Technical Report 23

Assessment of Land and Groundwater Contamination Effects

NZ TRANSPORT AGENCY
WAKA KOTAHI

1 MacKays to Peka Peka Expressway

Revision History

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1. Executive Summary

Introduction

The proposed MacKays to Peka Peka Expressway route (‘the Expressway’) has been identified as one of eight sections within the Wellington Northern Corridor (SH1 from Levin to the Wellington Airport) which is an identified “Road of National Significance” (RoNS). The proposed MacKays to Peka Peka Expressway Project (‘the Project’) is to be lodged with the Environmental Protection Agency (EPA) as a Proposal of National Significance.

The purpose of this contamination assessment is to identify and characterise areas of soil and groundwater contamination along the route of the proposed Expressway and to determine the potential environmental effects of the Project. This has involved the assessment of soil, groundwater and surface water contamination, human health risk to the general public and construction workers, resource consent requirements and soil classification for reuse or disposal.

The Project has been divided into four sectors which broadly define the urban and rural areas along the route of the proposed Expressway.

The general geological sequence beneath the Project area is recent alluvial deposits (sands and gravels) with superimposed areas of swamps and sand dunes. Significant peat deposits are associated with the swamps. The alluvial deposits are underlain by greywacke basement rocks. A shallow unconfined aquifer extends to a depth of approximately 30m. This aquifer supplies water for potable and irrigation use.

Criteria have been adopted for assessment of resource consent requirements, groundwater quality, surface water quality, human health risks and soil classification. In the Wellington Region, discharge of contaminants is controlled by the Regional Plan for the Discharges to Land for the Wellington Region, 1999 (Discharges to Land Plan) and the Regional Freshwater Plan for the Wellington Region, 1999 (Regional Freshwater Plan).

For the groundwater quality assessment, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000) guidelines has been used. For surface water quality assessment, the Ministry for the Environment (MfE) hierarchy of guidelines has been used. For human health risk assessment, the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (NES), 2011criteria have been used. For soil classification, MfE and regional guidance has been used.

A number of intrusive investigations have been carried out comprising test pits and hand augers. Soils, groundwater and surface water have been sampled for chemical laboratory analyses for a broad suite of organic and inorganic determinands.

Sector 1

The route in this sector passes through the corner of Queen Elizabeth Park and follows approximately the existing Western Link Road (WLR) designation through Raumati towards the Kāpiti Road intersection. Two properties were identified in the desk study in Sector 1 that were considered to have the potential to be contaminated from current or historical activities. The two sites will be used for the construction of stormwater wetlands and ponds for the proposed Expressway. Intrusive investigations have not been undertaken at these sites to identify and characterise any potential contamination present. Investigations should be undertaken prior to construction commencing to determine any requirements for resource consents, assessment of environmental effects, mitigation and disposal of any contaminated soils at these sites.

Sector 2

This sector runs along the existing WLR designation through the semi-rural area of Paraparaumu from Raumati Road to 300m north of Mazengarb Road.

The intrusive investigation findings for Sector 2 reveal that fill, where identified, consisted of reworked natural materials (organic sandy silts). Waste materials in the fill comprised plastic, brick, asphalt, concrete, metal, wire, glass and wood. In addition, fragments of suspected cement bound asbestos were identified.

Results of chemical laboratory analyses of soils indicate that land disturbance activities would require discharge resource consent under Rule 22 of the Discharges to Land Plan. Human health criteria were exceeded at one site in Sector 2 and activities at this site would require a resource consent under Regulation 10 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (NES), 2011. The excavation of soils at this site should be carried out in accordance with the Contaminated Soils and Groundwater Management Plan found in Appendix K of the CEMP, Volume 4, and the Contractor Health and Safety Plan (CHSP) to protect against identified and unidentified contamination.

The potential environmental effects within Sector 2 relate to discharge of contaminants to ground and surface water and dispersal of soil contaminants during earthworks. The potential human health effects relate to the health risks to construction workers and the general public. These can be mitigated by containment of contaminants on site, excavation and disposal of contaminated soils to a licenced landfill and adherence to the Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4), Construction Air Quality Management Plan (Appendix G of the CEMP, Volume 4), and Erosion and Sediment Control Plan (Appendix H of the CEMP, Volume 4).

Two other properties were identified in the desk study in Sector 2 that were considered to have the potential to be contaminated from current or historical activities. The sites will be used for the construction of stormwater wetlands for the proposed Expressway. Further investigations have not been undertaken at these sites to identify and characterise any potential contamination present. Investigations should be undertaken prior to construction commencing to determine any requirements for resource consents, assessment of environmental effects, mitigation and disposal of any contaminated soils.

Sector 3

This sector runs approximately along the existing WLR designation through the area of Waikanae from 300m north of Mazengarb Road to 600m north of Te Moana Road.

The intrusive investigation findings for Sector 3 reveal that fill, where identified, consisted of reworked natural materials (organic sandy silts). Waste materials were identified at one location.

Results of groundwater analyses show that there are contaminants present at concentrations which exceed their environmental criteria. There is evidence of contamination from leachate from the landfill. A second round of groundwater analysis could be undertaken to confirm elevated results.

Groundwater modelling of the proposed Expressway in the vicinity of the Otaihanga Landfill indicates there would be no noticeable change in groundwater levels, gradients and flow as a result of proposed Expressway construction. The effects of the construction of the proposed Expressway are not likely to increase the environmental risk associated with the groundwater contamination.

It is considered that the conditions of Rule 9B of the Regional Freshwater Plan can be complied with and that groundwater disturbance would be a Permitted Activity.

The main health risk is to construction workers from the elevated concentrations of faecal coliforms and E.coli count in the Landfill Drain. The effects can be mitigated by adhering to management methods and procedures to protect human health and the environment detailed in Appendix K of the CEMP and the CHSP.

Results of chemical laboratory analyses of soils indicate that land disturbance activities would require resource consent under Rule 22 of the Discharges to Land Plan. Human health criteria were not exceeded but any excavation of soils should be carried out in accordance with Appendix K of the CEMP, Volume 4 and the CHSP to protect against identified and unidentified contamination.

The potential environmental effects within Sector 3 relate to discharge of contaminants to ground and surface water and dispersal of soil contaminants during earthworks. These can be mitigated by containment of contaminants on site, excavation and disposal of contaminated soils to a licenced landfill and adherence to Appendix K of the CEMP, Volume 4, Appendix G of the CEMP, Volume 4 and Appendix H of the CEMP, Volume 4.

Sector 4

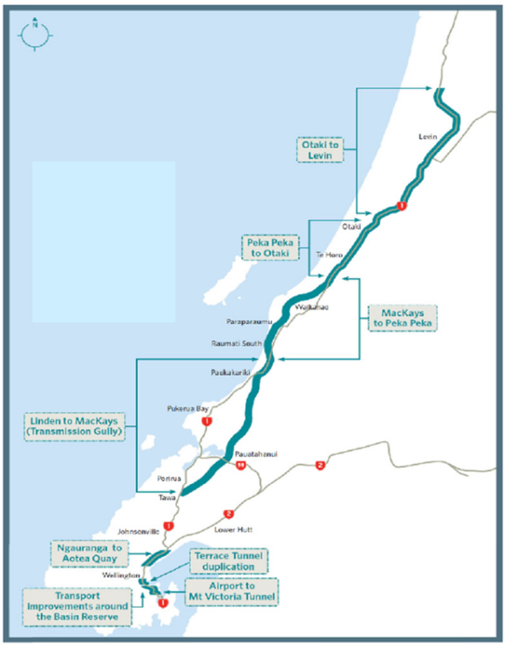
Sector 4 runs from Te Moana Road to Peka Peka Beach Road. There were no properties in Sector 4 identified in the desk study that were considered to have the potential to be contaminated from current or historical activities. However, detailed site inspections were not carried out and the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil.

2. Introduction

The NZ Transport Agency ('the NZTA') is lodging a Notice of Requirement (NOR) and resource consent applications (RCA's) to construct, operate and maintain an expressway between MacKays Crossing and Peka Peka ('the Project') on the Kāpiti Coast.

The proposed MacKays to Peka Peka Expressway route[1] ('the Expressway') has been identified as one of eight sections within the Wellington Northern Corridor (SH1 from Levin to the Wellington Airport) which is an identified "Road of National Significance" (RoNS) in terms of the 2009 Government Policy Statement[2].

Figure 23.1: Wellington Northern Corridor



As part of the Assessment of Environmental Effects (AEE) for the Project, a series of technical reports have been produced. This report relates to the assessment of effects from land and groundwater contamination.

Purpose and scope

The purpose of this contamination assessment is to identify and characterise areas of soil and groundwater contamination along the route of the proposed Expressway. This will allow the likely environmental effects of the Project to be determined together with any regulatory controls and mitigation measures.

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[1] Route refers to the overall corridor of land between MacKays Crossing and Peka Peka

[2] Government Policy Statement on Land Transport Funding 2009/2010-2018/2019

In more detail, this has involved the assessment of:

- The presence and distribution of contaminants in soils at selected locations along the route of the proposed Expressway identified as potentially contaminated in the *MacKays to Peka Peka, Kāpiti Coast – Contamination Desk Study*, March 2012 (Appendix 23.F of this report).
- The potential effects of any identified contamination on human health (general public and construction workers) and the environment.
- The requirements for resource consent under the Resource Management Act (RMA) 1991, the details of which are set out in the Regional Plan for the Discharges to Land for the Wellington Region, 1999 (Discharges to Land Plan).
- Any groundwater and leachate within land adjacent to the Otaihanga Landfill and the potential effects on human health and the environment.
- The requirements for resource consent under the Resource Management Act (RMA) 1991, the details of which are set out in the Regional Freshwater Plan for the Wellington Region, 1999 (Regional Freshwater Plan).
- Any groundwater, leachate and landfill gas within the area of Otaihanga Landfill being developed as the main Project Yard and the potential effects on human health and the environment[3].
- The requirements and options for remediation, management or monitoring of contaminated soils and groundwater, including the potential for re-use of excavated materials along the route of the proposed Expressway and evaluation of off-site disposal options.

Report structure

The Project has been divided into four Sectors (Sector Diagram, Part D, Chapter 7, Section 3, Volume 2) which broadly define the different rural and urban zones of the Project.

The main body of this report (Sections 6-9) is structured around the four Sectors, with each Sector having its own section. The Sector specific sections are intended to be relatively ‘stand alone’ and each contains the following standard information:

- Introduction - location, existing environment, land use, potential contamination.
- Investigation activities and methodology - what investigations were carried out and why.
- Investigation findings – description of soils, occurrence of fill, detection of soil and/or groundwater contamination, identifying the baseline quality of soils and groundwater and comparison against guideline values.

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[3] Whilst this objective is relevant to the overall assessment of effects, investigation of this area of the route had not been completed at the time of lodgement.

- Discussion – interpretation of results, nature of materials, resource consent requirements, human health impact assessment and soil classification.
- Assessment of environmental effects.
- Conclusions – summary of key findings and relevance for the construction phase of the Project.

Sections 2 to 5 provide general information and discussion of the Project, the existing environment, the adoption of guideline values and investigation methodology.

All the factual information relevant to each sector (such as investigation logs, laboratory testing summary sheets, field data etc.) is contained within the sector specific appendices to this report.

3. Existing environment

Geology

The geological sequence beneath the Project area is described in geological map 10 Geology of the Wellington Area 1:250,000 (Geological and Nuclear Sciences, 2000). Full details of the geology in the context of the finalised Alignment and the construction envelope can be found in Technical Report 35, Volume 3. Details of the local geology encountered within each sector are provided in later sections of this report. However, a summary of the general regional geology is given below.

Regional geology

The vertical geological sequence comprises Recent alluvial deposits (sands and gravels) with superimposed areas of swamps and sand dunes. Significant peat deposits are associated with the swamps. The alluvial deposits are underlain by greywacke basement rocks.

The topography of the region is characterised by the mountainous greywacke terrain of the Tararua Ranges in the east which fall steeply to the large coastal plains in the west.

Hydrology

The proposed Expressway crosses the low-lying coastal plains and dune areas of western Kāpiti district. The characteristics of the area are described below, in so far as they are relevant to hydrology, stormwater and flood risk management.

The majority of this land is modified farm land except where it passes through the urban areas of Raumati, Paraparaumu and Waikanae. The land is characterized by a mix of low peat flats and sand dune formations. The inter-dunal areas are generally low lying and poorly drained. The topography and geology in conjunction with relatively high rainfall are condusive to the formation of wetlands.

The main watercourse systems are shown on Drawings CV-SW-010 and 011, Technical Report Appendices, Report 22, Volume 5. The Waikanae River is the largest watercourse crossed by the proposed Expressway. It is managed by Greater Wellington Regional Council (GWRC). As with the wetlands, the watercourses have been heavily modified by farm or urban development, and there is a flood protection scheme and active management of the Waikanae River.

In addition to the principal watercourses there are many minor streams and drains that are crossed by the proposed Expressway.

The coastal plain is also subject to significant flooding during heavy rainfall events. The rainfall patterns are strongly influenced by prevailing westerly winds, the presence of the coastal hills, and further east the Tararua Ranges.

Hydrogeology

Detailed discussion of the hydrogeological characteristics of the Project area is beyond the scope of this report (see Technical Report 21, Volume 3 for hydrogeological data). However, certain key aspects of the hydrogeological regime beneath the Project footprint are significant in the context of this assessment, these are discussed below.

Shallow groundwater

Data gathered from parallel hydrogeological investigations by the Project team[4] on behalf of the NZTA to date have identified a series of sand and gravel aquifers separated by silt, clay and peat aquitards. A shallow unconfined aquifer extends to a depth of approximately 30m. This aquifer supplies water for potable and irrigation use. The shallow aquifer is in hydraulic connection with the Waikanae River and smaller streams in the area and the water table is generally present only a few metres below ground level.

The seasonal variation in groundwater level is in the order of 2m. The general groundwater flow direction is from the Tararua foothills towards the coastline. However there will be localised variations associated with watercourses and wetlands.

Deep groundwater

Beneath the unconfined aquifer lies a series of semi-confined sand and gravel aquifers largely separated by silt. However, the Project is not directly impacting on these deeper aquifers and therefore they are not considered further in this report.

Groundwater abstraction

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[4] This Technical Report refers to the Project team as carrying out works on behalf of and as contracted by the NZTA. The NZTA is the requiring authority and the consent holder.

There are a large number of shallow and deep groundwater abstraction bores along the Kāpiti Coast. Information on shallow boreholes (<10m depth) within a radius of approximately 300m down hydraulic gradient from each of the areas being investigated was reviewed. The main use for the boreholes is for supply of irrigation water. There were no shallow boreholes identified as being used for supply of drinking water.

4. Assessment criteria

4.1. Introduction

The following sub sections discuss the rationale used in the selection of appropriate criteria for the assessment of environmental and human health risks, resource consent requirements, groundwater quality, and soil classification for reuse or disposal.

The provisions for the control of discharges of contaminants into water, or onto or into land are set out in Section 15 of the RMA. The presumption in Section 15(1) is that a discharge is prohibited unless expressly authorised by a resource consent, by a rule in a regional plan, or by national standards or regulations.

The definition of a 'contaminant' under Section 2 of the RMA is as follows:

"Contaminant includes any substance (including gases, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat –

- *a) when discharged into water, changes or is likely to change the physical, chemical, or biological condition of water; or*
- *b) when discharged onto or into land or into air, changes or is likely to change the physical, chemical, or biological condition of the land or air onto or into which it is discharged."*

The definition of 'contaminated land' under Section 2 of the RMA is as follows:

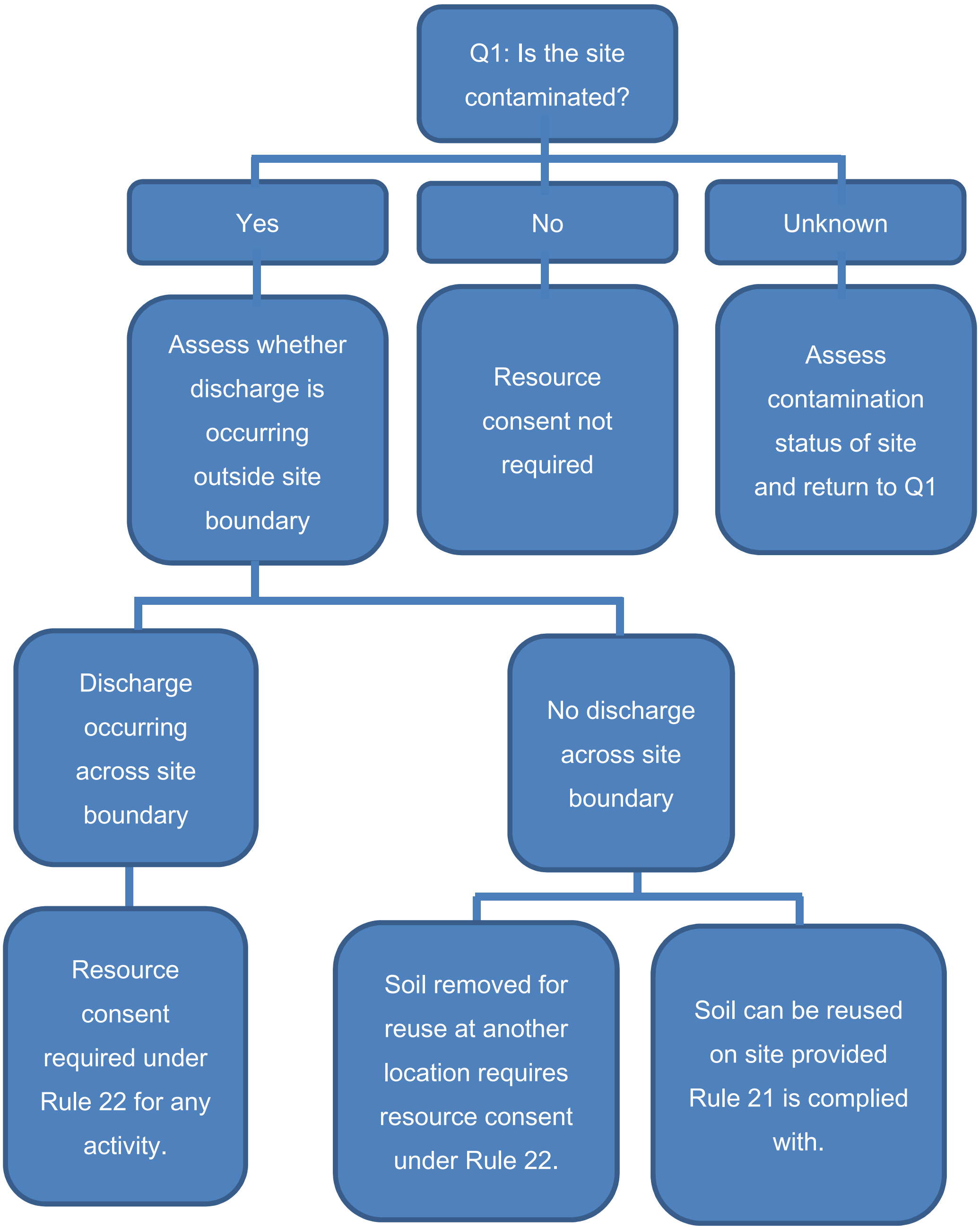
"Contaminated land means land that has a hazardous substance in or on it that –

- *a) has significant adverse effects on the environment; or*
- *b) is reasonably likely to have significant adverse effects on the environment."*

The control of discharges of contaminants from contaminated sites within the Wellington region is achieved via Rules 21 and 22 of the Discharges to Land Plan (reproduced in Appendix 23.A). As the Rules are explicitly related to the discharge of contaminants from "contaminated sites", it is necessary to establish if the site being assessed is a contaminated site.

The process for determining whether a site is contaminated and then whether a discharge resource consent is required is shown in **Figure 23.2** below:

Figure 23.2: Resource Consent Assessment Flowchart – Discharges of Contaminants



4.2. Assessment of soil contamination

4.2.1. Determination of a contaminated site

The definition of a contaminated site is given in the Discharges to Land Plan and is as follows:

"A site at which a hazardous substance occurs at concentrations above background levels and where assessment indicates it poses or is likely to pose an immediate or long term hazard to human health or the environment."

Site-specific background levels of contaminants should be determined where possible. If these cannot be determined, the background levels detailed in the GWRC report *Determination of Common Pollutant Background Soil Concentrations for the Wellington Region*, August 2003 should be used. For this assessment, the GWRC background levels have been used, specifically those listed under Main Soil Type 1 (sand) as these best represent the soil type of the Kāpiti Coast. Background levels for contaminants in peat are not listed in the GWRC report.

Given that the Discharges to Land Plan does not specify any threshold concentrations for contaminants (other than background concentrations) above which there is a potential hazard to human health or the environment, the following documents have been adopted to undertake the hazard (risk) assessments:

- The hierarchy of guideline values in the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values,* 2003.

In **Tables 23.1** and **23.2** detailed in the following sections, the hierarchy of the reference documents containing guideline values used in establishing the contamination status of a site are in descending order of applicability. The hierarchy works by comparing the concentrations of the identified contaminants of concern against the guideline values defined in the reference documents in each table (in the order tabulated). If the contaminants being assessed are not included in the first reference document then the next document in the list is referred to and so on.

The determination of whether a site is contaminated is based firstly on whether contaminant concentrations are above background levels. If this is the case, an assessment of the risks to human health and the environment from those elevated contaminant concentrations is undertaken. Therefore if a contaminant concentration is below relevant background levels then no further assessment of risk is undertaken. The environmental and human health risk assessments are considered separately in Sections 3.2.2 and 3.2.3.

In some instances the guideline documents provide a range of values for a particular contaminant based on land use and/or soil type. For the areas being assessed along the route, a number of different land uses and soil types have been identified. Given the range of both land use and soil type, it is not proposed to discuss their adoption here. Rather, and where appropriate, the justification for the choice of land use and soil type in selecting guideline values is detailed within each of the sector specific discussions. They are also indicated on the relevant laboratory testing summary sheets in Appendices 23.B and 23.C.

4.2.2. Determination of a contaminated site based on environmental risk

The hierarchy of the soil guideline values (in descending order of applicability) for the assessment of whether a site is contaminated based on environmental risks from contaminated soils is detailed in Table 23.1.

Table 23.1 - Hierarchy for Determination of a Contaminated Site Based on Environmental Risk

Reference Document and Hierarchy	
1	*Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health,* Canadian Council of Ministers of the Environment (CCME), 1999.
2	*Guideline on the Investigation Levels for Soil and Groundwater*, National Environment Protection Council (NEPC), 1999.

In selecting the most appropriate land use category from these guideline documents, the existing land use at each site has been considered.

4.2.3. Determination of a contaminated site based on human health risk

The hierarchy of the soil guideline values (in descending order of applicability) for the assessment of whether a site is contaminated based on human health risks from contaminated soils is detailed in Table 23.2.

Table 23.2 - Hierarchy for Determination of a Contaminated Site Based on Human Health Risk

Reference Document and Hierarchy	
1	*Health and Environmental Guidelines for Selected Timber Treatment Chemicals*, MfE, 1997. *Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand*, MfE, 1997. *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*, MfE, 1999.
2	*Guideline on the Investigation Levels for Soil and Groundwater*, NEPC, 1999

In selecting the most appropriate land use category from these guideline documents, the existing land use at each site has been considered.

4.3. Assessment of regional resource consent requirements for contaminated sites

The Discharges to Land Plan contaminated land rules focus on whether or not contaminants are discharging across the boundary of a contaminated site. Discharging means contaminants leaving the site by leaching into groundwater, dispersing into air, or migrating through soil. Where contaminants are discharging across the site boundary resource consent is required under Rule 22 for any activity including reuse of materials on site or at another location.

Where contaminants are not discharging across the site boundary, resource consent is not required for the reuse of materials on site provided Rule 21 is complied with. If materials are to be removed from site for reuse at another location (other than disposal to landfill) then this activity would require resource consent from the GWRC under Rule 22. Rules 21 and 22 are reproduced in Appendix 23.A.

In order to determine if contaminants were migrating across a site boundary, soil and water samples were collected close to or at the boundary of each assessed site. Where contaminants were identified at concentrations above guideline values at a boundary sampling location then migration across the site boundary was deemed to be happening.

4.4. Assessment of health risks to the general public

The soil guideline values adopted for the assessment of health risks to members of the public or other workers outside the construction footprint from contaminated soils are taken from the following regulations:

- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (NES), 2011 (reproduced in Appendix 23.A).

The NES came into force on 1 January 2012. In selecting the most appropriate land use category from the NES, the most sensitive receptor adjacent to each site has been considered.

4.5. Assessment of health risks to construction workers

The assessment of human health risks from contaminated soils needs to consider potential effects on workers within the construction footprint in addition to members of the public or other workers outside the construction footprint. The contaminant exposure pathway and duration of exposure for construction workers are subtly different from contaminant exposure pathway and duration of exposure for the general public.

The soil guideline values adopted for assessment of risk to construction workers are selected from the NES. The values detailed in the NES are based on chronic exposure, thereby affording a greater level of protection to construction workers whose risk profile would be based on acute exposure.

The human health assessments carried out within this report are not intended to replace any contaminant specific occupational exposure assessment that may be deemed necessary as part of any Health and Safety Plan.

4.6. Assessment of groundwater and surface water quality

The Regional Freshwater Plan does not contain numerical criteria for the assessment of water quality. Instead it makes reference to several documents which should be used to inform the assessment. The most relevant of these is the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC) guideline document listed in the table below.

Groundwater and surface water quality guidelines have been selected in accordance with the hierarchy defined in the MfE document *Contaminated Land Management Guidelines No. 2 - Hierarchy and Application in New Zealand of Environmental Guideline Values*, 2003. **Table 23.3** details the hierarchy of guideline values (in descending order of applicability) for the assessment of groundwater and surface water quality.

Table 23.3 - Hierarchy for Assessment of Groundwater and Surface Water Quality

Reference Document and Hierarchy	
1	*Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).
2	*Canadian Environmental Quality Guidelines,* Canadian Council of Ministers of the Environment (CCME), 2007.

The control of discharges of contaminants from contaminated sites within the Wellington region is achieved via the Discharges to Land Plan. The discharge of contaminants directly to an aquifer is achieved via the Regional Freshwater Plan. One objective of this report is to assess the groundwater quality in the land adjacent to Otaihanga Landfill and the potential environmental and human health effects. The applicable plan is therefore the Regional Freshwater Plan, to control any effects the Project may have on the disturbance of possibly contaminated groundwater in this area of land.

The applicable Rule from the Regional Freshwater Plan in relation to this assessment is Rule 9B Diversion of Groundwater (reproduced in Appendix 23.A).

4.7. Assessment of soils for reuse or disposal

The assessment (classification) of soils for reuse or disposal is based on:

- Observations of soils recovered during ground investigations (hand augers and test pits).
- Results of chemical laboratory analyses of soil samples collected during the ground investigations.

These observations and results were obtained from discrete locations based on systematic grid sampling, targeted random sampling and linear spaced sampling. The actual characteristics of the subsurface materials, particularly in areas of fill, may vary between adjacent sampling locations. In addition, subsurface conditions, including perched groundwater levels and contaminant concentrations can vary over short distances.

4.7.1. Soil classification

The assessment of soils for reuse within the construction footprint or disposal to a licensed facility is based around a standard classification of soils into cleanfill, contaminated fill or highly contaminated fill. A brief definition of these classifications is given below:

Highly Contaminated Fill

Highly contaminated fill in the context of this assessment constitutes:

- Soil containing concentrations of contaminants above threshold levels specified in the waste acceptance criteria of a landfill.

Contaminated fill

Contaminated fill comprises:

- Soil containing contaminants above their Wellington region background concentrations which pose a risk to the environment or to human health.
- Soil containing hazardous materials in the form of household and industrial waste, putrescible waste or Asbestos Containing Material (ACM).
- Soil that does not contain concentrations of contaminants above threshold levels specified in the waste acceptance criteria of a landfill.

Cleanfill

Cleanfill is defined in the MfE document *A Guide to the Management of Cleanfills*, 2002 as:

“..material that when buried will have no adverse effect on people or the environment; and includes virgin materials such as clay, soil and rock, and other inert materials such as concrete or brick that are free of:

- Combustible, putrescible, degradable or leachable components
- Hazardous substances
- Products or materials derived from hazardous waste treatment, hazardous waste stabilization or hazardous waste disposal practices
- Materials that may present a risk to human health
- Liquid waste.”

In simple terms, cleanfill includes materials such as uncontaminated soils, cured asphalt, bricks, unreinforced concrete, fibre cement building products (excluding asbestos) and glass. Non cleanfill materials would include contaminated soils (contaminants levels above Wellington region background concentrations), asbestos containing materials, asphalt (new), green waste and household refuse.

4.7.2. Reuse or disposal options

Soils classified as cleanfill – These soils can be re-used (subject to obtaining necessary approvals from KCDC and/or GWRC) within the Project footprint or they can be disposed of to a cleanfill facility or operation.

Soils classified as contaminated fill – Depending on the nature of the contamination, these soils can be stabilised and reused within the same property boundary or other location within the Project footprint (subject to obtaining necessary approvals from KCDC and/or GWRC). Alternatively these soils can be disposed of to a licenced landfill site. Each landfill site within the Wellington region is consented by GWRC and has site specific acceptance criteria which dictate what materials can be accepted and will include maximum concentrations for certain contaminants. The acceptance criteria for the closest landfill site to the Project licenced to accept contaminated fill are detailed in the waste acceptance criteria spreadsheets in Appendices 23.B and 23.C.

Soils classified as highly contaminated fill - These soils must be disposed of to a licensed hazardous waste landfill that can accept fill with high levels of contaminants, or alternatively treated to reduce the levels or mobility of the contaminants to acceptable levels.

The classification of soils based on the results of the Project contamination assessment is discussed within the section for each sector.

5. Methodology

5.1. Investigation activities

As outlined in Section 1.1, the purpose of this contamination assessment is to establish the quality of both soil and groundwater at selected locations within the construction footprint of the Project. The intrusive investigations were informed by the desk study and detailed site inspections (see Appendix 23.F).

The intrusive investigations associated with the contamination assessment comprised the excavation of test pits and the completion of auger holes. In addition, samples of soil, groundwater and surface water were collected for chemical laboratory analysis. Intrusive investigations and sampling were carried out in general accordance with the MfE *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, 1999 and the Contaminated Land Management Guidelines No. 5 - Site Investigation and Analysis of Soils*, 2004.

The investigations were carried out between 5 July 2011 and 12 October 2011. Full details of the intrusive investigations including logs, sampling and monitoring details, and laboratory analysis suites and results are provided on a sector specific basis in Appendices 23.B and 23.C.

The methods of intrusive investigation and sampling used during the assessment are detailed below in Sections 4.2 to 4.4. All investigation locations are shown on Drawings EN-CL-001 to 004, Technical Report Appendices, Report 23, Volume 5.

5.2. Test pits

Test pits were excavated in Sector 2 by Goodmans Contractors Ltd using a Sumitomo 12 tonne tracked excavator. Test pits were excavated to a maximum depth of 3m below ground level (bgl). Soils encountered were logged and sampled and test pits were backfilled with the excavated soils and the ground reinstated to its original condition.

All test pit locations were surveyed so that any identified contamination could be delineated and/or remediated as appropriate.

5.3. Boreholes

Boreholes were drilled in Sector 3 as part of the parallel hydrogeological investigations using rotary coring which was carried out by Perry Drilling Ltd using a John Deer Tractor Mounted Rig. Rotary cored boreholes used water and mud as drilling fluid. Recovered core was logged and sampled. The boreholes were fitted with standpipe piezometers to facilitate groundwater sampling and monitoring.

The following construction materials were used for all monitoring installations:

- 50mm diameter screw fitted blank PVC pipe, incorporating 0.5mm machine slotted holes for screened intervals.
- Filter pack comprised of washed medium gravel.
- Bentonite pellets.
- Push on well caps with flush-mounted, lockable, alloy “Toby” boxes set in concrete.

A non-solvent-based glue was used where lengths of pipe were fitted together to reduce the potential for lengths to come apart during installation.

5.4. Hand augers

Hand augers were drilled in Sector 3 to a maximum depth of 0.5m bgl using a 50mm diameter auger. Soils encountered were logged and sampled and all hand auger holes were backfilled with the excavated soils.

All hand auger locations were surveyed so that any identified contamination could be delineated and/or remediated as appropriate.

5.5. Sampling and monitoring

5.5.1. Soil sampling

The methodology for collecting soil samples was tailored to the method of investigation as follows:

- Test Pits – samples were collected from excavated soil placed at the side of the pit or directly from the excavator bucket.
- Boreholes – samples were collected from the core retrieved from the borehole.
- Hand Augers – samples were collected from the auger flight.

For all soil sampling, nitrile gloves were worn (a clean pair for each new sample) and samples were collected directly by hand or by using a stainless steel trowel or spatula. Samples were placed in plastic or glass jars as provided by the analytical laboratory and chilled.

Hand auger sampling equipment was decontaminated between holes by rinsing with water and detergent. Loose soils on the excavator bucket were brushed off between test pits.

All samples scheduled for chemical testing were dispatched to the laboratory generally within 24 hours of collection.

5.5.2. Groundwater sampling

Following the installation of standpipe piezometers within each borehole adjacent to Otaihanga Mountain Bike Park, the residual drilling water within the standpipe was removed via lifting with compressed air. The boreholes were then allowed to stabilise for approximately one week before groundwater sampling was carried out. Prior to sample collection, each borehole was purged was using a 12v mini typhoon submersible pump. Purged volumes were at least three times the volume of groundwater within the standpipe piezometer. Groundwater samples were collected from the boreholes using the methods described below.

- Pump – groundwater samples were collected using a 12v mini typhoon submersible pump. The groundwater was pumped directly from the water column where it passed through a sealed flow cell. During passage through the flow cell, key chemical parameters (electrical conductivity, temperature and pH) were monitored until they had stabilised (three consecutive readings within approximately 5%). Once stabilisation had occurred, the flow cell was by-passed and groundwater collected in glass or plastic sampling jars as provided by the analytical laboratory. Sample jars for organic analysis were filled to the brim to leave minimum headspace.

- Sample jars were then placed in a cool box until they could be transferred to a refrigerator. All samples scheduled for chemical testing were dispatched to the laboratory generally within 24 hours of collection.

5.5.3. Surface water sampling

Surface water samples were collected using a sterilised plastic bottle attached to a telescopic sampling pole and dispensed to glass or plastic jars as provided by the analytical laboratory and chilled. Sample jars for organic analysis were filled to the brim to leave minimum headspace. The samples were collected near the middle of the watercourse channel or at a location within the channel representative of well-mixed average flow conditions.

All samples scheduled for chemical testing were dispatched to the laboratory generally within 24 hours of collection.

5.5.4. Chemical laboratory analyses

All chemical laboratory analyses were performed by R J Hill Laboratories Ltd (Hill Laboratories). A full set of Hill Laboratories results is provided in Appendix 23.D. The analysis suites were tailored to reflect the likely contaminants associated with historical and current land use activities. The full range of analyses at the sites investigated comprised the following:

Soils

- Heavy metals (HM) – arsenic, cadmium, chromium, copper, lead, nickel and zinc.
- Semi volatile organic compounds (SVOC) – including polycyclic aromatic hydrocarbons (PAH).
- Total petroleum hydrocarbons (TPH).
- Organophosphorus and organonitrogen (OP/ON) pesticides.
- Organochlorine pesticides (OCP).

Groundwater

- Dissolved and total HM including mercury.
- SVOC.
- TPH
- Volatile organic compounds (VOC).
- Nutrient suite.
- Anion/cation suite.

- Faecal coliform and E.coli.

Surface Water

- Dissolved and total HM, SVOC and TPH.

All samples submitted to Hill Laboratories were accompanied by Chain of Custody forms which outline the required handling instructions. The Chain of Custody forms are provided in Appendix 23.E.

6. Sector 1

6.1. Sector description

Sector 1 runs from just south of Poplar Avenue to Raumati Road. This portion of the route will comprise construction of an interchange at Poplar Avenue and stormwater wetlands.

The route passes through the corner of Queen Elizabeth Park and follows approximately the existing WLR designation through Raumati towards the Kāpiti Road intersection.

The generalised geological sequence beneath Sector 1 is expected to comprise sand dunes and peat swamps overlying sandy, gravelly alluvial deposits from the erosion of the mountainous greywacke terrain of the Tararua Ranges in the east.

Several waterways cross Sector 1 including part of the Queen Elizabeth Park Drain and part of Drain 7.

The current land use within this sector is a mixture of residential housing and open bush recreational areas.

6.2. Investigation activities

There were two properties identified in the desk study in Sector 1 that were considered to have the potential to be contaminated from current or historical activities. Those locations were:

- 16 Leinster Avenue: Livingstone Garden Centre.
- 150 Raumati Road: Area of bush/unused land to the south of Raumati Road bordered by residential properties.

The rear of the property at 16 Leinster Avenue was in use as a contractors yard with areas of fill visible, presumably used to level the ground. Areas of dumped waste materials were also visible including metal sheeting, timber, empty chemical containers and drums. It is considered that the soils in the yard area have the potential to be contaminated due to unknown fill materials used to level ground and dumped waste materials and containers.

The area of bush at 150 Raumati Road contained a small area which may have been levelled with fill materials and there were some signs of dumped waste materials including sheet metal and timber and an abandoned car.

These two properties will be used for the construction of stormwater wetlands and ponds for the proposed Expressway. Intrusive investigations have not been undertaken at these sites to identify and characterise any potential contamination present. Further investigations should be undertaken prior to construction commencing to determine any requirements for resource consents, assessment of environmental effects, mitigation and disposal of any contaminated soils.

7. Sector 2

7.1. Sector description

This sector runs along the existing WLR designation through the area of Paraparaumu from Raumati Road to 300m north of Mazengarb Road. Underbridges will be constructed over local roads at Raumati Road and Mazengarb Road, with an underbridge spanning the Wharemauku Stream. A new intersection will be constructed at Kāpiti Road.

The portion of the route from Raumati Road to Kāpiti Road passes through a semi-rural area. At Kāpiti Road there is significant residential development to the east of the Alignment and commercial industrial businesses to the west. From Kāpiti Road to Fytfield Place residential properties border the route on the east with interspersed residential and rural properties to the west.

The generalised geological sequence beneath Sector 2 is expected to comprise sand dunes and peat swamps overlying sandy, gravelly alluvial deposits from the erosion of the mountainous greywacke terrain of the Tararua Ranges in the east. Fill is expected to overlie natural deposits at some locations.

Several waterways cross Sector 2 including Drain 7, the Wharemauku Stream and Drain 5.

The current land use within this sector is a mix of rural and residential. The Alignment follows the existing WLR designation for the whole of this section of the route through the township of Paraparaumu.

7.2. Investigation activities and methodology

The objectives of the investigations within this sector were:

- To determine if selected areas within the sector were contaminated.
- To establish resource consent requirements associated with any identified soil contamination.

- To assess any effects of any identified contamination on human health (general public and construction workers).
- To assess any Project environmental effects.
- To classify soils for re-use and off site disposal purposes.

There were four properties identified in Sector 2 that were considered to have the potential to be contaminated from current or historical activities. Those locations were:

- 55 Rata Road: identified on the GWRC Hazardous Activities and Industries List (HAIL) as a site where hydrocarbon fuel was stored.
- 58 Kiwi Road: former horticultural area.
- Area of designated land behind the commercial/industrial zone of Manchester and Sheffield Streets (Kāpiti Road Intersection): considered that waste materials could have been dumped in this area from the adjacent industrial zone.
- 109 Kāpiti Road: in use as a firewood storage area with the land raised above original height with unknown fill materials.

Investigations were undertaken at two properties identified in the list above, for which a summary of the investigation activities undertaken is outlined in **Table 23.4**. The investigation locations are shown on Drawings EN-CL-001 and 002, Technical Report Appendices, Report 23, Volume 5.

Intrusive investigations have not been undertaken at 58 Kiwi Road and 109 Kāpiti Road to identify and characterise any potential contamination present. Historical photographs viewed during the desk study assessment showed possible horticultural activities at 58 Kiwi Road, an activity which is associated with pesticide and herbicide use. It is considered that there is the potential for contamination to be present at 109 Kāpiti Road due to the extensive filling undertaken and the unknown and visibly variable nature of the fill.

The two sites will be used for the construction of stormwater wetlands for the proposed Expressway. Further investigation of these sites should be undertaken prior to construction commencing to determine any requirements for resource consents, assessment of environmental effects, mitigation and disposal of any contaminated soils.

Table 23.4 – Summary of Investigation Activities in Sector 2

Area	Rationale	Number of samples analysed	Analysis Suite
55 Rata Road	Grid spacing - 17 Sampling locations (reduced to 13). (TP201 to TP217) Analysis suite based on fuel storage and current use as materials storage yard.	27 + 1 duplicate	Heavy Metals, TPH, SVOC
	3 surface water samples (Northern Drain S1, Southern Drain S1 and S2) Analysis suite based on use of site for fuel storage and its current use as materials storage yard.	3	Heavy Metals, TPH, SVOC
Kāpiti Road Intersection	Linear spacing – 11 sampling locations. (TP101 to TP111) Analysis suite based on possible dumping of unknown waste materials.	22	Heavy Metals, TPH, SVOC
Notes:			
▪ Heavy metals tested comprise arsenic, cadmium, chromium, copper, lead, nickel and zinc ▪ TPH – total petroleum hydrocarbons	▪SVOC – semi volatile organic compounds		

Full details of the investigation activities and the methodologies used for these activities are provided in Section 4 and Appendix 23.B. The following subsections outline the investigations carried out and provide a rationale for the sampling and analysis.

7.2.1. 55 Rata Road

In order to give statistically representative coverage of the area at 55 Rata Road (estimated to be 5700m^2), a systematic grid system was used based on the MfE document *Contaminated Land Management Guidelines No. 5, Site Investigation and Analysis of Soils* (2004). The number of sampling locations has been calculated based on the following equations taken from the MfE document:

$$G = \frac{R}{0.59}$$

$$N = \frac{A}{G^2}$$

where:

G = grid size of the sampling pattern, in metres

R = radius of the smallest hot spot that the sampling intends to detect, in metres

0.59 = factor derived from 95% detection probability assuming circular hot spots

N = number of sampling points

A = size of the sampling area, in square metres.

The hot spot radius (R) was chosen as 12m and this resulted in the need for 14 sampling locations. The choice of hot spot radius of 12m was considered appropriate taking into account the presence of some indications for hydrocarbon contamination at surface and the possibility of random contamination resulting from the long standing historical use as a transport/storage yard.

The site is bordered on two sides by drains, Drain 7 on the southern side and an unnamed drain on the northern side that joins Drain 7 at the western apex of the site.

To allow determination of resource consent requirements for this site, three additional soil sampling locations were proposed along the site boundary, and three surface water samples were collected (two upstream and one downstream of the site). The additional soil and water samples would provide further information to help assess whether any contaminants in the soil could be migrating beyond the site boundary. This gave a total of 17 soil sampling locations and three surface water sample locations.

Due to waterlogged ground and difficult terrain on site restricting access, four test pits were unable to be excavated (TP211 and TP215 to TP217).

In total, 13 test pits were excavated and three surface water samples collected (see Drawing EN-CL-001, Technical Report Appendices, Report 23, Volume 5 for investigation locations). The maximum depth of analysed soil samples was 1.5m below ground level (bgl), this reflected the general thickness of fill and the potential vertical extent of contamination within the fill. A total of 28 soil samples and three surface water samples were scheduled for chemical laboratory analysis and the analysis suite is summarised in **Table 23.4** and detailed in Appendix 23.B.

7.2.2. Kāpiti Road intersection

A linear spacing of approximately 50m was used to cover the length of the boundary between the commercial/industrial zone and the designated land. The spacing reflected the distribution of businesses along the boundary.

Linear spacing was considered the most appropriate sampling strategy to investigate the possible dumping of waste materials along the boundary of the commercial/industrial zone. The land in the Alignment is densely overgrown with gorse and blackberry which prevented observation of the ground for evidence of contamination during the site visit. There are many vacant land parcels along the route of the proposed Expressway which are equally overgrown, preventing any possible evidence of contamination being identified. However, it was considered that the presence of this commercial/industrial zone directly adjacent to vacant land increased the possibility of the dumping of waste materials.

A total of 11 test pits were excavated (see Drawing EN-CL-002, Technical Report Appendices, Report 23, Volume 5 for investigation locations) from which 22 soil samples were collected. The maximum depth of analysed soil samples was 2.6m bgl, this reflected the thickness of fill and the potential vertical extent of contamination. These samples were scheduled for chemical laboratory analysis and the analysis suite is summarised in **Table 23.4** and detailed in Appendix 23.B.

7.3. Soil investigation findings

7.3.1. 55 Rata Road

Review of the test pit logs has confirmed the geology beneath the site to comprise fill or reworked natural materials (organic sandy silts) overlying sand and peat deposits. The fill was predominantly a silty sand with gravel and inclusions of waste materials comprising plastic, brick, asphalt, concrete, metal, wire, glass and wood. Waste materials were identified at locations TP201 to TP204, TP206 to TP209, and TP212 to TP214. In addition, fragments of suspected cement bound asbestos were identified at locations TP203 and TP204. Visible and olfactory evidence for contamination was noted at one location (TP209), where a strong hydrocarbon odour and black staining of soil were present at 0.8m bgl.

Groundwater, as a seepage, was encountered in three test pits (TP201, TP202 and TP206) at depths between 1.3m and 2.4m bgl.

The following land uses or receptors were considered most appropriate when selecting guideline values:

- Contaminated Site Assessment - commercial land use.
- Health Risk to General Public – residential receptors.
- Health Risks to Construction Workers - commercial/industrial outdoor worker.

The chemical analysis results for soils revealed that several samples contained contaminants that exceeded background concentrations and their environmental or human health guideline values and these are detailed in **Table 23.5** below (see Appendix 23.B for full results) and shown on Drawing EN-CL-005, Technical Report Appendices, Report 23, Volume 5. In selected samples the laboratory detection limit for benzo[a]pyrene was not sufficiently low to rule out the environmental risk from this contaminant. This is discussed in more detail in Section 6.3.3. The chemical analysis results for surface water samples exceeding guideline values are detailed in **Table 23.6**.

Table 23.5 – Contaminants Exceeding Guideline Values at 55 Rata Road

Location	Contaminant	Depth (m)	Concen-tration (mg/kg)	Background Concen-tration (mg/kg)	Environ-mental Criterion (mg/kg)	Health Risk to Site Workers (mg/kg)	Health Risk to Con-struction Workers Criterion (mg/kg)	Health Risk to general Public Criterion (mg/kg)
TP209	Benzo[a]pyrene (BaP)	0.8	**380**	-	0.7	10	-	1
	Napthalene	0.8	**4,300**	-	-	190	-	380
	Benzo[a]pyrene equivalent (BaP equivalent)	0.8	**602**	-	-	11	35	10
	TPH C7-C9	0.8	**210**	-	-	120	-	NA*
	TPH C10-C14	0.8	**10,400**	-	-	1,500	-	20,000
TP214	BaP	1.0	0.74	-	0.7	10	-	1

* NA indicates contaminant not limiting. Greater than 20,000 mg/kg for TPH.

Results exceeding environmental risk criteria are shaded grey. Results exceeding human health risk criteria are in bold.

Table 23.6 – Surface Water Contaminants Downstream and Upstream

Contaminant	Downstream Concentration (mg/l)	Northern Drain Upstream Concentration (mg/l)	Southern Drain Upstream Concentration (mg/l)	ANZECC Criterion (mg/l)
Dissolved zinc	0.028	0.134	0.032	0.031

Results exceeding ANZECC criteria are shaded grey.

On the basis of the soil analysis results, 55 Rata Road meets the definition of a contaminated site. It should be noted that the classification of the whole of the land parcel at 55 Rata Road as contaminated is a conservative classification, as soil contamination posing a risk to the environment or human health has only been found at two sampling locations at the site.

7.3.2. Kāpiti Road intersection

Review of the test pit logs has confirmed the geology beneath the site to comprise fill or reworked natural materials (organic sandy silts) overlying sand and peat deposits. The fill was predominantly a silty sand with gravel and inclusions of waste materials comprising plastic, brick, concrete, textile, metal, wire, glass and wood. Waste materials were identified at locations TP101 to TP106, TP108 and TP110. In addition, a fragment of suspected cement bound asbestos was identified at location TP108. There was no visible or olfactory evidence of contamination noted in any test pits.

Groundwater, as a seepage, was encountered in one test pit (TP109) at a depth of 2.4m bgl.

The following land uses or receptors were considered most appropriate when selecting guideline values:

- Contaminated Site Assessment -parkland land use.
- Health Risk to General Public – public access to land for recreational purposes.
- Health Risks to Construction Workers - commercial/industrial outdoor worker.

The chemical analysis results revealed that several samples contained contaminants that exceeded background concentrations whilst one contaminant exceeded its environmental guideline value and these are detailed in **Table 23.7** below (see Appendix 23.B for full results) and shown on Drawing EN-CL-006, Technical Report Appendices, Report 23, Volume 5. In some samples the laboratory detection limit for total DDT isomers and benzo[a]pyrene was not sufficiently low to rule out the environmental risk from these contaminants. This is discussed in more detail in Section 6.3.3.

Table 23.7 – Contaminants Exceeding Guideline Values at Kāpiti Road Intersection

Location	Contaminant	Depth (m)	Concen-tration (mg/kg)	Background Concentrations (mg/kg)	Environ-mental Criterion (mg/kg)	Health Risks to Cons-truction Workers Criterion (mg/kg)	Health Risks to General Public Criterion (mg/kg)
TP109	Arsenic	0.2	24	<2-7	12	70	80
	Arsenic	0.5	70	<2-7	12	70	80

Results exceeding environmental risk criteria are shaded grey.

On the basis of these results, the land at Kāpiti Road Intersection meets the definition of a contaminated site. It should be noted that the classification of the whole of the land parcel at Kāpiti Road Intersection as contaminated is a conservative classification, as soil contamination posing a risk to the environment has only been found at one sampling location at the site.

7.3.3. Laboratory Limits of Detection Issues

The contaminants listed in **Table 23.8** were identified at concentrations below the laboratory detection limit, but those limits of detection were in excess of the environmental risk criteria.

Table 23.8 – Contaminants with Laboratory Limit of Detection above Environmental Risk Criteria

Location	Contaminant	Concentration (mg/kg)	Environmental Risk Criteria (mg/kg)
55 Rata Road			
Selected locations	Benzo[a]pyrene	<1.2 - <3	0.7
Kāpiti Road Intersection			
Shallow samples at all locations	Total DDT	<1.2 - <4	0.7
At least one sample from all sampling locations	Benzo[a]pyrene	<1.2 - <3	0.7

With reference to **Table 23.8** above, selected samples were retested at lower levels of detection to ascertain the significance of the issue. All shallow samples at Kāpiti Road Intersection were retested for DDT isomers, with results showing that all samples were below the environmental risk criterion.

Samples from half the number of locations at 55 Rata Road and Kāpiti Road Intersection were retested for PAH, with an equal number of shallow and deep samples selected. There were no samples which exceeded the environmental risk criterion from either site. It is therefore considered that the risk posed by benzo[a]pyrene in the remaining samples where laboratory detection limits are above the environmental criterion is low.

Following retesting of selected samples and further assessment of the results, the limit of detection issues are considered to be of low significance in the context of the overall assessment.

7.4. Discussion

7.4.1. Nature of materials

The investigations in Sector 2 have shown the geology to comprise fill or reworked natural materials (organic sandy silts) overlying sand dunes and peat deposits. The observed fill was predominantly a silty sand with gravel and inclusions of waste materials comprising plastic, brick, asphalt, concrete, textile, metal, wire, glass and wood. Waste materials were identified at several locations at 55 Rata Road and Kāpiti Road Intersection. In addition, fragments of suspected cement bound asbestos were identified at both sites. Visible and olfactory evidence for contamination was identified at one location (TP209) at 55 Rata Road.

7.4.2. Assessment of discharge resource consent requirements

The definition of a contaminated site as given in the Discharges to Land Plan is as follows:
"A site at which a hazardous substance occurs at concentrations above background levels and where assessment indicates it poses or is likely to pose an immediate or long term hazard to human health or the environment."

The results of soil analyses within Sector 2 show that there are contaminants present at concentrations which exceed background levels and either environmental or human health risk criteria. Therefore the sites at 55 Rata Road and Kāpiti Road Intersection are classified as contaminated sites. It should be noted that the classification of the whole of these land parcels as contaminated is a conservative classification, as soil contamination posing a risk to the environment or human health has only been found at selected sampling locations at the sites.

55 Rata Road:

The results of chemical analysis of soil samples from the boundary of the site (locations TP209 and TP214) show that contaminants (PAH and TPH) are present in concentrations exceeding guideline values. The results of the water quality analyses from the Drains bounding the site show that PAH and TPH present in the soils on site may not be migrating into the surface water at the boundary of the site, however it is noted that only one sampling round was undertaken. Given the elevated levels of PAH and TPH at two sampling locations at the boundary of the site, a conservative approach would be to recommend that activities involving the reuse of soils on site or the removal of soils for reuse at another location be controlled by a discharge resource consent under Rule 22 of the Discharges to Land Plan. The consenting requirements will need to be confirmed with GWRC. If however the contaminated soils are excavated and disposed of to a licenced landfill then a discharge consent is not required under Rule 22 of the Discharges to Land Plan.

The concentrations of zinc in upstream samples are above relevant ANZECC water quality guidelines. Further surface water sampling and analysis may be required to confirm this result.

Kāpiti Road Intersection:

The results of chemical analysis of soil samples at the boundary of the site show that arsenic is present in concentrations exceeding its guideline value.

On the basis of this assessment, activities involving the reuse of soils on site or the removal of soils for reuse at another location will require a discharge resource consent under Rule 22 of the Discharges to Land Plan. If however the contaminated soils are excavated and disposed of to a licenced landfill then a discharge consent is not required under Rule 22 of the Discharges to Land Plan. The consenting requirements will need to be confirmed with GWRC.

7.4.3. Assessment of human health risks

The results of soil analyses at 55 Rata Road have revealed that benzo[a]pyrene, naphthalene, benzo[a]pyrene equivalent, TPH C7-C9 and TPH C10-C14 exceeded health guidelines for site workers, for the general public outside the site and construction workers potentially working at the site at location TP209. The results are shown on Drawing EN-CL-005, Technical Report Appendices, Report 23, Volume 5. The risks to those working on the site from contaminated soils are from dermal contact, accidental ingestion and inhalation of contaminated dust. The risks to members of the public living adjacent to or walking past the site are from inhalation of contaminated dust.

i. Assessment of Resource Consent Requirements under the NES

The property at 55 Rata Road appears on the GWRC Selected Land Use Register for the historical storage of fuel at the site. This activity is listed on the Hazardous Activities and Industries List (HAIL) and so the NES Regulations apply to this land parcel. The volume of soil disturbance at the site is likely to be more than 25m^3 per 500m^2 and require more than 5m^3 of soil to be removed from the site. This is above the Permitted Activity volumes detailed in the Regulations and so this activity would require a consent. As the concentrations of contaminants at location TP209 exceed the guideline values in the NES, the activities at this site would be restricted discretionary and the NZTA will need to apply to the Kāpiti Coast District Council (KCDC) for a resource consent under Regulation 10 of the NES. This will need to be confirmed with KCDC.

ii. Proposed Mitigation of Effects

The soils at location TP209 should be excavated and disposed of to landfill to avoid on-going health risks. The excavation of the contaminated soils should be completed prior to any construction works commencing at the site. The contaminated soils should be disposed of to a landfill licenced to accept the contaminant levels in the soils. Alternatively the soils may need to be treated to reduce the mobility or toxicity of the contaminants. Land disturbance activities at this location will require special management procedures to protect workers and the general public from exposure to soil contaminants. The risk to the general public from the excavation of contaminated materials at this particular location of the site is from direct contact with the material by having access to the site, or by inhalation of dust if there are poor controls during excavation. The risk to the general public is considered to be low as the site will be fenced off from public access and dust controls will be rigorously implemented during excavation.

Soil sampling of the contaminated area should be undertaken post-excavation to ensure the contaminated soils have been removed. The management methods and procedures for excavations in this area are detailed in the Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4).

Land disturbance activities on the remainder of land at 55 Rata Road and at Kāpiti Road Intersection do not require any special management practices to protect workers and the general public from the health risks from soil contamination. However, all excavations should be carried out and managed in accordance with Appendix K of the CEMP, Volume 4 and the Contractor Health and Safety Plan (CHSP). Adherence to such plans will control the off site migration of any, as yet, unidentified contaminants and minimise the exposure of construction workers to potentially contaminated soils. Appendix K of the CEMP, Volume 4 is a sub-plan to the Construction Environmental Management Plan (CEMP, Volume 4).

7.4.4. Assessment of environmental risks

The environmental criterion for benzo[a]pyrene (BaP) was exceeded at 55 Rata Road at locations TP209 and TP214. The environmental criterion for arsenic was exceeded at Kāpiti Road Intersection at location TP109. The environmental risks from BaP and arsenic would result from discharge to groundwater and dispersal of contaminated soils during construction.

i. Assessment of Discharge Resource Consent Requirements

The environmental effects from the reuse of soils at these sites would be controlled by discharge resource consent conditions.

ii. Proposed Mitigation of Effects

The soils at locations TP209 and TP214 at 55 Rata Road should be excavated and disposed of to landfill to avoid on-going environmental risks associated with these soils.

Should the soils at location TP109 at Kāpiti Road Intersection be required for use within the embankment, containment of the contaminants (for example using cement stabilisation) should be considered prior to placement within the embankment. Alternatively these soils can be disposed of to landfill.

All excavations should be carried out and managed in accordance with Appendix K of the CEMP, Volume 4 and the CHSP. Adherence to such plans will control the off-site migration of any, as yet, unidentified contaminants and minimise the exposure of construction workers to potentially contaminated soils. Appendix K of the CEMP, Volume 4 is a sub-plan to the CEMP, Volume 4.

7.4.5. Soil classification

One of the aims of the construction methodology for the Project is to minimise the volume of soils that are disposed to landfill therefore the soils at 55 Rata Road and Kāpiti Road Intersection have not been classified for disposal. The exceptions to this are soils at locations TP209 and TP214 at

55 Rata Road. These soils are classified as possibly highly contaminated fill (location TP209) and contaminated fill (location TP214) and should be disposed of to a landfill licenced to accept the contaminant levels in the soils.

The construction methodology at Kāpiti Road Intersection will involve some excavation of sand to be used as fill in the overbridge construction. Soils at location TP109 are classified as contaminated fill and can be stabilised prior to reuse or disposed of to landfill.

Non-natural materials were encountered at 15 locations across both sites. The presence of materials such as metal, wood, peat and other biodegradables precludes acceptance of the soils as cleanfill material at a landfill. Soils at these locations are classified as contaminated fill. The results of the classification are best appreciated spatially and they are therefore presented on Drawings EN-CL-004 and 005, Technical Report Appendices, Report 23, Volume 5.

7.5. Summary of effects and proposed mitigation

Based on the findings of the investigation for this sector, the potential effects on the environment are detailed in **Table 23.9** below, along with appropriate mitigation measures:

Table 23.9 - Sector 2: Assessment of Environmental Effects

Area	Effect	Mitigation
55 Rata Road	▪ Exposure of construction workers/site workers to contaminated soils (dermal contact, accidental ingestion, inhalation of dust) ▪ Discharge of soil contaminants to air causing risk to public health through inhalation of dust ▪ Discharge of soil contaminants to groundwater/surface water ▪ Discharge of contaminants to land during construction	▪ Excavation and disposal of contaminated soils to a licenced landfill. ▪ Compliance with discharge and human health Resource Consent conditions. ▪ Adherence to Appendix K of the CEMP, Volume 4 management procedures to protect human health. ▪ Adherence to the Appendix K of the CEMP, Volume 4 to prevent discharge of contaminants to land and discharge of contaminants to water. ▪ Use of dust suppression controls as per Appendix G of the CEMP, Volume 4. ▪ Use of erosion and sediment controls as per Appendix H of the CEMP, Volume 4.
Kāpiti Road Intersection	▪ Discharge of soil contaminants to groundwater/surface water ▪ Discharge of contaminants to land during construction	▪ Containment of contaminants using cement stabilisation or excavation and disposal to landfill. ▪ Compliance with discharge Resource

Area	Effect	Mitigation
		Consent conditions. - Adherence to Appendix K of the CEMP, Volume 4 to prevent discharge of contaminants to land and discharge of contaminants to water. - Use of dust suppression controls as per Appendix G of the CEMP, Volume 4. - Use of erosion and sediment controls as per Appendix H of the CEMP, Volume 4.

More detail on the mitigation measures to address the potential effects from the discharge of soil contaminants to land, water or air are provided within Appendix K of the CEMP, Volume 4. The key measures are summarised in Section 10.

7.6. Conclusions

The investigations in Sector 2 have shown that soils comprise fill or reworked natural materials (organic sandy silts) overlying sand and peat deposits. The observed fill was predominantly a silty sand with gravel and inclusions of waste materials at both sites comprising plastic, brick, asphalt, concrete, textile, metal, wire, glass and wood. In addition, fragments of suspected cement bound asbestos were identified at both sites.

The results of soil analyses within Sector 2 show that there are contaminants present at concentrations which exceed background levels and either environmental or human health risk criteria (arsenic, PAH and TPH). Therefore the sites at 55 Rata Road and Kāpiti Road Intersection are classified as contaminated sites. The classification of the whole of the land parcels at these sites as contaminated is a conservative classification, as soil contamination posing a risk to the environment has only been found at selected sampling locations at the sites.

The results of soil and surface water analyses of samples at the boundaries of the sites indicate that contaminants may be migrating across the site boundaries. Therefore activities involving the reuse of soils on site or the removal of soils for reuse at another location would require a discharge resource consent under Rule 22 of the Discharges to Land Plan. This should be confirmed with GWRC.

Potential environmental effects relate to the discharge of soil contaminants to groundwater, surface water and land during construction. Potential human health effects relate to the exposure of construction workers and site workers to contaminated soils and the inhalation of airborne soil contaminants by the public. Activities at 55 Rata Road would require a resource consent under Regulation 10 of the NES. This should be confirmed with KCDC.

The effects in Sector 2 can be mitigated by the excavation and disposal off-site of contaminated soils, containment of contaminants on site, compliance with discharge and human health resource consent conditions and adherence to management methods and procedures to protect human health and the environment detailed in Appendix K of the CEMP, Volume 4, Appendix G of the CEMP, Volume 4 and Appendix H of the CEMP, Volume 4.

8. Sector 3

8.1. Sector description

This sector runs approximately along the existing WLR designation through the area of Waikanae from 300m north of Mazengarb Road to 600m north of Te Moana Road. An underbridge will be constructed over Otaihanga Road, with a new bridge spanning the Waikanae River and a new intersection at Te Moana Road. The main construction yard and Project office will be established at the Otaihanga Landfill site on Otaihanga Road.

The generalised geological sequence beneath Sector 3 is expected to comprise sand dunes and peat swamps overlying sandy, gravelly alluvial deposits from the erosion of the mountainous greywacke terrain of the Tararua Ranges in the east.

Several waterways cross Sector 3 including the Mazengarb Drain, the Waste Water Treatment Plant Drain, the Landfill Drain, the Muaupoko Stream, the Waikanae River and the Waimeha Stream.

The current land use within this sector is predominantly rural with an area of residential use between Waikanae River and Te Moana Road. The Alignment follows the existing WLR designation for the majority of this section of the route and deviates into privately-owned land at the river crossing.

8.2. Investigation activities and methodology

The objectives of the investigations within this sector were:

- To determine if selected areas within the sector were contaminated.
- To assess groundwater and leachate within land adjacent to the Otaihanga Landfill and the potential effects on human health and the environment.
- To establish resource consent requirements associated with any identified soil or groundwater contamination.
- To assess any effects of any identified contamination on human health (general public and construction workers).
- To assess any Project environmental effects.

- To classify soils for re-use and off site disposal purposes.

The investigations within Sector 3 took place at two locations which were identified in the desk study as having the potential to be contaminated. These locations were:

- Otaihanga Mountain Bike Park: adjacent to Otaihanga Landfill.
- 124-154 Te Moana Road: currently used for market gardening activities.

A summary of the investigation activities undertaken at these locations are outlined in **Table 23.10** below. The investigation locations are shown on Drawing EN-CL-003 and 004, Technical Report Appendices, Report 23, Volume 5.

Table 23.10 – Summary of Investigation Activities in Sector 3

Area	Rationale	Number of samples analysed	Analysis Suite
Otaihanga Mountain Bike Park	3 groundwater sampling locations (shallow and deep boreholes at each location) BH305 to BH307 3 groundwater samples (one from each deep borehole) Analysis suite based on broad contaminant discharge from landfill.	3	Heavy Metals, SVOC, VOC, TPH, nutrient suite, anion/cation, faecal coliform + E.coli
	6 soil samples (shallow and deep sample depths) Analysis suite based on broad contaminant discharge from landfill.	6	Heavy Metals, SVOC
124-154 Te Moana Road	Grid spacing – 20 sampling locations, plus 5 targeted locations (HA101 to HA125) Analysis suite based on horticultural activities	22 + 2 duplicates	Heavy Metals, OCP, ON/OP, PAH

Notes:

- Heavy metals tested comprise arsenic, cadmium, chromium, copper, lead, nickel and zinc
- PAH – polycyclic aromatic hydrocarbons
- SVOC – semi volatile organic compounds
- OP/ON – organophosphorus/organonitrogen pesticides
- OCP – organochlorine pesticides
- VOC – volatile organic compounds
- TPH – total petroleum hydrocarbons

Full details of the investigation activities and the methodology used for these activities are provided in Section 4 and Appendix 23.C. The following subsections outlines the investigations carried out and provides a rationale for the sampling and analysis.

8.2.1. Otaihanga Mountain Bike Park

Otaihanga Mountain Bike Park is situated to the west of and directly adjacent to Otaihanga Landfill. The landfill has been in operation since the 1970s as a municipal waste landfill and is unlined. It is now closed but continues to accept treated sewage sludge, cleanfill and green waste.

The boundaries of the extent of deposit of solid wastes at the landfill were not clearly defined by Council records, however the likelihood of wastes being deposited beyond the western leachate/stormwater drain (within the mountain bike park and therefore within the Alignment) was considered to be low. This was because the mountain bike park area is covered by aged pine forest on natural sand dune formations. Given the lack of evidence for historical activities taking place within the mountain bike park area which could have resulted in soil contamination, characterisation of these soils was not considered necessary.

The focus of the investigation in this area was on determining groundwater quality within the mountain bike park given that leachate is discharging from the landfill directly into groundwater. The Landfill Drain runs between the landfill and the mountain bike park and has been designed to capture leachate and stormwater runoff from the western portion of the landfill. The drain discharges via a sewer to the Paraparaumu Wastewater Treatment Plant. The discharge of leachate from the landfill to groundwater is a consented activity.

Boreholes drilled as described in Section 4.3 as part of the parallel hydrogeological investigations by the Project team were used to obtain groundwater samples. Due to severe access constraints within the mountain bike park, the boreholes were located adjacent to the boundary between the mountain bike park and the landfill (see drawing number EN-CL-003 in Technical Report Appendices, Report 23, Volume 5 of the AEE for investigation locations). These locations are within the legal land parcel for Otaihanga Landfill rather than the designated land parcel containing the mountain bike park.

Full details of the methodology used to collect the groundwater samples are provided in Section 4. In total three groundwater samples were collected from three boreholes (deeper 10m boreholes) and analysed for a broad suite of contaminants based on discharges from landfill and general groundwater quality.

The determination of potential soil contamination in Otaihanga Mountain Bike Park was not the purpose of the assessment for this section of the route. However, a small number of soil samples were collected from boreholes at selected locations at the edge of Otaihanga Landfill. The soil samples were collected to identify the presence of waste materials and determine the levels of contaminants in soils at the edge of the landfill. The soil samples were collected from the cores retrieved from the boreholes drilled as part of the parallel hydrogeological investigations. In total 6 soil samples were collected (shallow and deep depths) and analysed for a broad range of contaminants.

As the area where the soils were collected is not being disturbed during construction of the proposed Expressway, an assessment of resource consent requirements under the Discharges to Land Plan was not considered relevant. However, the guideline values and methodology for the assessment of whether the soils are contaminated has been undertaken in accordance with this Plan for consistency.

8.2.2. 124-154 Te Moana Road

In order to give statistically representative coverage of the area at 124-154 Te Moana Road (estimated to be 27,000m^2), a systematic grid system was used based on the MfE document *Contaminated Land Management Guidelines No. 5, Site Investigation and Analysis of Soils* (2004). The number of sampling locations has been calculated based on the following equations taken from the MfE document:

$$G = \frac{R}{0.59}$$

$$N = \frac{A}{G^2}$$

where:

G = grid size of the sampling pattern, in metres

R = radius of the smallest hot spot that the sampling intends to detect, in metres

0.59 = factor derived from 95% detection probability assuming circular hot spots

N = number of sampling points

A = size of the sampling area, in square metres.

The hot spot radius (R) was chosen as 15m and this resulted in the need for 39 sampling locations. The choice of hot spot radius of 15m was considered appropriate taking into account the likely widespread application of pesticides. Given that the application of pesticides was likely to have been done in an even manner across the site, the number of sampling locations was halved to 20. This was considered sufficient to assess the potential contamination at this site. In addition, five targeted sampling locations were located in a mixing shed viewed during the site visit.

The site is traversed by drains which lead to the Waimeha Stream on the northern side of Te Moana Road.

In total, 22 hand augers were drilled (see Drawing EN-CL-004, Technical Report Appendices, Report 23, Volume 5 for investigation locations). Three locations (HA113 to HA115) were not drilled as they were on a grassed slope outside of the area used for market gardening activities. The maximum depth of investigation was 0.5m bgl which was considered appropriate for identifying any contamination associated with pesticide use. A total of 22 soil samples were scheduled for chemical laboratory analysis and the analysis suite is summarised in **Table 23.10** and detailed in Appendix 23.C.

8.3. Investigation findings

8.3.1. Otaihanga Mountain Bike Park

Review of the borehole logs has confirmed the geology beneath the site to comprise fill or reworked natural materials (organic sandy silts) overlying sand and peat deposits. The fill was predominantly a silty sand with gravel. A small piece of waste material (plastic bag) was identified in the borehole core at location BH307.

Groundwater was encountered at depths of 0.6m to 1.5m bgl at all borehole locations.

The chemical analysis results revealed that one groundwater sample contained contaminants that exceeded ANZECC guideline values and these are detailed in **Table 23.11** below (see Appendix 23.C for full results). In selecting an appropriate level of species protection within the ANZECC guidelines, a level of protection for 80% species has been adopted which is appropriate for a highly modified environment such as a landfill. This level of protection has been adopted to assess the groundwater and surface water quality as part of the monitoring programme carried out by KCDC at the Otaihanga Landfill.

Table 23.11 – Contaminants Exceeding Guideline Values in Groundwater at Otaihanga Mountain Bike Park

Location	Contaminant	Screen Depth (m)	Concentration (mg/l)	ANZECC Criterion (mg/l)
BH305	Total ammoniacal-N	7.5-10.5	0.4	0.021
BH306	Total ammoniacal-N	7-10.5	3	0.021
BH307	Total ammoniacal-N	7.6-10	7.3	0.021
BH307	Copper	7.6-10	0.0087	0.0025
BH307	Zinc	7.6-10	6.2	0.031

Results exceeding ANZECC criteria are shaded grey.

Faecal coliform and E.coli were also detected in groundwater samples from each borehole.

The following land uses and receptors were considered most appropriate when selecting guideline values for soil sample assessment:

- Contaminated Site Assessment - industrial land use.

The chemical analysis results of the soil samples revealed that no contaminant exceeded its background concentration or its environmental or human health guideline value (see Appendix 23.C for full results).

8.3.2. 124-154 Te Moana Road

Review of the hand auger logs has confirmed the geology beneath the site to comprise reworked natural materials (sandy silts) overlying sand. There was no visible or olfactory evidence for contamination within any of the hand augers.

Groundwater, as a seepage, was encountered in two hand augers (HA102 and HA118) at depths between 0.4m and 0.5m bgl.

The following land uses and receptors were considered most appropriate when selecting guideline values for soil sample assessment:

- Contaminated Site Assessment - agricultural land use.
- Health Risk to General Public – residential receptors.
- Health Risks to Construction Workers - commercial/industrial outdoor worker.

The chemical analysis results revealed that one sample contained a contaminant that exceeded its background concentration and its environmental guideline value and this is detailed in **Table 23.12** below (see Appendix 23.C for full results) and shown on Drawing EN-CL-008, Technical Report Appendices, Report 23, Volume 5.

Table 23.12 – Contaminant Exceeding Guideline Values at 124-154 Te Moana Road

Location	Contaminant	Depth (m)	Concentration (mg/kg)	Background Concentrations (mg/kg)	Environ-mental Criterion (mg/kg)	Human Health Criterion (mg/kg)
HA125	Zinc	0-0.1	510	28-79	46	7000

Results exceeding environmental risk criterion are shaded grey.

On the basis of these results, 124-154 Te Moana Road meets the definition of a contaminated site. It should be noted that the classification of the whole of the land parcel at 124-154 Te Moana Road as contaminated is a conservative classification, as soil contamination posing a risk to the environment has only been found at one sampling location at the site.

8.3.3. Laboratory limits of detection issues

The contaminants listed in **Table 23.13** were identified at concentrations below the laboratory detection limit, but those limits of detection were in excess of the environmental risk criteria.

Table 23.13 – Contaminants with Laboratory Limit of Detection above Environmental Risk Criteria

Location	Contaminant	Concentration (mg/l)	Assessment Criteria (mg/l)
Otaihanga Mountain Bike Park - Groundwater			
All samples	Benzo[a]anthracene	<0.0003	0.000018
All samples	Pyrene	<0.0003	0.000025
All samples	Azinphos-methyl	<0.0007	0.00011
All samples	Dimethoate	<0.0007	0.0003

The limit of detection for benzo[a]anthracene, pyrene, azinphos-methyl and dimethoate in all groundwater samples was above the environmental risk criteria. These criteria are stringent and set at ultratrace levels. Given that no other pesticides or PAH have been identified above their detection limit at the site it is considered that the risk posed by these contaminants is low. The limit of detection issues for groundwater samples are considered to be of low significance in the context of the overall assessment.

8.4. Discussion

8.4.1. Nature of materials

The investigation in Sector 3 has shown the geology to comprise fill or reworked natural materials (organic sandy silts) overlying sand and peat deposits. The fill was predominantly a silty sand with gravel. A small piece of waste material (plastic bag) was identified in the borehole core at location BH307 in Otaihanga Mountain Bike Park. The results of the soil and water analyses are discussed in the following sections.

8.4.2. Groundwater investigation findings

The results of groundwater analyses at otaihanga Mountain Bike Park show that there are contaminants present at concentrations which exceed their ANZECC criteria. There is evidence of contamination from leachate from the landfill through elevated levels of ammoniacal nitrogen and the presence of faecal coliform and E.coli. However the elevated ammoniacal nitrogen levels could also be attributed to dissolved ammonia formed through the natural degradation of peat which is present at this location.

These results have been compared with the results reported as part of the resource consent compliance groundwater monitoring for Otaihanga Landfill[5] between 1992 and 2010. The results of groundwater analyses at BH305 to BH307 are below the maximum recorded values from

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[5] KCDC Landfill Monitoring Programme, Annual Report 2009-2010

groundwater monitoring well K1 on the western side of the landfill during this period. The only exception is the elevated zinc concentration in BH307 which is significantly higher than the maximum concentration recorded in monitoring well K1 (0.39 mg/L).

The elevated zinc concentration could be confirmed by undertaking a second round of groundwater analyses, selecting heavy metals and a nutrient suite as the analysis parameters, for BH305 to BH307.

8.4.3. Groundwater model

The effects on groundwater from the construction of the proposed Expressway have been assessed by the development of regional and area specific 2- and 3-dimensional computer groundwater models calibrated to groundwater level monitoring data and taking into consideration the modelling work carried out by others addressing parts of the region. The full assessment of effects is detailed in the Assessment of Groundwater Effects (Technical Report 21, Volume 3).

Groundwater issues identified in Sector 3 included potential changes in flow directions in the vicinity of Otaihanga Landfill that might result in changes to current leachate flow directions. A site specific model has been developed to consider the interactions of the Otaihanga Landfill and adjacent wetlands with proposed Expressway construction.

Both regional and site-specific 3D groundwater modelling of the proposed Expressway in the vicinity of the Otaihanga Landfill indicate no noticeable change in groundwater levels, gradients and flow as a result of proposed Expressway construction. Changes in contaminant migration from the landfill as a result of proposed Expressway construction are therefore considered negligible.

Construction of stormwater pond number 6, located in proximity to the toe of the landfill, may result in a lowering of the groundwater level by up to 0.1m immediately adjacent to the storage area, with drawdown extending less than 100m. Contaminated groundwater from the landfill may enter the stormwater pond area, however the stormwater from the pond is discharged into the Landfill Drain and so additional mitigation should not be required.

8.4.4. Surface water quality – Otaihanga Mountain Bike Park

As part of the parallel water quality investigations carried out by the Project team, surface water and sediment samples were taken from the southern, central and northern wetlands in the Otaihanga Mountain Bike Park, and the Landfill Drain which separates Otaihanga Landfill from the mountain bike park. Full details of the methodology used to collect the surface water and sediment samples are provided in the Baseline Water and Sediment Quality Investigation (Technical Report 24, Volume 3), and sampling locations are shown within that report.

Sediment and surface water samples were collected from the three wetlands and the Landfill Drain. The concentration of arsenic in one sediment sample and dieldrin in another sediment sample were slightly above guideline values. The concentration of aluminium, manganese and zinc in surface water samples were above their ANZECC guideline values.

The results of the sampling of the Landfill Drain showed that water quality in the drain is ‘poor’. The water was slightly acidic, had low dissolved oxygen and elevated conductivity. All water samples had elevated faecal coliforms with the E coli counts at levels which exceeded the action mode level for recreational purposes. The Landfill Drain has been designed to capture leachate and stormwater runoff from the western portion of the landfill. The drain discharges via an overflow sump to sewer which is connected to the Paraparaumu Wastewater Treatment Plant.

8.4.5. Surface water quality - Te Moana Road

As part of the parallel water quality investigations carried out by the Project team (on behalf of the NZTA), surface water and sediment samples were taken from the Waimeha Stream which runs adjacent to the Te Moana Road site (see Drawing EN-CL-003, Technical Report Appendices, Report 23, Volume 5 for investigation location). The sample location was downstream from the Te Moana Road site. Full details of the methodology used to collect the surface water and sediment samples are provided in Technical Report 24, Volume 3*.*

The results of three base flow water sampling rounds showed that TPH, organochlorine pesticides and organonitrogen herbicides were not detected in the water samples. Metal contaminants were detected but were below the guideline value.

The results of the base flow sediment sampling round showed that all metal concentrations were below the guideline value while the organic contaminants (TPH, SVOC and VOC) were all less than the analytical limit of detection. This suggests that the sediment poses a low risk to aquatic life. The results of sediment analysis indicate that contaminants present in the soils at the site are not migrating into the stream.

A drinking water observation well located on the boundary of the site was identified in the desk study. Given that the results of the surface water and sediment analyses show no detectable pesticides and low levels of heavy metals, the risk of contaminants from the site impacting groundwater is considered to be low. It is not therefore considered necessary to monitor this observation well for contaminants from the Te Moana Road site.

8.4.6. Assessment of resource consent requirements

Otaihanga Mountain Bike Park:

KCDC is consented to discharge leachate to groundwater from Otaihanga Landfill. There are no consent limits set for groundwater quality but the general trends are tracked through a monitoring programme. Given that the discharge of contaminants is already a consented activity, the resource consent requirements relate to the potential movement of the contaminated groundwater caused by the construction of the proposed Expressway.

Rule 9B of the Regional Freshwater Plan is applicable, which stipulates that the diversion of groundwater is a Permitted Activity providing conditions are complied with. The conditions include that there shall be no adverse effects on water supply (other than temporary), no flooding of land, and no lowering of groundwater levels in any river, lake or wetland, or neighbouring property (reproduced in full in Appendix 23.A).

The groundwater modelling for the area indicates no noticeable change in groundwater levels, gradients and flow as a result of proposed Expressway construction. It is therefore considered that the conditions of Rule 9B can be complied with and that this is a Permitted Activity.

The results of soil analyses revealed that no contaminant exceeded its background concentration or its environmental or human health guideline value. As these soils are not being disturbed during construction a resource consent assessment has not been undertaken.

124-154 Te Moana Road:

The definition of a contaminated site given in the Discharges to Land Plan is as follows:

"A site at which a hazardous substance occurs at concentrations above background levels and where assessment indicates it poses or is likely to pose an immediate or long term hazard to human health or the environment."

The results of soil analyses at 124-154 Te Moana Road show that there are contaminants present at concentrations which exceed background levels and environmental risk criteria for soils. This site is classified as a contaminated site. It should be noted that the classification of the whole of the land parcel at 124-154 Te Moana Road as contaminated is a conservative classification, as soil contamination posing a risk to the environment has only been found at one sampling location at the site.

The results of chemical analysis of soil samples from the boundaries of the site show that contaminants (heavy metals) are present in concentrations exceeding guideline values (see Drawing EN-CL-008, Technical Report Appendices, Report 23, Volume 5). On the basis of this assessment, activities involving the reuse of soils on site or the removal of soils for reuse at another location would require resource consent under Rule 22 of the Discharges to Land Plan. If however the contaminated soils are excavated and disposed of to a licenced landfill then a discharge consent is not required under Rule 22 of the Discharges to Land Plan. This should be confirmed with GWRC.

8.4.7. Assessment of human health risks

Otaihanga Mountain Bike Park:

The risks to human health from contaminated groundwater and surface water are from dermal contact and ingestion. The contaminated water may pose a risk to construction workers who are likely to come in direct contact during construction. The contaminants identified in the groundwater samples are in much lower concentrations than the surface water. The main health risk is the elevated concentrations of faecal coliforms and E.coli count in the Landfill Drain. The concentrations exceed the ANZECC action mode level for recreational purposes. Given the likely low exposure time of workers during the construction period to contaminated surface water the risks would be accidental ingestion and infection of any skin abrasions and cuts.

The Landfill Drain area is not easily accessible to the public from the mountain bike park area due to dense vegetation growth, and once the proposed Expressway is constructed, the only publicly accessible wetland/recreational area will be to the west of the proposed Expressway. It is considered that the risk to members of the public is low.

All excavations in this area are proposed to be carried out and managed in accordance with Appendix K of the CEMP, Volume 4 and the CHSP. Adherence to such plans will minimise the exposure of construction workers to contaminated groundwater and control the off site migration of any, as yet, unidentified contamination. Appendix K of the CEMP, Volume 4 is a sub-plan to the CEMP, Volume 4.

124-154 Te Moana Road:

There were no contaminants in excess of their human health criteria at 124-154 Te Moana Road. Therefore land disturbance activities at these sites will not require any special management practices to protect workers.

However, all excavations should be carried out and managed in accordance with Appendix K of the CEMP, Volume 4 and the CHSP. Adherence to such plans will control the off site migration of any, as yet, unidentified contaminants and minimise the exposure of construction workers to potentially contaminated soils.

8.4.8. Assessment of environmental risks

Otaihanga Mountain Bike Park:

Contaminants are present in the groundwater in concentrations above the ANZECC criteria in this section of the route. Given the results of the groundwater modelling, the effects of the construction of the proposed Expressway are not likely to increase the environmental risk associated with this contamination.

124-154 Te Moana Road:

The environmental criterion for zinc was exceeded at 124-154 Te Moana Road at location HA125. The environmental risks from zinc include discharge to groundwater and land during construction. The soils at this location should be stabilised prior to reuse.

The environmental effects from the disturbance of soils at these sites will be controlled by resource consent conditions. All excavations should be carried out and managed in accordance with Appendix K of the CEMP, Volume 4 and the CHSP. Adherence to such plans will control the off site migration of any, as yet, unidentified contaminants and minimise the exposure of construction workers to potentially contaminated soils.

8.4.9. Soil classification

One of the aims of the construction methodology for the Project is to minimise the volume of soils that are disposed to landfill. The construction methodology at 124-154 Te Moana Road will involve the excavation of surface soils to be used as fill in the overbridge construction. Location HA125 is within the construction footprint. Should soils from this location be required for use within the embankment, cement stabilisation should be considered prior to placement within the embankment. The remainder of soils at this location have not been classified for disposal.

There were no non-natural materials encountered at this site.

8.5. Summary of effects and proposed mitigation

Based on the findings of the investigation for this sector, the potential effects on the environment are detailed in **Table 23.14** below, along with appropriate mitigation measures:

Table 23.14 - Sector 3: Assessment of Environmental Effects

Area	Effect	Mitigation
Otaihanga Mountain Bike Park	- Exposure of construction workers/site workers to contaminated groundwater (dermal contact, accidental ingestion)	- Adherence to Appendix K of the CEMP, Volume 4 and CHSP management procedures to protect human health. - Adherence to the Appendix K of the CEMP, Volume 4 to manage any unexpected soil or groundwater contamination.
124-154 Te Moana Road	- Discharge of soil contaminants to groundwater/surface water - Discharge of contaminants to land during construction	- Containment of contaminants using cement stabilisation - Excavation and disposal to landfill. - Compliance with discharge Resource Consent conditions. - Adherence to Appendix K of the CEMP, Volume 4 to prevent discharge of contaminants to water and land. - Use of dust suppression controls as per Appendix G of the CEMP, Volume 4.

More detail on the mitigation measures to address the potential effects from the discharge of soil contaminants to land, water or air are provided within Appendix K of the CEMP, Volume 4. The key measures are summarised in Section 10.

8.6. Conclusions

The investigation in Sector 3 has shown that soils comprise reworked natural materials (sandy silts) overlying sand. There were no waste materials identified except at one location (BH307).

The results of groundwater analyses at the boundary of Otaihanga Landfill and the mountain bike park show that there are contaminants present at concentrations which exceed their ANZECC criteria. There is evidence of contamination from leachate from the landfill through elevated levels of ammoniacal nitrogen and the presence of faecal coliform and E.coli. A second round of groundwater sample analysis could be undertaken for BH305 to BH307 to confirm elevated results.

Groundwater modelling of the proposed Expressway in the vicinity of the Otaihanga Landfill indicates no noticeable change in groundwater levels, gradients and flow as a result of proposed Expressway construction. Changes in contaminant migration from the landfill as a result of proposed Expressway construction are therefore considered negligible. The effects of the construction of the proposed Expressway are not likely to increase the environmental risk associated with the groundwater contamination.

Given that the discharge of contaminants from the landfill is already a consented activity, the resource consent requirements relate to the potential movement of the contaminated groundwater caused by the construction of the proposed Expressway. It is considered that the conditions of Rule 9B of the Regional Freshwater Plan can be complied with and that groundwater disturbance is a Permitted Activity.

The results of soil analyses within Sector 3 show that there are contaminants present at concentrations which exceed background levels and environmental criteria (zinc). Therefore the site at 124-154 Te Moana Road is classified as a contaminated site. The classification of the whole of the land parcel at 124-154 Te Moana Road as contaminated is a conservative classification, as soil contamination posing a risk to the environment has only been found at one sampling location at the site.

The elevated concentration of zinc at location HA125 at the site boundary of 124-154 Te Moana Road may be migrating across the site boundaries. Therefore activities involving the reuse of soils on site or the removal of soils for reuse at another location will require a discharge resource consent under Rule 22 of the Discharges to Land Plan. This should be confirmed with GWRC.

Potential environmental effects relate to the discharge of soil contaminants to groundwater, surface water and land during construction. There are no human health effects relating to 124-154 Te Moana Road.

The risks to human health from contaminated groundwater and surface water at Otaihanga Mountain Bike Park are from dermal contact and ingestion. The main health risk is the elevated concentrations of faecal coliforms and E.coli count in the Landfill Drain. The contaminated water may pose a risk to construction workers who are likely to come in direct contact with it during construction.

The effects in Sector 3 can be mitigated by the excavation and disposal off-site of contaminated soils, containment of contaminants on site, compliance with discharge resource consent conditions and adherence to management methods and procedures to protect human health and the environment detailed in Appendix K of the CEMP, Volume 4, Appendix G of the CEMP, Volume 4 and Appendix H of the CEMP, Volume 4.

9. Sector 4

9.1. Sector description

Sector 4 runs from Te Moana Road to Peka Peka Beach Road. A new Alignment to Ngarara Road will be built to cross the proposed Expressway, which will include construction of an overbridge. Smithfield Road will be relocated to the south of its existing position, with an overbridge constructed to carry the new Alignment over the proposed Expressway. At the Peka Peka end, an interchange will be constructed over both the proposed Expressway and the existing railway, linking Peka Peak Beach Road to Hadfield Road.

The generalised geological sequence beneath Sector 4 is expected to comprise sand dunes and peat swamps overlying sandy, gravelly alluvial deposits from the erosion of the mountainous greywacke terrain of the Tararua Ranges in the east.

Several waterways cross Sector 4 including the Waimeha Stream, the Ngarara Stream, the Ngarara Drain, the Kakariki Stream and the Paetawa Drain.

The current land use within this sector is rural, with predominantly pasture and some areas of bush.

9.2. Investigation activities

There were no properties in Sector 4 identified in the desk study that were considered to have the potential to be contaminated from current or historical activities. However, detailed site inspections of each land parcel intersected by the construction footprint were not undertaken and given the rural nature of the Sector, the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil.

10. Areas not investigated

Stormwater pond/wetland areas identified in the desk study as having the potential to be contaminated will require further investigations to be undertaken to determine any requirements for resource consents, assessment of environmental effects, mitigation and disposal of any contaminated soils. This should be undertaken prior to construction commencing. These properties are:

- Sector 1 - 16 Leinster Avenue: Rear of property used as transport yard with dumped waste materials.
- Sector 1 - 150 Raumati Road: Area of bush/unused land with dumped waste materials to the south of Raumati Road.
- Sector 2 - 58 Kiwi Road: Former horticultural area.
- Sector 2 - 109 Kāpiti Road: In use as a firewood storage area, multiple sources of fill on site.

The stormwater pond/wetland areas requiring further investigation are detailed on drawing numbers EN-CL-010 to 012, Technical Report Appendices, Report 23, Volume 5.

Test pit locations TP215 to TP217 at 55 Rata Road were not able to be excavated due to difficult terrain (see Drawing EN-CL-001, Technical Report Appendices, Report 23, Volume 5). As these locations are within the area due to be pre-loaded, soil samples should be collected and sent for chemical laboratory analysis to determine the leachability of any contaminants present. This should be undertaken prior to pre-load construction commencing.

The Project scope in Section 1.1 included the following objectives:

- To assess any groundwater, leachate and landfill gas within the area of Otaihanga Landfill being developed as the main Project Yard and the potential effects on human health and the environment.

A preliminary assessment of the Otaihanga Landfill area was undertaken in the desk study. Following this a number of test pits were due to be excavated within the area of the landfill selected as the Project Yard. The investigation of this area will be a priority for the next phase of works. The Project Yard area is shown on Drawing EN-CL-009, Technical Report Appendices, Report 23, Volume 5.

11. Summary of proposed mitigation measures

The proposed mitigation measures for the effects from contaminants identified in the soils within the Project footprint are detailed in Appendix K of the CEMP, Volume 4. This Management Plan addresses the potential adverse environmental and human health effects of the Project in relation to contaminated soils and groundwater. The key mitigation measures are summarised below:

- Appointment of a Contaminated Land Specialist (CLS) during the construction phase of the Project. The CLS will be available on site during all excavation works, and has responsibility for:
  - Co-ordinating additional soil and groundwater testing;
  - Advising on classification of excavated materials for reuse and disposal;
  - Co-ordinating groundwater management and disposal; and
  - Training of staff in contaminated land identification and control procedures.
- A Construction Health & Safety Plan (CHSP) to detail procedures and protocols for mitigation of risks to construction workers and the general public during the excavation and handling of contaminated soils.
- Excavation, where appropriate, and off-site disposal of soils containing contaminants or hazardous materials.
- Containment of contaminants using cement stabilisation where soils are to be reused.
- Monitoring of activities and receptors likely to be affected by discharges.
- Management procedures for the excavation of contaminated soils, to include:
  - Handling and storage requirements (stockpiling to be limited to confirmed cleanfill materials, contaminated materials to be loaded directly onto trucks or loaded into covered bins);

  - Measures to control the discharge of contaminants to air, the discharge of contaminants to the land and discharge of contaminants to water (dust suppression and earthworks erosion and sediment controls); and
  - Disposal of contaminated soils to appropriately licensed landfill (including details of excavations, waste carrier records and retaining landfill documentation).
- Procedures for identifying and managing unexpected discoveries of contamination.
- Soil testing, to include:
  - Verification testing: confirmation of lateral and vertical extent of areas of contamination.
  - Validation testing: testing of materials left in situ following excavation of an area of contamination.
  - Discovery testing: testing of suspected contamination upon discovery.
- Submission of a Site Validation Report at the completion of the construction works, detailing the procedures adopted to manage the contamination within the Project footprint.

12. Summary conclusions

This contamination assessment has established the quality of soils at selected locations along the route of the proposed Expressway. In addition, the potential environmental effects due to construction of the Project have been determined together with the necessary regulatory controls and mitigation. These are discussed in detail within the sector specific sections of this report and summarised below.

12.1. Investigation summary

The contamination assessment comprised a range of investigations which have been detailed and discussed in the preceding sector specific sections of this report. The main findings of the assessment are summarised in the following sub sections which broadly define the following:

- Where contaminated soils and groundwater have been identified.
- Where waste materials have been encountered.
- Where a requirement for a discharge resource consent is triggered due to the migration of contaminants beyond the boundary of a contaminated site.
- Where health risks to construction workers, site workers and the general public have been identified.
- Where a requirement for a resource consent is triggered due to exceedance of human health guideline values in the NES.
- The environmental effects of the Project based on the investigation findings.
- The mitigation required for the identified environmental and human health effects.

12.2. Soils

The proposed works associated with the Project will involve land disturbance within Sectors 1 to 4. Three sites (two in Sector 2 and one in Sector 3) have been conservatively identified as contaminated sites under the Discharges to Land Plan. Discharge resource consent would be required for the reuse of soils under Rule 22 of the Discharges to Land Plan for these three sites as contaminants could be migrating across the boundaries of the sites (see **Table 23.15**). This should be confirmed with GWRC.

Health guidelines for construction workers and the general public have been exceeded at one site in Sector 2 (55 Rata Road). A resource consent would be required under Regulation 10 of the NES for this site. This should be confirmed with KCDC. Soils containing elevated levels of contaminants at this site should be excavated and disposed of to landfill.

Environmental guidelines have been exceeded in Sector 2 at 55 Rata Road and Kāpiti Road Intersection and in Sector 3 at 124-154 Te Moana Road. Soils containing elevated levels of contaminants at 55 Rata Road should be excavated and disposed of to landfill. Soils containing elevated levels of contaminants at Kāpiti Road Intersection and 124-154 Te Moana Road can be cement stabilised and reused in construction works at the sites or alternatively disposed of to landfill.

Specific management procedures for the protection of construction workers, the general public and the environment are outlined in Appendix K of the CEMP, Volume 4. Notwithstanding the exceedance of human health guideline values, the human health risks from contaminated soils can be mitigated by adherence to Appendix K of the CEMP, Volume 4 and the CHSP. This will control the off site migration of identified and any, as yet, unidentified contaminants and minimise the exposure of construction workers and the general public to actually or potentially contaminated soils.

12.3. Groundwater

Environmental criteria for groundwater have been exceeded at Otaihanga Mountain Bike Park and there is evidence of contamination from leachate from the landfill. A second round of groundwater sample analysis could be undertaken to confirm elevated results.

Groundwater modelling of the proposed Expressway in the vicinity of the Otaihanga Landfill indicates no noticeable change in groundwater levels, gradients and flow as a result of proposed Expressway construction. The effects of the construction of the proposed Expressway are not likely to increase the environmental risk associated with the groundwater contamination.

It is considered that the conditions of Rule 9B of the Regional Freshwater Plan can be complied with and that groundwater disturbance in this area is a Permitted Activity.

The risks to human health from contaminated groundwater and surface water at Otaihanga Mountain Bike Park are from dermal contact and ingestion. The main health risk is the elevated concentrations of faecal coliforms and E.coli count in the Landfill Drain. The human health risks from contaminated groundwater and surface water can be mitigated by adherence to Appendix K of the CEMP, Volume 4 and the CHSP.

Table 23.15 - Investigation Findings - Contamination, Resource Consent, Environmental and Human Health

Sector	Area	Contaminated Site	Resource Consent Requirement Triggered	Environmental Guidelines Exceeded	Human Health Guidelines Exceeded
2	55 Rata Road	Y	Y (NES)	Y	Y
	Kāpiti Road Intersection	Y	Y (discharge only if soils reused)	Y	N
3	Otaihanga Mountain Bike Park	N/A	N	Y	N/A
	124-154 Te Moana Road	Y	Y (discharge only if soils reused)	Y	N

12.4. Assessment of environmental effects and mitigation

The sector specific environmental and human health effects that could result from the Project construction are summarised in **Table 23.16** along with proposed mitigation measures.

Table 23.16 - Potential Environmental and Human Health Effects from Construction

Sector	Area	Effect	Mitigation
2	55 Rata Road	■ Exposure of construction workers/site workers to contaminated soils (dermal contact, accidental ingestion, inhalation of dust) ■ Discharge of soil contaminants to air causing risk to public health through inhalation of dust ■ Discharge of soil	■ Excavation and disposal of contaminated soils to a licenced landfill. ■ Compliance with discharge and human health Resource Consent conditions. ■ Adherence to Appendix K of the CEMP, Volume 4 management procedures to protect human health. ■ Adherence to Appendix K of the

Sector	Area	Effect	Mitigation
		contaminants to groundwater/surface water - Discharge of contaminants to land during construction	CEMP, Volume 4 to prevent discharge of contaminants to land and discharge of contaminants to water. - Use of dust suppression controls as per Appendix G of the CEMP, Volume 4. - Use of erosion and sediment controls as per Appendix H of the CEMP, Volume 4.
2	Kāpiti Road Intersection	- Discharge of soil contaminants to groundwater/surface water - Discharge of contaminants to land during construction	- Containment of contaminants using cement stabilisation - Excavation and disposal to landfill. - Compliance with discharge Resource Consent conditions. - Adherence to Appendix K of the CEMP, Volume 4 to prevent discharge of contaminants to land and discharge of contaminants to water. - Use of dust suppression controls as per Appendix G of the CEMP, Volume 4. - Use of erosion and sediment controls as per Appendix H of the CEMP, Volume 4.
3	Otaihanga Mountain Bike Park	- Exposure of construction workers/site workers to contaminated groundwater (dermal contact, accidental ingestion)	- Adherence to Appendix K of the CEMP, Volume 4 and CHSP management procedures to protect human health. - Adherence to the Appendix K of the CEMP, Volume 4 to manage any unexpected soil or groundwater contamination.

Sector	Area	Effect	Mitigation
3	124-154 Te Moana Road	▪ Discharge of soil contaminants to groundwater/surface water ▪ Discharge of contaminants to land during construction	▪ Containment of contaminants using cement stabilisation ▪ Excavation and disposal to landfill. ▪ Compliance with discharge Resource Consent conditions. ▪ Adherence to Appendix K of the CEMP, Volume 4 to prevent discharge of contaminants to land and discharge of contaminants to water. ▪ Use of dust suppression controls as per Appendix G of the CEMP, Volume 4. ▪ Use of erosion and sediment controls as per Appendix H of the CEMP, Volume 4.

This assessment has identified contaminated soils and groundwater and potentially hazardous materials within the Project footprint. However, these occur in relatively localised areas as defined in the table above. The environmental effects of the Project relate to discharge of soil contaminants to ground or surface water and land during earthworks. The human health effects of the Project relate to construction workers and general public exposure to soil and groundwater contaminants. These effects can be mitigated by compliance with resource consents, containment of contaminants on site, excavation of contaminated soils and disposal off-site, and adherence to Appendix K of the CEMP, Volume 4 and the CHSP.

12.5. Assessment of effects of land and groundwater contamination during operation

Once the proposed Expressway has been constructed and is in operation, the contamination identified is not likely to pose an adverse effect on human health or the environment. Soils containing levels of contaminants in excess of guideline values will have either been excavated and disposed of to landfill, or cement bound for reuse to prevent leaching of contaminants.

Soils remaining on site will either be clean or contain low levels of contamination below guideline values and are unlikely to pose an adverse effect on human health or the environment.

The effects of the operation of the proposed Expressway are not likely to increase the environmental risk associated with the groundwater contamination at Otaihanga Mountain Bike Park. Human health risks associated with the contamination in the Landfill Drain will be low as this area will not be publicly accessible once the proposed Expressway is in operation.

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Appendix 23.A

Appendix 23.A – Regulatory Framework

APPENDIX A

Regulatory Framework

Regional Plan for Discharges to Land for the Wellington Region, GWRC, 1999

Rule 21 Contaminated sites (on-site discharges)

The discharge of any contaminants:

(1) into or onto land from a contaminated site, (and not from any activity located on the site) other than as provided in clause (1) of Rule 22; or

(2) into or onto land which is, or is part of, a contaminated site, in association with the on-site remediation of the contaminated site;

is a **Permitted Activity** provided

(a) there shall be no noxious, dangerous, offensive or objectionable levels of contaminants in the air at or beyond the site boundary as a result of the discharge;

(b) there shall be no contaminants from the contaminated site or from any discharge associated with site remediation (or any other contaminants emanating as a result of natural processes from those contaminants) beyond the boundary of the contaminated site at concentrations above the background levels for that location;

(c) the site owner shall undertake such monitoring as is necessary to ensure that the site complies with conditions (a) and (b) above, and shall make the monitoring results available to the Wellington Regional Council, on request.

Rule 22 Contaminated sites (off-site discharges)

The discharge of any contaminants:

(1) into or onto land from a contaminated site (and not from any activity located on the site); or

(2) into or onto land which is, or is part of, a contaminated site, in association with the on-site remediation of the contaminated site;

if:

(3) the activity involves the removal of material from the contaminated site and the discharge of contaminated material at some other location (unless the material is discharged at a landfill which holds resource consents which enable it to accept the discharge); or

(4) the discharge does not comply with any of the conditions in Rule 21;

is a **Controlled Activity** and shall comply with the standards and terms below.

Standards and terms

(a) the consent holder shall undertake such monitoring as is necessary to ensure that the site complies with conditions or standards set by the Wellington Regional Council under provisions (i) and (ii) of this Rule, and shall make the monitoring results available to the Wellington Regional Council, on request.

Control

The Wellington Regional Council shall exercise control over:

(1) any on-site actions that may be required in order to manage the actual or potential effects of discharges of contaminants from the originating site or the disposal site;
(2) standards for site remediation, if necessary;
(3) the means of removal, and the location of the disposal, of any contaminated material from the site;
(4) the duration of the consent; and
(5) administrative charges.

Applying for a Resource Consent

An application for a resource consent under Rule 22 shall be made on the prescribed form, and shall include:

(1) the matters set out in (1)-(8) of Section 5.3.1 of this Plan;
(2) a summary of any site investigations that have been undertaken to determine the degree and extent of the contamination, including an identification of the boundaries of the contaminated site;
(3) any remedial action planned for the site, and the actual and potential effects of the remedial action.

Notification

An application for a resource consent:

- shall not be publicly notified; and
- shall be considered without the written approval of affected persons;

except where the consent authority considers that there are exceptional circumstances which justify notification of the obtaining of written approval from affected persons.

Explanation. These rules apply to both:

- *discharges from contaminated sites (as a result of site contaminants leaving the site, e.g., leaching into groundwater, dispersing into air, or migrating through soil); and*
- *discharges which result from site remediation activities, whether at the site (e.g., in-situ bioremediation) or at some other location (e.g., removal and disposal of contaminated material).*

The rules do not apply to other activities (e.g., factory discharges) which may occur at a contaminated site.

Contaminated sites are defined in Section 3 of this Plan. The rules focus on whether or not the site is having an adverse effect beyond the site boundary. For the purposes of these rules, the "boundary" of a contaminated site means the complete extent of the contaminated land, as assessed at the time that the site was investigated, and confirmed as being contaminated.

If the existence of the contaminated site, or the remediation of the site doesn't have an effect beyond the boundary of the site, then Rule 21 provides that no resource consent is required. This permits, for example, discharges of uncontaminated stormwater from the site, or the on-site containment of contaminated material.

If the site or the remedial action is having or will have an adverse effect beyond the site boundaries then the discharges are controlled activities. The only exception to this is where material from a contaminated site is discharged at a landfill which holds resource consents which enable it to accept the discharge. In this case, no additional resource consent is required.

In enforcing this rule, the Regional Council will ensure that owners of contaminated sites are given sufficient time to respond to the requirement to obtain a resource consent before enforcement action is taken. This may include issuing an abatement notice which requires a discharge consent to be obtained within a specified time.

Policy 4.2.48 is particularly relevant to applications made under Rule 22.

Contaminated sites may also be subject to provisions in district plans and other legislation.

2011/361

Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

Jerry Mateparae, Governor-General

Order in Council

At Wellington this 10th day of October 2011

Present:
His Excellency the Governor-General in Council

Pursuant to section 43 of the Resource Management Act 1991, His Excellency the Governor-General, acting on the advice and with the consent of the Executive Council, and on the recommendation of the Minister for the Environment given in accordance with section 44 of the Act, makes the following regulations.

Contents

Regulations

1 Title

These regulations are the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

2 Commencement

These regulations come into force on 1 January 2012.

3 Interpretation

In these regulations,—

Act means the Resource Management Act 1991

current edition means the edition that has legal effect when the edition is being used

detailed site investigation means an investigation that—

(a) is done by a suitably qualified and experienced practitioner; and

(b) is done in accordance with the current edition of *Contaminated Land Management Guidelines No. 5–Site Investigation and Analysis of Soils*, Wellington, Ministry for the Environment; and

(c) is reported on in accordance with the current edition of *Contaminated Land Management Guidelines No. 1–Reporting on Contaminated Sites in New Zealand*, Wellington, Ministry for the Environment; and

(d) results in a report that is certified by the practitioner

fuel storage system means a system in which at least 1 of the following is underground:

(a) a storage tank for aviation kerosene, diesel, kerosene, lubricating oil, or petroleum:

(b) the whole of the tank's ancillary equipment:
(c) part of the tank's ancillary equipment

HAIL means the current edition of the *Hazardous Activities and Industries List*, Wellington, Ministry for the Environment

person means the person referred to in regulation 5(1)(a)

preliminary site investigation means an investigation that—
(a) is done by a suitably qualified and experienced practitioner; and
(b) is reported on in accordance with the current edition of *Contaminated Land Management Guidelines No. 1–Reporting on Contaminated Sites in New Zealand*, Wellington, Ministry for the Environment; and
(c) results in a report that is certified by the practitioner.

4 Relationship of regulations with territorial authority and regional council functions

These regulations—
(a) deal with territorial authority functions under section 31 of the Act:
(b) do not deal with regional council functions under section 30 of the Act.

5 Application

(1) These regulations—
(a) apply when a person wants to do an activity described in any of subclauses (2) to (6) on a piece of land described in subclause (7) or (8):
(b) do not apply when a person wants to do an activity described in any of subclauses (2) to (6) on a piece of land described in subclause (9).

Activities

(2) An activity is removing a fuel storage system from the piece of land or replacing a fuel storage system in or on the piece of land, which means—
(a) doing any of the following:
  (i) removing or replacing the whole system:
  (ii) removing or replacing an underground part of the system:

(iii) taking away or putting back soil associated with the removal or replacement of the system or the part:

(b) doing any of the following for purposes associated with removing or replacing the whole system or part of the system:
  (i) sampling the soil of the piece of land:
  (ii) investigating the piece of land:
  (iii) remediating the piece of land:
  (iv) validating the piece of land:
  (v) managing the piece of land.

(3) An activity is sampling the soil of the piece of land, which means sampling it to determine whether or not it is contaminated and, if it is, the amount and kind of contamination.

(4) An activity is disturbing the soil of the piece of land, which—
(a) means disturbing the soil of the piece of land for a particular purpose:
(b) does not include disturbing the soil of the piece of land, whatever the purpose, if the land is land to which regulation 33(9) or 36 of the Resource Management (National Environmental Standard for Electricity Transmission Activities) Regulations 2009 applies.

(5) An activity is subdividing land, which means subdividing land—
(a) that has boundaries that are identical with the boundaries of the piece of land; or
(b) that has all the piece of land within its boundaries; or
(c) that has part of the piece of land within its boundaries.

(6) An activity is changing the use of the piece of land, which means changing it to a use that, because the land is as described in subclause (7), is reasonably likely to harm human health.

Land covered

(7) The piece of land is a piece of land that is described by 1 of the following:
(a) an activity or industry described in the *HAIL* is being undertaken on it:
(b) an activity or industry described in the *HAIL* has been undertaken on it:

(c) it is more likely than not that an activity or industry described in the *HAIL* is being or has been undertaken on it.

(8) If a piece of land described in subclause (7) is production land, these regulations apply if the person wants to—

(a) remove a fuel storage system from the piece of land or replace a fuel storage system in or on the piece of land:

(b) sample or disturb—

(i) soil under existing residential buildings on the piece of land:

(ii) soil used for the farmhouse garden or other residential purposes in the immediate vicinity of existing residential buildings:

(iii) soil that would be under proposed residential buildings on the piece of land:

(iv) soil that would be used for the farmhouse garden or other residential purposes in the immediate vicinity of proposed residential buildings:

(c) subdivide land in a way that causes the piece of land to stop being production land:

(d) change the use of the piece of land in a way that causes the piece of land to stop being production land.

Land not covered

(9) These regulations do not apply to a piece of land described in subclause (7) or (8) about which a detailed site investigation exists that demonstrates that any contaminants in or on the piece of land are at, or below, background concentrations.

6 Methods

(1) Subclauses (2) and (3) prescribe the only 2 methods that the person may use for establishing whether or not a piece of land is as described in regulation 5(7).

(2) One method is by using information that is the most up-to-date information about the area where the piece of land is located that the territorial authority—

(a) holds on its dangerous goods files, property files, or resource consent database or relevant registers; or

(b) has available to it from the regional council.

(3) The other method is by relying on the report of a preliminary site investigation—
  - (a) stating that an activity or industry described in the *HAIL* is, or is not, being undertaken on the piece of land; or
  - (b) stating that an activity or industry described in the *HAIL* has, or has not, been undertaken on the piece of land; or
  - (c) stating the likelihood of an activity or industry described in the *HAIL* being undertaken, or having been undertaken, on the piece of land.

(4) The person must—
  - (a) choose which of the 2 methods to use; and
  - (b) meet all the costs involved in using the method that the person has chosen.

7 Standards

(1) In this regulation,—

land use means—
  - (a) the current use, if the activity the person wants to do is—
    - (i) to remove a fuel storage system from the piece of land or replace a fuel storage system in or on the piece of land:
    - (ii) to sample the soil of the piece of land:
    - (iii) to disturb the soil of the piece of land:
  - (b) the intended use, if the activity the person wants to do is—
    - (i) to subdivide land:
    - (ii) to change the use of the piece of land

Methodology means the current edition of the *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, Wellington, Ministry for the Environment

priority contaminant means a contaminant for which the *Methodology* derives a soil contaminant standard.

(2) If the contaminant of concern is a priority contaminant and the land use fits within an exposure scenario adopted in the *Methodology*, the applicable standard is the soil contaminant standard for the priority contaminant.

(3) If the contaminant of concern is a priority contaminant and the land use does not fit within an exposure scenario adopted in the *Methodology*, the applicable standard is whichever of the following is more appropriate in the circumstances:
- (a) the guideline value derived in accordance with the methods and guidance on site-specific risk assessment provided in the *Methodology*:
- (b) the soil contaminant standard for the priority contaminant of the exposure scenario adopted in the *Methodology* with greater assumed exposure than the actual exposure.

(4) If the contaminant of concern is not a priority contaminant, the applicable standard is whichever of the following is more appropriate in the circumstances:
- (a) the guideline value derived in accordance with the methods and guidance on site-specific risk assessment provided in the *Methodology*:
- (b) a guideline value for the protection of human health that is chosen in accordance with the current edition of *Contaminated Land Management Guidelines No. 2–Hierarchy and Application in New Zealand of Environmental Guideline Values*, Wellington, Ministry for the Environment.

8 Permitted activities

Removing or replacing fuel storage system

(1) Removing or replacing a fuel storage system is a permitted activity while the following requirements are met:
- (a) the activity must be done in accordance with the current edition of *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*, Wellington, Ministry for the Environment:
- (b) the territorial authority of the district where the system is located must be notified of—
  - (i) the place where the activity is to be done:
  - (ii) the dates on which it is intended that the activity begin and end:
  - (iii) the facility at which it is intended that soil taken away in the course of the activity be disposed of:

(c) notification under paragraph (b) must be done no sooner than 1 month and no later than 1 week before the activity begins:

(d) the volume of soil disturbed must be no more than 30 m^3 for each tank in the system:

(e) the volume of soil taken away in the course of the activity must be no more than 30 m^3 for each tank in the system:

(f) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

(g) the duration of the activity must be no longer than 2 months:

(h) the results of the investigation of the piece of land required by the guidelines described in paragraph (a) must be reported to the territorial authority within 3 months after the activity ends.

Sampling soil

(2) Sampling the soil of the piece of land is a permitted activity while the following requirements are met:

(a) controls to minimise the exposure of humans to mobilised contaminants must—

  (i) be in place when the activity begins:

  (ii) be effective while the activity is done:

  (iii) be effective until the soil is reinstated to an erosion-resistant state:

(b) the soil must be reinstated to an erosion-resistant state within 1 month after the end of the course of sampling for which the activity was done:

(c) soil must not be taken away in the course of the activity except as samples taken for the purpose of laboratory analysis:

(d) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

Disturbing soil

(3) Disturbing the soil of the piece of land is a permitted activity while the following requirements are met:

(a) controls to minimise the exposure of humans to mobilised contaminants must—
  (i) be in place when the activity begins:
  (ii) be effective while the activity is done:
  (iii) be effective until the soil is reinstated to an erosion-resistant state:

(b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:

(c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2:

(d) soil must not be taken away in the course of the activity, except that,—
  (i) for the purpose of laboratory analysis, any amount of soil may be taken away as samples:
  (ii) for all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year:

(e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

(f) the duration of the activity must be no longer than 2 months:

(g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

Subdividing or changing use

(4) Subdividing land or changing the use of the piece of land is a permitted activity while the following requirements are met:

(a) a preliminary site investigation of the land or piece of land must exist:

(b) the report on the preliminary site investigation must state that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land:

(c) the report must be accompanied by a relevant site plan to which the report is referenced:

(d) the consent authority must have the report and the plan.

Consequence if requirement not met

(5) If a requirement described in any of subclauses (1) to (3) is not met, the activity is a controlled activity under regulation 9 while it meets the requirements in regulation 9(1).

(6) If a requirement described in subclause (4) is not met, the activity is a controlled activity under regulation 9 while it meets the requirements in regulation 9(3).

9 Controlled activities

Removing or replacing fuel storage system, sampling soil, or disturbing soil

(1) If a requirement described in any of regulation 8(1) to (3) is not met, the activity is a controlled activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
- (b) the report on the detailed site investigation must state that the soil contamination does not exceed the applicable standard in regulation 7:
- (c) the consent authority must have the report:
- (d) conditions arising from the application of subclause (2), if there are any, must be complied with.

(2) The matters over which control is reserved are as follows:
- (a) the adequacy of the detailed site investigation, including—
  - (i) site sampling:
  - (ii) laboratory analysis:
  - (iii) risk assessment:
- (b) how the activity must be—
  - (i) managed, which may include the requirement of a site management plan:
  - (ii) monitored:
  - (iii) reported on:
- (c) the transport, disposal, and tracking of soil and other materials taken away in the course of the activity:
- (d) the timing and nature of the review of the conditions in the resource consent:
- (e) the duration of the resource consent.

Subdividing or changing use

(3) If a requirement described in regulation 8(4) is not met, the activity is a controlled activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
- (b) the report on the detailed site investigation must state that the soil contamination does not exceed the applicable standard in regulation 7:
- (c) the consent authority must have the report:
- (d) conditions arising from the application of subclause (4), if there are any, must be complied with.

(4) The matter over which control is reserved is the adequacy of the detailed site investigation, including—
- (a) site sampling:
- (b) laboratory analysis:
- (c) risk assessment.

No public notification of application for resource consent

(5) The consent authority must not give public notification of an application for a resource consent to do any of the activities.

Consequence if requirement not met

(6) If a requirement described in this regulation is not met, the activity is a restricted discretionary activity under regulation 10 while it meets the requirements in regulation 10(2).

10 Restricted discretionary activities

(1) This regulation applies to an activity described in any of regulation 5(2) to (6) on a piece of land described in regulation 5(7) or (8) that is not a permitted activity or a controlled activity.

(2) The activity is a restricted discretionary activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
- (b) the report on the detailed site investigation must state that the soil contamination exceeds the applicable standard in regulation 7:
- (c) the consent authority must have the report:

(d) conditions arising from the application of subclause (3), if there are any, must be complied with.

(3) The matters over which discretion is restricted are as follows:
- (a) the adequacy of the detailed site investigation, including—
  - (i) site sampling:
  - (ii) laboratory analysis:
  - (iii) risk assessment:
- (b) the suitability of the piece of land for the proposed activity, given the amount and kind of soil contamination:
- (c) the approach to the remediation or ongoing management of the piece of land, including—
  - (i) the remediation or management methods to address the risk posed by the contaminants to human health:
  - (ii) the timing of the remediation:
  - (iii) the standard of the remediation on completion:
  - (iv) the mitigation methods to address the risk posed by the contaminants to human health:
  - (v) the mitigation measures for the piece of land, including the frequency and location of monitoring of specified contaminants:
- (d) the adequacy of the site management plan or the site validation report or both, as applicable:
- (e) the transport, disposal, and tracking of soil and other materials taken away in the course of the activity:
- (f) the requirement for and conditions of a financial bond:
- (g) the timing and nature of the review of the conditions in the resource consent:
- (h) the duration of the resource consent.

Consequence if requirement not met

(4) If a requirement described in this regulation is not met, the activity is a discretionary activity under regulation 11.

11 Discretionary activities

(1) This regulation applies to an activity described in any of regulation 5(2) to (6) on a piece of land described in regulation 5(7) or (8) that is not a permitted activity, controlled activity, or restricted discretionary activity.

(2) The activity is a discretionary activity.

Rebecca Kitteridge,
Clerk of the Executive Council.

Explanatory note

This note is not part of the regulations, but is intended to indicate their general effect.

These regulations provide a national environmental standard for activities on pieces of land whose soil may be contaminated in such a way as to be a risk to human health. The activities are removing or replacing a fuel storage system, sampling the soil, disturbing the soil, subdividing land, and changing the use of the piece of land. The activities are classed as permitted activities, controlled activities, restricted discretionary activities, or discretionary activities.

The current editions of documents incorporated by reference are available on the Ministry for the Environment's website.

The regulations come into force on 1 January 2012.

Issued under the authority of the Acts and Regulations Publication Act 1989.
Date of notification in *Gazette*: 13 October 2011.
These regulations are administered by the Ministry for the Environment.

Wellington, New Zealand:
Published under the authority of the New Zealand Government—2011

Regional Freshwater Plan for the Wellington Region, GWRC, 1999

Rule 9B Diversion of groundwater

The diversion of groundwater is a permitted activity, provided that it complies with the conditions specified below:

(1) There shall be no adverse effects on water supply other than for a temporary period during construction of no more than 24 hours.

(2) There shall be no flooding of land on any neighbouring property.

(3) There shall be no lowering of water levels in any river, lake, or wetland.

(4) There shall be no lowering of groundwater levels on any neighbouring property.

Appendix 23.B

Sector 2: Laboratory Testing Summary Sheets, Logs and Investigation Summary

APPENDIX B

Sector 2 – Laboratory Testing Summary Sheets, Logs and Investigation Summary

SECTOR 2: SOIL ANALYSIS RESULTS (55 RATA ROAD)

Sampling Date	6/07/2011																	**Assessment Criteria**					
Test Pit Number	**TP201**	**TP201**	**TP202**	**TP202**	**TP203**	**TP203**	**TP204**	**TP204**	**TP205**	**TP205**	**TP206**	**TP206**	**TP206**	**TP207**	**TP207**	**TP208**	**TP208**						
Sample Number	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	**Contaminated Site Assessment**				**Health Risk to Construction Workers**	**Public Health Risk**
Laboratory Number	912271.1	912271.2	912271.3	912271.4	912271.5	912271.6	912271.7	912271.8	912271.9	912271.10	912271.11	912271.12	912271.13	912271.14	912271.15	912271.16	912271.17	**Background Levels[a]**	**Environmental Risk**	**Human Health Risk**			
Sample Depth (m)	0.3	0.65	0.3	0.8	0.2	1.4	0.4	1.4	0.2	1	0.3	0.5	1.5	0.3	0.8	0.3	1.3						
Soil Type	Silty gravel	Silty gravel	Silty sand	Silty sand	Sandy silt	Peat	Sandy silt	Peat	Silty sand	Silty sand	Silty sand	Silty clay	Silty sand	Sandy silt	Silty sand	Sandy silt	Silty sand						
Heavy metal (mg/kg dry weight)																							
Arsenic	6	4	6	5	6	15	10	11	4	5	8	5	13	4	4	8	6	<2-7	12[#]	500*		70[+]	20[++]
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	< 0.10	0.25	< 0.10	<0.1-0.1	22[#]	100**		1300[+]	3[++]
Chromium	9	7	8	10	13	14	10	9	8	8	16	9	31	9	7	11	8	7-12	86[#]	NL*		NL[+]	NL[++]
Copper	6	5	10	9	19	14	15	14	8	8	27	11	13	10	6	24	8	4-10	91[#]	NL*		NL[+]	NL[++]
Lead	9.5	6.8	13.7	14.9	29	31	27	38	20	7.6	30	24	29	19.8	7.1	56	11.1	5-15	260[#]	1500**		3300[+]	210[++]
Nickel	9	6	6	9	15	6	7	10	6	6	20	7	7	8	6	9	7	4-9	50[#]	3000**		-	-
Zinc	47	30	40	46	78	95	75	68	71	35	92	64	168	48	33	153	34	28-79	360[#]	35000**		-	-
Pesticides (mg/kg dry weight)																							
2,4'-DDD	< 0.006	-	< 0.006	-	< 0.005	-	0.007	-	< 0.005	-	< 0.005	-	-	< 0.006	-	< 0.005	-	-	-	-		-	-
4,4'-DDD	< 0.006	-	< 0.006	-	< 0.005	-	0.024	-	< 0.005	-	< 0.005	-	-	< 0.006	-	< 0.005	-	-	-	-		-	-
2,4'-DDE	< 0.006	-	< 0.006	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	< 0.006	-	< 0.005	-	-	-	-		-	-
4,4'-DDE	< 0.006	-	< 0.006	-	< 0.005	-	0.048	-	< 0.005	-	< 0.005	-	-	< 0.006	-	< 0.005	-	-	-	-		-	-
2,4'-DDT	< 0.006	-	< 0.006	-	< 0.005	-	0.025	-	< 0.005	-	< 0.005	-	-	< 0.006	-	< 0.005	-	-	-	-		-	-
4,4'-DDT	< 0.006	-	< 0.006	-	< 0.005	-	0.152	-	0.008	-	< 0.005	-	-	< 0.006	-	0.006	-	-	-	-		-	-
Total DDT Isomers	< 0.03	-	< 0.03	-	< 0.03	-	0.26	-	< 0.03	-	< 0.03	-	-	< 0.03	-	< 0.03	-	-	12[#]	1000**		1000[+]	70[++]
Dieldrin	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	< 1.4	< 1.5	-	-	50**		160[+]	2.6[++]
Heptachlor	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	< 1.4	< 1.5	-	-	50**		-	-
SVOC (mg/kg dry weight)																				**<1m**	**1m-4m**		
Acenaphthene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	< 0.04	< 0.03	< 0.7	< 0.7	0.03	-	-	-		-	-
Acenaphthylene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	< 0.04	< 0.03	< 0.7	< 0.7	< 0.03	-	-	-		-	-
Anthracene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	< 0.04	< 0.03	< 0.7	< 0.7	0.04	-	-	-		-	-
Benzo[a]anthracene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	0.21	0.1	< 0.7	< 0.7	0.33	-	-	-		-	-
Benzo[a]pyrene (BAP)	< 0.03	< 1.4	< 1.3	< 0.03	< 0.03	< 3	< 1.3	< 0.03	< 0.03	< 1.3	< 1.2	< 1.4	0.21	0.13	< 1.4	< 1.4	0.35	-	0.7[#]	10[§]		-	1[§§]
Benzo[b]fluoranthene	0.02	< 1.4	< 1.3	0.03	< 0.03	< 3	< 1.3	< 0.03	0.04	< 1.3	< 1.2	< 1.4	0.4	0.22	< 1.4	< 1.4	0.59	-	-	-		-	-
Benzo[g,h,i]perylene	< 0.03	< 1.4	< 1.3	< 0.03	< 0.03	< 3	< 1.3	< 0.03	< 0.03	< 1.3	< 1.2	< 1.4	0.19	0.12	< 1.4	< 1.4	0.24	-	-	-		-	-
Benzo[k]fluoranthene	< 0.03	< 1.4	< 1.3	< 0.03	< 0.03	< 3	< 1.3	< 0.03	< 0.03	< 1.3	< 1.2	< 1.4	0.15	0.09	< 1.4	< 1.4	0.24	-	-	-		-	-
2-Chloronaphthalene	<0.06	< 0.7	< 0.7	<0.07	<0.06	< 1.2	< 0.7	<0.06	<0.07	< 0.7	< 0.6	< 0.7	<0.09	<0.07	< 0.7	< 0.7	<0.08	-	-	-		-	-
Chrysene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	0.22	0.1	< 0.7	< 0.7	0.39	-	-	-		-	-
Dibenzo[a,h]anthracene	< 0.03	< 1.4	< 1.3	< 0.03	< 0.03	< 3	< 1.3	< 0.03	< 0.03	< 1.3	< 1.2	< 1.4	0.06	0.05	< 1.4	< 1.4	0.12	-	-	-		-	-
Fluoranthene	0.03	< 0.7	< 0.7	0.04	< 0.03	< 1.2	< 0.7	< 0.03	0.03	< 0.7	< 0.6	< 0.7	0.37	0.17	< 0.7	< 0.7	0.82	-	-	-		-	-
Fluorene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	< 0.04	< 0.03	< 0.7	< 0.7	< 0.03	-	-	-		-	-
Indeno(1,2,3-c,d)pyrene	< 0.03	< 1.4	< 1.3	< 0.03	< 0.03	< 3	< 1.3	< 0.03	< 0.03	< 1.3	< 1.2	< 1.4	0.13	0.1	< 1.4	< 1.4	0.24	-	-	-		-	-
2-Methylnaphthalene	<0.06	< 0.7	< 0.7	<0.07	<0.06	< 1.2	< 0.7	<0.06	<0.07	< 0.7	< 0.6	< 0.7	<0.09	<0.07	< 0.7	< 0.7	<0.08	-	-	-		-	-
Naphthalene	< 0.12	< 0.7	< 0.7	< 0.13	< 0.13	< 1.2	< 0.7	< 0.13	< 0.15	< 0.7	< 0.6	< 0.7	< 0.18	< 0.13	< 0.7	< 0.7	< 0.15	-	-	190 (sand)^ 210 (sandy silt)^ 8000 (peat)^	230 (sand)^ 270 (sandy silt)^ 9000 (peat)^	-	380 (sand)^^ 820 (sandy silt)^^ 3800 (peat)^^
Phenanthrene	< 0.03	< 0.7	< 0.7	< 0.03	< 0.03	< 1.2	< 0.7	< 0.03	< 0.03	< 0.7	< 0.6	< 0.7	0.13	0.06	< 0.7	< 0.7	0.34	-	-	-		-	-
Pyrene	0.03	< 0.7	< 0.7	0.04	< 0.03	< 1.2	< 0.7	< 0.03	0.04	< 0.7	< 0.6	< 0.7	0.34	0.18	< 0.7	< 0.7	0.75	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
BaP Equivalent	0.04	1.65	1.53	0.04	0.04	3.52	1.53	0.04	0.04	1.53	1.41	1.65	0.36	0.23	1.65	1.65	0.61	-	-	11 (sand)^ 11 (sandy silt)^ 11 (peat)^	25 (sand)^ 25 (sandy silt)^ 25 (peat)^	35[+]	10[++]
Pentachlorophenol (PCP)	< 30	< 30	< 30	< 30	< 30	< 50	< 30	< 30	< 30	< 30	< 30	< 30	< 40	< 30	< 31	< 30	< 30	-	-	570*		360[+]	55[++]
All other compounds	Below detection																	-	-	-		-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)																				**<1m**	**1m-4m**		
C7 - C9	< 8	< 8	< 8	< 8	< 8	< 30	< 9	< 8	< 9	< 8	< 8	< 8	< 11	< 8	< 8	< 8	< 9	-	-	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	-	NA (sand)^^ NA (sandy silt)^^ NA (peat)^^
C10 - C14	< 20	< 20	< 20	< 20	< 20	< 60	< 20	< 20	< 20	< 20	< 20	< 20	< 30	< 20	< 20	< 20	< 20	-	-	1500 (sand)^ 1700 (sandy silt)^ NA (peat)^	1900 (sand)^ 2200 (sandy silt)^ NA (peat)^	-	20000 (sand)^^ NA (sandy silt)^^ NA (peat)^^
C15 - C36	< 40	< 40	< 40	< 40	< 40	250	< 40	< 40	< 40	< 40	< 40	< 40	380	< 40	< 40	< 40	< 40	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
Total hydrocarbons (C7 - C36)	< 70	< 70	< 70	< 70	< 70	250	< 70	< 70	< 70	< 70	< 70	< 70	380	< 70	< 70	< 70	< 70	-	-	-	-	-	-

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.
Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'commercial' land use have been selected.
*Health and Environmental Guidelines for Selected Timber Treatment Chemicals, MfE, 1997. Values for 'Industrial unpaved - adopted' have been used.
** Guideline on the Investigation Levels for Soil and Groundwater, NEPC, 1999. Values applicable to 'Health Investigation Level F - commercial/industrial' have been used.
§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'commercial/industrial - adopted' have been used.
§§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'residential' have been used.
^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'commercial/industrial' land use have been selected.
^^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'residential (inhalation) outdoor' land use have been selected.
+ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'commercial/industrial outdoor worker' have been used.
++ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'residential 10% produce' have been used.

Results exceeding background levels are underlined
Results exceeding environmental risk criteria are shaded in grey
Results exceeding human health risk criteria are in **bold**
NL - No Limit. Derived value exceeds 10000 mg/kg.
NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 2: SOIL ANALYSIS RESULTS (55 RATA ROAD)

Sampling Date	6/07/2011			7/07/2011				6/07/2011			Assessment Criteria					
Test Pit Number	**TP209**	**TP209**	**TP209**	**TP210**	**TP212**	**TP212**	**TP213**	**TP214**	**TP214**	**TP214**						
Sample Number	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	**Contaminated Site Assessment**				**Health Risk to Construction Workers**	**Public Health Risk**
Laboratory Number	912271.18	912271.19	912271.20	912569.1	912569.2	912569.3	912569.5	912271.21	912271.22	912271.23	**Background Levels**[a]	**Environmental Risk**	**Human Health Risk**			
Sample Depth (m)	0.3	0.8	1.3	0.15	0.3	1	0.2	0.3	1	1.5						
Soil Type	Silty sand	Silty sand	Peat	Silty clay	Silty sand	Silty sand	Sandy silt	Sandy silt	Sandy silt	Sandy silt						
Heavy metal (mg/kg dry weight)																
Arsenic	6	-	7	10	10	4	11	6	-	9	<2-7	$12^{\#}$	500*		70^{+}	20^{++}
Cadmium	< 0.10	-	0.28	0.11	< 0.10	< 0.10	0.14	< 0.10	-	< 0.10	<0.1-0.1	$22^{\#}$	100**		1300^{+}	3^{++}
Chromium	16	-	9	19	12	8	14	9	-	8	7-12	$86^{\#}$	NL*		NL^{+}	NL^{++}
Copper	14	-	22	19	12	8	25	9	-	8	4-10	$91^{\#}$	NL*		NL^{+}	NL^{++}
Lead	22	-	68	31	35	11.2	49	14.9	-	10.4	5-15	$260^{\#}$	1500**		3300^{+}	210^{++}
Nickel	15	-	7	10	8	8	9	7	-	7	4-9	$50^{\#}$	3000**		-	-
Zinc	67	-	68	72	64	43	90	54	-	43	28-79	$360^{\#}$	35000**		-	-
Pesticides (mg/kg dry weight)																
2,4'-DDD	< 0.006	-	-	< 0.005	< 0.005	-	< 0.005	< 0.005	-	-	-	-	-		-	-
4,4'-DDD	< 0.006	-	-	< 0.005	< 0.005	-	0.006	< 0.005	-	-	-	-	-		-	-
2,4'-DDE	< 0.006	-	-	< 0.005	< 0.005	-	< 0.005	< 0.005	-	-	-	-	-		-	-
4,4'-DDE	< 0.006	-	-	< 0.005	< 0.005	-	0.015	< 0.005	-	-	-	-	-		-	-
2,4'-DDT	< 0.006	-	-	< 0.005	< 0.005	-	< 0.005	< 0.005	-	-	-	-	-		-	-
4,4'-DDT	0.008	-	-	< 0.005	< 0.005	-	0.005	< 0.005	-	-	-	-	-		-	-
Total DDT Isomers	< 0.03	-	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-	-	-	$12^{\#}$	1000**		1000^{+}	70^{++}
Dieldrin	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-	50**		160^{+}	2.6^{++}
Heptachlor	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-	50**		-	-
SVOC (mg/kg dry weight)													**<1m**	**1m-4m**		
Acenaphthene	< 0.6	450	< 0.9	0.03	< 0.8	< 0.03	< 0.03	< 0.7	< 0.17	< 0.8	-	-	-		-	-
Acenaphthylene	1.1	500	< 0.9	< 0.03	< 0.8	< 0.03	< 0.03	0.8	< 0.17	< 0.8	-	-	-		-	-
Anthracene	< 0.6	860	< 0.9	0.07	< 0.8	< 0.03	< 0.03	< 0.7	0.25	< 0.8	-	-	-		-	-
Benzo[a]anthracene	0.9	640	< 0.9	0.35	< 0.8	< 0.03	0.09	0.8	2.2	< 0.8	-	-	-		-	-
Benzo[a]pyrene (BAP)	1.2	**380**	< 1.8	0.38	< 1.5	0.03	0.13	< 1.4	0.74	< 1.6	-	$0.7^{\#}$	$10^{\S}$		-	$1^{\S\S}$
Benzo[b]fluoranthene	1.7	530	< 1.8	0.61	< 1.5	0.05	0.22	1.4	2.7	< 1.6	-	-	-		-	-
Benzo[g,h,i]perylene	1.8	170	< 1.8	0.28	< 1.5	< 0.03	0.14	< 1.4	1.3	< 1.6	-	-	-		-	-
Benzo[k]fluoranthene	< 1.2	250	< 1.8	0.25	< 1.5	< 0.03	0.09	< 1.4	0.85	< 1.6	-	-	-		-	-
2-Chloronaphthalene	< 0.6	-	< 0.9	<0.7	< 0.8	<0.7	<0.8	< 0.7	-	< 0.8	-	-	-		-	-
Chrysene	0.8	460	< 0.9	0.33	< 0.8	0.03	0.1	< 0.7	4.2	< 0.8	-	-	-		-	-
Dibenzo[a,h]anthracene	< 1.2	59	< 1.8	0.12	< 1.5	< 0.03	0.06	< 1.4	< 0.17	< 1.6	-	-	-		-	-
Fluoranthene	1.4	2000	< 0.9	0.72	< 0.8	0.05	0.16	1	1.54	< 0.8	-	-	-		-	-
Fluorene	< 0.6	860	< 0.9	< 0.03	< 0.8	< 0.03	< 0.03	< 0.7	0.47	< 0.8	-	-	-		-	-
Indeno(1,2,3-c,d)pyrene	1.4	165	< 1.8	0.26	< 1.5	< 0.03	0.12	< 1.4	< 0.17	< 1.6	-	-	-		-	-
2-Methylnaphthalene	< 0.6	-	< 0.9	<0.7	< 0.8	<0.7	<0.8	< 0.7	-	< 0.8	-	-	-		-	-
Naphthalene	< 0.6	**4300**	1.4	< 0.14	< 0.8	< 0.13	< 0.15	< 0.7	< 0.9	< 0.8	-	-	190 (sand)^ 210 (sandy silt)^ 8000 (peat)^	230 (sand)^ 270 (sandy silt)^ 9000 (peat)^	-	380 (sand)^^ 820 (sandy silt)^^ 3800 (peat)^^
Phenanthrene	< 0.6	3100	< 0.9	0.22	< 0.8	< 0.03	0.06	< 0.7	5.9	< 0.8	-	-	-		-	-
Pyrene	1.6	1210	< 0.9	0.67	< 0.8	0.05	0.17	2	2.5	< 0.8	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
BaP Equivalent	2.27	**602.10**	2.12	0.65	1.77	0.05	0.24	1.76	1.45	1.88	-	-	11 (sand)^ 11 (sandy silt)^ 11 (peat)^	25 (sand)^ 25 (sandy silt)^ 25 (peat)^	35^{+}	10^{++}
Pentachlorophenol (PCP)	< 30	-	< 40	< 30	< 30	< 30	< 30	< 30	-	< 40	-	-	570*		360^{+}	55^{++}
All other compounds	Below detection										-	-	-		-	-
													<1m	**1m-4m**		
C7 - C9	< 8	**210**	< 12	< 9	< 10	< 8	< 9	< 9	< 50	< 10	-	-	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	-	NA (sand)^^ NA (sandy silt)^^ NA (peat)^^
C10 - C14	< 20	**10400**	< 30	< 20	< 20	< 20	< 20	< 20	< 100	< 20	-	-	1500 (sand)^ 1700 (sandy silt)^ NA (peat)^	1900 (sand)^ 2200 (sandy silt)^ NA (peat)^	-	20000 (sand)^^ NA (sandy silt)^^ NA (peat)^^
C15 - C36	116	61000	58	210	101	< 40	< 40	< 40	36000	< 40	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
Total hydrocarbons (C7 - C36)	116	71000	< 80	210	101	< 70	< 70	< 70	36000	< 70	-	-	-	-	-	-

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.
Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'commercial' land use have been selected.
*Health and Environmental Guidelines for Selected Timber Treatment Chemicals, MfE, 1997. Values for 'Industrial unpaved - adopted' have been used.
** Guideline on the Investigation Levels for Soil and Groundwater, NEPC, 1999. Values applicable to 'Health Investigation Level F - commercial/industrial' have been used.
§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'commercial/industrial - adopted' have been used.
§§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'residential' have been used.
^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'commercial/industrial' land use have been selected.
^^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'residential (inhalation) outdoor' land use have been selected.
+ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'commercial/industrial outdoor worker' have been used.
++ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'residential 10% produce' have been used.

Results exceeding background levels are underlined
Results exceeding environmental risk criteria are shaded in grey
Results exceeding human health risk criteria are in **bold**
NL - No Limit. Derived value exceeds 10000 mg/kg.
NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 2: WATER ANALYSIS RESULTS (55 RATA ROAD)

Sampling Date	6/07/2011	6/07/2011	6/07/2011		
Sample Location	**Northern Drain S1 Upstream**	**Southern Drain S1 Upstream**	**Southern Drain S2 Downstream**	**Assessment Criteria**	
Sample Number	11:081	11:081	11:081		
Laboratory Number	912569.6	912569.7	912569.8	ANZECC*	CCME**
Dissolved heavy metals (mg/l)					
Dissolved Arsenic	0.0033 ± 0.00069	0.0039 #1	0.0039 #1	0.14	-
Dissolved Cadmium	< 0.00005 ± 0.00034	< 0.000053 #1	< 0.000053 #1	0.0008	-
Dissolved Chromium	0.00055 ± 0.00034	0.00122 ± 0.00037 #1	**0.00129 #1**	0.04	-
Dissolved Copper	0.0008 ± 0.00034	0.00193 #1	**0.00177 #1**	0.0025	-
Dissolved Lead	0.00029	0.00045 #1	0.00045 #1	0.0094	-
Dissolved Nickel	< 0.00005 ± 0.00034	0.00056 #1	< 0.00053 #1	0.017	-
Dissolved Zinc	0.134	0.032 #1	0.028 #1	0.031	-
Total heavy metals (mg/l)					
Total Arsenic	0.0126	0.0078	0.0071	-	-
Total Cadmium	< 0.000053	< 0.000053	< 0.000053	-	-
Total Chromium	0.00172	0.00169	0.00152	-	-
Total Copper	0.0016 ± 0.00039	0.0027	**0.0023**	-	-
Total Lead	0.0021	0.00094	0.00087	-	-
Total Nickel	0.0006	0.00065	0.00055	-	-
Total Zinc	0.184	0.041	0.037	-	-
SVOC Nitrogen containing compounds (mg/l)					
2,4-Dinitrotoluene	< 0.0010	< 0.0010	< 0.0010	0.25	-
Nitrobenzene	< 0.0005	< 0.0005	< 0.0005	1.3	-
SVOC Organochlorine Pesticides (mg/l)					
Aldrin	< 0.0005	< 0.0005	< 0.0005	ID	-
gamma-BHC (Lindane)	< 0.0005	< 0.0005	< 0.0005	0.001	-
4,4'-DDT	< 0.0005	< 0.0005	< 0.0005	0.0004	-
4,4'-DDE	< 0.0005	< 0.0005	< 0.0005	ID	-
Dieldrin	< 0.0005	< 0.0005	< 0.0005	ID	-
Endosulfan I	< 0.0010	< 0.0010	< 0.0010	0.0018	-
Endrin	< 0.0010	< 0.0010	< 0.0010	0.00006	-
Heptachlor	< 0.0005	< 0.0005	< 0.0005	0.0007	-
SVOC Polycyclic Aromatic Hydrocarbons (mg/l)					
Acenaphthene	< 0.0003	< 0.0003	< 0.0003	-	0.0058
Anthracene	< 0.0003	< 0.0003	< 0.0003	ID	-
Benzo[a]anthracene	< 0.0003	< 0.0003	< 0.0003	-	0.000018
Benzo[a]pyrene (BAP)	< 0.0005	< 0.0005	< 0.0005	ID	-
Fluoranthene	< 0.0003	< 0.0003	< 0.0003	ID	-
Fluorene	< 0.0003	< 0.0003	< 0.0003	-	0.003
Naphthalene	< 0.0003	< 0.0003	< 0.0003	0.085	-
Phenanthrene	< 0.0003	< 0.0003	< 0.0003	ID	-
Pyrene	< 0.0003	< 0.0003	< 0.0003	-	0.000025
SVOC Phenols (mg/l)					
2-Chlorophenol	< 0.0005	< 0.0005	< 0.0005	0.87	-
2,4-Dichlorophenol	< 0.0005	< 0.0005	< 0.0005	0.27	-
2,4,6-Trichlorophenol	< 0.0010	< 0.0010	< 0.0010	0.095	-
2,4-Dimethylphenol	< 0.0005	< 0.0005	< 0.0005	ID	-
2-Nitrophenol	< 0.0010	< 0.0010	< 0.0010	ID	-
Pentachlorophenol (PCP)	< 0.010	< 0.010	< 0.010	0.027	-
Phenol	< 0.0010	< 0.0010	< 0.0010	1.2	-
2,4,5-Trichlorophenol	< 0.0010	< 0.0010	< 0.0010	ID	-
SVOC Plasticisers (mg/l)					
Diethylphthalate	< 0.0010	< 0.0010	< 0.0010	1.3	-
Dimethylphthalate	< 0.0010	< 0.0010	< 0.0010	5.1	-
Di-n-butylphthalate	< 0.0010	< 0.0010	< 0.0010	0.0646	-
Bis(2-ethylhexyl)phthalate	< 0.003	< 0.003	< 0.003	ID	-
SVOC Other Halogenated compounds (mg/l)					
1,2-Dichlorobenzene	< 0.0010	< 0.0010	< 0.0010	0.27	-
1,3-Dichlorobenzene	< 0.0010	< 0.0010	< 0.0010	0.52	-
1,4-Dichlorobenzene	< 0.0010	< 0.0010	< 0.0010	0.1	-
Hexachlorobutadiene	< 0.0010	< 0.0010	< 0.0010	ID	-
Hexachlorocyclopentadiene	< 0.003	< 0.003	< 0.003	ID	-
Hexachloroethane	< 0.0010	< 0.0010	< 0.0010	0.5	-
1,2,4-Trichlorobenzene	< 0.0005	< 0.0005	< 0.0005	0.3	-
Other SVOC (mg/l)					
Isophorone	< 0.0005	< 0.0005	< 0.0005	ID	-
All other SVOC compounds	Below detection			-	-
Total Petroleum Hydrocarbons (mg/l)					
C7 - C9	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	< 0.7	< 0.7	< 0.7	-	-

#1 It should be noted that a precipitate was observed in the filtered nitric preserved fraction of this sample.
In order to analyse this sample for dissolved metals, an additional digestion step was required on the filtrate to re-dissolve the precipitate prior to analysis.

All analyses have been performed at screen levels with the exception of metals and SVOCs performed at trace.
*Australian and New Zealand Environment and Conservation Council (ANZECC), 2000. Fresh and Marine Water Quality Guidelines. Values for freshwater 80% level of species protection used.
**Canadian Environmental Quality Guidelines. Canadian Council of Ministers of the Environment (CCME), 2007. Values for freshwater used.
Results shaded grey exceed the Assessment Criteria.
Results in bold are where downstream values exceed upstream values
ID - Insufficient data to derive a reliable trigger value.

SECTOR 2: SOIL ANALYSIS RESULTS (KAPITI ROAD INTERSECTION)

Sampling Date	5/07/2011										Assessment Criteria					
Test Pit Number	**TP101**	**TP101**	**TP102**	**TP102**	**TP103**	**TP103**	**TP104**	**TP104**	**TP105**	**TP105**						
Sample Number	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	**Contaminated Site Assessment**				**Health Risk to Construction Workers**	**Public Health Risk**
Laboratory Number	911650.1	911650.2	911650.3	911650.4	911650.5	911650.6	911650.7	911650.8	911650.10	911650.9	**Background Levels**^{a}	**Environmental Risk**	**Human Health Risk**			
Sample Depth (m)	1	2.6	0.7	2.3	0.6	1.4	0.4	1.6	0.15	1.3						
Soil Type	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Silty sand	Peat	Silty sand	Silty sand						
Heavy metal (mg/kg dry weight)																
Arsenic	4	3	2	3	10	3	4	< 2	6	< 2	<2-7	$12^{\#}$	1500*		70^{+}	80^{++}
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.16	0.27	0.14	<0.1-0.1	$10^{\#}$	40**		1300^{+}	400^{++}
Chromium	9	5	6	6	11	6	8	5	16	5	7-12	$64^{\#}$	3100000*		NL^{+}	NL^{++}
Copper	17	8	8	8	50	9	13	5	39	5	4-10	$63^{\#}$	NL*		NL^{+}	NL^{++}
Lead	13.7	5.2	6.2	6	18.2	6.2	15.9	6.1	36	5.9	5-15	$140^{\#}$	600**		3300^{+}	880^{++}
Nickel	7	5	6	5	8	5	6	3	9	3	4-9	$50^{\#}$	600**		-	-
Zinc	50	26	31	27	72	30	51	12	146	11	28-79	$200^{\#}$	14000**		-	-
Pesticides (mg/kg dry weight)																
2,4'-DDD	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	-	-		-	-
4,4'-DDD	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	-	-		-	-
2,4'-DDE	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	-	-		-	-
4,4'-DDE	0.007	-	< 0.005	-	< 0.005	-	0.008	-	< 0.005	-	-	-	-		-	-
2,4'-DDT	< 0.005	-	0.015	-	< 0.005	-	0.009	-	< 0.005	-	-	-	-		-	-
4,4'-DDT	0.008	-	0.012	-	0.007	-	0.012	-	0.007	-	-	-	-		-	-
Total DDT Isomers	< 0.03	-	< 0.03	-	< 0.03	-	< 0.03	-	< 0.03	-	-	$0.7^{\#}$	400**		1000+	400^{++}
Dieldrin	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-	20**		160^{+}	70^{++}
Heptachlor	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-	20**		-	-
SVOC (mg/kg dry weight)													**<1m**	**1m-4m**		
Acenaphthene	< 0.03	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-	-		-	-
Acenaphthylene	< 0.03	< 0.9	< 0.7	< 0.03	< 0.03	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Anthracene	< 0.03	< 0.9	< 0.7	< 0.03	< 0.03	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Benzo[a]anthracene	< 0.03	< 0.9	< 0.7	< 0.03	< 0.03	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Benzo[a]pyrene (BAP)	< 0.03	< 1.8	< 1.4	< 0.03	0.03	< 1.4	< 1.3	< 0.04	< 0.03	< 0.04	-	$0.7^{\#}$	$2.7^{\S}$		-	-
Benzo[b]fluoranthene	< 0.03	< 1.8	< 1.4	< 0.03	0.06	< 1.4	< 1.3	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Benzo[g,h,i]perylene	< 0.03	< 1.8	< 1.4	< 0.03	0.08	< 1.4	< 1.3	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Benzo[k]fluoranthene	< 0.03	< 1.8	< 1.4	< 0.03	0.07	< 1.4	< 1.3	< 0.04	< 0.03	< 0.04	-	-	-		-	-
2-Chloronaphthalene	< 0.03	< 0.9	< 0.7	< 0.03	0.04	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Chrysene	< 0.03	< 0.9	< 0.7	< 0.03	0.03	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Dibenzo[a,h]anthracene	< 0.03	< 1.8	< 1.4	< 0.03	< 0.03	< 1.4	< 1.3	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Fluoranthene	< 0.03	< 0.9	< 0.7	< 0.03	0.04	< 0.7	< 0.7	< 0.04	0.03	< 0.04	-	-	-		-	-
Fluorene	< 0.03	< 0.9	< 0.7	< 0.03	< 0.03	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Indeno(1,2,3-c,d)pyrene	< 0.03	< 1.8	< 1.4	< 0.03	0.05	< 1.4	< 1.3	< 0.04	< 0.03	< 0.04	-	-	-		-	-
2-Methylnaphthalene	<0.7	< 0.9	< 0.7	<0.7	<0.7	< 0.7	< 0.7	<0.8	<0.7	<0.7	-	-	-		-	-
Naphthalene	< 0.15	< 0.9	< 0.7	< 0.15	< 0.15	< 0.7	< 0.7	< 0.19	< 0.15	< 0.16	-	-	380 (sand)^ 820 (sandy silt)^ 3800 (peat)^	850 (sand)^ 3000 (sandy silt)^ NA (peat)^	-	-
Phenanthrene	< 0.03	< 0.9	< 0.7	< 0.03	< 0.03	< 0.7	< 0.7	< 0.04	< 0.03	< 0.04	-	-	-		-	-
Pyrene	< 0.03	< 0.9	< 0.7	< 0.03	0.05	< 0.7	< 0.7	< 0.04	0.04	< 0.04	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
BaP Equivalent	0.04	1.67	1.30	0.04	0.06	1.30	1.23	0.05	0.04	0.05	-	-	530 (sand)^ 290 (sandy silt)^ 2500 (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	35^{+}	40^{++}
Pentachlorophenol (PCP)	< 30	< 40	< 30	< 30	< 30	< 30	< 30	< 40	< 30	< 40	-	-	570*		360^{+}	150^{++}
All other compounds	Below detection										-	-	-		-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)													**<1m**	**1m-4m**		
C7 - C9	< 9	< 12	< 10	< 9	< 9	< 10	< 9	< 11	< 9	< 11	-	-	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	-	-
C10 - C14	< 20	< 30	< 20	< 20	< 20	< 20	< 20	< 30	< 20	< 30	-	-	1500 (sand)^ 510 (sandy silt)^ NA (peat)^	1900 (sand)^ 670 (sandy silt)^ NA (peat)^	-	-
C15 - C36	< 40	< 50	92	< 40	46	104	< 40	< 50	41	< 50	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
Total hydrocarbons (C7 - C36)	< 70	< 90	92	< 70	< 70	104	< 70	< 80	< 70	< 80	-	-	-	-	-	-

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.

Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'residential/parkland' land use have been selected.

* Health and Environmental Guidelines for Selected Timber Treatment Chemicals, MfE, 1997. Values for 'residential - inhalation' have been used.

** Guideline on the Investigation Levels for Soil and Groundwater, NEPC, 1999. Values applicable to 'Health Investigation Level E - parkland' have been used.

§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'parkland - adopted' have been used.

^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'residential (inhalation) outdoor' land use have been selected.

\+ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'commercial/industrial outdoor worker' have been used.

++ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'recreational' have been used.

Results exceeding background levels are underlined
Results exceeding environmental risk criteria are shaded in grey
Results exceeding human health risk criteria are in **bold**
NL - No Limit. Derived value exceeds 10000 mg/kg.
NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 2: SOIL ANALYSIS RESULTS (KAPITI ROAD INTERSECTION)

Sampling Date	5/07/2011												**Assessment Criteria**					
Test Pit Number	**TP106**	**TP106**	**TP107**	**TP107**	**TP108**	**TP108**	**TP109**	**TP109**	**TP110**	**TP110**	**TP111**	**TP111**						
Sample Number	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	11:081	**Contaminated Site Assessment**				**Health Risk to Construction Workers**	**Public Health Risk**
Laboratory Number	911650.12	911650.11	911650.14	911650.13	911650.15	911650.16	911650.17	911650.18	911650.19	911650.20	911650.21	911650.22	**Background Levels[a]**	**Environmental Risk**	**Human Health Risk**			
Sample Depth (m)	0.3	1	0.2	1	0.2	2	0.2	0.5	0.4	1	0.5	1.5						
Soil Type	Silty sand	Silty sand	Silty sand	Silty sand	Sandy silt	Sandy silt	Sandy silt	Silty sand	Sandy silt	Silty sand	Silty sand	Silty sand						
Heavy metal (mg/kg dry weight)																		
Arsenic	4	4	4	2	4	4	24	70	3	4	3	3	<2-7	12[#]	1500*		70[+]	80[++]
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	<0.1-0.1	10[#]	40**		1300[+]	400[++]
Chromium	7	6	6	5	6	6	13	14	6	6	5	5	7-12	64[#]	3100000*		NL[+]	NL[++]
Copper	11	10	8	10	14	36	17	15	10	7	7	9	4-10	63[#]	NL*		NL[+]	NL[++]
Lead	13.7	26	5.4	5.4	6.3	35	7	4.5	4.6	4.4	4.4	4.1	5-15	140[#]	600**		3300[+]	880[++]
Nickel	5	5	5	3	5	5	5	5	5	5	4	4	4-9	50[#]	600**		-	-
Zinc	70	56	29	33	41	41	32	25	25	25	36	23	28-79	200[#]	14000**		-	-
Pesticides (mg/kg dry weight)																		
2,4'-DDD	< 0.005	-	< 0.005	-	< 0.005	-	< 0.006	-	< 0.005	-	< 0.006	-	-	-	-		-	-
4,4'-DDD	0.007	-	< 0.005	-	< 0.005	-	< 0.006	-	0.008	-	< 0.006	-	-	-	-		-	-
2,4'-DDE	< 0.005	-	< 0.005	-	< 0.005	-	< 0.006	-	< 0.005	-	< 0.006	-	-	-	-		-	-
4,4'-DDE	0.02	-	0.02	-	0.005	-	0.02	-	0.062	-	< 0.006	-	-	-	-		-	-
2,4'-DDT	0.021	-	0.009	-	< 0.005	-	< 0.006	-	0.028	-	< 0.006	-	-	-	-		-	-
4,4'-DDT	0.022	-	0.021	-	< 0.005	-	0.013	-	0.039	-	< 0.006	-	-	-	-		-	-
Total DDT Isomers	0.07	-	0.05	-	< 0.03	-	0.03	-	0.14	-	< 0.03	-	-	0.7[#]	400**		1000+	400[++]
Dieldrin	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-	20**		160[+]	70[++]
Heptachlor	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-	20**		-	-
SVOC (mg/kg dry weight)															**<1m**	**1m-4m**		
Acenaphthene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-	-		-	-
Acenaphthylene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Anthracene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Benzo[a]anthracene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Benzo[a]pyrene (BAP)	< 1.5	< 1.4	< 0.03	< 3	< 1.3	< 0.04	< 0.04	< 1.4	< 1.7	< 0.04	< 0.03	< 1.2	-	0.7[#]	2.7[§]		-	-
Benzo[b]fluoranthene	< 1.5	< 1.4	< 0.03	< 3	< 1.3	< 0.04	< 0.04	< 1.4	< 1.7	< 0.04	< 0.03	< 1.2	-	-	-		-	-
Benzo[g,h,i]perylene	< 1.5	< 1.4	< 0.03	< 3	< 1.3	< 0.04	< 0.04	< 1.4	< 1.7	< 0.04	< 0.03	< 1.2	-	-	-		-	-
Benzo[k]fluoranthene	< 1.5	< 1.4	< 0.03	< 3	< 1.3	< 0.04	< 0.04	< 1.4	< 1.7	< 0.04	< 0.03	< 1.2	-	-	-		-	-
2-Chloronaphthalene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Chrysene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Dibenzo[a,h]anthracene	< 1.5	< 1.4	< 0.03	< 3	< 1.3	< 0.04	< 0.04	< 1.4	< 1.7	< 0.04	< 0.03	< 1.2	-	-	-		-	-
Fluoranthene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Fluorene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Indeno(1,2,3-c,d)pyrene	< 1.5	< 1.4	< 0.03	< 3	< 1.3	< 0.04	< 0.04	< 1.4	< 1.7	< 0.04	< 0.03	< 1.2	-	-	-		-	-
2-Methylnaphthalene	< 0.8	< 0.7	<0.7	< 1.1	< 0.7	<0.7	<0.7	< 0.7	< 0.9	<0.7	<0.6	< 0.6	-	-	-		-	-
Naphthalene	< 0.8	< 0.7	< 0.14	< 1.1	< 0.7	< 0.16	< 0.16	< 0.7	< 0.9	< 0.16	< 0.14	< 0.6	-	-	380 (sand)^ 820 (sandy silt)^ 3800 (peat)^	850 (sand)^ 3000 (sandy silt)^ NA (peat)^	-	-
Phenanthrene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	-		-	-
Pyrene	< 0.8	< 0.7	< 0.03	< 1.1	< 0.7	< 0.04	< 0.04	< 0.7	< 0.9	< 0.04	< 0.03	< 0.6	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
BaP Equivalent	1.30	1.42	0.04	1.23	1.23	0.05	0.05	1.30	1.60	0.05	0.04	1.42	-	-	530 (sand)^ 290 (sandy silt)^ 2500 (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	35[+]	40[++]
Pentachlorophenol (PCP)	< 30	< 30	< 30	< 50	< 30	< 30	< 30	< 30	< 40	< 30	< 30	< 30	-	-	570*		360[+]	150[++]
All other compounds	Below detection												-	-	-		-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)															**<1m**	**1m-4m**		
C7 - C9	< 11	< 10	< 9	< 30	< 9	< 10	< 10	< 10	< 12	< 10	< 8	< 8	-	-	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	120 (sand)^ 500 (sandy silt)^ 6700 (peat)^	-	-
C10 - C14	< 30	< 20	< 20	< 50	< 20	< 20	< 20	< 20	< 30	< 20	< 20	< 20	-	-	1500 (sand)^ 510 (sandy silt)^ NA (peat)^	1900 (sand)^ 670 (sandy silt)^ NA (peat)^	-	-
C15 - C36	< 50	< 40	< 40	220	< 40	< 40	< 40	60	141	< 40	< 40	< 40	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^	-	-
Total hydrocarbons (C7 - C36)	< 80	< 70	< 70	220	< 70	< 70	< 70	< 70	141	< 70	< 70	< 70	-	-	-	-	-	-

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.

Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'residential/parkland' land use have been selected.

* Health and Environmental Guidelines for Selected Timber Treatment Chemicals, MfE, 1997. Values for 'residential - inhalation' have been used.

** Guideline on the Investigation Levels for Soil and Groundwater, NEPC, 1999. Values applicable to 'Health Investigation Level E - parkland' have been used.

§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'parkland - adopted' have been used.

^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'residential (inhalation) outdoor' land use have been selected.

\+ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'commercial/industrial outdoor worker' have been used.

++ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'recreational' have been used.

Results exceeding background levels are underlined
Results exceeding environmental risk criteria are shaded in grey
Results exceeding human health risk criteria are in **bold**
NL - No Limit. Derived value exceeds 10000 mg/kg.
NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 2: WASTE ACCEPTANCE CRITERIA (55 RATA ROAD)

Sampling Date	6/07/2011																
Test Pit Number	**TP201**	**TP201**	**TP202**	**TP202**	**TP203**	**TP203**	**TP204**	**TP204**	**TP205**	**TP205**	**TP206**	**TP206**	**TP206**	**TP207**	**TP207**	**Waste Acceptance Criteria**	
Sample Number	TP201 S1	TP201 S2	TP202 S1	TP202 S2	TP203 S1	TP203 S2	TP204 S1	TP204 S2	TP205 S1	TP205 S2	TP206 S1	TP206 S2	TP206 S3	TP207 S1	TP207 S2		
Laboratory Number	912271.1	912271.2	912271.3	912271.4	912271.5	912271.6	912271.7	912271.8	912271.9	912271.1	912271.11	912271.12	912271.13	912271.14	912271.15	**Porirua City Council**	**Hutt City Council**
Sample Depth (m)	0.3	0.65	0.3	0.8	0.2	1.4	0.4	1.4	0.2	1	0.3	0.5	1.5	0.3	0.8	**Spicer Landfill (Class B)**	**Silverstream Landfill (Class A)**
Soil Type	Silty gravel	Silty gravel	Silty sand	Silty sand	Sandy silt	Peat	Sandy silt	Peat	Silty sand	Silty sand	Silty sand	Silty clay	Silty sand	Sandy silt	Silty sand	**(mg/kg)**	**(mg/kg)**
Heavy metal (mg/kg dry weight)																	
Arsenic	6	4	6	5	6	**15**	10	**11**	4	5	8	5	**13**	4	4	10	100
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10	< 0.10	2	20
Chromium	9	7	8	10	**13**	**14**	10	9	8	8	**16**	9	**31**	9	7	10	100
Copper	6	5	10	9	**19**	**14**	**15**	**14**	8	8	**27**	**11**	**13**	10	6	10	28
Lead	9.5	6.8	**13.7**	**14.9**	**29**	**31**	**27**	**38**	**20**	7.6	**30**	**24**	**29**	**19.8**	7.1	10	100
Nickel	9	6	6	9	15	6	7	10	6	6	20	7	7	8	6	20	40
Zinc	**47**	**30**	**40**	**46**	**78**	**95**	**75**	**68**	**71**	**35**	**92**	**64**	**168**	**48**	**33**	20	160
Pesticides (mg/kg dry weight)																	
Aldrin	**< 1.2**	**< 1.4**	**< 1.3**	**< 1.3**	**< 1.2**	**< 3**	**< 1.3**	**< 1.2**	**< 1.3**	**< 1.3**	**< 1.2**	**< 1.4**	**< 1.7**	**< 1.3**	**< 1.4**	0.000016	0.02
alpha-BHC	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
beta-BHC	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
delta-BHC	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
gamma-BHC (Lindane)	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
2,4'-DDD	< 0.006	-	< 0.006	-	< 0.005	-	0.007	-	< 0.005	-	< 0.005	-	-	< 0.006	-	-	-
4,4'-DDD	< 0.006	-	< 0.006	-	< 0.005	-	0.024	-	< 0.005	-	< 0.005	-	-	< 0.006	-	-	-
2,4'-DDE	< 0.006	-	< 0.006	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	< 0.006	-	-	-
4,4'-DDE	< 0.006	-	< 0.006	-	< 0.005	-	0.048	-	< 0.005	-	< 0.005	-	-	< 0.006	-	-	-
2,4'-DDT	< 0.006	-	< 0.006	-	< 0.005	-	0.025	-	< 0.005	-	< 0.005	-	-	< 0.006	-	-	-
4,4'-DDT	< 0.006	-	< 0.006	-	< 0.005	-	0.152	-	0.008	-	< 0.005	-	-	< 0.006	-	-	-
Total DDT Isomers	< 0.03	-	< 0.03	-	< 0.03	-	0.26	-	< 0.03	-	< 0.03	-	-	< 0.03	-	-	-
Dieldrin	**< 1.2**	**< 1.4**	**< 1.3**	**< 1.3**	**< 1.2**	**< 3**	**< 1.3**	**< 1.2**	**< 1.3**	**< 1.3**	**< 1.2**	**< 1.4**	**< 1.7**	**< 1.3**	**< 1.4**	0.8	0.08
Endosulfan I	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 5**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	0.6	4
Endosulfan II	< 3	< 3	< 3	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	-	-
Endosulfan sulphate	< 3	< 3	< 3	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	-	-
Endrin	< 3	< 3	< 3	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	-	-
Endrin ketone	< 3	< 3	< 3	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	-	-
Heptachlor	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
Heptachlor epoxide	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
Hexachlorobenzene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
SVOC (mg/kg dry weight)																	
Acenaphthene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Acenaphthylene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Anthracene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Benzo[a]anthracene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Benzo[a]pyrene (BAP)	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
Benzo[b]fluoranthene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
Benzo[g,h,i]perylene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
Benzo[k]fluoranthene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
2-Chloronaphthalene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Chrysene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Dibenzo[a,h]anthracene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
Fluoranthene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Fluorene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Indeno(1,2,3-c,d)pyrene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	-	-
2-Methylnaphthalene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Naphthalene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	20	-
Phenanthrene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
Pyrene	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7	-	-
BaP Equivalent	1.41	1.65	1.53	1.53	1.41	3.52	1.53	1.41	1.53	1.53	1.41	1.65	2.00	1.53	1.65	-	-
2,4-Dichlorophenol	**< 1.2**	**< 1.4**	**< 1.3**	**< 1.3**	**< 1.2**	**< 3**	**< 1.3**	**< 1.2**	**< 1.3**	**< 1.3**	**< 1.2**	**< 1.4**	**< 1.7**	**< 1.3**	**< 1.4**	0.01	0.4
Phenol	< 3	< 3	< 3	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	80	280
2,4,6-Trichlorophenol	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 5**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	0.2	40
1,2-Dichlorobenzene	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 5**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	0.4	86
1,3-Dichlorobenzene	< 3	< 3	< 3	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	100	-
1,2,4-Trichlorobenzene	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2	< 3	< 1.3	< 1.2	< 1.3	< 1.3	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4	80	10
All other compounds	Below detection															-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)																	
C7 - C9	< 8	< 8	< 8	< 8	< 8	< 30	< 9	< 8	< 9	< 8	< 8	< 8	< 11	< 8	< 8	-	-
C10 - C14	< 20	< 20	< 20	< 20	< 20	< 60	< 20	< 20	< 20	< 20	< 20	< 20	< 30	< 20	< 20	-	-
C15 - C36	< 40	< 40	< 40	< 40	< 40	250	< 40	< 40	< 40	< 40	< 40	< 40	380	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	< 70	< 70	< 70	< 70	< 70	250	< 70	< 70	< 70	< 70	< 70	< 70	380	< 70	< 70	-	-
Materials in Borehole Log which Preclude Soils as Cleanfill?	No	No	No	Yes	No	Yes	Yes	Yes	No	No	No	No	Yes	Yes	No		

Annotations:

Results exceeding Spicer Landfill (Class B) waste acceptance criteria are in **bold**

Results exceeding Silverstream Landfill (Class A) waste acceptance criteria are shaded in grey

SECTOR 2: WASTE ACCEPTANCE CRITERIA (55 RATA ROAD)

	6/07/2011					7/07/2011					6/07/2011				
Test Pit Number	**TP208**	**TP208**	**TP209**	**TP209**	**TP209**	**TP210**	**TP212**	**TP212 dup**	**TP212**	**TP213**	**TP214**	**TP214**	**TP214**	**Waste Acceptance Criteria**	
Sample Number	TP208 S1	TP208 S2	TP209 S1	TP209 S2	TP209 S3	TP201 S1	TP212 S1	TP212 S2 dup	TP212 S2	TP213 S1	TP214 S1	TP214 S2	TP214 S3		
Laboratory Number	912271.16	912271.17	912271.18	912271.19	912271.2	912569.1	912569.2	912569.4	912569.3	912569.5	912271.21	912271.22	912271.23	**Porirua City Council**	**Hutt City Council**
Sample Depth (m)	0.3	1.3	0.3	0.8	1.3	0.15	0.3	0.3	1	0.2	0.3	1	1.5	**Spicer Landfill (Class B)**	**Silverstream Landfill (Class A)**
Soil Type	Sandy silt	Silty sand	Silty sand	Silty sand	Peat	Silty clay	Silty sand	Silty sand	Silty sand	Sandy silt	Sandy silt	Sandy silt	Sandy silt	**(mg/kg)**	**(mg/kg)**
Heavy metal (mg/kg dry weight)															
Arsenic	8	6	6	-	7	10	10	6	4	**11**	6	-	9	10	100
Cadmium	0.25	< 0.10	< 0.10	-	0.28	0.11	< 0.10	0.15	< 0.10	0.14	< 0.10	-	< 0.10	2	20
Chromium	**11**	8	**16**	-	9	**19**	**12**	**11**	8	**14**	9	-	8	10	100
Copper	**24**	8	**14**	-	**22**	**19**	**12**	**20**	8	**25**	9	-	8	10	28
Lead	**56**	**11.1**	**22**	-	**68**	**31**	**35**	**27**	**11.2**	**49**	**14.9**	-	**10.4**	10	100
Nickel	9	7	15	-	7	10	8	9	8	9	7	-	7	20	40
Zinc	**153**	**34**	**67**	-	**68**	**72**	**64**	**91**	**43**	**90**	**54**	-	**43**	20	160
Pesticides (mg/kg dry weight)															
Aldrin	**< 1.4**	**< 1.5**	**< 1.2**	-	**< 1.8**	**< 1.3**	**< 1.5**	**< 1.6**	**< 1.3**	**< 1.5**	**< 1.4**	-	**< 1.6**	0.000016	0.02
alpha-BHC	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
beta-BHC	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
delta-BHC	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
gamma-BHC (Lindane)	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
2,4'-DDD	< 0.005	-	< 0.006	-	-	< 0.005	< 0.005	-	-	< 0.005	< 0.005	-	-	-	-
4,4'-DDD	< 0.005	-	< 0.006	-	-	< 0.005	< 0.005	-	-	0.006	< 0.005	-	-	-	-
2,4'-DDE	< 0.005	-	< 0.006	-	-	< 0.005	< 0.005	-	-	< 0.005	< 0.005	-	-	-	-
4,4'-DDE	< 0.005	-	< 0.006	-	-	< 0.005	< 0.005	-	-	0.015	< 0.005	-	-	-	-
2,4'-DDT	< 0.005	-	< 0.006	-	-	< 0.005	< 0.005	-	-	< 0.005	< 0.005	-	-	-	-
4,4'-DDT	0.006	-	0.008	-	-	< 0.005	< 0.005	-	-	0.005	< 0.005	-	-	-	-
Total DDT Isomers	< 0.03	-	< 0.03	-	-	< 0.03	< 0.03	-	-	< 0.03	< 0.03	-	-	-	-
Dieldrin	**< 1.4**	**< 1.5**	**< 1.2**	-	**< 1.8**	**< 1.3**	**< 1.5**	**< 1.6**	**< 1.3**	**< 1.5**	**< 1.4**	-	**< 1.6**	0.8	0.08
Endosulfan I	**< 3**	**< 3**	**< 3**	-	**< 4**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	**< 3**	-	**< 4**	0.6	4
Endosulfan II	< 3	< 3	< 3	-	< 4	< 3	< 3	< 4	< 3	< 3	< 3	-	< 4	-	-
Endosulfan sulphate	< 3	< 3	< 3	-	< 4	< 3	< 3	< 4	< 3	< 3	< 3	-	< 4	-	-
Endrin	< 3	< 3	< 3	-	< 4	< 3	< 3	< 4	< 3	< 3	< 3	-	< 4	-	-
Endrin ketone	< 3	< 3	< 3	-	< 4	< 3	< 3	< 4	< 3	< 3	< 3	-	< 4	-	-
Heptachlor	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
Heptachlor epoxide	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
Hexachlorobenzene	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	-	< 1.6	-	-
SVOC (mg/kg dry weight)															
Acenaphthene	< 0.7	< 0.8	< 0.6	450	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	< 0.17	< 0.8	-	-
Acenaphthylene	< 0.7	< 0.8	1.1	500	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	0.8	< 0.17	< 0.8	-	-
Anthracene	< 0.7	< 0.8	< 0.6	860	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	0.25	< 0.8	-	-
Benzo[a]anthracene	< 0.7	< 0.8	0.9	640	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	0.8	2.2	< 0.8	-	-
Benzo[a]pyrene (BAP)	< 1.4	< 1.5	1.2	380	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	0.74	< 1.6	-	-
Benzo[b]fluoranthene	< 1.4	< 1.5	1.7	530	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	1.4	2.7	< 1.6	-	-
Benzo[g,h,i]perylene	< 1.4	< 1.5	1.8	170	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	1.3	< 1.6	-	-
Benzo[k]fluoranthene	< 1.4	< 1.5	< 1.2	250	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	0.85	< 1.6	-	-
2-Chloronaphthalene	< 0.7	< 0.8	< 0.6	-	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	-	< 0.8	-	-
Chrysene	< 0.7	< 0.8	0.8	460	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	4.2	< 0.8	-	-
Dibenzo[a,h]anthracene	< 1.4	< 1.5	< 1.2	59	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	< 0.17	< 1.6	-	-
Fluoranthene	< 0.7	< 0.8	1.4	2000	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	1	1.54	< 0.8	-	-
Fluorene	< 0.7	< 0.8	< 0.6	860	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	0.47	< 0.8	-	-
Indeno(1,2,3-c,d)pyrene	< 1.4	< 1.5	1.4	165	< 1.8	< 1.3	< 1.5	< 1.6	< 1.3	< 1.5	< 1.4	< 0.17	< 1.6	-	-
2-Methylnaphthalene	< 0.7	< 0.8	< 0.6	-	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	-	< 0.8	-	-
Naphthalene	< 0.7	< 0.8	< 0.6	**4300**	1.4	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	< 0.9	< 0.8	20	-
Phenanthrene	< 0.7	< 0.8	< 0.6	3100	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.7	5.9	< 0.8	-	-
Pyrene	< 0.7	< 0.8	1.6	1210	< 0.9	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	2	2.5	< 0.8	-	-
BaP Equivalent	1.65	1.77	2.27	602.10	2.12	1.53	1.77	1.88	1.53	1.77	1.76	1.45	1.88	-	-
2,4-Dichlorophenol	**< 1.4**	**< 1.5**	**< 1.2**	-	**< 1.8**	**< 1.3**	**< 1.5**	**< 1.3**	**< 1.6**	**< 1.5**	**< 1.4**	-	**< 1.6**	0.01	0.4
Phenol	< 3	< 3	< 3	-	< 4	< 3	< 3	< 3	< 4	< 3	< 3	-	< 4	80	280
2,4,6-Trichlorophenol	**< 3**	**< 3**	**< 3**	-	**< 4**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	-	**< 4**	0.2	40
1,2-Dichlorobenzene	**< 3**	**< 3**	**< 3**	-	**< 4**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	-	**< 4**	0.4	86
1,3-Dichlorobenzene	< 3	< 3	< 3	-	< 4	< 3	< 3	< 3	< 4	< 3	< 3	-	< 4	100	-
1,2,4-Trichlorobenzene	< 1.4	< 1.5	< 1.2	-	< 1.8	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5	< 1.4	-	< 1.6	80	10
All other compounds	Below detection													-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)															
C7 - C9	< 8	< 9	< 8	210	< 12	< 9	< 10	< 11	< 8	< 9	< 9	< 50	< 10	-	-
C10 - C14	< 20	< 20	< 20	10400	< 30	< 20	< 20	< 30	< 20	< 20	< 20	< 100	< 20	-	-
C15 - C36	< 40	< 40	116	61000	58	210	101	79	< 40	< 40	< 40	36000	< 40	-	-
Total hydrocarbons (C7 - C36)	< 70	< 70	116	71000	< 80	210	101	79	< 70	< 70	< 70	36000	< 70	-	-
Materials in Borehole Log which Preclude Soils as Cleanfill?	Yes	No	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	No		

Annotations:

Results exceeding Spicer Landfill (Class B) waste acceptance criteria are in **bold**

Results exceeding Silverstream Landfill (Class A) waste acceptance criteria are shaded in grey

SECTOR 2: WASTE ACCEPTANCE CRITERIA (KAPITI ROAD INTERSECTION)

Sampling Date	5/07/2011										**Waste Acceptance Criteria**	
Test Pit Number	**TP101**	**TP101**	**TP102**	**TP102**	**TP103**	**TP103**	**TP104**	**TP104**	**TP105**	**TP105**		
Sample Number	TP101 S1	TP101 S2	TP102 S1	TP102 S2	TP103 S1	TP103 S2	TP104 S1	TP104 S2	TP105 S2	TP105 S1		
Laboratory Number	911650.1	911650.2	911650.3	911650.4	911650.5	911650.6	911650.7	911650.8	911650.10	911650.9	**Porirua City Council**	**Hutt City Council**
Sample Depth (m)	1	2.6	0.7	2.3	0.6	1.4	0.4	1.6	0.15	1.6	**Spicer Landfill (Class B)**	**Silverstream Landfill (Class A)**
Soil Type	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Sandy silt	Silty sand	Peat	Silty sand	Silty sand	**(mg/kg)**	**(mg/kg)**
Heavy metal (mg/kg dry weight)												
Arsenic	4	3	2	3	10	3	4	< 2	6	< 2	10	100
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	0.1	< 0.10	< 0.10	0.16	0.27	0.14	2	20
Chromium	9	5	6	6	**11**	6	8	5	**16**	5	10	100
Copper	**17**	8	8	8	**50**	9	**13**	5	**39**	5	10	28
Lead	**13.7**	5.2	6.2	6	**18.2**	6.2	**15.9**	6.1	**36**	5.9	10	100
Nickel	7	5	6	5	8	5	6	3	9	3	20	40
Zinc	**50**	**26**	**31**	**27**	**72**	**30**	**51**	12	**146**	11	20	160
Pesticides (mg/kg dry weight)												
Aldrin	**< 1.8**	**< 1.4**	**< 1.4**	**< 1.3**	**< 1.4**	**< 1.3**	**< 1.6**	**< 1.6**	**< 1.4**	**< 1.3**	0.000016	0.02
alpha-BHC	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
beta-BHC	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
delta-BHC	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
gamma-BHC (Lindane)	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
2,4'-DDD	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	-
4,4'-DDD	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	-
2,4'-DDE	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	< 0.005	-	-	-
4,4'-DDE	0.007	-	< 0.005	-	< 0.005	-	0.008	-	< 0.005	-	-	-
2,4'-DDT	< 0.005	-	0.015	-	< 0.005	-	0.009	-	< 0.005	-	-	-
4,4'-DDT	0.008	-	0.012	-	0.007	-	0.012	-	0.007	-	-	-
Total DDT Isomers	< 0.03	-	< 0.03	-	< 0.03	-	< 0.03	-	< 0.03	-	-	-
Dieldrin	**< 1.8**	**< 1.4**	**< 1.4**	**< 1.3**	**< 1.4**	**< 1.3**	**< 1.6**	**< 1.6**	**< 1.4**	**< 1.3**	0.8	0.08
Endosulfan I	**< 4**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 4**	**< 3**	**< 3**	0.6	4
Endosulfan II	< 4	< 3	< 3	< 3	< 3	< 3	< 4	< 4	< 3	< 3	-	-
Endosulfan sulphate	< 4	< 3	< 3	< 3	< 3	< 3	< 4	< 4	< 3	< 3	-	-
Endrin	< 4	< 3	< 3	< 3	< 3	< 3	< 4	< 4	< 3	< 3	-	-
Endrin ketone	< 4	< 3	< 3	< 3	< 3	< 3	< 4	< 4	< 3	< 3	-	-
Heptachlor	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
Heptachlor epoxide	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
Hexachlorobenzene	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.4	< 1.3	-	-
SVOC (mg/kg dry weight)												
Acenaphthene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Acenaphthylene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Anthracene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Benzo[a]anthracene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Benzo[a]pyrene (BAP)	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.3	< 1.6	-	-
Benzo[b]fluoranthene	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.3	< 1.6	-	-
Benzo[g,h,i]perylene	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.3	< 1.6	-	-
Benzo[k]fluoranthene	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.3	< 1.6	-	-
2-Chloronaphthalene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Chrysene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Dibenzo[a,h]anthracene	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.3	< 1.6	-	-
Fluoranthene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Fluorene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Indeno(1,2,3-c,d)pyrene	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.3	< 1.6	-	-
2-Methylnaphthalene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Naphthalene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	20	-
Phenanthrene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
Pyrene	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.8	< 0.7	< 0.8	-	-
BaP Equivalent	1.23	1.67	1.30	1.30	1.23	1.30	1.23	1.48	1.23	1.48	-	-
2,4-Dichlorophenol	**< 1.3**	**< 1.8**	**< 1.4**	**< 1.4**	**< 1.3**	**< 1.4**	**< 1.3**	**< 1.6**	**< 1.6**	**< 1.3**	0.01	0.4
Phenol	< 3	< 4	< 3	< 3	< 3	< 3	< 3	< 4	< 4	< 3	80	280
2,4,6-Trichlorophenol	**< 3**	**< 4**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 4**	**< 3**	0.2	40
1,2-Dichlorobenzene	**< 3**	**< 4**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 4**	**< 3**	0.4	86
1,3-Dichlorobenzene	< 3	< 4	< 3	< 3	< 3	< 3	< 3	< 4	< 4	< 3	100	-
1,2,4-Trichlorobenzene	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3	80	10
All other compounds	Below detection										-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)												
C7 - C9	< 9	< 12	< 10	< 9	< 9	< 10	< 9	< 11	< 9	< 11	-	-
C10 - C14	< 20	< 30	< 20	< 20	< 20	< 20	< 20	< 30	< 20	< 30	-	-
C15 - C36	< 40	< 50	92	< 40	46	104	< 40	< 50	41	< 50	-	-
Total hydrocarbons (C7 - C36)	< 70	< 90	92	< 70	< 70	104	< 70	< 80	< 70	< 80	-	-
Materials in Borehole Log which Preclude Soils as Cleanfill?	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes		

Annotations:

Results exceeding Spicer Landfill (Class B) waste acceptance criteria are in **bold**

Results exceeding Silverstream Landfill (Class A) waste acceptance criteria are shaded in grey

SECTOR 2: WASTE ACCEPTANCE CRITERIA (KAPITI ROAD INTERSECTION)

Sampling Date	5/07/2011													
Test Pit Number	**TP106**	**TP106**	**TP107**	**TP107**	**TP108**	**TP108**	**TP109**	**TP109**	**TP110**	**TP110**	**TP111**	**TP111**	**Waste Acceptance Criteria**	
Sample Number	TP106 S2	TP106 S1	TP107 S2	TP107 S1	TP108 S1	TP108 S2	TP109 S1	TP109 S2	TP110 S1	TP110 S2	TP111 S1	TP111 S2		
Laboratory Number	911650.12	911650.11	911650.14	911650.13	911650.15	911650.16	911650.17	911650.18	911650.19	911650.20	911650.21	911650.22	**Porirua City Council**	**Hutt City Council**
Sample Depth (m)	0.3	1.3	0.2	1	0.2	2	0.2	0.5	0.4	1	0.5	1.5	**Spicer Landfill (Class B)**	**Silverstream Landfill (Class A)**
Soil Type	Silty sand	Silty sand	Silty sand	Silty sand	Sandy silt	Sandy silt	Sandy silt	Silty sand	Sandy silt	Silty sand	Silty sand	Silty sand	**(mg/kg)**	**(mg/kg)**
Heavy metal (mg/kg dry weight)														
Arsenic	4	4	4	2	4	4	**24**	**70**	3	4	3	3	10	100
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	2	20
Chromium	7	6	6	5	6	6	**13**	**14**	6	6	5	5	10	100
Copper	**11**	10	8	10	**14**	**36**	**17**	**15**	10	7	7	9	10	28
Lead	**13.7**	**26**	5.4	5.4	6.3	**35**	7	4.5	4.6	4.4	4.4	4.1	10	100
Nickel	5	5	5	3	5	5	5	5	5	5	4	4	20	40
Zinc	**70**	**56**	**29**	**33**	**41**	**41**	**32**	**25**	**25**	**25**	**36**	**23**	20	160
Pesticides (mg/kg dry weight)														
Aldrin	**< 3**	**< 1.5**	**< 1.3**	**< 1.3**	**< 1.4**	**< 1.4**	**< 1.4**	**< 1.7**	**< 1.4**	**< 1.2**	**< 1.2**	**< 1.2**	0.000016	0.02
alpha-BHC	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
beta-BHC	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
delta-BHC	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
gamma-BHC (Lindane)	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
2,4'-DDD	< 0.005	-	< 0.005	-	< 0.005	-	< 0.006	-	< 0.005	-	< 0.006	-	-	-
4,4'-DDD	0.007	-	< 0.005	-	< 0.005	-	< 0.006	-	0.008	-	< 0.006	-	-	-
2,4'-DDE	< 0.005	-	< 0.005	-	< 0.005	-	< 0.006	-	< 0.005	-	< 0.006	-	-	-
4,4'-DDE	0.02	-	0.02	-	0.005	-	0.02	-	0.062	-	< 0.006	-	-	-
2,4'-DDT	0.021	-	0.009	-	< 0.005	-	< 0.006	-	0.028	-	< 0.006	-	-	-
4,4'-DDT	0.022	-	0.021	-	< 0.005	-	0.013	-	0.039	-	< 0.006	-	-	-
Total DDT Isomers	0.07	-	0.05	-	< 0.03	-	0.03	-	0.14	-	< 0.03	-	-	-
Dieldrin	**< 3**	**< 1.5**	**< 1.3**	**< 1.3**	**< 1.4**	**< 1.4**	**< 1.4**	**< 1.7**	**< 1.4**	**< 1.2**	**< 1.2**	**< 1.2**	0.8	0.08
Endosulfan I	**< 5**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	**< 3**	**< 3**	0.6	4
Endosulfan II	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	< 3	< 3	-	-
Endosulfan sulphate	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	< 3	< 3	-	-
Endrin	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	< 3	< 3	-	-
Endrin ketone	< 5	< 3	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	< 3	< 3	-	-
Heptachlor	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
Heptachlor epoxide	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
Hexachlorobenzene	< 3	< 1.5	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	< 1.2	-	-
SVOC (mg/kg dry weight)														
Acenaphthene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Acenaphthylene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Anthracene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Benzo[a]anthracene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Benzo[a]pyrene (BAP)	< 1.5	< 1.4	< 1.3	< 3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	-	-
Benzo[b]fluoranthene	< 1.5	< 1.4	< 1.3	< 3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	-	-
Benzo[g,h,i]perylene	< 1.5	< 1.4	< 1.3	< 3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	-	-
Benzo[k]fluoranthene	< 1.5	< 1.4	< 1.3	< 3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	-	-
2-Chloronaphthalene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Chrysene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Dibenzo[a,h]anthracene	< 1.5	< 1.4	< 1.3	< 3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	-	-
Fluoranthene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Fluorene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Indeno(1,2,3-c,d)pyrene	< 1.5	< 1.4	< 1.3	< 3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	-	-
2-Methylnaphthalene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Naphthalene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	20	-
Phenanthrene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
Pyrene	< 0.8	< 0.7	< 0.7	< 1.1	< 0.7	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7	< 0.6	< 0.6	-	-
BaP Equivalent	1.42	1.30	1.23	2.56	1.23	1.30	1.30	1.30	1.60	1.30	1.11	1.42	-	-
2,4-Dichlorophenol	**< 1.4**	**< 1.5**	**< 3**	**< 1.3**	**< 1.3**	**< 1.4**	**< 1.4**	**< 1.4**	**< 1.7**	**< 1.4**	**< 1.2**	**< 1.2**	0.01	0.4
Phenol	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	< 3	80	280
2,4,6-Trichlorophenol	**< 3**	**< 3**	**< 5**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	**< 3**	0.2	40
1,2-Dichlorobenzene	**< 3**	**< 3**	**< 5**	**< 3**	**< 3**	**< 3**	**< 3**	**< 3**	**< 4**	**< 3**	**< 3**	**< 3**	0.4	86
1,3-Dichlorobenzene	< 3	< 3	< 5	< 3	< 3	< 3	< 3	< 3	< 4	< 3	< 3	< 3	100	-
1,2,4-Trichlorobenzene	< 1.4	< 1.5	< 3	< 1.3	< 1.3	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4	< 1.2	< 1.2	80	10
All other compounds	Below detection												-	-
Total Petroleum Hydrocarbons (mg/kg dry weight)														
C7 - C9	< 11	< 10	< 9	< 30	< 9	< 10	< 10	< 10	< 12	< 10	< 8	< 8	-	-
C10 - C14	< 30	< 20	< 20	< 50	< 20	< 20	< 20	< 20	< 30	< 20	< 20	< 20	-	-
C15 - C36	< 50	< 40	< 40	220	< 40	< 40	< 40	60	141	< 40	< 40	< 40	-	-
Total hydrocarbons (C7 - C36)	< 80	< 70	< 70	220	< 70	< 70	< 70	< 70	141	< 70	< 70	< 70	-	-
Materials in Borehole Log which Preclude Soils as Cleanfill?	Yes	No	No	No	Yes	Yes	No	No	No	Yes	No	No		

Annotations:

Results exceeding Spicer Landfill (Class B) waste acceptance criteria are in **bold**

Results exceeding Silverstream Landfill (Class A) waste acceptance criteria are shaded in grey

SECTOR 2 – TEST PIT LOGS

Test Pits	**Location**
TP201 to TP210, TP212 to TP214	55 Rata Road

Sector 2 – Summary of Soil Sampling and Analysis

Test Pit Number	**Test Pit Depth (m bgl)**	**Sample Depth (m bgl)**	**Laboratory Number**	**Analysis Suite**
TP201	2.0	0.3	912271.1	HM, SVOC, TPH
		0.65	912271.2	HM, SVOC, TPH
TP202	2.4	0.3	912271.3	HM, SVOC, TPH
		0.8	912271.4	HM, SVOC, TPH
TP203	2.4	0.2	912271.5	HM, SVOC, TPH
		1.4	912271.6	HM, SVOC, TPH
TP204	2.2	0.4	912271.7	HM, SVOC, TPH
		1.4	912271.8	HM, SVOC, TPH
TP205	2.4	0.2	912271.9	HM, SVOC, TPH
		1.0	912271.10	HM, SVOC, TPH
TP206	2.5	0.3	912271.11	HM, SVOC, TPH
		0.5	912271.12	HM, SVOC, TPH
		1.5	912271.13	HM, SVOC, TPH
TP207	2.1	0.3	912271.14	HM, SVOC, TPH
		0.8	912271.15	HM, SVOC, TPH
TP208	2.2	0.3	912271.16	HM, SVOC, TPH
		1.3	912271.17	HM, SVOC, TPH
TP209	2.2	0.3	912271.18	HM, SVOC, TPH
		0.8	912271.19	HM, SVOC, TPH
		1.3	912271.20	HM, SVOC, TPH
TP210	0.15	0.15	912569.1	HM, SVOC, TPH
TP212	2.4	0.3	912569.2	HM, SVOC, TPH
		0.3	912569.4	HM, SVOC, TPH
		1	912569.3	HM, SVOC, TPH

TP213	0.6	0.2	912569.5	HM, SVOC, TPH
TP214	2.7	0.3	912271.21	HM, SVOC, TPH
		1.0	912271.22	HM, SVOC, TPH
		1.5	912271.23	HM, SVOC, TPH

Sector 2 – Summary of Surface Water Sampling and Analysis – 55 Rata Road

Sample Location	Laboratory Number	Analysis Suite
Northern Drain S1	912569.6	HM, SVOC, TPH
Southern Drain S1	912569.7	HM, SVOC, TPH
Southern Drain S2	912569.8	HM, SVOC, TPH

TEST PIT No: TP201

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,268.715 m
E 1,767,782.672 m
TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Light brown silty CLAY with some gravel.						
					Brown silty GRAVEL with some sand and large cobbles.					S1	
0.5											0.5
					Grey silty GRAVEL. Concrete pieces.					S2	
					Grey silty SAND with some tree roots.						
1.0						Fill					1.0
1.5											1.5
2.0					END OF LOG @ 2 m						2.0
2.5											2.5

TEST_PIT P:\332\3320901\TENCON LAND\GROUND INVESTIGATION\GINT LOGS\M2PP TP LOGS.GPJ BECA.GDT 16/2/12

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater seepage at 2.0m

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP202

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,242.285 m
E 1,767,782.407 m

TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Grey silty SAND with some gravel.	Fill					
0.5					Grey brown silty SAND with minor gravel and pieces of wood, polythene and sheet metal.					S1 S2	0.5
1.0 1.5 2.0					Grey brown silty SAND.	Holocene sand					1.0 1.5 2.0
2.5					END OF LOG @ 2.4 m						2.5

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater seepage at 2.4m. Ground covered with bark and chopped firewood.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST_PIT P:\332\3320901\TEN\CON LAND\GROUND INVESTIGATION\GINT LOGS\M2PP TP LOGS.GPJ BECA.GDT 16/2/12

TEST PIT No: TP203

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT:	NZTM	TEST PIT LOCATION:	55 Rata Road
COORDINATES:	N 5,468,234.438 m	R L:	
	E 1,767,761.165 m	DATUM:	

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Light brown sandy CLAY with some gravel.	Fill					
					Dark brown sandy SILT with some gravel.					S1	
0.5					Light brown sandy CLAY with some gravel.						0.5
1.0					Dark grey silty SAND. Fragments of glass, wood, concrete blocks, and suspected bonded asbestos.						1.0
1.5 2.0					Dark brown PEAT with large tree roots and large pieces of partly decomposed tree.	Interdune deposits (Peat)				S2	1.5 2.0
2.5					END OF LOG @ 2.4 m						2.5

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans	COMMENTS: Groundwater not encountered
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator	
SHEAR VANE No:	N/A	METHOD:	Excavation	

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

Beca

TEST PIT No: TP204

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,210.558 m
E 1,767,761.126 m
TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Light brown sandy CLAY with some gravel.	Fill					
					Dark brown sandy SILT with some gravel. Pieces of plastic, wood, textile and suspected bonded asbestos.						
0.5					Dark brown sandy SILT with some gravel.					S1	0.5
1.0					Dark grey silty SAND with some gravel. Shell fragments, bricks, concrete blocks, glass bottle, cable.						1.0
1.5 2.0					Dark brown PEAT.	Interdune deposits (Peat)				S2	1.5 2.0
2.5					END OF LOG @ 2.2 m						2.5

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Ground covered with large logs. Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP205

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,249.088 m
E 1,767,742.204 m
TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Grey mottled cream sandy CLAY with some gravel.	Fill					
0.5					Brown silty SAND with some gravel.					S1	0.5
1.0 1.5					Grey brown silty SAND with some gravel.					S2	1.0 1.5
2.0					Dark brown PEAT.	Interdune deposits (Peat)					2.0
2.5					END OF LOG @ 2.4 m						2.5

DATE EXCAVATED: 6/7/11
LOGGED BY: G Smith
SHEAR VANE No: N/A
CONTRACTOR: Goodmans
EQUIPMENT: 12t Tracked Excavator
METHOD: Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP206

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT:	NZTM	TEST PIT LOCATION:	55 Rata Road
COORDINATES:	N 5,468,250.583 m	R L:	
	E 1,767,764.313 m	DATUM:	

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Grey sandy GRAVEL with some clay.	Fill				S1	
					Brown silty SAND.						
0.5					Light grey mottled orange silty CLAY.					S2	0.5
					Grey silty SAND.						
1.0											1.0
					Dark brown organic silty SAND with trace clay and pieces of wood, glass, asphalt, plastic, metal.						
1.5										S3	1.5
2.0											2.0
2.5					END OF LOG @ 2.5 m						2.5

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater seepage at 1.3m

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST_PIT P:\3321\3320901\TEN\CON LAND\GROUND INVESTIGATION\GINT LOGS\M2PP TP LOGS.GPJ BECA.GDT 16/2/12

TEST PIT No: **TP207**

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,278.665 m
E 1,767,760.319 m
TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown organic sandy SILT with pieces of wood.	Fill					
					Light brown sandy SILT with some gravel.						
0.5					Grey sandy SILT with some gravel.					S1	0.5
1.0					Dark brown silty SAND.					S2	1.0
1.5 2.0					Dark brown PEAT.	Interdune deposits (Peat)					1.5 2.0
2.5					END OF LOG @ 2.1 m						2.5

DATE EXCAVATED: 6/7/11
LOGGED BY: G Smith
SHEAR VANE No: N/A
CONTRACTOR: Goodmans
EQUIPMENT: 12t Tracked Excavator
METHOD: Excavation

COMMENTS:
Ground covered with bark and wood chippings. Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP208

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,282.304 m
E 1,767,785.874 m

TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0					Brown sandy SILT with pieces of tile, polythene and bricks at 0.3m.	Fill				S1	
0.5											0.5
1.0											1.0
1.3					Brown silty SAND with some gravel and fragments of tile.					S2	
1.4					Dark brown PEAT.	Interdune deposits (Peat)					
1.5											1.5
1.9					Brown silty SAND.	Holocene sand					
2.0											2.0
2.2					END OF LOG @ 2.2 m						
2.5											2.5

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans	COMMENTS: Groundwater not encountered
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator	
SHEAR VANE No:	N/A	METHOD:	Excavation	

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

TEST PIT No: TP209

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,295.515 m
E 1,767,766.685 m

TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	SAMPLES
0.0 – 0.3	Brown sandy SILT	Fill	
0.3 – 0.9	Dark brown silty SAND with pieces of asphalt. Dark stained sand, strong hydrocarbon odour at 0.8m.	Fill	S1 S2
0.9 – 2.2	Dark brown PEAT.	Fill (to 1.6) Interdune deposits (Peat)	S3
2.2	END OF LOG @ 2.2 m		

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP210

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,292.195 m
E 1,767,741.754 m

TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty CLAY with some sand and gravel.	**Fill**					
					END OF LOG @ 0.15 m					S1	
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5

DATE EXCAVATED:	7/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Test pit located in operational area of site and operational restrictions precluded excavation of pit. Groundwatwer not encountered.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP212

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,278.07 m
E 1,767,727.951 m
TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0					Brown sandy SILT with sawdust and pieces of plastic, wood, metal and glass.	Fill					
0.3					Brown silty SAND.					S1	
0.4					Brown silty SAND with some clay.						
0.5					Grey silty SAND. Bricks at 1.1m.					S2	0.5
1.6					Dark brown PEAT.	Interdune deposits (Peat)					
2.4					END OF LOG @ 2.4 m						

DATE EXCAVATED: 7/7/11
CONTRACTOR: Goodmans
LOGGED BY: G Smith
EQUIPMENT: 12t Tracked Excavator
SHEAR VANE No: N/A
METHOD: Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP213

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,468,306.169 m
E 1,767,723.199 m

TEST PIT LOCATION: 55 Rata Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0–0.6					Brown sandy SILT with pieces of asphalt and metal pipe.	**Fill**				S1	
0.5											0.5
0.6					END OF LOG @ 0.6 m						
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5

DATE EXCAVATED:	7/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Pit terminated to prevent hitting drain. Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP214

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT:	NZTM	TEST PIT LOCATION:	55 Rata Road
COORDINATES:	N 5,468,309.931 m	R L:	
	E 1,767,748.224 m	DATUM:	

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0–0.2					Brown sandy SILT with rootlets.	Fill					
0.2–1.5					Grey sandy SILT with some gravel with pieces of tile and asphalt, metal pole and a tyre.					S1 S2	
1.5–1.7					Dark brown sandy SILT.					S3	
1.7–2.7					Dark brown PEAT.	Interdune deposits (Peat)					
2.7					END OF LOG @ 2.7 m						

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5

DATE EXCAVATED:	6/7/11	CONTRACTOR:	Goodmans	COMMENTS: Ground covered with logs, bark and planks. Groundwater not encountered
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator	
SHEAR VANE No:	N/A	METHOD:	Excavation	

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

SECTOR 2 – TEST PIT LOGS

Test Pits	**Location**
TP101 to TP111	Kāpiti Road Intersection

Sector 2 – Summary of Soil Sampling and Analysis

Test Pit Number	**Test Pit Depth (m bgl)**	**Sample Depth (m bgl)**	**Laboratory Number**	**Analysis Suite**
TP101	2.6	1.0	911650.1	HM, SVOC, TPH
		2.6	911650.2	HM, SVOC, TPH
TP102	2.3	0.7	911650.3	HM, SVOC, TPH
		2.3	911650.4	HM, SVOC, TPH
TP103	2.7	0.6	911650.5	HM, SVOC, TPH
		1.4	911650.6	HM, SVOC, TPH
TP104	2.5	0.4	911650.7	HM, SVOC, TPH
		1.6	911650.8	HM, SVOC, TPH
TP105	3.0	0.15	911650.10	HM, SVOC, TPH
		1.3	911650.9	HM, SVOC, TPH
TP106	2.0	0.3	911650.12	HM, SVOC, TPH
		1.0	911650.11	HM, SVOC, TPH
TP107	1.9	0.2	911650.14	HM, SVOC, TPH
		1.0	911650.13	HM, SVOC, TPH
TP108	2.6	0.2	911650.15	HM, SVOC, TPH
		2.0	911650.16	HM, SVOC, TPH
TP109	2.6	0.2	911650.17	HM, SVOC, TPH
		0.5	911650.18	HM, SVOC, TPH
TP110	2.1	0.4	911650.19	HM, SVOC, TPH
		1.0	911650.20	HM, SVOC, TPH
TP111	2.3	0.5	911650.21	HM, SVOC, TPH
		1.5	911650.22	HM, SVOC, TPH

TEST PIT No: TP101

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,565.057 m
E 1,768,518.055 m

TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Light brown sandy SILT with some cobbles and pieces of wire. Musty smell.	Fill					
0.5											0.5
					Dark brown sandy SILT. Musty smell.						
1.0										S1	1.0
1.5											1.5
2.0											2.0
2.5										S2	2.5
					END OF LOG @ 2.6 m						

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP102

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,574.723 m
E 1,768,508.248 m
TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Dark brown sandy SILT. Large pieces of wood.	Fill					
					Pieces of polythene plastic wrap at 1m.						
0.5											0.5
										S1	
1.0											1.0
1.5											1.5
2.0											2.0
										S2	
					END OF LOG @ 2.3 m						
2.5											2.5

DATE EXCAVATED: 5/7/11
LOGGED BY: G Smith
SHEAR VANE No: N/A
CONTRACTOR: Goodmans
EQUIPMENT: 12t Tracked Excavator
METHOD: Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP103

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,596.116 m
E 1,768,490.787 m

TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0–2.7					Light brown sandy SILT with some gravel and minor rootlets. Concrete blocks, bricks, wood, plastic, textile, tree stumps and steel girder.	Fill				S1 (0.6–0.7) S2 (1.4–1.5)	
2.7					END OF LOG @ 2.7 m						

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP104

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT:	NZTM	TEST PIT LOCATION:	Kapiti Road Intersection
COORDINATES:	N 5,469,611.952 m	R L:	
	E 1,768,499.942 m	DATUM:	

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Dark brown silty SAND with some cobbles. Polystyrene, plastic and wood pieces.	Fill					
					Metal bars at 0.7m.						
										S1	
0.5											0.5
1.0											1.0
1.5											1.5
					Dark brown PEAT.	Interdune deposits (Peat)				S2	
2.0					Orange brown PEAT.						2.0
2.5					END OF LOG @ 2.5 m						2.5

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans	COMMENTS: Groundwater not encountered
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator	
SHEAR VANE No:	N/A	METHOD:	Excavation	

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST_PIT P:\332\3320901\TEN\CON LAND\GROUND INVESTIGATION\GINT LOGS\M2PP TP LOGS.GPJ BECA.GDT 16/2/12

TEST PIT No: TP105

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,633.443 m
E 1,768,523.589 m
TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Dark brown silty SAND with minor cobbles. Metal, plastic, concrete blocks at 0.2m.	Fill					
										S1	
					Steel beams, wire, wood, plastic at 1.4m.						
0.5											0.5
1.0											1.0
										S2	
1.5											1.5
2.0											2.0
2.5					Dark brown PEAT.	Interdune deposits (Peat)					2.5

END OF LOG @ 3m

DATE EXCAVATED: 5/7/11
LOGGED BY: G Smith
SHEAR VANE No: N/A
CONTRACTOR: Goodmans
EQUIPMENT: 12t Tracked Excavator
METHOD: Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

TEST PIT No: **TP106**

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,655.724 m
E 1,768,556.232 m

TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Dark brown silty SAND. Metal rods, wood, plastic.	**Fill**				S1	
					Dark brown PEAT with some roots.	**Interdune deposits (Peat)**					
0.5											0.5
1.0					Dark brown silty SAND.	**Holocene sand**				S2	1.0
1.5											1.5
2.0					END OF LOG @ 2 m						2.0
2.5											2.5

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST_PIT P:\332\3320901\TEN\CON LAND\GROUND INVESTIGATION\GINT LOGS\M2PP TP LOGS.GPJ BECA.GDT 16/2/12

Beca

TEST PIT No: **TP107**

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,706.958 m
E 1,768,599.329 m
TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
0.5											0.5
1.0											1.0
1.5											1.5
2.0					END OF LOG @ 1.9 m						2.0
2.5											2.5

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Pit terminated to prevent slope failure. Groundwater not encountered.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP108

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 2
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,726.913 m
E 1,768,621.995 m
TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Dark brown sandy SILT. Small fragment of asbestos.	Fill					
										S1	
0.5					Wood, metal sheeting, wire, concrete blocks at 1.5m.						0.5
1.0											1.0
1.5											1.5
2.0										S2	2.0
2.5					Dark brown PEAT.	Interdune deposits (Peat)					2.5
					END OF LOG @ 2.6 m						

DATE EXCAVATED: 5/7/11
LOGGED BY: G Smith
SHEAR VANE No: N/A
CONTRACTOR: Goodmans
EQUIPMENT: 12t Tracked Excavator
METHOD: Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP109

TEST PIT LOG

SHEET 1 of 1

PROJECT: MacKays to Peka Peka, Contamination Assessment

JOB NUMBER: 3320901/500/004

SITE LOCATION: Sector 2

CLIENT: NZTA

CIRCUIT: NZTM

COORDINATES: N 5,469,755.249 m
E 1,768,651.821 m

TEST PIT LOCATION: Kapiti Road Intersection

R L:

DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0					Dark brown sandy SILT.	Holocene sand				S1	
0.5					Light brown silty SAND.					S2	0.5
1.0											1.0
1.5											1.5
2.0					Dark brown PEAT.	Interdune deposits (Peat)					2.0
2.5											2.5
					END OF LOG @ 2.6 m						

DATE EXCAVATED: 5/7/11
LOGGED BY: G Smith
SHEAR VANE No: N/A

CONTRACTOR: Goodmans
EQUIPMENT: 12t Tracked Excavator
METHOD: Excavation

COMMENTS:
Groundwater seepage at 2.4m

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP110

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,834.285 m
E 1,768,739.043 m

TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
0.0					Dark brown sandy SILT with minor gravel.	Fill				S1 (0.4–0.5) S2 (1.0–1.1)	
1.0					Brown silty SAND. Small piece of polythene.	Fill					1.0
1.3					Dark brown PEAT with minor rootlets.	Interdune deposits (Peat)					
2.1					END OF LOG @ 2.1 m						

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

TEST PIT No: TP111

TEST PIT LOG

SHEET 1 of 1

PROJECT:	MacKays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 2	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,469,792.13 m
E 1,768,686.402 m

TEST PIT LOCATION: Kapiti Road Intersection
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Dark brown sandy SILT.	Holocene sand					
					Orange brown clayey SAND with minor gravel.						
0.5 1.0 1.5 2.0					Light brown silty SAND.					S1 S2	0.5 1.0 1.5 2.0
2.5					END OF LOG @ 2.3 m						2.5

DATE EXCAVATED:	5/7/11	CONTRACTOR:	Goodmans
LOGGED BY:	G Smith	EQUIPMENT:	12t Tracked Excavator
SHEAR VANE No:	N/A	METHOD:	Excavation

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Revision A

A4 Scale 1:15

Appendix 23.C

Sector 3: Laboratory Testing Summary Sheets, Logs and Investigation Summary

APPENDIX C

Sector 3 – Laboratory Testing Summary Sheets, Logs and Investigation Summary

SECTOR 3: GROUNDWATER ANALYSIS RESULTS (OTAIHANGA MOUNTAIN BIKE PARK)

Sampling Date	18/10/2011			**Assessment Criteria**	
Borehole No.	**BH305**	**BH306**	**BH307**		
Sample Number	11:128	11:128	11:128	**ANZECC***	**CCME****
Lab Number	944634.1	944634.2	944634.3		
Sum of Anions (meq/L)	8.1	5	9.9	-	-
Sum of Cations (meq/L)	8	5.1	10.3	-	-
pH	6.4	6.6	6.6	-	-
Total Alkalinity (g/m3 as CaCO3)	260	180	440	-	-
Bicarbonate (g/m3 at 25°C)	320	220	530	-	-
Total Hardness (g/m3 as CaCO3)	240	149	410	-	-
Electrical Conductivity (EC) (Ms/m)	78.4	49.9	87.6	-	-
Dissolved Calcium	58	40	136	-	-
Dissolved Magnesium	23	11.9	16.1	-	-
Dissolved Mercury	< 0.00008	< 0.00008	< 0.00008	-	-
Total Mercury	< 0.00008	< 0.00008	< 0.00008	-	-
Dissolved Potassium	10.6	8.5	18.1	-	-
Dissolved Sodium	67	38	23	-	-
Chloride	67	48	22	-	-
Total Ammoniacal-N	0.4	3	7.3	0.021	-
Nitrite-N	0.153	< 0.002	0.007	-	-
Nitrate-N	0.71	0.002	0.025	-	-
Nitrate-N + Nitrite-N	0.86	0.003	0.032	-	-
Dissolved Reactive Phosphorus	0.005	0.045	< 0.004	-	-
Sulphate	46	< 0.5	28	-	-
Faecal Coliforms and E. coli profile					
Faecal Coliforms	33	33	220	-	-
Escherichia coli	17	17	170	-	-
Heavy metals, dissolved (mg/l)					
Dissolved Arsenic	< 0.002	0.007	0.044	0.14	-
Dissolved Cadmium	< 0.00005	< 0.00005	0.00019	0.0008	-
Dissolved Chromium	< 0.0010	< 0.0010	0.0023	0.04	-
Dissolved Copper	0.0013	0.0005	0.0087	0.0025	-
Dissolved Lead	0.00105	0.00034	0.0043	0.0094	-
Dissolved Nickel	0.0109	< 0.0005	0.003	0.017	-
Dissolved Zinc	0.026 #1	0.0174	6.2	0.031	-
Heavy Metals, total (mg/l)					
Total Arsenic	0.0011	0.0072	0.045	-	-
Total Cadmium	< 0.000053	< 0.000053	0.00035	-	-
Total Chromium	< 0.00053	0.0031	0.0064	-	-
Total Copper	0.0162	0.0049	0.085	-	-
Total Lead	0.00168	0.00194	0.0123	-	-
Total Nickel	0.0117	0.00152	0.0039	-	-
Total Zinc	0.025 #1	0.048	6.8	-	-
Nitrogen containing compounds (mg/l)					
2,4-Dinitrotoluene	< 0.0010	< 0.0010	< 0.0010	0.25	-
2,6-Dinitrotoluene	< 0.0010	< 0.0010	< 0.0010	0.21	-
Nitrobenzene	< 0.0005	< 0.0005	< 0.0005	1.3	-
Organochlorine Pesticides (mg/l)					
gamma-BHC (Lindane)	< 0.0005	< 0.0005	< 0.0005	0.001	-
4,4'-DDE	< 0.0005	< 0.0005	< 0.0005	ID	-
4,4'-DDT	< 0.0010	< 0.0010	< 0.0010	0.00004	-
Endosulfan I	< 0.0010	< 0.0010	< 0.0010	0.0018	-
Endrin	< 0.0010	< 0.0010	< 0.0010	0.00006	-
Heptachlor	< 0.0005	< 0.0005	< 0.0005	0.0007	-
Polycyclic Aromatic Hydrocarbons (mg/l)					
Acenaphthene	< 0.0003	< 0.0003	< 0.0003	-	0.0058
Anthracene	< 0.0003	< 0.0003	< 0.0003	ID	-
Benzo[a]anthracene	< 0.0003	< 0.0003	< 0.0003	-	0.000018
Benzo[a]pyrene (BAP)	< 0.0005	< 0.0005	< 0.0005	ID	-
Fluoranthene	< 0.0003	< 0.0003	< 0.0003	ID	-
Fluorene	< 0.0003	< 0.0003	< 0.0003	-	0.003
Naphthalene	< 0.0003	< 0.0003	< 0.0003	0.085	-
Phenanthrene	< 0.0003	< 0.0003	< 0.0003	ID	-
Pyrene	< 0.0003	< 0.0003	< 0.0003	-	0.000025
Phenols (mg/l)					
2-Chlorophenol	< 0.0005	< 0.0005	< 0.0005	0.87	-
2,4-Dichlorophenol	< 0.0005	< 0.0005	< 0.0005	0.27	-
2,4,6-Trichlorophenol	< 0.0010	< 0.0010	< 0.0010	0.095	-
Pentachlorophenol (PCP)	< 0.010	< 0.010	< 0.010	0.027	-
Phenol	< 0.0010	< 0.0010	< 0.0010	1.2	-
Plasticisers (mg/l)					
Diethylphthalate	< 0.0010	< 0.0010	< 0.0010	1.3	-
Dimethylphthalate	< 0.0010	< 0.0010	< 0.0010	5.1	-
Di-n-butylphthalate	< 0.0010	< 0.0010	< 0.0010	0.0646	-
Other Halogenated compounds (mg/l)					
1,2-Dichlorobenzene	< 0.0010	< 0.0010	< 0.0010	0.27	-
1,3-Dichlorobenzene	< 0.0010	< 0.0010	< 0.0010	0.52	-
1,4-Dichlorobenzene	< 0.0010	< 0.0010	< 0.0010	0.1	-
1,2,4-Trichlorobenzene	< 0.0005	< 0.0005	< 0.0005	0.3	-
Total Petroleum Hydrocarbons (mg/l)					
C7 - C9	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	< 0.7	< 0.7	< 0.7	-	-
BTEX (mg/l)					
Benzene	< 0.005	< 0.005	< 0.005	2	-
Toluene	< 0.010	< 0.010	< 0.010	-	-
Ethylbenzene	< 0.005	< 0.005	< 0.005	-	-
o-Xylene	< 0.005	< 0.005	< 0.005	0.64	-

VOC (mg/l)					
Dichloromethane (methylene chloride)	< 0.10	< 0.10	< 0.10	-	-
1,1,2,2-Tetrachloroethane	< 0.005	< 0.005	< 0.005	-	-
1,1,2-Trichloroethane	< 0.005	< 0.005	< 0.005	8.4	-
1,2-Dichlorobenzene	< 0.005	< 0.005	< 0.005	0.27	-
1,3-Dichlorobenzene	< 0.005	< 0.005	< 0.005	0.52	-
1,4-Dichlorobenzene	< 0.005	< 0.005	< 0.005	0.1	-
1,2,3-Trichlorobenzene	< 0.005	< 0.005	< 0.005	0.03	-
1,2,4-Trichlorobenzene	< 0.005	< 0.005	< 0.005	0.3	-
Methyl tert-butylether (MTBE)	< 0.05	< 0.05	< 0.05	-	10
Naphthalene	< 0.005	< 0.005	< 0.005	0.085	-
Organonitro&phosphorus Pesticides (mg/l)					
Azinphos-methyl	< 0.0007	< 0.0007	< 0.0007	0.00011	-
Chlorpyrifos	< 0.0004	< 0.0004	< 0.0004	0.0012	-
Diazinon	< 0.0002	< 0.0002	< 0.0002	0.002	-
Dimethoate	< 0.0007	< 0.0007	< 0.0007	0.0003	-
Malathion	< 0.0004	< 0.0004	< 0.0004	0.0011	-

Annotations

#1 It has been noted that the result for the dissolved fraction was greater than that for the total fraction, but within analytical variation of the methods.

*Australian and New Zealand Environment and Conservation Council (ANZECC), 2000. Fresh and Marine Water Quality Guidelines. Values for freshwater 80% level of species protection used.

**Canadian Environmental Quality Guidelines. Canadian Council of Ministers of the Environment (CCME), 2007. Values for freshwater used.

Results shaded grey exceed the Assessment Criteria.

ID - Insufficient data to derive a reliable trigger value.

SECTOR 3: SOIL ANALYSIS RESULTS (OTAIHANGA MOUNTAIN BIKE PARK)

Sampling Date	12/10/2011	12/10/2011	10/10/2011	10/10/2011	11/10/2011	11/10/2011	**Assessment Criteria**			
Test Pit Number	BH305	BH305	BH306	BH306	BH307	BH307				
Sample Number	11:125	11:125	11:125	11:125	11:125	11:125	**Contaminated Site Assessment**			
Laboratory Number	942066.5	942066.6	942066.1	942066.2	942066.3	942066.4	**Background Levels***	**Environmental Risk**	**Human Health Risk**	
Sample Depth (m)	3.6-3.9	9.8-10.1	3.0-3.3	9.9-10.1	2.6-2.8	10.1-10.5				
Soil Type	Sand	Sand	Silt	Sand	Sand	Sand				
Heavy metal (mg/kg dry weight)										
Arsenic	< 2	< 2	< 2	< 2	< 2	2	<2-7	12[#]	500*	
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	<0.1-0.1	22[#]	100**	
Chromium	7	7	7	6	6	6	7-12	87[#]	NL*	
Copper	10	7	10	7	7	6	4-10	91[#]	NL*	
Lead	3.9	4.2	4	4.2	3.5	4.1	5-15	600[#]	1500**	
Nickel	4	5	5	5	6	5	4-9	50[#]	3000**	
Zinc	28	24	56	26	25	25	28-79	360[#]	35000**	
Pesticides (mg/kg dry weight)										
Aldrin	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
alpha-BHC	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
beta-BHC	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
delta-BHC	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
gamma-BHC (Lindane)	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
4,4'-DDD	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
4,4'-DDE	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
4,4'-DDT	< 0.3	< 0.3	< 1.1	< 0.3	< 0.3	< 0.3	-	-	-	
Total DDT	<0.58	<0.58	<2.3	<0.6	<0.6	<0.6	-	12[#]	1000**	
Dieldrin	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	50**	
Endosulfan I	< 0.3	< 0.3	< 1.1	< 0.3	< 0.3	< 0.3	-	-	-	
Endosulfan II	< 0.5	< 0.5	< 1.1	< 0.5	< 0.5	< 0.5	-	-	-	
Endosulfan sulphate	< 0.3	< 0.3	< 1.1	< 0.3	< 0.3	< 0.3	-	-	-	
Endrin	< 0.3	< 0.3	< 1.1	< 0.3	< 0.3	< 0.3	-	-	-	
Endrin ketone	< 0.3	< 0.3	< 1.1	< 0.3	< 0.3	< 0.3	-	-	-	
Heptachlor	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	50**	
Heptachlor epoxide	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
Hexachlorobenzene	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
SVOC (mg/kg dry weight)									**<1m**	**1m-4m**
Acenaphthene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Acenaphthylene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Anthracene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Benzo[a]anthracene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Benzo[a]pyrene (BAP)	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	0.7[#]	10[§]	
Benzo[b]fluoranthene	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
Benzo[g,h,i]perylene	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
Benzo[k]fluoranthene	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
2-Chloronaphthalene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Chrysene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Dibenzo[a,h]anthracene	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
Fluoranthene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Fluorene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Indeno(1,2,3-c,d)pyrene	< 0.14	< 0.14	< 0.6	< 0.15	< 0.15	< 0.15	-	-	-	
2-Methylnaphthalene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Naphthalene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	190 (sand)^ 210 (sandy silt)^ 8000 (peat)^	230 (sand)^ 270 (sandy silt)^ 9000 (peat)^
Phenanthrene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	-	
Pyrene	< 0.10	< 0.10	< 0.3	< 0.10	< 0.10	< 0.10	-	-	NA (sand)^ NA (sandy silt)^ NA (peat)^	NA (sand)^ NA (sandy silt)^ NA (peat)^
BaP Equivalent	0.17	0.17	0.71	0.18	0.18	0.18	-	-	11 (sand)^ 11 (sandy silt)^ 11 (peat)^	25 (sand)^ 25 (sandy silt)^ 25 (peat)^
Pentachlorophenol (PCP)	< 6	< 6	< 11	< 6	< 6	< 6	-	-	570**	
All other compounds	Below detection						-	-	-	

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.

Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'industrial' land use have been selected.

* Health and Environmental Guidelines for Selected Timber Treatment Chemicals, MfE, 1997. Values for 'industrial unpaved - adopted' have been used.

** Guideline on the Investigation Levels for Soil and Groundwater, NEPC, 1999. Values applicable to 'Health Investigation Level F - commercial/industrial' have been used.

§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'commercial/industrial' have been used.

^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'commercial/industrial' land use have been selected.

Results exceeding background levels are <u>underlined</u>

Results exceeding environmental risk criteria are shaded in grey

Results exceeding human health risk criteria are in **bold**

NL - No Limit. Derived value exceeds 10000 mg/kg.

NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 3: SOIL ANALYSIS RESULTS (124-154 TE MOANA ROAD)

Sampling Date	1/08/2011								2/08/2011			Assessment Criteria					
Test Pit Number	**HA101**	**HA102**	**HA103**	**HA104**	**HA105**	**HA106**	**HA107**	**HA108**	**HA109**	**HA110**	**HA111**						
Sample Number	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	**Contaminated Site Assessment**				**Health Risk to Construction Workers**	**Public Health Risk**
Laboratory Number	918870.1	918870.2	918870.3	918870.4	918870.5	918870.6	918870.7	918870.8	919264.1	919264.2	919264.3	**Background Levels[a]**	**Environmental Risk**	**Human Health Risk**			
Sample Depth (m)	0.3-0.5	0-0.4	0-0.4	0-0.5	0-0.4	0-0.4	0-0.5	0-0.5	0-0.5	0-0.3	0-0.5						
Soil Type	Silty sand	Silty sand	Clayey silt	Clayey silt	Silty sand	Silty sand	Silty sand	Silty sand	Sandy silt	Silty sand	Silty sand						
Heavy metal (mg/kg dry weight)																	
Arsenic	3	3	3	3	3	4	4	4	3	5	4	<2-7	12[#]	4.2*		70[+]	20[++]
Cadmium	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	0.1	0.12	0.13	< 0.10	<0.1-0.1	1.4[#]	20**		1300[+]	3[++]
Chromium	11	9	19	16	12	10	9	11	12	15	13	7-12	64[#]	10000*		NL[+]	NL[++]
Copper	8	8	14	10	10	7	8	10	9	12	9	4-10	63[#]	39*		NL[+]	NL[++]
Lead	8.5	6.2	18.4	14.1	10.3	7	6.8	10.9	11.7	14.6	11.4	5-15	70[#]	300**		3300[+]	210[++]
Nickel	8	7	13	12	9	7	7	8	9	10	9	4-9	50[#]	600**		-	-
Zinc	42	34	68	55	46	35	35	50	49	59	47	28-79	200[#]	7000**		-	-
Organochlorine Pesticides (mg/kg dry weight)																	
Aldrin	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
Chlordane	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	-	-	50**		-	-
2,4'-DDD	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
4,4'-DDD	< 0.0010	0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
2,4'-DDE	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
4,4'-DDE	< 0.0010	0.021	< 0.0010	0.0034	0.0038	0.0033	0.022	0.05	0.0058	0.0032	0.0013	-	-	-		-	-
2,4'-DDT	< 0.0010	0.0014	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.002	0.0061	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
4,4'-DDT	< 0.0010	0.0064	< 0.0010	0.0014	0.0013	0.0014	0.0104	0.021	0.002	< 0.0010	< 0.0010	-	-	-		-	-
Total DDT	<0.006	0.0321	<0.006	<0.0088	<0.0091	<0.0087	0.0374	0.0801	<0.0818	<0.0082	<0.0063	-	0.7[#]	200**		1000[+]	70[++]
Dieldrin	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	10**		160[+]	2.6[++]
Endosulfan I	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
Endosulfan II	< 0.0010	0.0027	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
Endosulfan sulphate	< 0.0010	0.0107	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0022	0.0039	0.0025	< 0.0010	0.003	-	-	-		-	-
Heptachlor	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	10**		-	-
Hexachlorobenzene	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
All other compounds	Below detection											-	-	-		-	-
Organonitro&phosphorus Pesticides (mg/kg dry weight)																	
Alachlor	< 0.006	0.107	0.014	0.007	0.06	0.014	0.023	0.007	0.016	< 0.006	0.026	-	-	-		-	-
Cyhalothrin	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	-	-	-		-	-
Difenoconazole	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.010	< 0.011	< 0.012	< 0.011	-	-	-		-	-
Pirimicarb	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	-	-	-		-	-
Procymidone	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	-	-	-		-	-
Prometryn	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	-	-	-		-	-
All other compounds	Below detection											-	-	-		-	-
Polycyclic Aromatic Hydrocarbons (mg/kg dry weight)														**<1m**	**1m-4m**		
Acenaphthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Acenaphthylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Benzo[a]anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Benzo[a]pyrene (BAP)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	0.1[#]	0.2[§]		-	-
Benzo[b]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Benzo[g,h,i]perylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Benzo[k]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Chrysene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Dibenzo[a,h]anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Fluoranthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Fluorene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Indeno(1,2,3-c,d)pyrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Naphthalene	< 0.14	< 0.14	< 0.14	< 0.14	< 0.13	< 0.14	< 0.14	< 0.13	< 0.15	< 0.16	< 0.13	-	-	7.2 (sand)^ 7.2 (sandy silt)^	70 (sand)^ 83 (sandy silt)^	-	-
Phenanthrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	-		-	-
Pyrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	-	-	160 (sand)^ 160 (sandy silt)^	NA (sand)^ NA (sandy silt)^	-	-
BaP Equivalent	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	-	-	0.027 (sand)^ 0.027 (sandy silt)^	25 (sand)^ 25 (sandy silt)^	35[+]	10[++]

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.

Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'agricultural' land use have been selected.

* Health and Environmental Guidelines for Selected Timber Treatment Chemicals, MfE, 1997. Values for 'agricultural - health combination' have been used.

** Guideline on the Investigation Levels for Soil and Groundwater, NEPC, 1999. Values applicable to 'Health Investigation Level A - standard residential' have been used.

§ Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE, 1997. Values for 'agricultural/horticultural - adopted' have been used.

^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'agricultural' land use have been selected.

+ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'commercial/industrial outdoor worker' have been used.

++ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'residential 10% produce' have been used.

Results exceeding background levels are underlined

Results exceeding environmental risk criteria are shaded in grey

Results exceeding human health risk criteria are in **bold**

NL - No Limit. Derived value exceeds 10000 mg/kg.

NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 3: SOIL ANALYSIS RESULTS (124-154 TE MOANA ROAD)

Sampling Date	2/08/2011			1/08/2011								Assessment Criteria					
Test Pit Number	**HA112**	**HA116**	**HA117**	**HA118**	**HA119**	**HA120**	**HA121**	**HA122**	**HA123**	**HA124**	**HA125**						
Sample Number	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	**Contaminated Site Assessment**				**Health Risk to Construction Workers**	**Public Health Risk**
Laboratory Number	919264.4	919264.6	919264.7	918870.15	918870.9	918870.16	918870.10	918870.11	918870.12	918870.13	918870.14	**Background Levels[a]**	**Environmental Risk**	**Human Health Risk**			
Sample Depth (m)	0-0.5	0-0.5	0-0.5	0-0.35	0-0.5	0-0.5	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1						
Soil Type	Silty sand	Silty sand	Silty sand	Sandy silt	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand						
Heavy metal (mg/kg dry weight)																	
Arsenic	4	3	4	5	3	4	5	3	4	4	4	<2-7	12[#]	4.2*		70[+]	20[++]
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	0.2	0.29	0.12	0.16	<0.1-0.1	1.4[#]	20**		1300[+]	3[++]
Chromium	13	9	9	10	9	10	10	10	12	11	11	7-12	64[#]	10000*		NL[+]	NL[++]
Copper	9	6	9	9	9	8	10	8	30	11	12	4-10	63[#]	39*		NL[+]	NL[++]
Lead	11.3	6.2	9.9	8.9	6.8	8.8	10.7	8.2	9.1	10	12	5-15	70[#]	300**		3300[+]	210[++]
Nickel	10	7	6	7	7	8	7	8	8	7	7	4-9	50[#]	600**		-	-
Zinc	47	34	60	38	35	40	132	44	89	70	510	28-79	200[#]	7000**		-	-
Organochlorine Pesticides (mg/kg dry weight)																	
Aldrin	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-	-		-	-
Chlordane	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	-	-	50**		-	-
2,4'-DDD	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0015	0.0044	0.001	< 0.0010	-	-	-		-	-
4,4'-DDD	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0013	0.0041	0.0014	0.0047	0.0125	0.0024	0.0011	-	-	-		-	-
2,4'-DDE	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-	-		-	-
4,4'-DDE	0.0014	0.035	< 0.0010	0.0126	0.0088	0.032	0.013	0.04	0.041	0.023	0.025	-	-	-		-	-
2,4'-DDT	< 0.0010	0.0042	< 0.0010	< 0.0010	< 0.0010	0.0025	0.0048	0.0087	0.0137	0.0045	0.0018	-	-	-		-	-
4,4'-DDT	< 0.0010	0.022	< 0.0010	0.0021	0.0034	0.0138	0.051	0.126	0.084	0.065	0.021	-	-	-		-	-
Total DDT	<0.0064	0.0642	<0.006	<0.0187	0.0165	0.0544	0.0722	0.1819	0.1566	0.0969	0.0509	-	0.7[#]	200**		1000[+]	70[++]
Dieldrin	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0115	< 0.0010	< 0.0010	-	-	10**		160[+]	2.6[++]
Endosulfan I	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0095	< 0.0010	< 0.0010	-	-	-		-	-
Endosulfan II	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0014	< 0.0010	0.0011	0.0025	0.045	0.0053	0.0019	-	-	-		-	-
Endosulfan sulphate	0.0014	0.002	< 0.0010	0.0016	0.0101	0.0014	0.0015	0.0049	0.071	0.0031	0.0091	-	-	-		-	-
Heptachlor	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0015	< 0.0010	-	-	10**		-	-
Hexachlorobenzene	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0014	-	-	-		-	-
All other compounds	Below detection											-	-	-		-	-
Organonitro&phosphorus Pesticides (mg/kg dry weight)																	
Alachlor	0.015	< 0.006	< 0.04	0.047	0.021	0.039	< 0.006	< 0.006	12.9	0.033	0.014	-	-	-		-	-
Cyhalothrin	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.007	< 0.008	0.12	< 0.007	< 0.008	-	-	-		-	-
Difenoconazole	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011	< 0.011	< 0.010	< 0.011	< 0.11	0.01	< 0.011	-	-	-		-	-
Pirimicarb	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.007	< 0.008	0.5	< 0.007	< 0.008	-	-	-		-	-
Procymidone	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.007	< 0.008	0.14	< 0.007	< 0.008	-	-	-		-	-
Prometryn	< 0.004	< 0.004	< 0.04	< 0.005	< 0.004	< 0.004	< 0.004	< 0.004	< 0.04	0.022	0.004	-	-	-		-	-
All other compounds	Below detection											-	-	-		-	-
Polycyclic Aromatic Hydrocarbons (mg/kg dry weight)														**<1m**	**1m-4m**		
Acenaphthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Acenaphthylene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Anthracene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Benzo[a]anthracene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Benzo[a]pyrene (BAP)	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	-	0.1[#]	0.2[§]		-	-
Benzo[b]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.12	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Benzo[g,h,i]perylene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Benzo[k]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Chrysene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.1	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Dibenzo[a,h]anthracene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Fluoranthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.27	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Fluorene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Indeno(1,2,3-c,d)pyrene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.05	< 0.03	< 0.03	< 0.03	< 0.03	-	-	-		-	-
Naphthalene	< 0.14	< 0.15	< 0.15	< 0.16	< 0.14	< 0.14	< 0.13	< 0.14	< 0.13	< 0.13	< 0.14	-	-	7.2 (sand)^ 7.2 (sandy silt)^	70 (sand)^ 83 (sandy silt)^	-	-
Phenanthrene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	0.39	< 0.03	0.04	< 0.03	< 0.03	-	-	-		-	-
Pyrene	< 0.03	< 0.03	2.1	< 0.04	< 0.03	< 0.03	0.25	< 0.03	0.3	< 0.03	< 0.03	-	-	160 (sand)^ 160 (sandy silt)^	NA (sand)^ NA (sandy silt)^	-	-
BaP Equivalent	0.04	0.04	0.04	0.05	0.04	0.04	0.10	0.04	0.04	0.04	0.04	-	-	0.027 (sand)^ 0.027 (sandy silt)^	25 (sand)^ 25 (sandy silt)^	35[+]	10[++]

Annotations:

[a] Determination of common pollutant background soil concentrations for the Wellington region, GWRC 2003. Values applicable to 'Main Soil Type 1 (Sand)' have been used.

Canadian Soil Quality Guidelines, Canadian Council of Ministers of the Environment, 1999. Values applicable to 'agricultural' land use have been selected.

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^ Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999. Values for 'agricultural' land use have been selected.

+ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'commercial/industrial outdoor worker' have been used.

++ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011. Values applicable to 'residential 10% produce' have been used.

Results exceeding background levels are underlined

Results exceeding environmental risk criteria are shaded in grey

Results exceeding human health risk criteria are in **bold**

NL - No Limit. Derived value exceeds 10000 mg/kg.

NA - indicates contaminant not limiting. Greater than 20000 mg/kg for TPH and 10000 mg/kg for other contaminants.

SECTOR 3: WASTE ACCEPTANCE CRITERIA (124-154 TE MOANA ROAD)

Sampling Date	1/08/2011								2/08/2011				Waste Acceptance Criteria	
Test Pit Number	**HA101**	**HA102**	**HA103**	**HA104**	**HA105**	**HA106**	**HA107**	**HA108**	**HA109**	**HA110**	**HA111**	**HA111 dup**		
Sample Number	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099		
Laboratory Number	918870.1	918870.2	918870.3	918870.4	918870.5	918870.6	918870.7	918870.8	919264.1	919264.2	919264.3	919264.5	**Porirua City Council**	**Hutt City Council**
Sample Depth (m)	0.3-0.5	0-0.4	0-0.4	0-0.5	0-0.4	0-0.4	0-0.5	0-0.5	0-0.5	0-0.3	0-0.5	0-0.5	**Spicer Landfill (Class B)**	**Silverstream Landfill (Class A)**
Soil Type	Silty sand	Silty sand	Clayey silt	Clayey silt	Silty sand	Silty sand	Silty sand	Silty sand	Sandy silt	Silty sand	Silty sand	Silty sand	**(mg/kg)**	**(mg/kg)**
Heavy metal (mg/kg dry weight)														
Arsenic	3	3	3	3	3	4	4	4	3	5	4	4	10	100
Cadmium	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	0.1	0.12	0.13	< 0.10	< 0.10	2	20
Chromium	**11**	9	**19**	**16**	**12**	10	9	**11**	**12**	**15**	**13**	**13**	10	100
Copper	8	8	**14**	10	10	7	8	10	9	**12**	9	8	10	28
Lead	8.5	6.2	**18.4**	**14.1**	**10.3**	7	6.8	10.9	**11.7**	**14.6**	**11.4**	**11.3**	10	100
Nickel	8	7	13	12	9	7	7	8	9	10	9	9	20	40
Zinc	**42**	**34**	**68**	**55**	**46**	**35**	**35**	**50**	**49**	**59**	**47**	**47**	20	160
Pesticides (mg/kg dry weight)														
Aldrin	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0011**	0.000016	0.02
2,4'-DDD	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
4,4'-DDD	< 0.0010	0.0013	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
2,4'-DDE	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
4,4'-DDE	< 0.0010	0.021	< 0.0010	0.0034	0.0038	0.0033	0.022	0.05	0.0058	0.0032	0.0013	0.0013	-	-
2,4'-DDT	< 0.0010	0.0014	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.002	0.0061	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
4,4'-DDT	< 0.0010	0.0064	< 0.0010	0.0014	0.0013	0.0014	0.0104	0.021	0.002	< 0.0010	< 0.0010	< 0.0011	-	-
Total DDT	<0.006	0.0321	<0.006	<0.0088	<0.0091	<0.0087	0.0374	0.0801	<0.0818	<0.0082	<0.0063	<0.0063	-	-
Dieldrin	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	0.8	0.08
Endosulfan I	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	0.6	4
Endosulfan II	< 0.0010	0.0027	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
Endosulfan sulphate	< 0.0010	0.0107	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0022	0.0039	0.0025	< 0.0010	0.003	0.0023	-	-
Endrin Aldehyde	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0018	-	-
Heptachlor	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
Hexachlorobenzene	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	-	-
Acetochlor	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	< 0.008	-	-
Alachlor	< 0.006	0.107	0.014	0.007	0.06	0.014	0.023	0.007	0.016	< 0.006	0.026	0.011	-	-
Cyhalothrin	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	< 0.008	-	-
Pirimicarb	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	< 0.008	-	-
Procymidone	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.008	< 0.008	< 0.008	-	-
Prometryn	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	-	-
All other compounds	Below detection													
Polycyclic Aromatic Hydrocarbons Screening in Soil														
Acenaphthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Acenaphthylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Benzo[a]anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Benzo[a]pyrene (BAP)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Benzo[b]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Benzo[g,h,i]perylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Benzo[k]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Chrysene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Dibenzo[a,h]anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Fluoranthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Fluorene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Indeno(1,2,3-c,d)pyrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Naphthalene	< 0.14	< 0.14	< 0.14	< 0.14	< 0.13	< 0.14	< 0.14	< 0.13	< 0.15	< 0.16	< 0.13	< 0.14	20	-
Phenanthrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
Pyrene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	-	-
BaP equivalent	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04		
Materials in Borehole Log which Preclude Soils as Cleanfill?	No	No	No	No	No	No	No	No	No	No	No	No		

Annotations:

Results exceeding Spicer Landfill (Class B) waste acceptance criteria are in **bold**

Results exceeding Silverstream Landfill (Class A) waste acceptance criteria are shaded in grey

SECTOR 3: WASTE ACCEPTANCE CRITERIA (124-154 TE MOANA ROAD)

Sampling Date	2/08/2011			1/08/2011									**Waste Acceptance Criteria**	
Test Pit Number	**HA112**	**HA116**	**HA117**	**HA118**	**HA119**	**HA120**	**HA120 dup**	**HA121**	**HA122**	**HA123**	**HA124**	**HA125**		
Sample Number	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099	11:099		
Laboratory Number	919264.4	919264.6	919264.7	918870.15	918870.9	918870.16	918870.17	918870.10	918870.11	918870.12	918870.13	918870.14	**Porirua City Council**	**Hutt City Council**
Sample Depth (m)	0-0.5	0-0.5	0-0.5	0-0.35	0-0.5	0-0.5	0-0.5	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1	**Spicer Landfill (Class B)**	**Silverstream Landfill (Class A)**
Soil Type	Silty sand	Silty sand	Silty sand	Sandy silt	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand	Silty sand	**(mg/kg)**	**(mg/kg)**
Heavy metal (mg/kg dry weight)														
Arsenic	4	3	4	5	3	4	4	5	3	4	4	4	10	100
Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13	0.2	0.29	0.12	0.16	2	20
Chromium	**13**	9	9	10	9	10	**11**	10	10	**12**	**11**	**11**	10	100
Copper	9	6	9	9	9	8	8	10	8	**30**	**11**	**12**	10	28
Lead	**11.3**	6.2	9.9	8.9	6.8	8.8	9.3	**10.7**	8.2	9.1	10	**12**	10	100
Nickel	10	7	6	7	7	8	8	7	8	8	7	7	20	40
Zinc	**47**	**34**	**60**	**38**	**35**	**40**	**41**	**132**	**44**	**89**	**70**	**510**	20	160
Pesticides (mg/kg dry weight)														
Aldrin	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0011**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	**< 0.0010**	0.000016	0.02
2,4'-DDD	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	0.0015	0.0044	0.001	< 0.0010	-	-
4,4'-DDD	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0013	0.0041	< 0.0011	0.0014	0.0047	0.0125	0.0024	0.0011	-	-
2,4'-DDE	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-
4,4'-DDE	0.0014	0.035	< 0.0010	0.0126	0.0088	0.032	0.021	0.013	0.04	0.041	0.023	0.025	-	-
2,4'-DDT	< 0.0010	0.0042	< 0.0010	< 0.0010	< 0.0010	0.0025	0.0017	0.0048	0.0087	0.0137	0.0045	0.0018	-	-
4,4'-DDT	< 0.0010	0.022	< 0.0010	0.0021	0.0034	0.0138	0.009	0.051	0.126	0.084	0.065	0.021	-	-
Total DDT	<0.0064	0.0642	<0.006	<0.0187	0.0165	0.0544	0.035	0.0722	0.1819	0.1566	0.0969	0.0509	-	-
Dieldrin	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	< 0.0010	0.0115	< 0.0010	< 0.0010	0.8	0.08
Endosulfan I	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	< 0.0010	0.0095	< 0.0010	< 0.0010	0.6	4
Endosulfan II	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0014	< 0.0010	< 0.0011	0.0011	0.0025	0.045	0.0053	0.0019	-	-
Endosulfan sulphate	0.0014	0.002	< 0.0010	0.0016	0.0101	0.0014	< 0.0011	0.0015	0.0049	0.071	0.0031	0.0091	-	-
Endrin Aldehyde	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-	-
Heptachlor	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	< 0.0010	< 0.0010	0.0015	< 0.0010	-	-
Hexachlorobenzene	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0014	-	-
Acetochlor	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	< 0.08	< 0.007	< 0.008	-	-
Alachlor	0.015	< 0.006	< 0.04	0.047	0.021	0.039	< 0.006	< 0.006	< 0.006	12.9	0.033	0.014	-	-
Cyhalothrin	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	0.12	< 0.007	< 0.008	-	-
Pirimicarb	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	0.5	< 0.007	< 0.008	-	-
Procymidone	< 0.008	< 0.008	< 0.08	< 0.009	< 0.008	< 0.008	< 0.008	< 0.007	< 0.008	0.14	< 0.007	< 0.008	-	-
Prometryn	< 0.004	< 0.004	< 0.04	< 0.005	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.04	0.022	0.004	-	-
All other compounds	Below detection													
Polycyclic Aromatic Hydrocarbons Screening in Soil														
Acenaphthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Acenaphthylene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Anthracene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Benzo[a]anthracene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Benzo[a]pyrene (BAP)	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Benzo[b]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.12	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Benzo[g,h,i]perylene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Benzo[k]fluoranthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Chrysene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.1	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Dibenzo[a,h]anthracene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Fluoranthene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.27	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Fluorene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Indeno(1,2,3-c,d)pyrene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.05	< 0.03	< 0.03	< 0.03	< 0.03	-	-
Naphthalene	< 0.14	< 0.15	< 0.15	< 0.16	< 0.14	< 0.14	< 0.14	< 0.13	< 0.14	< 0.13	< 0.13	< 0.14	20	-
Phenanthrene	< 0.03	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03	0.39	< 0.03	0.04	< 0.03	< 0.03	-	-
Pyrene	< 0.03	< 0.03	2.1	< 0.04	< 0.03	< 0.03	< 0.03	0.25	< 0.03	0.3	< 0.03	< 0.03	-	-
BaP equivalent	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.10	0.04	0.04	0.04	0.04		
Materials in Borehole Log which Preclude Soils as Cleanfill?	No	No	No	No	No	No	No	No	No	No	No	No		

Annotations:

Results exceeding Spicer Landfill (Class B) waste acceptance criteria are in **bold**

Results exceeding Silverstream Landfill (Class A) waste acceptance criteria are shaded in grey

SECTOR 3 – BOREHOLE LOGS

Boreholes	**Location**
BH305 to BH307	Otaihanga Mountain Bike Park

Sector 3 – Summary of Groundwater Sampling and Analysis

Borehole Number	**Borehole Depth (m bgl)**	**Screen Depth (m bgl)**	**Laboratory Number**	**Analysis Suite**
BH305	10.5	7.5-10.5	944634.1	HM, SVOC, VOC, TPH, nutrient suite, anion/cation, faecal coliform, E.coli
BH306	10.5	7-10.5	944634.2	HM, SVOC, VOC, TPH, nutrient suite, anion/cation, faecal coliform, E.coli
BH307	10	7.6-10	944634.3	HM, SVOC, VOC, TPH, nutrient suite, anion/cation, faecal coliform, E.coli

Sector 3 – Otaihanga Mountain Bike Park– Summary of Soil Sampling and Analysis

Borehole Number	**Borehole Depth (m bgl)**	**Sample Depth (m bgl)**	**Laboratory Number**	**Analysis Suite**
BH305	10.5	3.6-3.9	942066.5	HM, SVOC
		9.8-10.1	942066.6	HM, SVOC
BH306	10.5	3.0-3.3	942066.1	HM, SVOC
		9.9-10.1	942066.2	HM, SVOC
BH307	10	2.6-2.8	942066.3	HM, SVOC
		10.1-10.5	942066.4	HM, SVOC

BOREHOLE No: 2011/BH305

MACHINE BOREHOLE LOG

SHEET 1 of 2

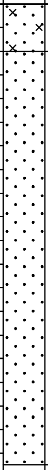
PROJECT:	Mackays to Peka Peka Expressway	JOB NUMBER:	3320901
SITE LOCATION:	Kapiti Coast	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,470,956.8 m
E 1,770,140.5 m

BOREHOLE LOCATION: Near fence between Otaihanga Landfill and Treatment Plant
R L: 9.3 m
DATUM: Mean sea level

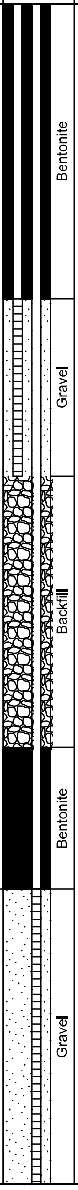
CORE RECOVERY	METHOD	SPT 'N'	SAMPLES
100 %	TT		
100 %	SPT	5 7 8 9 11 12 N=40	
100 %	TT		
66 %	SPT	5 5 7 8 9 9 N=33	D
76 %	TT		
100 %	SPT	2 4 7 7 8 8 N=30	
81 %	TT		
100 %	SPT	3 6 7 10 11 11 N=39	
90 %	TT		
0 %	SC	3 6 10 14 16 10 for 48mm N=50+	
100 %	TT		
0 %	SC	5 8 18 19 18 for 65mm N=50+	
90 %	TT		D

(FLUID LOSS, WATER LEVEL, RQD, CASING, SV, τ (kPa): no entries)



USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT
SM	W	'Loose', silty fine to medium SAND, minor organics; dark brown; wet, low plasticity. Organics: Amorphous, trace rootlets.	Holocene Sand
SP	M	Medium dense, fine to medium SAND, minor silt, trace organics; brownish red; moist, non plastic. Organics: Amorphous, trace rootlets. Interbedded with moderately thin (150mm) bands of cemented sand. 2.5 m depth, brown. Uncemented.	
SP	S	Dense, fine to medium SAND, minor silt; grey; saturated, non plastic. 7.5 m depth, very dense.	Pleistocene Sand

DEPTH (m): 1, 2, 3, 4, 5, 6, 7, 8, 9



R L (m): 9, 8, 7, 6, 5, 4, 3, 2, 1, 0

DATE STARTED:	12/10/11	DRILLED BY:	Perry Drilling Ltd
DATE FINISHED:	12/10/11	EQUIPMENT:	John Deere Tractor Rig
LOGGED BY:	AT	DRILL METHOD:	Rotary wireline
SHEAR VANE No:	N/A	DRILL FLUID:	Water & mud
		DIAMETER/INCLINATION:	90 mm / 90°

COMMENTS:
Shallow piezometer installed in adjacent bore (~1m offset) to 4 m depth. SC = Solid cone SPT.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:50

BOREHOLE No: 2011/BH305

MACHINE BOREHOLE LOG

SHEET 2 of 2

PROJECT:	Mackays to Peka Peka Expressway	JOB NUMBER:	3320901
SITE LOCATION:	Kapiti Coast	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,470,956.8 m
E 1,770,140.5 m

BOREHOLE LOCATION: Near fence between Otaihanga Landfill and Treatment Plant
R L: 9.3 m
DATUM: Mean sea level

DRILLING						IN-SITU TESTS											
FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	INSTRUMENTATION	R L (m)
		90 %	TT					2 4 10 18 19 3 for 5mm N=50+				SP	S	Very dense, fine to medium SAND, minor silt; bluish grey; saturated, non plastic.		Gravel	-1
										11 12 13 14 15 16 17 18 19				END OF LOG @ 10.5 m			-2 -3 -4 -5 -6 -7 -8 -9 -10

DATE STARTED:	12/10/11	DRILLED BY:	Perry Drilling Ltd
DATE FINISHED:	12/10/11	EQUIPMENT:	John Deere Tractor Rig
LOGGED BY:	AT	DRILL METHOD:	Rotary wireline
SHEAR VANE No:	N/A	DRILL FLUID:	Water & mud
		DIAMETER/INCLINATION:	90 mm / 90°

COMMENTS:
Shallow piezometer installed in adjacent bore (~1m offset) to 4 m depth. SC = Solid cone SPT.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

BOREHOLE No: 2011/BH306

MACHINE BOREHOLE LOG

SHEET 1 of 2

PROJECT:	Mackays to Peka Peka Expressway	JOB NUMBER:	3320901
SITE LOCATION:	Kapiti Coast	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,471,202.9 m
E 1,770,306.6 m

BOREHOLE LOCATION: At edge of landfill adjacent to leachate drain
R L: 8.25 m
DATUM: Mean sea level

DRILLING: FLUID LOSS | WATER LEVEL | CORE RECOVERY | METHOD | RQD | CASING

WATER LEVEL	CORE RECOVERY	METHOD	IN-SITU TESTS SPT 'N'	SAMPLES
12/10/11 (Shallow)	100 %	TT		
12/10/11 (Deep)	46 %	TT		
	63 %	TT		D
	100 %	SPT	0 3 2 7 7 10 N=26	
	100 %	TT		
	100 %	SPT	3 5 10 14 18 8 for 19mm N=50+	
	100 %	TT		
	0 %	SC	2 4 10 17 23 for 61mm N=50+	
	100 %	TT		
	0 %	SC	3 3 8 13 17 12 for 50mm N=50+	
	100 %	TT		

IN-SITU TESTS: SV | τ (kPa) | SPT 'N'

DEPTH (m): 1, 2, 3, 4, 5, 6, 7, 8, 9

USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT
SW	M	'Loose', fine to coarse SAND, some silt, trace clay, trace gravel; brown mottled light grey; moist, low plasticity.	**Fill**
ML	W	Very soft, fine to medium sandy SILT, some organics, trace clay; brownish black; moist, low plasticity. Organics: Fibrous, some amorphous.	**Interdune deposits**
OL	W	Very soft, PEAT, minor silt, trace clay; brownish black; wet, low plasticity. Organics: Fibrous, some amorphous. [Peat H7] 1.5 m depth, 450 mm thick partially decomposed tree trunk.	
		No recovery. Peat washed away below tree trunk.	
OL	W	Very soft, PEAT, minor silt, trace clay; brownish black; wet, low plasticity. Organics: Fibrous, some amorphous. [Peat H7] 2.8 m depth, 200 mm thick partially decomposed tree trunk.	
OL	S	Very soft, ORGANIC SILT, trace clay; brownish black; saturated, low plasticity. Organics: Fibrous, some amorphous. [Peat H8]	
SP	S	'Loose', silty fine to medium SAND, some organics, trace clay; brownish black; saturated, low plasticity. Organics: Amorphous, minor fibrous.	
SP	W	Medium dense, fine to medium SAND, minor silt; grey; wet, non plastic. Trace fibrous organics. 5.8 m depth, thin (20 mm) lens of firm, ORGANIC SILT, trace clay; black; moist, low plasticity. Organics: Amorphous. [Peat H9]	**Holocene Sand**
		Very dense.	**Pleistocene Sand**

INSTRUMENTATION: Bentonite, Gravel, Backfill, Bentonite, Gravel, Gravel

R L (m): 8, 7, 6, 5, 4, 3, 2, 1, 0, -1

DATE STARTED:	10/10/11	DRILLED BY:	Perry Drilling Ltd
DATE FINISHED:	10/10/11	EQUIPMENT:	John Deere Tractor Rig
LOGGED BY:	AT	DRILL METHOD:	Rotary wireline
SHEAR VANE No:	N/A	DRILL FLUID:	Water & mud
		DIAMETER/INCLINATION:	90 mm / 90°

COMMENTS:
Shallow piezometer installed in adjacent bore (~1m offset) to 2.5 m depth. SC = Solid cone SPT.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:50

BOREHOLE No: 2011/BH306

MACHINE BOREHOLE LOG

SHEET 2 of 2

PROJECT:	Mackays to Peka Peka Expressway	JOB NUMBER:	3320901
SITE LOCATION:	Kapiti Coast	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,471,202.9 m
E 1,770,306.6 m

BOREHOLE LOCATION: At edge of landfill adjacent to leachate drain
R L: 8.25 m
DATUM: Mean sea level

DRILLING						IN-SITU TESTS											
FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	INSTRUMENTATION	R L (m)
		100 %	TT					5				SP	W	Medium dense, fine to medium SAND, minor silt; grey; wet, non plastic.		Gravel	-2
								10 24 26 for 56mm N=50+		11 12 13 14 15 16 17 18 19				END OF LOG @ 10.5 m			-3 -4 -5 -6 -7 -8 -9 -10 -11

DATE STARTED:	10/10/11	DRILLED BY:	Perry Drilling Ltd
DATE FINISHED:	10/10/11	EQUIPMENT:	John Deere Tractor Rig
LOGGED BY:	AT	DRILL METHOD:	Rotary wireline
SHEAR VANE No:	N/A	DRILL FLUID:	Water & mud
		DIAMETER/INCLINATION:	90 mm / 90°

COMMENTS:
Shallow piezometer installed in adjacent bore (~1m offset) to 2.5 m depth. SC = Solid cone SPT.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

BOREHOLE No: 2011/BH307

MACHINE BOREHOLE LOG

SHEET 1 of 2

PROJECT:	Mackays to Peka Peka Expressway	JOB NUMBER:	3320901
SITE LOCATION:	Kapiti Coast	CLIENT:	NZTA

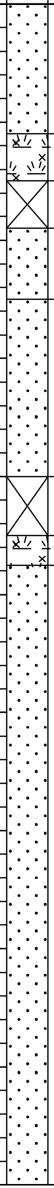
CIRCUIT: NZTM
COORDINATES: N 5,471,309.8 m
E 1,770,450 m

BOREHOLE LOCATION: At northern end of leachate drain
R L: 8.3 m
DATUM: Mean sea level

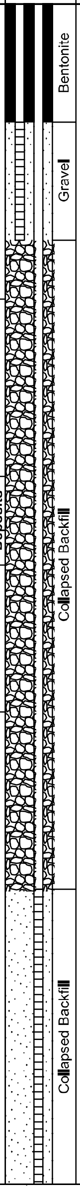
DRILLING

FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	SV	τ (kPa)	SPT 'N'	SAMPLES
	12/10/11 Shallow 12/10/11 Deep	100 %	TT						
		73 %	TT						D
		100 %	SPT					2 3 6 9 10 10 N=35	
		52 %	TT						
		100 %	SPT					0 1 3 4 7 8 N=22	
		85 %	TT						
		100 %	SPT					2 4 6 10 15 19 for 58mm N=50+	
		100 %	TT						
		93 %	TT					3 2 8 22 20 for 61mm N=50+	
		0 %	SC					2 3 5 13 20 12 for 47mm N=50+	
		100 %	TT						

DEPTH (m): 1, 2, 3, 4, 5, 6, 7, 8, 9



USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT
SP	M	'Loose', fine to medium SAND, minor silt, trace organics, trace gravel; brown; moist, non plastic. Organics: Amorphous and fibrous.	Fill
OL	W	Soft, ORGANIC SILT, trace fine sand, trace clay; brownish black; wet, low plasticity. Organics: Amorphous, trace fibrous. [Peat H8]	
		No recovery.	
SP	S	'Loose', fine to medium SAND, minor silt, minor organics; dark brown; saturated, non plastic. Organics: Amorphous, minor fibrous. Plastic bag fragment in core.	
SP	S	Dense, fine to medium SAND, minor silt, trace organics; brown; saturated, non plastic. Organics: Amorphous.	Holocene Sand
		No recovery. Peat washed away.	Interdune Deposits
OL	S	Soft, ORGANIC SILT, some fine to medium sand; dark brown; saturated, low plasticity. Organics: Fibrous (wood) and amorphous.	
SP	S	Medium dense, fine to medium SAND, trace silt; grey; saturated, non plastic.	Holocene Sand
			Pleistocene Sand
		Trace coarse subrounded greywacke gravel.	



R L (m): 8, 7, 6, 5, 4, 3, 2, 1, 0, -1

DATE STARTED:	11/10/11	DRILLED BY:	Perry Drilling Ltd
DATE FINISHED:	11/10/11	EQUIPMENT:	John Deere Tractor Rig
LOGGED BY:	AT	DRILL METHOD:	Rotary wireline
SHEAR VANE No:	N/A	DRILL FLUID:	Water & mud
		DIAMETER/INCLINATION:	90 mm / 90°

COMMENTS:
Shallow piezometer installed in adjacent bore (~1m offset) to 2 m depth. Deep piezometer hole collapsed to 1.7 m during installation. A bentonite plug to the ground surface was installed above the collapse. SC = Solid cone SPT.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:50

BOREHOLE No: **2011/BH307**

MACHINE BOREHOLE LOG

SHEET 2 of 2

PROJECT:	Mackays to Peka Peka Expressway	JOB NUMBER:	3320901
SITE LOCATION:	Kapiti Coast	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,471,309.8 m
E 1,770,450 m

BOREHOLE LOCATION: At northern end of leachate drain
R L: 8.3 m
DATUM: Mean sea level

DRILLING						IN-SITU TESTS											
FLUID LOSS	WATER LEVEL	CORE RECOVERY	METHOD	RQD	CASING	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	INSTRUMENTATION	R L (m)
		100 %	TT					4	D			SP	S	Medium dense, fine to medium SAND, trace silt; grey; saturated, non plastic.			-2
								10 14 17 19 for 53mm N=50+		11 12 13 14 15 16 17 18 19				END OF LOG @ 10.5 m			-3 -4 -5 -6 -7 -8 -9 -10 -11

DATE STARTED:	11/10/11	DRILLED BY:	Perry Drilling Ltd
DATE FINISHED:	11/10/11	EQUIPMENT:	John Deere Tractor Rig
LOGGED BY:	AT	DRILL METHOD:	Rotary wireline
SHEAR VANE No:	N/A	DRILL FLUID:	Water & mud
		DIAMETER/INCLINATION:	90 mm / 90°

COMMENTS:
Shallow piezometer installed in adjacent bore (~1m offset) to 2 m depth. Deep piezometer hole collapsed to 1.7 m during installation. A bentonite plug to the ground surface was installed above the collapse. SC = Solid cone SPT.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:50

SECTOR 3 – HAND AUGER LOGS

Hand Augers	Location
HA101 to HA112, HA116 to HA125	124-154 Te Moana Road

Sector 3 – Summary of Soil Sampling and Analysis

Hand Auger Number	Hand Auger Depth (m bgl)	Sample Depth (m bgl)	Laboratory Number	Analysis Suite
HA101	0.5	0.5	918870.1	HM, OCP, ON/OP, PAH
HA102	0.5	0.5	918870.1	HM, OCP, ON/OP, PAH
HA103	0.5	0.5	918870.2	HM, OCP, ON/OP, PAH
HA104	0.5	0.5	918870.3	HM, OCP, ON/OP, PAH
HA105	0.5	0.5	918870.4	HM, OCP, ON/OP, PAH
HA106	0.5	0.5	918870.5	HM, OCP, ON/OP, PAH
HA107	0.5	0.5	918870.6	HM, OCP, ON/OP, PAH
HA108	0.5	0.5	918870.7	HM, OCP, ON/OP, PAH
HA109	0.5	0.5	919264.1	HM, OCP, ON/OP, PAH
HA110	0.5	0.5	919264.2	HM, OCP, ON/OP, PAH
HA111	0.5	0.5	919264.3	HM, OCP, ON/OP, PAH
HA111 dup	0.5	0.5	919264.5	HM, OCP, ON/OP, PAH
HA112	0.5	0.5	919264.4	HM, OCP, ON/OP, PAH
HA116	0.5	0.5	919264.6	HM, OCP, ON/OP, PAH
HA117	0.5	0.5	919264.7	HM, OCP, ON/OP, PAH
HA118	0.5	0.5	918870.15	HM, OCP, ON/OP, PAH
HA119	0.5	0.5	918870.9	HM, OCP, ON/OP, PAH
HA120	0.5	0.5	918870.16	HM, OCP, ON/OP, PAH
HA120 dup	0.5	0.5	918870.17	HM, OCP, ON/OP, PAH
HA121	0.5	0.5	918870.10	HM, OCP, ON/OP, PAH
HA122	0.5	0.5	918870.11	HM, OCP, ON/OP, PAH
HA123	0.5	0.5	918870.12	HM, OCP, ON/OP, PAH
HA124	0.5	0.5	918870.13	HM, OCP, ON/OP, PAH
HA125	0.5	0.5	918870.14	HM, OCP, ON/OP, PAH

HAND AUGER No HA101

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,737.477 m
E 1,771,458.321 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	1/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand auger
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA102

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,768.009 m
E 1,771,430.277 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND with minor gravel.	Holocene sand				S1	
					Brown clayey SILT with some sand.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand auger
SHEAR VANE No:

COMMENTS:
Ground saturated. Groundwater seepage at 0.4m.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No **HA103**

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,733.106 m
E 1,771,407.458 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown clayey SILT with minor sand.	Holocene sand				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand auger
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA104

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,749.708 m
E 1,771,357.42 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty CLAY with minor sand.	Holocene sand					
					Brown clayey SILT with minor sand.					S1	
					Brown sandy SILT with some clay.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	1/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand auger
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND_AUGER P:\329\3290000\GINT\3320901500001\M2PP HA LOGS.GPJ BECA.GDT 22/9/11

HAND AUGER No HA105

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,783.72 m
E 1,771,389.915 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND with trace gravel.	Holocene sand				S1	
					Brown clayey SILT with some sand and trace gravel.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand auger
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND_AUGER P:\329\3290000\GINT\3320901500001\M2PP HA LOGS.GPJ BECA.GDT 22/9/11

HAND AUGER No **HA106**

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,815.68 m
E 1,771,419.917 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
					Brown clayey SILT with some sand.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11 DIAMETER: 50mm
LOGGED BY: G Smith METHOD: Hand auger
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER NoHA107

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,845.828 m
E 1,711,446.589 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand auger
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No **HA108**

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,883.948 m
E 1,771,402.7 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand auger
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET
Draft

A4 Scale 1:25

HAND AUGER No HA109

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,854.273 m
E 1,771,374.775 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown sandy SILT.	**Holocene sand**				S1	
					Brown silty SAND.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	2/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand auger
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND_AUGER P:\329\3290000\GINT\3320901500001\M2PP HA LOGS.GPJ BECA.GDT 22/9/11

HAND AUGER No**HA110**

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,819.252 m
E 1,771,337.871 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1	
					Grey sandy SILT.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	2/8/11	DIAMETER:	50mm	COMMENTS: Groundwater not encountered
LOGGED BY:	G Smith	METHOD:	Hand auger	
SHEAR VANE No:				

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No **HA111**

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,792.26 m
E 1,771,313.972 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1 &dup	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	2/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand auger
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND_AUGER P:\329\3290000\GINT\3320901500001\M2PP HA LOGS.GPJ BECA.GDT 22/9/11

HAND AUGER No **HA112**

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,764.635 m
E 1,771,288.624 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	2/8/11	DIAMETER:	50mm	COMMENTS: Groundwater not encountered
LOGGED BY:	G Smith	METHOD:	Hand auger	
SHEAR VANE No:				

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA116

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,790.932 m
E 1,771,242.015 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	2/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand auger
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER NoHA117

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,818.691 m
E 1,771,271.16 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	2/8/11	DIAMETER:	50mm	COMMENTS: Groundwater not encountered
LOGGED BY:	G Smith	METHOD:	Hand auger	
SHEAR VANE No:				

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No**HA118**

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM

COORDINATES: N 5,473,847.299 m
E 1,771,302.012 m

AUGER LOCATION: 124-154 Te Moana Road

R L:

DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown sandy SILT.	**Holocene sand**				S1	
					Grey silty SAND.						
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	1/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand auger
SHEAR VANE No:			

COMMENTS:
Groundwater seepage at 0.5m.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA119

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,880.404 m
E 1,771,335.329 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	**Holocene sand**				S1	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
LOGGED BY: G Smith
SHEAR VANE No:

DIAMETER: 50mm
METHOD: Hand auger

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA120

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,915.271 m
E 1,771,364.471 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1 &dup	
0.5					END OF LOG @ 0.5 m						0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand trowel
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND_AUGER P:\329\3290000\GINT\3320901500001\M2PP HA LOGS.GPJ BECA.GDT 22/9/11

HAND AUGER No HA121

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,740.874 m
E 1,771,474.519 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
					END OF LOG @ 0.2 m						
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	1/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand trowel
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA122

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,736.945 m
E 1,771,473.765 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
					END OF LOG @ 0.2 m						
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	1/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand trowel
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

Beca

HAND AUGER No**HA123**

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,744.684 m
E 1,771,471.543 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
					END OF LOG @ 0.2 m						
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand trowel
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA124

HAND AUGER LOG

SHEET 1 of 1

PROJECT: Mackays to Peka Peka, Contamination Assessment
JOB NUMBER: 3320901/500/004
SITE LOCATION: Sector 3
CLIENT: NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,740.676 m
E 1,771,472.495 m
AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
					END OF LOG @ 0.2 m						
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED: 1/8/11
DIAMETER: 50mm
LOGGED BY: G Smith
METHOD: Hand trowel
SHEAR VANE No:

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

HAND AUGER No HA125

HAND AUGER LOG

SHEET 1 of 1

PROJECT:	Mackays to Peka Peka, Contamination Assessment	JOB NUMBER:	3320901/500/004
SITE LOCATION:	Sector 3	CLIENT:	NZTA

CIRCUIT: NZTM
COORDINATES: N 5,473,732.659 m
E 1,771,470.868 m

AUGER LOCATION: 124-154 Te Moana Road
R L:
DATUM:

DEPTH (m)	WATER LEVEL	GRAPHIC LOG	USCS	MOISTURE	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	Scala	SV	τ (kPa)	SAMPLES	DEPTH (m)
					Brown silty SAND.	Holocene sand				S1	
					END OF LOG @ 0.2 m						
0.5											0.5
1.0											1.0
1.5											1.5
2.0											2.0
2.5											2.5
3.0											3.0
3.5											3.5
4.0											4.0
4.5											4.5

DATE AUGERED:	1/8/11	DIAMETER:	50mm
LOGGED BY:	G Smith	METHOD:	Hand trowel
SHEAR VANE No:			

COMMENTS:
Groundwater not encountered

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

Draft

A4 Scale 1:25

Appendix 23.D

Hills Laboratory Results

APPENDIX D

Hills Laboratory Results

SECTOR 2 – 55 RATA ROAD

Laboratory Number	Test Pits
912271	TP201–TP209 and TP214
912569	TP210, TP212, TP213, Northern Drain S1, Southern Drain S1 and S2

Hill Laboratories
BETTER TESTING BETTER RESULTS

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ANALYSIS REPORT

Client: Beca Infrastructure Limited
Contact: G Smith
C/- Beca Infrastructure Limited
PO Box 6345
Wellesley Street
AUCKLAND 1141

Lab No: 912271 SPv3
Date Registered: 07-Jul-2011
Date Reported: 19-Aug-2011
Quote No:
Order No:
Client Reference: 11:081 - 3320901/500/004
Submitted By: G Smith

Amended Report

This report replaces an earlier report issued on the 03 Aug 2011 at 4:18 pm
At the client's request, PAH analyses have been added to 6 samples.

Sample Type: Soil

Sample Name:		TP201 0.3m 06-Jul-2011	TP201 0.65m 06-Jul-2011	TP202 0.3m 06-Jul-2011	TP202 0.8m 06-Jul-2011	TP203 0.2m 06-Jul-2011
Lab Number:		912271.1	912271.2	912271.3	912271.4	912271.5
Individual Tests						
Dry Matter	g/100g as rcvd	92	82	85	87	92
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	6	4	6	5	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	9	7	8	10	13
Total Recoverable Copper	mg/kg dry wt	6	5	10	9	19
Total Recoverable Lead	mg/kg dry wt	9.5	6.8	13.7	14.9	29
Total Recoverable Nickel	mg/kg dry wt	9	6	6	9	15
Total Recoverable Zinc	mg/kg dry wt	47	30	40	46	78
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.006	-	< 0.006	-	< 0.005
4,4'-DDD	mg/kg dry wt	< 0.006	-	< 0.006	-	< 0.005
2,4'-DDE	mg/kg dry wt	< 0.006	-	< 0.006	-	< 0.005
4,4'-DDE	mg/kg dry wt	< 0.006	-	< 0.006	-	< 0.005
2,4'-DDT	mg/kg dry wt	< 0.006	-	< 0.006	-	< 0.005
4,4'-DDT	mg/kg dry wt	< 0.006	-	< 0.006	-	< 0.005
Total DDT Isomers	mg/kg dry wt	< 0.03	-	< 0.03	-	< 0.03
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Anthracene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.02	-	-	0.03	< 0.03
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Chrysene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	0.03	-	-	0.04	< 0.03
Fluorene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Naphthalene	mg/kg dry wt	< 0.12	-	-	< 0.13	< 0.13
Phenanthrene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Pyrene	mg/kg dry wt	0.03	-	-	0.04	< 0.03

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil						
	Sample Name:	TP201 0.3m 06-Jul-2011	TP201 0.65m 06-Jul-2011	TP202 0.3m 06-Jul-2011	TP202 0.8m 06-Jul-2011	TP203 0.2m 06-Jul-2011
	Lab Number:	912271.1	912271.2	912271.3	912271.4	912271.5
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 6	< 7	< 7	< 7	< 6
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Nitrobenzene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
alpha-BHC	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
beta-BHC	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
delta-BHC	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
gamma-BHC (Lindane)	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
4,4'-DDD	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
4,4'-DDE	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Dieldrin	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Endosulfan I	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Endosulfan II	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Endrin	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Endrin ketone	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Heptachlor	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Heptachlor epoxide	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Hexachlorobenzene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Acenaphthylene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Anthracene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Benzo[a]anthracene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Benzo[b]fluoranthene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Benzo[k]fluoranthene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
2-Chloronaphthalene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Chrysene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Fluoranthene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Fluorene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
2-Methylnaphthalene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Naphthalene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Phenanthrene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Pyrene	mg/kg dry wt	< 0.6	< 0.7	< 0.7	< 0.7	< 0.6
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
2,4-Dichlorophenol	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
2,4-Dimethylphenol	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2

Sample Type: Soil

Sample Name:		TP201 0.3m 06-Jul-2011	TP201 0.65m 06-Jul-2011	TP202 0.3m 06-Jul-2011	TP202 0.8m 06-Jul-2011	TP203 0.2m 06-Jul-2011
Lab Number:		912271.1	912271.2	912271.3	912271.4	912271.5
Phenols in SVOC Soil Samples by GC-MS						
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 6	< 6	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 6	< 7	< 7	< 7	< 6
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 12	< 14	< 13	< 13	< 12
Carbazole	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Dibenzofuran	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Isophorone	mg/kg dry wt	< 1.2	< 1.4	< 1.3	< 1.3	< 1.2
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 8	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70

Sample Name:		TP203 1.4m 06-Jul-2011	TP204 0.4m 06-Jul-2011	TP204 1.4m 06-Jul-2011	TP205 0.2m 06-Jul-2011	TP205 1.0m 06-Jul-2011
Lab Number:		912271.6	912271.7	912271.8	912271.9	912271.10
Individual Tests						
Dry Matter	g/100g as rcvd	47	83	91	85	85
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	15	10	11	4	5
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.13	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	14	10	9	8	8
Total Recoverable Copper	mg/kg dry wt	14	15	14	8	8
Total Recoverable Lead	mg/kg dry wt	31	27	38	20	7.6
Total Recoverable Nickel	mg/kg dry wt	6	7	10	6	6
Total Recoverable Zinc	mg/kg dry wt	95	75	68	71	35
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	-	0.007	-	< 0.005	-
4,4'-DDD	mg/kg dry wt	-	0.024	-	< 0.005	-
2,4'-DDE	mg/kg dry wt	-	< 0.005	-	< 0.005	-
4,4'-DDE	mg/kg dry wt	-	0.048	-	< 0.005	-
2,4'-DDT	mg/kg dry wt	-	0.025	-	< 0.005	-
4,4'-DDT	mg/kg dry wt	-	0.152	-	0.008	-
Total DDT Isomers	mg/kg dry wt	-	0.26	-	< 0.03	-

Sample Type: Soil						
Sample Name:		TP203 1.4m 06-Jul-2011	TP204 0.4m 06-Jul-2011	TP204 1.4m 06-Jul-2011	TP205 0.2m 06-Jul-2011	TP205 1.0m 06-Jul-2011
Lab Number:		912271.6	912271.7	912271.8	912271.9	912271.10
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Anthracene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.03	0.04	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Chrysene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Fluoranthene	mg/kg dry wt	-	-	< 0.03	0.03	-
Fluorene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Naphthalene	mg/kg dry wt	-	-	< 0.13	< 0.15	-
Phenanthrene	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Pyrene	mg/kg dry wt	-	-	< 0.03	0.04	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Bis(2-chloroethyl)ether	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
4-Bromophenyl phenyl ether	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 12	< 7	< 6	< 7	< 7
2,4-Dinitrotoluene	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Nitrobenzene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
alpha-BHC	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
beta-BHC	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
delta-BHC	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
gamma-BHC (Lindane)	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
4,4'-DDD	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
4,4'-DDE	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
4,4'-DDT	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Dieldrin	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Endosulfan I	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Endosulfan II	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Endosulfan sulphate	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Endrin	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Endrin ketone	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Heptachlor	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Heptachlor epoxide	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Hexachlorobenzene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Acenaphthylene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Anthracene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Benzo[a]anthracene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Benzo[b]fluoranthene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3

Sample Type: Soil

Sample Name:		TP203 1.4m 06-Jul-2011	TP204 0.4m 06-Jul-2011	TP204 1.4m 06-Jul-2011	TP205 0.2m 06-Jul-2011	TP205 1.0m 06-Jul-2011
Lab Number:		912271.6	912271.7	912271.8	912271.9	912271.10
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Benzo[g,h,i]perylene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Benzo[k]fluoranthene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
2-Chloronaphthalene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Chrysene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Dibenzo[a,h]anthracene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Fluoranthene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Fluorene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
2-Methylnaphthalene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Naphthalene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Phenanthrene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Pyrene	mg/kg dry wt	< 1.2	< 0.7	< 0.6	< 0.7	< 0.7
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
2,4-Dichlorophenol	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 50	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 10	< 6	< 5	< 5	< 6
Butylbenzylphthalate	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Diethylphthalate	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Dimethylphthalate	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Di-n-butylphthalate	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Di-n-octylphthalate	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Hexachlorobutadiene	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 12	< 7	< 6	< 7	< 7
Hexachloroethane	mg/kg dry wt	< 5	< 3	< 3	< 3	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 30	< 13	< 12	< 13	< 13
Carbazole	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Dibenzofuran	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Isophorone	mg/kg dry wt	< 3	< 1.3	< 1.2	< 1.3	< 1.3
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 30	< 9	< 8	< 9	< 8
C10 - C14	mg/kg dry wt	< 60	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	250	< 40	< 40	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	250	< 70	< 70	< 70	< 70

Sample Name:		TP206 0.3m 06-Jul-2011	TP206 0.5m 06-Jul-2011	TP206 1.5m 06-Jul-2011	TP207 0.3m 06-Jul-2011	TP207 0.8m 06-Jul-2011
Lab Number:		912271.11	912271.12	912271.13	912271.14	912271.15
Individual Tests						

Sample Type: Soil

	Sample Name:	TP206 0.3m 06-Jul-2011	TP206 0.5m 06-Jul-2011	TP206 1.5m 06-Jul-2011	TP207 0.3m 06-Jul-2011	TP207 0.8m 06-Jul-2011
	Lab Number:	912271.11	912271.12	912271.13	912271.14	912271.15
Individual Tests						
Dry Matter	g/100g as rcvd	92	80	63	87	82
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	8	5	13	4	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.24	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	16	9	31	9	7
Total Recoverable Copper	mg/kg dry wt	27	11	13	10	6
Total Recoverable Lead	mg/kg dry wt	30	24	29	19.8	7.1
Total Recoverable Nickel	mg/kg dry wt	20	7	7	8	6
Total Recoverable Zinc	mg/kg dry wt	92	64	168	48	33
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.005	-	-	< 0.006	-
4,4'-DDD	mg/kg dry wt	< 0.005	-	-	< 0.006	-
2,4'-DDE	mg/kg dry wt	< 0.005	-	-	< 0.006	-
4,4'-DDE	mg/kg dry wt	< 0.005	-	-	< 0.006	-
2,4'-DDT	mg/kg dry wt	< 0.005	-	-	< 0.006	-
4,4'-DDT	mg/kg dry wt	< 0.005	-	-	< 0.006	-
Total DDT Isomers	mg/kg dry wt	< 0.03	-	-	< 0.03	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	-	< 0.04	< 0.03	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.04	< 0.03	-
Anthracene	mg/kg dry wt	-	-	< 0.04	< 0.03	-
Benzo[a]anthracene	mg/kg dry wt	-	-	0.21	0.10	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	0.21	0.13	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	0.40	0.22	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	0.19	0.12	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	0.15	0.09	-
Chrysene	mg/kg dry wt	-	-	0.22	0.10	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	0.06	0.05	-
Fluoranthene	mg/kg dry wt	-	-	0.37	0.17	-
Fluorene	mg/kg dry wt	-	-	< 0.04	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	0.13	0.10	-
Naphthalene	mg/kg dry wt	-	-	< 0.18	< 0.13	-
Phenanthrene	mg/kg dry wt	-	-	0.13	0.06	-
Pyrene	mg/kg dry wt	-	-	0.34	0.18	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 6	< 7	< 9	< 7	< 7
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Nitrobenzene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
alpha-BHC	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
beta-BHC	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
delta-BHC	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
gamma-BHC (Lindane)	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
4,4'-DDD	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4

Sample Type: Soil

Sample Name:		TP206 0.3m 06-Jul-2011	TP206 0.5m 06-Jul-2011	TP206 1.5m 06-Jul-2011	TP207 0.3m 06-Jul-2011	TP207 0.8m 06-Jul-2011
Lab Number:		912271.11	912271.12	912271.13	912271.14	912271.15
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
4,4'-DDE	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Dieldrin	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Endosulfan I	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Endosulfan II	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Endrin	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Endrin ketone	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Heptachlor	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Heptachlor epoxide	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Hexachlorobenzene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Acenaphthylene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Anthracene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Benzo[a]anthracene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Benzo[b]fluoranthene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Benzo[k]fluoranthene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
2-Chloronaphthalene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Chrysene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Fluoranthene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Fluorene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
2-Methylnaphthalene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Naphthalene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Phenanthrene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Pyrene	mg/kg dry wt	< 0.6	< 0.7	< 0.9	< 0.7	< 0.7
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
2,4-Dichlorophenol	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
2,4-Dimethylphenol	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 40	< 30	< 30
Phenol	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 6	< 7	< 5	< 6
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3

Sample Type: Soil

Sample Name:		TP206 0.3m 06-Jul-2011	TP206 0.5m 06-Jul-2011	TP206 1.5m 06-Jul-2011	TP207 0.3m 06-Jul-2011	TP207 0.8m 06-Jul-2011
Lab Number:		912271.11	912271.12	912271.13	912271.14	912271.15
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 6	< 7	< 9	< 7	< 7
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 4	< 3	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 12	< 14	< 17	< 13	< 14
Carbazole	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Dibenzofuran	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Isophorone	mg/kg dry wt	< 1.2	< 1.4	< 1.7	< 1.3	< 1.4
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	< 11	< 8	< 8
C10 - C14	mg/kg dry wt	< 20	< 20	< 30	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	380	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	380	< 70	< 70

Sample Name:		TP208 0.3m 06-Jul-2011	TP208 1.3m 06-Jul-2011	TP209 0.3m 06-Jul-2011	TP209 0.8m 06-Jul-2011	TP209 1.3m 06-Jul-2011
Lab Number:		912271.16	912271.17	912271.18	912271.19	912271.20
Individual Tests						
Dry Matter	g/100g as rcvd	81	74	90	81	62
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	8	6	6	-	7
Total Recoverable Cadmium	mg/kg dry wt	0.25	< 0.10	< 0.10	-	0.28
Total Recoverable Chromium	mg/kg dry wt	11	8	16	-	9
Total Recoverable Copper	mg/kg dry wt	24	8	14	-	22
Total Recoverable Lead	mg/kg dry wt	56	11.1	22	-	68
Total Recoverable Nickel	mg/kg dry wt	9	7	15	-	7
Total Recoverable Zinc	mg/kg dry wt	153	34	67	-	68
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.005	-	< 0.006	-	-
4,4'-DDD	mg/kg dry wt	< 0.005	-	< 0.006	-	-
2,4'-DDE	mg/kg dry wt	< 0.005	-	< 0.006	-	-
4,4'-DDE	mg/kg dry wt	< 0.005	-	< 0.006	-	-
2,4'-DDT	mg/kg dry wt	< 0.005	-	< 0.006	-	-
4,4'-DDT	mg/kg dry wt	0.006	-	0.008	-	-
Total DDT Isomers	mg/kg dry wt	< 0.03	-	< 0.03	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	0.03	-	450	0.16
Acenaphthylene	mg/kg dry wt	-	< 0.03	-	500	0.04
Anthracene	mg/kg dry wt	-	0.04	-	860	0.20
Benzo[a]anthracene	mg/kg dry wt	-	0.33	-	640	0.26
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.35	-	380	0.24
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.59	-	530	0.38
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.24	-	170	0.18
Benzo[k]fluoranthene	mg/kg dry wt	-	0.24	-	250	0.17
Chrysene	mg/kg dry wt	-	0.39	-	460	0.25
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.12	-	59	0.08
Fluoranthene	mg/kg dry wt	-	0.82	-	2,000	0.76
Fluorene	mg/kg dry wt	-	< 0.03	-	860	0.20
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.24	-	165	0.16
Naphthalene	mg/kg dry wt	-	< 0.15	-	4,300	1.48
Phenanthrene	mg/kg dry wt	-	0.34	-	3,100	0.66
Pyrene	mg/kg dry wt	-	0.75	-	1,210	0.71
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8

Sample Type: Soil

Sample Name:		TP208 0.3m 06-Jul-2011	TP208 1.3m 06-Jul-2011	TP209 0.3m 06-Jul-2011	TP209 0.8m 06-Jul-2011	TP209 1.3m 06-Jul-2011
Lab Number:		912271.16	912271.17	912271.18	912271.19	912271.20
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	< 8	< 6	-	< 9
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	-	< 4
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Nitrobenzene	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 3	-	< 4
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
alpha-BHC	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
beta-BHC	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
delta-BHC	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
gamma-BHC (Lindane)	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
4,4'-DDD	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
4,4'-DDE	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Dieldrin	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Endosulfan I	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Endosulfan II	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Endrin	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Endrin ketone	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Heptachlor	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Heptachlor epoxide	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Hexachlorobenzene	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	< 0.9
Acenaphthylene	mg/kg dry wt	< 0.7	< 0.8	1.1	-	< 0.9
Anthracene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	< 0.9
Benzo[a]anthracene	mg/kg dry wt	< 0.7	< 0.8	0.9	-	< 0.9
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.4	< 1.5	1.2	-	< 1.8
Benzo[b]fluoranthene	mg/kg dry wt	< 1.4	< 1.5	1.7	-	< 1.8
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.4	< 1.5	1.8	-	< 1.8
Benzo[k]fluoranthene	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
2-Chloronaphthalene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	< 0.9
Chrysene	mg/kg dry wt	< 0.7	< 0.8	0.8	-	< 0.9
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Fluoranthene	mg/kg dry wt	< 0.7	< 0.8	1.4	-	< 0.9
Fluorene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	< 0.9
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.4	< 1.5	1.4	-	< 1.8
2-Methylnaphthalene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	< 0.9
Naphthalene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	1.4
Phenanthrene	mg/kg dry wt	< 0.7	< 0.8	< 0.6	-	< 0.9
Pyrene	mg/kg dry wt	< 0.7	< 0.8	1.6	-	< 0.9
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	-	< 5
2-Chlorophenol	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
2,4-Dichlorophenol	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
2,4-Dimethylphenol	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	-	< 4

Sample Type: Soil

Sample Name:		TP208 0.3m 06-Jul-2011	TP208 1.3m 06-Jul-2011	TP209 0.3m 06-Jul-2011	TP209 0.8m 06-Jul-2011	TP209 1.3m 06-Jul-2011
Lab Number:		912271.16	912271.17	912271.18	912271.19	912271.20
Phenols in SVOC Soil Samples by GC-MS						
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	-	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	-	< 40
Phenol	mg/kg dry wt	< 3	< 3	< 3	-	< 4
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	-	< 4
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	< 6	< 5	-	< 7
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	-	< 4
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	-	< 4
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 3	-	< 4
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	< 8	< 6	-	< 9
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 3	-	< 4
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 14	< 15	< 12	-	< 18
Carbazole	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Dibenzofuran	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Isophorone	mg/kg dry wt	< 1.4	< 1.5	< 1.2	-	< 1.8
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 9	< 8	210	< 12
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	10,400	< 30
C15 - C36	mg/kg dry wt	< 40	< 40	116	61,000	58
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	116	71,000	< 80

Sample Name:		TP214 0.3m 06-Jul-2011	TP214 1.0m 06-Jul-2011	TP214 1.5m 06-Jul-2011		
Lab Number:		912271.21	912271.22	912271.23		
Individual Tests						
Dry Matter	g/100g as rcvd	77	89	71	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	6	-	9	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	9	-	8	-	-
Total Recoverable Copper	mg/kg dry wt	9	-	8	-	-
Total Recoverable Lead	mg/kg dry wt	14.9	-	10.4	-	-
Total Recoverable Nickel	mg/kg dry wt	7	-	7	-	-
Total Recoverable Zinc	mg/kg dry wt	54	-	43	-	-
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.005	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.005	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.005	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.005	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.005	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.005	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.03	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						

Sample Type: Soil						
Sample Name:		TP214 0.3m 06-Jul-2011	TP214 1.0m 06-Jul-2011	TP214 1.5m 06-Jul-2011		
Lab Number:		912271.21	912271.22	912271.23		
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	< 0.17	< 0.04	-	-
Acenaphthylene	mg/kg dry wt	-	< 0.17	< 0.04	-	-
Anthracene	mg/kg dry wt	-	0.25	< 0.04	-	-
Benzo[a]anthracene	mg/kg dry wt	-	2.2	< 0.04	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.74	< 0.04	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	2.7	0.05	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	1.30	< 0.04	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	0.85	< 0.04	-	-
Chrysene	mg/kg dry wt	-	4.2	0.04	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.17	< 0.04	-	-
Fluoranthene	mg/kg dry wt	-	1.54	0.06	-	-
Fluorene	mg/kg dry wt	-	0.47	< 0.04	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.17	< 0.04	-	-
Naphthalene	mg/kg dry wt	-	< 0.9	< 0.17	-	-
Phenanthrene	mg/kg dry wt	-	5.9	< 0.04	-	-
Pyrene	mg/kg dry wt	-	2.5	0.06	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.4	-	< 1.6	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.4	-	< 1.6	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	-	< 8	-	-
2,4-Dinitrotoluene	mg/kg dry wt	< 3	-	< 4	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 3	-	< 4	-	-
Nitrobenzene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	-	< 4	-	-
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	-	< 4	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.4	-	< 1.6	-	-
alpha-BHC	mg/kg dry wt	< 1.4	-	< 1.6	-	-
beta-BHC	mg/kg dry wt	< 1.4	-	< 1.6	-	-
delta-BHC	mg/kg dry wt	< 1.4	-	< 1.6	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 1.4	-	< 1.6	-	-
4,4'-DDD	mg/kg dry wt	< 1.4	-	< 1.6	-	-
4,4'-DDE	mg/kg dry wt	< 1.4	-	< 1.6	-	-
4,4'-DDT	mg/kg dry wt	< 3	-	< 4	-	-
Dieldrin	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Endosulfan I	mg/kg dry wt	< 3	-	< 4	-	-
Endosulfan II	mg/kg dry wt	< 3	-	< 4	-	-
Endosulfan sulphate	mg/kg dry wt	< 3	-	< 4	-	-
Endrin	mg/kg dry wt	< 3	-	< 4	-	-
Endrin ketone	mg/kg dry wt	< 3	-	< 4	-	-
Heptachlor	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Heptachlor epoxide	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Hexachlorobenzene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Acenaphthylene	mg/kg dry wt	0.8	-	< 0.8	-	-
Anthracene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Benzo[a]anthracene	mg/kg dry wt	0.8	-	< 0.8	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Benzo[b]fluoranthene	mg/kg dry wt	1.4	-	< 1.6	-	-

Sample Type: Soil

	Sample Name:	TP214 0.3m 06-Jul-2011	TP214 1.0m 06-Jul-2011	TP214 1.5m 06-Jul-2011		
	Lab Number:	912271.21	912271.22	912271.23		
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
2-Chloronaphthalene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Chrysene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Fluoranthene	mg/kg dry wt	1.0	-	< 0.8	-	-
Fluorene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Naphthalene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Phenanthrene	mg/kg dry wt	< 0.7	-	< 0.8	-	-
Pyrene	mg/kg dry wt	2.0	-	< 0.8	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	< 1.4	-	< 1.6	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.4	-	< 1.6	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 1.4	-	< 1.6	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	-	< 4	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.4	-	< 1.6	-	-
2-Nitrophenol	mg/kg dry wt	< 5	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	-	< 40	-	-
Phenol	mg/kg dry wt	< 3	-	< 4	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	-	< 4	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	-	< 4	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	-	< 7	-	-
Butylbenzylphthalate	mg/kg dry wt	< 3	-	< 4	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Diethylphthalate	mg/kg dry wt	< 3	-	< 4	-	-
Dimethylphthalate	mg/kg dry wt	< 3	-	< 4	-	-
Di-n-butylphthalate	mg/kg dry wt	< 3	-	< 4	-	-
Di-n-octylphthalate	mg/kg dry wt	< 3	-	< 4	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	-	< 4	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 3	-	< 4	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 3	-	< 4	-	-
Hexachlorobutadiene	mg/kg dry wt	< 3	-	< 4	-	-
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	-	< 8	-	-
Hexachloroethane	mg/kg dry wt	< 3	-	< 4	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 14	-	< 16	-	-
Carbazole	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Dibenzofuran	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Isophorone	mg/kg dry wt	< 1.4	-	< 1.6	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 50	< 10	-	-
C10 - C14	mg/kg dry wt	< 20	< 100	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	36,000	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	36,000	< 70	-	-

Analyst's Comments

Appendix No.1 - Asbestos Report - TP203 1.4m & TP204 0.4m - 912271.7 & .8

Analyst's Comments

Appendix No.2 - Total Petroleum Hydrocarbon Chromatograms

Appendix No.3 - Total Petroleum Hydrocarbon Chromatograms

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-18, 20-21, 23
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	19, 22
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-18, 20-21, 23
DDT Screening in Soil*	Sonication extraction, Florisil cleanup, GC-ECD analysis. Tested on dried sample	-	1, 3, 5, 7, 9, 11, 14, 16, 18, 21
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1, 4-5, 8-9, 13-14, 17, 19-20, 22-23
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Haloethers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Nitrogen containing compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Organochlorine Pesticides in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Phenols in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Plasticisers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Other Halogenated compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Other compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
SMC Compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1-23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-23
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-18, 20-21, 23
Asbestos	150-200g, sealed plastic bag. Polarised Light Microscopy and dispersion staining techniques. Subcontracted to Dowdell & Associates, 4 Cain Road, Penrose, Auckland. AS 4964 (2004) - Method for the Qualitative / Semi-Quantitative Identification of Asbestos in Bulk Samples.	-	6-7

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental Division

DOWDELL & ASSOCIATES LTD

OCCUPATIONAL HEALTH ANALYSTS & CONSULTANTS

4 Cain Rd, Penrose, PO Box 112-017 Auckland 1642, Phone (09) 5260-246, Fax (09) 5795-389.

11th July 2011

Hill Laboratories
Private Bag 3205
Hamilton

Dear Sir/Madam,

Re: Bulk Fibre Analysis -

Sampled by : Client
Date Samples Received : 8th July 2011
Laboratory No. : 25425
Location/Description : Job 912271, 2x soil samples for asbestos ID – (O/N 126749)
Method : AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.

The following samples were examined using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including Dispersion Staining Techniques.
The following results apply to the samples as received.

Reg No: 88781 **Description:** Soil 912271/6
Sample Size: 52.18g wet weight / 21.10g dry
Result: Asbestos **NOT** detected

Reg No: 88782 **Description:** Soil 912271/7
Sample Size: 101.26g wet weight / 76.28g dry
Result: Asbestos **NOT** detected

Yours Faithfully
DOWDELL & ASSOCIATES LTD

I.B. Murgatroyd BSc.
Consultant

Q.E. Dowdell NZCS MNZMS
Director

NOTES:

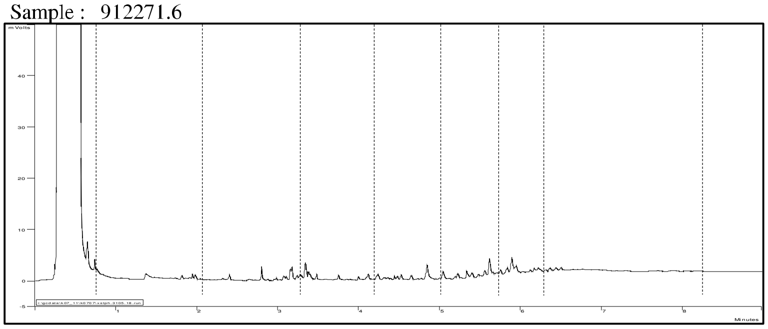
- This report must not be altered, or reproduced except in full.

- Sample weights are defined as;

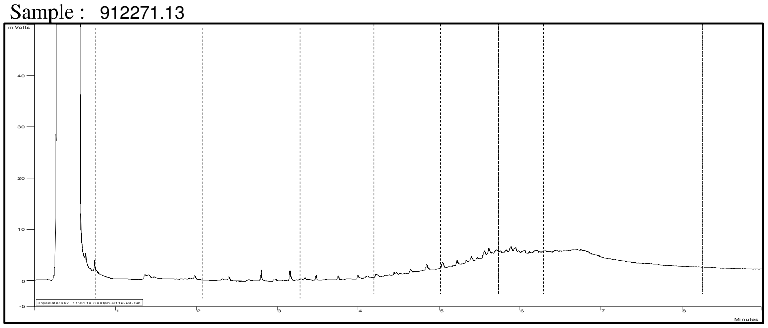
a) (Wet Weight) – Weight of Sample that has been Analysed.
b) (Dry Basis) - The combusted dry weight of the Analysed Sample.

- New Zealand has no specific guidelines with regard to asbestos content in soils. However, we recommend that the Australian Government's enHealth Council's Document 'Management of Asbestos in the Non-Occupational Environment' – 2005 and the (DOH) WA's 'Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia – May 2009 be consulted.

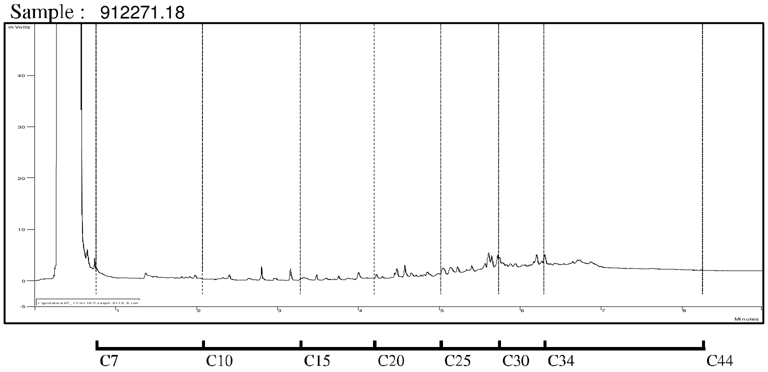
Sample : 912271.6



Sample : 912271.13

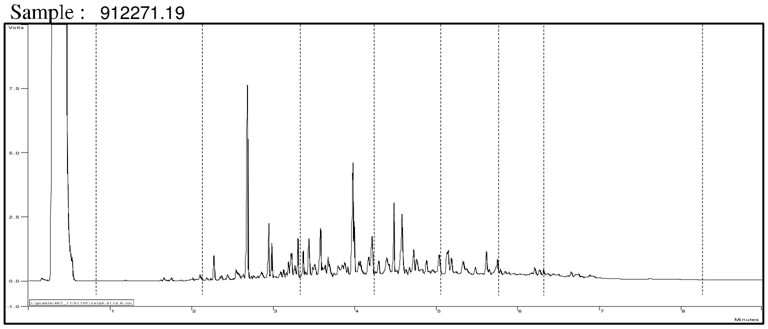


Sample : 912271.18

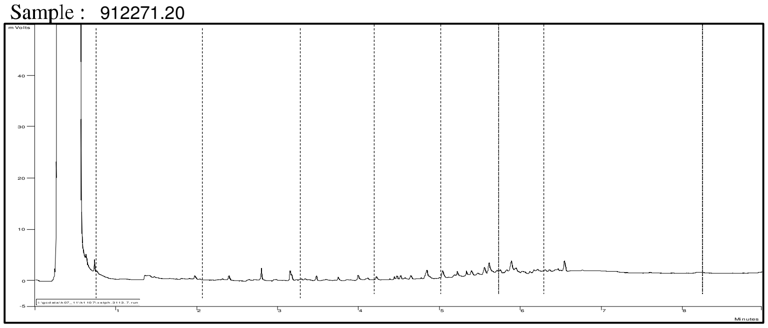


Appendix No.3 - Total Petroleum Hydrocarbon Chromatograms - Page 1 of 1

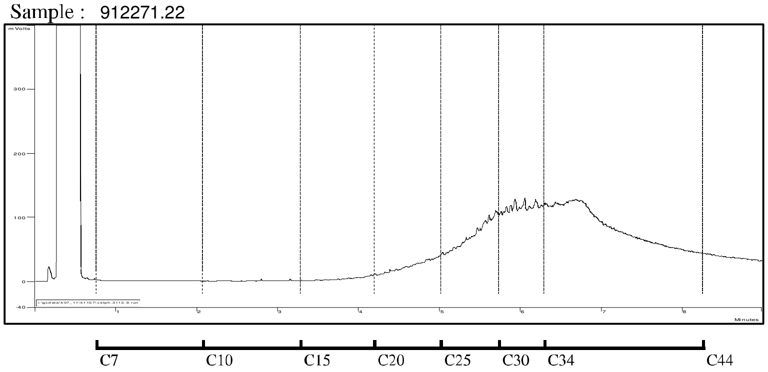
Sample : 912271.19



Sample : 912271.20



Sample : 912271.22



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ANALYSIS REPORT

Client: Beca Infrastructure Limited
Contact: G Smith
C/- Beca Infrastructure Limited
PO Box 6345
Wellesley Street
AUCKLAND 1141

Lab No: 912569 SPv3
Date Registered: 08-Jul-2011
Date Reported: 16-Aug-2011
Quote No:
Order No:
Client Reference: 11:081 - 3320901/500/004
Submitted By: G Smith

Amended Report

This report replaces an earlier report issued on the 03 Aug 2011 at 4:50 pm
At the client's request, a PAH analysis has been added to sample TP212 1.0m.

Sample Type: Soil

Sample Name:		TP210 0.15m 07-Jul-2011	TP212 0.3m 07-Jul-2011	TP212 1.0m 07-Jul-2011	TP212 0.3m dup 07-Jul-2011	TP213 0.2 07-Jul-2011
Lab Number:		912569.1	912569.2	912569.3	912569.4	912569.5
Individual Tests						
Dry Matter	g/100g as rcvd	85	71	85	67	76
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	10	10	4	6	11
Total Recoverable Cadmium	mg/kg dry wt	0.11	< 0.10	< 0.10	0.15	0.14
Total Recoverable Chromium	mg/kg dry wt	19	12	8	11	14
Total Recoverable Copper	mg/kg dry wt	19	12	8	20	25
Total Recoverable Lead	mg/kg dry wt	31	35	11.2	27	49
Total Recoverable Nickel	mg/kg dry wt	10	8	8	9	9
Total Recoverable Zinc	mg/kg dry wt	72	64	43	91	90
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.005	< 0.005	-	-	< 0.005
4,4'-DDD	mg/kg dry wt	< 0.005	< 0.005	-	-	0.006
2,4'-DDE	mg/kg dry wt	< 0.005	< 0.005	-	-	< 0.005
4,4'-DDE	mg/kg dry wt	< 0.005	< 0.005	-	-	0.015
2,4'-DDT	mg/kg dry wt	< 0.005	< 0.005	-	-	< 0.005
4,4'-DDT	mg/kg dry wt	< 0.005	< 0.005	-	-	0.005
Total DDT Isomers	mg/kg dry wt	< 0.03	< 0.03	-	-	< 0.03
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	0.03	-	< 0.03	-	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	-	< 0.03	-	< 0.03
Anthracene	mg/kg dry wt	0.07	-	< 0.03	-	< 0.03
Benzo[a]anthracene	mg/kg dry wt	0.35	-	< 0.03	-	0.09
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.38	-	0.03	-	0.13
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.61	-	0.05	-	0.22
Benzo[g,h,i]perylene	mg/kg dry wt	0.28	-	< 0.03	-	0.14
Benzo[k]fluoranthene	mg/kg dry wt	0.25	-	< 0.03	-	0.09
Chrysene	mg/kg dry wt	0.33	-	0.03	-	0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	0.12	-	< 0.03	-	0.06
Fluoranthene	mg/kg dry wt	0.72	-	0.05	-	0.16
Fluorene	mg/kg dry wt	< 0.03	-	< 0.03	-	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.26	-	< 0.03	-	0.12
Naphthalene	mg/kg dry wt	< 0.14	-	< 0.13	-	< 0.15
Phenanthrene	mg/kg dry wt	0.22	-	< 0.03	-	0.06
Pyrene	mg/kg dry wt	0.67	-	0.05	-	0.17

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil

Sample Name:		TP210 0.15m 07-Jul-2011	TP212 0.3m 07-Jul-2011	TP212 1.0m 07-Jul-2011	TP212 0.3m dup 07-Jul-2011	TP213 0.2 07-Jul-2011
Lab Number:		912569.1	912569.2	912569.3	912569.4	912569.5
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	< 8	< 7	< 8	< 8
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Nitrobenzene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
alpha-BHC	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
beta-BHC	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
delta-BHC	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
gamma-BHC (Lindane)	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
4,4'-DDD	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
4,4'-DDE	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Dieldrin	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Endosulfan I	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endosulfan II	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endrin	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endrin ketone	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Heptachlor	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Heptachlor epoxide	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Hexachlorobenzene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Acenaphthylene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Anthracene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Benzo[a]anthracene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Benzo[b]fluoranthene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Benzo[k]fluoranthene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
2-Chloronaphthalene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Chrysene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Fluoranthene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Fluorene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
2-Methylnaphthalene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Naphthalene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Phenanthrene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Pyrene	mg/kg dry wt	< 0.7	< 0.8	< 0.7	< 0.8	< 0.8
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
2,4-Dichlorophenol	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
2,4-Dimethylphenol	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5

Sample Type: Soil

	Sample Name:	TP210 0.15m 07-Jul-2011	TP212 0.3m 07-Jul-2011	TP212 1.0m 07-Jul-2011	TP212 0.3m dup 07-Jul-2011	TP213 0.2 07-Jul-2011
	Lab Number:	912569.1	912569.2	912569.3	912569.4	912569.5
Phenols in SVOC Soil Samples by GC-MS						
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 40	< 30
Phenol	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	< 6	< 6	< 7	< 6
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	< 8	< 7	< 8	< 8
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 13	< 15	< 13	< 16	< 15
Carbazole	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Dibenzofuran	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Isophorone	mg/kg dry wt	< 1.3	< 1.5	< 1.3	< 1.6	< 1.5
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 10	< 8	< 11	< 9
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 30	< 20
C15 - C36	mg/kg dry wt	210	101	< 40	79	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	210	101	< 70	79	< 70

Sample Type: Aqueous

	Sample Name:	North Drain S1 06-Jul-2011	Southern Drain S1 06-Jul-2011	Southern Drain S2 06-Jul-2011		
	Lab Number:	912569.6	912569.7	912569.8		
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m^3	0.0033	0.0039 [#1]	0.0039 [#1]	-	-
Dissolved Cadmium	g/m^3	< 0.00005	< 0.000053 [#1]	< 0.000053 [#1]	-	-
Dissolved Chromium	g/m^3	0.0005	0.00122 [#1]	0.00129 [#1]	-	-
Dissolved Copper	g/m^3	0.0008	0.00193 [#1]	0.00177 [#1]	-	-
Dissolved Lead	g/m^3	0.00029	0.00045 [#1]	0.00045 [#1]	-	-
Dissolved Nickel	g/m^3	< 0.0005	0.00056 [#1]	< 0.00053 [#1]	-	-
Dissolved Zinc	g/m^3	0.134	0.032 [#1]	0.028 [#1]	-	-
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Arsenic	g/m^3	0.0126	0.0078	0.0071	-	-
Total Cadmium	g/m^3	< 0.000053	< 0.000053	< 0.000053	-	-
Total Chromium	g/m^3	0.00172	0.00169	0.00152	-	-
Total Copper	g/m^3	0.00160	0.0027	0.0023	-	-
Total Lead	g/m^3	0.0021	0.00094	0.00087	-	-
Total Nickel	g/m^3	0.00060	0.00065	0.00055	-	-
Total Zinc	g/m^3	0.184	0.041	0.037	-	-

Sample Type: Aqueous						
Sample Name:		North Drain S1 06-Jul-2011	Southern Drain S1 06-Jul-2011	Southern Drain S2 06-Jul-2011		
Lab Number:		912569.6	912569.7	912569.8		
Haloethers Trace in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Bis(2-chloroethyl)ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Bis(2-chloroisopropyl)ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4-Bromophenyl phenyl ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4-Chlorophenyl phenyl ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS						
3,3'-Dichlorobenzidine	g/m^3	< 0.003	< 0.003	< 0.003	-	-
2,4-Dinitrotoluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
2,6-Dinitrotoluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Nitrobenzene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
N-Nitrosodi-n-propylamine	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
N-Nitrosodiphenylamine	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS						
Aldrin	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
alpha-BHC	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
beta-BHC	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
delta-BHC	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
gamma-BHC (Lindane)	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4,4'-DDD	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4,4'-DDE	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4,4'-DDT	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Dieldrin	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Endosulfan I	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Endosulfan II	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Endosulfan sulfate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Endrin	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Endrin ketone	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Heptachlor	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Heptachlor epoxide	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Hexachlorobenzene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples						
Acenaphthene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Acenaphthylene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Anthracene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Benzo[a]anthracene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Benzo[a]pyrene (BAP)	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Benzo[b]fluoranthene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Benzo[g,h,i]perylene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Benzo[k]fluoranthene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
2-Chloronaphthalene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Chrysene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Dibenzo[a,h]anthracene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Fluoranthene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Fluorene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Indeno(1,2,3-c,d)pyrene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
2-Methylnaphthalene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Naphthalene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Phenanthrene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Pyrene	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS						
2-Chlorophenol	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
2,4-Dichlorophenol	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
2,4,6-Trichlorophenol	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS						

Sample Type: Aqueous

Sample Name:		North Drain S1 06-Jul-2011	Southern Drain S1 06-Jul-2011	Southern Drain S2 06-Jul-2011		
Lab Number:		912569.6	912569.7	912569.8		
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
2,4-Dimethylphenol	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
2-Methylphenol (o-Cresol)	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
2-Nitrophenol	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Pentachlorophenol (PCP)	g/m^3	< 0.010	< 0.010	< 0.010	-	-
Phenol	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
2,4,5-Trichlorophenol	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS						
Butylbenzylphthalate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Diethylphthalate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Dimethylphthalate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Di-n-butylphthalate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Di-n-octylphthalate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS						
Bis(2-ethylhexyl)phthalate	g/m^3	< 0.003	< 0.003	< 0.003	-	-
Di(2-ethylhexyl)adipate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Other Halogenated compounds Trace (drinkingwater) in SVOC Water						
1,2-Dichlorobenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
1,3-Dichlorobenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
1,4-Dichlorobenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Other Halogenated compounds Trace (non-drinkingwater) in SVOC						
Hexachlorobutadiene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Hexachlorocyclopentadiene	g/m^3	< 0.003	< 0.003	< 0.003	-	-
Hexachloroethane	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
1,2,4-Trichlorobenzene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Other SVOC Trace in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Carbazole	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Dibenzofuran	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Isophorone	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m^3	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	g/m^3	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	g/m^3	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	g/m^3	< 0.7	< 0.7	< 0.7	-	-

Analyst's Comments

[#1] It should be noted that a precipitate was observed in the filtered nitric preserved fraction of this sample. In order to analyse this sample for dissolved metals, an additional digestion step was required on the filtrate to re-dissolve the precipitate prior to analysis.

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-5
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-5
DDT Screening in Soil*	Sonication extraction, Florisil cleanup, GC-ECD analysis. Tested on dried sample	-	1-2, 5

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1, 3, 5
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Haloethers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Organochlorine Pesticides in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Phenols in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Plasticisers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Other Halogenated compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Other compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
SMC Compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1-5
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-5
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-5

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Samples
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45μm filtration, ICP-MS, trace level	-	6-8
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level	-	6-8
Semivolatile Organic Compounds Trace in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Haloethers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Phenols Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Plasticisers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other Halogenated compounds Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other Halogenated compounds Trace (drinkingwater) in SVOC Water	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other Halogenated compounds Trace (non-drinkingwater) in SVOC	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Other SVOC Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
SMC Compounds Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines	-	6-8
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 21st ed. 2005.	-	6-8
Total Digestion after Filtration	Sample filtration through 0.45µm membrane filter followed by boiling nitric acid digestion. Required for samples which precipitate after filtration. APHA 3030 E 21st ed. 2005.	-	7-8
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 21st ed. 2005.	-	6-8

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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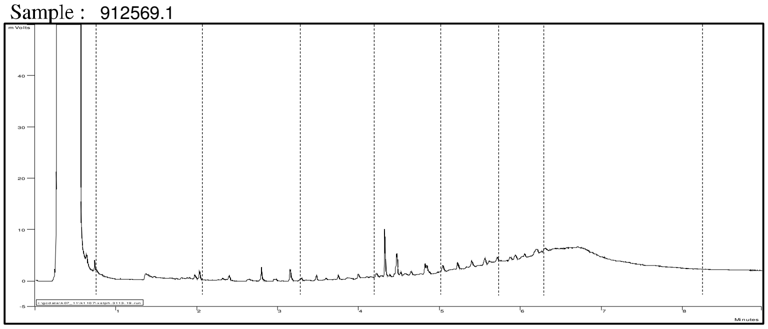
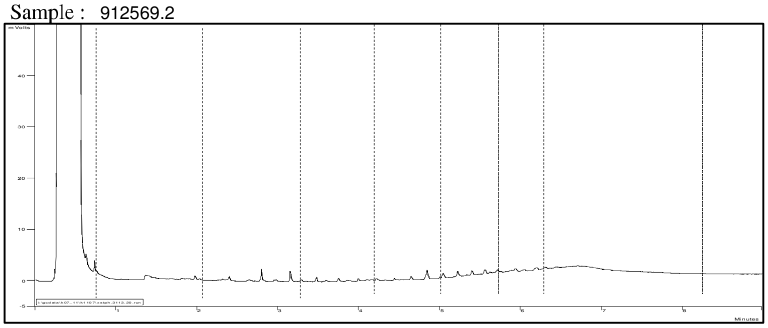
Ara Heron BSc (Tech)
Client Services Manager - Environmental Division

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms - Page 1 of 1

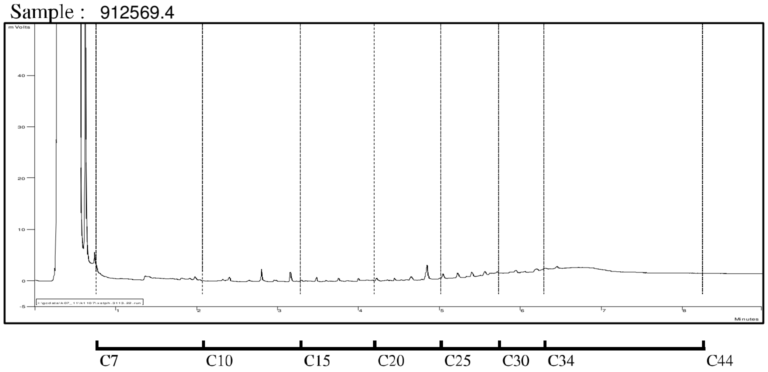
Sample : 912569.1



Sample : 912569.2



Sample : 912569.4



SECTOR 2 – KAPITI ROAD INTERSECTION

Laboratory Number	Test Pits
911650	TP101to TP111

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ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	911650 SPv3
Contact:	G Smith	**Date Registered:**	06-Jul-2011
	C/- Beca Infrastructure Limited	**Date Reported:**	17-Aug-2011
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:081 - 3320901/500/004
		Submitted By:	G Smith

Amended Report

This report replaces an earlier report issued on the 03 Aug 2011 at 4:13 pm
At the client's request, PAH analyses have been added to five of the samples.

Sample Type: Soil

	Sample Name:	TP101 1M 05-Jul-2011	TP101 2.6M 05-Jul-2011	TP102 0.7M 05-Jul-2011	TP102 2.3M 05-Jul-2011	TP103 0.6M 05-Jul-2011
	Lab Number:	911650.1	911650.2	911650.3	911650.4	911650.5
Individual Tests						
Dry Matter	g/100g as rcvd	86	63	77	82	84
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	3	2	3	10
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.10
Total Recoverable Chromium	mg/kg dry wt	9	5	6	6	11
Total Recoverable Copper	mg/kg dry wt	17	8	8	8	50
Total Recoverable Lead	mg/kg dry wt	13.7	5.2	6.2	6.0	18.2
Total Recoverable Nickel	mg/kg dry wt	7	5	6	5	8
Total Recoverable Zinc	mg/kg dry wt	50	26	31	27	72
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.005	-	< 0.005	-	< 0.005
4,4'-DDD	mg/kg dry wt	< 0.005	-	< 0.005	-	< 0.005
2,4'-DDE	mg/kg dry wt	< 0.005	-	< 0.005	-	< 0.005
4,4'-DDE	mg/kg dry wt	0.007	-	< 0.005	-	< 0.005
2,4'-DDT	mg/kg dry wt	< 0.005	-	0.015	-	< 0.005
4,4'-DDT	mg/kg dry wt	0.008	-	0.012	-	0.007
Total DDT Isomers	mg/kg dry wt	< 0.03	-	< 0.03	-	< 0.03
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Anthracene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	-	-	< 0.03	0.06
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.08
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.07
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.04
Chrysene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.04
Fluorene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.05
Naphthalene	mg/kg dry wt	< 0.15	-	-	< 0.15	< 0.15
Phenanthrene	mg/kg dry wt	< 0.03	-	-	< 0.03	< 0.03
Pyrene	mg/kg dry wt	< 0.03	-	-	< 0.03	0.05

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil

Sample Name:		TP101 1M 05-Jul-2011	TP101 2.6M 05-Jul-2011	TP102 0.7M 05-Jul-2011	TP102 2.3M 05-Jul-2011	TP103 0.6M 05-Jul-2011
Lab Number:		911650.1	911650.2	911650.3	911650.4	911650.5
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	< 9	< 7	< 7	< 7
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Nitrobenzene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
alpha-BHC	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
beta-BHC	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
delta-BHC	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
gamma-BHC (Lindane)	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
4,4'-DDD	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
4,4'-DDE	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
4,4'-DDT	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Dieldrin	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Endosulfan I	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Endosulfan II	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Endrin	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Endrin ketone	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Heptachlor	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Heptachlor epoxide	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Hexachlorobenzene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Acenaphthylene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Anthracene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Benzo[a]anthracene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Benzo[b]fluoranthene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Benzo[k]fluoranthene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
2-Chloronaphthalene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Chrysene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Fluoranthene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Fluorene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
2-Methylnaphthalene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Naphthalene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Phenanthrene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Pyrene	mg/kg dry wt	< 0.7	< 0.9	< 0.7	< 0.7	< 0.7
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
2,4-Dichlorophenol	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
2,4-Dimethylphenol	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3

Sample Type: Soil

Sample Name:		TP101 1M 05-Jul-2011	TP101 2.6M 05-Jul-2011	TP102 0.7M 05-Jul-2011	TP102 2.3M 05-Jul-2011	TP103 0.6M 05-Jul-2011
Lab Number:		911650.1	911650.2	911650.3	911650.4	911650.5
Phenols in SVOC Soil Samples by GC-MS						
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 40	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	< 7	< 6	< 6	< 6
Butylbenzylphthalate	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Diethylphthalate	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Hexachlorobutadiene	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	< 9	< 7	< 7	< 7
Hexachloroethane	mg/kg dry wt	< 3	< 4	< 3	< 3	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 13	< 18	< 14	< 14	< 13
Carbazole	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Dibenzofuran	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Isophorone	mg/kg dry wt	< 1.3	< 1.8	< 1.4	< 1.4	< 1.3
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 9	< 12	< 10	< 9	< 9
C10 - C14	mg/kg dry wt	< 20	< 30	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 50	92	< 40	46
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 90	92	< 70	< 70

Sample Name:		TP103 1.4M 05-Jul-2011	TP104 0.4M 05-Jul-2011	TP104 1.6M 05-Jul-2011	TP104 1.6M DUP 05-Jul-2011	TP105 0.15M 05-Jul-2011
Lab Number:		911650.6	911650.7	911650.8	911650.9	911650.10
Individual Tests						
Dry Matter	g/100g as rcvd	81	87	68	68	86
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	4	< 2	< 2	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.16	0.14	0.27
Total Recoverable Chromium	mg/kg dry wt	6	8	5	5	16
Total Recoverable Copper	mg/kg dry wt	9	13	5	5	39
Total Recoverable Lead	mg/kg dry wt	6.2	15.9	6.1	5.9	36
Total Recoverable Nickel	mg/kg dry wt	5	6	3	3	9
Total Recoverable Zinc	mg/kg dry wt	30	51	12	11	146
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	-	< 0.005	-	-	< 0.005
4,4'-DDD	mg/kg dry wt	-	< 0.005	-	-	< 0.005
2,4'-DDE	mg/kg dry wt	-	< 0.005	-	-	< 0.005
4,4'-DDE	mg/kg dry wt	-	0.008	-	-	< 0.005
2,4'-DDT	mg/kg dry wt	-	0.009	-	-	< 0.005
4,4'-DDT	mg/kg dry wt	-	0.012	-	-	0.007
Total DDT Isomers	mg/kg dry wt	-	< 0.03	-	-	< 0.03

Sample Type: Soil

Sample Name:		TP103 1.4M 05-Jul-2011	TP104 0.4M 05-Jul-2011	TP104 1.6M 05-Jul-2011	TP104 1.6M DUP 05-Jul-2011	TP105 0.15M 05-Jul-2011
Lab Number:		911650.6	911650.7	911650.8	911650.9	911650.10
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Acenaphthylene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Anthracene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Chrysene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Fluoranthene	mg/kg dry wt	-	-	< 0.04	-	0.03
Fluorene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Naphthalene	mg/kg dry wt	-	-	< 0.19	-	< 0.15
Phenanthrene	mg/kg dry wt	-	-	< 0.04	-	< 0.03
Pyrene	mg/kg dry wt	-	-	< 0.04	-	0.04
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	< 7	< 8	< 8	< 7
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Nitrobenzene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
alpha-BHC	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
beta-BHC	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
delta-BHC	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
gamma-BHC (Lindane)	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
4,4'-DDD	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
4,4'-DDE	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Dieldrin	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Endosulfan I	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Endosulfan II	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Endrin	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Endrin ketone	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Heptachlor	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Heptachlor epoxide	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Hexachlorobenzene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Acenaphthylene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Anthracene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Benzo[a]anthracene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Benzo[b]fluoranthene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3

Sample Type: Soil						
Sample Name:		TP103 1.4M 05-Jul-2011	TP104 0.4M 05-Jul-2011	TP104 1.6M 05-Jul-2011	TP104 1.6M DUP 05-Jul-2011	TP105 0.15M 05-Jul-2011
Lab Number:		911650.6	911650.7	911650.8	911650.9	911650.10
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Benzo[k]fluoranthene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
2-Chloronaphthalene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Chrysene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Fluoranthene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Fluorene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
2-Methylnaphthalene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Naphthalene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Phenanthrene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Pyrene	mg/kg dry wt	< 0.7	< 0.7	< 0.8	< 0.8	< 0.7
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
2,4-Dichlorophenol	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
2,4-Dimethylphenol	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 40	< 40	< 30
Phenol	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	< 5	< 7	< 7	< 5
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	< 7	< 8	< 8	< 7
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 4	< 4	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 14	< 13	< 16	< 16	< 13
Carbazole	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Dibenzofuran	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Isophorone	mg/kg dry wt	< 1.4	< 1.3	< 1.6	< 1.6	< 1.3
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	< 9	< 11	< 11	< 9
C10 - C14	mg/kg dry wt	< 20	< 20	< 30	< 30	< 20
C15 - C36	mg/kg dry wt	104	< 40	< 50	< 50	41
Total hydrocarbons (C7 - C36)	mg/kg dry wt	104	< 70	< 80	< 80	< 70

Sample Name:		TP105 1.3M 05-Jul-2011	TP106 0.3M 05-Jul-2011	TP106 1.0M 05-Jul-2011	TP107 0.2M 05-Jul-2011	TP108 0.2M 05-Jul-2011
Lab Number:		911650.11	911650.12	911650.13	911650.14	911650.15
Individual Tests						

Sample Type: Soil						
	Sample Name:	TP105 1.3M 05-Jul-2011	TP106 0.3M 05-Jul-2011	TP106 1.0M 05-Jul-2011	TP107 0.2M 05-Jul-2011	TP108 0.2M 05-Jul-2011
	Lab Number:	911650.11	911650.12	911650.13	911650.14	911650.15
Individual Tests						
Dry Matter	g/100g as rcvd	83	73	53	87	84
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	4	2	4	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	6	7	5	6	6
Total Recoverable Copper	mg/kg dry wt	10	11	10	8	14
Total Recoverable Lead	mg/kg dry wt	26	13.7	5.4	5.4	6.3
Total Recoverable Nickel	mg/kg dry wt	5	5	3	5	5
Total Recoverable Zinc	mg/kg dry wt	56	70	33	29	41
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	-	< 0.005	-	< 0.005	< 0.005
4,4'-DDD	mg/kg dry wt	-	0.007	-	< 0.005	< 0.005
2,4'-DDE	mg/kg dry wt	-	< 0.005	-	< 0.005	< 0.005
4,4'-DDE	mg/kg dry wt	-	0.020	-	0.020	0.005
2,4'-DDT	mg/kg dry wt	-	0.021	-	0.009	< 0.005
4,4'-DDT	mg/kg dry wt	-	0.022	-	0.021	< 0.005
Total DDT Isomers	mg/kg dry wt	-	0.07	-	0.05	< 0.03
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Acenaphthylene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Anthracene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Benzo[a]anthracene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Chrysene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Fluoranthene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Fluorene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Naphthalene	mg/kg dry wt	< 0.16	-	-	< 0.14	-
Phenanthrene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Pyrene	mg/kg dry wt	< 0.04	-	-	< 0.03	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	< 8	< 11	< 7	< 7
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Nitrobenzene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
alpha-BHC	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
beta-BHC	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
delta-BHC	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
gamma-BHC (Lindane)	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
4,4'-DDD	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3

Sample Type: Soil						
	Sample Name:	TP105 1.3M 05-Jul-2011	TP106 0.3M 05-Jul-2011	TP106 1.0M 05-Jul-2011	TP107 0.2M 05-Jul-2011	TP108 0.2M 05-Jul-2011
	Lab Number:	911650.11	911650.12	911650.13	911650.14	911650.15
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
4,4'-DDE	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Dieldrin	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Endosulfan I	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Endosulfan II	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Endrin	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Endrin ketone	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Heptachlor	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Heptachlor epoxide	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Hexachlorobenzene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Acenaphthylene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Anthracene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Benzo[a]anthracene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Benzo[b]fluoranthene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Benzo[k]fluoranthene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
2-Chloronaphthalene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Chrysene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Fluoranthene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Fluorene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
2-Methylnaphthalene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Naphthalene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Phenanthrene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Pyrene	mg/kg dry wt	< 0.7	< 0.8	< 1.1	< 0.7	< 0.7
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
2,4-Dichlorophenol	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
2,4-Dimethylphenol	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 50	< 30	< 30
Phenol	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	< 6	< 9	< 5	< 6
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3

Sample Type: Soil

Sample Name:		TP105 1.3M 05-Jul-2011	TP106 0.3M 05-Jul-2011	TP106 1.0M 05-Jul-2011	TP107 0.2M 05-Jul-2011	TP108 0.2M 05-Jul-2011
Lab Number:		911650.11	911650.12	911650.13	911650.14	911650.15
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	< 8	< 11	< 7	< 7
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 5	< 3	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 14	< 15	< 30	< 13	< 13
Carbazole	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Dibenzofuran	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Isophorone	mg/kg dry wt	< 1.4	< 1.5	< 3	< 1.3	< 1.3
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	< 11	< 30	< 9	< 9
C10 - C14	mg/kg dry wt	< 20	< 30	< 50	< 20	< 20
C15 - C36	mg/kg dry wt	< 40	< 50	220	< 40	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 80	220	< 70	< 70

Sample Name:		TP108 2.0M 05-Jul-2011	TP109 0.2M 05-Jul-2011	TP109 0.5M 05-Jul-2011	TP110 0.4M 05-Jul-2011	TP110 1.0M 05-Jul-2011
Lab Number:		911650.16	911650.17	911650.18	911650.19	911650.20
Individual Tests						
Dry Matter	g/100g as rcvd	80	78	78	64	77
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	24	70	3	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.12	< 0.10
Total Recoverable Chromium	mg/kg dry wt	6	13	14	6	6
Total Recoverable Copper	mg/kg dry wt	36	17	15	10	7
Total Recoverable Lead	mg/kg dry wt	35	7.0	4.5	4.6	4.4
Total Recoverable Nickel	mg/kg dry wt	5	5	5	5	5
Total Recoverable Zinc	mg/kg dry wt	41	32	25	25	25
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	-	< 0.006	-	< 0.005	-
4,4'-DDD	mg/kg dry wt	-	< 0.006	-	0.008	-
2,4'-DDE	mg/kg dry wt	-	< 0.006	-	< 0.005	-
4,4'-DDE	mg/kg dry wt	-	0.020	-	0.062	-
2,4'-DDT	mg/kg dry wt	-	< 0.006	-	0.028	-
4,4'-DDT	mg/kg dry wt	-	0.013	-	0.039	-
Total DDT Isomers	mg/kg dry wt	-	0.03	-	0.14	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Acenaphthylene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Anthracene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Benzo[a]anthracene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Benzo[k]fluoranthene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Chrysene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Fluoranthene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Fluorene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Naphthalene	mg/kg dry wt	< 0.16	< 0.16	-	-	< 0.16
Phenanthrene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Pyrene	mg/kg dry wt	< 0.04	< 0.04	-	-	< 0.04
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4

Sample Type: Soil						
Sample Name:		TP108 2.0M 05-Jul-2011	TP109 0.2M 05-Jul-2011	TP109 0.5M 05-Jul-2011	TP110 0.4M 05-Jul-2011	TP110 1.0M 05-Jul-2011
Lab Number:		911650.16	911650.17	911650.18	911650.19	911650.20
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 7	< 7	< 7	< 9	< 7
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Nitrobenzene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
alpha-BHC	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
beta-BHC	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
delta-BHC	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
gamma-BHC (Lindane)	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
4,4'-DDD	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
4,4'-DDE	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
4,4'-DDT	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Dieldrin	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Endosulfan I	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endosulfan II	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endrin	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Endrin ketone	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Heptachlor	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Heptachlor epoxide	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Hexachlorobenzene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Acenaphthylene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Anthracene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Benzo[a]anthracene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Benzo[b]fluoranthene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Benzo[k]fluoranthene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
2-Chloronaphthalene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Chrysene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Fluoranthene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Fluorene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
2-Methylnaphthalene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Naphthalene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Phenanthrene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Pyrene	mg/kg dry wt	< 0.7	< 0.7	< 0.7	< 0.9	< 0.7
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
2,4-Dichlorophenol	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
2,4-Dimethylphenol	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3

Sample Type: Soil

Sample Name:		TP108 2.0M 05-Jul-2011	TP109 0.2M 05-Jul-2011	TP109 0.5M 05-Jul-2011	TP110 0.4M 05-Jul-2011	TP110 1.0M 05-Jul-2011
Lab Number:		911650.16	911650.17	911650.18	911650.19	911650.20
Phenols in SVOC Soil Samples by GC-MS						
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 40	< 30
Phenol	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 6	< 6	< 6	< 7	< 6
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Diethylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Dimethylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
Hexachlorocyclopentadiene	mg/kg dry wt	< 7	< 7	< 7	< 9	< 7
Hexachloroethane	mg/kg dry wt	< 3	< 3	< 3	< 4	< 3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 14	< 14	< 14	< 17	< 14
Carbazole	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Dibenzofuran	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Isophorone	mg/kg dry wt	< 1.4	< 1.4	< 1.4	< 1.7	< 1.4
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	< 10	< 10	< 12	< 10
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 30	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	60	141	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	141	< 70

Sample Name:		TP111 0.5M 05-Jul-2011	TP111 1.5M 05-Jul-2011			
Lab Number:		911650.21	911650.22			
Individual Tests						
Dry Matter	g/100g as rcvd	92	92	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	3	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	5	5	-	-	-
Total Recoverable Copper	mg/kg dry wt	7	9	-	-	-
Total Recoverable Lead	mg/kg dry wt	4.4	4.1	-	-	-
Total Recoverable Nickel	mg/kg dry wt	4	4	-	-	-
Total Recoverable Zinc	mg/kg dry wt	36	23	-	-	-
DDT Screening in Soil						
2,4'-DDD	mg/kg dry wt	< 0.006	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.006	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.006	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.006	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.006	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.006	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.03	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						

Sample Type: Soil

Sample Name:		TP111 0.5M 05-Jul-2011	TP111 1.5M 05-Jul-2011			
Lab Number:		911650.21	911650.22			
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.03	-	-	-	-
Anthracene	mg/kg dry wt	< 0.03	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.03	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	-	-	-	-
Chrysene	mg/kg dry wt	< 0.03	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.03	-	-	-	-
Fluorene	mg/kg dry wt	< 0.03	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.14	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.03	-	-	-	-
Pyrene	mg/kg dry wt	< 0.03	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.2	< 1.2	-	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.2	< 1.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 6	< 6	-	-	-
2,4-Dinitrotoluene	mg/kg dry wt	< 3	< 3	-	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 3	< 3	-	-	-
Nitrobenzene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 3	< 3	-	-	-
N-Nitrosodiphenylamine	mg/kg dry wt	< 3	< 3	-	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.2	< 1.2	-	-	-
alpha-BHC	mg/kg dry wt	< 1.2	< 1.2	-	-	-
beta-BHC	mg/kg dry wt	< 1.2	< 1.2	-	-	-
delta-BHC	mg/kg dry wt	< 1.2	< 1.2	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 1.2	< 1.2	-	-	-
4,4'-DDD	mg/kg dry wt	< 1.2	< 1.2	-	-	-
4,4'-DDE	mg/kg dry wt	< 1.2	< 1.2	-	-	-
4,4'-DDT	mg/kg dry wt	< 3	< 3	-	-	-
Dieldrin	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Endosulfan I	mg/kg dry wt	< 3	< 3	-	-	-
Endosulfan II	mg/kg dry wt	< 3	< 3	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 3	< 3	-	-	-
Endrin	mg/kg dry wt	< 3	< 3	-	-	-
Endrin ketone	mg/kg dry wt	< 3	< 3	-	-	-
Heptachlor	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Anthracene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Benzo[b]fluoranthene	mg/kg dry wt	< 1.2	< 1.2	-	-	-

Sample Type: Soil

	Sample Name:	TP111 0.5M 05-Jul-2011	TP111 1.5M 05-Jul-2011			
	Lab Number:	911650.21	911650.22			
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
2-Chloronaphthalene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Chrysene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Fluoranthene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Fluorene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Naphthalene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Phenanthrene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Pyrene	mg/kg dry wt	< 0.6	< 0.6	-	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	-	-	-
2-Chlorophenol	mg/kg dry wt	< 1.2	< 1.2	-	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.2	< 1.2	-	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 1.2	< 1.2	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	-	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.2	< 1.2	-	-	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	-	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	-	-	-
Phenol	mg/kg dry wt	< 3	< 3	-	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 3	< 3	-	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 3	< 3	-	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	-	-	-
Butylbenzylphthalate	mg/kg dry wt	< 3	< 3	-	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Diethylphthalate	mg/kg dry wt	< 3	< 3	-	-	-
Dimethylphthalate	mg/kg dry wt	< 3	< 3	-	-	-
Di-n-butylphthalate	mg/kg dry wt	< 3	< 3	-	-	-
Di-n-octylphthalate	mg/kg dry wt	< 3	< 3	-	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 3	< 3	-	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 3	< 3	-	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 3	< 3	-	-	-
Hexachlorobutadiene	mg/kg dry wt	< 3	< 3	-	-	-
Hexachlorocyclopentadiene	mg/kg dry wt	< 6	< 6	-	-	-
Hexachloroethane	mg/kg dry wt	< 3	< 3	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 12	< 12	-	-	-
Carbazole	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Dibenzofuran	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Isophorone	mg/kg dry wt	< 1.2	< 1.2	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	-	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	-	-	-

Analyst's Comments

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms

Analyst's Comments
Appendix No.2 - Total Petroleum Hydrocarbon Chromatograms

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-22
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-22
DDT Screening in Soil*	Sonication extraction, Florisil cleanup, GC-ECD analysis. Tested on dried sample	-	1, 3, 5, 7, 10, 12, 14-15, 17, 19, 21
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1, 4-5, 8, 10-11, 14, 16-17, 20-21
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Haloethers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Nitrogen containing compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Organochlorine Pesticides in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Phenols in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Plasticisers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Other Halogenated compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Other compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
SMC Compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1-22
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-22
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-22

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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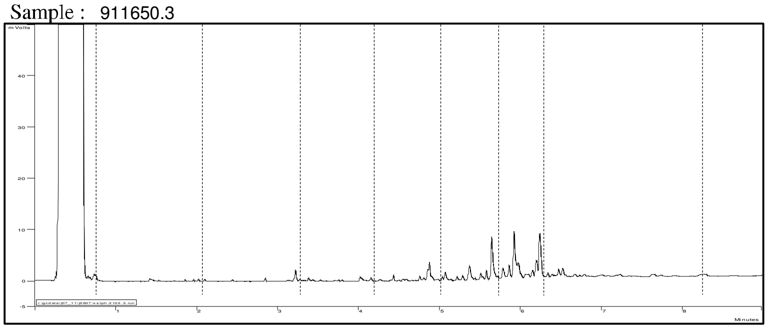
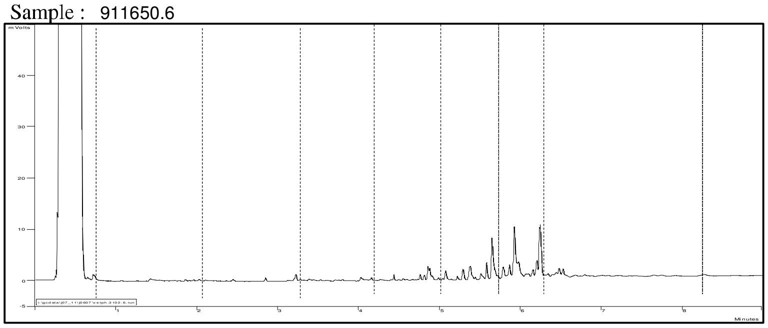
Ara Heron BSc (Tech)
Client Services Manager - Environmental Division

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms - Page 1 of 1

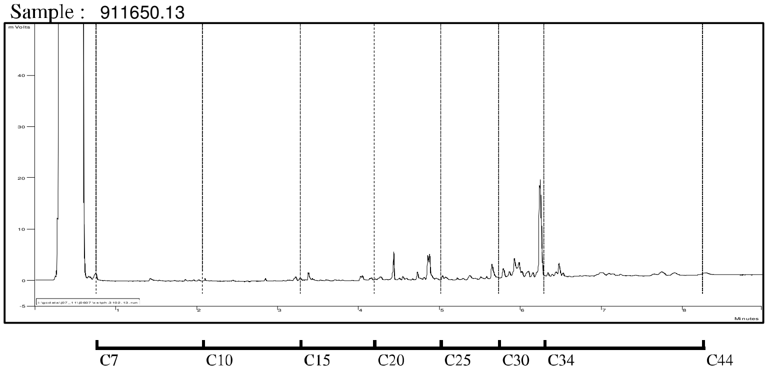
Sample : 911650.3



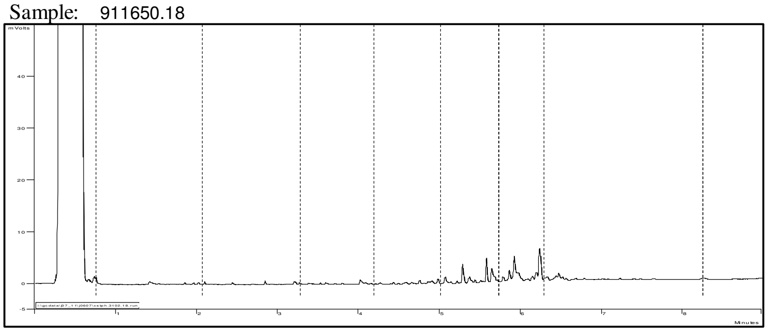
Sample : 911650.6



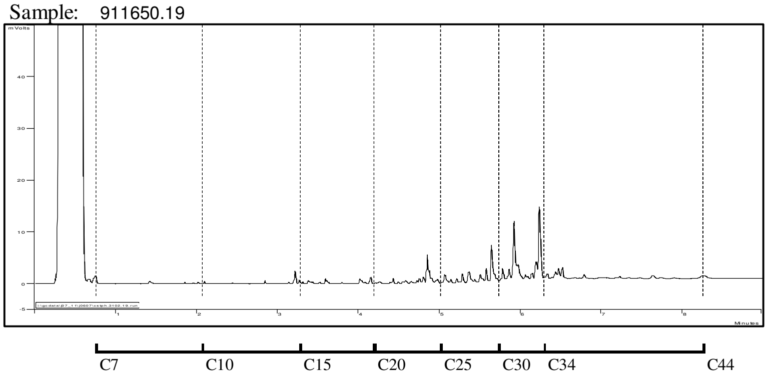
Sample : 911650.13



Sample: 911650.18



Sample: 911650.19



SECTOR 3 – OTAIHANGA LANDFILL

Laboratory Number	**Boreholes**
942066 (soils)	BH305 to BH307
944634 (groundwater)	

Hill Laboratories
BETTER TESTING BETTER RESULTS

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1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

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ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	942066 SPv1
Contact:	Kate Jackson C/- Beca Infrastructure Limited PO Box 6345 Wellesley Street AUCKLAND 1141	**Date Registered:**	11-Oct-2011
		Date Reported:	25-Oct-2011
		Quote No:	
		Order No:	
		Client Reference:	11:125 3320901/500/004
		Submitted By:	Kate Jackson

Sample Type: Soil

Sample Name:		11:125 BH306 3.0-3.3m 10-Oct-2011 12:30 pm	11:125 BH306 9.9-10.1m 10-Oct-2011 2:30 pm	11:125 BH 307 2.6-2.8m 11-Oct-2011 12:00 pm	11:125 BH 307 10.1-10.5m 11-Oct-2011 12:00 pm	11:125 BH 305 3.6-3.9m 12-Oct-2011 9:45 am
Lab Number:		942066.1	942066.2	942066.3	942066.4	942066.5
Individual Tests						
Dry Matter	g/100g as rcvd	21	75	74	74	77
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	< 2	2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	7	6	6	6	7
Total Recoverable Copper	mg/kg dry wt	10	7	7	6	10
Total Recoverable Lead	mg/kg dry wt	4.0	4.2	3.5	4.1	3.9
Total Recoverable Nickel	mg/kg dry wt	5	5	6	5	4
Total Recoverable Zinc	mg/kg dry wt	56	26	25	25	28
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 3	< 0.8	< 0.8	< 0.8	< 0.7
2,4-Dinitrotoluene	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
2,6-Dinitrotoluene	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Nitrobenzene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
N-Nitrosodiphenylamine	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
alpha-BHC	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
beta-BHC	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
delta-BHC	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
gamma-BHC (Lindane)	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
4,4'-DDD	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
4,4'-DDE	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
4,4'-DDT	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Dieldrin	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Endosulfan I	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Endosulfan II	mg/kg dry wt	< 1.1	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan sulphate	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Endrin	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3

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The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil

Sample Name:		11:125 BH306 3.0-3.3m 10-Oct-2011 12:30 pm	11:125 BH306 9.9-10.1m 10-Oct-2011 2:30 pm	11:125 BH 307 2.6-2.8m 11-Oct-2011 12:00 pm	11:125 BH 307 10.1-10.5m 11-Oct-2011 12:00 pm	11:125 BH 305 3.6-3.9m 12-Oct-2011 9:45 am
Lab Number:		942066.1	942066.2	942066.3	942066.4	942066.5
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Heptachlor	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Heptachlor epoxide	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Hexachlorobenzene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Benzo[b]fluoranthene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Benzo[k]fluoranthene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
2-Chloronaphthalene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Fluoranthene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
2-Methylnaphthalene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Naphthalene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg dry wt	< 0.3	< 0.10	< 0.10	< 0.10	< 0.10
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 1.1	< 0.5	< 0.5	< 0.5	< 0.5
2-Chlorophenol	mg/kg dry wt	< 0.6	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dichlorophenol	mg/kg dry wt	< 0.6	< 0.2	< 0.2	< 0.2	< 0.2
2,4-Dimethylphenol	mg/kg dry wt	< 0.6	< 0.2	< 0.2	< 0.2	< 0.2
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 1.1	< 0.4	< 0.4	< 0.4	< 0.4
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.6	< 0.2	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg dry wt	< 1.1	< 0.4	< 0.4	< 0.4	< 0.4
Pentachlorophenol (PCP)	mg/kg dry wt	< 11	< 6	< 6	< 6	< 6
Phenol	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 3	< 0.6	< 0.6	< 0.6	< 0.6
Butylbenzylphthalate	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.6	< 0.2	< 0.2	< 0.2	< 0.2
Diethylphthalate	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Dimethylphthalate	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Di-n-butylphthalate	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Di-n-octylphthalate	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
1,3-Dichlorobenzene	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
1,4-Dichlorobenzene	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Hexachlorobutadiene	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
Hexachlorocyclopentadiene	mg/kg dry wt	< 3	< 0.8	< 0.8	< 0.8	< 0.7
Hexachloroethane	mg/kg dry wt	< 1.1	< 0.3	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Other SVOC Trace in SVOC Soil Samples by GC-MS						

Sample Type: Soil						
Sample Name:		11:125 BH306 3.0-3.3m 10-Oct-2011 12:30 pm	11:125 BH306 9.9-10.1m 10-Oct-2011 2:30 pm	11:125 BH 307 2.6-2.8m 11-Oct-2011 12:00 pm	11:125 BH 307 10.1-10.5m 11-Oct-2011 12:00 pm	11:125 BH 305 3.6-3.9m 12-Oct-2011 9:45 am
Lab Number:		942066.1	942066.2	942066.3	942066.4	942066.5
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 6	< 1.5	< 1.5	< 1.5	< 1.4
Carbazole	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Dibenzofuran	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14
Isophorone	mg/kg dry wt	< 0.6	< 0.15	< 0.15	< 0.15	< 0.14

Sample Name:		11:125 BH 305 9.75-10.05 12-Oct-2011 11:10 am				
Lab Number:		942066.6				
Individual Tests						
Dry Matter	g/100g as rcvd	77	-	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	7	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	7	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	4.2	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	5	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	24	-	-	-	-
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.14	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.14	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.14	-	-	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.14	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.14	-	-	-	-
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 0.7	-	-	-	-
2,4-Dinitrotoluene	mg/kg dry wt	< 0.3	-	-	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 0.3	-	-	-	-
Nitrobenzene	mg/kg dry wt	< 0.14	-	-	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.3	-	-	-	-
N-Nitrosodiphenylamine	mg/kg dry wt	< 0.3	-	-	-	-
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.14	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.14	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.14	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.14	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.14	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.14	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.14	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.3	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.14	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.3	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.5	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.3	-	-	-	-
Endrin	mg/kg dry wt	< 0.3	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.3	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.14	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.14	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.14	-	-	-	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.10	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.10	-	-	-	-

Sample Type: Soil						
Sample Name:		11:125 BH 305 9.75-10.05 12-Oct-2011 11:10 am				
Lab Number:		942066.6				
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Anthracene	mg/kg dry wt	< 0.10	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.10	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.14	-	-	-	-
Benzo[b]fluoranthene	mg/kg dry wt	< 0.14	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.14	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.14	-	-	-	-
2-Chloronaphthalene	mg/kg dry wt	< 0.10	-	-	-	-
Chrysene	mg/kg dry wt	< 0.10	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.14	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.10	-	-	-	-
Fluorene	mg/kg dry wt	< 0.10	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.14	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.10	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.10	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.10	-	-	-	-
Pyrene	mg/kg dry wt	< 0.10	-	-	-	-
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 0.5	-	-	-	-
2-Chlorophenol	mg/kg dry wt	< 0.2	-	-	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 0.2	-	-	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 0.2	-	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 0.4	-	-	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 0.2	-	-	-	-
2-Nitrophenol	mg/kg dry wt	< 0.4	-	-	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 6	-	-	-	-
Phenol	mg/kg dry wt	< 0.3	-	-	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 0.3	-	-	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 0.3	-	-	-	-
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 0.6	-	-	-	-
Butylbenzylphthalate	mg/kg dry wt	< 0.3	-	-	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 0.2	-	-	-	-
Diethylphthalate	mg/kg dry wt	< 0.3	-	-	-	-
Dimethylphthalate	mg/kg dry wt	< 0.3	-	-	-	-
Di-n-butylphthalate	mg/kg dry wt	< 0.3	-	-	-	-
Di-n-octylphthalate	mg/kg dry wt	< 0.3	-	-	-	-
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.3	-	-	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.3	-	-	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.3	-	-	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.3	-	-	-	-
Hexachlorocyclopentadiene	mg/kg dry wt	< 0.7	-	-	-	-
Hexachloroethane	mg/kg dry wt	< 0.3	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.14	-	-	-	-
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 1.4	-	-	-	-
Carbazole	mg/kg dry wt	< 0.14	-	-	-	-
Dibenzofuran	mg/kg dry wt	< 0.14	-	-	-	-
Isophorone	mg/kg dry wt	< 0.14	-	-	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-6
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-6
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental Division

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ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	944634 SPv1
Contact:	Kate Jackson	**Date Registered:**	19-Oct-2011
	C/- Beca Infrastructure Limited	**Date Reported:**	02-Nov-2011
	PO Box 6345	**Quote No:**	46716
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:128 3320901/500/004
		Submitted By:	Kate Jackson

Sample Type: Aqueous

	Sample Name:	11:128 BH305 18-Oct-2011 10:45 am	11:128 BH306 18-Oct-2011 12:15 pm	11:128 BH307 18-Oct-2011 1:30 pm		
	Lab Number:	944634.1	944634.2	944634.3		
Individual Tests						
Sum of Anions	meq/L	8.1	5.0	9.9	-	-
Sum of Cations	meq/L	8.0	5.1	10.3	-	-
pH	pH Units	6.4	6.6	6.6	-	-
Total Alkalinity	g/m^3 as CaCO$_3$	260	180	440	-	-
Bicarbonate	g/m^3 at 25°C	320	220	530	-	-
Total Hardness	g/m^3 as CaCO$_3$	240	149	410	-	-
Electrical Conductivity (EC)	mS/m	78.4	49.9	87.6	-	-
Dissolved Calcium	g/m^3	58	40	136	-	-
Dissolved Magnesium	g/m^3	23	11.9	16.1	-	-
Dissolved Mercury	g/m^3	< 0.00008	< 0.00008	< 0.00008	-	-
Total Mercury	g/m^3	< 0.00008	< 0.00008	< 0.00008	-	-
Dissolved Potassium	g/m^3	10.6	8.5	18.1	-	-
Dissolved Sodium	g/m^3	67	38	23	-	-
Chloride	g/m^3	67	48	22	-	-
Total Ammoniacal-N	g/m^3	0.40	3.0	7.3	-	-
Nitrite-N	g/m^3	0.153	< 0.002	0.007	-	-
Nitrate-N	g/m^3	0.71	0.002	0.025	-	-
Nitrate-N + Nitrite-N	g/m^3	0.86	0.003	0.032	-	-
Dissolved Reactive Phosphorus	g/m^3	0.005	0.045	< 0.004	-	-
Sulphate	g/m^3	46	< 0.5	28	-	-
Faecal Coliforms and E. coli profile						
Faecal Coliforms	MPN / 100mL	33	33	220	-	-
Escherichia coli	MPN / 100mL	17	17	170	-	-
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Acetochlor	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Alachlor	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine-desethyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine-desisopropyl	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Azaconazole	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Azinphos-methyl	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Benalaxyl	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Bitertanol	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Bromacil	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Bromopropylate	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Butachlor	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Captan	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Aqueous

Sample Name:		11:128 BH305 18-Oct-2011 10:45 am	11:128 BH306 18-Oct-2011 12:15 pm	11:128 BH307 18-Oct-2011 1:30 pm		
Lab Number:		944634.1	944634.2	944634.3		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Carbaryl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Carbofuran	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorfluazuron	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorothalonil	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorpyrifos	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorpyrifos-methyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Chlortoluron	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Cyanazine	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Cyfluthrin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Cyhalothrin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Cypermethrin	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Deltamethrin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Diazinon	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Dichlofluanid	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Dichloran	g/m^3	< 0.002	< 0.002	< 0.002	-	-
Dichlorvos	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Difenoconazole	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Dimethoate	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Diphenylamine	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Diuron	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Fenpropimorph	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Fluazifop-butyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Fluometuron	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Flusilazole	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Fluvalinate	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Furalaxyl	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Haloxyfop-methyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Hexaconazole	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Hexazinone	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m^3	< 0.002	< 0.002	< 0.002	-	-
Iprodione	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Kresoxim-methyl	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Linuron	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Malathion	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Metalaxyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Metolachlor	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Metribuzin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Molinate	g/m^3	< 0.0007	< 0.0007	0.0014	-	-
Myclobutanil	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Naled	g/m^3	< 0.002	< 0.002	< 0.002	-	-
Norflurazon	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Oxadiazon	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Oxyfluorfen	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Paclobutrazol	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Parathion-ethyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Parathion-methyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Pendimethalin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Permethrin	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Pirimicarb	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Pirimiphos-methyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Prochloraz	g/m^3	< 0.002	< 0.002	< 0.002	-	-
Procymidone	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Prometryn	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Propachlor	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-

Sample Type: Aqueous

Sample Name:		11:128 BH305 18-Oct-2011 10:45 am	11:128 BH306 18-Oct-2011 12:15 pm	11:128 BH307 18-Oct-2011 1:30 pm		
Lab Number:		944634.1	944634.2	944634.3		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Propanil	g/m^3	< 0.002	< 0.002	< 0.002	-	-
Propazine	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Propiconazole	g/m^3	< 0.0003	< 0.0003	< 0.0003	-	-
Pyriproxyfen	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Quizalofop-ethyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Simazine	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Simetryn	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Sulfentrazone	g/m^3	< 0.002	< 0.002	< 0.002	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	g/m^3	< 0.0007	< 0.0007	< 0.0007	-	-
Tebuconazole	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Terbacil	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Terbufos	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Terbumeton	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Terbuthylazine	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Terbuthylazine-desethyl	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Terbutryn	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Thiabendazole	g/m^3	< 0.002	< 0.002	< 0.002	-	-
Thiobencarb	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Tolylfluanid	g/m^3	< 0.0002	< 0.0002	< 0.0002	-	-
Triazophos	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Trifluralin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Vinclozolin	g/m^3	< 0.0004	< 0.0004	< 0.0004	-	-
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m^3	< 0.002	0.007	0.044	-	-
Dissolved Cadmium	g/m^3	< 0.00005	< 0.00005	0.00019	-	-
Dissolved Chromium	g/m^3	< 0.0010	< 0.0010	0.0023	-	-
Dissolved Copper	g/m^3	0.0013	0.0005	0.0087	-	-
Dissolved Lead	g/m^3	0.00105	0.00034	0.0043	-	-
Dissolved Nickel	g/m^3	0.0109	< 0.0005	0.0030	-	-
Dissolved Zinc	g/m^3	0.026 $^{\#1}$	0.0174	6.2	-	-
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Arsenic	g/m^3	0.0011	0.0072	0.045	-	-
Total Cadmium	g/m^3	< 0.000053	< 0.000053	0.00035	-	-
Total Chromium	g/m^3	< 0.00053	0.0031	0.0064	-	-
Total Copper	g/m^3	0.0162	0.0049	0.085	-	-
Total Lead	g/m^3	0.00168	0.00194	0.0123	-	-
Total Nickel	g/m^3	0.0117	0.00152	0.0039	-	-
Total Zinc	g/m^3	0.025 $^{\#1}$	0.048	6.8	-	-
Haloethers Trace in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Bis(2-chloroethyl)ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Bis(2-chloroisopropyl)ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4-Bromophenyl phenyl ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
4-Chlorophenyl phenyl ether	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS						
3,3'-Dichlorobenzidine	g/m^3	< 0.003	< 0.003	< 0.003	-	-
2,4-Dinitrotoluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
2,6-Dinitrotoluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Nitrobenzene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
N-Nitrosodi-n-propylamine	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
N-Nitrosodiphenylamine	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS						
Aldrin	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-

Sample Type: Aqueous						
Sample Name:		11:128 BH305 18-Oct-2011 10:45 am	11:128 BH306 18-Oct-2011 12:15 pm	11:128 BH307 18-Oct-2011 1:30 pm		
Lab Number:		944634.1	944634.2	944634.3		
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS						
alpha-BHC	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
beta-BHC	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
delta-BHC	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
gamma-BHC (Lindane)	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
4,4'-DDD	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
4,4'-DDE	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
4,4'-DDT	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Dieldrin	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Endosulfan I	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Endosulfan II	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Endosulfan sulfate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Endrin	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Endrin ketone	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Heptachlor	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Heptachlor epoxide	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Hexachlorobenzene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples						
Acenaphthene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Acenaphthylene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Anthracene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Benzo[a]anthracene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Benzo[b]fluoranthene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Benzo[g,h,i]perylene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Benzo[k]fluoranthene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
2-Chloronaphthalene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Chrysene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Fluoranthene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Fluorene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
2-Methylnaphthalene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Naphthalene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Phenanthrene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Pyrene	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS						
2-Chlorophenol	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
2,4-Dichlorophenol	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
2,4,6-Trichlorophenol	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
2,4-Dimethylphenol	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
2-Methylphenol (o-Cresol)	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
2-Nitrophenol	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Pentachlorophenol (PCP)	g/m³	< 0.010	< 0.010	< 0.010	-	-
Phenol	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
2,4,5-Trichlorophenol	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS						
Butylbenzylphthalate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Diethylphthalate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Dimethylphthalate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Di-n-butylphthalate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Di-n-octylphthalate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-

Sample Type: Aqueous

Sample Name:		11:128 BH305 18-Oct-2011 10:45 am	11:128 BH306 18-Oct-2011 12:15 pm	11:128 BH307 18-Oct-2011 1:30 pm		
Lab Number:		944634.1	944634.2	944634.3		
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS						
Bis(2-ethylhexyl)phthalate	g/m^3	< 0.003	< 0.003	< 0.003	-	-
Di(2-ethylhexyl)adipate	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Other Halogenated compounds Trace (drinkingwater) in SVOC Water						
1,2-Dichlorobenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
1,3-Dichlorobenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
1,4-Dichlorobenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Other Halogenated compounds Trace (non-drinkingwater) in SVOC						
Hexachlorobutadiene	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
Hexachlorocyclopentadiene	g/m^3	< 0.003	< 0.003	< 0.003	-	-
Hexachloroethane	g/m^3	< 0.0010	< 0.0010	< 0.0010	-	-
1,2,4-Trichlorobenzene	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Other SVOC Trace in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Carbazole	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Dibenzofuran	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Isophorone	g/m^3	< 0.0005	< 0.0005	< 0.0005	-	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m^3	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	g/m^3	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	g/m^3	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	g/m^3	< 0.7	< 0.7	< 0.7	-	-
BTEX in VOC Water by Purge&Trap GC-MS						
Benzene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Toluene	g/m^3	< 0.010	< 0.010	< 0.010	-	-
Ethylbenzene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
m&p-Xylene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
o-Xylene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Halogenated Aliphatics in VOC Water by Purge&Trap GC-MS						
Bromomethane	g/m^3	< 0.02	< 0.02	< 0.02	-	-
Carbon tetrachloride	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Chloroethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Chloromethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,2-Dibromo-3-chloropropane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Dibromomethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Dichlorodifluoromethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloroethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,2-Dichloroethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloroethene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
cis-1,2-Dichloroethene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
trans-1,2-Dichloroethene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Dichloromethane (methylene chloride)	g/m^3	< 0.10	< 0.10	< 0.10	-	-
1,2-Dichloropropane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,3-Dichloropropane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
2,2-Dichloropropane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloropropene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
cis-1,3-Dichloropropene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
trans-1,3-Dichloropropene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Hexachlorobutadiene	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,1,1,2-Tetrachloroethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,1,2,2-Tetrachloroethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-
Tetrachloroethene (tetrachloroethylene)	g/m^3	< 0.005	< 0.005	< 0.005	-	-
1,1,1-Trichloroethane	g/m^3	< 0.005	< 0.005	< 0.005	-	-

Sample Type: Aqueous						
Sample Name:		11:128 BH305 18-Oct-2011 10:45 am	11:128 BH306 18-Oct-2011 12:15 pm	11:128 BH307 18-Oct-2011 1:30 pm		
Lab Number:		944634.1	944634.2	944634.3		
Halogenated Aliphatics in VOC Water by Purge&Trap GC-MS						
1,1,2-Trichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Trichloroethene (trichloroethylene)	g/m³	< 0.005	< 0.005	< 0.005	-	-
Trichlorofluoromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2,3-Trichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	g/m³	< 0.05	< 0.05	< 0.05	-	-
Vinyl chloride	g/m³	< 0.005	< 0.005	< 0.005	-	-
Haloaromatics in VOC Water by Purge&Trap GC-MS						
Bromobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Chlorobenzene (monochlorobenzene)	g/m³	< 0.005	< 0.005	< 0.005	-	-
2-Chlorotoluene	g/m³	< 0.005	< 0.005	< 0.005	-	-
4-Chlorotoluene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,3-Dichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,4-Dichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2,3-Trichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2,4-Trichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,3,5-Trichlorobenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Monoaromatic Hydrocarbons in VOC Water by Purge&Trap GC-MS						
n-Butylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
tert-Butylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Isopropylbenzene (Cumene)	g/m³	< 0.005	< 0.005	< 0.005	-	-
4-Isopropyltoluene (p-Cymene)	g/m³	< 0.005	< 0.005	< 0.005	-	-
n-Propylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
sec-Butylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Styrene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2,4-Trimethylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,3,5-Trimethylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Ketones in VOC Water by Purge&Trap GC-MS						
Acetone	g/m³	< 0.5	< 0.5	< 0.5	-	-
2-Butanone (MEK)	g/m³	< 0.05	< 0.05	< 0.05	-	-
Methyl tert-butylether (MTBE)	g/m³	< 0.05	< 0.05	< 0.05	-	-
4-Methylpentan-2-one (MIBK)	g/m³	< 0.05	< 0.05	< 0.05	-	-
Trihalomethanes in VOC Water by Purge&Trap GC-MS						
Bromodichloromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Bromoform (tribromomethane)	g/m³	< 0.005	< 0.005	< 0.005	-	-
Chloroform (Trichloromethane)	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dibromochloromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Other VOC in Water by Purge&Trap GC-MS						
Carbon disulphide	g/m³	< 0.05	< 0.05	< 0.05	-	-
Naphthalene	g/m³	< 0.005	< 0.005	< 0.005	-	-
System monitoring Compounds for VOC - % Recovery						
4-Bromofluorobenzene	%	96	97	97	-	-
Toluene-d8	%	100	98	100	-	-

Analyst's Comments

Please interpret these microbiological results with caution as the sample temperature was >10 °C on receipt in the lab. Samples are required to be less than 10 °C (but not frozen).

[#1] It has been noted that the result for the dissolved fraction was greater than that for the total fraction, but within analytical variation of the methods.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Samples
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-3
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 21st ed. 2005.	-	1-3
Total anions for anion/cation balance check	Calculation: sum of anions as mEquiv/L.	0.07 meq/L	1-3
Total cations for anion/cation balance check	Calculation: sum of cations as mEquiv/L.	0.05 meq/L	1-3
pH	pH meter. APHA 4500-H^+ B 21st ed. 2005.	0.1 pH Units	1-3
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. APHA 2320 B (Modified for alk <20) 21st ed. 2005.	1.0 g/m^3 as $CaCO_3$	1-3
Bicarbonate	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO_2 D 21st ed. 2005.	1.0 g/m^3 at 25°C	1-3
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 21st ed. 2005.	1.0 g/m^3 as $CaCO_3$	1-3
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 21st ed. 2005.	0.1 mS/m	1-3
Dissolved Calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.05 g/m^3	1-3
Dissolved Magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.02 g/m^3	1-3
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	1-3
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	1-3
Dissolved Potassium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.05 g/m^3	1-3
Dissolved Sodium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.02 g/m^3	1-3
Chloride	Filtered sample. Ferric thiocyanate colorimetry. Discrete Analyser. APHA 4500 Cl^- E (modified from continuous flow analysis) 21st ed. 2005.	0.5 g/m^3	1-3
Total Ammoniacal-N	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH_4-N = NH_4+-N + NH_3-N). APHA 4500-NH_3 F (modified from manual analysis) 21st ed. 2005.	0.010 g/m^3	1-3
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	0.002 g/m^3	1-3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N.	0.002 g/m^3	1-3
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	0.002 g/m^3	1-3
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colorimetry. Discrete Analyser. APHA 4500-P E (modified from manual analysis) 21st ed. 2005.	0.004 g/m^3	1-3
Sulphate	Filtered sample. Ion Chromatography. APHA 4110 B 21st ed. 2005.	0.5 g/m^3	1-3
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	1-3
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level	-	1-3
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level	-	1-3
Semivolatile Organic Compounds Trace in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines	-	1-3
Volatile Organic Compounds Screening in Water by Purge&Trap	Purge & Trap, GC-MS FS analysis	-	1-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	MPN count in LT Broth at 35°C for 48 hours, EC Broth at 44.5° C for 24 hours Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9221 B, 9221 E 21st ed. 2005.	2 MPN / 100mL	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Escherichia coli	MPN count in LT Broth at 35°C for 48 hours, EC MUG Broth at 44.5°C for 24 hours Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9221 B, 9221 F 21st ed. 2005.	2 MPN / 100mL	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental Division

SECTOR 3 – 124-154 TE MOANA ROAD

Laboratory Number	Hand Augers
918870	HA101 to HA108, HA118 to HA125
919264	HA109 to HA112, HA116

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ANALYSIS REPORT

SPv1

Client:	Beca Infrastructure Limited	**Lab No:**	918870
Contact:	G Smith	**Date Registered:**	02-Aug-2011
	C/- Beca Infrastructure Limited	**Date Reported:**	17-Aug-2011
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:099 - 3320901/500/004
		Submitted By:	G Smith

Sample Type: Soil

Sample Name:		HA101 0.3-0.5m 01-Aug-2011	HA102 0-0.4m 01-Aug-2011	HA103 0-0.4m 01-Aug-2011	HA104 0-0.5m 01-Aug-2011	HA105 0-0.4m 01-Aug-2011
Lab Number:		918870.1	918870.2	918870.3	918870.4	918870.5
Individual Tests						
Dry Matter	g/100g as rcvd	80	79	82	79	82
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	3	3	3	3
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.12	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	11	9	19	16	12
Total Recoverable Copper	mg/kg dry wt	8	8	14	10	10
Total Recoverable Lead	mg/kg dry wt	8.5	6.2	18.4	14.1	10.3
Total Recoverable Nickel	mg/kg dry wt	8	7	13	12	9
Total Recoverable Zinc	mg/kg dry wt	42	34	68	55	46
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
2,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
4,4'-DDD	mg/kg dry wt	< 0.0010	0.0013	< 0.0010	< 0.0010	< 0.0010
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
4,4'-DDE	mg/kg dry wt	< 0.0010	0.021	< 0.0010	0.0034	0.0038
2,4'-DDT	mg/kg dry wt	< 0.0010	0.0014	< 0.0010	< 0.0010	< 0.0010
4,4'-DDT	mg/kg dry wt	< 0.0010	0.0064	< 0.0010	0.0014	0.0013
Dieldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endosulfan I	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endosulfan II	mg/kg dry wt	< 0.0010	0.0027	< 0.0010	< 0.0010	< 0.0010
Endosulfan sulphate	mg/kg dry wt	< 0.0010	0.0107	< 0.0010	< 0.0010	< 0.0010
Endrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil

Sample Name:		HA101 0.3-0.5m 01-Aug-2011	HA102 0-0.4m 01-Aug-2011	HA103 0-0.4m 01-Aug-2011	HA104 0-0.5m 01-Aug-2011	HA105 0-0.4m 01-Aug-2011
Lab Number:		918870.1	918870.2	918870.3	918870.4	918870.5
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Alachlor	mg/kg dry wt	< 0.006	0.107	0.014	0.007	0.060
Atrazine	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Atrazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Atrazine-desisopropyl	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Azaconazole	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Azinphos-methyl	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Benalaxyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Bitertanol	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Bromacil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Bromopropylate	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Butachlor	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Captan	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Carbaryl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Carbofuran	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorfluazuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorothalonil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorpyrifos	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorpyrifos-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlortoluron	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Cyanazine	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Cyfluthrin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Cyhalothrin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Cypermethrin	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Deltamethrin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Diazinon	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Dichlofluanid	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Dichloran	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dichlorvos	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Difenoconazole	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Dimethoate	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Diphenylamine	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Diuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fenpropimorph	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fluazifop-butyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fluometuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Flusilazole	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fluvalinate	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Furalaxyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Haloxyfop-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Hexaconazole	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Hexazinone	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Iprodione	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Kresoxim-methyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Linuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Malathion	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Metalaxyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Methamidophos	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Metolachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Metribuzin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Molinate	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Myclobutanil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Naled	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04

Sample Type: Soil						
	Sample Name:	HA101 0.3-0.5m 01-Aug-2011	HA102 0-0.4m 01-Aug-2011	HA103 0-0.4m 01-Aug-2011	HA104 0-0.5m 01-Aug-2011	HA105 0-0.4m 01-Aug-2011
	Lab Number:	918870.1	918870.2	918870.3	918870.4	918870.5
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Norflurazon	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Oxadiazon	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Oxyfluorfen	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Paclobutrazol	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Parathion-ethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Parathion-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Pendimethalin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Permethrin	mg/kg dry wt	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Pirimicarb	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Pirimiphos-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Prochloraz	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Procymidone	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Prometryn	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Propachlor	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Propanil	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Propazine	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Propiconazole	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Pyriproxyfen	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Quizalofop-ethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Simazine	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Simetryn	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Sulfentrazone	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Tebuconazole	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbacil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbufos	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbumeton	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbuthylazine	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Terbuthylazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbutryn	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Thiabendazole	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Thiobencarb	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Tolylfluanid	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Triazophos	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Trifluralin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Vinclozolin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Naphthalene	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.13
Phenanthrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03

Sample Type: Soil						
Sample Name:		HA106 0-0.4m 01-Aug-2011	HA107 0-0.5m 01-Aug-2011	HA108 0-0.5m 01-Aug-2011	HA119 0-0.5m 01-Aug-2011	HA121 0-0.1m 01-Aug-2011
Lab Number:		918870.6	918870.7	918870.8	918870.9	918870.10
Individual Tests						
Dry Matter	g/100g as rcvd	80	83	85	82	86
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	4	4	3	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.10	< 0.10	0.13
Total Recoverable Chromium	mg/kg dry wt	10	9	11	9	10
Total Recoverable Copper	mg/kg dry wt	7	8	10	9	10
Total Recoverable Lead	mg/kg dry wt	7.0	6.8	10.9	6.8	10.7
Total Recoverable Nickel	mg/kg dry wt	7	7	8	7	7
Total Recoverable Zinc	mg/kg dry wt	35	35	50	35	132
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
2,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
4,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	0.0013	0.0014
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
4,4'-DDE	mg/kg dry wt	0.0033	0.022	0.050	0.0088	0.0130
2,4'-DDT	mg/kg dry wt	< 0.0010	0.0020	0.0061	< 0.0010	0.0048
4,4'-DDT	mg/kg dry wt	0.0014	0.0104	0.021	0.0034	0.051
Dieldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endosulfan I	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endosulfan II	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	0.0014	0.0011
Endosulfan sulphate	mg/kg dry wt	< 0.0010	0.0022	0.0039	0.0101	0.0015
Endrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Alachlor	mg/kg dry wt	0.014	0.023	0.007	0.021	< 0.006
Atrazine	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Atrazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Atrazine-desisopropyl	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Azaconazole	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Azinphos-methyl	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Benalaxyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Bitertanol	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Bromacil	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Bromopropylate	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Butachlor	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Captan	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Carbaryl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Carbofuran	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Chlorfluazuron	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Chlorothalonil	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Chlorpyrifos	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007

Sample Type: Soil						
	Sample Name:	HA106 0-0.4m 01-Aug-2011	HA107 0-0.5m 01-Aug-2011	HA108 0-0.5m 01-Aug-2011	HA119 0-0.5m 01-Aug-2011	HA121 0-0.1m 01-Aug-2011
	Lab Number:	918870.6	918870.7	918870.8	918870.9	918870.10
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Chlorpyrifos-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Chlortoluron	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Cyanazine	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Cyfluthrin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Cyhalothrin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Cypermethrin	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Deltamethrin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Diazinon	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Dichlofluanid	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Dichloran	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dichlorvos	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Difenoconazole	mg/kg dry wt	< 0.011	< 0.011	< 0.010	< 0.011	< 0.010
Dimethoate	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Diphenylamine	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Diuron	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Fenpropimorph	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Fluazifop-butyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Fluometuron	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Flusilazole	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Fluvalinate	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Furalaxyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Haloxyfop-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Hexaconazole	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Hexazinone	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Iprodione	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Kresoxim-methyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Linuron	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Malathion	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Metalaxyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Methamidophos	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Metolachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Metribuzin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Molinate	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Myclobutanil	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Naled	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Norflurazon	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Oxadiazon	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Oxyfluorfen	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Paclobutrazol	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Parathion-ethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Parathion-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Pendimethalin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Permethrin	mg/kg dry wt	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Pirimicarb	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Pirimiphos-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Prochloraz	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Procymidone	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Prometryn	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Propachlor	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Propanil	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Propazine	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Propiconazole	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Pyriproxyfen	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007

Sample Type: Soil

	Sample Name:	HA106 0-0.4m 01-Aug-2011	HA107 0-0.5m 01-Aug-2011	HA108 0-0.5m 01-Aug-2011	HA119 0-0.5m 01-Aug-2011	HA121 0-0.1m 01-Aug-2011
	Lab Number:	918870.6	918870.7	918870.8	918870.9	918870.10
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Quizalofop-ethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Simazine	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Simetryn	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Sulfentrazone	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.015	< 0.015	< 0.014	< 0.015	< 0.014
Tebuconazole	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Terbacil	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Terbufos	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Terbumeton	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Terbuthylazine	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Terbuthylazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Terbutryn	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Thiabendazole	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Thiobencarb	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Tolylfluanid	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Triazophos	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Trifluralin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Vinclozolin	mg/kg dry wt	< 0.008	< 0.008	< 0.007	< 0.008	< 0.007
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.06
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.12
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.06
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.04
Chrysene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.10
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.27
Fluorene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.05
Naphthalene	mg/kg dry wt	< 0.14	< 0.14	< 0.13	< 0.14	< 0.13
Phenanthrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.39
Pyrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.25

	Sample Name:	HA122 0-0.1m 01-Aug-2011	HA123 0-0.1m 01-Aug-2011	HA124 0-0.1m 01-Aug-2011	HA125 0-0.1m 01-Aug-2011	HA118 0-0.35m 01-Aug-2011
	Lab Number:	918870.11	918870.12	918870.13	918870.14	918870.15
Individual Tests						
Dry Matter	g/100g as rcvd	84	83	87	77	73
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	4	4	4	5
Total Recoverable Cadmium	mg/kg dry wt	0.20	0.29	0.12	0.16	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	12	11	11	10
Total Recoverable Copper	mg/kg dry wt	8	30	11	12	9
Total Recoverable Lead	mg/kg dry wt	8.2	9.1	10.0	12.0	8.9
Total Recoverable Nickel	mg/kg dry wt	8	8	7	7	7
Total Recoverable Zinc	mg/kg dry wt	44	89	70	510	38
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010

Sample Type: Soil						
	Sample Name:	HA122 0-0.1m 01-Aug-2011	HA123 0-0.1m 01-Aug-2011	HA124 0-0.1m 01-Aug-2011	HA125 0-0.1m 01-Aug-2011	HA118 0-0.35m 01-Aug-2011
	Lab Number:	918870.11	918870.12	918870.13	918870.14	918870.15
Organochlorine Pesticides Trace in Soil						
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
2,4'-DDD	mg/kg dry wt	0.0015	0.0044	0.0010	< 0.0010	< 0.0010
4,4'-DDD	mg/kg dry wt	0.0047	0.0125	0.0024	0.0011	< 0.0010
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
4,4'-DDE	mg/kg dry wt	0.040	0.041	0.023	0.025	0.0126
2,4'-DDT	mg/kg dry wt	0.0087	0.0137	0.0045	0.0018	< 0.0010
4,4'-DDT	mg/kg dry wt	0.126	0.084	0.065	0.021	0.0021
Dieldrin	mg/kg dry wt	< 0.0010	0.0115	< 0.0010	< 0.0010	< 0.0010
Endosulfan I	mg/kg dry wt	< 0.0010	0.0095	< 0.0010	< 0.0010	< 0.0010
Endosulfan II	mg/kg dry wt	0.0025	0.045	0.0053	0.0019	< 0.0010
Endosulfan sulphate	mg/kg dry wt	0.0049	0.071	0.0031	0.0091	0.0016
Endrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	0.0015	< 0.0010	< 0.0010
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	0.0014	< 0.0010
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Alachlor	mg/kg dry wt	< 0.006	12.9	0.033	0.014	0.047
Atrazine	mg/kg dry wt	< 0.008	< 0.08	0.008	< 0.008	< 0.009
Atrazine-desethyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Atrazine-desisopropyl	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Azaconazole	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Azinphos-methyl	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Benalaxyl	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Bitertanol	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Bromacil	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Bromopropylate	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Butachlor	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Captan	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Carbaryl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Carbofuran	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Chlorfluazuron	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Chlorothalonil	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Chlorpyrifos	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Chlorpyrifos-methyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Chlortoluron	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Cyanazine	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Cyfluthrin	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Cyhalothrin	mg/kg dry wt	< 0.008	0.12	< 0.007	< 0.008	< 0.009
Cypermethrin	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Deltamethrin	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Diazinon	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Dichlofluanid	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Dichloran	mg/kg dry wt	< 0.03	< 0.18	< 0.03	< 0.03	< 0.03
Dichlorvos	mg/kg dry wt	< 0.010	< 0.08	< 0.010	< 0.010	< 0.010
Difenoconazole	mg/kg dry wt	< 0.011	< 0.11	0.010	< 0.011	< 0.012
Dimethoate	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Diphenylamine	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017

Sample Type: Soil

Sample Name:		HA122 0-0.1m 01-Aug-2011	HA123 0-0.1m 01-Aug-2011	HA124 0-0.1m 01-Aug-2011	HA125 0-0.1m 01-Aug-2011	HA118 0-0.35m 01-Aug-2011
Lab Number:		918870.11	918870.12	918870.13	918870.14	918870.15
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Diuron	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Fenpropimorph	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Fluazifop-butyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Fluometuron	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Flusilazole	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Fluvalinate	mg/kg dry wt	< 0.006	< 0.06	< 0.006	< 0.006	< 0.006
Furalaxyl	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Haloxyfop-methyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Hexaconazole	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Hexazinone	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	< 0.4	< 0.04	< 0.04	< 0.05
Iprodione	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Kresoxim-methyl	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Linuron	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Malathion	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Metalaxyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Methamidophos	mg/kg dry wt	< 0.04	< 0.4	< 0.04	< 0.04	< 0.05
Metolachlor	mg/kg dry wt	< 0.006	< 0.04	< 0.006	< 0.006	< 0.006
Metribuzin	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Molinate	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Myclobutanil	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Naled	mg/kg dry wt	< 0.04	< 0.4	< 0.04	< 0.04	< 0.05
Norflurazon	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Oxadiazon	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Oxyfluorfen	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Paclobutrazol	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Parathion-ethyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Parathion-methyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Pendimethalin	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Permethrin	mg/kg dry wt	< 0.003	< 0.03	< 0.003	< 0.003	< 0.003
Pirimicarb	mg/kg dry wt	< 0.008	0.50	< 0.007	< 0.008	< 0.009
Pirimiphos-methyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Prochloraz	mg/kg dry wt	< 0.04	< 0.4	< 0.04	< 0.04	< 0.05
Procymidone	mg/kg dry wt	< 0.008	0.14	< 0.007	< 0.008	< 0.009
Prometryn	mg/kg dry wt	< 0.004	< 0.04	0.022	0.004	< 0.005
Propachlor	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Propanil	mg/kg dry wt	< 0.03	< 0.15	< 0.03	< 0.03	< 0.03
Propazine	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Propiconazole	mg/kg dry wt	< 0.006	< 0.06	< 0.006	< 0.006	< 0.006
Pyriproxyfen	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Quizalofop-ethyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Simazine	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Simetryn	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Sulfentrazone	mg/kg dry wt	< 0.04	< 0.4	< 0.04	< 0.04	< 0.05
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.015	< 0.15	< 0.014	< 0.016	< 0.017
Tebuconazole	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Terbacil	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Terbufos	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Terbumeton	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Terbuthylazine	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Terbuthylazine-desethyl	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Terbutryn	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Thiabendazole	mg/kg dry wt	< 0.04	< 0.4	< 0.04	< 0.04	< 0.05
Thiobencarb	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009

Sample Type: Soil

Sample Name:		HA122 0-0.1m 01-Aug-2011	HA123 0-0.1m 01-Aug-2011	HA124 0-0.1m 01-Aug-2011	HA125 0-0.1m 01-Aug-2011	HA118 0-0.35m 01-Aug-2011
Lab Number:		918870.11	918870.12	918870.13	918870.14	918870.15
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Tolylfluanid	mg/kg dry wt	< 0.004	< 0.04	< 0.004	< 0.004	< 0.005
Triazophos	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Trifluralin	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Vinclozolin	mg/kg dry wt	< 0.008	< 0.08	< 0.007	< 0.008	< 0.009
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Chrysene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Fluorene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Naphthalene	mg/kg dry wt	< 0.14	< 0.13	< 0.13	< 0.14	< 0.16
Phenanthrene	mg/kg dry wt	< 0.03	0.04	< 0.03	< 0.03	< 0.04
Pyrene	mg/kg dry wt	< 0.03	0.30	< 0.03	< 0.03	< 0.04

Sample Name:		HA120 0-0.5 01-Aug-2011	HA120 0-0.5 [Duplicate Sample]			
Lab Number:		918870.16	918870.17			
Individual Tests						
Dry Matter	g/100g as rcvd	80	79	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	4	4	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	10	11	-	-	-
Total Recoverable Copper	mg/kg dry wt	8	8	-	-	-
Total Recoverable Lead	mg/kg dry wt	8.8	9.3	-	-	-
Total Recoverable Nickel	mg/kg dry wt	8	8	-	-	-
Total Recoverable Zinc	mg/kg dry wt	40	41	-	-	-
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
4,4'-DDD	mg/kg dry wt	0.0041	< 0.0011	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
4,4'-DDE	mg/kg dry wt	0.032	0.021	-	-	-
2,4'-DDT	mg/kg dry wt	0.0025	0.0017	-	-	-
4,4'-DDT	mg/kg dry wt	0.0138	0.0090	-	-	-
Dieldrin	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Endosulfan I	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Endosulfan II	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Endosulfan sulphate	mg/kg dry wt	0.0014	< 0.0011	-	-	-
Endrin	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-

Sample Type: Soil

Sample Name:		HA120 0-0.5 01-Aug-2011	HA120 0-0.5 [Duplicate Sample]			
Lab Number:		918870.16	918870.17			
Organochlorine Pesticides Trace in Soil						
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0011	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	-	-	-
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Alachlor	mg/kg dry wt	0.039	< 0.006	-	-	-
Atrazine	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Atrazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Azaconazole	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Azinphos-methyl	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Benalaxyl	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Bitertanol	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Bromacil	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Bromopropylate	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Butachlor	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Captan	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Carbaryl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Carbofuran	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Chlorfluazuron	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Chlorothalonil	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Chlorpyrifos	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Chlortoluron	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Cyanazine	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Cyfluthrin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Cyhalothrin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Cypermethrin	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Deltamethrin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Diazinon	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Dichlofluanid	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Dichloran	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Dichlorvos	mg/kg dry wt	< 0.010	< 0.010	-	-	-
Difenoconazole	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Dimethoate	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Diphenylamine	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Diuron	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Fenpropimorph	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Fluazifop-butyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Fluometuron	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Flusilazole	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Fluvalinate	mg/kg dry wt	< 0.006	< 0.006	-	-	-
Furalaxyl	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Haloxyfop-methyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Hexaconazole	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Hexazinone	mg/kg dry wt	< 0.004	< 0.004	-	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Iprodione	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Kresoxim-methyl	mg/kg dry wt	< 0.004	< 0.004	-	-	-

Sample Type: Soil						
Sample Name:		HA120 0-0.5 01-Aug-2011	HA120 0-0.5 [Duplicate Sample]			
Lab Number:		918870.16	918870.17			
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Linuron	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Malathion	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Metalaxyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Methamidophos	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Metolachlor	mg/kg dry wt	< 0.006	< 0.006	-	-	-
Metribuzin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Molinate	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Myclobutanil	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Naled	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Norflurazon	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Oxadiazon	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Oxyfluorfen	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Paclobutrazol	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Parathion-ethyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Parathion-methyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Pendimethalin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Permethrin	mg/kg dry wt	< 0.003	< 0.003	-	-	-
Pirimicarb	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Pirimiphos-methyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Prochloraz	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Procymidone	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Prometryn	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Propachlor	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Propanil	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Propazine	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Propiconazole	mg/kg dry wt	< 0.006	< 0.006	-	-	-
Pyriproxyfen	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Quizalofop-ethyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Simazine	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Simetryn	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Sulfentrazone	mg/kg dry wt	< 0.04	< 0.04	-	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Tebuconazole	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Terbacil	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Terbufos	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Terbumeton	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Terbuthylazine	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Terbutryn	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Thiabendazole	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Thiobencarb	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Tolylfluanid	mg/kg dry wt	< 0.004	< 0.004	-	-	-
Triazophos	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Trifluralin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Vinclozolin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Anthracene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.03	-	-	-

Sample Type: Soil						
Sample Name:		HA120 0-0.5 01-Aug-2011	HA120 0-0.5 [Duplicate Sample]			
Lab Number:		918870.16	918870.17			
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Chrysene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Fluoranthene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Fluorene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Naphthalene	mg/kg dry wt	< 0.14	< 0.14	-	-	-
Phenanthrene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Pyrene	mg/kg dry wt	< 0.03	< 0.03	-	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-17
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-17
Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-17
Organochlorine Pesticides Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), dual column GC-ECD analysis. Tested on dried sample	-	1-17
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-17
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1-17
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-17
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-17

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental Division

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ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	919264 SPv1
Contact:	G Smith C/- Beca Infrastructure Limited PO Box 6345 Wellesley Street AUCKLAND 1141	**Date Registered:**	03-Aug-2011
		Date Reported:	17-Aug-2011
		Quote No:	
		Order No:	
		Client Reference:	11:099 - 3320901/500/004
		Submitted By:	G Smith

Sample Type: Soil

	Sample Name:	HA109 0-0.5m 02-Aug-2011	HA110 0-0.3m 02-Aug-2011	HA111 0-0.5m 02-Aug-2011	HA112 0-0.5m 02-Aug-2011	HA111Dup 0-0.5m 02-Aug-2011
	Lab Number:	919264.1	919264.2	919264.3	919264.4	919264.5
Individual Tests						
Dry Matter	g/100g as rcvd	80	75	82	79	81
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	5	4	4	4
Total Recoverable Cadmium	mg/kg dry wt	0.12	0.13	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	12	15	13	13	13
Total Recoverable Copper	mg/kg dry wt	9	12	9	9	8
Total Recoverable Lead	mg/kg dry wt	11.7	14.6	11.4	11.3	11.3
Total Recoverable Nickel	mg/kg dry wt	9	10	9	10	9
Total Recoverable Zinc	mg/kg dry wt	49	59	47	47	47
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
2,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
4,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
4,4'-DDE	mg/kg dry wt	0.0058	0.0032	0.0013	0.0014	0.0013
2,4'-DDT	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
4,4'-DDT	mg/kg dry wt	0.0020	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Dieldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Endosulfan I	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Endosulfan II	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Endosulfan sulphate	mg/kg dry wt	0.0025	< 0.0010	0.0030	0.0014	0.0023
Endrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0018
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0011
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil

Sample Name:		HA109 0-0.5m 02-Aug-2011	HA110 0-0.3m 02-Aug-2011	HA111 0-0.5m 02-Aug-2011	HA112 0-0.5m 02-Aug-2011	HA111Dup 0-0.5m 02-Aug-2011
Lab Number:		919264.1	919264.2	919264.3	919264.4	919264.5
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Alachlor	mg/kg dry wt	0.016	< 0.006	0.026	0.015	0.011
Atrazine	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Atrazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Atrazine-desisopropyl	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Azaconazole	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Azinphos-methyl	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Benalaxyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Bitertanol	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Bromacil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Bromopropylate	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Butachlor	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Captan	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Carbaryl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Carbofuran	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorfluazuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorothalonil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorpyrifos	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlorpyrifos-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Chlortoluron	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Cyanazine	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Cyfluthrin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Cyhalothrin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Cypermethrin	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Deltamethrin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Diazinon	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Dichlofluanid	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Dichloran	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dichlorvos	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Difenoconazole	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.011
Dimethoate	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Diphenylamine	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Diuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fenpropimorph	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fluazifop-butyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fluometuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Flusilazole	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Fluvalinate	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Furalaxyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Haloxyfop-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Hexaconazole	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Hexazinone	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Iprodione	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Kresoxim-methyl	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Linuron	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Malathion	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Metalaxyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Methamidophos	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Metolachlor	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Metribuzin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Molinate	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Myclobutanil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Naled	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04

Sample Type: Soil

Sample Name:		HA109 0-0.5m 02-Aug-2011	HA110 0-0.3m 02-Aug-2011	HA111 0-0.5m 02-Aug-2011	HA112 0-0.5m 02-Aug-2011	HA111Dup 0-0.5m 02-Aug-2011
Lab Number:		919264.1	919264.2	919264.3	919264.4	919264.5
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Norflurazon	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Oxadiazon	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Oxyfluorfen	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Paclobutrazol	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Parathion-ethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Parathion-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Pendimethalin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Permethrin	mg/kg dry wt	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Pirimicarb	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Pirimiphos-methyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Prochloraz	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Procymidone	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Prometryn	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Propachlor	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Propanil	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Propazine	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Propiconazole	mg/kg dry wt	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Pyriproxyfen	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Quizalofop-ethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Simazine	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Simetryn	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Sulfentrazone	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.015	< 0.016	< 0.015	< 0.016	< 0.015
Tebuconazole	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbacil	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbufos	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbumeton	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbuthylazine	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Terbuthylazine-desethyl	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Terbutryn	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Thiabendazole	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Thiobencarb	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Tolylfluanid	mg/kg dry wt	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Triazophos	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Trifluralin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Vinclozolin	mg/kg dry wt	< 0.008	< 0.008	< 0.008	< 0.008	< 0.008
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Anthracene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Chrysene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Fluorene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Naphthalene	mg/kg dry wt	< 0.15	< 0.16	< 0.13	< 0.14	< 0.14
Phenanthrene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03
Pyrene	mg/kg dry wt	< 0.03	< 0.04	< 0.03	< 0.03	< 0.03

Sample Type: Soil

Sample Name:		HA109 0-0.5m 02-Aug-2011	HA110 0-0.3m 02-Aug-2011	HA111 0-0.5m 02-Aug-2011	HA112 0-0.5m 02-Aug-2011	HA111Dup 0-0.5m 02-Aug-2011
Lab Number:		919264.1	919264.2	919264.3	919264.4	919264.5
Sample Name:		HA116 0-0.5m 02-Aug-2011	HA117 0-0.5m 02-Aug-2011	HA126 0-0.2m 02-Aug-2011		
Lab Number:		919264.6	919264.7	919264.8		
Individual Tests						
Dry Matter	g/100g as rcvd	81	80	77	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	3	4	4	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	9	9	12	-	-
Total Recoverable Copper	mg/kg dry wt	6	9	8	-	-
Total Recoverable Lead	mg/kg dry wt	6.2	9.9	9.8	-	-
Total Recoverable Nickel	mg/kg dry wt	7	6	9	-	-
Total Recoverable Zinc	mg/kg dry wt	34	60	45	-	-
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
4,4'-DDE	mg/kg dry wt	0.035	< 0.0010	-	-	-
2,4'-DDT	mg/kg dry wt	0.0042	< 0.0010	-	-	-
4,4'-DDT	mg/kg dry wt	0.022	< 0.0010	-	-	-
Dieldrin	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Endosulfan I	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Endosulfan II	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Endosulfan sulphate	mg/kg dry wt	0.0020	< 0.0010	-	-	-
Endrin	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0010	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	-	-	-
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Alachlor	mg/kg dry wt	< 0.006	< 0.04	-	-	-
Atrazine	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Atrazine-desethyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Azaconazole	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Azinphos-methyl	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Benalaxyl	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Bitertanol	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Bromacil	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Bromopropylate	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Butachlor	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Captan	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Carbaryl	mg/kg dry wt	< 0.008	< 0.08	-	-	-

Sample Type: Soil

Sample Name:		HA116 0-0.5m 02-Aug-2011	HA117 0-0.5m 02-Aug-2011	HA126 0-0.2m 02-Aug-2011		
Lab Number:		919264.6	919264.7	919264.8		
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Carbofuran	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Chlorfluazuron	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Chlorothalonil	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Chlorpyrifos	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Chlortoluron	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Cyanazine	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Cyfluthrin	mg/kg dry wt	< 0.008	< 0.008	-	-	-
Cyhalothrin	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Cypermethrin	mg/kg dry wt	< 0.015	< 0.015	-	-	-
Deltamethrin	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Diazinon	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Dichlofluanid	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Dichloran	mg/kg dry wt	< 0.03	< 0.19	-	-	-
Dichlorvos	mg/kg dry wt	< 0.010	< 0.08	-	-	-
Difenoconazole	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Dimethoate	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Diphenylamine	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Diuron	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Fenpropimorph	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Fluazifop-butyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Fluometuron	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Flusilazole	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Fluvalinate	mg/kg dry wt	< 0.006	< 0.006	-	-	-
Furalaxyl	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Haloxyfop-methyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Hexaconazole	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Hexazinone	mg/kg dry wt	< 0.004	< 0.04	-	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.04	< 0.4	-	-	-
Iprodione	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Kresoxim-methyl	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Linuron	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Malathion	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Metalaxyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Methamidophos	mg/kg dry wt	< 0.04	< 0.4	-	-	-
Metolachlor	mg/kg dry wt	< 0.006	< 0.04	-	-	-
Metribuzin	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Molinate	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Myclobutanil	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Naled	mg/kg dry wt	< 0.04	< 0.4	-	-	-
Norflurazon	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Oxadiazon	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Oxyfluorfen	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Paclobutrazol	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Parathion-ethyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Parathion-methyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Pendimethalin	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Permethrin	mg/kg dry wt	< 0.003	< 0.003	-	-	-
Pirimicarb	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Pirimiphos-methyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Prochloraz	mg/kg dry wt	< 0.04	< 0.4	-	-	-
Procymidone	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Prometryn	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Propachlor	mg/kg dry wt	< 0.008	< 0.08	-	-	-

Sample Type: Soil

Sample Name:		HA116 0-0.5m 02-Aug-2011	HA117 0-0.5m 02-Aug-2011	HA126 0-0.2m 02-Aug-2011		
Lab Number:		919264.6	919264.7	919264.8		
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Propanil	mg/kg dry wt	< 0.03	< 0.15	-	-	-
Propazine	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Propiconazole	mg/kg dry wt	< 0.006	< 0.006	-	-	-
Pyriproxyfen	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Quizalofop-ethyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Simazine	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Simetryn	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Sulfentrazone	mg/kg dry wt	< 0.04	< 0.4	-	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.015	< 0.15	-	-	-
Tebuconazole	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Terbacil	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Terbufos	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Terbumeton	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Terbuthylazine	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Terbutryn	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Thiabendazole	mg/kg dry wt	< 0.04	< 0.4	-	-	-
Thiobencarb	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Tolylfluanid	mg/kg dry wt	< 0.004	< 0.04	-	-	-
Triazophos	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Trifluralin	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Vinclozolin	mg/kg dry wt	< 0.008	< 0.08	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Chrysene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Fluoranthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Fluorene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Naphthalene	mg/kg dry wt	< 0.15	< 0.15	< 0.14	-	-
Phenanthrene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Pyrene	mg/kg dry wt	< 0.03	2.1	< 0.03	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 9	-	-
C10 - C14	mg/kg dry wt	-	-	< 20	-	-
C15 - C36	mg/kg dry wt	-	-	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	< 70	-	-

Analyst's Comments

It has been noted that the client supplied duplicate for Multiresidue analysis on sample /5, showed greater variation than we would normally be expected. The sample was re-extracted and confirmed, this may reflect the heterogeneity of the sample.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	8
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-8
Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-7
Organochlorine Pesticides Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), dual column GC-ECD analysis. Tested on dried sample	-	1-7
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-7
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1-8
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	8
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-8
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-8

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental Division

Appendix 23.E

Chain of Custody Forms

APPENDIX E

Chain of Custody Forms

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

Time Received 07-Jul-2011 10 37 05 am

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Lab No 912271
No of Samples 23 No of Fractions 180
0319122719

Client

Name Beca Infrastructure 76225
Address PO Box 6345, AUCKLAND
Phone 09 300 9000 Fax 09 300 9300
Client Reference 11:081 - 3320901/500/004
Quote No Order Number

Primary Contact Genevieve Smith
Submitted By Genevieve Smith
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results genevieve-smith@beca.com
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Office use only

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 6/7 430pm
Name: Gen Smith
☑ Please tick if you require COC to be faxed back
Signature: GCSmith

Received at Hill Laboratories Date & Time: 7 JUL 11 7:34
Name: Bean
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen Temp: 13.2
☐ Sample Analysis details checked
Signature:

Priority ☐ Low ☑ Normal ☐ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	TP201 0.3m	6/7	ES	HM (screen) SVOC (screen) TPH (screen)
2	TP201 0.65m	6/7	ES	" " "
3	TP202 0.3m	6/7	ES	" " "
4	TP202 0.8m	6/7	ES	" " "
5	TP203 0.2m	6/7	ES	" " "
6	TP203 1.4m	6/7	ES	as above plus asbestos fibres
7	TP204 0.4m	6/7	ES	as above plus asbestos fibres
8	TP204 1-4m	6/7	ES	HM (screen) SVOC (screen) TPH (screen)
9	TP205 0.2m	6/7	ES	" " "
10	TP205 1.0m	6/7	ES	" " "

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	TP206 0·3m	6/7	ES	HM(screen) SVOC(screen) TPH(screen)
12	TP206 0·5m	"	ES	" " "
13	TP206 1·5m	"	ES	" " "
14	TP 207 0·3m	"	ES	" " "
15	TP 207 0·8m	"	ES	" " "
16	TP 208 0·3m	"	ES	" " "
17	TP 208 1·3m	"	ES	" " "
18	TP209 0·3m	"	ES	" " "
19	TP209 0·8m	"	ES	TPH(screen) PAH (screen)
20	TP209 1·3m	"	ES	HM(screen) SVOC(screen) TPH(screen)
21	TP214 0·3m	"	ES	" " "
22	TP 214 1·0m	"	ES	TPH(screen) PAH (screen)
23	TP 214 1·5m	"	ES	HM(screen) SVOC(screen) TPH(screen)
24				
25				
26	* sample no TP209 0·8m has strong odour of bitumen			
27	* sample no TP214 1·0m has strong organic odour.			
28				
29	~~Northern Drain S1~~	~~6/7~~	~~SW~~	~~HM(diss+total) SVOC (trace) TPH (screen)~~
30	~~Southern Drain S1~~	~~6/7~~	~~SW~~	~~" " "~~
31	~~Southern Drain S2~~	~~6/7~~	~~SW~~	~~" " "~~
32				
33				
34				
35				
36				
37				
38				
39				
40				

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz

Job Information Summary

Page 1 of 3

Client: Beca Infrastructure Limited
Contact: G Smith
C/- Beca Infrastructure Limited
PO Box 6345
Wellesley Street
AUCKLAND 1141

Lab No: 912271
Date Registered: 07-Jul-2011 10:45:37 am
Priority: Normal
Quote No:
Order No:
Client Reference: 11:081-3320901/500/004
Add. Client Ref:
Submitted By: G Smith
Charge To: Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	TP201 0.3m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
2	TP201 0.65m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
3	TP202 0.3m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
4	TP202 0.8m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
5	TP203 0.2m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
6	TP203 1.4m 06-Jul-2011	Soil	PSoil250, cGSoil	Asbestos; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
7	TP204 0.4m 06-Jul-2011	Soil	PSoil250, GSoil300	Asbestos; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
8	TP204 1.4m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
9	TP205 0.2m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
10	TP205 1.0m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
11	TP206 0.3m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
12	TP206 0.5m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
13	TP206 1.5m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
14	TP207 0.3m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
15	TP207 0.8m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
16	TP208 0.3m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
17	TP208 1.3m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
18	TP209 0.3m 06-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
19	TP209 0.8m 06-Jul-2011	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen
20	TP209 1.3m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
21	TP214 0.3m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
22	TP214 1.0m 06-Jul-2011	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen
23	TP214 1.5m 06-Jul-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-18, 20-21, 23
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	19, 22
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-18, 20-21, 23
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	19, 22
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Haloethers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Nitrogen containing compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Organochlorine Pesticides in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Phenols in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Plasticisers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Other Halogenated compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Other compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
SMC Compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-18, 20-21, 23
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1-23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-23
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-18, 20-21, 23

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Asbestos	150-200g, sealed plastic bag. Polarised Light Microscopy and dispersion staining techniques. Subcontracted to Dowdell & Associates, 4 Cain Road, Penrose, Auckland. AS 4964 (2004) - Method for the Qualitative / Semi-Quantitative Identification of Asbestos in Bulk Samples.	-	6-7

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Time Received 08-Jul-2011 9:46:26 am
Job No 912569
No of Samples 0 No of Fractions 0

Client

Name Beca Infrastructure 76225
Address PO Box 6345, AUCKLAND
Phone 09 300 9000 *Fax* 09 300 9300
Client Reference 11:081 - 3320901/500/004
Quote No *Order Number*

Primary Contact Genevieve Smith
Submitted By Genevieve Smith
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results genevieve-smith@beca.com
☑ Email Results envirolab@beca.com

Office use only Job N

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 7/7 2pm
Name: Gen Smith
Signature: G Smith
☑ *Please tick if you require COC to be faxed back*

Received at Hill Laboratories
Date & Time: 8 JUL 11 6:20
Name: Alen S.
Signature:

Condition
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*
Temp: 13.6

☐ *Sample Analysis details checked*
Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Priority
☐ **Low** ☑ **Normal** ☐ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)	Pot2 Potable Water (NZDWS)
	GW Ground Water	L Leachate	☐ Audit Monitoring	Pot3 Potable Water (other)
	SW Surface Water	S Saline	☐ Check Monitoring	Pool Swimming/Spa Pool
	TW Trade Waste			
Solids	ES Soil	SE Sediment	SL Sludge	PL Plant
Other	O Oil	M Miscellaneous	FS Fish/shellfish/biota	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	TP210 0.15m	7/7	ES	HM(screen) SVOC(screen) TPH(screen)
2	TP212 0.3m	7/7	ES	" " "
3	TP212 1.0m	7/7	ES	" " "
4	TP212 0.3m dup	7/7	ES	" " "
5	TP213 0.2m	7/7	ES	" " "
6	Northern Drain S1	6/7	SW	HM(diss+total) SVOC(trace) TPH(screen)
7	Southern Drain S1	6/7	SW	" " "
8	Southern Drain S2	6/7	SW	" " "
9				
10				

Continued on next page

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz

Job Information Summary

Page 1 of 2

Client:	Beca Infrastructure Limited	**Lab No:**	912569
Contact:	G Smith	**Date Registered:**	08-Jul-2011 9:55:41 am
	C/- Beca Infrastructure Limited	**Priority:**	Normal
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:081 - 3320901/500/004
		Add. Client Ref:	
		Submitted By:	G Smith
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	TP210 0.15m 07-Jul-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
2	TP212 0.3m 07-Jul-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
3	TP212 1.0m 07-Jul-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
4	TP212 0.3m dup 07-Jul-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
5	TP213 0.2 07-Jul-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
6	North Drain S1 06-Jul-2011	Surface Water	Org500, TPH250, N100, NWU100	Heavy metals, dissolvd, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Water by GC-MS; Total Petroleum Hydrocarbons in Water
7	Southern Drain S1 06-Jul-2011	Surface Water	Org500, TPH250, N100, NWU100	Heavy metals, dissolvd, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Water by GC-MS; Total Petroleum Hydrocarbons in Water
8	Southern Drain S2 06-Jul-2011	Surface Water	Org500, TPH250, N100, NWU100	Heavy metals, dissolvd, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Water by GC-MS; Total Petroleum Hydrocarbons in Water

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-5
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-5
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Haloethers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Organochlorine Pesticides in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Phenols in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Plasticisers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Other Halogenated compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Other compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
SMC Compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-5
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1-5
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-5
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-5

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Samples
Heavy metals, dissolvd, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level	-	6-8
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level	-	6-8
Semivolatile Organic Compounds Trace in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Haloethers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Phenols Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Plasticisers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other Halogenated compounds Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other Halogenated compounds Trace (drinkingwater) in SVOC Water	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other Halogenated compounds Trace (non-drinkingwater) in SVOC	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Other SVOC Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
SMC Compounds Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	6-8
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines	-	6-8
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 21st ed. 2005.	-	6-8
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 21st ed. 2005.	-	6-8

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ANALY

R J Hill Laboratories Limite
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zeala

Time Received 06-Jul-2011 6:33:32 am
Job No **911650**
No of Samples **22** No of Fractions **176**
0319116506

Client

Name Beca Infrastructure 76225
Address PO Box 6345, AUCKLAND

Phone 09 300 9000 Fax 09 300 9300
Client Reference 11:081 - 3320901/500/004
Quote No Order Number

Primary Contact Genevieve Smith
Submitted By Genevieve Smith
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results genevieve.smith@beca.com
☑ Email Results envirolab@beca.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 5/7 3pm
Name: Gen Smith
Signature: G Smith
☑ Please tick if you require COC to be faxed back

Received at Hill Laboratories
Date & Time: 5 JUL 11 0:23
Name: Lisa Bailey
Signature: Bailey

Condition
☐ Room Temp ☐ Chilled ☐ Frozen
Temp: 13.1

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Priority
☐ Low ☑ Normal ☐ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	11:081/TP101 1m	5/7	ES	HM (screen) SVOC (screen) TPH (screen)
2	TP101 2.6m	5/7	ES	" " "
3	TP102 0.7m	5/7	ES	" " "
4	TP102 2.3m	5/7	ES	" " "
5	TP103 0.6m	5/7	ES	" " "
6	TP103 1.4m	5/7	ES	" " "
7	TP104 0.4m	5/7	ES	" " "
8	TP104 1.6m	5/7	ES	" " "
9	TP104 1.6m duplicate	5/7	ES	" " "
10	TP105 0.15m	5/7	ES	" " "

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	TP105 1·3m	5/7	ES	HM(screen) SVOC(screen) TPH(screen)
12	TP106 0·3m	5/7	ES	" " "
13	TP106 1·0m	5/7	ES	" " "
14	TP107 0·2m	5/7	ES	" " "
15	TP108 0·2m	5/7	ES	" " "
16	TP108 2·0m	5/7	ES	" " "
17	TP109 0·2m	5/7	ES	" " "
18	TP109 0·5m	5/7	ES	" " "
19	TP110 0·4m	5/7	ES	" " "
20	TP110 1·0m	5/7	ES	" " "
21	TP111 0·5m	5/7	ES	" " "
22	TP111 1·5m	5/7	ES	" " "
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Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	911650
Contact:	G Smith	**Date Registered:**	06-Jul-2011 6:43:46 am
	C/- Beca Infrastructure Limited	**Priority:**	Normal
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:081 - 3320901/500/004
		Add. Client Ref:	
		Submitted By:	G Smith
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	TP101 1M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
2	TP101 2.6M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
3	TP102 0.7M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
4	TP102 2.3M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
5	TP103 0.6M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
6	TP103 1.4M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
7	TP104 0.4M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
8	TP104 1.6M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
9	TP104 1.6M DUP 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
10	TP105 0.15M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
11	TP105 1.3M 05-Jul-2011	Soil	cPSoil, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
12	TP106 0.3M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
13	TP106 1.0M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
14	TP107 0.2M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
15	TP108 0.2M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
16	TP108 2.0M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
17	TP109 0.2M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
18	TP109 0.5M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
19	TP110 0.4M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
20	TP110 1.0M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
21	TP111 0.5M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
22	TP111 1.5M 05-Jul-2011	Soil	PSoil250, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Screening in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-22
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-22
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Haloethers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Nitrogen containing compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Organochlorine Pesticides in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Phenols in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Plasticisers in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Other Halogenated compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Other compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
SMC Compounds in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-22
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1-22
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-22
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-22

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ANALY
ime Received 02-Aug-2011 7:23:17 am
Job No **918870**
lo of Samples **16** No of Fractions **162**
0319188707

R J Hill Laboratories Limite
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zeala

Client

Name Beca Infrastructure 76225
Address PO Box 6345, AUCKLAND
Phone 09 300 9000 *Fax* 09 300 9300
Client Reference 11:099-3320901/500/004
Quote No *Order Number*

Primary Contact Genevieve Smith
Submitted By Genevieve Smith
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results genevieve.smith@beca.com
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Office use only Jo

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 1/8/11 3·30pm
Name: Gen Smith
Signature:
☑ *Please tick if you require COC to be faxed back*

Received at Hill Laboratories
Date & Time: 2 AUG 11 6:30
Name: Kathryn H
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 11.4

☐ *Sample Analysis details checked*
Signature:

Priority
☐ **Low** ☑ **Normal** ☐ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	HA101 0-3-0-5m	1/8	ES	Heavy metals (sc), OCP/ONP (Tr), PAH (sc)
2	HA102 0-0·4m	1/8	ES	" " "
3	HA103 0-0·4m	1/8	ES	" " "
4	HA104 ~~0-~~0·5m	1/8	ES	" " "
5	HA105 0-0·4m	1/8	ES	" " "
6	HA106 0-0·4m	1/8	ES	" " "
7	HA107 0-0·5m	1/8	ES	" " "
8	HA108 0-0·5m	1/8	ES	" " "
9	HA119 0-0·5m	1/8	ES	" " "
10	HA120 0-0·5m	1/8	ES	" " "

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	HA121 0-0.1m	1/8	ES	Heavy metals (sc). OCP/OVP (Trace) PAH (sc
12	HA122 0-0.1m	1/8	ES	" " "
13	HA123 0-0.1m	1/8	ES	" " "
14	HA124 0-0.1m	1/8	ES	" " "
15	HA125 0-0.1m	1/8	ES	" " "
16	HA118 0-0.35m	1/8	ES	" " "
17	HA120 0-0.5m	1/8	ES	" " "
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R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	918870
Contact:	G Smith	**Date Registered:**	02-Aug-2011 7:37:16 am
	C/- Beca Infrastructure Limited	**Priority:**	Normal
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:099 - 3320901/500/004
		Add. Client Ref:	
		Submitted By:	G Smith
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	HA101 0.3-0.5m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
2	HA102 0-0.4m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
3	HA103 0-0.4m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
4	HA104 0-0.5m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
5	HA105 0-0.4m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
6	HA106 0-0.4m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
7	HA107 0-0.5m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
8	HA108 0-0.5m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
9	HA119 0-0.5m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
10	HA121 0-0.1m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
11	HA122 0-0.1m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
12	HA123 0-0.1m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
13	HA124 0-0.1m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
14	HA125 0-0.1m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
15	HA118 0-0.35m 01-Aug-2011	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
16	HA120 0-0.5 01-Aug-2011	Soil	PSoil250, GSoil300, PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
17	HA120 0-0.5 [Duplicate Sample]	Soil	cGSoil, cPSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-17
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-17
Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-17
Organochlorine Pesticides Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), dual column GC-ECD analysis. Tested on dried sample	-	1-17
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-17
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1-17
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-17
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-17

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Time Received 02-Aug-2011 6:32:27 am
Job No **919264**
No of Samples **8** No of Fractions **76**

Office use only Job No:

0319192645

Client

Name Beca Infrastructure 76225
Address PO Box 6345, AUCKLAND

Phone 09 300 9000 Fax 09 300 9300
Client Reference 11:099- 3320901/500/004
Quote No Order Number

Primary Contact Genevieve Smith
Submitted By Genevieve Smith
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results genevieve.smith@beca.com
☑ Email Results envirolab@beca.com

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 2/8 12pm
Name: G Smith
Signature: G Smith
☑ Please tick if you require COC to be faxed back

Received at Hill Laboratories
Date & Time: 3 AUG 11 6:14
Name:
Signature:

Condition
☐ Room Temp ☐ Chilled ☐ Frozen
Temp: 12.2

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Priority
☐ **Low** ☑ **Normal** ☐ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	HA109 0-0.5m	2/8	ES	Heavy metals (sc) OCP/ONP (trace) PAH (sc)
2	HA110 0-0.3m	2/8	ES	" " "
3	HA111 0-0.5m	2/8	ES	" " "
4	HA112 0-0.5m	2/8	ES	" " "
5	HA111 Dup 0-0.5m	2/8	ES	" " "
6	HA116 0-0.5m	2/8	ES	" " "
7	HA117 0-0.5m	2/8	ES	" " "
8	HA126 0-0.2m	2/8	ES	PAH (sc) TPH (sc) HM (sc) - please
9				sample from same container
10				

Continued on next page

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	919264
Contact:	G Smith C/- Beca Infrastructure Limited PO Box 6345 Wellesley Street AUCKLAND 1141	**Date Registered:**	03-Aug-2011 6:38:08 am
		Priority:	Normal
		Quote No:	
		Order No:	
		Client Reference:	11:099-3320901/500/004
		Add. Client Ref:	
		Submitted By:	G Smith
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	HA109 0-0.5m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
2	HA110 0-0.3m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
3	HA111 0-0.5m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
4	HA112 0-0.5m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
5	HA111Dup 0-0.5m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
6	HA116 0-0.5m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
7	HA117 0-0.5m 02-Aug-2011	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS; Polycyclic Aromatic Hydrocarbons Screening in Soil
8	HA126 0-0.2m 02-Aug-2011	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	8
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-8
Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-7

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Organochlorine Pesticides Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), dual column GC-ECD analysis. Tested on dried sample	-	1-7
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-7
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1-8
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	8
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-8
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-8

Hill Laboratories
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ANALYSIS RE

R J Hill Laboratories Limite
1 Clyde Street,
Private Bag 3205
Hamilton, New Zealand

00
01
nz
nz

Time Received 19-Oct-2011 6:25:26 am
Job No **944634**
No of Samples **3** No of Fractions **42**
0319446344

Client
Name Beca Infrastructure Limited 76225
Address PO Box 6345, Wellesley Street
AUCKLAND 1141
Phone 09 300 9000 *Fax* 09 300 9300
Client Reference 11:128 3320901/500/004
Quote No 46716 *Order No*

Primary Contact Kate Jackson 157140
Submitted By Kate Jackson 157140
Charge To Beca Infrastructure Limited 76225

Results To ☐ *Mail Primary Contact* ☐ *Mail Submitter*
☐ *Fax Results*
☐ *Email Results*

ADDITIONAL INFORMATION

Office use only: *Job*

CHAIN OF C

Sent to Hill Laboratories
☐ *Please tick if you require COC to be faxed back*
Date & Time: 18/10/11, 3pm
Name: Kate Jackson
Signature:

Received at Hill Laboratories
Date & Time: [illegible]
Name: DARYL
Signature:

Condition
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*
Temp: 13.2

☐ Sample & Analysis details checked
Signature:

Priority ☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 6 working days following receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

No.	*Sample Name*	*Sample Date/Time*	*Sample Type*	*Tests Required*
1	11:128 BH305	18/10/11	GW	As per quote.
2	11:128 BH306	18/10/11	GW	
3	11:128 BH307	18/10/11	GW	
4				
5				
6				
7				
8				
9				
10				

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205

Tel +64 7 858 2000
Fax +64 7 858 2001
Emai l mail@hill-labs.co.nz

Job Information Summary

Page 1 of 2

Client:	Beca Infrastructure Limited	**Lab No:**	944634
Contact:	Kate Jackson	**Date Registered:**	19-Oct-2011 6:28:37 am
	C/- Beca Infrastructure Limited	**Priority:**	Normal
	PO Box 6345	**Quote No:**	46716
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:128 3320901/500/004
		Add. Client Ref:	
		Submitted By:	Kate Jackson
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	11:128 BH305 18-Oct-2011 10:45 am	Ground Water	UP1L, TPH250, Org500, Ster, FN100, N100, cVOC40	Anion / Cation profile, dissolved metals trace level; Total Ammoniacal-N; Dissolved Reactive Phosphorus; Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq; Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Water by GC-MS; Faecal Coliforms and E. coli profile; Total Petroleum Hydrocarbons in Water; Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Dissolved Mercury; Total Mercury; Volatile Organic Compounds Screening in Water by Purge&Trap
2	11:128 BH306 18-Oct-2011 12:15 pm	Ground Water	UP1L, TPH250, Org500, Ster, FN100, N100, cVOC40	Anion / Cation profile, dissolved metals trace level; Total Ammoniacal-N; Dissolved Reactive Phosphorus; Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq; Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Water by GC-MS; Faecal Coliforms and E. coli profile; Total Petroleum Hydrocarbons in Water; Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Dissolved Mercury; Total Mercury; Volatile Organic Compounds Screening in Water by Purge&Trap
3	11:128 BH307 18-Oct-2011 1:30 pm	Ground Water	UP1L, TPH250, Org500, Ster, cFN100, cVOC40, cN100	Anion / Cation profile, dissolved metals trace level; Total Ammoniacal-N; Dissolved Reactive Phosphorus; Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq; Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Water by GC-MS; Faecal Coliforms and E. coli profile; Total Petroleum Hydrocarbons in Water; Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Dissolved Mercury; Volatile Organic Compounds Screening in Water by Purge&Trap; Total Mercury

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Samples
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-3
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 21st ed. 2005.	-	1-3
Total anions for anion/cation balance check	Calculation: sum of anions as mEquiv/L.	0.07 meq/L	1-3
Total cations for anion/cation balance check	Calculation: sum of cations as mEquiv/L.	0.05 meq/L	1-3
pH	pH meter. APHA 4500-H^+ B 21st ed. 2005.	0.1 pH Units	1-3

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Samples
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. APHA 2320 B (Modified for alk <20) 21st ed. 2005.	1.0 g/m^3 as CaCO$_3$	1-3
Bicarbonate	Calculation: from alkalinity and pH, valid where TDS is not > 500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO$_2$ D 21st ed. 2005.	1.0 g/m^3 at 25°C	1-3
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 21st ed. 2005.	1.0 g/m^3 as CaCO$_3$	1-3
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 21st ed. 2005.	0.1 mS/m	1-3
Dissolved Calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.05 g/m^3	1-3
Dissolved Magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.02 g/m^3	1-3
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	1-3
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	1-3
Dissolved Potassium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.05 g/m^3	1-3
Dissolved Sodium	Filtered sample, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.02 g/m^3	1-3
Chloride	Filtered sample. Ferric thiocyanate colorimetry. Discrete Analyser. APHA 4500 Cl$^-$ E (modified from continuous flow analysis) 21st ed. 2005.	0.5 g/m^3	1-3
Total Ammoniacal-N	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH$_4$-N = NH$_4$+-N + NH$_3$-N). APHA 4500-NH$_3$ F (modified from manual analysis) 21st ed. 2005.	0.010 g/m^3	1-3
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO$_3^-$ I (Proposed) 21st ed. 2005.	0.002 g/m^3	1-3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N.	0.002 g/m^3	1-3
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO$_3^-$ I (Proposed) 21st ed. 2005.	0.002 g/m^3	1-3
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colorimetry. Discrete Analyser. APHA 4500-P E (modified from manual analysis) 21st ed. 2005.	0.004 g/m^3	1-3
Sulphate	Filtered sample. Ion Chromatography. APHA 4110 B 21st ed. 2005.	0.5 g/m^3	1-3
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	1-3
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level	-	1-3
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level	-	1-3
Semivolatile Organic Compounds Trace in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines	-	1-3
Volatile Organic Compounds Screening in Water by Purge&Trap	Purge & Trap, GC-MS FS analysis	-	1-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	MPN count in LT Broth at 35°C for 48 hours, EC Broth at 44.5°C for 24 hours Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9221 B, 9221 E 21st ed. 2005.	2 MPN / 100mL	1-3
Escherichia coli	MPN count in LT Broth at 35°C for 48 hours, EC MUG Broth at 44.5°C for 24 hours Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9221 B, 9221 F 21st ed. 2005.	2 MPN / 100mL	1-3

Hill Laboratories
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ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street,
Private Bag 3205
Hamilton, New Zealand

Time Received 11-Oct-2011 7 27 36 am
Job No **942066**
No of Samples **2** No of Fractions **12**
0319420663

Office use only: *Job I*

Client

Name Beca Infrastructure Limited 76225

Address PO Box 6345, Wellesley Street
AUCKLAND 1141

Phone 09 300 9000 *Fax* 09 300 9300

Client Reference 11:125

Quote No *Order No*

Primary Contact Kate Jackson 157140

Submitted By Kate Jackson 157140

Charge To Beca Infrastructure Limited 76225

Results To ☐ *Mail Primary Contact* ☐ *Mail Submitter*

☐ *Fax Results*

☑ *Email Results* kate.jackson@beca.com

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☑ *Please tick if you require COC to be faxed back*

Date & Time: 10/10/11, 5pm
Name: Kate Jackson
Signature: Kate

Received at Hill Laboratories

Date & Time: OCT 11 AM8:15
Name:
Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 16.0

☐ Sample & Analysis details checked

Signature:

ADDITIONAL INFORMATION

Priority ☐ Low ☐ Normal ☑ High

☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	*Sample Name*	*Sample Date/Time*	*Sample Type*	*Tests Required*
1	11:125 BH306 30-33m	10/10/11, 12.30pm	Soil	HM (Sc), SVOC (trace)
2	11:125 BH306 ~~29~~ 9.9-10.1m	10/10/11, 14.30pm	Soil	HM (Sc), SVOC (trace)
3				
4				
5				
6				
7				
8				
9				
10				

Hill Laboratories
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[illegible]

R J Hill Laboratories Limited
1 Clyde Street,
Private Bag 3205
Hamilton, New Zealand

Time Received 11-Oct-2011 7 27 36 am
Job No **942066**
No of Samples **6** No of Fractions **36**
0319420663

Client

Name Beca Infrastructure Limited 76225
Address PO Box 6345, Wellesley Street
AUCKLAND 1141
Phone 09 300 9000 Fax 09 300 9300
Client Reference
Quote No *Order No*
Primary Contact Kate Jackson 157140
Submitted By Kate Jackson 157140
Charge To Beca Infrastructure Limited 76225
Results To ☐ *Mail Primary Contact* ☐ *Mail Submitter*
☐ *Fax Results*
☑ *Email Results* kate.jackson@beca.com.

ADDITIONAL INFORMATION

***Office use only:* Job No.**

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☐ *Please tick if you require COC to be faxed back*
Date & Time: 12/10/11 5:00pm
Name: Aidan Thorp
Signature:

Received at Hill Laboratories
Date & Time: OCT 13 AM6:25
Name: Bean
Signature:

Condition
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*
Temp: 16.1

☐ Sample & Analysis details checked
Signature:

Priority ☐ Low ☐ Normal ☑ High
☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	*Sample Name*	*Sample Date/Time*	*Sample Type*	*Tests Required*
1	11:125 BH 307 2.6-2.8m	11/10/11 12:00	Soil	HM (Screen), SVOC (trace)
2	11:125 BH307 10.1-10.5m	11/10/11 12:00	Soil	HM (Screen), SVOC (trace).
3	11:125 BH 305 3.6-3.9m	12/10/11 9:45am	Soil	HM (Screen), SVOC (trace)
4	11:125 BH 305 9.75-10.05 ~~9.75-10.05~~	12/10/11 11:10am	Soil	HM (Screen), SVOC (trace).
5	~~11:128~~			
6				
7				
8				
9				
10				

132 Vincent Street
PO Box 6345,A uckland 1141, New Zealand
T: +64 9 300 9000 // F: +64 9 300 9300
E: info@beca.com // www.beca.com

R.J. Hill Laboratories Limited
Private Bag 3205
Hamilton 3240
New Zealand

13 October 2011

Attention: Jean Connick

Dear Jean,

R.J. Hill Laboratories Commissioning Letter - Samples 11:125

Please find enclosed our sample series 11:125 consisting of 6 soil samples dated 10 - 12 October 2011. The samples are labelled as follows:

- Please refer to attached COCs [Reference K.J ackson 10/10/11 and A. Thorp 12/10/11]

Beca Reference: 11:125 3320901/500/004 **Hills Quote N°:** none

These are the final samples expected under this reference. I understand from your catalogue prices thatt he approximate cost of analysis of the 6 samples will be $1,900. Please contact me should this be incorrect.

Please e-mail the results to envirolab@beca.com as well as kate.jackson@beca.com and also send a hard copy.

Conditions of Engagement

The conditions of engagement will be the terms and conditions set out in the Continuous Services Agreement between Beca Infrastructure Limited and R.J. Hill Laboratories Ltd dated 26 April 2006.

Should you have any questions please call Kate Jackson on 09 300 9288.

Yours sincerely
Kate Jackson
Environmental Scientist

on behalf of
Beca Infrastructure Ltd
Direct Dial: +64-9-300 9288
Email: kate.jackson@beca.com

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	942066
Contact:	Kate Jackson C/- Beca Infrastructure Limited PO Box 6345 Wellesley Street AUCKLAND 1141	**Date Registered:**	11-Oct-2011 7:31:46 am
		Priority:	Normal
		Quote No:	
		Order No:	
		Client Reference:	11:125 3320901/500/004
		Add. Client Ref:	
		Submitted By:	Kate Jackson
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	11:125 BH306 3.0-3.3m 10-Oct-2011 12:30 pm	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS
2	11:125 BH306 9.9-10.1m 10-Oct-2011 2:30 pm	Soil	GSoil300, PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS
3	11:125 BH 307 2.6-2.8m 11-Oct-2011 12:00 pm	Soil	cPSoil, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS
4	11:125 BH 307 10.1-10.5m 11-Oct-2011 12:00 pm	Soil	cPSoil, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS
5	11:125 BH 305 3.6-3.9m 12-Oct-2011 9:45 am	Soil	cPSoil, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS
6	11:125 BH 305 9.75-10.05 12-Oct-2011 11:10 am	Soil	cPSoil, cGSoil	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-6
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-6
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	1-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-6

Appendix 23.F

M2PP-AEE-RPT-EN-CL-023 MacKays to Peka Peka, Kāpiti Coast – Contamination Desk Study, March 2012

Appendix F to Technical Report 23

MacKays to Peka Peka Expressway, Contamination Desk Study

Revision History

Revision Nº	Prepared By	Description	Date
A	Kate Jackson	Draft	5/11/10
B	Genevieve Smith	Review following final alignment selection	24/6/11
C	Genevieve Smith	Review following EPA comments	5/3/12

Document Acceptance

Action	Name	Signed	Date
Prepared by	Kate Jackson and Genevieve Smith		
Reviewed by	Kerry Laing		
Approved by	Graham Spargo		
on behalf of	Beca Infrastructure Ltd		

Table of Contents

Appendices

Executive Summary

The NZ Transport Agency (‘the NZTA’) is lodging a Notice of Requirement (NOR) and resource consent applications (RCA’s) to construct, operate and maintain an expressway between MacKays Crossing and Peka Peka (‘the Project’) on the Kāpiti Coast.

As part of the Assessment of Environmental Effects (AEE) for the Project, a series of technical reports have been produced. The aim of this Stage 1 desk study is to ascertain whether the soil and groundwater along the route has the potential to be contaminated as a result of current and/or historical land use activities.

The desk study has been compiled using the following information sources:

- Review of properties registered on the Selected Land Use Register (SLUR) held by Greater Wellington Regional Council (GWRC).
- Review of discharge resource consents issued within 200m of the Expressway designation.
- Review of information held by the Kāpiti Coast District Council (KCDC) including property files, building consent registers, resource consent registers, dangerous goods licence registers, and underground tank location registers.
- Review of historical aerial photographs available.
- Review of Kāpiti Coast groundwater abstraction borehole information.
- A walkover of the route viewing land and activities within the route.
- A detailed site inspection of sites identified as having the potential to be contaminated.

The Project has been divided into four sectors which broadly define the urban and rural areas along the route of the Expressway.

Sector 1

The potential for land and groundwater contamination in the section of route between Queen Elizabeth Park and Poplar Ave is considered to be low. Two properties have been identified in the area between Poplar Ave and Raumati Road from the inspections as having the potential to be contaminated by current or historical activities, and these are as follows:

- 16 Leinster Avenue – possible contamination arising from unknown fill materials and dumping of waste and empty chemical containers and drums.
- 150 Raumati Road – possible contamination arising from dumping of waste materials.

Sector 2

The route follows the existing Western Link Road (WLR) Designation for the whole of this sector through the township of Paraparaumu. Four properties have been identified as having the potential to be contaminated by current or historical activities, and these are as follows:

- 55 Rata Road – identified SLUR site, hydrocarbon storage and general contractor’s yard containing stockpiled metal, timber, rubble and machinery.
- 58 Kiwi Road – from aerial photographs taken in 1957 this land parcel is likely to have been used for horticultural activities.
- Area of designated land behind Manchester and Sheffield Streets - the potential that waste materials may have been dumped in this area from the adjacent industrial zone.
- 109 Kāpiti Road – firewood storage area where land has been raised from original level with fill from multiple sources.

Sector 3

The route through this sector runs adjacent to Otaihanga Landfill, crosses the Waikanae River and passes through a residential area at Te Moana Road. Two properties have been identified as having the potential to be contaminated by current or historical activities, and these are as follows:

- Otaihanga Landfiil – the landfill is unlined and is consented to discharge contaminants to groundwater.
- 124-154 Te Moana Road – market gardening activities.

The discharge consent granted for the Otaihanga Landfill has the potential to affect the adjacent land parcels within the route. Otaihanga Landfill is also identified on the SLUR register. Landfilling activities are unlikely to have taken place within land parcels within the route.

A public water supply observation borehole is located on the property boundary of 124-154 Te Moana Road which may require monitoring for potential groundwater contamination associated with the property.

Sector 4

The land use in this sector is predominately rural and the potential for land contamination from current activities is considered to be low. However given the rural nature of the sector the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil. Such activities, if they occurred, may lie outside the designation, which is only a small proportion of the rural land in the sector.

1 Introduction

The NZ Transport Agency ('the NZTA') is lodging a Notice of Requirement (NOR) and resource consent applications (RCA's) to construct, operate and maintain an expressway between MacKays Crossing and Peka Peka ('the Project') on the Kāpiti Coast.

The MacKays to Peka Peka Expressway route[1] ('the Expressway') has been identified as one of eight sections within the Wellington Northern Corridor (SH1 from Levin to the Wellington Airport) which is an identified "Road of National Significance" (RoNS) in terms of the 2009 Government Policy Statement[2].

Figure 1: Wellington Northern Corridor

As part of the Assessment of Environmental Effects (AEE) for the Project, a series of technical reports have been produced. This report is a Stage 1 desk study which relates to the assessment of effects from land and groundwater contamination. The aim of this desk study is to ascertain whether

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[1] Route refers to the overall corridor of land between MacKays Crossing and Peka Peka

[2] Government Policy Statement on Land Transport Funding 2009/2010-2018/2019

the soil and groundwater along the route has the potential to be contaminated as a result of current and/or historical land use activities.

This desk study has been carried out and reported in general accordance with the Ministry for the Environment (MfE) *'Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand'* (2003).

1.1 Documentation and Methodology

The desk study has been compiled using the following information sources:

- A walkover of the route viewing land parcels within the route of the Expressway from public roads.
- A detailed site inspection of sites identified as having the potential to be contaminated, where possible.
- Review of properties registered on the Selected Land Use Register (SLUR) held by Greater Wellington Regional Council (GWRC) and any associated information referenced.
- Review of discharge resource consents issued within 200m of the Expressway designation.
- Review of information held by the Kāpiti Coast District Council (KCDC) including property files, building consent registers, resource consent registers, dangerous goods licence registers, and underground tank location registers.
- Review of historical aerial photographs available from the National Library of New Zealand and NZ Aerial Mapping.
- Review of Kāpiti Coast groundwater abstraction borehole information held by Beca.

1.2 Report structure

The Project has been divided into four Sectors (Sector Diagram, Part D, Chapter 7, Section 3, Volume 2) which broadly define the different rural and urban zones of the Project.

The main body of this report (Sections 2-5) is structured around the four Sectors, with each Sector having its own section. The Sector specific sections are intended to be relatively 'stand alone' and each contains the following relevant information retrieved during the information searches listed above.

2 Sector 1

Sector 1 runs from just south of Poplar Avenue to Raumati Road. This portion of the route will comprise construction of an interchange at Poplar Avenue and stormwater wetlands.

The route passes through the corner of Queen Elizabeth Park and follows approximately the existing Western Link Road (WLR) Designation through Raumati towards the Kāpiti Road intersection.

The extent of Sector 1 is shown in **Figure 2** with the yellow line indicating the route of the Expressway. Maps of the route are shown in Drawing EN-CL-009, Volume 5.

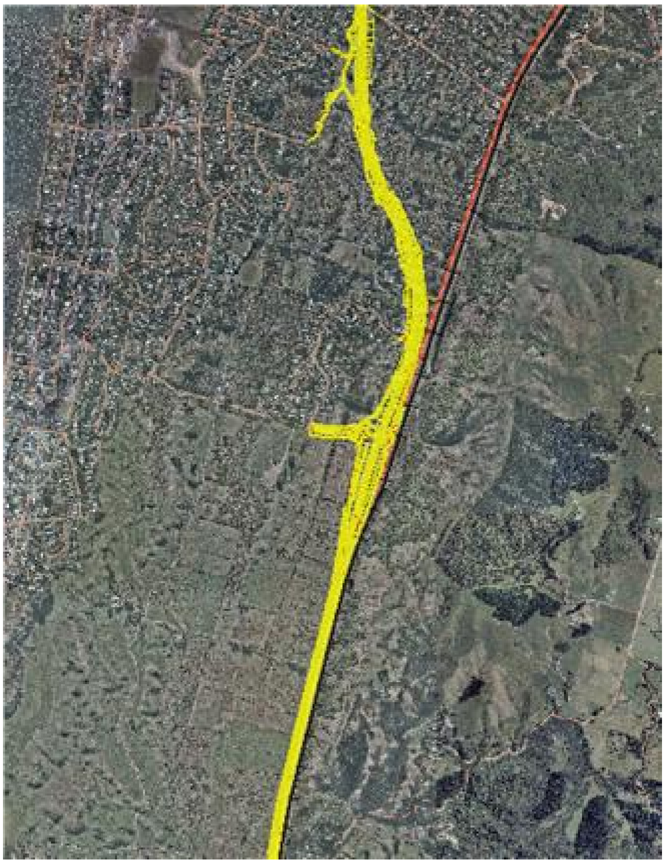

Figure 2: Sector 1

2.1 Description

The land use within this sector is a mix of rural and residential. The route follows the WLR Designation for the most part, with the exception of the section after Poplar Avenue where the route deviates from the existing SH1 route at 200 Main Road and passes through a group of lifestyle blocks adjacent to Leinster Avenue. The route then passes through the township of Raumati within the designation, which is currently unoccupied bush.

The KCDC District Plan shows the areas bordering the route to be zoned as rural and residential. Queen Elizabeth Park is zoned open space.

2.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives was undertaken. There were no relevant historical aerial photographs available for Sector 1 of the route.

Aerial photographs for the entire route for the years 1956/57 and 2001/2 were sourced from NZ Aerial Mapping and are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photographs 1956/57

Queen Elizabeth Park is visible between MacKays Crossing and Poplar Avenue, with a small area of earthworks observed towards Poplar Avenue. The Leinster Avenue area is sparsely populated with remnant bush areas and wetland covering this area up to Raumati Road. There are no signs of earthworks or dumped materials through this section.

Aerial photographs 2001/2

Small areas of QE Park adjacent to SH1 appear to have been ploughed but no crop planting is visible. The area of earthworks towards Poplar Avenue has increased in size. The Leinster Avenue area is now a fully populated residential area. The property at 16 Leinster Avenue appears to contain a residential building with bush and lawns covering the remainder of the property. The area between Leinster Avenue and Raumati Road contains a central wetland/bush area with infill of residential and lifestyle blocks along SH1 and Raumati Road. The central bush area appears to have an accessway cleared through the bush. There are no visible signs of earthworks or dumped waste materials.

2.3 Current Land Use and Site Visits

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. The land uses observed are detailed in **Table 1.**

Table 1: Current Land Use, Sector 1.

Location	Property Address	Activity	Observations
Queen Elizabeth Park, Poplar Avenue	Various	Paddocks and bush	Predominantly rural use. Area of landfilling observed towards Poplar Avenue - stockpiled soil and construction debris.
Poplar Avenue	Various	Residential properties	No activities indicating the potential for land contamination.

	16 Leinster Avenue	Commercial nursery shop	Possible storage of herbicides and pesticides on site.
Existing SH1 Route	Between Leinster Avenue and Raumati Road	Lifestyle blocks	No activities indicating the potential for land contamination.
Raumati Road	Various	Residential properties	No activities indicating the potential for land contamination.
	150 Raumati Road	Unoccupied bush area (existing WLR Designation)	Possible area for dumped waste materials.

With respect to the stockpiled earth observed within Queen Elizabeth Park, the director of Goodmans Contractors Limited, Stan Goodman, confirmed that the company operates a small cleanfill site at this location which has been established for several years. This site is not within the construction footprint of the Expressway, and therefore is not considered further in this study.

A detailed site inspection was undertaken on 12 April 2011 at the two remaining properties which had the potential to be contaminated, and are within the construction footprint of the Expressway. The properties and observations made are detailed in **Table 2**:

Table 2: Detailed Site Inspections, Sector 1.

Location	Activity	Observations
16 Leinster Avenue	Commercial Garden Centre	There did not appear to be any significant bulk storage area for pesticides and herbicides within the garden centre building area. The land area behind the buildings was being used as a contractor/transport storage yard. The ground had been levelled using imported fill, with stockpiles of materials at the edge of the site. There was evidence of dumping of waste materials including timber, sheet metal, empty chemical containers and drums. Photographs are included below.
150 Raumati Road	Unoccupied bush area	The land was generally low lying bush/wetland area. There was evidence of dumping of waste materials including sheet metal, timber and an abandoned car. An area of ground may have been levelled with fill materials. Photographs are included below.


Figure 3: 16 Leinster Avenue


Figure 4: 16 Leinster Avenue


Figure 5: 16 Leinster Avenue


Figure 6: 150 Raumati Road

Figure 7: 150 Raumati Road

2.4 Hazardous Activities and Industries List (HAIL)

There are a number of activities and industries that are considered by the Ministry for the Environment (MfE) to have potential for causing land contamination due to hazardous substance use, storage or disposal. This is known as the Hazardous Activities and Industries List (HAIL). GWRC hold a register of sites in the region on which an activity or industry listed on the HAIL is currently taking place, or has previously taken place. This is called the Selected Land Use Register (SLUR).

A request was made to GWRC to search their SLUR register for information relating to any property along the route of the Expressway identified on the register. Information received from GWRC shows that no properties within Sector 1 are recorded on the SLUR database.

2.5 Council Information Request

2.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land and groundwater contamination (see **Table 2**) were highlighted for further consideration and information was sought from KCDC.

A request was made to KCDC to view building and property files for land parcels at 16 Leinster Avenue and 150 Raumati Road. KCDC reported that the associated files for these properties are missing from their records.

A request was made to KCDC to search their records for any properties in Sector 1 where a dangerous good licence had been issued, or where an underground storage tank was located. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 1 and that no property was listed as having an underground storage tank on site.

2.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the route of the Expressway. A number of discharge consents were returned for Sector 1 but none were identified as likely to have an impact on land parcels within the route for Sector 1.

Construction of the Expressway in this sector of the route will involve widening of the existing SH1 route and construction of a roundabout in the far northern corner adjacent to Poplar Avenue. It is known that Queen Elizabeth Park was used as a World War II military base. Information was requested from GWRC on locations of the base itself and any subsequent discoveries of ammunition dumps. The location of the base is well documented and is towards the MacKays Crossing end of the park. Discoveries of ammunition in the park have also been documented. It is considered that the potential for the discovery of buried ammunitions in the areas to be disturbed is low. GWRC provided a procedure to be followed for any earthworks taking place in the park, including sweeping the ground with Ground Penetrating Radar (GPR).

2.6 Groundwater Abstraction Review

Beca has been assisting KCDC with a wider study into the effects of saline intrusion into groundwater boreholes in the region and consequently Beca holds information on the location and depth of groundwater boreholes along the Kāpiti Coast.

A review of groundwater abstraction boreholes within a 300m downgradient radius of 16 Leinster Avenue and 150 Raumati Road was undertaken. The aim of the review was to determine whether there were any water abstractions that could be affected by possible land contamination at these properties.

No boreholes were considered likely to be affected by any potential contamination at 16 Leinster Avenue and 150 Raumati Road, due to their depth, use or location.

2.7 Summary

The section of route between Queen Elizabeth Park and Poplar Ave is park land, and based on information detailed in the above sections, the potential for land and groundwater contamination from current activities is considered to be low.

The area between Poplar Ave and Raumati Road is mixed residential and lifestyle blocks with a portion of unoccupied bush land. Two properties have been identified from detailed site inspections as having the potential to be contaminated by current or historical activities, and these are as follows:

- 16 Leinster Avenue – possible contamination arising from unknown fill materials and dumping of waste and empty chemical containers and drums.

- 150 Raumati Road – possible contamination arising from dumping of waste materials.

No boreholes were considered likely to be affected by any potential contamination at 16 Leinster Avenue and 150 Raumati Road, due to their depth, use or location.

3 Sector 2

This sector runs along the existing WLR Designation through the area of Paraparaumu from Raumati Road to 300m north of Mazengarb Road. Underbridges will be constructed over local roads at Raumati Road and Mazengarb Road, with an underbridge spanning the Wharemauku Stream. A new intersection will be constructed at Kāpiti Road.

The extent of Sector 2 is shown in **Figure 8** with the yellow line indicating the route of the Expressway. Maps of the route within this sector are shown in Drawings EN-CL-010 and 011, Volume 5.

Figure 8: Sector 2

3.1 Description

The land use within this sector is a mix of rural and residential. The route follows the existing WLR Designation for the whole of this section of the route through the township of Paraparaumu. This is due to the constraints of property development up to the designation boundary.

The portion of the route from Raumati Road to Kāpiti Road passes through a semi-rural area. At Kāpiti Road there is significant residential development to the east of the route and commercial industrial businesses to the west. From Kāpiti Road to Fytfield Place residential properties border the route on the east with interspersed residential and rural properties to the west.

The KCDC District Plan shows the areas bordering the route to be predominantly zoned as rural and residential. There is an area zoned as industrial on the western boundary of the route between Kāpiti Road and the end of Te Roto Drive in Paraparaumu.

3.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives was undertaken. There were no relevant historical aerial photographs available for Sector 2 of the route.

Aerial photographs for the entire route for 1957 and 2001 were sourced from NZ Aerial Mapping and are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photographs 1956/7

The area of land between Raumati Road and Kāpiti Road is predominantly rural with bush and wetlands visible. A property along Rata Road (actual address is 58 Kiwi Road) appears to have been used for horticultural activities. The property at 55 Rata Road appears to be an unused paddock. The area between Kāpiti Road and Mazengarb Road is again rural and sparsely populated with residential houses.

Aerial photographs 2001/2

The area between Raumati Road and Kāpiti Road remains predominantly rural, but with infill of residential properties adjacent to Raumati and Rata Roads. The property at 55 Rata Road is still an unused paddock. The horticultural activities at 58 Kiwi Road appear to have been discontinued, with the site turned over to pasture. The area between Kāpiti Road and Mazengarb Road has been occupied by a commercial/industrial zone and residential housing. The WLR Designation is clearly visible as an area where development has not occurred. The exception is a small area which has been used for commercial premises adjacent to Kāpiti Road, and an area of bush clearance to make an accessway between Sheffield Street and Makanini Street. The remainder of the designation between Kāpiti Road and Mazengarb Road is bush.

3.3 Current Land Use and Site Visits

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. The land uses observed are detailed in **Table 3** and relevant photographs are shown in the figures below.

Table 3: Current Land Use, Sector 2.

Location	Property Address	Activity	Observations
Rata Road	55 Rata Road	Storage Yard	Stockpiled metal, timber, fill and machinery.

Commercial / Industrial Zone (Paraparaumu)	Various – Sheffield Street	Commercial / Industrial	Several heavy engineering service businesses. An interiors fittings business.
	Various – Manchester Street	Commercial / Industrial	A haulage business, a kitchen cupboard manufacturer, a plastic extrusion business and storage units.
	Area of designated land behind Manchester and Sheffield Streets	Unoccupied land, dense vegetation	Potential for dumped waste materials.
	109 Kāpiti Road	Commercial	Firewood storage area.
	102 Kāpiti Road	Commercial	Brick and paving products storage yard.
	104 Kāpiti Road	Commercial	Tool sharpening services. Timber joinery factory.
	108 Kāpiti Road	Commercial	Goodyear Auto Service Centre.
Paraparaumu Wastewater Treatment Plant	26 Fytfield Place	Wastewater Treatment Plant	Paraparaumu Wastewater Treatment Plant and Emergency Operations Centre.

Of the properties listed above, only the land parcels at 55 Rata Road, 109 Kāpiti Road and the area of designated land behind Manchester and Sheffield Streets are affected by the Expressway construction footprint. As the remaining sites of potential interest are not directly affected, no further investigation of the sites was considered necessary.

Figure 9: 55 Rata Road

Figure 10: Area of designated land behind Manchester and Sheffield Streets

A detailed site inspection was undertaken on 12 April 2011 at one property, with observations made. This is shown in **Table 4**.

Table 4: Detailed Site Inspections, Sector 2.

Location	Activity	Observations
109 Kāpiti Road	Firewood storage area	The site had been raised from its original level by placement of fill. The area covered by the fill was extensive and from visibly different sources. Photographs are included below.

Figure 11: 109 Kāpiti Road

Figure 12: showing fill placement from multiple sources, natural ground level seen in the background

3.4 Hazardous Activities and Industries List (HAIL).

A request was made to GWRC to search their SLUR register for information relating to any property along to the route of the Expressway identified on the register in Sector 2. The properties listed on the SLUR for Sector 2 are shown in **Table 5.**

Table 5: HAIL Summary, Sector 2.

Site Address	Legal Description	Category	Activity
55 Rata Road	Lots 1 & 3 DP 349464	Category V –Verified Hazardous Activity or	**Storage – Fuel** Site used by transport operator.

		Industry	Hydrocarbons (diesel and petrol) stored in bulk quantities. Photos on file show tank removal however no tank pull report is held.
102 Kāpiti Road	Lot 1 DP 307526	Category V –Verified Hazardous Activity or Industry	**Service Station** Petrol and diesel underground storage tanks removed 22 October 1997. No tank pull records held.
108 Kāpiti Road	Lot 1 DP 29743	Contamination Acceptable/Managed/ Remediated	**Motor Vehicle Workshop** Site previously used as small parts foundry, currently a motor vehicle workshop. Diesel underground storage tank removed by Mobil in 1992/3. Testing found localised contamination.
106 Kāpiti Road	Lot 1 DP 29743	Category V –Verified Hazardous Activity or Industry	**Iron and Steel Works** Site used for the manufacture of wire and tube products and metal powder-coating. No site assessment held by GWRC, extent of contamination unknown, if any.
106 Kāpiti Road	Lot 1 DP 87980	Category V –Verified Hazardous Activity or Industry	**Iron and Steel Works** Site used for the manufacture of wire and tube products and metal powder-coating. No site assessment held by GWRC, extent of contamination unknown, if any.
24 Fytfield Place	Pt Lot 2 DP 2241	Category V –Verified Hazardous Activity or Industry	**Waste storage/treatment/disposal – Sewage Treatment Facility** Paraparaumu Wastewater Treatment Plant

Of the properties listed above, only the land parcel at 55 Rata Road is intersected by the Expressway construction footprint. As the remaining SLUR sites are not directly affected no further investigation of the sites is considered necessary.

The full information provided by the GWRC for 55 Rata Road is presented in **Appendix B**.

3.5 Council Information Request

3.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land and groundwater contamination were highlighted for further consideration and information was sought from KCDC.

A request was made to KCDC to view building and property files for land parcels at 55 Rata Road, 58 Kiwi Road, the area of designated land behind Manchester and Sheffield Streets and 109 Kāpiti Road. KCDC confirmed that no records are held for the property at 58 Kiwi Road or the designated land behind Manchester and Sheffield Streets. Building and property files were received and reviewed for 55 Rata Road and 109 Kāpiti Road, however there was no information relating to potentially contaminating activities on the files.

A request was made to KCDC to search their records for any properties in Sector 2 where a dangerous good licence had been issued. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 2, which appears inconsistent with the bulk fuel storage tanks referred to below.

A request was made to KCDC to search their records for any properties where underground storage tanks were located. The following properties were listed in their records:

- 55 Rata Road
- 102 Kāpiti Road
- 108 Kāpiti Road

This list corresponds to the information held by GWRC on the SLUR register (listed in **Table 5**). No further information was held by KCDC in relation to these sites than that already provided by GWRC (see **Appendix B** for SLUR information). Of the three properties only 55 Rata Road is affected by the construction of the Expressway.

3.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the route of the Expressway. There was one property where discharge consents had been granted which could impact land parcels within the route for Sector 2, and this is:

- Paraparaumu Wastewater Treatment Plant (PWWTP)

The resource consents granted for PWWTP relate to the discharge of treated wastewater to the Mazengarb Drain and the discharge of contaminants to air, land and water from the sludge lagoons. A copy of the consents is included in **Appendix C**. The consent conditions refer to the requirement for groundwater monitoring for a range of contaminants. Groundwater monitoring data and borehole locations have been requested and received from the GWRC Compliance Officer for the site, and this is also included in **Appendix C**.

3.6 Groundwater Abstraction Review

A review of groundwater abstraction boreholes within a 300m downgradient radius of 55 Rata Road, 58 Kiwi Road, 109 Kāpiti Road and the area of designated land behind Manchester and Sheffield Streets was undertaken. The aim of the review was to determine whether there were any water abstractions that could be affected by possible land contamination at these properties.

There is one domestic supply borehole screened at a depth of less than 20m located downgradient of 58 Kiwi Road. Should contamination be present in the soils at the site, it is recommended that this borehole be monitored for similar contamination in the groundwater. No boreholes were considered likely to be affected by any potential contamination at 55 Rata Road, 109 Kāpiti Road or the area of designated land behind Manchester and Sheffield Streets, due to their depth, use or location.

3.7 Summary

The land use within this sector is a mix of rural and residential. The route follows the existing WLR Designation for the whole of this section of the route through the township of Paraparaumu.

Four properties have been identified as having the potential to be contaminated by current or historical activities, and are as follows:

- 55 Rata Road – identified SLUR site, hydrocarbon storage and general contractor's yard containing stockpiled metal, timber, rubble and machinery.
- 58 Kiwi Road – from aerial photographs taken in 1957 this land parcel is likely to have been used for horticultural activities.
- Area of designated land behind Manchester and Sheffield Streets - the potential that waste materials may have been dumped in this area from the adjacent industrial zone.
- 109 Kāpiti Road – firewood storage area where land has been raised from original level with fill from multiple sources.

Several businesses occupying the commercial / industrial zone in Manchester and Sheffield Streets, and some businesses along Kāpiti Road were identified during the site visit, and are listed on the SLUR register, as undertaking activities that have the potential to cause land contamination, including car workshops, engineering services, and a timber joinery factory. However these properties are not affected by the Expressway construction footprint and therefore no further investigation of the sites is considered necessary. There were no relevant discharge consents relating to these properties which had the potential to affect land parcels with the route.

The wastewater treatment plant was also identified through the site visit and from the SLUR register as an activity which has the potential to cause contamination. As the property is not directly affected by the Expressway construction footprint no further investigation of the site is considered necessary. However resource consents issued to the site have the potential to affect land parcels within the route of the Expressway.

One domestic supply groundwater abstraction borehole may be affected by any potential contamination at 58 Kiwi Road.

4 Sector 3

This sector runs approximately along the existing WLR Designation through the area of Waikanae from 300m north of Mazengarb Road to 600m north of Te Moana Road. An underbridge will be constructed over Otaihanga Road, with a new bridge spanning the Waikanae River and a new intersection at Te Moana Road. The main construction yard and Project office will be established at the Otaihanga Landfill site on Otaihanga Road.

The extent of Sector 3 is shown in **Figure 13** with the yellow line indicating the route of the Expressway. Maps of the route within this sector are show in Drawings EN-CL-012 and 013, Volume 5.

Figure 3: Sector 3

4.1 Description

The route follows the WLR Designation from Fytfield Place to Otaihanga Road, running through land adjacent to the western side of Otaihanga Landfill. The land use in this portion of the route comprises a recreation mountain bike park.

A new crossing will be constructed over the Waikanae River. The land use in this portion of the route comprises mainly rural blocks.

There is a residential area between the Waikanae River and Te Moana Road and a sacred Waahi Tapu burial site (urupa). An interchange will be constructed at Te Moana Road.

The KCDC District Plan shows the areas bordering the route to be rural, with a residential area within Waikanae. The Waikanae Golf Course is zoned as open space.

4.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives found two historical aerial photographs relevant to Sector 3. These are presented in **Appendix A** and are summarised below.

30 April 1965 – Aerial view of Waikanae looking north

The photograph shows the settlement of Waikanae Beach with Te Moana Road running through the middle of the residential area. The route passes through the pasture and bush land in the distance to the north east of the photograph. There is very little evidence of development along the route with the area appearing rural.

7 March 1969 – Aerial view of Waikanae looking south

This photograph is an aerial view of Waikanae looking south. It shows the Waikanae River running through the centre of the photograph with residential developments along Te Moana Road parallel to the river. The route passes adjacent to the Paraparaumu airfield, which can be seen in the far south-west, and cross the river approximately where there are darker patches of bush, again to the west. There is some housing development interspersed with bush and pasture where the route crosses the river.

Aerial photographs for the entire route for 1957 and 2001 were sourced from NZ Aerial Mapping. In addition aerial photographs from 1942, 1964, 1986 and 1998 for the Otaihanga Landfill area were sourced. All photographs are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photograph 1942 – Otaihanga Landfill area only

The area of Otaihanga Landfill is a wetland/bush area with sand dunes; no landfilling activity is visible.

Aerial photographs 1956/7

The area of Otaihanga Landfill is a wetland/bush area with sand dunes; no landfilling activity is visible. The area between Otaihanga Road and the Waikanae River is rural pasture land. The area of Te Moana Road is also rural pasture land with limited housing along Te Moana Road and some along Greenaway and Puriri Roads.

Aerial photograph 1964 – Otaihanga Landfill area only

The area of Otaihanga Landfill is a wetland/bush area with sand dunes; no landfilling activity is visible.

Aerial photograph 1986 – Otaihanga Landfill area only

Landfilling has occurred in the southern corner of the site near the wastewater treatment plant and bush/wetland has been cleared in the east and north-east areas of the site. The land within the Expressway route appears to be unaltered from the 1964 photograph.

Aerial photograph 1998 – Otaihanga Landfill area only

The area of landfilling has spread from the southern corner towards the centre of the site. There is no evidence of waste materials being deposited near the land designated for the Expressway. The sand dunes within the route appear to have been planted with pine trees.

Aerial photographs 2001/2

The land adjacent to Otaihanga Landfill remains as pine forest and wetlands. The area that has been subject to landfilling is clearly visible and appears to have occurred only in the southern portion of the land parcel with the northern portion remaining as wetland. The area between Otaihanga Road and the Waikanae River is pasture land with very few buildings within the route of the Expressway. The area between the Waikanae River and Te Moana Road is bush with residential housing present along all roads in the area. Horticultural activities are visible at 124-154 Te Moana Road.

4.3 Current Land Use and Site Visits

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. The land uses observed are detailed in **Table 6** and relevant photographs are shown in the figures below.

Table 6 - Current Land Uses, Sector 3

Location	Property Address	Activity	Observations
Otaihanga	160 Otaihanga Road	Landfill	Landfill currently accepts cleanfill green waste and treated sludge from the wastewater treatment plant. Leachate collection ditch observed which contained floating waste materials.
Otaihanga Road to Waikanae River	Various	Rural / Lifestyle blocks	No activities indicating the potential for land contamination.

Waikanae River to Te Moana Road	Various	Residential	No activities indicating the potential for land contamination.
	22 Kauri Road	Commercial	A community lifestyle farm camp.
Te Moana Road	124-154 Te Moana Road	Horticultural	Market gardening activities observed.

Figure 14: Otaihanga Landfill – toe of landfill, route to the right in the pine trees

Figure 15: Otaihanga Landfill – Landfill Drain.


Figure 16: 124-154 Te Moana Road

4.4 Hazardous Activities and Industries List (HAIL).

A request was made to GWRC to search their SLUR register for information relating to any property along the route of the Expressway identified on the register in Sector 3. The properties listed on the SLUR for Sector 3 are shown in **Table 7.** The full information provided by the GWRC for this property is presented in **Appendix C**.

Table 7: HAIL Summary, Sector 3.

Site Address	Legal Description	Category	Activity
160 Otaihanga Road, Paraparaumu	Pt Lot 2 DP 2241, Pt Sec 5 Ngarara Settlement, Sec 3 SO 419095	Category V – Verified Hazardous Activity or Industry	**Landfill** **Waste Storage / Treatment / Disposal – Sewage Treatment Facilities** Landfill established since at least the early 1970s. Water table at the site is high, with possibility of leachate entering groundwater. 2000 litres of fuel and a number of smaller quantities of hazardous substances in drums stored on site.

4.5 Council Information Request

4.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land contamination were highlighted for further consideration and information was sought from KCDC.

A request was made to KCDC to view building and property files for land parcels at Otaihanga Landfill and 124-154 Te Moana Road. KCDC provided a recent annual report on the Otaihanga Landfill, the details of which are discussed in Section 4.6 below. The file for 124-154 Te Moana Road was received and reviewed, however there was no relevant information contained within the file.

A request was made to KCDC to search their records for any properties in Sector 3 where a dangerous good licence had been issued or where an underground tank was located. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 3 and no property was listed as having an underground storage tank.

4.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the Expressway designation. There was one property where discharge consents had been granted which could impact land parcels within the designation for Sector 3, and this is:

- Otaihanga Landfill

The consents issued for the Otaihanga Landfill relate to the discharge of leachate to groundwater, the discharge of municipal waste to the landfill and the discharge of clean diverted stormwater from around the landfill into the Mazengarb Drain. The key discharge which is likely to impact adjacent land parcels within the route is the discharge of leachate to groundwater. The route runs adjacent to the western side of the landfill and so the groundwater under the route is likely to be affected by this discharge. A copy of the consent is included in **Appendix C**.

4.6 Otaihanga Landfill

The Otaihanga Landfill is located at 160 Otaihanga Road. It is owned by the KCDC and has been in operation since approximately 1970. The KCDC annual plan indicates that the landfill is now closed, however it continues to accept treated sludge (from the Paraparaumu and Ōtaki Wastewater Treatment Plants), cleanfill and green waste. Information from the KCDC website indicates that the landfill is not lined.

The landfill is being capped and clean fill is being accepted for this purpose. The site now operates as a recycling centre.

The route passes through the existing WLR Designation in the western portion of the site. There appears to be no information on the extent of landfilling activities.

The MfE report *“Wellington “waste catchment” trial: An investigation into a new model for waste monitoring”* (2007) discusses the Otaihanga Landfill as part of the catchment trial. Relevant information from this report includes the waste types previously accepted at Otaihanga Landfill. These are listed below.

- General commercial and residential wastes.
- Council domestic kerbside collections.
- Green waste separated and composted.
- Sludge from Paraparaumu Wastewater Treatment Plant.
- Hazardous wastes were not accepted.

The consultants Montgomery Watson Harza (MWH) were commissioned by the KCDC to carry out groundwater and surface water monitoring at the Otaihanga Landfill, for the consent compliance reporting. The 2009 / 2010 report is summarised below and is included as **Appendix D**.

The resource consent for the site requires groundwater monitoring to be undertaken at three groundwater bores around the landfill and surface water monitoring at three locations along Mazengarb Drain. Groundwater has been monitored at the landfill since 1992.

A detailed description of the hydrogeology is contained within the report and not summarised here. However, it is stated in the report that groundwater is abstracted from a gravel aquifer which underlies the site.

There is a leachate collection drain constructed along the north-western boundary of the landfill which collects both surface and groundwater. The leachate is discharged via sewer to the Paraparaumu Wastewater Treatment Plant.

One of the groundwater sampling boreholes (K1) is located very close to the route and analysis results indicate that this tends to have the lowest levels of contaminants of the three groundwater sampling locations. Monitoring results show that groundwater quality at the landfill is slowly deteriorating. However the annual report states that there will be a decrease in leachate and subsequent improvement in groundwater quality following the closure of the landfill.

Surface water sampling point K7 is the closest monitoring point to the route. It is located in the Western Tributary which arises from the wetland immediately north-west of the landfill. The landfill appears to be having a negative impact on water quality in this area. This is attributed to K7 being located close to the most recent landfilling activities and to the leachate collection drain. However, there is no mention of further investigation of this matter in the report.

4.7 Groundwater Abstraction Review

A review of shallow groundwater abstraction boreholes (<10m depth) within a 300m hydraulic downgradient radius of Otaihanga Landfill and 124-154 Te Moana Road was undertaken. The aim of the review was to determine whether there were any groundwater abstractions that could be affected by possible land contamination at these properties.

One borehole located on the boundary of the Te Moana Road property is noted as being a public water supply observation bore. Should contamination be present in the soils at the site, it is recommended that this borehole be monitored for similar contamination in the groundwater.

4.8 Summary

The route runs adjacent to Otaihanga Landfill, crosses the Waikanae River and passes through a residential area at Te Moana Road. The land use in the portion of the route adjacent to Otaihanga Landfill comprises a recreation mountain bike park. There is a sacred Waahi Tapu burial site (urupa) in the area near the Waikane River.

Two properties have been identified as having the potential to be contaminated by current or historical activities, and are as follows:

- Otaihanga Landfiil – the landfill is unlined and is consented to discharge contaminants to groundwater.
- 124-154 Te Moana Road – market gardening activities.

The discharge consent granted for the Otaihanga Landfill has the potential to affect the adjacent land parcels within the route. Otaihanga Landfill is also identified on the SLUR register.

From historical aerial photographs it appears that landfilling activities at have not encroached into the land designated for the Expressway, and therefore an assessment of soil contamination is not considered necessary. The priority therefore would be to characterise any groundwater contamination present within this section of the route.

A public water supply observation borehole is located on the property boundary of 124-154 Te Moana Road which may require monitoring for potential groundwater contamination associated with the property.

5 Sector 4

Sector 4 runs from Te Moana Road to Peka Peka Beach Road. A new link to Ngarara Road will be built to cross the Expressway, which will include construction of an overbridge. Smithfield Road will be relocated to the south of its existing position, with an overbridge constructed to carry the new road over the Expressway. At the Peka Peka end, an interchange will be constructed over both the Expressway and the existing railway, linking Peka Peak Beach Road to Hadfield Road.

The extent of Sector 4 is shown in **Figure 17** with the yellow line indicating the route of the Expressway. Maps of the route within this sector are shown in Drawings EN-MP-003a, Volume 5.

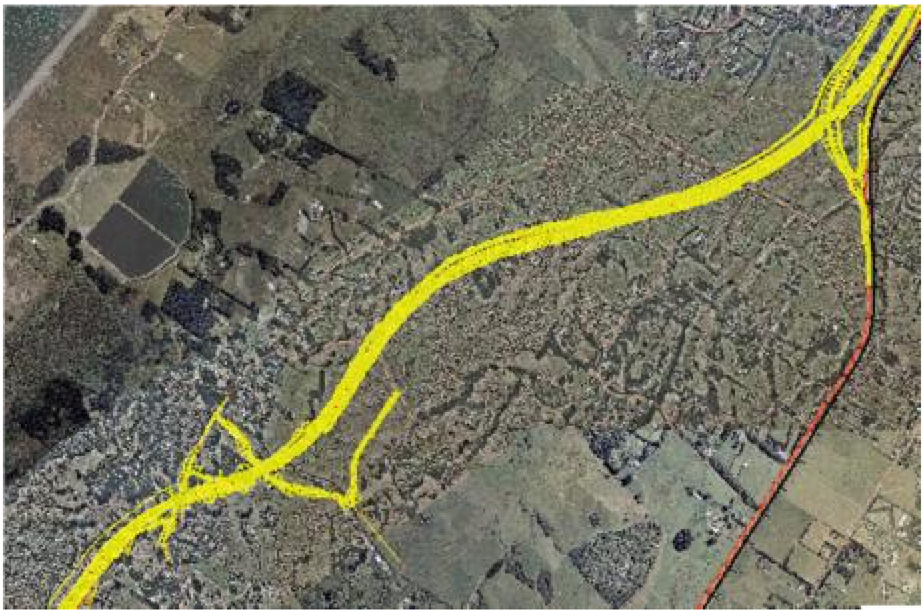

Figure 17: Sector 4

5.1 Description

The land use within Sector 4 is rural comprising pasture and bush. The route deviates slightly from the existing WLR Designation mainly on the eastern side. There are no intersections along the route other than at Te Moana Road and at Peka Peka Road at the end of the Expressway.

The KCDC District Plan shows the areas bordering the route to be rural.

5.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives was undertaken. There were no relevant historical aerial photographs available for Sector 4 of the route.

Aerial photographs for the entire route for 1957 and 2001 were sourced from NZ Aerial Mapping and are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photographs 1956/7

The area between Te Moana Road and Peka Peka is almost entirely pasture with bush and wetland patches. There are very few buildings or evidence of earthworks in this sector of the route.

Aerial photographs 2001/2

This sector has remained predominantly pasture with bush and wetland patches. There are a few buildings visible towards Peka Peka, but no evidence of earthworks.

5.3 Current Land Use and Site Visit

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. Much of Sector 4 is private land and so views of the area from public roads were limited. The land uses observed are detailed in **Table 8.**

Table 8 - Current Land Uses, Sector 4

Location	Property Address	Activity	Observations
Peka Peka Road, Ngarara Road and the existing SH1 route	Various	Rural	No activities indicating the potential for land contamination.

Given the rural nature of the sector the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil. Detailed site investigations or inspections were not undertaken at the time as the exact route of the Expressway was not known. Potentially contaminating activities, if any, may not have occurred along the route.

5.4 Hazardous Activities and Industries List (HAIL)

A request was made to GWRC to search their SLUR register for information relating to any property along the route of the Expressway identified on the register in Sector 4. Information received from GWRC shows that there are no properties within Sector 4 recorded on the SLUR register.

5.5 Council Information Request

5.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land contamination were highlighted for further consideration and information was sought from KCDC.

Based on a review of the information obtained during the site visit, there were no properties identified within Sector 4 where a request to the KCDC for further information was deemed to be necessary.

A request was made to KCDC to search their records for any properties in Sector 4 where a dangerous good licence had been issued or where underground storage tanks were located. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 4 and no properties were listed as having underground storage tanks.

5.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the Expressway designation. There were no discharge consents identified which would impact land parcels within the route for Sector 4.

5.6 Summary

The land use in this sector is predominately rural and the potential for land contamination from current activities, based on information detailed in the above sections, is considered to be low. However given the rural nature of the sector the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil. Such activities, if they occurred, may lie outside the designation, which is only a small proportion of the rural land in the sector.

6 Potential Contamination

The following assessment of potential contamination is based on the information gained from the review of aerial imagery, information from local government authorities and observations made during the site visits. The assessment presents the findings of the desk study in relation to each sector.

The properties presented in **Table 9**, and shown on the maps in Drawings EN-CL-010 to 012, Volume 5 are those which are considered, based on current and historical activities, to have the greatest potential for land and groundwater contamination. The table details the address, the activity or land use and the associated potential contaminants.

Table 9: Properties for Further Inspection/Investigation

Map Reference	Sector	Address/Reason for Inspection	Activity/ Land Use	Potential Contaminants
A	1	16 Leinster Avenue: to assess any ground contamination from dumped waste materials and empty containers and unknown fill.	Contractor/transport storage yard (commercial)	Fuels and oils, metals.
B	1	150 Raumati Road: to assess any potential ground contamination from possible dumping of waste materials.	Unoccupied area of bush	Unknown.
C	2	55 Rata Road: to assess any potential ground contamination from the historical fuel storage activity and current stockpiling activities.	Contractor/transport storage yard (commercial)	Fuels and oils, metals.
D	2	58 Kiwi Road: to assess any potential ground contamination from historical horticultural activities.	Horticultural	Pesticides, metals.
E	2	109 Kāpiti Road: to assess any potential ground contamination from multiple sources of fill at the site.	Firewood storage yard (commercial)	Fuels and oils, metals.
F	2	Area of designated land behind Manchester and Sheffield Streets: to assess any potential ground contamination from possible dumping of waste materials.	Unoccupied area of bush	Unknown.
G	3	Otaihanga Mountain Bike Park: to	Landfill	Metals, fuels

		assess any potential land and groundwater contamination from the Otaihanga Landfill.		and oils. Landfill gas, leachate.
H	3	124 – 154 Te Moana Road: to assess any potential ground contamination from current horticultural activities.	Horticultural	Pesticides, metals.

7 Recommendations

The findings of this desk study have indicated that historical and current activities along the route of the Expressway have limited potential to cause land and groundwater contamination.

It is therefore recommended that the properties listed in **Table 9** and summarised below should undergo further contamination investigation.

Sector 1

The properties at 16 Leinster Avenue and 150 Raumati Road are within the construction footprint of the Expressway and portions of the land will also be used for the construction of stormwater wetlands/ponds. Further investigation of these sites is recommended.

Sector 2

The properties at 55 Rata Road, 58 Kiwi Road and 109 Kāpiti Road are within the route of the Expressway, with the land at 109 Kāpiti Road and 58 Kiwi Road likely to be used to construct stormwater wetland/ponds. Further investigation of these sites is recommended.

Vacant land adjacent to industrial areas can be susceptible to illegal dumping of rubbish and unwanted materials. Whilst no waste materials were able to be observed due to the dense vegetation within the designation behind the industrial area of Sector 3, further inspection of this area is recommended.

Sector 3

The section of the route passing adjacent to Otaihanga Landfill has the highest potential to be contaminated. From historical aerial photographs it appears that landfilling activities have not encroached into the land designated for the Expressway, and therefore an assessment of soil contamination is not considered necessary. The priority therefore would be to characterise any groundwater contamination present within this section of the route. Landfill gas assessment should also be carried out.

The intersection at Te Moana Road would pass directly through the property at 124-154 Te Moana Road and therefore further inspection of this property is recommended.

The collection of further information and detailed inspection of the properties listed in **Table 9** would likely be a precursor to intrusive investigations. Such investigations would aim to delineate and characterise any contamination so as to formulate appropriate mitigation of risks, establish any resource consent requirements and classify materials for off-site disposal, where necessary.