.55MPa | 0.65MPa |

Test Method(s): RTA T446, T131

Sampling Method(s): Sampled by client – compacted in laboratory

Remarks:

Approved Signatory:

Norman Weimann
Laboratory Manager

Tested: MBG
Checked: NW



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CERTIFICATE OF ANALYSIS 43953

Client:

Enviropacific Services (Chatswood) Pty Ltd
1/28 Barcoo St
Chatswood
NSW 2067

Attention: Marty Croker

Sample log in details:

| | |
|---------------------------------------|---|
| Your Reference: | <u>E10100 Macdonaldtown Gasworks</u> |
| No. of samples: | 9 Soils |
| Date samples received: | 26/07/10 |
| Date completed instructions received: | 26/07/10 |

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

| | |
|-----------------------------|------------|
| Date results requested by: | 2/08/10 |
| Date of Preliminary Report: | Not Issued |
| Issue Date: | 13/08/10 |

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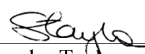
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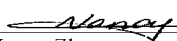
Tests not covered by NATA are denoted with *.

Results Approved By:


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Envirolab Reference: 43953
Revision No: R 01



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|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| VOCs in soil Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 |
| styrene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 93 | 91 | 90 | 92 | 92 |
| Surrogate aaa-Trifluorotoluene | % | 70 | 77 | 75 | 75 | 72 |
| Surrogate Toluene-d8 | % | 110 | 107 | 96 | 112 | 113 |
| Surrogate 4-Bromofluorobenzene | % | 94 | 93 | 92 | 110 | 103 |

| | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| VOCs in soil Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 |
| styrene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 95 | 95 | 96 | 95 |
| Surrogate aaa-Trifluorotoluene | % | 73 | 73 | 73 | 72 |
| Surrogate Toluene-d8 | % | 114 | 114 | 114 | 113 |
| Surrogate 4-Bromofluorobenzene | % | 105 | 96 | 95 | 96 |

| vTPH & BTEX in Soil Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 30/7/2010 | 30/7/2010 | 30/7/2010 | 30/7/2010 | 30/7/2010 |
| vTPH C ₆ - C ₉ | mg/kg | <25 | <25 | <25 | 54 | 37 |
| Benzene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | 0.70 | 0.60 |
| Ethylbenzene | mg/kg | <1.0 | <1.0 | <1.0 | 19 | 14 |
| m+p-xylene | mg/kg | <2.0 | <2.0 | <2.0 | 16 | 11 |
| o-Xylene | mg/kg | <1.0 | <1.0 | <1.0 | 15 | 11 |
| Surrogate aaa-Trifluorotoluene | % | 70 | 77 | 75 | 75 | 72 |

| vTPH & BTEX in Soil Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 30/7/2010 | 30/7/2010 | 30/7/2010 | 30/7/2010 |
| vTPH C ₆ - C ₉ | mg/kg | 65 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 |
| Toluene | mg/kg | 0.80 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | 21 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | mg/kg | 17 | <2.0 | <2.0 | <2.0 |
| o-Xylene | mg/kg | 15 | <1.0 | <1.0 | <1.0 |
| Surrogate aaa-Trifluorotoluene | % | 73 | 73 | 73 | 72 |

| | | | | | | |
|------------------------|-------|---------------------|---------------------|---------------------|---------------------|---------------------|
| sTPH in Soil (C10-C36) | | | | | | |
| Our Reference: | UNITS | 43953-1 | 43953-2 | 43953-3 | 43953-4 | 43953-5 |
| Your Reference | ----- | Material 1 Pre 1 | Material 1 Pre 2 | Material 1 Pre 3 | Material 2 Pre 1 | Material 2 Pre 2 |
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| TPH C10 - C14 | mg/kg | <50 | <50 | <50 | 440 | 580 |
| TPH C15 - C28 | mg/kg | 320 | 330 | 390 | 210 | 200 |
| TPH C29 - C36 | mg/kg | 380 | 370 | 370 | <100 | <100 |
| Surrogate o-Terphenyl | % | # | # | # | # | # |

| | | | | | |
|------------------------|-------|---------------------|---------------------|---------------------|---------------------|
| sTPH in Soil (C10-C36) | | | | | |
| Our Reference: | UNITS | 43953-6 | 43953-7 | 43953-8 | 43953-9 |
| Your Reference | ----- | Material 2 Pre 3 | Material 3 Pre 1 | Material 3 Pre 2 | Material 3 Pre 3 |
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| TPH C10 - C14 | mg/kg | 570 | <50 | 110 | 140 |
| TPH C15 - C28 | mg/kg | 220 | <100 | 260 | 310 |
| TPH C29 - C36 | mg/kg | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | # | 100 | # | # |

| PAHs in Soil Our Reference: Your Reference | UNITS ----- ----- | 43953-1 Material 1 Pre 1 26/07/2010 Soil | 43953-2 Material 1 Pre 2 26/07/2010 Soil | 43953-3 Material 1 Pre 3 26/07/2010 Soil | 43953-4 Material 2 Pre 1 26/07/2010 Soil | 43953-5 Material 2 Pre 2 26/07/2010 Soil |
|--|-------------------------|--|--|--|--|--|
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 30/07/2010 | 30/07/2010 | 30/07/2010 | 30/07/2010 | 30/07/2010 |
| Naphthalene | mg/kg | 0.4 | 0.4 | 0.5 | 250 | 260 |
| Acenaphthylene | mg/kg | 0.7 | 0.7 | 1.4 | 1.6 | 2.0 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | <0.1 | 3.7 | 4.9 |
| Fluorene | mg/kg | 0.2 | 0.2 | 0.5 | 3.3 | 4.2 |
| Phenanthrene | mg/kg | 2.0 | 1.8 | 5.8 | 5.8 | 7.1 |
| Anthracene | mg/kg | 0.6 | 0.6 | 1.5 | 1.6 | 2.0 |
| Fluoranthene | mg/kg | 4.3 | 4.7 | 8.3 | 2.4 | 2.8 |
| Pyrene | mg/kg | 5.0 | 6.2 | 8.5 | 3.0 | 3.4 |
| Benzo(a)anthracene | mg/kg | 3.3 | 3.3 | 4.4 | 1 | 1.1 |
| Chrysene | mg/kg | 2.7 | 3.2 | 4.0 | 0.9 | 1.1 |
| Benzo(b+k)fluoranthene | mg/kg | 6.0 | 5.5 | 7.5 | 1.0 | 1.2 |
| Benzo(a)pyrene | mg/kg | 4.4 | 4.5 | 5.6 | 0.9 | 1.1 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 2.0 | 1.9 | 2.4 | 0.3 | 0.3 |
| Dibenzo(a,h)anthracene | mg/kg | 0.5 | 0.4 | 0.5 | <0.1 | <0.1 |
| Benzo(g,h,i)perylene | mg/kg | 1.9 | 2.0 | 2.3 | 0.3 | 0.4 |
| Surrogate p-Terphenyl-d14 | % | 75 | 77 | 74 | 80 | 66 |

| PAHs in Soil Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 30/07/2010 | 30/07/2010 | 30/07/2010 | 30/07/2010 |
| Naphthalene | mg/kg | 300 | 1.7 | 11 | 7.4 |
| Acenaphthylene | mg/kg | 1.9 | 0.1 | 0.8 | 0.9 |
| Acenaphthene | mg/kg | 4.6 | 0.1 | 0.4 | 0.7 |
| Fluorene | mg/kg | 4.0 | 0.2 | 1.3 | 1.7 |
| Phenanthrene | mg/kg | 6.9 | 0.6 | 4.3 | 5.2 |
| Anthracene | mg/kg | 1.9 | 0.2 | 1.2 | 1.5 |
| Fluoranthene | mg/kg | 2.8 | 0.4 | 4.1 | 4.1 |
| Pyrene | mg/kg | 3.5 | 0.6 | 5.0 | 5.3 |
| Benzo(a)anthracene | mg/kg | 1.1 | 0.2 | 2.2 | 1.9 |
| Chrysene | mg/kg | 1.1 | 0.2 | 2.1 | 1.8 |
| Benzo(b+k)fluoranthene | mg/kg | 1.1 | 0.3 | 2.9 | 2.3 |
| Benzo(a)pyrene | mg/kg | 1.0 | 0.2 | 2.1 | 1.7 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.3 | <0.1 | 0.8 | 0.6 |
| Dibenzo(a,h)anthracene | mg/kg | <0.1 | <0.1 | 0.2 | 0.2 |
| Benzo(g,h,i)perylene | mg/kg | 0.3 | <0.1 | 0.9 | 0.7 |
| Surrogate p-Terphenyl-d ₁₄ | % | 76 | 75 | 79 | 92 |

| Speciated Phenols in Soil Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43953-1 Material 1 Pre 1 26/07/2010 Soil | 43953-2 Material 1 Pre 2 26/07/2010 Soil | 43953-3 Material 1 Pre 3 26/07/2010 Soil | 43953-4 Material 2 Pre 1 26/07/2010 Soil | 43953-5 Material 2 Pre 2 26/07/2010 Soil |
|---|-------------------------|--|--|--|--|--|
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 2/8/2010 | 2/8/2010 | 2/8/2010 | 2/8/2010 | 2/8/2010 |
| Phenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| Surrogate 2-fluorophenol | % | 105 | 95 | 92 | 116 | 123 |
| Surrogate Phenol-d6 | % | 68 | 84 | 82 | 96 | 89 |
| Surrogate 2,4,6-Tribromophenol | % | 93 | 99 | 89 | 139 | 140 |
| Surrogate p-Terphenyl-d14 | % | 114 | 114 | 105 | 116 | 114 |

| Speciated Phenols in Soil Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43953-6 Material 2 Pre 3 26/07/2010 Soil | 43953-7 Material 3 Pre 1 26/07/2010 Soil | 43953-8 Material 3 Pre 2 26/07/2010 Soil | 43953-9 Material 3 Pre 3 26/07/2010 Soil |
|---|-----------------------------|--|--|--|--|
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 2/8/2010 | 2/8/2010 | 2/8/2010 | 2/8/2010 |
| Phenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 | <10 | <10 |
| Surrogate 2-fluorophenol | % | 122 | 111 | 116 | 72 |
| Surrogate Phenol-d6 | % | 82 | 72 | 122 | 63 |
| Surrogate 2,4,6-Tribromophenol | % | 127 | 100 | 120 | 78 |
| Surrogate p-Terphenyl-d14 | % | 108 | 106 | 110 | 76 |

| Acid Extractable metals in soil Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Arsenic | mg/kg | 36 | 38 | 44 | <4 | <4 |
| Cadmium | mg/kg | 1.1 | 1.4 | 1.3 | <0.5 | <0.5 |
| Chromium | mg/kg | 19 | 20 | 20 | 14 | 14 |
| Lead | mg/kg | 230 | 230 | 300 | 27 | 32 |
| Mercury | mg/kg | 0.4 | 0.3 | 0.4 | <0.1 | <0.1 |
| Nickel | mg/kg | 21 | 26 | 27 | 3 | 3 |

| Acid Extractable metals in soil Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date digested | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Arsenic | mg/kg | 8 | <4 | 5 | 6 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 19 | 14 | 20 | 24 |
| Lead | mg/kg | 43 | 11 | 21 | 29 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | 3 | 2 | 2 | 3 |

| | | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Moisture Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date prepared | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Moisture | % | 15 | 10 | 16 | 21 | 21 |

| | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Moisture Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date prepared | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Moisture | % | 2.7 | 21 | 22 | 20 |

| | | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| VOCs in Zero Headspace Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 |
| Styrene | µg/L | <1.0 | <1.0 | <1.0 | 3.2 | 3.0 |
| Surrogate Dibromofluoromethane | % | 107 | 109 | 111 | 108 | 104 |
| Surrogate toluene-d8 | % | 61 | 110 | 97 | 112 | 99 |
| Surrogate 4-BFB | % | 95 | 93 | 94 | 121 | 115 |

| | | | | | |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| VOCs in Zero Headspace Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 |
| Styrene | µg/L | 2.3 | 1.2 | 1.3 | 1.2 |
| Surrogate Dibromofluoromethane | % | 100 | 98 | 106 | 107 |
| Surrogate toluene-d8 | % | 102 | 117 | 108 | 100 |
| Surrogate 4-BFB | % | 114 | 103 | 105 | 107 |

| BTEX in Zero Headspace Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 | 10 | 10 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 | 19 | 17 |
| Ethylbenzene | µg/L | <1.0 | <1.0 | <1.0 | 270 | 260 |
| m+p-xylene | µg/L | <2.0 | <2.0 | <2.0 | 250 | 240 |
| o-xylene | µg/L | <1.0 | <1.0 | <1.0 | 210 | 200 |
| Surrogate Dibromofluoromethane | % | 107 | 109 | 111 | 108 | 104 |
| Surrogate toluene-d8 | % | 101 | 110 | 97 | 112 | 99 |
| Surrogate 4-BFB | % | 95 | 93 | 94 | 121 | 115 |

| BTEX in Zero Headspace Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 31/7/2010 | 31/7/2010 | 31/7/2010 | 31/7/2010 |
| Benzene | µg/L | 13 | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | 21 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | 290 | 3.7 | 8.1 | 8.8 |
| m+p-xylene | µg/L | 270 | 2.2 | 5.0 | 6.1 |
| o-xylene | µg/L | 230 | 2.7 | 5.9 | 6.8 |
| Surrogate Dibromofluoromethane | % | 100 | 98 | 106 | 107 |
| Surrogate toluene-d8 | % | 102 | 117 | 108 | 100 |
| Surrogate 4-BFB | % | 114 | 103 | 105 | 107 |

| Metals in TCLP USEPA1311 Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| pH of soil for fluid# determ. | pH units | 6.80 | 7.40 | 7.70 | 7.90 | 7.60 |
| pH of soil for fluid # determ. (acid) | pH units | 1.50 | 1.50 | 1.50 | 1.50 | 1.40 |
| Extraction fluid used | - | 1 | 1 | 1 | 1 | 1 |
| pH of final Leachate | pH units | 5.10 | 5.10 | 5.10 | 5.00 | 5.00 |
| Arsenic in TCLP | mg/L | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Cadmium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chromium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Lead in TCLP | mg/L | 0.04 | 0.07 | 0.03 | <0.03 | <0.03 |
| Mercury in TCLP | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Nickel in TCLP | mg/L | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |

| Metals in TCLP USEPA1311 Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
|--|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Date Sampled | ----- | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| Type of sample | | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| pH of soil for fluid# determ. | pH units | 7.40 | 5.00 | 6.10 | 5.90 |
| pH of soil for fluid # determ. (acid) | pH units | 1.50 | 1.40 | 1.40 | 1.40 |
| Extraction fluid used | - | 1 | 1 | 1 | 1 |
| pH of final Leachate | pH units | 5.00 | 4.90 | 4.90 | 4.90 |
| Arsenic in TCLP | mg/L | <0.05 | <0.05 | <0.05 | <0.05 |
| Cadmium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 |
| Chromium in TCLP | mg/L | <0.01 | <0.01 | <0.01 | <0.01 |
| Lead in TCLP | mg/L | <0.03 | <0.03 | <0.03 | 0.05 |
| Mercury in TCLP | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Nickel in TCLP | mg/L | <0.02 | <0.02 | <0.02 | <0.02 |

| | | | | | | |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| TPH in TCLP extract Our Reference: Your Reference | UNITS ----- | 43953-1 Material 1 Pre 1 | 43953-2 Material 1 Pre 2 | 43953-3 Material 1 Pre 3 | 43953-4 Material 2 Pre 1 | 43953-5 Material 2 Pre 2 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | <50 | <50 | <50 | 8,000 | 6,500 |
| TPH C ₁₅ - C ₂₈ | µg/L | 120 | 110 | <100 | 740 | 560 |
| TPH C ₂₉ - C ₃₆ | µg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | 120 | 129 | 109 | # | # |

| | | | | | |
|---|----------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| TPH in TCLP extract Our Reference: Your Reference | UNITS ----- | 43953-6 Material 2 Pre 3 | 43953-7 Material 3 Pre 1 | 43953-8 Material 3 Pre 2 | 43953-9 Material 3 Pre 3 |
| Date Sampled Type of sample | ----- | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil | 26/07/2010 Soil |
| Date extracted | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| Date analysed | - | 29/7/2010 | 29/7/2010 | 29/7/2010 | 29/7/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 5,700 | 1,700 | 6,000 | 990 |
| TPH C ₁₅ - C ₂₈ | µg/L | 450 | 420 | 960 | 490 |
| TPH C ₂₉ - C ₃₆ | µg/L | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | # | # | # | 123 |

| PAHs in TCLP (USEPA 1311) | | | | | | |
|---------------------------------------|-------|----------------|----------------|----------------|----------------|----------------|
| Our Reference: | UNITS | 43953-1 | 43953-2 | 43953-3 | 43953-4 | 43953-5 |
| Your Reference | ----- | Material 1 Pre | Material 1 Pre | Material 1 Pre | Material 2 Pre | Material 2 Pre |
| Date Sampled | ----- | 1 | 2 | 3 | 1 | 2 |
| Type of sample | | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 | 26/07/2010 |
| | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Naphthalene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 3.4 | 2.7 |
| Acenaphthylene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.03 | 0.02 |
| Acenaphthene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.040 | 0.030 |
| Fluorene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.020 | 0.020 |
| Phenanthrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.010 | 0.010 |
| Anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.002 | 0.002 |
| Fluoranthene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 |
| Pyrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | 0.001 | <0.001 |
| Benzo(a)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chrysene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in TCLP | mg/L | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzo(a)pyrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 103 | 108 | 93 | 85 | 129 |

| PAHs in TCLP (USEPA 1311) Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43953-6 Material 2 Pre 3 26/07/2010 Soil | 43953-7 Material 3 Pre 1 26/07/2010 Soil | 43953-8 Material 3 Pre 2 26/07/2010 Soil | 43953-9 Material 3 Pre 3 26/07/2010 Soil |
|---|-------------------------|--|--|--|--|
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Naphthalene in TCLP | mg/L | 2.6 | 3.2 | 2.9 | 1.2 |
| Acenaphthylene in TCLP | mg/L | 0.02 | 0.001 | 0.003 | 0.001 |
| Acenaphthene in TCLP | mg/L | 0.030 | 0.009 | 0.010 | 0.007 |
| Fluorene in TCLP | mg/L | 0.020 | 0.020 | 0.020 | 0.010 |
| Phenanthrene in TCLP | mg/L | 0.010 | 0.020 | 0.020 | 0.010 |
| Anthracene in TCLP | mg/L | 0.002 | 0.003 | 0.003 | 0.002 |
| Fluoranthene in TCLP | mg/L | 0.001 | 0.002 | 0.002 | 0.002 |
| Pyrene in TCLP | mg/L | 0.001 | 0.002 | 0.002 | 0.002 |
| Benzo(a)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 |
| Chrysene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in TCLP | mg/L | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzo(a)pyrene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in TCLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 90 | 104 | 86 | 101 |

| Speciated Phenols in water Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43953-1 Material 1 Pre 1 26/07/2010 Soil | 43953-2 Material 1 Pre 2 26/07/2010 Soil | 43953-3 Material 1 Pre 3 26/07/2010 Soil | 43953-4 Material 2 Pre 1 26/07/2010 Soil | 43953-5 Material 2 Pre 2 26/07/2010 Soil |
|--|-----------------------------|--|--|--|--|--|
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 30/07/2010 | 30/07/2010 | 30/07/2010 | 30/07/2010 | 30/07/2010 |
| Phenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2-Chlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2-Methylphenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 3/4-Methylphenol | µg/L | <20 | <20 | <20 | <20 | <20 |
| 2-Nitrophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dimethylphenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,6-Dichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4,5-Trichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4,6-Trichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dinitrophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| 4-Nitrophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| 2,3,4,6-Tetrachlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2-methyl-4,6-dinitrophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| Pentachlorophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate 2-fluorophenol | % | 68 | 59 | 54 | 90 | 66 |
| Surrogate Phenol-d6 | % | 52 | 44 | 42 | 49 | 35 |
| Surrogate 2,4,6-Tribromophenol | % | 131 | 128 | 105 | 116 | 101 |
| Surrogate p-Terphenyl-d14 | % | 85 | 93 | 95 | 75 | 60 |

| Speciated Phenols in water Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 43953-6 Material 2 Pre 3 26/07/2010 Soil | 43953-7 Material 3 Pre 1 26/07/2010 Soil | 43953-8 Material 3 Pre 2 26/07/2010 Soil | 43953-9 Material 3 Pre 3 26/07/2010 Soil |
|--|-----------------------------|--|--|--|--|
| Date extracted | - | 29/07/2010 | 29/07/2010 | 29/07/2010 | 29/07/2010 |
| Date analysed | - | 30/07/2010 | 30/07/2010 | 30/07/2010 | 30/07/2010 |
| Phenol | µg/L | <10 | <10 | <10 | <10 |
| 2-Chlorophenol | µg/L | <10 | <10 | <10 | <10 |
| 2-Methylphenol | µg/L | <10 | <10 | <10 | <10 |
| 3/4-Methylphenol | µg/L | <20 | <20 | <20 | <20 |
| 2-Nitrophenol | µg/L | <10 | <10 | <10 | <10 |
| 2,4-Dimethylphenol | µg/L | <10 | <10 | <10 | <10 |
| 2,4-Dichlorophenol | µg/L | <10 | <10 | <10 | <10 |
| 2,6-Dichlorophenol | µg/L | <10 | <10 | <10 | <10 |
| 2,4,5-Trichlorophenol | µg/L | <10 | <10 | <10 | <10 |
| 2,4,6-Trichlorophenol | µg/L | <10 | <10 | <10 | <10 |
| 2,4-Dinitrophenol | µg/L | <100 | <100 | <100 | <100 |
| 4-Nitrophenol | µg/L | <100 | <100 | <100 | <100 |
| 2,3,4,6-Tetrachlorophenol | µg/L | <10 | <10 | <10 | <10 |
| 2-methyl-4,6-dinitrophenol | µg/L | <100 | <100 | <100 | <100 |
| Pentachlorophenol | µg/L | <100 | <100 | <100 | <100 |
| Surrogate 2-fluorophenol | % | 59 | 59 | 66 | 58 |
| Surrogate Phenol-d ₆ | % | 32 | 46 | 45 | 46 |
| Surrogate 2,4,6-Tribromophenol | % | 71 | 126 | 121 | 121 |
| Surrogate p-Terphenyl-d ₁₄ | % | 89 | 91 | 84 | 86 |

| Method ID | Methodology Summary |
|------------------------------|--|
| GC.14 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. |
| GC.16 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. |
| GC.3 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. |
| GC.12 subset | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| GC.12 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| Metals.20 ICP-AES | Determination of various metals by ICP-AES. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| LAB.8 | Moisture content determined by heating at 105 deg C for a minimum of 4 hours. |
| GC.13 | Water samples are analysed directly by purge and trap GC-MS. |
| LAB.4 | Toxicity Characteristic Leaching Procedure (TCLP). |
| EXTRACT.7 | Toxicity Characteristic Leaching Procedure (TCLP). |
| LAB.1 | pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+. |
| Metals.20 ICP-AES | Determination of various metals by ICP-AES. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| GC.12 subset | Leachates are extracted with Dichloromethane and analysed by GC-MS. |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| VOCs in soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | 43953-1 | 29/7/2010 29/7/2010 | LCS-1 | 29/7/2010 |
| Date analysed | - | | | 31/7/2010 | 43953-1 | 31/7/2010 31/7/2010 | LCS-1 | 31/7/2010 |
| styrene | mg/kg | 1 | GC.14 | <1.0 | 43953-1 | <1.0 <1.0 | LCS-1 | 98% |
| Surrogate Dibromofluorometha | % | | GC.14 | 95 | 43953-1 | 93 90 RPD: 3 | LCS-1 | 97% |
| Surrogate aaa-Trifluorotoluene | % | | GC.14 | 62 | 43953-1 | 70 75 RPD: 7 | LCS-1 | 80% |
| Surrogate Toluene-d8 | % | | GC.14 | 105 | 43953-1 | 110 109 RPD: 1 | LCS-1 | 98% |
| Surrogate 4-Bromofluorobenzene | % | | GC.14 | 98 | 43953-1 | 94 93 RPD: 1 | LCS-1 | 93% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| vTPH & BTEX in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | 43953-1 | 29/7/2010 29/7/2010 | LCS-1 | 29/7/2010 |
| Date analysed | - | | | 31/7/2010 | 43953-1 | 30/7/2010 30/7/2010 | LCS-1 | 31/7/2010 |
| vTPH C6 - C9 | mg/kg | 25 | GC.16 | <25 | 43953-1 | <25 <25 | LCS-1 | 86% |
| Benzene | mg/kg | 0.5 | GC.16 | <0.5 | 43953-1 | <0.5 <0.5 | LCS-1 | 78% |
| Toluene | mg/kg | 0.5 | GC.16 | <0.5 | 43953-1 | <0.5 <0.5 | LCS-1 | 88% |
| Ethylbenzene | mg/kg | 1 | GC.16 | <1.0 | 43953-1 | <1.0 <1.0 | LCS-1 | 88% |
| m+p-xylene | mg/kg | 2 | GC.16 | <2.0 | 43953-1 | <2.0 <2.0 | LCS-1 | 90% |
| o-Xylene | mg/kg | 1 | GC.16 | <1.0 | 43953-1 | <1.0 <1.0 | LCS-1 | 92% |
| Surrogate aaa-Trifluorotoluene | % | | GC.16 | 62 | 43953-1 | 70 75 RPD: 7 | LCS-1 | 106% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| sTPH in Soil (C10-C36) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | 43953-1 | 29/7/2010 29/7/2010 | LCS-5 | 29/7/2010 |
| Date analysed | - | | | 29/7/2010 | 43953-1 | 29/7/2010 29/7/2010 | LCS-5 | 29/7/2010 |
| TPH C10 - C14 | mg/kg | 50 | GC.3 | <50 | 43953-1 | <50 <50 | LCS-5 | 81% |
| TPH C15 - C28 | mg/kg | 100 | GC.3 | <100 | 43953-1 | 320 360 RPD: 12 | LCS-5 | 89% |
| TPH C29 - C36 | mg/kg | 100 | GC.3 | <100 | 43953-1 | 380 380 RPD: 0 | LCS-5 | 99% |
| Surrogate o-Terphenyl | % | | GC.3 | 110 | 43953-1 | # # | LCS-5 | 96% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|------|--------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/07/2010 | 43953-1 | 29/07/2010 29/07/2010 | LCS-5 | 29/07/2010 |
| Date analysed | - | | | 30/07/2010 | 43953-1 | 30/07/2010 30/07/2010 | LCS-5 | 30/07/2010 |
| Naphthalene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 0.4 0.5 RPD: 22 | LCS-5 | 85% |
| Acenaphthylene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 0.7 0.9 RPD: 25 | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | <0.1 0.3 | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 0.2 0.4 RPD: 67 | LCS-5 | 102% |
| Phenanthrene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 2.0 4.9 RPD: 84 | LCS-5 | 92% |
| Anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 0.6 1.2 RPD: 67 | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 4.3 7.7 RPD: 57 | LCS-5 | 87% |
| Pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 5.0 8.1 RPD: 47 | LCS-5 | 108% |
| Benzo(a)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 3.3 4.2 RPD: 24 | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 2.7 4.2 RPD: 43 | LCS-5 | 108% |
| Benzo(b+k)fluoranthene | mg/kg | 0.2 | GC.12 subset | <0.2 | 43953-1 | 6.0 6.7 RPD: 11 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 0.05 | GC.12 subset | <0.05 | 43953-1 | 4.4 5.0 RPD: 13 | LCS-5 | 103% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 2.0 2.3 RPD: 14 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 0.5 0.5 RPD: 0 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | GC.12 subset | <0.1 | 43953-1 | 1.9 2.2 RPD: 15 | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | | GC.12 subset | 89 | 43953-1 | 75 78 RPD: 4 | LCS-5 | 86% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| Speciated Phenols in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | 43953-1 | 29/7/2010 29/7/2010 | LCS-1 | 29/7/2010 |
| Date analysed | - | | | 2/8/2010 | 43953-1 | 2/8/2010 2/8/2010 | LCS-1 | 2/8/2010 |
| Phenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | LCS-1 | 95% |
| 2-Chlorophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | LCS-1 | 102% |
| 2-Methylphenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 3/4-Methylphenol | mg/kg | 2 | GC.12 | <2.0 | 43953-1 | <2.0 <2.0 | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,6-dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,5-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,6-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 43953-1 | <10 <10 | [NR] | [NR] |
| 4-nitrophenol | mg/kg | 10 | GC.12 | <10 | 43953-1 | <10 <10 | LCS-1 | 74% |
| 2,3,4,6-tetrachlorophenol | mg/kg | 1 | GC.12 | <1.0 | 43953-1 | <1.0 <1.0 | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 43953-1 | <10 <10 | [NR] | [NR] |
| pentachlorophenol | mg/kg | 10 | GC.12 | <10 | 43953-1 | <10 <10 | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 123 | 43953-1 | 105 113 RPD: 7 | LCS-1 | 118% |
| Surrogate Phenol-d6 | % | | GC.12 | 85 | 43953-1 | 68 83 RPD: 20 | LCS-1 | 99% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 59 | 43953-1 | 93 96 RPD: 3 | LCS-1 | 65% |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 102 | 43953-1 | 114 106 RPD: 7 | LCS-1 | 92% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------|-------|-----|-------------------|------------|---------------|---------------------------|-----------|------------------|
| Acid Extractable metals in soil | | | | | | Base II Duplicate II %RPD | | |
| Date digested | - | | | 29/07/2010 | 43953-1 | 29/07/2010 29/07/2010 | LCS-2 | 29/07/2010 |
| Date analysed | - | | | 29/07/2010 | 43953-1 | 29/07/2010 29/07/2010 | LCS-2 | 29/07/2010 |
| Arsenic | mg/kg | 4 | Metals.20 ICP-AES | <4 | 43953-1 | 36 30 RPD: 18 | LCS-2 | 100% |
| Cadmium | mg/kg | 0.5 | Metals.20 ICP-AES | <0.5 | 43953-1 | 1.1 1.1 RPD: 0 | LCS-2 | 96% |
| Chromium | mg/kg | 1 | Metals.20 ICP-AES | <1 | 43953-1 | 19 14 RPD: 30 | LCS-2 | 101% |
| Lead | mg/kg | 1 | Metals.20 ICP-AES | <1 | 43953-1 | 230 180 RPD: 24 | LCS-2 | 100% |
| Mercury | mg/kg | 0.1 | Metals.21 CV-AAS | <0.1 | 43953-1 | 0.4 0.3 RPD: 29 | LCS-2 | 97% |
| Nickel | mg/kg | 1 | Metals.20 ICP-AES | <1 | 43953-1 | 21 17 RPD: 21 | LCS-2 | 104% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank |
|-----------------|-------|-----|--------|-----------|
| Moisture | | | | |
| Date prepared | - | | | 29/7/2010 |
| Date analysed | - | | | 29/7/2010 |
| Moisture | % | 0.1 | LAB.8 | <0.10 |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| VOCs in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | [NT] | [NT] | LCS-W1 | 29/7/2010 |
| Date analysed | - | | | 31/7/2010 | [NT] | [NT] | LCS-W1 | 31/7/2010 |
| Styrene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 98% |
| Surrogate Dibromofluoromethane | % | | GC.13 | 95 | [NT] | [NT] | LCS-W1 | 97% |
| Surrogate toluene-d8 | % | | GC.13 | 105 | [NT] | [NT] | LCS-W1 | 98% |
| Surrogate 4-BFB | % | | GC.13 | 98 | [NT] | [NT] | LCS-W1 | 93% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| BTEX in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | [NT] | [NT] | LCS-W1 | 29/7/2010 |
| Date analysed | - | | | 31/7/2010 | [NT] | [NT] | LCS-W1 | 31/7/2010 |
| Benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 115% |
| Toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 106% |
| Ethylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 97% |
| m+p-xylene | µg/L | 2 | GC.13 | <2.0 | [NT] | [NT] | LCS-W1 | 96% |
| o-xylene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 98% |
| Surrogate | % | | GC.13 | 95 | [NT] | [NT] | LCS-W1 | 102% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.13 | 105 | [NT] | [NT] | LCS-W1 | 101% |
| Surrogate 4-BFB | % | | GC.13 | 98 | [NT] | [NT] | LCS-W1 | 109% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-----------------------------|-------|--------|----------------------|------------|---------------|---------------------------|-----------|------------------|
| Metals in TCLP USEPA1311 | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/07/2010 | [NT] | [NT] | LCS-W1 | 29/07/2010 |
| Date analysed | - | | | 29/07/2010 | [NT] | [NT] | LCS-W1 | 29/07/2010 |
| Arsenic in TCLP | mg/L | 0.05 | Metals.20 ICP-AES | <0.05 | [NT] | [NT] | LCS-W1 | 107% |
| Cadmium in TCLP | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | [NT] | [NT] | LCS-W1 | 97% |
| Chromium in TCLP | mg/L | 0.01 | Metals.20 ICP-AES | <0.01 | [NT] | [NT] | LCS-W1 | 101% |
| Lead in TCLP | mg/L | 0.03 | Metals.20 ICP-AES | <0.03 | [NT] | [NT] | LCS-W1 | 98% |
| Mercury in TCLP | mg/L | 0.0005 | Metals.21 CV-AAS | <0.0005 | [NT] | [NT] | LCS-W1 | 100% |
| Nickel in TCLP | mg/L | 0.02 | Metals.20 ICP-AES | <0.02 | [NT] | [NT] | LCS-W1 | 101% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| TPH in TCLP extract | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/7/2010 | [NT] | [NT] | LCS-W2 | 29/7/2010 |
| Date analysed | - | | | 29/7/2010 | [NT] | [NT] | LCS-W2 | 29/7/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 50 | GC.3 | <50 | [NT] | [NT] | LCS-W2 | 71% |
| TPH C ₁₅ - C ₂₈ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W2 | 113% |
| TPH C ₂₉ - C ₃₆ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W2 | 96% |
| Surrogate o-Terphenyl | % | | GC.3 | 123 | [NT] | [NT] | LCS-W2 | 116% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-------|--------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in TCLP (USEPA 1311) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/07/2010 | [NT] | [NT] | LCS-W1 | 29/07/2010 |
| Date analysed | - | | | 29/07/2010 | [NT] | [NT] | LCS-W1 | 29/07/2010 |
| Naphthalene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 91% |
| Acenaphthylene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluorene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 108% |
| Phenanthrene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 103% |
| Anthracene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 99% |
| Pyrene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 109% |
| Benzo(a)anthracene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Chrysene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 106% |
| Benzo(b+k)fluoranthene in TCLP | mg/L | 0.002 | GC.12 subset | <0.002 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | LCS-W1 | 119% |
| Indeno(1,2,3-c,d)pyrene - TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene in TCLP | mg/L | 0.001 | GC.12 subset | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 | 111 | [NT] | [NT] | LCS-W1 | 120% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--|-------|----------|--------|--------------------------------------|---------------|---------------------------|------------------|------------------|
| Speciated Phenols in water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 29/07/2010 | [NT] | [NT] | LCS-W1 | 29/07/2010 |
| Date analysed | - | | | 30/07/2010 | [NT] | [NT] | LCS-W1 | 30/07/2010 |
| Phenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 38% |
| 2-Chlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 78% |
| 2-Methylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol | µg/L | 20 | GC.12 | <20 | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,6-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| 4-Nitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | LCS-W1 | 36% |
| 2,3,4,6-Tetrachlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Pentachlorophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 63 | [NT] | [NT] | LCS-W1 | 70% |
| Surrogate Phenol-d6 | % | | GC.12 | 47 | [NT] | [NT] | LCS-W1 | 57% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 90 | [NT] | [NT] | LCS-W1 | 105% |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 115 | [NT] | [NT] | LCS-W1 | 121% |
| QUALITY CONTROL vTPH & BTEX in Soil | UNITS | Dup. Sm# | | Duplicate Base + Duplicate + %RPD | | Spike Sm# | Spike % Recovery | |
| Date extracted | - | [NT] | | [NT] | | 43953-2 | 29/7/2010 | |
| Date analysed | - | [NT] | | [NT] | | 43953-2 | 31/7/2010 | |
| vTPH C6 - C9 | mg/kg | [NT] | | [NT] | | 43953-2 | 93% | |
| Benzene | mg/kg | [NT] | | [NT] | | 43953-2 | 95% | |
| Toluene | mg/kg | [NT] | | [NT] | | 43953-2 | 94% | |
| Ethylbenzene | mg/kg | [NT] | | [NT] | | 43953-2 | 90% | |
| m+p-xylene | mg/kg | [NT] | | [NT] | | 43953-2 | 92% | |
| o-Xylene | mg/kg | [NT] | | [NT] | | 43953-2 | 95% | |
| Surrogate aaa-Trifluorotoluene | % | [NT] | | [NT] | | 43953-2 | 111% | |

| QUALITY CONTROL sTPH in Soil (C10-C36) | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|-------|----------|--------------------------------------|-----------|------------------|
| Date extracted | - | [NT] | [NT] | 43953-2 | 29/7/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 29/7/2010 |
| TPH C10 - C14 | mg/kg | [NT] | [NT] | 43953-2 | 86% |
| TPH C15 - C28 | mg/kg | [NT] | [NT] | 43953-2 | # |
| TPH C29 - C36 | mg/kg | [NT] | [NT] | 43953-2 | # |
| Surrogate o-Terphenyl | % | [NT] | [NT] | 43953-2 | # |
| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | [NT] | [NT] | 43953-2 | 29/07/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 30/07/2010 |
| Naphthalene | mg/kg | [NT] | [NT] | 43953-2 | 89% |
| Acenaphthylene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Fluorene | mg/kg | [NT] | [NT] | 43953-2 | 115% |
| Phenanthrene | mg/kg | [NT] | [NT] | 43953-2 | # |
| Anthracene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | mg/kg | [NT] | [NT] | 43953-2 | # |
| Pyrene | mg/kg | [NT] | [NT] | 43953-2 | # |
| Benzo(a)anthracene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Chrysene | mg/kg | [NT] | [NT] | 43953-2 | # |
| Benzo(b+k)fluoranthene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | [NT] | [NT] | 43953-2 | # |
| Indeno(1,2,3-c,d)pyrene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | [NT] | [NT] | 43953-2 | 89% |

| QUALITY CONTROL Speciated Phenols in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|--|-------|----------|--------------------------------------|-----------|------------------|
| Date extracted | - | [NT] | [NT] | 43953-2 | 29/7/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 2/8/2010 |
| Phenol | mg/kg | [NT] | [NT] | 43953-2 | 83% |
| 2-Chlorophenol | mg/kg | [NT] | [NT] | 43953-2 | 90% |
| 2-Methylphenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,6-dichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-trichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-trichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4-dinitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 4-nitrophenol | mg/kg | [NT] | [NT] | 43953-2 | 80% |
| 2,3,4,6-tetrachlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| pentachlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | [NT] | [NT] | 43953-2 | 105% |
| Surrogate Phenol-d6 | % | [NT] | [NT] | 43953-2 | 84% |
| Surrogate 2,4,6-Tribromophenol | % | [NT] | [NT] | 43953-2 | 107% |
| Surrogate p-Terphenyl-d14 | % | [NT] | [NT] | 43953-2 | 108% |

| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|-------|----------|--------------------------------------|-----------|------------------|
| Date digested | - | [NT] | [NT] | 43953-2 | 29/07/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 29/07/2010 |
| Arsenic | mg/kg | [NT] | [NT] | 43953-2 | 96% |
| Cadmium | mg/kg | [NT] | [NT] | 43953-2 | 83% |
| Chromium | mg/kg | [NT] | [NT] | 43953-2 | 92% |
| Lead | mg/kg | [NT] | [NT] | 43953-2 | 83% |
| Mercury | mg/kg | [NT] | [NT] | 43953-2 | 92% |
| Nickel | mg/kg | [NT] | [NT] | 43953-2 | 83% |

Report Comments:

Total Petroleum Hydrocarbons in water:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Total Petroleum Hydrocarbons in soil:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

PAH's in soil:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference and The RPD for duplicate results is accepted due to the non homogenous nature of the sample.

Asbestos was analysed by Approved Identifier: Not applicable for this job
Asbestos was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test

PQL: Practical Quantitation Limit

NT: Not tested

NA: Test not required

RPD: Relative Percent Difference

NA: Test not required

<: Less than

>: Greater than

LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.



Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 44211

Client:

Enviropacific Services (Chatswood) Pty Ltd
1/28 Barcoo St
Chatswood
NSW 2067

Attention: Marty Croker

Sample log in details:

| | |
|---------------------------------------|---|
| Your Reference: | <u>E10100 Macdonaldtown Gasworks</u> |
| No. of samples: | 7 Soils |
| Date samples received: | 02/08/10 |
| Date completed instructions received: | 02/08/10 |

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

| | |
|-----------------------------|------------|
| Date results requested by: | 9/08/10 |
| Date of Preliminary Report: | Not Issued |
| Issue Date: | 9/08/10 |

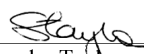
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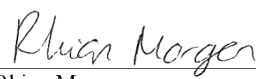
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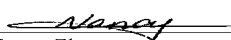
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Tests not covered by NATA are denoted with *.

Results Approved By:


Sandra Taylor
Senior Organic Chemist


Rhian Morgan
Metals Supervisor


Nancy Zhang
Chemist

Envirolab Reference: 44211
Revision No: R 00



| | | | | | | |
|--|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| VOCs in soil Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| styrene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 65 | 69 | 71 | 61 | 69 |
| Surrogate aaa-Trifluorotoluene | % | 98 | 102 | 89 | 111 | 97 |
| Surrogate Toluene-d8 | % | 90 | 90 | 89 | 89 | 91 |
| Surrogate 4-Bromofluorobenzene | % | 85 | 85 | 85 | 85 | 89 |

| | | | |
|--|----------------|-----------------------------------|--------------------|
| VOCs in soil Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 |
| styrene | mg/kg | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 70 | 71 |
| Surrogate aaa-Trifluorotoluene | % | 93 | 85 |
| Surrogate Toluene-d8 | % | 89 | 88 |
| Surrogate 4-Bromofluorobenzene | % | 89 | 102 |

| vTPH & BTEX in Soil Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
|---|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| Date Sampled | ----- | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 03/08/2010 | 03/08/2010 | 03/08/2010 | 03/08/2010 | 03/08/2010 |
| Date analysed | - | 05/08/2010 | 05/08/2010 | 05/08/2010 | 05/08/2010 | 05/08/2010 |
| vTPH C ₆ - C ₉ | mg/kg | <25 | <25 | <25 | <25 | <25 |
| Benzene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| m+p-xylene | mg/kg | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| o-Xylene | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate aaa-Trifluorotoluene | % | 98 | 102 | 89 | 131 | 97 |

| vTPH & BTEX in Soil Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
|---|----------------|-----------------------------------|--------------------|
| Date Sampled | ----- | 2/08/2010 | 2/08/2010 |
| Type of sample | | Soil | Soil |
| Date extracted | - | 03/08/2010 | 03/08/2010 |
| Date analysed | - | 05/08/2010 | 05/08/2010 |
| vTPH C ₆ - C ₉ | mg/kg | <25 | <25 |
| Benzene | mg/kg | <0.5 | <0.5 |
| Toluene | mg/kg | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | <1.0 | <1.0 |
| m+p-xylene | mg/kg | <2.0 | <2.0 |
| o-Xylene | mg/kg | <1.0 | <1.0 |
| Surrogate aaa-Trifluorotoluene | % | 93 | 71 |

| | | | | | | |
|------------------------|-------|------------|------------|------------|------------|------------|
| sTPH in Soil (C10-C36) | | | | | | |
| Our Reference: | UNITS | 44211-1 | 44211-2 | 44211-3 | 44211-4 | 44211-5 |
| Your Reference | ----- | Material 1 | Material 1 | Material 1 | Material 3 | Material 3 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% | Post 5% | Post 12.5% |
| Type of sample | | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 |
| | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 |
| TPH C10 - C14 | mg/kg | <50 | <50 | <50 | <50 | <50 |
| TPH C15 - C28 | mg/kg | 250 | 200 | 190 | <100 | 130 |
| TPH C29 - C36 | mg/kg | 110 | 120 | 110 | <100 | <100 |
| Surrogate o-Terphenyl | % | # | 133 | 131 | 138 | # |

| | | | |
|------------------------|-------|------------|-----------|
| sTPH in Soil (C10-C36) | | | |
| Our Reference: | UNITS | 44211-6 | 44211-7 |
| Your Reference | ----- | Material 3 | Control |
| Date Sampled | ----- | Post 20% | |
| Type of sample | | 2/08/2010 | 2/08/2010 |
| | | Soil | Soil |
| Date extracted | - | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 3/8/2010 | 3/8/2010 |
| TPH C10 - C14 | mg/kg | 120 | 170 |
| TPH C15 - C28 | mg/kg | 340 | 330 |
| TPH C29 - C36 | mg/kg | <100 | <100 |
| Surrogate o-Terphenyl | % | # | # |

| PAHs in Soil Our Reference: Your Reference | UNITS ----- ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
|--|-------------------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| Date Sampled Type of sample | | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Naphthalene | mg/kg | 0.6 | 0.5 | 0.4 | 2.7 | 5.0 |
| Acenaphthylene | mg/kg | 0.7 | 0.6 | 1.4 | 0.5 | 0.6 |
| Acenaphthene | mg/kg | <0.1 | <0.1 | 0.2 | 0.4 | 0.4 |
| Fluorene | mg/kg | 0.2 | 0.2 | 0.8 | 0.9 | 1.0 |
| Phenanthrene | mg/kg | 2.9 | 2.2 | 5.6 | 2.6 | 2.5 |
| Anthracene | mg/kg | 0.8 | 0.6 | 1.3 | 0.7 | 0.8 |
| Fluoranthene | mg/kg | 6.3 | 4.3 | 6.6 | 1.8 | 1.9 |
| Pyrene | mg/kg | 7.1 | 5.0 | 6.7 | 2.3 | 2.4 |
| Benzo(a)anthracene | mg/kg | 4.4 | 3.3 | 3.4 | 0.9 | 1 |
| Chrysene | mg/kg | 4.0 | 3.0 | 2.8 | 0.9 | 0.9 |
| Benzo(b+k)fluoranthene | mg/kg | 6.0 | 5.0 | 5.1 | 1.0 | 1.1 |
| Benzo(a)pyrene | mg/kg | 4.7 | 3.8 | 3.9 | 0.8 | 0.8 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 2.9 | 2.2 | 2.2 | 0.4 | 0.5 |
| Dibenzo(a,h)anthracene | mg/kg | 0.7 | 0.6 | 0.5 | 0.1 | 0.1 |
| Benzo(g,h,i)perylene | mg/kg | 2.7 | 2.3 | 2.2 | 0.5 | 0.5 |
| Surrogate p-Terphenyl-d ₁₄ | % | 81 | 77 | 76 | 77 | 77 |

| | | | |
|--|-------------------------|-----------------------------------|--------------------|
| PAHs in Soil Our Reference: Your Reference | UNITS ----- ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
| Date Sampled Type of sample | | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 |
| Naphthalene | mg/kg | 16 | 18 |
| Acenaphthylene | mg/kg | 1.2 | 1.2 |
| Acenaphthene | mg/kg | 0.9 | 0.9 |
| Fluorene | mg/kg | 2.8 | 2.8 |
| Phenanthrene | mg/kg | 6.5 | 6.8 |
| Anthracene | mg/kg | 1.8 | 1.8 |
| Fluoranthene | mg/kg | 3.9 | 4.2 |
| Pyrene | mg/kg | 4.9 | 5.3 |
| Benzo(a)anthracene | mg/kg | 1.9 | 2.0 |
| Chrysene | mg/kg | 1.7 | 1.8 |
| Benzo(b+k)fluoranthene | mg/kg | 2.1 | 2.1 |
| Benzo(a)pyrene | mg/kg | 1.7 | 1.7 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.8 | 0.8 |
| Dibenzo(a,h)anthracene | mg/kg | 0.3 | 0.2 |
| Benzo(g,h,i)perylene | mg/kg | 1 | 1 |
| Surrogate p-Terphenyl-d ₁₄ | % | 77 | 77 |

| Speciated Phenols in Soil Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44211-1 Material 1 Post 5% 2/08/2010 Soil | 44211-2 Material 1 Post 12.5% 2/08/2010 Soil | 44211-3 Material 1 Post 20% 2/08/2010 Soil | 44211-4 Material 3 Post 5% 2/08/2010 Soil | 44211-5 Material 3 Post 12.5% 2/08/2010 Soil |
|---|-----------------------------|---|--|--|---|--|
| Date extracted | - | 06/08/2010 | 06/08/2010 | 06/08/2010 | 06/08/2010 | 06/08/2010 |
| Date analysed | - | 07/08/2010 | 07/08/2010 | 07/08/2010 | 07/08/2010 | 07/08/2010 |
| Phenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 | <10 | <10 | <10 |
| Surrogate 2-fluorophenol | % | # | # | # | 82 | # |
| Surrogate Phenol-d6 | % | # | # | # | 36 | # |
| Surrogate 2,4,6-Tribromophenol | % | # | # | # | 18 | # |
| Surrogate p-Terphenyl-d14 | % | 89 | 95 | 97 | 88 | 90 |

| Speciated Phenols in Soil Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44211-6 Material 3 Post 20% 2/08/2010 Soil | 44211-7 Control 2/08/2010 Soil |
|---|-----------------------------|--|---|
| Date extracted | - | 06/08/2010 | 06/08/2010 |
| Date analysed | - | 07/08/2010 | 07/08/2010 |
| Phenol | mg/kg | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 |
| Surrogate 2-fluorophenol | % | # | 82 |
| Surrogate Phenol-d ₆ | % | # | 22 |
| Surrogate 2,4,6-Tribromophenol | % | # | 86 |
| Surrogate p-Terphenyl-d ₁₄ | % | 91 | 109 |

| Acid Extractable metals in soil Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
|---|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| Date Sampled | ----- | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 |
| Type of sample | | Soil | Soil | Soil | Soil | Soil |
| Date digested | - | 03/08/2010 | 03/08/2010 | 03/08/2010 | 03/08/2010 | 03/08/2010 |
| Date analysed | - | 04/08/2010 | 04/08/2010 | 04/08/2010 | 04/08/2010 | 04/08/2010 |
| Arsenic | mg/kg | 26 | 35 | 29 | 4 | 5 |
| Cadmium | mg/kg | 1 | 1.2 | 1.0 | <0.5 | <0.5 |
| Chromium | mg/kg | 29 | 21 | 24 | 20 | 21 |
| Lead | mg/kg | 170 | 210 | 300 | 16 | 17 |
| Mercury | mg/kg | 0.4 | 0.4 | 0.3 | <0.1 | <0.1 |
| Nickel | mg/kg | 20 | 19 | 20 | 2 | 4 |

| Acid Extractable metals in soil Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
|---|----------------|-----------------------------------|--------------------|
| Date Sampled | ----- | 2/08/2010 | 2/08/2010 |
| Type of sample | | Soil | Soil |
| Date digested | - | 03/08/2010 | 03/08/2010 |
| Date analysed | - | 04/08/2010 | 04/08/2010 |
| Arsenic | mg/kg | 7 | 4 |
| Cadmium | mg/kg | <0.5 | <0.5 |
| Chromium | mg/kg | 28 | 18 |
| Lead | mg/kg | 21 | 16 |
| Mercury | mg/kg | <0.1 | <0.1 |
| Nickel | mg/kg | 4 | 1 |

| | | | | | | |
|--|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| Moisture Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil |
| Date prepared | - | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 | 3/8/2010 |
| Moisture | % | 12 | 14 | 10 | 23 | 20 |

| | | | |
|--|----------------|-----------------------------------|--------------------|
| Moisture Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil |
| Date prepared | - | 3/8/2010 | 3/8/2010 |
| Date analysed | - | 3/8/2010 | 3/8/2010 |
| Moisture | % | 19 | 24 |

| | | | | | | |
|---|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| VOCs in Zero Headspace ASLP Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Styrene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | 88 | 81 | 76 | 99 | 87 |
| Surrogate toluene-d8 | % | 100 | 99 | 99 | 105 | 109 |
| Surrogate 4-BFB | % | 92 | 94 | 90 | 113 | 100 |

| | | | |
|---|----------------|-----------------------------------|--------------------|
| VOCs in Zero Headspace ASLP Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 5/8/2010 | 5/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 |
| Styrene | µg/L | <1.0 | <1.0 |
| Surrogate Dibromofluoromethane | % | 89 | 105 |
| Surrogate toluene-d8 | % | 111 | 113 |
| Surrogate 4-BFB | % | 106 | 105 |

| BTEX in Zero Headspace Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
|--|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | <1.0 | <1.0 | <1.0 | 4.4 | <1.0 |
| m+p-xylene | µg/L | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| o-xylene | µg/L | <1.0 | <1.0 | <1.0 | 2.3 | <1.0 |
| Surrogate Dibromofluoromethane | % | 88 | 81 | 76 | 99 | 87 |
| Surrogate toluene-d8 | % | 100 | 99 | 99 | 105 | 109 |
| Surrogate 4-BFB | % | 92 | 94 | 90 | 113 | 100 |

| BTEX in Zero Headspace Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
|--|----------------|-----------------------------------|--------------------|
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 5/8/2010 | 5/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 |
| Benzene | µg/L | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 |
| Ethylbenzene | µg/L | 2.6 | 1.5 |
| m+p-xylene | µg/L | <2.0 | <2.0 |
| o-xylene | µg/L | 1.9 | 1.5 |
| Surrogate Dibromofluoromethane | % | 89 | 105 |
| Surrogate toluene-d8 | % | 111 | 113 |
| Surrogate 4-BFB | % | 106 | 105 |

| Metals-ASLP Neutral (ICP-MS) | | | | | | |
|------------------------------|----------|------------|------------|------------|------------|------------|
| Our Reference: | UNITS | 44211-1 | 44211-2 | 44211-3 | 44211-4 | 44211-5 |
| Your Reference | ----- | Material 1 | Material 1 | Material 1 | Material 3 | Material 3 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% | Post 5% | Post 12.5% |
| Type of sample | | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 | 2/08/2010 |
| | | Soil | Soil | Soil | Soil | Soil |
| Date extracted | - | 04/08/2010 | 04/08/2010 | 04/08/2010 | 04/08/2010 | 04/08/2010 |
| Date analysed | - | 05/08/2010 | 05/08/2010 | 05/08/2010 | 05/08/2010 | 05/08/2010 |
| pH of final Leachate | pH units | 12.3 | 12.4 | 12.7 | 11.5 | 12.5 |
| Arsenic in ASLP | µg/L | 2 | <1 | <1 | 2 | 2 |
| Cadmium in ASLP | µg/L | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium in ASLP | µg/L | 42 | 36 | 28 | 13 | 36 |
| Lead in ASLP | µg/L | 1 | 3 | 6 | <1 | <1 |
| Mercury in ASLP | µg/L | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Nickel in ASLP | µg/L | 4 | 5 | 4 | <1 | 1 |

| Metals-ASLP Neutral (ICP-MS) | | | |
|------------------------------|----------|------------|------------|
| Our Reference: | UNITS | 44211-6 | 44211-7 |
| Your Reference | ----- | Material 3 | Control |
| Date Sampled | ----- | Post 20% | |
| Type of sample | | 2/08/2010 | 2/08/2010 |
| | | Soil | Soil |
| Date extracted | - | 04/08/2010 | 04/08/2010 |
| Date analysed | - | 05/08/2010 | 05/08/2010 |
| pH of final Leachate | pH units | 12.4 | 9.20 |
| Arsenic in ASLP | µg/L | 2 | <1 |
| Cadmium in ASLP | µg/L | <0.1 | <0.1 |
| Chromium in ASLP | µg/L | 43 | <1 |
| Lead in ASLP | µg/L | <1 | <1 |
| Mercury in ASLP | µg/L | <0.50 | <0.50 |
| Nickel in ASLP | µg/L | <1 | <1 |

| | | | | | | |
|---|----------------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|-------------------------------------|
| sTPH in water leach Our Reference: Your Reference | UNITS ----- | 44211-1 Material 1 Post 5% | 44211-2 Material 1 Post 12.5% | 44211-3 Material 1 Post 20% | 44211-4 Material 3 Post 5% | 44211-5 Material 3 Post 12.5% |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 |
| Date analysed | - | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 160 | 100 | 110 | 940 | 880 |
| TPH C ₁₅ - C ₂₈ | µg/L | 240 | 180 | 180 | 480 | 420 |
| TPH C ₂₉ - C ₃₆ | µg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | 128 | 111 | 114 | 117 | 131 |

| | | | |
|---|----------------|-----------------------------------|--------------------|
| sTPH in water leach Our Reference: Your Reference | UNITS ----- | 44211-6 Material 3 Post 20% | 44211-7 Control |
| Date Sampled Type of sample | ----- | 2/08/2010 Soil | 2/08/2010 Soil |
| Date extracted | - | 4/8/2010 | 4/8/2010 |
| Date analysed | - | 4/8/2010 | 4/8/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 1,400 | 430 |
| TPH C ₁₅ - C ₂₈ | µg/L | 550 | 250 |
| TPH C ₂₉ - C ₃₆ | µg/L | <100 | <100 |
| Surrogate o-Terphenyl | % | 119 | 104 |

| PAHs in water leach Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44211-1 Material 1 Post 5% 2/08/2010 Soil | 44211-2 Material 1 Post 12.5% 2/08/2010 Soil | 44211-3 Material 1 Post 20% 2/08/2010 Soil | 44211-4 Material 3 Post 5% 2/08/2010 Soil | 44211-5 Material 3 Post 12.5% 2/08/2010 Soil |
|---|-----------------------------|---|--|--|---|--|
| Date extracted | - | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Naphthalene in ASLP | mg/L | 0.001 | <0.001 | <0.001 | 0.20 | 0.27 |
| Acenaphthylene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.002 | 0.001 |
| Acenaphthene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.009 | 0.008 |
| Fluorene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.016 | 0.017 |
| Phenanthrene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.021 | 0.022 |
| Anthracene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.004 | 0.005 |
| Fluoranthene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.003 | 0.003 |
| Pyrene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | 0.003 | 0.003 |
| Benzo(a)anthracene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Chrysene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in ASLP | mg/L | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzo(a)pyrene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - ASLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in ASLP | mg/L | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 105 | 88 | 95 | 90 | 99 |

| | | | |
|---------------------------------------|-------|------------|-----------|
| PAHs in water leach | | | |
| Our Reference: | UNITS | 44211-6 | 44211-7 |
| Your Reference | ----- | Material 3 | Control |
| | | Post 20% | |
| Date Sampled | ----- | 2/08/2010 | 2/08/2010 |
| Type of sample | | Soil | Soil |
| Date extracted | - | 4/8/2010 | 4/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 |
| Naphthalene in ASLP | mg/L | 0.42 | 0.059 |
| Acenaphthylene in ASLP | mg/L | 0.002 | 0.001 |
| Acenaphthene in ASLP | mg/L | 0.009 | 0.004 |
| Fluorene in ASLP | mg/L | 0.019 | 0.007 |
| Phenanthrene in ASLP | mg/L | 0.022 | 0.008 |
| Anthracene in ASLP | mg/L | 0.004 | 0.002 |
| Fluoranthene in ASLP | mg/L | 0.003 | 0.001 |
| Pyrene in ASLP | mg/L | 0.003 | 0.001 |
| Benzo(a)anthracene in ASLP | mg/L | <0.001 | <0.001 |
| Chrysene in ASLP | mg/L | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in ASLP | mg/L | <0.002 | <0.002 |
| Benzo(a)pyrene in ASLP | mg/L | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - ASLP | mg/L | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in ASLP | mg/L | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in ASLP | mg/L | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 98 | 90 |

| Speciated Phenols in water Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44211-1 Material 1 Post 5% 2/08/2010 Soil | 44211-2 Material 1 Post 12.5% 2/08/2010 Soil | 44211-3 Material 1 Post 20% 2/08/2010 Soil | 44211-4 Material 3 Post 5% 2/08/2010 Soil | 44211-5 Material 3 Post 12.5% 2/08/2010 Soil |
|--|-----------------------------|---|--|--|---|--|
| Date extracted | - | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 | 4/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Phenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2-Chlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2-Methylphenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 3/4-Methylphenol | µg/L | <20 | <20 | <20 | <20 | <20 |
| 2-Nitrophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dimethylphenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,6-Dichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4,5-Trichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4,6-Trichlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2,4-Dinitrophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| 4-Nitrophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| 2,3,4,6-Tetrachlorophenol | µg/L | <10 | <10 | <10 | <10 | <10 |
| 2-methyl-4,6-dinitrophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| Pentachlorophenol | µg/L | <100 | <100 | <100 | <100 | <100 |
| Surrogate 2-fluorophenol | % | 62 | 56 | 65 | 74 | 70 |
| Surrogate Phenol-d6 | % | 42 | 38 | 43 | 52 | 47 |
| Surrogate 2,4,6-Tribromophenol | % | 129 | 97 | 104 | 127 | 118 |
| Surrogate p-Terphenyl-d14 | % | 140 | 109 | 121 | 132 | 140 |

| | | | |
|---------------------------------------|-------|------------|-----------|
| Speciated Phenols in water | | | |
| Our Reference: | UNITS | 44211-6 | 44211-7 |
| Your Reference | ----- | Material 3 | Control |
| Date Sampled | ----- | Post 20% | |
| Type of sample | | 2/08/2010 | 2/08/2010 |
| | | Soil | Soil |
| Date extracted | - | 4/8/2010 | 4/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 |
| Phenol | µg/L | <10 | <10 |
| 2-Chlorophenol | µg/L | <10 | <10 |
| 2-Methylphenol | µg/L | <10 | <10 |
| 3/4-Methylphenol | µg/L | <20 | <20 |
| 2-Nitrophenol | µg/L | <10 | <10 |
| 2,4-Dimethylphenol | µg/L | <10 | <10 |
| 2,4-Dichlorophenol | µg/L | <10 | <10 |
| 2,6-Dichlorophenol | µg/L | <10 | <10 |
| 2,4,5-Trichlorophenol | µg/L | <10 | <10 |
| 2,4,6-Trichlorophenol | µg/L | <10 | <10 |
| 2,4-Dinitrophenol | µg/L | <100 | <100 |
| 4-Nitrophenol | µg/L | <100 | <100 |
| 2,3,4,6-Tetrachlorophenol | µg/L | <10 | <10 |
| 2-methyl-4,6-dinitrophenol | µg/L | <100 | <100 |
| Pentachlorophenol | µg/L | <100 | <100 |
| Surrogate 2-fluorophenol | % | 83 | 61 |
| Surrogate Phenol-d ₆ | % | 56 | 34 |
| Surrogate 2,4,6-Tribromophenol | % | 110 | 102 |
| Surrogate p-Terphenyl-d ₁₄ | % | 122 | 114 |

| Method ID | Methodology Summary |
|------------------------------|--|
| GC.14 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. |
| GC.16 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. |
| GC.3 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. |
| GC.12 subset | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| GC.12 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| Metals.20 ICP-AES | Determination of various metals by ICP-AES. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| LAB.8 | Moisture content determined by heating at 105 deg C for a minimum of 4 hours. |
| GC.13 | Water samples are analysed directly by purge and trap GC-MS. |
| LAB.1 | pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+. |
| Metals.22 ICP-MS | Determination of various metals by ICP-MS following leaching using neutralised deionised water by AS 4439.3 - 1997. |
| Metals.21 ASLP | Determination of Mercury by Cold Vapour AAS following neutral water leaching by AS 4439.3 - 1997. |
| GC.12 ASLP | ASLP Leachates are extracted with Dichloromethane and analysed by GC-MS. |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| VOCs in soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 3/8/2010 | 44211-1 | 3/8/2010 3/8/2010 | LCS-5 | 3/8/2010 |
| Date analysed | - | | | 5/8/2010 | 44211-1 | 5/8/2010 5/8/2010 | LCS-5 | 5/8/2010 |
| styrene | mg/kg | 1 | GC.14 | <1.0 | 44211-1 | <1.0 <1.0 | LCS-5 | 110% |
| Surrogate Dibromofluorometha | % | | GC.14 | 69 | 44211-1 | 65 65 RPD: 0 | LCS-5 | 71% |
| Surrogate aaa-Trifluorotoluene | % | | GC.14 | 106 | 44211-1 | 98 108 RPD: 10 | LCS-5 | 113% |
| Surrogate Toluene-d8 | % | | GC.14 | 89 | 44211-1 | 90 89 RPD: 1 | LCS-5 | 89% |
| Surrogate 4-Bromofluorobenzene | % | | GC.14 | 84 | 44211-1 | 85 84 RPD: 1 | LCS-5 | 83% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| vTPH & BTEX in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 03/08/2010 | 44211-1 | 03/08/2010 03/08/2010 | LCS-1 | 03/08/2010 |
| Date analysed | - | | | 05/08/2010 | 44211-1 | 05/08/2010 05/08/2010 | LCS-1 | 05/08/2010 |
| vTPH C6 - C9 | mg/kg | 25 | GC.16 | <25 | 44211-1 | <25 <25 | LCS-1 | 115% |
| Benzene | mg/kg | 0.5 | GC.16 | <0.5 | 44211-1 | <0.5 <0.5 | LCS-1 | 72% |
| Toluene | mg/kg | 0.5 | GC.16 | <0.5 | 44211-1 | <0.5 <0.5 | LCS-1 | 105% |
| Ethylbenzene | mg/kg | 1 | GC.16 | <1.0 | 44211-1 | <1.0 <1.0 | LCS-1 | 126% |
| m+p-xylene | mg/kg | 2 | GC.16 | <2.0 | 44211-1 | <2.0 <2.0 | LCS-1 | 136% |
| o-Xylene | mg/kg | 1 | GC.16 | <1.0 | 44211-1 | <1.0 <1.0 | LCS-1 | 137% |
| Surrogate aaa-Trifluorotoluene | % | | GC.16 | 106 | 44211-1 | 98 137 RPD: 33 | LCS-1 | 105% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| sTPH in Soil (C10-C36) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 3/8/2010 | 44211-1 | 3/8/2010 3/8/2010 | LCS-5 | 3/8/2010 |
| Date analysed | - | | | 3/8/2010 | 44211-1 | 3/8/2010 3/8/2010 | LCS-5 | 3/8/2010 |
| TPH C10 - C14 | mg/kg | 50 | GC.3 | <50 | 44211-1 | <50 <50 | LCS-5 | 76% |
| TPH C15 - C28 | mg/kg | 100 | GC.3 | <100 | 44211-1 | 250 200 RPD: 22 | LCS-5 | 81% |
| TPH C29 - C36 | mg/kg | 100 | GC.3 | <100 | 44211-1 | 110 130 RPD: 17 | LCS-5 | 80% |
| Surrogate o-Terphenyl | % | | GC.3 | 127 | 44211-1 | # 134 | LCS-5 | 113% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|------|--------------|----------|---------------|---------------------------|-----------|------------------|
| PAHs in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 3/8/2010 | 44211-1 | 3/8/2010 3/8/2010 | LCS-5 | 3/8/2010 |
| Date analysed | - | | | 5/8/2010 | 44211-1 | 5/8/2010 5/8/2010 | LCS-5 | 5/8/2010 |
| Naphthalene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 0.6 0.7 RPD: 15 | LCS-5 | 91% |
| Acenaphthylene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 0.7 0.7 RPD: 0 | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | <0.1 <0.1 | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 0.2 0.3 RPD: 40 | LCS-5 | 95% |
| Phenanthrene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 2.9 2.6 RPD: 11 | LCS-5 | 103% |
| Anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 0.8 0.7 RPD: 13 | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 6.3 4.8 RPD: 27 | LCS-5 | 94% |
| Pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 7.1 5.4 RPD: 27 | LCS-5 | 101% |
| Benzo(a)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 4.4 3.3 RPD: 29 | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 4.0 3.1 RPD: 25 | LCS-5 | 112% |
| Benzo(b+k)fluoranthene | mg/kg | 0.2 | GC.12 subset | <0.2 | 44211-1 | 6.0 5.1 RPD: 16 | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 0.05 | GC.12 subset | <0.05 | 44211-1 | 4.7 4.0 RPD: 16 | LCS-5 | 94% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 2.9 2.4 RPD: 19 | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 0.7 0.6 RPD: 15 | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | GC.12 subset | <0.1 | 44211-1 | 2.7 2.4 RPD: 12 | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | | GC.12 subset | 76 | 44211-1 | 81 77 RPD: 5 | LCS-5 | 102% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| Speciated Phenols in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 06/08/2010 | 44211-1 | 06/08/2010 06/08/2010 | LCS-5 | 06/08/2010 |
| Date analysed | - | | | 07/08/2010 | 44211-1 | 07/08/2010 07/08/2010 | LCS-5 | 07/08/2010 |
| Phenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | LCS-5 | 88% |
| 2-Chlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | LCS-5 | 95% |
| 2-Methylphenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 3/4-Methylphenol | mg/kg | 2 | GC.12 | <2.0 | 44211-1 | <2.0 <2.0 | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,6-dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,5-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,6-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 44211-1 | <10 <10 | [NR] | [NR] |
| 4-nitrophenol | mg/kg | 10 | GC.12 | <10 | 44211-1 | <10 <10 | LCS-5 | 26% |
| 2,3,4,6-tetrachlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44211-1 | <1.0 <1.0 | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 44211-1 | <10 <10 | [NR] | [NR] |
| pentachlorophenol | mg/kg | 10 | GC.12 | <10 | 44211-1 | <10 <10 | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 12 | 44211-1 | # # | LCS-5 | 61% |
| Surrogate Phenol-d ₆ | % | | GC.12 | 27 | 44211-1 | # # | LCS-5 | 67% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 15 | 44211-1 | # # | LCS-5 | 19% |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 | 76 | 44211-1 | 89 89 RPD: 0 | LCS-5 | 75% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------|-------|-----|-------------------|------------|---------------|---------------------------|-----------|------------------|
| Acid Extractable metals in soil | | | | | | Base II Duplicate II %RPD | | |
| Date digested | - | | | 03/08/2010 | 44211-1 | 03/08/2010 03/08/2010 | LCS-1 | 03/08/2010 |
| Date analysed | - | | | 04/08/2010 | 44211-1 | 04/08/2010 04/08/2010 | LCS-1 | 04/08/2010 |
| Arsenic | mg/kg | 4 | Metals.20 ICP-AES | <4 | 44211-1 | 26 39 RPD: 40 | LCS-1 | 104% |
| Cadmium | mg/kg | 0.5 | Metals.20 ICP-AES | <0.5 | 44211-1 | 1 1.2 RPD: 18 | LCS-1 | 106% |
| Chromium | mg/kg | 1 | Metals.20 ICP-AES | <1 | 44211-1 | 29 20 RPD: 37 | LCS-1 | 102% |
| Lead | mg/kg | 1 | Metals.20 ICP-AES | <1 | 44211-1 | 170 230 RPD: 30 | LCS-1 | 102% |
| Mercury | mg/kg | 0.1 | Metals.21 CV-AAS | <0.1 | 44211-1 | 0.4 0.5 RPD: 22 | LCS-1 | 105% |
| Nickel | mg/kg | 1 | Metals.20 ICP-AES | <1 | 44211-1 | 20 20 RPD: 0 | LCS-1 | 104% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank |
|-----------------|-------|-----|--------|----------|
| Moisture | | | | |
| Date prepared | - | | | 3/8/2010 |
| Date analysed | - | | | 3/8/2010 |
| Moisture | % | 0.1 | LAB.8 | <0.10 |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| VOCs in Zero Headspace ASLP | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 05/08/2010 |
| Date analysed | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 05/08/2010 |
| Styrene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 104% |
| Surrogate Dibromofluoromethane | % | | GC.13 | 98 | [NT] | [NT] | LCS-W1 | 106% |
| Surrogate toluene-d8 | % | | GC.13 | 104 | [NT] | [NT] | LCS-W1 | 103% |
| Surrogate 4-BFB | % | | GC.13 | 104 | [NT] | [NT] | LCS-W1 | 102% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| BTEX in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 5/8/2010 |
| Date analysed | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 5/8/2010 |
| Benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Ethylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| m+p-xylene | µg/L | 2 | GC.13 | <2.0 | [NT] | [NT] | [NR] | [NR] |
| o-xylene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | [NR] | [NR] |
| Surrogate | % | | GC.13 | 98 | [NT] | [NT] | LCS-W1 | 98% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.13 | 100 | [NT] | [NT] | LCS-W1 | 100% |
| Surrogate 4-BFB | % | | GC.13 | 104 | [NT] | [NT] | LCS-W1 | 104% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------------|-------|-----|------------------|------------|---------------|---------------------------|-----------|------------------|
| Metals-ASLP Neutral (ICP-MS) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | [NT] | 44211-1 | 04/08/2010 04/08/2010 | LCS-W1 | 05/08/2010 |
| Date analysed | - | | | 05/08/2010 | 44211-1 | 05/08/2010 05/08/2010 | [NR] | [NR] |
| Arsenic in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44211-1 | 2 2 RPD: 0 | LCS-W1 | 106% |
| Cadmium in ASLP | µg/L | 0.1 | Metals.22 ICP-MS | <0.1 | 44211-1 | <0.1 <0.1 | LCS-W1 | 110% |
| Chromium in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44211-1 | 42 42 RPD: 0 | LCS-W1 | 102% |
| Lead in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44211-1 | 1 1 RPD: 0 | LCS-W1 | 106% |
| Mercury in ASLP | µg/L | 0.5 | Metals.21 ASLP | <0.50 | 44211-1 | <0.50 <0.50 | LCS-W1 | 117% |
| Nickel in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44211-1 | 4 4 RPD: 0 | LCS-W1 | 98% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| sTPH in water leach | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 4/8/2010 | [NT] | [NT] | LCS-W1 | 4/8/2010 |
| Date analysed | - | | | 4/8/2010 | [NT] | [NT] | LCS-W1 | 4/8/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 50 | GC.3 | <50 | [NT] | [NT] | LCS-W1 | 83% |
| TPH C ₁₅ - C ₂₈ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W1 | 120% |
| TPH C ₂₉ - C ₃₆ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W1 | 90% |
| Surrogate o-Terphenyl | % | | GC.3 | 116 | [NT] | [NT] | LCS-W1 | 112% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-------|------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in water leach | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 04/08/2010 | [NT] | [NT] | LCS-W1 | 04/08/2010 |
| Date analysed | - | | | 05/08/2010 | [NT] | [NT] | LCS-W1 | 05/08/2010 |
| Naphthalene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 92% |
| Acenaphthylene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluorene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 110% |
| Phenanthrene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 109% |
| Anthracene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 104% |
| Pyrene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 114% |
| Benzo(a)anthracene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Chrysene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 106% |
| Benzo(b+k)fluoranthene in ASLP | mg/L | 0.002 | GC.12 ASLP | <0.002 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 113% |
| Indeno(1,2,3-c,d)pyrene - ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 | 122 | [NT] | [NT] | LCS-W1 | 105% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--|-------|----------|--------|--------------------------------------|---------------|---------------------------|------------------|------------------|
| Speciated Phenols in water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 4/8/2010 | [NT] | [NT] | LCS-W1 | 4/8/2010 |
| Date analysed | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 5/8/2010 |
| Phenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 27% |
| 2-Chlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 84% |
| 2-Methylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol | µg/L | 20 | GC.12 | <20 | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,6-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| 4-Nitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | LCS-W1 | 28% |
| 2,3,4,6-Tetrachlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Pentachlorophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 60 | [NT] | [NT] | LCS-W1 | 57% |
| Surrogate Phenol-d6 | % | | GC.12 | 31 | [NT] | [NT] | LCS-W1 | 30% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 124 | [NT] | [NT] | LCS-W1 | 120% |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 127 | [NT] | [NT] | LCS-W1 | 119% |
| QUALITY CONTROL vTPH & BTEX in Soil | UNITS | Dup. Sm# | | Duplicate Base + Duplicate + %RPD | | Spike Sm# | Spike % Recovery | |
| Date extracted | - | [NT] | | [NT] | | 43953-2 | 03/08/2010 | |
| Date analysed | - | [NT] | | [NT] | | 43953-2 | 05/08/2010 | |
| vTPH C6 - C9 | mg/kg | [NT] | | [NT] | | 43953-2 | 96% | |
| Benzene | mg/kg | [NT] | | [NT] | | 43953-2 | 60% | |
| Toluene | mg/kg | [NT] | | [NT] | | 43953-2 | 87% | |
| Ethylbenzene | mg/kg | [NT] | | [NT] | | 43953-2 | 103% | |
| m+p-xylene | mg/kg | [NT] | | [NT] | | 43953-2 | 114% | |
| o-Xylene | mg/kg | [NT] | | [NT] | | 43953-2 | 113% | |
| Surrogate aaa-Trifluorotoluene | % | [NT] | | [NT] | | 43953-2 | 91% | |

Client Reference: E10100 Macdonaldtown Gasworks

| QUALITY CONTROL sTPH in Soil (C10-C36) | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|-------|----------|--------------------------------------|-----------|------------------|
| Date extracted | - | [NT] | [NT] | 43953-2 | 3/8/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 3/8/2010 |
| TPH C10 - C14 | mg/kg | [NT] | [NT] | 43953-2 | 80% |
| TPH C15 - C28 | mg/kg | [NT] | [NT] | 43953-2 | 139% |
| TPH C29 - C36 | mg/kg | [NT] | [NT] | 43953-2 | 99% |
| Surrogate o-Terphenyl | % | [NT] | [NT] | 43953-2 | 131% |
| QUALITY CONTROL PAHs in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | [NT] | [NT] | 43953-2 | 3/8/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 5/8/2010 |
| Naphthalene | mg/kg | [NT] | [NT] | 43953-2 | 90% |
| Acenaphthylene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Fluorene | mg/kg | [NT] | [NT] | 43953-2 | 101% |
| Phenanthrene | mg/kg | [NT] | [NT] | 43953-2 | 77% |
| Anthracene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | mg/kg | [NT] | [NT] | 43953-2 | 68% |
| Pyrene | mg/kg | [NT] | [NT] | 43953-2 | 70% |
| Benzo(a)anthracene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Chrysene | mg/kg | [NT] | [NT] | 43953-2 | 79% |
| Benzo(b+k)fluoranthene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | [NT] | [NT] | 43953-2 | 91% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | [NT] | [NT] | 43953-2 | 76% |

Client Reference: E10100 Macdonaldtown Gasworks

| QUALITY CONTROL Speciated Phenols in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|--|-------|----------|--------------------------------------|-----------|------------------|
| Date extracted | - | [NT] | [NT] | 44211-2 | 06/08/2010 |
| Date analysed | - | [NT] | [NT] | 44211-2 | 07/08/2010 |
| Phenol | mg/kg | [NT] | [NT] | 44211-2 | 32% |
| 2-Chlorophenol | mg/kg | [NT] | [NT] | 44211-2 | # |
| 2-Methylphenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,6-dichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-trichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-trichlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2,4-dinitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 4-nitrophenol | mg/kg | [NT] | [NT] | 44211-2 | 13% |
| 2,3,4,6-tetrachlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| pentachlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | [NT] | [NT] | 44211-2 | # |
| Surrogate Phenol-d6 | % | [NT] | [NT] | 44211-2 | # |
| Surrogate 2,4,6-Tribromophenol | % | [NT] | [NT] | 44211-2 | # |
| Surrogate p-Terphenyl-d14 | % | [NT] | [NT] | 44211-2 | 84% |

Client Reference: E10100 Macdonaldtown Gasworks

| QUALITY CONTROL Acid Extractable metals in soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|---|-------|----------|--------------------------------------|-----------|------------------|
| Date digested | - | [NT] | [NT] | 43953-2 | 03/08/2010 |
| Date analysed | - | [NT] | [NT] | 43953-2 | 04/08/2010 |
| Arsenic | mg/kg | [NT] | [NT] | 43953-2 | 99% |
| Cadmium | mg/kg | [NT] | [NT] | 43953-2 | 88% |
| Chromium | mg/kg | [NT] | [NT] | 43953-2 | 88% |
| Lead | mg/kg | [NT] | [NT] | 43953-2 | 112% |
| Mercury | mg/kg | [NT] | [NT] | 43953-2 | 108% |
| Nickel | mg/kg | [NT] | [NT] | 43953-2 | 89% |
| QUALITY CONTROL Metals-ASLP Neutral (ICP-MS) | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
| Date extracted | - | [NT] | [NT] | 44211-2 | 05/08/2010 |
| Date analysed | - | [NT] | [NT] | [NR] | [NR] |
| Arsenic in ASLP | µg/L | [NT] | [NT] | 44211-2 | 106% |
| Cadmium in ASLP | µg/L | [NT] | [NT] | 44211-2 | 108% |
| Chromium in ASLP | µg/L | [NT] | [NT] | 44211-2 | 102% |
| Lead in ASLP | µg/L | [NT] | [NT] | 44211-2 | 102% |
| Mercury in ASLP | µg/L | [NT] | [NT] | 44211-2 | 106% |
| Nickel in ASLP | µg/L | [NT] | [NT] | 44211-2 | 96% |

Report Comments:

Total Petroleum Hydrocarbons in water:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Total Petroleum Hydrocarbons in soil:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

PAH's in soil:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference and The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s.

Total Petroleum Hydrocarbons in soil:# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Phenols in soil:# Percent recovery is not possible to report due to interference from analytes (other than those being tested) in the sample/s.

Asbestos was analysed by Approved Identifier: Not applicable for this job

Asbestos was authorised by Approved Signatory: Not applicable for this job

INS: Insufficient sample for this test NT: Not tested PQL: Practical Quantitation Limit <: Less than >: Greater than

RPD: Relative Percent Difference NA: Test not required LCS: Laboratory Control Sample NR: Not requested

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the sample batch were within laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable. Surrogates: 60-140% is acceptable for general organics and 10-140% for



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CERTIFICATE OF ANALYSIS 44271

Client:

Enviropacific Services (Chatswood) Pty Ltd
1/28 Barcoo St
Chatswood
NSW 2067

Attention: Marty Croker

Sample log in details:

| | |
|---------------------------------------|---|
| Your Reference: | <u>E10100 Macdonaldtown Gasworks</u> |
| No. of samples: | 3 Soils |
| Date samples received: | 04/08/10 |
| Date completed instructions received: | 04/08/10 |

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

| | |
|-----------------------------|------------|
| Date results requested by: | 11/08/10 |
| Date of Preliminary Report: | Not issued |
| Issue Date: | 11/08/10 |

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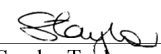
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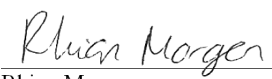
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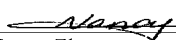
Results Approved By:


Giovanni Agosti
Technical Manager


Sandra Taylor
Senior Organic Chemist


Rhian Morgan
Metals Supervisor


Jacinta Hurst
Laboratory Manager


Nancy Zhang
Chemist

Envirolab Reference: 44271
Revision No: R 00



| | | | | |
|--|----------------|----------------------------------|-------------------------------------|-----------------------------------|
| VOCs in soil Our Reference: Your Reference | UNITS ----- | 44271-1 Material 2 Post 5% | 44271-2 Material 2 Post 12.5% | 44271-3 Material 2 Post 20% |
| Date Sampled Type of sample | ----- | 4/08/2010 Soil | 4/08/2010 Soil | 4/08/2010 Soil |
| Date extracted | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| Date analysed | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| styrene | mg/kg | <1.0 | <1.0 | <1.0 |
| Surrogate Dibromofluorometha | % | 96 | 87 | 87 |
| Surrogate aaa-Trifluorotoluene | % | 70 | 71 | 72 |
| Surrogate Toluene-d8 | % | 95 | 102 | 104 |
| Surrogate 4-Bromofluorobenzene | % | 101 | 96 | 96 |

| vTPH & BTEX in Soil Our Reference: Your Reference | UNITS ----- ----- | 44271-1 Material 2 Post 5% | 44271-2 Material 2 Post 12.5% | 44271-3 Material 2 Post 20% |
|---|-------------------------|----------------------------------|-------------------------------------|-----------------------------------|
| Date Sampled Type of sample | | 4/08/2010 Soil | 4/08/2010 Soil | 4/08/2010 Soil |
| Date extracted | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| Date analysed | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| vTPH C ₆ - C ₉ | mg/kg | <25 | <25 | <25 |
| Benzene | mg/kg | <0.5 | <0.5 | <0.5 |
| Toluene | mg/kg | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | mg/kg | 2.8 | 1.4 | <1.0 |
| m+p-xylene | mg/kg | 2.4 | <2.0 | <2.0 |
| o-Xylene | mg/kg | 2.3 | 1.2 | <1.0 |
| Surrogate aaa-Trifluorotoluene | % | 70 | 71 | 72 |

| | | | | |
|------------------------|-------|------------|------------|------------|
| sTPH in Soil (C10-C36) | | | | |
| Our Reference: | UNITS | 44271-1 | 44271-2 | 44271-3 |
| Your Reference | ----- | Material 2 | Material 2 | Material 2 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% |
| Type of sample | | 4/08/2010 | 4/08/2010 | 4/08/2010 |
| | | Soil | Soil | Soil |
| Date extracted | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| Date analysed | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| TPH C10 - C14 | mg/kg | 470 | 240 | 210 |
| TPH C15 - C28 | mg/kg | 340 | 210 | 210 |
| TPH C29 - C36 | mg/kg | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | # | # | # |

| PAHs in Soil Our Reference: Your Reference | UNITS ----- ----- | 44271-1 Material 2 Post 5% | 44271-2 Material 2 Post 12.5% | 44271-3 Material 2 Post 20% |
|--|-------------------------|----------------------------------|-------------------------------------|-----------------------------------|
| Date Sampled Type of sample | | 4/08/2010 Soil | 4/08/2010 Soil | 4/08/2010 Soil |
| Date extracted | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| Date analysed | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| Naphthalene | mg/kg | 120 | 74 | 60 |
| Acenaphthylene | mg/kg | 3.2 | 2.5 | 2.4 |
| Acenaphthene | mg/kg | 6.9 | 5.5 | 5.1 |
| Fluorene | mg/kg | 6.2 | 5.0 | 4.7 |
| Phenanthrene | mg/kg | 12 | 9.5 | 9.2 |
| Anthracene | mg/kg | 3.2 | 2.7 | 2.5 |
| Fluoranthene | mg/kg | 5.2 | 4.2 | 4.2 |
| Pyrene | mg/kg | 6.3 | 5.2 | 4.9 |
| Benzo(a)anthracene | mg/kg | 2.2 | 1.8 | 1.8 |
| Chrysene | mg/kg | 2.1 | 1.7 | 1.7 |
| Benzo(b+k)fluoranthene | mg/kg | 0.7 | 1.8 | 1.9 |
| Benzo(a)pyrene | mg/kg | 2.0 | 1.6 | 1.6 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.5 | 0.5 | 0.4 |
| Dibenzo(a,h)anthracene | mg/kg | 0.2 | 0.1 | 0.1 |
| Benzo(g,h,i)perylene | mg/kg | 0.6 | 0.5 | 0.5 |
| Surrogate p-Terphenyl-d ₁₄ | % | 95 | 97 | 99 |

| Speciated Phenols in Soil Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44271-1 Material 2 Post 5% 4/08/2010 Soil | 44271-2 Material 2 Post 12.5% 4/08/2010 Soil | 44271-3 Material 2 Post 20% 4/08/2010 Soil |
|---|-------------------------|---|--|--|
| Date extracted | - | 10/08/2010 | 10/08/2010 | 10/08/2010 |
| Date analysed | - | 11/08/2010 | 11/08/2010 | 11/08/2010 |
| Phenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2-Chlorophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2-Methylphenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 3/4-Methylphenol | mg/kg | <2.0 | <2.0 | <2.0 |
| 2-Nitrophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2,4-Dimethylphenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2,4-Dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2,6-dichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2,4,5-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2,4,6-trichlorophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2,4-dinitrophenol | mg/kg | <10 | <10 | <10 |
| 4-nitrophenol | mg/kg | <10 | <10 | <10 |
| 2,3,4,6-tetrachlorophenol | mg/kg | <1.0 | <1.0 | <1.0 |
| 2-methyl-4,6-dinitrophenol | mg/kg | <10 | <10 | <10 |
| pentachlorophenol | mg/kg | <10 | <10 | <10 |
| Surrogate 2-fluorophenol | % | 64 | # | # |
| Surrogate Phenol-d6 | % | 77 | 56 | 43 |
| Surrogate 2,4,6-Tribromophenol | % | # | # | # |
| Surrogate p-Terphenyl-d14 | % | 107 | 102 | 102 |

| | | | | |
|---------------------------------|-------|------------|------------|------------|
| Acid Extractable metals in soil | | | | |
| Our Reference: | UNITS | 44271-1 | 44271-2 | 44271-3 |
| Your Reference | ----- | Material 2 | Material 2 | Material 2 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% |
| Type of sample | | 4/08/2010 | 4/08/2010 | 4/08/2010 |
| | | Soil | Soil | Soil |
| Date digested | - | 09/08/2010 | 09/08/2010 | 09/08/2010 |
| Date analysed | - | 10/08/2010 | 10/08/2010 | 10/08/2010 |
| Arsenic | mg/kg | 4 | <4 | 5 |
| Cadmium | mg/kg | <0.5 | <0.5 | <0.5 |
| Chromium | mg/kg | 15 | 16 | 21 |
| Lead | mg/kg | 24 | 26 | 23 |
| Mercury | mg/kg | <0.1 | <0.1 | <0.1 |
| Nickel | mg/kg | 3 | 4 | 5 |

| | | | | |
|--|-------------------------|----------------------------------|-------------------------------------|-----------------------------------|
| Moisture Our Reference: Your Reference | UNITS ----- ----- | 44271-1 Material 2 Post 5% | 44271-2 Material 2 Post 12.5% | 44271-3 Material 2 Post 20% |
| Date Sampled Type of sample | | 4/08/2010 Soil | 4/08/2010 Soil | 4/08/2010 Soil |
| Date prepared | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| Date analysed | - | 9/8/2010 | 9/8/2010 | 9/8/2010 |
| Moisture | % | 14 | 13 | 12 |

| | | | | |
|--------------------------------|-------|------------|------------|------------|
| VOCs in Zero Headspace ASLP | | | | |
| Our Reference: | UNITS | 44271-1 | 44271-2 | 44271-3 |
| Your Reference | ----- | Material 2 | Material 2 | Material 2 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% |
| Type of sample | | 4/08/2010 | 4/08/2010 | 4/08/2010 |
| | | Soil | Soil | Soil |
| Date extracted | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| Date analysed | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| Styrene | µg/L | 2.1 | 2.0 | 1.7 |
| Surrogate Dibromofluoromethane | % | 91 | 89 | 87 |
| Surrogate toluene-d8 | % | 95 | 109 | 107 |
| Surrogate 4-BFB | % | 113 | 115 | 106 |

| | | | | |
|--------------------------------|-------|------------|------------|------------|
| BTEX in Zero Headspace | | | | |
| Our Reference: | UNITS | 44271-1 | 44271-2 | 44271-3 |
| Your Reference | ----- | Material 2 | Material 2 | Material 2 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% |
| Type of sample | | 4/08/2010 | 4/08/2010 | 4/08/2010 |
| | | Soil | Soil | Soil |
| Date extracted | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| Date analysed | - | 10/8/2010 | 10/8/2010 | 10/8/2010 |
| Benzene | µg/L | <1.0 | <1.0 | <1.0 |
| Toluene | µg/L | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | µg/L | 70 | 44 | 30 |
| m+p-xylene | µg/L | 62 | 41 | 26 |
| o-xylene | µg/L | 59 | 39 | 26 |
| Surrogate Dibromofluoromethane | % | 91 | 89 | 87 |
| Surrogate toluene-d8 | % | 95 | 109 | 107 |
| Surrogate 4-BFB | % | 113 | 115 | 106 |

| | | | | |
|------------------------------|----------|------------|------------|------------|
| Metals-ASLP Neutral (ICP-MS) | | | | |
| Our Reference: | UNITS | 44271-1 | 44271-2 | 44271-3 |
| Your Reference | ----- | Material 2 | Material 2 | Material 2 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% |
| Type of sample | | 4/08/2010 | 4/08/2010 | 4/08/2010 |
| | | Soil | Soil | Soil |
| Date extracted | - | 11/08/2010 | 11/08/2010 | 11/08/2010 |
| Date analysed | - | 11/08/2010 | 11/08/2010 | 11/08/2010 |
| pH of final Leachate | pH units | 11.6 | 12.2 | 12.5 |
| Arsenic in ASLP | µg/L | 8 | 7 | 6 |
| Cadmium in ASLP | µg/L | <0.1 | <0.1 | 0.1 |
| Chromium in ASLP | µg/L | 7 | 26 | 38 |
| Lead in ASLP | µg/L | <1 | <1 | <1 |
| Mercury in ASLP | µg/L | <0.50 | <0.50 | <0.50 |
| Nickel in ASLP | µg/L | 2 | 4 | 5 |

| | | | | |
|---------------------------------------|-------|------------|------------|------------|
| sTPH in water leach | | | | |
| Our Reference: | UNITS | 44271-1 | 44271-2 | 44271-3 |
| Your Reference | ----- | Material 2 | Material 2 | Material 2 |
| Date Sampled | ----- | Post 5% | Post 12.5% | Post 20% |
| Type of sample | | 4/08/2010 | 4/08/2010 | 4/08/2010 |
| | | Soil | Soil | Soil |
| Date extracted | - | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| Date analysed | - | 5/8/2010 | 5/8/2010 | 5/8/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 5,600 | 4,500 | 3,700 |
| TPH C ₁₅ - C ₂₈ | µg/L | 1,100 | 1,200 | 1,200 |
| TPH C ₂₉ - C ₃₆ | µg/L | <100 | <100 | <100 |
| Surrogate o-Terphenyl | % | # | # | # |

| PAHs in water leach Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44271-1 Material 2 Post 5% 4/08/2010 Soil | 44271-2 Material 2 Post 12.5% 4/08/2010 Soil | 44271-3 Material 2 Post 20% 4/08/2010 Soil |
|---|-------------------------|---|--|--|
| Date extracted | - | 05/08/2010 | 05/08/2010 | 05/08/2010 |
| Date analysed | - | 06/08/2010 | 06/08/2010 | 06/08/2010 |
| Naphthalene in ASLP | mg/L | 2.4 | 1.7 | 1.3 |
| Acenaphthylene in ASLP | mg/L | 0.024 | 0.026 | 0.028 |
| Acenaphthene in ASLP | mg/L | 0.054 | 0.059 | 0.064 |
| Fluorene in ASLP | mg/L | 0.036 | 0.037 | 0.042 |
| Phenanthrene in ASLP | mg/L | 0.026 | 0.029 | 0.034 |
| Anthracene in ASLP | mg/L | 0.005 | 0.006 | 0.007 |
| Fluoranthene in ASLP | mg/L | 0.003 | 0.003 | 0.004 |
| Pyrene in ASLP | mg/L | 0.002 | 0.003 | 0.004 |
| Benzo(a)anthracene in ASLP | mg/L | <0.001 | <0.001 | <0.001 |
| Chrysene in ASLP | mg/L | <0.001 | <0.001 | <0.001 |
| Benzo(b+k)fluoranthene in ASLP | mg/L | <0.002 | <0.002 | <0.002 |
| Benzo(a)pyrene in ASLP | mg/L | <0.001 | <0.001 | <0.001 |
| Indeno(1,2,3-c,d)pyrene - ASLP | mg/L | <0.001 | <0.001 | <0.001 |
| Dibenzo(a,h)anthracene in ASLP | mg/L | <0.001 | <0.001 | <0.001 |
| Benzo(g,h,i)perylene in ASLP | mg/L | <0.001 | <0.001 | <0.001 |
| Surrogate p-Terphenyl-d ₁₄ | % | 85 | 87 | 98 |

| Speciated Phenols in water Our Reference: Your Reference Date Sampled Type of sample | UNITS ----- ----- | 44271-1 Material 2 Post 5% 4/08/2010 Soil | 44271-2 Material 2 Post 12.5% 4/08/2010 Soil | 44271-3 Material 2 Post 20% 4/08/2010 Soil |
|--|-----------------------------|---|--|--|
| Date extracted | - | 05/08/2010 | 05/08/2010 | 05/08/2010 |
| Date analysed | - | 05/08/2010 | 05/08/2010 | 05/08/2010 |
| Phenol | µg/L | <10 | <10 | <10 |
| 2-Chlorophenol | µg/L | <10 | <10 | <10 |
| 2-Methylphenol | µg/L | <10 | <10 | <10 |
| 3/4-Methylphenol | µg/L | <20 | <20 | <20 |
| 2-Nitrophenol | µg/L | <10 | <10 | <10 |
| 2,4-Dimethylphenol | µg/L | <10 | <10 | <10 |
| 2,4-Dichlorophenol | µg/L | <10 | <10 | <10 |
| 2,6-Dichlorophenol | µg/L | <10 | <10 | <10 |
| 2,4,5-Trichlorophenol | µg/L | <10 | <10 | <10 |
| 2,4,6-Trichlorophenol | µg/L | <10 | <10 | <10 |
| 2,4-Dinitrophenol | µg/L | <100 | <100 | <100 |
| 4-Nitrophenol | µg/L | <100 | <100 | <100 |
| 2,3,4,6-Tetrachlorophenol | µg/L | <10 | <10 | <10 |
| 2-methyl-4,6-dinitrophenol | µg/L | <100 | <100 | <100 |
| Pentachlorophenol | µg/L | <100 | <100 | <100 |
| Surrogate 2-fluorophenol | % | 65 | 62 | 62 |
| Surrogate Phenol-d6 | % | 41 | 42 | 42 |
| Surrogate 2,4,6-Tribromophenol | % | 117 | 110 | 129 |
| Surrogate p-Terphenyl-d14 | % | 120 | 98 | 132 |

| Method ID | Methodology Summary |
|------------------------------|--|
| GC.14 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. |
| GC.16 | Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. |
| GC.3 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. |
| GC.12 subset | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| GC.12 | Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. |
| Metals.20 ICP-AES | Determination of various metals by ICP-AES. |
| Metals.21 CV-AAS | Determination of Mercury by Cold Vapour AAS. |
| LAB.8 | Moisture content determined by heating at 105 deg C for a minimum of 4 hours. |
| GC.13 | Water samples are analysed directly by purge and trap GC-MS. |
| LAB.1 | pH - Measured using pH meter and electrode in accordance with APHA 20th ED, 4500-H+. |
| Metals.22 ICP-MS | Determination of various metals by ICP-MS following leaching using neutralised deionised water by AS 4439.3 - 1997. |
| Metals.21 ASLP | Determination of Mercury by Cold Vapour AAS following neutral water leaching by AS 4439.3 - 1997. |
| GC.12 ASLP | ASLP Leachates are extracted with Dichloromethane and analysed by GC-MS. |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|-------------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| VOCs in soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 9/8/2010 | [NT] | [NT] | LCS-5 | 9/8/2010 |
| Date analysed | - | | | 10/8/2010 | [NT] | [NT] | LCS-5 | 10/8/2010 |
| styrene | mg/kg | 1 | GC.14 | <1.0 | [NT] | [NT] | LCS-5 | 104% |
| Surrogate Dibromofluorometha | % | | GC.14 | 96 | [NT] | [NT] | LCS-5 | 86% |
| Surrogate aaa-Trifluorotoluene | % | | GC.14 | 72 | [NT] | [NT] | LCS-5 | 76% |
| Surrogate Toluene-d ₈ | % | | GC.14 | 93 | [NT] | [NT] | LCS-5 | 94% |
| Surrogate 4-Bromofluorobenzene | % | | GC.14 | 79 | [NT] | [NT] | LCS-5 | 82% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| vTPH & BTEX in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 9/8/2010 | [NT] | [NT] | LCS-5 | 9/8/2010 |
| Date analysed | - | | | 10/8/2010 | [NT] | [NT] | LCS-5 | 10/8/2010 |
| vTPH C ₆ - C ₉ | mg/kg | 25 | GC.16 | <25 | [NT] | [NT] | LCS-5 | 87% |
| Benzene | mg/kg | 0.5 | GC.16 | <0.5 | [NT] | [NT] | LCS-5 | 72% |
| Toluene | mg/kg | 0.5 | GC.16 | <0.5 | [NT] | [NT] | LCS-5 | 81% |
| Ethylbenzene | mg/kg | 1 | GC.16 | <1.0 | [NT] | [NT] | LCS-5 | 88% |
| m+p-xylene | mg/kg | 2 | GC.16 | <2.0 | [NT] | [NT] | LCS-5 | 97% |
| o-Xylene | mg/kg | 1 | GC.16 | <1.0 | [NT] | [NT] | LCS-5 | 98% |
| Surrogate aaa-Trifluorotoluene | % | | GC.16 | 72 | [NT] | [NT] | LCS-5 | 114% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| sTPH in Soil (C10-C36) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 9/8/2010 | [NT] | [NT] | LCS-6 | 9/8/2010 |
| Date analysed | - | | | 9/8/2010 | [NT] | [NT] | LCS-6 | 9/8/2010 |
| TPH C ₁₀ - C ₁₄ | mg/kg | 50 | GC.3 | <50 | [NT] | [NT] | LCS-6 | 80% |
| TPH C ₁₅ - C ₂₈ | mg/kg | 100 | GC.3 | <100 | [NT] | [NT] | LCS-6 | 88% |
| TPH C ₂₉ - C ₃₆ | mg/kg | 100 | GC.3 | <100 | [NT] | [NT] | LCS-6 | 85% |
| Surrogate o-Terphenyl | % | | GC.3 | 94 | [NT] | [NT] | LCS-6 | 105% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------|-------|------|--------------|-----------|---------------|---------------------------|-----------|------------------|
| PAHs in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 9/8/2010 | [NT] | [NT] | LCS-6 | 9/8/2010 |
| Date analysed | - | | | 10/8/2010 | [NT] | [NT] | LCS-6 | 10/8/2010 |
| Naphthalene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-6 | 102% |
| Acenaphthylene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluorene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-6 | 94% |
| Phenanthrene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-6 | 103% |
| Anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-6 | 94% |
| Pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-6 | 96% |
| Benzo(a)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Chrysene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | LCS-6 | 105% |
| Benzo(b+k)fluoranthene | mg/kg | 0.2 | GC.12 subset | <0.2 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene | mg/kg | 0.05 | GC.12 subset | <0.05 | [NT] | [NT] | LCS-6 | 111% |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | GC.12 subset | <0.1 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d14 | % | | GC.12 subset | 76 | [NT] | [NT] | LCS-6 | 126% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|------------|---------------|---------------------------|-----------|------------------|
| Speciated Phenols in Soil | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 10/08/2010 | 44271-1 | 10/08/2010 10/08/2010 | LCS-6 | 10/08/2010 |
| Date analysed | - | | | 11/08/2010 | 44271-1 | 11/08/2010 11/08/2010 | LCS-6 | 11/08/2010 |
| Phenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | LCS-6 | 98% |
| 2-Chlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | LCS-6 | 95% |
| 2-Methylphenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 3/4-Methylphenol | mg/kg | 2 | GC.12 | <2.0 | 44271-1 | <2.0 <2.0 | [NR] | [NR] |
| 2-Nitrophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dimethylphenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-Dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,6-dichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,5-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4,6-trichlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2,4-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 44271-1 | <10 <10 | [NR] | [NR] |
| 4-nitrophenol | mg/kg | 10 | GC.12 | <10 | 44271-1 | <10 <10 | LCS-6 | 72% |
| 2,3,4,6-tetrachlorophenol | mg/kg | 1 | GC.12 | <1.0 | 44271-1 | <1.0 <1.0 | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | 10 | GC.12 | <10 | 44271-1 | <10 <10 | [NR] | [NR] |
| pentachlorophenol | mg/kg | 10 | GC.12 | <10 | 44271-1 | <10 <10 | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 96 | 44271-1 | 64 68 RPD: 6 | LCS-6 | 65% |
| Surrogate Phenol-d6 | % | | GC.12 | 96 | 44271-1 | 77 79 RPD: 3 | LCS-6 | 72% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 60 | 44271-1 | # # | LCS-6 | 46% |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 91 | 44271-1 | 107 103 RPD: 4 | LCS-6 | 84% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------|-------|-----|-------------------|------------|---------------|---------------------------|-----------|------------------|
| Acid Extractable metals in soil | | | | | | Base II Duplicate II %RPD | | |
| Date digested | - | | | 09/08/2010 | [NT] | [NT] | LCS-2 | 09/08/2010 |
| Date analysed | - | | | 10/08/2010 | [NT] | [NT] | LCS-2 | 10/08/2010 |
| Arsenic | mg/kg | 4 | Metals.20 ICP-AES | <4 | [NT] | [NT] | LCS-2 | 102% |
| Cadmium | mg/kg | 0.5 | Metals.20 ICP-AES | <0.5 | [NT] | [NT] | LCS-2 | 104% |
| Chromium | mg/kg | 1 | Metals.20 ICP-AES | <1 | [NT] | [NT] | LCS-2 | 105% |
| Lead | mg/kg | 1 | Metals.20 ICP-AES | <1 | [NT] | [NT] | LCS-2 | 103% |
| Mercury | mg/kg | 0.1 | Metals.21 CV-AAS | <0.1 | [NT] | [NT] | LCS-2 | 99% |
| Nickel | mg/kg | 1 | Metals.20 ICP-AES | <1 | [NT] | [NT] | LCS-2 | 105% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank |
|-----------------|-------|-----|--------|----------|
| Moisture | | | | |
| Date prepared | - | | | 9/8/2010 |
| Date analysed | - | | | 9/8/2010 |
| Moisture | % | 0.1 | LAB.8 | <0.10 |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| VOCs in Zero Headspace ASLP | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 10/8/2010 | [NT] | [NT] | LCS-W1 | 10/8/2010 |
| Date analysed | - | | | 10/8/2010 | [NT] | [NT] | LCS-W1 | 10/8/2010 |
| Styrene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 99% |
| Surrogate Dibromofluoromethane | % | | GC.13 | 96 | [NT] | [NT] | LCS-W1 | 92% |
| Surrogate toluene-d8 | % | | GC.13 | 93 | [NT] | [NT] | LCS-W1 | 102% |
| Surrogate 4-BFB | % | | GC.13 | 79 | [NT] | [NT] | LCS-W1 | 101% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------|-------|-----|--------|-----------|---------------|---------------------------|-----------|------------------|
| BTEX in Zero Headspace | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 10/8/2010 | [NT] | [NT] | LCS-W1 | 10/8/2010 |
| Date analysed | - | | | 10/8/2010 | [NT] | [NT] | LCS-W1 | 10/8/2010 |
| Benzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 86% |
| Toluene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 100% |
| Ethylbenzene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 106% |
| m+p-xylene | µg/L | 2 | GC.13 | <2.0 | [NT] | [NT] | LCS-W1 | 110% |
| o-xylene | µg/L | 1 | GC.13 | <1.0 | [NT] | [NT] | LCS-W1 | 118% |
| Surrogate | % | | GC.13 | 96 | [NT] | [NT] | LCS-W1 | 86% |
| Dibromofluoromethane | | | | | | | | |
| Surrogate toluene-d8 | % | | GC.13 | 93 | [NT] | [NT] | LCS-W1 | 101% |
| Surrogate 4-BFB | % | | GC.13 | 79 | [NT] | [NT] | LCS-W1 | 106% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|------------------------------|-------|-----|------------------|------------|---------------|---------------------------|-----------|------------------|
| Metals-ASLP Neutral (ICP-MS) | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 11/08/2010 | 44271-1 | 11/08/2010 11/08/2010 | LCS-W1 | 11/08/2010 |
| Date analysed | - | | | 11/08/2010 | 44271-1 | 11/08/2010 11/08/2010 | LCS-W1 | 11/08/2010 |
| Arsenic in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44271-1 | 8 8 RPD: 0 | LCS-W1 | 106% |
| Cadmium in ASLP | µg/L | 0.1 | Metals.22 ICP-MS | <0.1 | 44271-1 | <0.1 <0.1 | LCS-W1 | 108% |
| Chromium in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44271-1 | 7 7 RPD: 0 | LCS-W1 | 88% |
| Lead in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44271-1 | <1 <1 | LCS-W1 | 117% |
| Mercury in ASLP | µg/L | 0.5 | Metals.21 ASLP | <0.50 | 44271-1 | <0.50 <0.50 | LCS-W1 | 116% |
| Nickel in ASLP | µg/L | 1 | Metals.22 ICP-MS | <1 | 44271-1 | 2 2 RPD: 0 | LCS-W1 | 86% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-----|--------|----------|---------------|---------------------------|-----------|------------------|
| sTPH in water leach | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 5/8/2010 |
| Date analysed | - | | | 5/8/2010 | [NT] | [NT] | LCS-W1 | 5/8/2010 |
| TPH C ₁₀ - C ₁₄ | µg/L | 50 | GC.3 | <50 | [NT] | [NT] | LCS-W1 | 83% |
| TPH C ₁₅ - C ₂₈ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W1 | 117% |
| TPH C ₂₉ - C ₃₆ | µg/L | 100 | GC.3 | <100 | [NT] | [NT] | LCS-W1 | 92% |
| Surrogate o-Terphenyl | % | | GC.3 | 128 | [NT] | [NT] | LCS-W1 | 117% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|---------------------------------------|-------|-------|------------|------------|---------------|---------------------------|-----------|------------------|
| PAHs in water leach | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 05/08/2010 | [NT] | [NT] | LCS-W1 | 05/08/2010 |
| Date analysed | - | | | 06/08/2010 | [NT] | [NT] | LCS-W1 | 06/08/2010 |
| Naphthalene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 94% |
| Acenaphthylene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Acenaphthene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluorene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 109% |
| Phenanthrene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 101% |
| Anthracene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Fluoranthene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 96% |
| Pyrene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 106% |
| Benzo(a)anthracene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Chrysene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 104% |
| Benzo(b+k)fluoranthene in ASLP | mg/L | 0.002 | GC.12 ASLP | <0.002 | [NT] | [NT] | [NR] | [NR] |
| Benzo(a)pyrene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | LCS-W1 | 113% |
| Indeno(1,2,3-c,d)pyrene - ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Dibenzo(a,h)anthracene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Benzo(g,h,i)perylene in ASLP | mg/L | 0.001 | GC.12 ASLP | <0.001 | [NT] | [NT] | [NR] | [NR] |
| Surrogate p-Terphenyl-d ₁₄ | % | | GC.12 | 116 | [NT] | [NT] | LCS-W1 | 99% |

| QUALITY CONTROL | UNITS | PQL | METHOD | Blank | Duplicate Sm# | Duplicate results | Spike Sm# | Spike % Recovery |
|--------------------------------|-------|----------|--------|-------------------------|---------------|---------------------------|------------------|------------------|
| Speciated Phenols in water | | | | | | Base II Duplicate II %RPD | | |
| Date extracted | - | | | 05/08/2010 | [NT] | [NT] | LCS-W1 | 05/08/2010 |
| Date analysed | - | | | 05/08/2010 | [NT] | [NT] | LCS-W1 | 05/08/2010 |
| Phenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 34% |
| 2-Chlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | LCS-W1 | 94% |
| 2-Methylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 3/4-Methylphenol | µg/L | 20 | GC.12 | <20 | [NT] | [NT] | [NR] | [NR] |
| 2-Nitrophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dimethylphenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,6-Dichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,5-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4,6-Trichlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2,4-Dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| 4-Nitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | LCS-W1 | 54% |
| 2,3,4,6-Tetrachlorophenol | µg/L | 10 | GC.12 | <10 | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Pentachlorophenol | µg/L | 100 | GC.12 | <100 | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | | GC.12 | 66 | [NT] | [NT] | LCS-W1 | 66% |
| Surrogate Phenol-d6 | % | | GC.12 | 32 | [NT] | [NT] | LCS-W1 | 36% |
| Surrogate 2,4,6-Tribromophenol | % | | GC.12 | 112 | [NT] | [NT] | LCS-W1 | 116% |
| Surrogate p-Terphenyl-d14 | % | | GC.12 | 126 | [NT] | [NT] | LCS-W1 | 119% |
| QUALITY CONTROL | UNITS | Dup. Sm# | | Duplicate | | Spike Sm# | Spike % Recovery | |
| Speciated Phenols in Soil | | | | Base + Duplicate + %RPD | | | | |
| Date extracted | - | [NT] | | [NT] | | 44271-2 | 10/08/2010 | |
| Date analysed | - | [NT] | | [NT] | | 44271-2 | 11/08/2010 | |
| Phenol | mg/kg | [NT] | | [NT] | | 44271-2 | 75% | |
| 2-Chlorophenol | mg/kg | [NT] | | [NT] | | 44271-2 | # | |
| 2-Methylphenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 3/4-Methylphenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2-Nitrophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4-Dimethylphenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4-Dichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,6-dichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4,5-trichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |
| 2,4,6-trichlorophenol | mg/kg | [NT] | | [NT] | | [NR] | [NR] | |

| QUALITY CONTROL Speciated Phenols in Soil | UNITS | Dup. Sm# | Duplicate Base + Duplicate + %RPD | Spike Sm# | Spike % Recovery |
|--|-------|----------|--------------------------------------|-----------|------------------|
| 2,4-dinitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 4-nitrophenol | mg/kg | [NT] | [NT] | 44271-2 | # |
| 2,3,4,6-tetrachlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| 2-methyl-4,6-dinitrophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| pentachlorophenol | mg/kg | [NT] | [NT] | [NR] | [NR] |
| Surrogate 2-fluorophenol | % | [NT] | [NT] | 44271-2 | # |
| Surrogate Phenol-d ₆ | % | [NT] | [NT] | 44271-2 | 64% |
| Surrogate 2,4,6-Tribromophenol | % | [NT] | [NT] | 44271-2 | # |
| Surrogate p-Terphenyl-d ₁₄ | % | [NT] | [NT] | 44271-2 | 108% |

Report Comments:

Total Petroleum Hydrocarbons in tcip: # Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Total Petroleum Hydrocarbons in soil: # Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Phenol's in soil by GCMS: # Percent recovery is not possible to report due to interference from analytes (other than those being tested) in the sample/s.

Asbestos was analysed by Approved Identifier: Not applicable for this job

INS: Insufficient sample for this test

NT: Not tested

NR: Not requested

PQL: Practical Quantitation Limit

<: Less than

>: Greater than

NA: Test not required

Quality Control Definitions

LCS: Laboratory Control Sample

RPD: Relative Percent Difference

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria:

Duplicates: <5xPQL - any RPD is acceptable

>5xPQL - 0-50% RPD is acceptable.

SOIL QUALITY REPORT

Client: JBS Environmental Pty Ltd
Address: Suite 2, 595 Gardeners Road MASCOT NSW 2020

Job No. 524
Report No. 1
Test Request No. N/A
Date Issued. 40386
Sample No. 55158

Project: Material Testing

Sample Source:

Lot No. TP1

Location Chainage & o/s: N/A

Material Type: .3m - .6m

Nomin. Size:

Specification:

Sampling Method:

Date Sampled: 02/07/10

Sample Description:

ATTERBERG LIMITS & LINEAR SHRINKAGE

SAMPLE HISTORY:

Test Methods:

Liquid Limit: AS1289.3.1.1

Plasticity Index: AS1289.3.3.2

Plastic Limit: AS1289.3.2.1

Linear Shrinkage: AS1289.3.4.1

Moisture Content: AS1289.2.1.1

RESULTS

LIQUID LIMIT: %

PLASTIC LIMIT: %

PLASTICITY INDEX: %

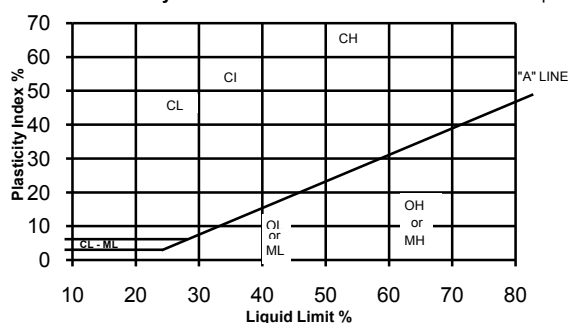
LINEAR SHRINKAGE: %

PI X 0.425mm SIEVE:

Linear Shrinkage Remarks:

Plasticity Chart - AS1726 1993

Sample Plot



PARTICLE SIZE DISTRIBUTION

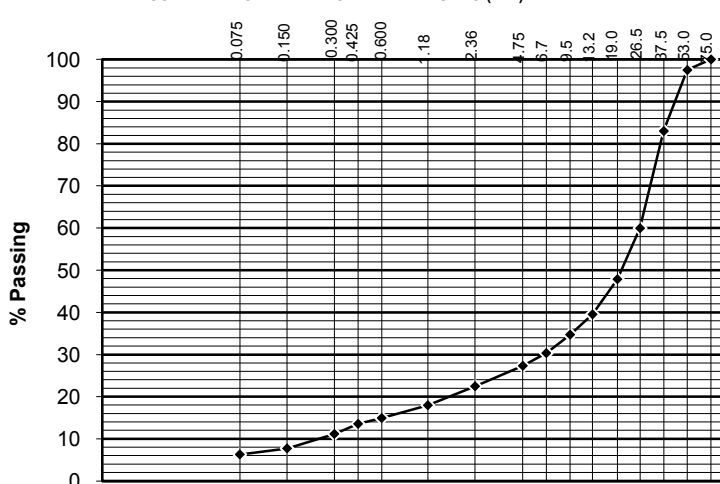
Grading Envelope

| SIEVE SIZE (mm) | Lower Limits | % PASSING (by mass) | Upper Limits |
|--------------------|-----------------|------------------------|-----------------|
| 75.0 | | 100 | |
| 53.0 | | 97 | |
| 37.5 | | 83 | |
| 26.5 | | 60 | |
| 19.0 | | 48 | |
| 13.2 | | 40 | |
| 9.5 | | 35 | |
| 6.7 | | 30 | |
| 4.75 | | 27 | |
| 2.36 | | 22 | |
| 1.18 | | 18 | |
| 0.600 | | 15 | |
| 0.425 | | 14 | |
| 0.300 | | 11 | |
| 0.150 | | 8 | |
| 0.075 | | 6 | |

SAMPLE HISTORY:

Test Method: AS1289.3.6.1

AUSTRALIAN STANDARD SIEVE APERTURES (mm)



EMERSON CLASS NUMBER

Test Method:

EMERSON CLASS NUMBER:

TYPE OF WATER:

TEMP. OF WATER:

°C

Natural moisture content of sample (%):

Workbook No. WB24 REV 0 10/10/08

APPROVED BY: P. Bowler

NATA Approved Signatory

Remarks.



This document is issued in accordance
with NATA's accreditation requirements.

Accredited for compliance with
ISO/IEC 17025

Laboratory No. 10830

Laboratory No. 10830

SOIL QUALITY REPORT

Client: JBS Environmental Pty Ltd
Address: Suite 2, 595 Gardeners Road MASCOT NSW 2020

Job No. 524
Report No. 3
Test Request No. N/A
Date Issued. 27/07/2010
Sample No. 55160

Project: Material Testing

Sample Source:

Lot No. TP3

Location Chainage & o/s: N/A

Material Type: 4m - 4.2m

Sample Description:

Nomin. Size:

Specification:

Sampling Method:

Date Sampled: 02/07/10

ATTERBERG LIMITS & LINEAR SHRINKAGE

SAMPLE HISTORY:

Test Methods:

Liquid Limit: AS1289.3.1.1

Plasticity Index: AS1289.3.3.2

Plastic Limit: AS1289.3.2.1

Linear Shrinkage: AS1289.3.4.1

Moisture Content: AS1289.2.1.1

RESULTS

LIQUID LIMIT: %

PLASTIC LIMIT: %

PLASTICITY INDEX: %

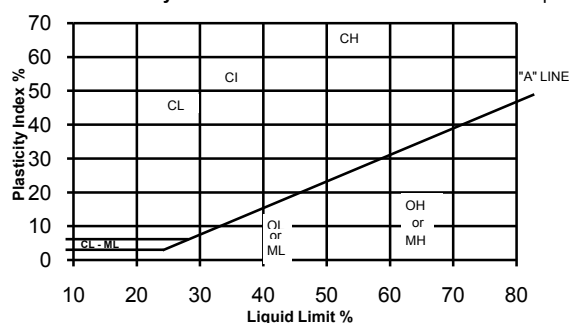
LINEAR SHRINKAGE: %

PI X 0.425mm SIEVE:

Linear Shrinkage Remarks:

Plasticity Chart - AS1726 1993

Sample Plot



PARTICLE SIZE DISTRIBUTION

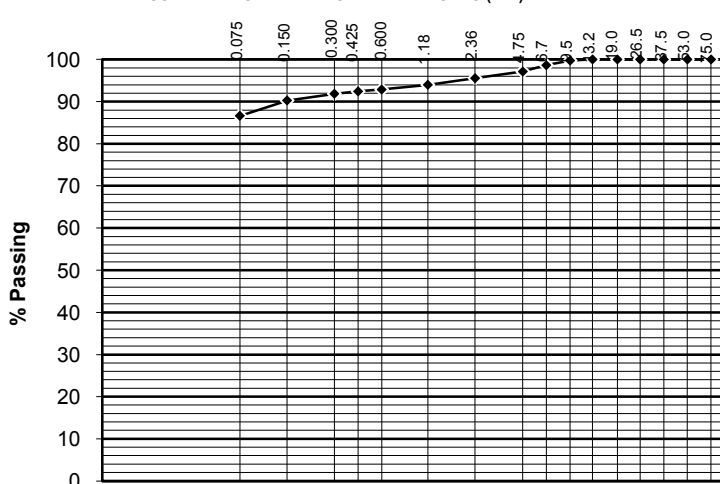
Grading Envelope

| SIEVE SIZE (mm) | Lower Limits | % PASSING (by mass) | Upper Limits |
|--------------------|-----------------|------------------------|-----------------|
| 75.0 | | 100 | |
| 53.0 | | 100 | |
| 37.5 | | 100 | |
| 26.5 | | 100 | |
| 19.0 | | 100 | |
| 13.2 | | 100 | |
| 9.5 | | 100 | |
| 6.7 | | 99 | |
| 4.75 | | 97 | |
| 2.36 | | 96 | |
| 1.18 | | 94 | |
| 0.600 | | 93 | |
| 0.425 | | 92 | |
| 0.300 | | 92 | |
| 0.150 | | 90 | |
| 0.075 | | 87 | |

SAMPLE HISTORY:

Test Method: AS1289.3.6.1

AUSTRALIAN STANDARD SIEVE APERTURES (mm)



EMERSON CLASS NUMBER

Test Method:

EMERSON CLASS NUMBER:

TYPE OF WATER:

TEMP. OF WATER:

°C

Natural moisture content of sample (%):

Workbook No. WB24 REV 0 10/10/08

APPROVED BY: P. Bowler

NATA Approved Signatory

Remarks.



This document is issued in accordance
with NATA's accreditation requirements.



Accredited for compliance with
ISO/IEC 17025

Laboratory No. 10830

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Document Status

| Rev No. | Author | Reviewer | Approved for Issue | | |
|---------|---------------|-----------------|--------------------|--|----------|
| | | Name | Name | Signature | Date |
| 6 | Sumi Dorairaj | Matthew Bennett | Matthew Bennett | | 24/06/11 |
| 7 | Sumi Dorairaj | Matthew Bennett | Matthew Bennett |  | 16/07/11 |
| 8 | Sumi Dorairaj | Matthew Bennett | Matthew Bennett |  | 16/07/11 |



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