Technical Report 24

Baseline Water and Sediment Quality Investigation Report

NZ TRANSPORT AGENCY
WAKA KOTAHI

1 MacKays to Peka Peka Expressway

Revision History

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Executive Summary

The proposed MacKays to Peka Peka (M2PP) Expressway extends for approximately 16km in a south to northeast direction along the Kāpiti Coast, passing across a minimum of nine major watercourses and includes construction of a new bridge over the Waikanae River. A baseline water and sediment quality investigation was undertaken such that information could be generated for input into the technical studies being undertaken as part of the Assessment of Environmental Effects (AEE). These included the ecology, stormwater and contaminated land technical studies. The baseline water quality investigation comprised the following:

1) Literature review of existing information
2) Ambient water quality monitoring programme
3) Sediment and water quality investigation near the Otaihanga Landfill
4) Chemical characterisation of groundwater associated with peat soils.

A review of existing studies was undertaken to characterise the water and sediment quality in the watercourses along the proposed route. The review was undertaken by evaluating and assessing existing surface water and sediment quality data (where available) from previous studies undertaken in the major watercourses along the Project area. In addition, an ambient water quality monitoring programme was undertaken at key sites in the major watercourses across the proposed Project extent. This was undertaken to generate information from which the existing water and sediment quality can be assessed. The field sampling programme involved the collection and analysis of water and sediment samples over a seven week period between 2 May and 16 June 2011. The programme comprised the following:

- Monthly base flow water quality sampling at eight key locations in six major watercourses along the proposed Project extent
- Collection and analysis of one sediment sample from each of the eight sampling locations
- Stormwater sampling in each of the six major watercourses.

The results of the literature review and ambient water quality monitoring programme showed that the water quality in the watercourses sampled across the Project extent are characteristic of lowland waterways draining predominantly pastoral land use with elevated nutrient concentrations, bacteriological counts and low toxicant concentrations. Nevertheless, there were some clear differences between watercourses with the water quality at each sampling location generally reflecting the catchment area that it drains. The results are summarised as follows:

- The water quality in the Wharemauku Stream and Mazengarb Drain was ‘poor’ with some elevated nutrient concentrations, ammoniacal-nitrogen, and copper and zinc concentrations relative to the corresponding guideline values. The water quality of the Waikanae River and

Hadfield Drain/Kowhai Stream was generally good. All other sites (Ngarara Stream, Kakariki Stream, Whareroa Stream) showed varying levels of nutrient enrichment and water quality degradation.

- Except for aluminium, there was little difference in the concentration of most metal and organic contaminants between the base and high flow sampling events. Aluminium (both dissolved and total) was often at elevated concentrations in many of the watercourses, both base and high flow, across the Project extent. This is likely due to elevated background soil concentrations across the Wellington region. In the Wharemauku Stream and Mazengarb Drain, the concentration of copper and zinc regularly exceeded the corresponding guideline values at the 95% level of detection during base and high flow sampling events. In the Mazengarb Drain, the elevated copper and zinc concentrations are likely due in part, to discharges from the 'eastern' tributary of the Otaihanga Landfill, the Paraparaumu Waste Water Treatment Plant and urban land use activities including the industrial/commercial area of Te Roto Drive. In the Wharemauku Stream, sources of zinc may include road and residential land use as well as the commercial/industrial activities along Rimu Road/Ihakara Street. The effects on the receiving environment from stormwater discharges have been considered in the *Assessment of Hydrology and Stormwater Effects report* (Technical Report 22, Volume 3). All organic contaminants (SVOCs and TPH) in the base flow waters sampled across the Project extent were below the analytical detection limits except for TPH (C7 – C36), which was present as a low, but measurable concentration in the Wharemauku Stream during one sampling event.
- All metal and organic contaminant concentrations in the bed sediment samples collected from the sites sampled in the major watercourses along the Project extent were below the corresponding guideline value indicating that the sediment presents a low risk of adverse effects on aquatic life.

A sediment and water quality investigation was undertaken in the stormwater/leachate drainage channel and wetlands along the western edge of the Otaihanga Landfill. The purpose of the investigation was to characterise the sediment quality in the wetlands within the footprint of the proposed Alignment, and the water quality in the stormwater/leachate drainage channel. The results showed that the sediment in the wetlands was predominantly organic with some elevated dieldrin, arsenic and zinc concentrations relative to the corresponding guideline trigger values. The metal and organic contaminant concentrations in the sediment sample collected from the stormwater/leachate drainage channel were at low concentrations. However, the water quality in the drainage channel was 'poor' with low dissolved oxygen and pH, and some elevated aluminium, manganese and zinc concentrations relative to the corresponding guideline trigger value at the 80% level of protection.

The groundwater associated with the peat was tested for a range of water quality indictors and parameters. Peat forms a significant soil component along the Alignment of the proposed

Expressway route. The purpose of the investigation was to assist in identification of the potential effects on the receiving environment from removal and storage of peat which will be required as part of construction of the proposed Expressway. The results of the study found the following;

The drainage released from the disturbance and removal of peat may have direct adverse effects on the quality of waters in the receiving environment. The *in situ* field testing results showed that the groundwater associated with the peat had low pH and dissolved oxygen. The results also showed that the groundwater runoff from the peat may have elevated organic carbon and nutrient concentrations which may impart a 'tea' to dark brown coloured staining to receiving waterways. This may lead to reduced water clarity and increased turbidity. The suspended solids in the groundwater may also contain elevated metal concentrations. As such, it was recommended that an appropriate management plan should be implemented during any peat removal and/or transport activities such that any runoff from the peat does not discharge directly to nearby waterways.

1. Introduction

The proposed MacKays to Peka Peka (M2PP) Expressway is to be located along the Kāpiti Coast linking the proposed Transmission Gully road with the proposed Peka Peka to Ōtaki Expressway. The proposed four-lane Expressway extends for approximately 16km in a south to northeast direction along the Kāpiti Coast, passing across a minimum of nine major watercourses and includes construction of a new bridge over the Waikanae River.

The Project has potential to impact on the function and aesthetic values of the downstream watercourses and receiving coastal environment through the discharge of sediment and/or associated contaminants during construction and operation. This report presents the results of the baseline water and sediment investigation, and associated technical investigations, undertaken for the Project.

1.1. Scope

This report presents the results of the baseline water and sediment investigation. The investigation comprised a number of distinct but related components as follows:

- Literature review of existing information
- Ambient water quality monitoring programme
- Otaihanga Landfill Sediment and water quality investigation
- Characterisation of groundwater associated with peat soils

1.2. Purpose

The purpose of the Baseline Water Quality Investigation was to obtain background information which could be used to assess and mitigate any effects on receiving waterbodies from construction and operation of the proposed Expressway Alignment. Specific purposes include:

- To provide a description of the existing water and sediment quality in the surfaces waters along the proposed route
- To assist in the identification and quantification of any environmental impacts on the receiving watercourses from construction and long-term operation of the proposed Expressway development

1.2.1. Literature review of existing information

A review of existing studies was undertaken to characterise the water and sediment quality in the watercourses along the proposed route. The findings obtained from this assessment would assist in the design of the proposed Expressway Alignment.

1.2.2. Ambient water quality monitoring programme

A baseline water and sediment monitoring programme was undertaken at key sites in the watercourses along the proposed route. The purpose of the ambient water quality monitoring programme was to obtain a database of information which would assist in determining the existing water and sediment quality in the surface watercourses along the proposed route.

1.2.3. Otaihanga landfill sediment and water quality investigation

A water and sediment sampling programme was undertaken at key sites in the vicinity of the Otaihanga Landfill. The purpose of the investigation was to characterise the water and sediment quality in the wetlands and stormwater/leachate drainage channel along the western edge of the Otaihanga Landfill. The information will also assist in quantifying the ecological value of the wetlands in the footprint of the proposed route.

1.2.4. Characterisation of groundwater associated with peat soils

The purpose of this investigation was to assist in determining the potential effects on the receiving watercourses from removal and storage of peat required as part of construction of the proposed Expressway. Peat forms a significant soil component along the route of the proposed Expressway. As such, its removal and disposal may have adverse effects on surface water quality through changes to water chemistry and/or the discharge of contaminants through subsoil and surface runoff. The objective of this investigation was to characterise the groundwater associated with the peat.

1.3. Report outline

A brief overview of the water quality indicators and parameters discussed in this report is provided in Section 2 together with a description of the guideline trigger values used to assess the current water and sediment quality of the receiving water resources across the Project extent. The methodology for each component of the water quality investigation (Section 1.1) is given in each relevant section of this report.

1.4. Potential effects to the receiving environment

The construction and operation of the proposed Expressway may potentially add to the discharge of sediment and contaminants to the receiving environment through stormwater runoff if not properly managed and mitigated. The water quality of urban river and streams is influenced by many factors including stormwater contaminants (e.g. zinc, copper, nutrients, polycyclic aromatic hydrocarbons (PAH), sediment from earthworks and/or construction sites, catchment imperviousness and wastewater overflows. These could potentially lead to a reduction in water clarity and quality.

Stormwater is a major source of contaminants with the potential for concentrations to exceed the receiving water quality criteria designed to protect aquatic life. Stormwater becomes contaminated as it flows across roads, roofs, pavements, grassed areas and other surfaces. The contaminants entrained in stormwater may ultimately discharge to the receiving coastal marine area where they can settle and build up in estuarine sediments, potentially to a level where adverse effects to marine ecosystems may occur. In urban environments, stormwater runoff typically contains heavy metals, PAHs, nutrients and bacteria.

2. Existing environment

The Project area comprises an approximate 16km route which extends north of MacKays Crossing to Peka Peka Road roughly following the the existing WLR designation historically designated for a local link road. The route passes through the townships of Raumati, Paraparaumu and Waikanae between the existing State Highway 1 (SH1) and the coast, and is to include a new bridge across the Waikanae River. Access on and off the proposed Expressway will be provided at a number of key intersections.

The Kāpiti Coast District has its southern boundary at Paekakariki and its northern boundary at Ōtaki. The district includes the towns of Waikanae, Paraparaumu, Raumati Beach and Raumati South. Prior to European settlement, wetlands were a dominant feature of the Kāpiti Coast landscape. Few of the original wetlands remain having been drained and developed for agriculture. A significant wetland, the Te Harakeke wetland, is located downstream of the proposed Expressway

in the north of the Project extent. The most significant watercourse along the proposed route is the Waikanae River which discharges through the Waikanae Estuary at the river mouth.

2.1. Description of the major watercourses across the Project area

In this section, a brief description of the major watercourses along the Project extent and their catchment drainage areas for which this study applies is given (see Figure 1).

Whareroa Stream

The Whareroa Stream passes through Queen Elizabeth Park west of SH1 and the extensive MacKays Crossing wetland. The land use in this area is largely pastoral. In the headwaters of catchment (east of SH1) the landform is moderately steep and stony.

Wharemauku Stream

The Wharemauku Stream is a low altitude stream serving a catchment area of approximately 1,400 ha, a third of which is urban space. The land area west of SH1 comprises mainly low-lying sand and peat dunes with predominantly residential land use. The catchment rises to the east of SH1 to form hills comprising a mixture of different land uses. These include pasture, replanted forest areas and some areas of residential development. The hillside catchment consists of a mix of thin loess and/or weathered greywacke/argillite soils.

The Wharemauku Stream to the west of SH1 drains an area of commercial/industrial/office development along Rimu Road/Ihakara Street as well as a small area of similar land use along Te Roto Drive. The boundary to the south of the catchment includes the undeveloped areas adjacent to and including much of Leinster Avenue off SH1. The 1.5 km2 catchment area of Drain 7 includes both residential and pastoral land use, and discharges into the Wharemauku Stream at Raumati Road. To the north, the Wharemauku catchment adjoins the Mazengarb catchment near of Kāpiti Road, adjacent to the Paraparaumu aerodrome. The ecological health of the Wharemauku Stream was assessed in 2002 and 2004 by Greater Wellington Regional Council (GWRC) revealing reduced species variety and abundance, indicating moderate pollution (GWRC, 2006).

Mazengarb Drain

The Mazengarb Drain (also known as Mazengarb Stream) catchment covers an area of approximately 900 ha with a northern and southern boundaries at approximately Otaihanga Road and Kāpiti Road respectively. The landform west of SH1 is relatively flat while at its headwaters, the catchment is relatively steep with significant riparian vegetation. The Mazengarb Drain discharges to the Waikanae River which it joins by way of a wetland (Waikanae Estuary) formed behind the bar of the river mouth.

The Mazengarb Drain receives treated municipal wastewater from the Paraparaumu Wastewater Treatment Plant (WWTP) upstream of the Mazengarb Reserve. The Drain also receives drainage from the 'eastern' and 'western' drains of the Otaihanga Landfill. Most drainage from the landfill flows through the 'western' tributary (Landfill Drain) via a wetland constructed at the western end of the drain. The 'western' tributary discharges into the Mazengarb Stream near Wood Leigh. The 'eastern' drain passes alongside the main trunk railway before joining the main Mazengarb Drain downstream. The tributary drains a small catchment area upstream of the landfill as well as a small area of land near the foothills adjacent to SH1. Along the north-western boundary of the landfill a leachate collection drain has been constructed which collects and discharges both surface and groundwater via a sewer to the Paraparaumu WWTP. The Otaihanga Landfill is now closed but while operational, it received waste from most of the Kāpiti Coast.

Waikanae River

The 14,900 ha Waikanae River catchment lies between the Ōtaki and Hutt River catchments and drains the southwestern portion of the Tararua Ranges. The mostly gravel-bedded river, which has its origins in the naturally vegetated headwaters of the Tararua Ranges, passes through pastured foothills and coastal plains prior to its ultimate discharge via the Waikanae Estuary to the Kāpiti Coast.

A number of major tributaries discharge into the Waikanae River. These include the Muaupoko Stream, Maungakotukutuku Stream, Reikorangi Stream, Rangiora River and Ngatiawa River. The most significant of these is the Muaupoko Stream. With an area of approximately 810 ha, the Muaupoko Stream catchment lies predominantly east of SH1 and comprises mainly pastoral land use activities. The Mazengarb Drain, carrying treated wastewater from the townships of Waikanae, Paraparaumu and Raumati enters the Waikanae River in its lower reaches (Milne, 2005).

Waimeha Stream

The Waimeha Stream originates from springs fed from the bed of the Waikanae River near Waikanae Park adjacent to Park Avenue. To the east, the stream largely flows through residential land use prior to passing through rural land and the Waikanae Golf Course. It joins with the Ngarara Stream just prior to discharge to the coastal receiving environment. The Waimeha Stream also receives overland runoff from the Waikanae River during extreme flood events.

Ngarara Stream

The Ngarara Stream flows north to south along the western boundary of the predominantly rural catchment passing through the significant Kawakahia wetland remnant before joining with the Waimeha Stream to the south and discharging to the Kāpiti Coast. A number of major tributaries drain into the Ngarara Stream including the Paetawa Drain in the north of the catchment, the Kakariki Stream which drains urban/pastoral land to the east and the Ngarara Drain which drains

the southeastern area of the catchment. The stream drains significant wetland areas including the Te Haraheke wetlands and the Nga Manu Sanctuary in the southwest

3. Background

This section gives a brief overview of the indicators and parameters used in this report to assess the water and sediment quality of the watercourses along the proposed Project extent. Also given, is a description of the guideline trigger values used to determine the potential risk of adverse effects on aquatic life from the water quality parameters measured.

3.1. Water quality parameters

pH and Temperature

Water temperature affects the ability of water to hold oxygen, the rate of photosynthesis by aquatic plants and the metabolic rates of aquatic organisms. Increasing the area of impervious surfaces and removal of riparian vegetation can cause increased in-stream temperatures which can often have significant effects on aquatic organisms.

The pH is a measure of the hydrogen ion concentration in water. In natural aquatic systems, the major influence on pH is likely to be photosynthetic activity by aquatic plants. Reduced carbon dioxide levels unbalance the carbon dioxide-bicarbonate equilibrium leading to high pH. This most often occurs in waters with high nutrient levels with maximum light penetration.

Oxygen

The dissolved oxygen content is a measure of the life supporting capacity of a water body. In natural aqueous systems, oxygen enters water by: 1) diffusion, 2) aeration through the turbulent action of running water, and 3) photosynthesis. Conversely, respiration by aquatic animals, decomposition of organic matter and various chemical reactions consume oxygen. Low measured concentrations of dissolved oxygen may indicate the presence of excessive organic loads while high values can indicate excessive plant production.

Suspended Solids, Turbidity and Visual Clarity

Suspended solids may be inorganic material (rock and mineral grains) or biological material including plant detritus, diatoms and other micro-organisms. Suspended solids can have adverse effects on receiving waters by altering water chemistry, the physical characteristics of the stream and decreasing primary productivity. It can also reduce the amount of light that can penetrate the water column, decreasing the available oxygen and cause smothering to bottom-dwelling organisms and aquatic life.

Sediments also play an important role in the accumulation and regeneration of nutrients. Under specific conditions, organic matter may coat fine clay particles. Iron and manganese oxides may also precipitate on clay mineral surfaces usually as oxyhydroxides. The coatings provide a highly active physicochemical site for both adsorption and desorption of phosphorus and a wide range of trace metals and organic pollutants of low solubility. This oxidative process with subsequent co-precipitation of phosphorus and other contaminants eliminates the recycling of phosphorus and other contaminants into the lake water column. The release of many contaminants from sediment depends on both redox and pH, and involves bacterial decomposition of organic matter, including algal blooms.

Nutrients

Nutrients are necessary for the plant growth, however, when present in excess, nutrient enrichment can occur which may have detrimental effects on aquatic life. Land use practices are a source of nitrogen and phosphorus in aquatic water bodies. Sources include road runoff, fertilisers, eroded soil, sewer systems, decomposing vegetation and animal wastes.

The growth of weeds and algae is stimulated principally by nutrients such as nitrates and phosphates. An increase in nutrient levels may lead to the proliferation of algae (in favourable flow and light conditions) which may subsequently have detrimental impacts on water quality. While the measurement of the dissolved nutrient forms are important in terms of plant growth, total nitrogen and phosphorus play a role in the pool of available nutrients for potential plant growth. Ammoniacal nitrogen is primarily derived from effluent (human and livestock) and contributes to excessive overall nutrient levels.

Nitrogen is readily converted from one form to another depending on environmental conditions. Identifying sources of nitrogen from the concentration of different nitrogen forms is difficult. Sources of Total Kjeldahl Nitrogen (TKN and/or ammonia plus organic nitrogen) include the decay of organic matter such as plant material, animal wastes and urban and industrial disposal of sewage and organic waste. Large amounts of ammonia and organic nitrogen are applied to cropland as fertilizer.

Nitrite nitrate nitrogen can be derived from nitrification of TKN (and thus shares all the potential sources of TKN). The concentration of the nitrogen oxides (often termed ‘nitrite-nitrate nitrogen’) commonly exceeds 10 mg/L in rivers affected by fertilizer application and animal wastes. Unlike ammonium ions and organic nitrogen, nitrate is highly mobile in ground water; nitrate derived from agricultural fertilizer, animal waste, or decaying plant material can infiltrate ground water, which in turn can discharge to streams.

Bacteria

Bacteriological indicators are used to indicate the risk of faecal contamination in waterways. They indicate the possible presence of pathogenic disease causing bacteria such as protozoans and viruses that also live in the digestive systems of warm-blooded animals. *Escherichia coli* (E.*coli*) is the preferred indicator of faecal contamination in freshwaters of New Zealand as this bacterial species is generally only associated with warm blooded animals. Faecal coliform tests are considered appropriate as a long-term qualitative monitoring tool for faecal contamination in natural waters.

Urban Contaminants

Urban runoff can be a major source of contaminants to the aquatic environment. Concentrations in urban runoff may exceed receiving water quality guidelines designed to protect aquatic life. Elevated concentrations of contaminants in receiving waters are mostly derived from anthropogenic sources such as building materials, transportation and industry. In freshwater, these may be present as dissolved and/or particulate forms. The dissolved forms are more readily available for uptake by organisms and are capable of causing toxic effects at high concentrations. However, many contaminants may also be associated with suspended solids in urban runoff which may then settle out of the water column in the receiving watercourses.

3.2. Water and sediment quality guidelines

Key water quality data in this report, where applicable, were compared to New Zealand sediment and water quality guideline trigger values. The guideline values most frequently cited in this report are the Australian and New Zealand Environment and Conservation Council (ANZECC, 2000) *Guidelines for Fresh and Marine Water Quality*. The guideline values have been used to provide a broad indication of the water and sediment quality in terms of potential adverse effects to aquatic life (Table 1). Other guideline values were derived from the Resource Management Act 1991 'Third Schedule' water quality classes and Ministry for the Environment (MfE, 2003) *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas*.

Table 1: Selected Water Quality Guidelines for Freshwaters used in this Study

Parameter	Trigger Value	Reference
Dissolved oxygen (% sat)	> 80%	RMA 1991 Third Schedule
Dissolved oxygen (mg/L)	> 6 mg/L	ANZECC (1992)
Nitrate	0.7 mg/L	ANZECC (2000)
Total phosphorus	0.033 mg/L	ANZECC (2000)
Total nitrogen	0.614 mg/L	ANZECC (2000)

Parameter	Trigger Value	Reference
pH	6.5 – 9	ANZECC (1992)
Turbidity	5.6 NTU	ANZECC (2000)
Dissolved reactive phosphorus	0.010 mg/L	ANZECC (2000)
Ammoniacal-nitrogen	0.021 mg/L	ANZECC (2000)
Nitrite nitrate nitrogen	0.444 mg/L	ANZECC (2000)
Aluminium	0.055 mg/L	ANZECC (2000)
Copper	0.0014 mg/L	ANZECC (2000)
Zinc	0.008 mg/L	ANZECC (2000)

Note that the ANZECC guidelines do not recommend direct comparison with trigger values in water quality risk assessment. The ANZECC (2000) guideline values are given as part of an integrated assessment approach to water quality management, which incorporate water quality monitoring, direct toxicity assessment and biological monitoring. Nevertheless, for the purposes of this study, measured contaminant/indicator levels have been compared directly against the given trigger values to obtain a broad indication of water quality in terms of the corresponding contaminant.

The data was assessed in terms of the following:

- Toxicant levels
- Risk of adverse effects due to nutrients
- Ecosystem health
- Sediment Quality

These are more fully described in the following sections.

3.2.1. Adverse effects due to nutrients

Key nutrient concentrations were compared to the corresponding default trigger value in Tables 3.3.10 and 3.3.11 of the ANZECC (2000) guidelines (as set out in Table 1). The default trigger values for nutrients are used to assess the risk of adverse effects in slightly disturbed stream and river systems. Turbidity is indicative of unmodified or slightly disturbed ecosystems in New Zealand.

Nutrients and turbidity are examples of stressors, that while not toxic, may have a direct effect on ecosystems. Recommended responses from an exceedance of the default trigger value include on-going monitoring, management/remedial actions or further site-specific investigation. Trigger values may be used in conjunction with professional judgement to provide an initial assessment of the state of a water body.

3.2.2. Toxicant levels

The metal and organic contaminant concentrations in this report were compared to the ANZECC (2000) guideline trigger values at the 95% level of protection, where available. The trigger values, as given in Table 3.4.1 of the ANZECC (2000) guidelines, are designed to protect 95% of species in slightly-to-moderately disturbed ecosystems.

Note that dissolved metal metal species are potentially the most bio-available form and of this, the free metal ion concentration is considered the most important in determining a metals toxicity. While total metal concentrations are often compared directly against guideline trigger values, there is a general understanding that this approach overestimates the deleterious form of the metal. In ANZECC (2000), more emphasis has been placed on filtered (usually < 0.45 µm) metal concentrations, in cases where the initial metal concentration is above the appropriate trigger value.

3.2.3. Ecosystem health

The E. coli counts were compared to the Ministry for the Environment (MfE, 2003) *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas* (see Table 2). The guidelines are based on a combination of both qualitative risk grading of the catchment and direct measurement of appropriate faecal indicators to assess the suitability of a site for recreational uses. For the purposes of this study, single-sample E. coli counts were compared to the guideline values to provide a broad indication of the general condition at the time of the sampling.

Table 2: Microbiological Water Quality Guidelines for Freshwaters (MfE, 2003)

Guideline Category	E Coli per 100 mL
Surveillance/Green Mode	< 260
Alert Amber Mode	260 – 550
Action/Red Mode	> 550

3.2.4. Sediment quality guidelines

The results of the sediment sample analyses were compared against the recommended guideline values in Table 3.5.1 of ANZECC (2000). The ANZECC (2000) low and high interim sediment quality guidelines (ISQG) correspond to effects range-low and median values. The effects range-low (ERL) value represents the lower 10th percentile mortality response concentration and the effects range-median (ERM) value represents the median (50th percentile) mortality response concentration. The guideline values were used to identify sediments where contaminant concentrations are likely to result in adverse effects on sediment ecological health.

3.2.5. Ecological indicators of water quality

In this report, the water and sediment quality in the watercourses along the extent of the proposed Expressway were assessed from evaluation of physicochemical data. Emphasis has been placed on existing sediment, metals and TPH contaminant levels as these are considered the most susceptible to change as a result of construction and operation of the proposed Expressway.

Nevertheless, and where applicable, ecological indicators of water quality may also be cited in this report to support the findings derived from the physicochemical data. The ecological indicator cited most commonly in this report is the Macroinvertebrate Community Index (MCI). Freshwater macroinvertebrates are aquatic animals such as insects, worms and snails. The MCI is derived from sampling the types of macroinvertebrate taxa (groups of similar individuals) present in a watercourse and provides a score that indicates general water quality. An MCI score of less than 80 indicates poor water quality and a score of greater than 119 indicates excellent water quality.

3.2.6. Limitations

Water quality monitoring programmes routinely analyse for a range of water quality determinants. Many do not relate specifically to predefined criteria but are instead used as diagnostic information to support investigation and/or interpretation of processes or interactions occurring within often complex aquatic systems.

In addition, water quality may vary significantly between seasons and in response to rainfall, biological activity and/or land use practices. A robust water quality assessment therefore relies on the collection and analysis of long-term monitoring data.

In this study, the water quality of the watercourses across the Project extent were assessed from data collected by grab sampling and/or spot measurement techniquesHowever, these approaches do not take into consideration the temporal and spatial variability inherent within environmental systems and as such, is not a reliable indicator of poor or degraded water quality. In addition, sampling was undertaken only in the winter months of May and June and therefore, does not emcompass summer months when water quality is generally poorest. The assessment of water quality in this report is therefore intended to merely act as a guide to where an obvious water quality problem may exist or watercourses across the Project area where further investigation may be warranted.

4. Literature review of existing information

This section presents the findings of the literature review which was undertaken to characterise the watercourses along the proposed Expressway in terms of their water and sediment quality. The review was undertaken by evaluating and assessing existing surface water and sediment quality data (where available) from previous studies undertaken in the major watercourses along the

Project area. Note that base flow water quality information is available for some watercourses across the Project extent while for others, only stormwater data was available.

4.1. Methodology

The assessment of the water and sediment quality in the watercourses along the proposed Expressway route has been undertaken by review of relevant information and data derived from a number of key studies and sources. Depending on the level of relevance and importance, a summary of the water quality data may be included in this report, while in other cases a descriptive summary of the findings is given. The main sources of information and associated methodologies from which this review was prepared are summarised in the following section.

4.1.1. Major sources of information

The main sources of information comprising the literature review is as follows:

- *Regional Baseline Water Quality Monitoring Programme*. Greater Wellington Regional Council (GWRC).
- *Stormwater Discharge Compliance Monitoring Results 2009 – 2010* (Sinclair Knight Mertz (SKM), 2010). Prepared for Kāpiti Coast District Council (KCDC).
- *Ngarara Baseline Freshwater Ecological and Water Quality Investigation*, SKM (2008).

Regional Baseline Water Quality Monitoring Programme. GWRC

The GWRC collects comprehensive water quality data for a number of freshwater bodies in the Wellington Region. The results from the Rivers State of the Environment (RSoE) monitoring programme and relevant targeted freshwater investigations are available in a series of annual reports. The most recent reports include the *"Annual Freshwater Quality Monitoring Report for the Wellington Region, 2009/2010"*, which documents the monthly water quality monitoring results for the July 2009 to June 2010 period inclusive, and the "*Annual Freshwater Quality Monitoring Report for the Wellington Region 2008/2009*". In addition, a report containing a detailed analysis of long-term trends is produced every six years (see Milne & Perrie 2005).

The monitoring programme includes five water quality monitoring sites within the Project area (Appendix 24.A). These are:

- Ngarara Stream at Field Way (RS08)
- Waikanae River at Mangaone Walkway (RS09)
- Waikanae at Greenaway Rd (RS10)
- Whareroa Stream at Waterfall Rd (RS11)
- Whareroa Stream at QE Park (RS12).

A range of physicochemical indicators and water quality parameters, which include dissolved oxygen, pH, visual clarity, total suspended solids, turbidity, nutrients and indicator bacteria are measured monthly as part of the monitoring programme. In the 2009/2010 monitoring period, the analysis of copper, lead and zinc were undertaken concurrently at selected monitoring locations which were either considered at risk from heavy metal contamination or discharged into sensitive downstream receiving environments.

A water quality index (WQI), as described in Perrie (2007), is used to facilitate inter-site comparisons of water quality in the Wellington region's rivers and streams. The WQI is derived from median values for the following six variables: visual clarity (black disc), dissolved oxygen (% saturation), dissolved reactive phosphorus, ammoniacal nitrogen, nitrite-nitrate nitrogen and *E. coli*. The WQI enables the water quality at each site to be classified into one of four categories as follows:

- Excellent: median values for all 6 variables comply with guideline values;
- Good: median values for 5 of the 6 variables comply with guideline values of which dissolved oxygen is one variable that must comply;
- Fair: median values for 3 or 4 of the 6 variables comply with guideline values of which dissolved oxygen is one variable that must comply;
- Poor: median values for <3 of the 6 variables comply with guideline values.

The water quality variables are compared to the guideline values in Table 3.

Table 3 - Physicochemical and Microbiological Guideline Values

Variable	Guideline Value	Reference
Dissolved oxygen (%sat)	≥ 80	RMA (1991) Third Schedule
Visual clarity (m)	≥ 1.6	MfE (1994)
Nitrite-nitrate nitrogen (mg/L)	≤ 0.444	ANZECC (2000)
Ammoniacal nitrogen (mg/L)	≤ 0.021	ANZECC (2000)
Dissolved reactive phosphorus (mg/L)	≤ 0.010	ANZECC (2000)
E coli (cfu/100mL)	≤ 100	ANZECC (2000)

Note that the water quality sampling programme was undertaken with no reference to flow, rainfall or current drainage conditions which would have a direct effect on the measured water quality conditions at the time of sampling (see Section 3.2.6).

Stormwater Discharge Compliance Monitoring Results 2009 – 2010 , SKM (2010). Prepared for KCDC

The KCDC has resource consents with GWRC to discharge stormwater into fresh water bodies and into the coastal marine area. As part of the conditions of consent, the water quality of receiving water bodies is monitored and where necessary, methods implemented to improve water quality.

This *Stormwater Discharge Compliance Monitoring Results 2009 – 2010* (SKM, 2010) report provides stormwater quality data through the 2009/2010 monitoring period. Five stormwater quality monitoring locations were located in the Project area (Appendix 24.A) and applicable to the objectives of this review. These are:

- Waikanae River at Jim Cook Parke (SKM0101/PH16) – Upstream of Alignment
- Waimeha Stream at Te Moana Road (SKM0070) – Downstream of Alignment
- Mazengarb Stream at Mazengarb Reserve (SKM0382/61154) –Downstream of Alignment
- Wharemauku Stream at Riwai Street (SKM0166) – Upstream of Alignment and east of SH1
- Wharamauku Stream at Weka Road (SKM0154) – Downstream of Alignment

Approximately three wet weather sampling rounds are completed each year. Surface water samples were collected from the discharge, and both upstream and downstream of the outlet, with one of the samples collected during the first flush period. The stormwater quality at the upstream and downstream sampling locations (not the discharge from the outlet) was of relevance to this review. The stormwater samples were analysed for a range of water quality parameters, microbiological indicators and metal contaminants.

Ngarara Baseline Freshwater Ecological and Water Quality Investigation, SKM (2008)

In 2006, SKM undertook a study to assess the aquatic resources (macroinvertebrate communities and fish populations), habitat and water quality in watercourses that crossed the site of Jonathon Smith's farm which is mostly located within the Ngarara Stream catchment. The 280ha property is a mixture of wetland (known as the Kawakahia Wetland), forestry and pastoral grazing. The study was undertaken to support a proposed future plan change to the Kāpiti District Plan (Plan Change 80) for which a baseline snapshot study provided data for future monitoring purposes. The sampling locations are shown in Appendix 24.B. In terms of the proposed Expressway, the sites are located as follows:

- Sites 1 and 4 are upstream of the proposed Alignment
- Sites 2, 3 and 5 are downstream of the proposed Alignment
- Site 6 is located in the Waimeha Stream, at or near the footprint of the proposed Alignment.

5. Results

5.1. Whareroa Stream

The GWRC has two sampling locations in the Whareroa Stream which are part of the RSoE water quality monitoring programme. These are located at Waterfall Road (RS11) and QE Park (RS12) (Section 5.1.1). The sampling location at Waterfall Road is located in the upper headwaters of the catchment east of SH1, while that within QE Park is located west of SH1 in the lower catchment.

In general, the results showed that the water quality of the Whareroa Stream was 'poor' with elevated nutrient concentrations, suspended solids and bacteriological counts. During the 2008/2009 and 2009/2010 monitoring periods, the water quality at Waterfall Road (RS11) was 'fair' in terms of the WQI due to median water clarity and dissolved reactive phosphorus at levels which did not meet the relevant guideline value. In addition, most waters sampled at this site had elevated turbidity and suspended solids with nutrient concentrations at levels which periodically exceeded the corresponding guideline value. The MCI of both monitoring periods was 105.6 and 123.3 respectively placing the water quality in a 'good' and 'excellent' category in terms of the macroinvertebrate communities present.

The median of all six water quality variables at QE Park (RS12) did not meet the corresponding guideline values during both the 2008/2009 and 2009/2010 monitoring periods. This placed the water quality at the site in the 'poor' category in terms of the WQI. The waters sampled regularly had elevated nutrients, turbidity, suspended solids and poor water clarity. These results were reflected in the MCI score which was 83.5 and 60.8 respectively placing this site in the 'fair' and 'poor' categories in terms of the existing macroinvertebrate communities.

Both GWRC sampling locations in the Wharaeroa Stream are low elevation sites draining predominantly pastoral land use. As such, the water quality in the stream has been impacted by a lack of riparian planting, erosion, nutrient runoff and contamination by stock. In QE Park, the drainage system has been significantly modified in order to facilitate drainage of the peat, which forms a significant soil component in this area. In recent years, there has been some restoration of the stream including fencing and planting of riparian margins.

5.2. Wharemauku Stream

Two stormwater monitoring sites are located in the Wharemauku Stream as part of the KCDC's stormwater monitoring programme (SKM, 2010). One of these is located at Riwai Street, east of both SH1 and the industrial\commercial complex of Paraparaumu, while the other is located west of SH1 in the lower catchment at Weka Road.

The results of the 2009/2010 monitoring programme showed that stormwater at both the Riwai Street and Weka Road locations was 'poor' with many water quality parameters and metal

contaminants at levels which did not meet the corresponding guideline value (Table 4 and 5). These included pH, dissolved oxygen, *E. coli*, acid soluble aluminium, and dissolved copper and zinc. The slightly low pH and dissolved oxygen were attributed to algae growth as a result of increased surface water temperatures.

The *E. coli* counts in the stormwater samples at both sites were significantly above the corresponding guideline value. At Riwai Street, the counts ranged between 20,000 and 150,000 cfu/100mL while at Weka Road, they ranged between 2,800 and 80,000 cfu/100mL. In response to consistently historical levels of elevated *E. coli* (and faecal coliform) counts in the Wharemaukau Stream, SKM carried out further sampling in the upper catchment streams during base flow conditions to identify possible contaminant sources. The results suggested a point source overflow in the upper catchment area.

In the stormwater samples at both sampling locations, the acid soluble aluminium (Al) and dissolved copper concentrations were elevated relative to the corresponding guideline value. The acid soluble aluminium concentrations exceeded the corresponding guideline up to 12 times while dissolved copper exceeded the relevant guideline between one and two times. Aluminium is generally elevated in rivers and streams in the Wellington region due to elevated background soil concentrations (SKM, 2010). Sources of copper in the catchment include agricultural, residential and industrial land use activities (from the Rimu Road/Ihakara Street area).

Table 4: Selected Stormwater Quality Results in the Wharemauku Stream at Riwai Street (SKM, 2010)

	18/11/2009 (2.6mm)		2/12/2009 (55mm)		24/05/2010 (13.7mm)	
	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
pH	6.93	7.01	6.59	6.8	6.44	6.02
DO (% sat)	98.5	98.9	78	79	101	99.1
Cond (µS/cm)	14,000	14,000	20,390	2,430	17,400	2,400
E coli (cfu/100mL)	105,000	150,000	42,000	57,000	20,000	26,000
Al – AS (mg/L)	0.28	0.29	0.18	0.19	0.43	0.42
Cu– Dis (mg/L)	0.0024	0.0023	0.0018	0.0022	0.0024	0.0021

Note: AS (acid soluble) and Dis (dissolved)

Note: Values in bold above the corresponding guideline value (see Tables 1 and 2, Section 3.2)

At Weka Road, dissolved zinc exceeded the relevant guideline in all stormwater samples between one and four times. Sources of zinc in the lower catchment area may include road and residential land uses as well as the commercial/industrial activities along Rimu Road/Ihakara Street. An investigation of stormwater-derived chemical contaminants in the bed sediment from selected urban streams across the Wellington region identified heavy metal contamination in the Wharemauku

Stream adjacent to Drain 6. Drain 6 drains the predominantly commercial/industrial area of Paraparaumu. Nevertheless, a study undertaken by Milne & Watts (2008) found that bed sediment concentrations of metals, PAHs and dieldrin were all below the ANZECC (2000) ISGG-low trigger values in the Wharemauku Stream at Tui Road (downstream of the Alignment). The only contaminant above the corresponding guideline at this location was total DDT.

Table 5: Selected Stormwater Quality Results in the Wharemauku Stream at Weka Road (SKM, 2010)

	18/11/2009 (2.6mm)		2/12/2009 (23.4mm)		24/05/2010 (13.8mm)	
	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
pH	6.51	6.64	6.65	6.85	6.37	6.71
DO (% sat)	86.4	85.9	68	68	127	108
Cond (µS/cm)	9,200	9,600	20,950	6,770	9,000	3,100
E coli (cfu/100mL)	80,000	69,000	3,500	2,800	3,500	3,500
Al – AS (mg/L)	0.50	0.48	0.46	0.47	0.63	0.63
Zn – Dis (mg/L)	0.019	0.018	0.024	0.022	0.031	0.031
Cu– Dis (mg/L)	0.0029	0.0030	0.0028	0.0026	0.0028	0.0027

Note: AS (acid soluble) and Dis (dissolved)

Note: Values in bold above the corresponding guideline value (guideline trigger values given in Tables 1 and 2, Section 3.2)

5.3. Mazengarb Drain

A stormwater monitoring site is located in the Mazengarb Drain as part of KCDC's stormwater compliance monitoring programme (SKM, 2010). The site is located in the Mazengarb Reserve (downstream of the Alignment). Upstream of the sampling location lies the Paraparaumu Waster Water Treatment Plant (WWTP) and the tributary draining the 'eastern' edge of the Otaihanga Landfill. In addition, the site also receives drainage from the industrial/commercial area of Te Roto Drive. Selected stormwater quality results from the 2009/2010 sampling programme are shown in Table 6.

The results showed that stormwater quality was generally 'poor' with many water quality parameters and metal contaminants at levels which did not meet the relevant guideline values. In general, the stormwater samples had low dissolved oxygen, and elevated *E. coli*, acid soluble Al, and both dissolved copper (Cu) and zinc (Zn). The dissolved oxygen concentrations were below the corresponding guideline values in five out of a possible six stormwater samples collected. The *E. Coli* counts ranged between 200 and 3,000 cfu/100mL and were mostly above the corresponding guideline value. The *E. coli* counts have historically been elevated within the Mazengarb Drain due to discharges from the WWTP upstream of the sampling location (SKM, 2010).

The acid soluble aluminium and dissolved zinc concentrations exceeded the corresponding guideline in all stormwater samples by up to five and 12 times respectively. In four stormwater samples, the dissolved copper concentration exceeded the corresponding guideline up to two times. Aluminium, zinc, chromium and other heavy metals may be entering the drain from the Te Roto Drive catchment drain (SKM, 2010). A contaminant source investigation has been proposed for the industrial/commercial area within Te Roto Drive catchment area such that these sources can be identified (SKM, 2010).

Table 6: Mazengarb Stream Stormwater Quality Results (SKM, 2010)

	18/11/2009 (2.6mm)		2/12/2009 (23.5mm)		24/05/2010 (1.9mm)	
	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
pH	6.46	6.57	6.77	6.85	6.82	6.75
DO (% sat)	70.1	81.6	63	64	73.4	72.5
Cond (µS/cm)	20,700	15,100	34,400	12,390	39,000	16,600
E coli (cfu/100mL)	3,000	1,500	2,000	2,600	400	200
Al – AS (mg/L)	0.12	0.10	0.25	0.18	0.073	0.084
Zn – Dis (mg/L)	0.020	0.093	0.037	0.060	0.037	0.036
Cu – Dis (mg/L)	0.0016	0.0023	0.0017	0.0022	0.00118	0.0013

Note: AS (acid soluble) and Dis (dissolved)

Note: Values in bold above the corresponding guideline value (guideline trigger values given in Tables 1 and 2, Section 3.2)

Water quality monitoring is undertaken in the surface watercourses near of the Otaihanga Landfill as part of KCDC's requirements to meet the consent conditions for ongoing management of the site (Section 2.1) (MWH, 2010). The results of the water quality monitoring at the Otaihanga Landfill suggest that the landfill is likely to be having an effect on the water quality in the 'western' tributary (Site K7 see Appendix 24.C) of the landfill with many parameters and contaminants above historic background and guideline levels. The 'western' tributary joins the Mazengarb Drain downstream at Wood Leigh. Some parameters were consistently above background concentrations such as potassium, boron, manganese, nickel and ammoniacal-nitrogen concentrations while others were more variable such as nitrate-nitrogen, sulphate and dissolved reactive phosphorus. In general, the contaminants of most concern in terms of potential adverse effects on aquatic life were boron and ammoniacal-nitrogen. The faecal coliform counts were generally near background levels except for some occasional periodic elevated counts through the monitoring period.

In comparison, the concentrations of most parameters and contaminants in the 'eastern' tributary (Site K5, see Appendix 24.C), which discharges to the Mazengarb Drain slightly upstream of the proposed Alignment, were generally at much lower concentrations than those measured in the

'western' tributary (K7). Nevertheless, many parameters and contaminants were at elevated levels relative to background concentrations and/or corresponding guideline value with the contaminants of most concern likely to be boron, aluminium and ammoniacal-nitrogen. At the sampling site, E4, which is located in the Mazengarb Drain, the median concentrations of boron, aluminium, ammoniacal-nitrogen, dissolved reactive phosphorus, copper and zinc during the 2009/2010 monitoring period were above the corresponding ANZECC (2000) guideline values indicating likely adverse effects on aquatic life at the site sampled. A comparison of the median measured concentrations at this site (E4) with those in the 'eastern' tributary (K5) suggest that the 'eastern' tributary is likely to be having an impact on the water quality in the Mazengarb Drain at the site sampled.

The Mazengarb Drain also receives treated municipal wastewater from the Paraparaumu WWTP discharges. As part of the consent requirements, water quality in the Drain is monitored both upstream (Lindale) and downstream (Mazengarb Culvert) of the confluence with the WWTP Drain. A summary of the annual monitoring results through the June 2010 to May 2011 monitoring period is shown in Table 7.

Table 7: Summary of Paraparaumu WWTP Water Quality Monitoring Results June 2010 – May 2011

		Lindale				Mazengarb Culvert			
	Guideline	Min	Max	Median	Avg	Min	Max	Median	Avg
BOD (mg/L)		2.0	5.8	2.5	2.8	1.8	4.3	2.5	2.7
SS (mg/L)		3.5	22.3	7.1	8.6	1.4	19.3	3.6	5.0
DO (mg/L)	6	5.9	14	8.3	8.7	4.3	10.3	7.1	7.1
Amm-N (mg/L)	0.021	0.2	0.9	0.6	0.5	0.2	0.7	0.4	0.4
Nitrate-N (mg/L)	0.7*	0.1	1.1	0.5	0.5	2.1	4.7	3.4	3.4
DRP (mg/L)	0.010	0.02	0.05	0.03	0.03	0.08	1.96	0.54	0.64
pH	6.5 - 9	5.9	7.4	6.9	6.8	6.4	7.3	6.7	6.8
Cond (mS/cm)		0.25	0.37	0.30	0.31	0.30	0.47	0.39	0.38
F coli/100mL		110	1000	200	368	150	700	300	347
Entero/100mL		5	430	120	162	30	440	138	166

* At the 95% level of protection

Note: Values in bold above the corresponding guideline value (see Table 1, Section 2.3)

The results suggest that the water quality in the Mazengarb Drain, both upstream and downstream of the WWTP drain, is generally 'poor' with elevated suspended solids, nutrient concentrations and bacteriological counts. At both sites sampled, the pH and dissolved oxygen showed periodic

exceedances which did not meet the relevant guideline values. Elevated conductivity, nitrate-nitrogen and dissolved reactive phosphorus measured at the site sampled in the Mazengarb Culvert compared to the upstream site (Lindale) suggest that discharge from the WWTP is likely to impact on the water quality at the site sampled. However, the water quality at both sampling locations is likely to be impacted by the discharge from the 'eastern' tributary of the Otaihanga Landfill as there was little difference in the bacteriological counts, ammoniacal-nitrogen and BOD concentrations between the upstream (Lindale) and downstream (Mazengarb Culvert) sites.

5.4. Waikanae River

There are two sampling locations in the Waikanae River which are included in GWRC's regular water quality monitoring programme (Section 5.1.1). One is located in the forested upper catchment at Mangaone Walkway (RS09) and the other is located in the lower catchment (west of SH1) at Greenaway Road (RS10). In general, the results of the monitoring programme showed that the water quality in the Waikanae River is good with mostly low nutrient concentrations, suspended solids and bacteriological counts.

During the 2008/2009 and 2009/2010 monitoring periods (Section 5.1.1), all dissolved oxygen, *E. coli*, visual clarity, turbidity and most nutrient concentration measurements at Manganone Walkway met the relevant corresponding guideline value. The only exceedance was for dissolved reactive phosphorus which, with a median value above the guideline value (Section 5.1.1), placed the site in the 'good' category in terms of the WQI. During the same monitoring periods, the MCI was 140.2 and 142.2 respectively placing the water quality at the site sampled in the 'excellent' category in terms of the macroinvertebrate communities present.

In comparison, the water quality at Greenaway Road during the 2008/2009 and 2009/2010 monitoring periods was 'excellent' relative to the WQI with the median of all indicators above the corresponding guideline. Nevertheless, there were some periodic exceedances of the relevant guideline values over both monitoring periods, particularly for nutrients. During both monitoring periods, the MCI was 118.6 and 117.7 respectively. This placed the site in the 'good' category in terms of sensitivity to complex environmental variables.

During the 2009/2010 monitoring period (Section 5.1.1), the water samples collected at the Greenaway Road site were concurrently analysed for dissolved copper, lead and zinc. In all water samples, dissolved copper and lead were below the corresponding guideline trigger value. However, the maximum dissolved zinc concentration was 0.01160 mg/L which is indicative of periodic exceedances of the corresponding guideline value. This may suggest that the sampling location receives stormwater runoff from urban land use in the upstream drainage area during high rainfall events.

The SKM (2010) stormwater monitoring programme included one sampling location in the Waikanae River. This is located at Jim Cooke Park upstream of the proposed Alignment. Except

for *E. coli* and acid soluble aluminium, all water quality parameters and metal contaminants were within the corresponding guideline value which is indicative of mostly good stormwater quality at this site. However, the *E. coli* counts ranged between 330 and 460 cfu/100 mL and exceeded the guideline value between one and two times while the concentration of acid soluble aluminium, with concentrations ranging between 0.068 and 0.20 mg/L, exceeded the corresponding guideline value by between one and four times. Elevated acid soluble aluminium in the stormwater samples is most likely due to background soil concentrations which are reportedly high in the Wellington region (SKM, 2010).

5.5. Waimeha Stream

The results of the SKM (2008) and SKM (2010) studies (Section 5.1.1) showed that the water quality of the Waimeha Stream was generally good however there were some elevated nutrient concentrations and *E. coli* counts. The SKM (2008) study included one sampling location (Site 6, Appendix 24.B) in the Waimeha Stream (Section 5.1.1) for which the upstream drainage area comprised both areas of urban and agricultural land use. The results of the snapshot sampling showed some elevated nutrient concentrations relative to the corresponding guideline values including total nitrogen, total oxidised nitrogen and ammonicacal-nitrogen. However, all acid soluble and dissolved metal concentrations were below the corresponding guideline value at the 95% level of protection. The results of the KCDC stormwater monitoring programme at Te Moana Road (SKM, 2010) showed elevated *E. coli* counts in all stormwater samples collected (900 – 1,700 cfu/100mL) however no other water quality parameters or metal contaminants measured exceeded the relevant guideline value.

5.6. Ngarara Stream

There are several sources of information for which the water quality in the watercourses of the Ngarara Stream catchment have been assessed. These include the *Ngarara Baseline Freshwater Ecological and Water Quality Investigation* (SKM, 2008) and the *Long-Term RSoE Monitoring Programme* (GWRC) (Section 5.1.1).

The SKM (2008) study found that clay and silt dominated the substrates at most of the sites sampled with the habitat parameters measured ranked from poor to marginal. Macroinvertebrate testing showed that sites were dominated by a high proportion of the more pollutant tolerant species that are typical of grossly enriched or severely graded habitat conditions.

The results of selected field measurements and water quality sample analyses are presented in Table 8 together with the relevant guideline value where applicable. Note that this was a snapshot survey that makes no reference to flow, rainfall or current drainage conditions which could have a direct effect on the measured water quality conditions at the time of sampling.

The results confirm that the sites sampled in the Ngarara Stream catchment are mostly characteristic of lowland waterways draining predominantly agricultural land, with elevated nutrient

levels and low toxicant concentrations (Table 8). Many nutrients exceeded the ANZECC (2000) guideline values including total nitrogen, ammoniacal-nitrogen, total oxidised nitrogen, total phosphorus and dissolved reactive phosphorus. There were also some dissolved oxygen, turbidity and pH measurements which did not meet the relevant guideline values.

At the sites sampled at both the base of the Kawakahia Wetland (Site 5) and Nga Manu Nature Reserve (Site 4), the degradation of organic matter is likely to be the significant process occurring in the water column as shown by the largely organic form of total nitrogen and low dissolved oxygen levels. At all other sites, well-oxygenated waters with elevated bacteriological counts, as well as predominantly inorganic nitrogen forms (as measured by nitrite-nitrate nitrogen), suggest a larger influence by agricultural and urban land use activities.

Table 8: Selected Water Quality Data (SKM, 2008) (units mg/L unless otherwise indicated)

Site	1	2	3	4	5	6	Guideline
Temperature (ºC)	16.5	15.4	14.8	12.6	15.3	14.2	-
DO	11.6	10.2	8.3	6.8	6.4	9.2	6.0
DO (% sat)	120	102	82	64	64	90	> 80%
Conductivity (mS/m)	247	284.6	291.8	167.4	299.5	182.3	
pH	6.8	6.9	6.8	6.4	6.9	6.3	6.5 - 9
Turbidity (NTU)	7.72	10.3	9.29	6.63	19.5	0.55	5.6
TSS	11	6	6	6	13	<3	-
cBOD5	1	1	<1	<1	<1	<1	-
Total Nitrogen	1.2	1.5	1.2	1.0	1.2	1.6	0.614
Ammoniacal-N	0.10	0.11	0.09	0.08	0.05	0.03	0.021
TKN	0.6	1.0	0.7	1.0	0.9	0.2	-
Total Oxidised-N	0.646	0.503	0.495	0.021	0.280	1.48	0.444
Nitrate-N	0.639	0.490	0.481	0.014	0.273	1.48	-
Nitrite-N	0.007	0.013	0.014	0.007	0.006	0.002	-
Total Phosphorus	0.085	0.086	0.084	0.125	0.133	0.021	0.033
Dissolved Reactive-P	0.024	0.033	0.045	0.045	0.053	0.010	0.010
Al – Dissolved Al - Acid Soluble	0.063 0.160	0.077 0.189	0.063 0.113	0.145 0.193	0.066 0.111	<0.003 0.004	0.055
Enterococci (cfu/100mL)	1500	250	250	120	120	39	-
Faecal Coliforms (cfu/100mL)	9600	1400	700	200	340	610	-

Note: Values in bold above the corresponding guideline value

The only clear spatial trend across the sites sampled in the Ngarara Stream catchment as the microbiological indicator counts which were highest in the waters sampled in the uppermost catchment (Site 1) and generally decreased with increasing distance downstream. This indicates a likely point source in the upper catchment. Aluminium was the only metal or toxicant in the Ngarara Stream to exceed the corresponding guideline value at the 95% level of protection.

The GWRC long-term RSoE water quality monitoring site in the Ngarara Stream catchment is located at Field Way (RS08). Note that this monitoring site is below the confluence of both the Ngarara and Waimeha streams. The results of the long-term monitoring programme were generally consistent with the SKM (2008) study. The water quality was classified as 'poor' relative to the WQI in both the 2008/2009 and 2009/2010 monitoring periods due to annual median dissolved oxygen, dissolved reactive phosphorus and water clarity at levels which did not meet the relevant guideline value.

In the 2009/2010 monitoring period, the MCI was 80.1 which placed the site in the 'fair' category in terms of sensitivity to complex environmental variables. This was one category higher than that obtained in the 2008/2009 and 2006/2007 monitoring periods, where the site was classified as 'poor'. During the 2009/2010 monitoring period, the water samples collected from the Ngarara Stream at Field Way were also analysed for dissolved copper, lead and zinc. The median dissolved copper concentration was 0.0006 mg/L and below the corresponding guideline trigger value at the 95% level of detection. Nevertheless, the maximum measured value was 0.003 mg/L. This was an exceedance of the corresponding guideline trigger value by two times. Both the median dissolved lead and zinc concentrations in all water samples were below the corresponding guideline trigger value at the 95% level of detection.

The water quality of the Ngarara Stream has been 'poor' for many years due to the nature of the stream catchment (low-gradient, peaty soils) as well as the discharge of treated wastewater from the Waikanae WWTP (Milne & Perrie, 2005). However, due to removal of treated municipal wastewater from the stream in 2002, over recent years the total organic carbon content, nutrients and faecal coliforms in the watercourses of the catchment have been found at lower levels.

6. Summary

The water quality information in Section 5.2 is summarised below for each major watercourse. Note that only those water quality parameters and/or contaminants which appeared to regularly exceed the relevant guideline values are shown in Table 9.

Table 9: Summary of the Water Quality Parameters/Contaminants at Elevated Levels (relevant to the corresponding guideline value) in the Watercourses across the Project Extent

Watercourse	General Water Quality	Base Flow Water Quality Exceedances	Stormwater Quality Exceedances
Whareroa Stream	Poor	Nutrients, TSS, turbidity, water clarity, bacteriological counts	
Wharemauku Stream	Poor		pH, dissolved oxygen, E coli, aluminium (acid soluble), copper (dissolved), zinc (dissolved)
Mazengarb Drain[1]	Poor	Boron, nutrients, suspended solids, BOD	DO, E coli, aluminium (acid soluble), copper (dissolved), zinc (dissolved)
Waikanae River	Good	Dissolved reactive phosphorus	E coli, aluminium (acid soluble)
Waimeha Stream	Fair	Nutrients	Ecoli
Ngarara Stream[1]	Poor	pH, dissolved oxygen, nutrients, suspended solids, turbidity, bacteriological counts, aluminium	

Note that the information summarises the information contained in Sections 5.2. Unless otherwise specified, it is assumed that the data is pertains to base flow sampling events.

[1] Streams in the Ngarara Stream catchment only (does not include Waimeha Stream)

Whareroa Stream

The Whareroa Stream passes through Queen Elizabeth Park and the extensive MacKays Crossing wetland. Two sampling locations in the Whareroa Stream are included in GWRC's water quality monitoring programme. One sampling site is located in the upper catchment at Waterfall Road while the other is located downstream in QE Park. The water quality of the Whareroa Stream at both sites sampled was 'poor' with elevated nutrient concentrations, suspended solids and bacteriological counts. Historically, a lack of riparian planting, erosion, nutrient runoff and contamination by stock is likely to be contributing to poor water quality within QE Park.

Wharemauku Stream

Existing studies have shown that the stormwater quality in the Wharemauku Stream is generally 'poor' with some evidence of localised degradation of the stream bed sediment. Stormwater quality in the Wharemauku Stream at both Weka Road (downstream of the proposed Alignment) and Riwai Street (upstream of the Alignment east of SH1) was 'poor' with many water quality parameters and metal contaminants at levels which did not meet the relevant guideline values (SKM, 2010). The stormwater samples at both sites had some low pH and dissolved oxygen, and significantly elevated *E. coli*. The elevated *E. coli* were attributed to point source overflows present in the upper catchment area. Acid soluble aluminium and dissolved copper were also elevated relative to the corresponding guideline at the 95% level of protection in the stormwater samples at the upstream and downstream locations. Potential sources of copper in the catchment include agricultural, residential and industrial land use activities. Dissolved zinc was elevated in the stormwater samples at the downstream sampling location (Weka Road). This may be due in part to the commercial/industrial activities along Rimu Road/Ihakara Street. Milne & Watts (2008) found heavy metal contamination of the stream sediment in the Wharemauku Stream adjacent to Drain 6 due to activities from the commercial/ industrial activities on Rimu Road/Ihakara Street. Analysis of bed sediment samples at locations downstream of the Project area were all below the corresponding guideline values (except for DDT) suggesting areas of localised bed sediment degradation in the catchment.

Mazengarb Drain

The results of the SKM (2010) study showed that the stormwater quality at Mazengarb Reserve (downstream of the Alignment) was generally 'poor' with many water quality indicators and metal contaminants at levels which did not meet the relevant guideline value. Generally, the stormwater at this location had low dissolved oxygen, and elevated *E. coli* counts, acid soluble aluminium, and dissolved copper and zinc. Elevated zinc and other heavy metals in the stormwater at Mazengarb Reserve were attributed to potential discharges from the Te Roto Drive drainage area.

In addition, there are a number of potential point source discharges of contamination in the Mazengarb catchment upstream of the sampling location. These include the Paraparaumu WWTP and the 'eastern' tributary that drains the Otaihanga Landfill.

The water quality in the Mazengarb culvert and outfall of the WWTP showed some elevated nutrient concentrations (relative to the relevant guidelines used in this study), faecal coliform and enterococci counts.

The water quality in the 'eastern' tributary and Mazengarb Stream is monitored as part of the consent requirements for the Otaihanga Landfill. The results showed elevated zinc, copper, aluminium, ammoniacal-nitrogen, dissolved reactive phosphorus and suspended solids in the

Mazengarb Stream which may in part be due discharges from the landfill by way of the 'eastern' tributary where these were also elevated.

Waikanae River

Existing studies suggest that the water quality of the Waikanae River is generally 'good'. The GWRC has two RSoE monitoring locations in the Waikanae River. One of these is located in the forested upper catchment (east of SH1 at Mangaone Walkway) and the other is at Greenaway Road (downstream of the Alignment) in the lower catchment.

The water quality at Mangaone Walkway was 'good' with low nutrient concentrations, *E. coli* and suspended solids. Downstream at Greenaway Road, the water quality was also generally good with only some nutrient concentrations periodically exceeding the corresponding guideline value. In the 2009/2010 monitoring period, dissolved copper, lead and zinc were measured at Greenaway Road as part of the monthly water quality monitoring programme. Only dissolved zinc showed evidence of periodic exceedances of the corresponding guideline value.

The results of the SKM (2010) stormwater monitoring programme at Jim Cooke Park (upstream of the Alignment) showed that the only parameters and/or contaminants above the relevant guideline values were *E. coli* and acid soluble aluminium. Elevated *E. coli* counts in the Waikanae Stream may be due to agricultural land use activities. The elevated aluminium in the stormwater samples is likely due to background soil concentrations which are high in the Wellington region (SKM, 2010).

Waimeha Stream

Previous water quality studies showed that the Waimeha Stream is characteristic of a lowland waterway draining predominantly agricultural land with elevated nutrients, bacteriological counts and low toxicant concentrations. The base flow water samples collected and analysed as part of the SKM (2008) study showed elevated nutrient concentrations. Concentrations of all other parameters measured (including suspended solids, turbidity, phosphorus and metal concentrations) were low and below the corresponding guideline value. The results of the SKM (2010) stormwater monitoring programme showed that only *E. coli* was elevated in the stormwater samples at Te Moana Road (downstream of the Alignment).

Ngarara Stream

Studies have shown that the water quality of the watercourses in the Ngarara Stream catchment are typical of sites draining predominantly agricultural land, with elevated nutrient concentrations, bacteriological counts and low toxicant concentrations. The results of the SKM (2008) study showed that all sites had elevated turbidity, while some sites also had low dissolved oxygen and pH indicative of organic matter degradation. As such, the Ngarara watercourses were characterised by macroinvertebrate species typical of grossly enriched or severely degraded habitat conditions.

Nevertheless, all acid soluble and dissolved metal and toxicant concentrations, except aluminium, were below the corresponding guideline at the 95% level of protection.

The results of the GWRC long-term monitoring programme at Field Way (note that this sampling site is below the confluence of the Ngarara and Waimeha streams) were generally consistent with the results of the SKM (2008) study. The water quality was found to be generally 'poor' due to elevated nutrient concentrations, turbidity and periodic low dissolved oxygen concentrations. In addition, dissolved copper concentrations were periodically above the corresponding guideline at the 95% level of protection.

7. Ambient water quality monitoring programme

An ambient water and sediment quality monitoring programme was undertaken at key sites in the watercourses across the proposed Expressway in order to generate a database of information from which the existing water and sediment quality can be assessed (Section 1.2.2). The field sampling programme involved the collection and analysis of water and sediment samples over a seven week period between 2 May and 16 June 2011. The programme comprised the following:

- Monthly base flow water quality sampling at eight key locations in six major watercourses along the proposed Project extent;
- Collection and analysis of one sediment sample from each of the eight sampling locations; and
- Stormwater sampling in each of the six major watercourses.

7.1. Methodology

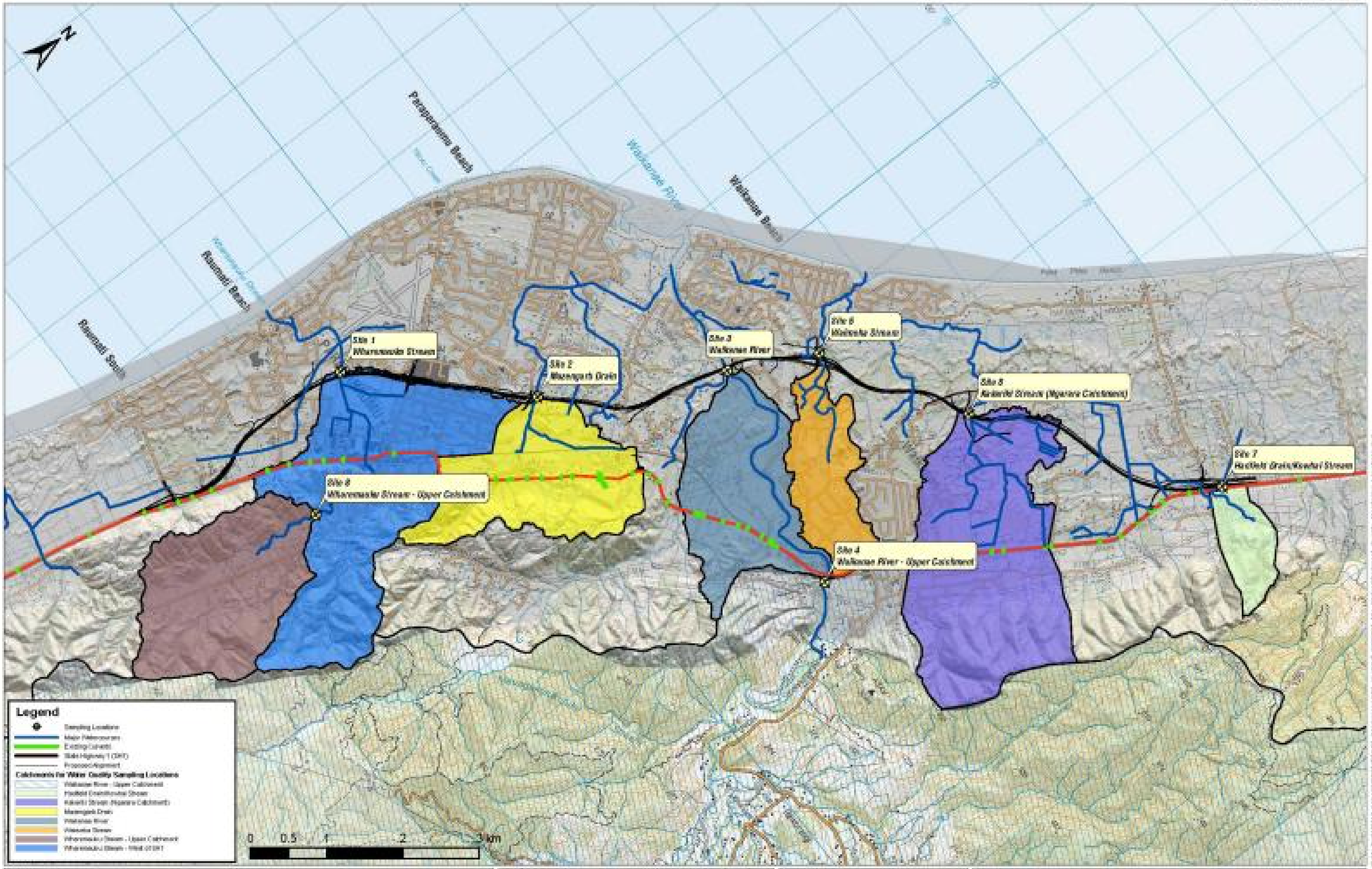
7.1.1. Sample site locations

The sediment and water quality field sampling programme was undertaken at eight locations in six major watercourses along the extent of the proposed Expressway Alignment as shown in Figure 2. Six of the locations lie directly west of the proposed route with a further two reference sites located in the upper catchments east of SH1 (Sites 4 and 8) (Table 10).

7.1.2. Monthly base flow water quality sampling programme

The base flow water samples were collected during base flow conditions (following three days of fine weather) on 2 May, 23 May and 16 June 2011. All field sampling and subsequent sample analysis were carried out by Environmental Laboratory Services (ELS) in Lower Hutt. The pH, dissolved oxygen and water temperature were measured at each site with portable field meters during field sampling. ELS provided all field meters for the *in situ* testing. The water velocity was estimated at each site during sampling. The water samples collected as part of the ambient water quality monitoring programme were analysed for the following:

- Dissolved and total heavy metals (aluminium, arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel and zinc)
- Total petroleum hydrocarbons (TPH)
- Semi volatile organic compounds (SVOC)
- Carbonaceous biological oxygen demand (cBOD)
- Chemical oxygen demand (COD)
- Nutrient suite (dissolved reactive phosphorus, nitrate, total nitrogen oxides, nitrite, TKN, total nitrogen, total phosphorus and ammoniacal-nitrogen)
- Total suspended solids
- *E. coli*.



Notes:

Drawing No: M2PP-AEE-DWG-EN-WQ002

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Project: **MACKAYS TO PEKA PEKA EXPRESSWAY**

Title: Figure 2: Water and Sediment Quality Monitoring Locations

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Table 10: Description of Sample Site Locations

Site No.	Sample Site	Description
1	Wharemauku Stream	Drains predominantly mixed urban land use west of SH1 which includes residential, commercial and the industrial storage area off Kāpiti Road. (Urban)
2	Mazengarb Drain	Drains small pockets of residential as well as pastoral and forestry land use. (Urban)
3	Waikanae River	Drains residential and agricultural land use west of SH1. The upper catchment comprises natural vegetation with areas of pastoral land use. (Rural/Natural)
4	Waikanae River – Upper Catchment	Drains the upper Waikanae River catchment which comprises natural vegetation with areas of pastoral land use. (Rural/Natural)
5	Waimeha Stream	Drains mainly residential and agricultural land use. Fed by springs derived from the bed of the Waikanae River as well as stormwater runoff. Potential surface water quality impacts from the proposed interchange. (Urban)
6	Kararíki Stream (Ngarara Stream Catchment)	Drains significant wetland areas as well as areas of pastoral and forestry land use. Potentially of high ecological value with a regionally significant wetland downstream. (Rural)
7	Hadfield Drain/Te Kowhai Stream	Downstream of proposed major interchange, potential for surface water quality impacts at the northern section of the route. (Rural)
8	Wharemauku Stream – Upper Catchment	East of SH1, the area comprises residential land use with pasture and replanted forests in the upper catchment. (Urban/rural)

7.1.3. Sediment sampling programme

A composite bed sediment sample was collected from each water quality monitoring site on 2 May 2011 (Table 10). The composite sediment samples were collected by scooping the top bed sediment layer, where fine silt had accumulated, directly into an appropriate sample container. ELS undertook all sediment sampling and subsequent sample analysis. The analyses carried out on the sediment samples included:

- pH
- Total recoverable metals (aluminium, arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel and zinc)

- TPH
- SVOC
- Volatile organic compounds (VOC).

7.1.4. Stormwater sampling programme

Two stormwater samples were collected from the Wharemauku Stream (Site 1) and Mazengarb Drain (Site 2) during a high rainfall event on 27 May 2011 (Figure 2). A further two stormwater samples were collected from each sampling location in the Waikanae River (Site 3), Waimeha Stream (Site 5), Kakariki Stream (Site 6) and Hadfield Drain/Te Kowhai Stream (Site 7) on 10 June 2011.

The two grab stormwater samples were collected approximately five minutes apart within the first hour of the rainfall event. Boffa Miskell and ELS undertook all stormwater sampling with the samples analysed by ELS. The following analyses were undertaken on the stormwater samples:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)
- Other metals (aluminium, boron, cobalt, iron and manganese)
- TPH
- SVOC
- cBOD
- Nutrient suite (to include ammoniacal nitrogen, total nitrogen and phosphorus)
- Total suspended solids (TSS).

Note that interpretation is based on collection and analysis of two grab stormwater water samples from each site during a rain event. An evaluation of the contaminant levels has been undertaken by direct comparison of the concentrations in the discharge with the corresponding ANZECC (2000) guideline trigger values. Assessment against the relevant statutory rules is outside of the scope of this assessment.

7.2. Results

7.2.1. Sediment quality

The base flow sediment sampling was undertaken on 2 May 2011. The ELS Report (No. 11/9526) containing the results of the sediment analyses is presented in Appendix 24.D.

The results of the metal analyses undertaken on the sediment samples collected from each site are given in Table 11. The results showed that all metal concentrations were below the ISGQ-low guideline value while the organics contaminants (TPH, SVOC and VOC) were all less than the analytical limit of detection. This suggests that the sediment at all sites sampled presents a low risk of adverse effects to aquatic life.

7.2.2. Base flow water quality

The base flow water sampling was undertaken on 2 May 20011, 23 May 2011 and 16 June 2011. The ELS Reports containing the results of the water analyses are presented in Appendix 24.E (Reports No. 11/9525, 11/11320 and 11/13096). Selected results of each base flow sampling event are given in Tables 12 to 14 with the median concentration of each parameter/contaminant over the six-week monitoring period summarised in Table 15. The sample site locations are shown in Figure 2.

Table 11: Sediment Quality Sampling Results – 2 May 2011 (mg/kg)

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	ISQG-Low ANZECC (2000)
Aluminium	11,600	12,100	11,300	11,000	8,660	8,720	8,750	10,100	
Arsenic	3.1	3.5	3.6	3.8	1.7	2.8	1.9	3.2	20
Boron	<7	<7	<7	<7	<7	<7	<7	<7	
Cadmium	0.05	0.05	0.04	0.07	0.04	0.03	0.04	0.09	1.5
Chromium	18.5	6.4	15.3	13.5	7.3	7.1	8.1	22	80
Cobalt	8.1	4.3	5.2	5.1	3.3	3.7	3.8	8.9	
Copper	13	7.4	8.2	10.6	4.5	4.8	10.1	12	65
Iron	20800	11700	18500	17900	10700	12200	11000	20200	
Lead	13.3	4.2	10.3	11	5	3.2	9.1	10.3	50
Manganese	326	140	306	323	136	152	139	454	
Nickel	16.6	5.6	12.4	11.6	6.3	5.8	6.7	21.1	21
Zinc	112	47.7	50.3	50.4	32.8	30.2	38.9	62.5	200

Note: The results of the VOC, TPH and SVOC tests are not shown as all measurements less than the analytical limit of detection.

Note: See Figure 2 for sampling site locations.

In general, the median water quality of the sites sampled across the Project area during the seven week monitoring period were of neutral pH (6.7 – 7.4), well-oxygenated (8,2 – 11.2 mg/L), had moderate conductivity (9.4 – 27.6 mS/m) and showed a temperature variation between sites of 2.4ºC (Table 14). In summary, the results indicated that the watercourses along the proposed Project Alignment are characteristic of lowland waterways draining predominantly agricultural land use with low toxicant concentrations, and some elevated nutrient and bacteriological counts.

Nevertheless, there were some clear differences in water quality between sampling locations with each site generally reflecting the catchment area which it drains.

The water quality of the Wharemauku Stream, Mazengarb Drain and Kakariki Stream was generally 'poor' with many nutrients at levels above the corresponding guideline trigger value in most of the base flow waters sampled. Both the upper and lower catchment sampling sites (Site 1 and 8) in the Wharemauku Stream were nutrient-enriched with the lower site (Site 1) having significantly higher ammoniacal-nitrogen, and dissolved and total zinc. At this sampling location, the median ammoniacal-nitrogen concentration exceeded the corresponding default trigger value approximately nine times and both the median dissolved and total zinc concentrations slightly exceeded the guideline trigger value at the 95% level of detection. Sources of zinc in the lower Wharemaukau Stream (Site 1) include roads, residential roofs and the industrial/commercial area near Rimu Road/Ihakara Street.

Many water quality parameters and contaminants in the base flow waters of the Mazengarb Drain (Site 2) were elevated relative to the corresponding guideline trigger values. In general, the water samples had elevated ammoniacal-nitrogen, turbidity, suspended solids, turbidity, chemical oxygen demand and phosphorus. In addition, copper and zinc were periodically elevated with the median of both metals (dissolved and total) above the corresponding guideline trigger value. As well as urban land use activities, the water quality at this sampling location is likely to be impacted in part, by the 'eastern' tributary of the Otaihanga Landfill which discharges into the Mazengarb Drain upstream of the sampling location (Section 2.1).

The results showed that both the Waimeha and Kakariki streams were nutrient enriched. While the waters sampled at both sites had elevated suspended solids, the water quality of the Kakariki Stream (Site 6) appeared to be the most impacted, with periodic elevated bacteriological counts and turbidity. The water quality of the Waimeha Stream (Site 5) was 'good' in terms of most measured parameters with only the median total nitrogen, total oxidised nitrogen (TON) and ammoniacal-nitrogen slightly above the corresponding guideline trigger value. The Waimeha Stream joins the Kakariki Stream downstream near Fieldway prior to discharge to the Kāpiti Coast.

The water quality in the Waikanae River, both at the upstream and downstream sampling locations (Sites 3 and 4), was generally 'good' with only the median dissolved reactive phosphorus slightly above the corresponding default trigger value at both sites (Table 15). Similarly, the water quality in the Hadfield Drain/Te Kowhai Stream (Site 7) was generally 'good' with only the median dissolved reactive phosphorus concentration and total aluminium exceeding the relevant guideline (Table 15). However, the water quality of the Hadfield Drain/Te Kowhai Stream (Site 7) on 16 June 2011 was of a notably 'poorer' water quality than that sampled on 2 May and 23 May as shown by elevated nitrogen-based nutrients, suspended solids and turbidity. This suggests some periodic variations in base flow water quality at this site.

All organic contaminants (SVOCs and TPH) in the base flow waters sampled across the Project extent were below the analytical detection limits except for TPH (C7 – C36), which was present as a low but measurable concentration in the Wharemauku Stream on the 2 May 2011. Except for aluminium, zinc and copper in the Wharemauku Stream (Site 1) and Mazengarb Drain (Site 2) exceeded the corresponding guideline trigger value in some of base flow waters sampled. This suggests a potential risk of adverse effects on aquatic life at these sites. The total and dissolved aluminium was above the corresponding guideline trigger value at many sites sampled which may be due to background soil concentrations of aluminium which are reportedly elevated in the Wellington region (SKM, 2010).

Figure 3: Median Total Nitrogen and Total Oxidised Nitrogen (TON) during Base Flows

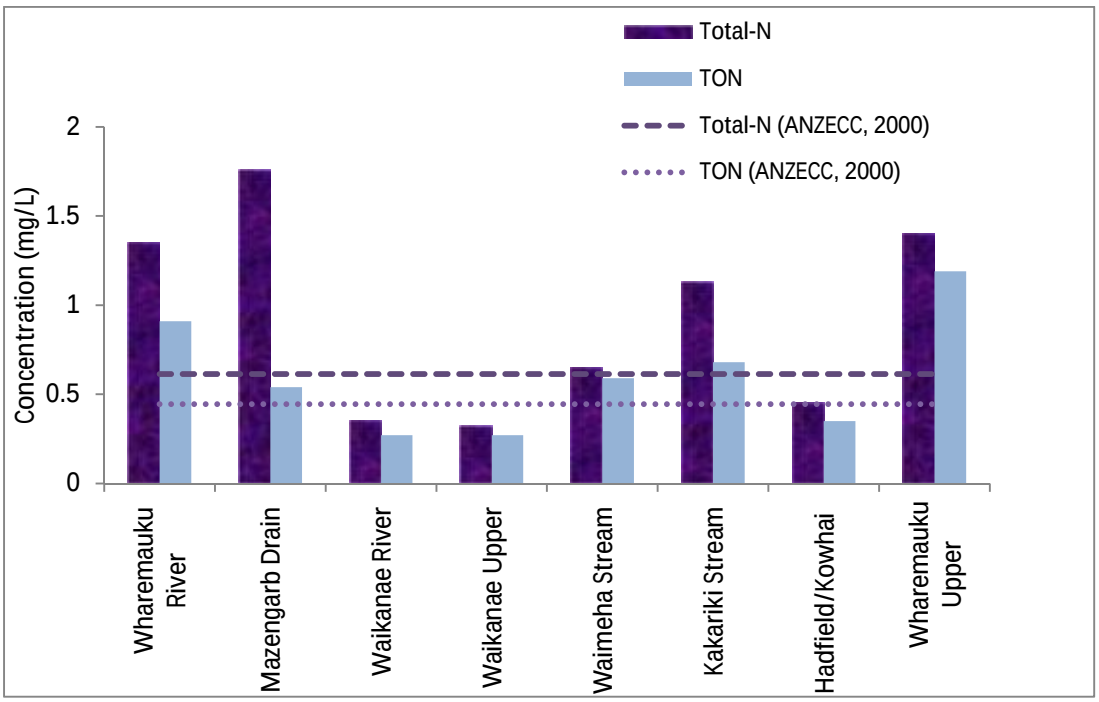


Figure 4: Median Total Phosphorus and Dissolved Reactive Phosphorus (DRP) during Base Flows

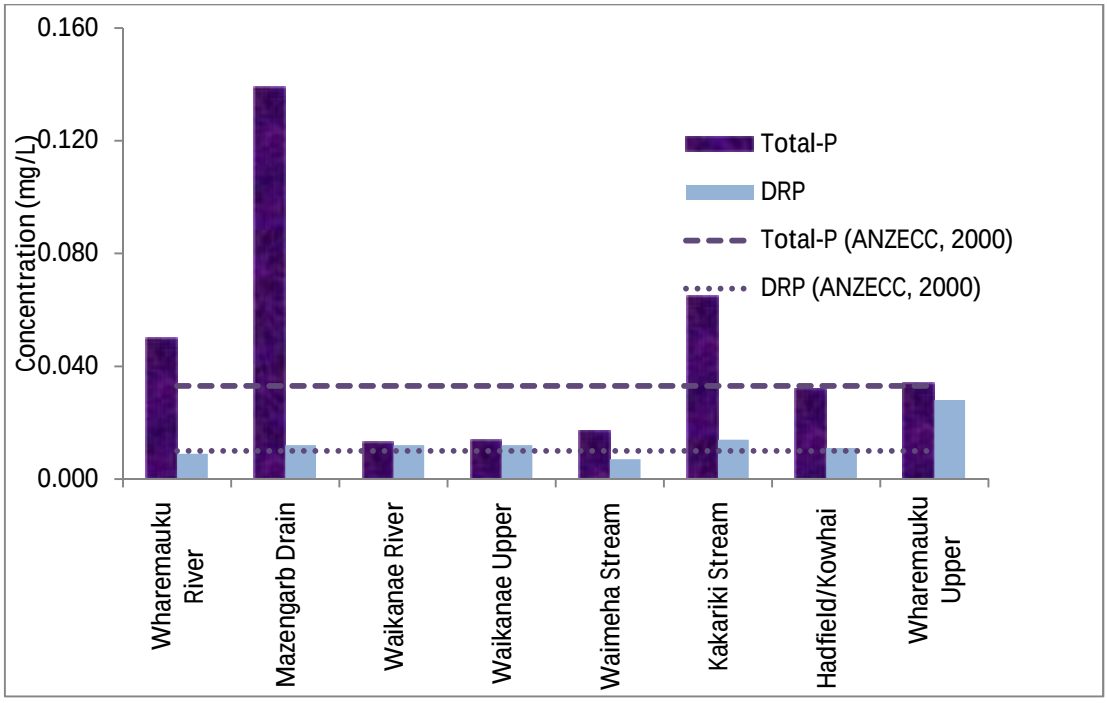


Table 12: Water Quality Monitoring Results – 2 May 2011 (mg/L unless otherwise stated)

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Guideline*
Sample Time (NZST)	10:40	11:30	12:15	13:05	13:35	14:10	14:45	15:20	
Flow Velocity (m/s)	0.2	0.2	0.8	0.5	0.1	0.5	0.1	0.3	
Cond at 25°C (mS/m)	25.2	29.2	9.8	9.4	14.5	24.9	18.7	8.9	
pH	7.1	7.1	7.4	7.4	7.1	7.2	7.1	7.4	6.5 – 9
Temp (°C)	14.5	13.8	13.0	12.0	14.9	14.3	13.9	14.0	
Dissolved Oxygen	8.9	8.3	10.6	10.8	7.9	8.2	8.5	9.8	> 6.0
Suspended Solids – Total	<5	7	<5	<5	7	8	8	<5	
Turbidity (NTU)	4.2	17.6	0.77	0.58	1.61	7.23	2.71	1.64	5.6
Ammonia-N	0.17	0.48	<0.01	<0.01	0.03	0.04	0.010	<0.01	0.021
Total Nitrogen	1.04	1.68	0.35	0.32	0.55	1.06	0.32	1.13	0.614
Total Oxidised-N	0.63	0.66	0.27	0.27	0.52	0.68	<0.05	0.86	0.444
Nitrate-N	0.61	0.59	0.26	0.27	0.52	0.67	0.01	0.85	0.700
Nitrite – N	0.02	0.07	<0.01	<0.01	<0.01	0.02	<0.01	0.01	
Total Kjeldahl-N	0.4	1.0	<0.1	<0.1	<0.1	0.4	0.3	0.3	
Total Phosphorus	0.045	0.091	0.013	0.014	0.023	0.065	0.022	0.034	0.033
Dissolved Reactive - P	0.007	0.012	0.008	0.012	0.007	0.015	0.011	0.028	0.010
Chemical Oxygen Demand	<15	33	<15	<15	<15	15	<15	<15	
$CBOD_5$	<1	1	<1	<1	<1	<1	<1	<1	
E. coli (cfu/100mL)	120	160	40	52	260	2100	140	260	260

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Guideline*
Aluminium – Dissolved	0.013	0.054	0.010	0.011	0.005	0.033	0.049	0.12	0.055
Aluminium - Total	0.092	0.212	0.027	0.030	0.029	0.205	0.082	0.066	0.055
Zinc -Dissolved	0.009	0.006	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	0.008
Zinc-Total	0.011	0.008	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	0.008
C7 – C36	0.049	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

Note: Only those metals where there is at least one exceedance of the corresponding guideline value shown. Semi-volatile organic compounds not shown; all less than the limit detection (<). *See Section 3.2 for guidance notes.

Table 13: Water Quality Monitoring Results – 23 May 2011 (mg/L unless otherwise stated)

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Guideline*
Sample Time (NZST)	11:40	12:13	12:50	13:21	13:42	14:05	14:25	14:58	
Flow Velocity (m/s)	0.3	0.2	0.6	0.7	<0.1	0.5	0.1	0.4	
Cond at 25°C (mS/m)	24.1	27.6	9.6	9.5	14.2	24.6	17.3	17.6	
pH	6.9	7.0	7.3	7.4	6.7	7.1	7.0	7.4	6.5 – 9
Temp (°C)	13.6	12.8	12.1	12.1	14.7	13.3	13.5	13.9	
Dissolved Oxygen	9.4	8.1	11.1	11.2	8.5	8.4	8.8	9.7	> 6.0
Suspended Solids – Total	4	12	7	<5	<5	8	<5	<5	
Turbidity (NTU)	7.84	21.4	4.64	0.56	0.67	7.38	3.27	1.60	5.6
Ammonia-N	0.19	0.54	<0.01	<0.01	0.02	0.04	<0.01	<0.01	0.021
Total Nitrogen	1.35	1.76	0.32	0.30	0.65	1.13	0.45	1.40	0.614
Total Oxidised-N	0.91	0.54	0.18	0.25	0.59	0.64	0.13	1.19	0.444
Nitrate-N	0.90	0.50	0.18	0.25	0.59	0.63	0.12	1.19	0.700
Nitrite – N	<0.01	0.04	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	
Total Kjeldahl-N	0.4	1.2	0.1	<0.1	<0.1	0.5	0.3	0.2	
Total Phosphorus	0.068	0.139	0.018	0.016	0.017	0.072	0.032	0.035	0.033
Dissolved Reactive - P	0.012	0.012	0.013	0.008	0.007	0.014	0.009	0.024	0.010
Chemical Oxygen Demand	25	41	<15	<15	<15	32	15	<15	
$CBOD_5$	<3	<3	<1	<1	<1	<1	<1	<1	
E. coli (cfu/100mL)	310	570	52	28	160	720	190	230	260

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Guideline*
Aluminium – Dissolved	0.042	0.172	0.028	0.011	<0.002	0.080	0.048	0.022	0.055
Aluminium - Total	0.171	0.416	0.183	0.032	0.008	0.303	0.163	0.063	0.055
Copper – Dissolved	0.0014	0.0018	<0.0005	<0.0005	<0.0005	0.0008	0.0013	0.0012	0.0014
Copper - Total	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0014
Zinc –Dissolved	0.020	0.013	<0.002	<0.002	0.003	0.004	0.003	<0.002	0.008
Zinc-Total	0.020	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008

Note: Only those metals where there is at least one exceedance of the corresponding guideline value shown. Semi-volatile organic compounds not shown; all less than the limit detection (<). *See Section 3.2 for guidance notes.

Table 14: Water Quality Monitoring Results – 16 June 2011 (mg/L unless otherwise stated)

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Guideline*
Sample Time (NZST)	10:56	11:28	11:59	12:35	12:55	13:22	13:47	14:15	
Flow Velocity (m/s)	0.5	0.4	0.9	1.0	< 0.1	0.6	0.3	0.5	
Cond at 25°C (mS/m)	19.1	26	9.4	9.2	13.8	24	16.7	19.3	
pH	7.1	7.0	7.4	7.4	6.7	7	7.1	7.5	6.5 – 9
Temp (°C)	10.7	11.1	10.4	10.2	13.9	11.7	11	11.3	
Dissolved Oxygen	10.4	8.2	11.3	11.4	8.7	8.9	10.3	10.6	> 6.0
Suspended Solids – Total	< 6	7	< 6	< 6	< 6	9	< 6	< 6	
Turbidity (NTU)	6.42	25.6	0.64	0.57	0.68	7.15	7.75	2.96	5.6
Ammonia-N	0.19	0.7	< 0.01	< 0.01	0.03	0.08	0.02	0.01	0.021
Total Nitrogen	1.65	1.96	0.4	0.38	0.75	1.56	0.89	1.69	0.614
Total Oxidised-N	1.28	0.54	0.35	0.34	0.68	1.05	0.57	1.41	0.444
Nitrate-N	1.27	0.52	0.35	0.34	0.68	1.04	0.56	1.41	0.700
Nitrite – N	<0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Total Kjeldahl-N	0.4	1.4	< 0.1	< 0.1	< 0.1	0.5	0.3	0.3	
Total Phosphorus	0.050	0.139	0.013	0.013	0.015	0.057	0.041	0.034	0.033
Dissolved Reactive - P	0.009	0.023	0.012	0.014	0.007	0.009	0.015	0.030	0.010
Chemical Oxygen Demand	26	52	< 15	< 15	< 15	42	< 15	< 15	
$CBOD_5$	< 3	< 3	< 1	< 1	< 1	< 6	< 3	< 3	
E. coli (cfu/100mL)	230	240	40	24	140	200	110	300	260

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Guideline*
Aluminium – Dissolved	0.047	0.061	0.015	0.016	0.003	0.090	0.054	0.037	0.055
Aluminium - Total	0.219	0.815	0.037	0.034	0.008	0.406	0.660	0.151	0.055
Copper – Dissolved	0.0007	0.0016	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0008	0.0007	0.0014
Copper - Total	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0014
Zinc –Dissolved	0.007	0.011	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	0.008
Zinc-Total	0.008	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008

Note: Only those metals where there is at least one exceedance of the corresponding guideline value shown. Semi-volatile organic compounds not shown; all less than the limit detection (<). *See Section 3.2 for guidance notes.

Table 15: Median Base Flow Water Quality Results of Tables 12 – 14 (units mg/L unless otherwise indicated)

	Guideline*	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Cond at 25°C (mS/m)		24.1	27.6	9.6	9.4	14.2	24.6	17.3	17.6
pH	6.5 – 9	7.1	7.0	7.4	7.4	6.7	7.1	7.1	7.4
Temp (°C)		13.6	12.8	12.1	12.0	14.7	13.3	13.5	13.9
Dissolved Oxygen	> 6.0	9.4	8.2	11.1	11.2	8.5	8.4	8.8	9.8
Suspended Solids – Total		< 5	7	< 7	< 5	7	8	< 8	< 5
Turbidity (NTU)	5.6	6.42	21.4	0.77	0.57	0.68	7.23	3.27	1.64
Ammonia-N	0.021	0.19	0.54	< 0.01	< 0.01	0.03	0.04	0.015	< 0.01
Total Nitrogen	0.614	1.35	1.76	0.35	0.32	0.65	1.13	0.45	1.4
Total Oxidised-N	0.444	0.91	0.54	0.27	0.27	0.59	0.68	0.35	1.19
Nitrate-N	0.700	0.90	0.52	0.26	0.27	0.59	0.67	0.12	1.19
Nitrite – N		< 0.01	0.04	<0.01	< 0.01	< 0.01	0.015	<0.01	< 0.01
Total Kjeldahl-N		0.4	1.2	< 0.01	< 0.1	< 0.1	0.5	0.3	0.3
Total Phosphorus	0.033	0.050	0.139	0.013	0.014	0.017	0.065	0.032	0.034
Dissolved Reactive - P	0.010	0.009	0.012	0.012	0.012	0.007	0.014	0.011	0.028
Chemical Oxygen Demand	0.033	25	41	< 15	< 15	< 15	32	< 15	< 15
$CBOD_5$	0.010	< 3	< 3	< 1	< 1	< 1	<1	< 1	< 1
E. coli (cfu/100mL)	260	230	240	40	28	160	720	140	260
Aluminium – Dissolved	0.055	0.042	0.061	0.015	0.011	0.004	0.080	0.049	0.037

	Guideline*	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
Aluminium - Total	0.055	0.171	0.416	0.037	0.032	0.008	0.303	0.16	0.066
Copper – Dissolved	0.0014	0.0010	0.0017	<0.0005	<0.0005	<0.0005	0.0008	0.0010	0.0010
Copper - Total	0.0014	< 0.002	< 0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc –Dissolved	0.008	0.009	0.011	<0.002	<0.002	0.003	0.003	0.002	<0.002
Zinc-Total	0.008	0.011	0.015	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005

Note: Only those metals where there is at least one exceedance of the corresponding guideline value shown. *See Section 3.2 for guidance notes.

7.2.3. Stormwater Quality

The stormwater sampling was undertaken at the sites listed in Table 16 on 25 May and 10 June 2011. The ELS Reports (Reports No. 11/11666 and 11/12927) containing the results of the stormwater sample analyses are presented in Appendix 24.F.

The estimated flow at the location sampled in each watercourse is provided in Table 16. Stream flow is monitored by GWRC in three waterways crossing the Project extent. These are the Waikanae River, Mazengarb Drain and Wharemauku Stream. The flow data was used to obtain an estimate of the flow in the watercourses sampled at the location where its crossed by the proposed Expressway.

Table 16: Estimated Flow during Stormwater Sampling

Sample Site	Drainage Area (km^2)	Date of Stormwater Sampling	Approx Sampling Time (NZST)	Mean Flow (m^3/s)	Mean Daily Flow (m^3/s)	% Time Flow Exceeded
Waikanae River (3)	132	25/05/2011	15:50	4.77	3.55	44
Mazengarb Drain (2)	2.8	25/05/2011	16:40	0.051	0.06	25
Wharemauku Stream (1)	-	10/06/2011	9:30	0.158	0.11 @ 10:00	30
Kakariki Stream (6)	6.2	10/06/2011	10:50	0.126	0.13	
Waimeha Stream (5)	0.6	10/06/2011	11:45	0.169	0.16	
Hadfield/Te Kowhai Stream (7)	1.8	10/06/2011	8:55	0.017	0.018	

Note: The % time flow exceeded was derived from flow duration curves and flow data from GWRC.

The flow in the Mazengarb Drain at the location of the proposed Expressway route was estimated from the monitored flow and the estimated discharge from the Paraparaumu WWTP, which enters the Drain between the proposed Expressway crossing point and the gauging station. The flow gauge in the Mazengarb Drain is located downstream of the WWTP which discharges a mean flow of approximately 0.1 m^3/s into the Drain. The water quality sampling location is downstream of the proposed Expressway route and upstream of the WWTP confluence.

The flow in the Wharemauku Stream at the location of the proposed Expressway was estimated from flow data collected at the Scaife Drive and Coastlands (at SH1) monitoring sites. The flow in the three streams where the flow is not monitored (Kakariki, Waimeha and Hadfield Drain/Te

Kowhai streams) was estimated from flow duration curves derived for each catchment from flow gaugings and data available from similar local catchments. Flow estimates for the Kakariki and Hadfield Drain/Te Kowhai streams were based on the naturalised (i.e. without influence from the WWTP discharge) flows in the Mazengarb Drain. The % flow exceedance in these streams was assumed to be similar to the flow exceedance in the Wharemauku Stream.

The flow results showed that the stormwater sampling was undertaken when flows were higher than normal. The stormwater samples collected on 10 June occurred after a storm event that occurred on 8 June.

The average stormwater quality results from the two samples collected at each sampling location are shown in Table 17. The results showed that the stormwater quality in the waterways across the Project area were generally variable although most were nutrient-enriched with elevated bacteriological counts measured at some sites.

The stormwater samples collected from all sites were of neutral pH (6.7 to 7.5) with variable levels of turbidity and suspended solids. The average turbidity ranged between 0.65 and 19.3 NTU and was above the corresponding guideline value in all stormwater samples except those from the Waikanae River and Waimeha Stream. The average concentration of suspended solids ranged between < 5 and 26 mg/L and was highest in the stormwater samples collected from the Kakariki Stream and Hadfield Drain/Te Kowhai Stream with concentrations of 26 and 9 mg/L respectively.

The average nutrient concentrations in the stormwater samples were generally elevated, with all sites sampled having at least one nutrient with a concentration above the corresponding guideline value. The average concentration of total nitrogen ranged between 0.45 and 1.79 mg/L and exceeded the guideline value at all sites sampled except those from the Waikanae River while the average nitrate concentrations (0.23 to 0.89 mg/L) were above the corresponding guideline value at all sites. The average concentration of total phosphorus in the stormwater samples ranged between 0.022 and 0.110 mg/L and was above the guideline value at all sites sampled except those from the Waikanae River and Waimeha Stream. The average concentration of dissolved reactive phosphorus (0.008 to 0.023 mg/L) was above the guideline value at all sites except in the stormwater samples collected from the Waimeha Stream and Hadfield Drain/Te Kowhai Stream.

The concentration of the semi-volatile organic compounds and total petroleum hydrocarbons were below the analytical detection limits in the stormwater samples collected from all sites. Of the metal contaminants, only aluminium, zinc and copper were at environmentally significant levels. The average concentration of total aluminium in the stormwater samples ranged between 0.182 and 0.761 mg/L and exceeded the corresponding guideline at all sites sampled while the average concentration of dissolved aluminium (0.022 to 0.122 mg/L) was above the guideline value at three sites (Waikanae River, Waimeha Stream and Kakariki Stream). The zinc and copper concentrations in the stormwater samples were generally low. However, the average total zinc

concentration in the stormwater samples collected from the Wharemauku Stream and Mazengarb Drain were above the corresponding guideline value while dissolved zinc exceeded the guideline value in the Wharemauku Stream only. For copper, only total copper in the stormwater samples collected from the Waimeha Stream were elevated relative to the corresponding guideline value.

The average *E. coli* counts in the stormwater samples ranged between 92 and 2,100 cfu/100mL and were below the corresponding guideline value. However, the average count in the Karakiki Stream and Hadfield Drain/Te Kowhai Stream were above the guideline with counts of 2,100 cfu/100mL and 500 cfu/100mL respectively.

Table 17: Mean Stormwater Sampling Results 25 May and 10 June 2011 (units mg/L unless otherwise indicated)

	Site 1	Site 2	Site 3	Site 5	Site 6	Site 7	Guideline
Site Name	Wharemauku Stream	Mazengarb Drain	Waikanae River	Waimeha Stream	Kakariki Stream	Hadfield Drain/ Te Kowhai	
pH	7.5	7.4	7.4	6.7	7.1	7.2	6.5 – 9
TSS	< 6	8	4	<5	26	9	-
Turbidity (NTU)	9.03	19.3	1.52	0.65	10.77	13.15	5.6
Ammonia-N	0.31	0.61	< 0.01	0.02	0.04	< 0.01	0.021
Total N	1.32	1.79	0.45	0.72	1.66	0.96	0.614
Nitrate-N	0.83	0.58	0.23	0.57	0.89	0.42	0.16*
TP	0.071	0.110	0.024	0.022	0.085	0.059	0.033
DRP	0.023	0.013	0.011	0.009	0.012	0.008	0.010
E. coli (cfu/100mL)	190	245	92	106	2100	500	260
Aluminium - Diss	0.030	0.046	0.022	0.003	0.122	0.122	0.055
Aluminium - Total	0.182	0.333	0.252	0.019	0.591	1.19	0.055
Copper – Dissolved	0.0012	0.0014	< 0.0005	< 0.0005	0.0008	0.0012	0.0014
Copper – Total	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	0.0014
Zinc –Diss	0.012	0.008	< 0.002	0.003	0.004	< 0.002	0.008
Zinc-Total	0.012	0.018	< 0.005	< 0.005	0.006	< 0.005	0.008
TPH	< dl	< dl	< dl	< dl	< dl	< dl	-

Note: Total petroleum hydrocarbons (TPH) and semi-volatile organic compounds (SVOC) were all less than the analytical limit detection (< dl).

7.3. Discussion

The results of the ambient water quality monitoring programme showed that the water quality in the watercourses sampled across the Project extent are characteristic of waterways draining predominantly agricultural land use with elevated nutrient concentrations, bacteriological counts and low toxicant concentrations. However, there were some differences in the water quality between watercourses with those draining urban areas of a poorer quality than those draining predominantly rural-based land use. Urban runoff is a major source of contaminants in streams and rivers with the potential for concentrations to exceed the receiving water quality criteria designed to protect aquatic life. In urban environments, stormwater runoff moves contaminants off impervious surfaces into drainage channels which discharge to streams, rivers and the coast.

7.3.1. Comparison between base flow and stormwater quality

The results of the stormwater sampling showed an increase in the concentration of some water quality parameters and/or contaminant concentrations relative to base flow levels however, in most cases, there was little significant change (Table 15 and 17). Except for the Karariki Stream and Hadfield Drain/Te Kowhai Stream, the suspended solids concentrations in the watercourses showed no clear change between the different flow regimes sampled.

During the initial stages of a rainfall event, the concentration of suspended solids increases on the rising limb of the hydrograph as sediment, which has accumulated on impervious urban surfaces, is washed into streams and rivers. Likewise, contaminants such as metals and organics (particularly those with a significant particulate component) show a similar increase in concentration during the initial stages of the rainfall event. After the concentration peak (termed ‘first flush’), levels decrease due to depletion of readily transportable material from the catchment drainage area. Contaminant concentrations are generally lower in the post ‘first flush’ water samples.

The stormwater samples in this study were not likely collected during the ‘first flush’. The ‘first flush’ most readily occurs in waterways draining small impervious catchments with a quick stream-flow response. The streams comprising this study may therefore be less likely to exhibit a distinctive ‘first flush’ due to their large and predominantly rural drainage area. As such, the measured suspended solids and contaminant concentrations do not exhibit sharp concentration peaks.

The only watercourses that showed a clear difference in the concentration of some water quality parameters and contaminant levels under the different flow regimes sampled were the Kakariki Stream and Hadfield Drain/Te Kowhai Stream (Table 15 and 17). In the Kakariki Stream the average concentration of suspended solids was 26 mg/L in the stormwater samples, an increase of 18 mg/L over the average base flow concentration while in the Hadfield Drain/Te Kowhai Stream, the average suspended solids in the base flow and stormwater samples was 9 mg/L and < 6 mg/L respectively. In both watercourses, there was a corresponding increase in the average turbidity levels and

bacteriological counts. The *E. coli* counts in the stormwater samples from the Kakariki Stream were 2,100 cfu/100mL while in the Hadfield Drain/Te Kowhai Stream the average count was 500 cfu/100mL. This is an approximate 200% times increase over average measured base flow concentrations (Table 15) in both watercourses. This may be indicative of surface runoff from agricultural-based land use activities.

Except for aluminium, in general there was little difference in the concentration of most metal and organic contaminants between the base and high flow sampling events. The concentration of total aluminium was higher in almost all stormwater samples relative to base flow waters. The biggest observed difference in the concentration of total aluminium was in the Waimeha Stream, where the average dissolved and total aluminium concentrations measured in the stormwater samples collected during the high rainfall event were 16 and 95 times higher than average base flow concentrations. This was most likely due to a corresponding increase in suspended solids in the high flow water samples due to eroded soils from the wider catchment area.

7.3.2. Existing levels of stormwater contaminants in the watercourses near the proposed Expressway

The contaminants most likely to be generated during the operational phase of the proposed Expressway are sediment, zinc, copper and TPH. The mean zinc and copper concentrations measured in the base and high flow sampling events are shown in Table 18.

Table 18: Contaminant Concentrations in Base Flow and Stormwater Samples (mg/L)

		1 Wharemaukau Stream	2 Mazengarb Stream	3 Waikanae River	5 Waimeha Stream	6 Kakariki Stream	7 Hadfield/ Te Kowhai	Guide-line
Sediment								
Base Flow		< 5	7	< 6	7	8	< 6	
High Flow		< 6	8	3	< 5	26	9	
Zinc								
Base Flow	Diss Total	0.009 0.011	0.011 0.015	< 0.002 < 0.005	0.003 < 0.005	0.003 < 0.005	0.002 < 0.005	0.008
Stormwater	Diss Total	0.012 0.012	0.008 0.018	< 0.002 < 0.005	0.003 < 0.005	0.004 0.006	< 0.002 < 0.005	
Copper								
Base Flow	Diss Total	0.0010 < 0.002	0.0016 < 0.002	< 0.0005 < 0.002	< 0.0005 < 0.002	0.0008 < 0.002	0.0008 < 0.002	0.0014
Stormwater	Diss Total	0.0012 < 0.002	0.0014 < 0.002	< 0.0005 < 0.002	< 0.0005 0.002	0.0008 < 0.002	0.0012 < 0.002	

Note: The base flow concentrations average of three sampling events while high flow concentrations, average of two samples from one sampling event.

Note: Total petroleum hydrocarbon (TPH) concentrations were all less than the analytical limit detection.
Note: The analytical detection limit for copper is higher than the guideline value at the 95% level of protection.
Note: The ANZECC (2000) values are generally chronic values and therefore interpretation of the stormwater concentrations against the guideline values may not necessarily be representative of long-term adverse effects.

In most of the watercourses, the concentration of copper and zinc was either below or near the analytical detection limits. Total and dissolved zinc only exceeded the corresponding guideline value in some of the base flow and stormwater samples collected from the Wharemauku Stream and Mazengarb Drain with little difference in the average measured concentration between the different sampling regimes. Similarly, the average dissolved and total copper concentrations in the water samples collected in the watercourses across the Project extent were mostly below or near the analytical detection limit. The only exceedance of the relevant guideline value was dissolved copper in the base flow water samples collected from the Mazengarb Drain and the stormwater sample collected from the Waimeha Stream.

Table 19: Range of Zinc and Copper Concentrations in Stormwater (mg/L)

	Source Reference	Dissolved Zn	Total Zn	Dissolved Cu	Total Cu
ANZECC (2000)		0.008	0.008	0.0014	0.0014
Wharemauku Stream	Weka Road (SKM, 2010) (6)	0.018 – 0.031		0.0003 – 0.0029	
	This Study (2)	0.012	0.011 - 0.012	0.0012	<0.002
Range		0.012 – 0.031	0.011 – 0.012	0.0003 – 0.0029	<0.002
Mazengarb Drain	Mazengarb Reserve (SKM, 2010) (6)	0.020 – 0.093		0.0012 – 0.0023	
	This Study (2)	0.007 - 0.008	0.010 – 0.026	0.0013 – 0.0014	<0.002
Range		0.007 – 0.093	0.010 - 0.026	0.0013 – 0.0014	<0.002
Waimeha Stream	Te Moana Road (SKM, 2010) (4)	0.0025 – 0.0034		<0.0005–0.0005	
	This Study (2)	<0.002 – 0.005	<0.005	<0.0005	<0.002–0.003
Range		0.0025 – 0.0034	<0.005	£0.0005	<0.002–0.003
Waikanae River	Jim Cooke Park (SKM, 2010) (4)	0.0010		0.0005	
	This Study (2)	<0.002	<0.005	<0.0005	<0.002

Range		0.001 - <0.002	<0.005	<0.0005	<0.002
Kakariki Stream	This Study (2)	0.004	0.005 - 0.006	0.0008	<0.002
Hadfield/Te Kowhai Stream	This Study (2)	<0.002	<0.005	0.0012	<0.002

Note: No of samples in parenthesis.
Note: ANZECC (2000) guideline values at the 80% level of protection.

The zinc and copper concentrations in the stormwater samples collected as part of this study as well as those from the SKM (2010) stormwater monitoring programme (Sections 5.1.1 and 5.2) are shown in Table 19. The zinc and copper concentrations from the SKM (2010) study are likely to be representative of those in the stormwater near of the proposed Expressway. Note that the concentrations of TPH were below detection in the stormwater samples collected as part of this study and TPH was not measured in the stormwater samples collected as part of the SKM (2010) study.

The data in Table 19 show that the Wharemauku Stream and Mazengarb Drain are likely to have zinc and copper at levels which may exceed the ANZECC (2000) guideline trigger value at the 95% level of protection during high flow conditions. The concentration of dissolved and total zinc in the Wharemauku Stream is likely to range between 0.012 and 0.031 mg/L, and 0.011 and 0.012 mg/L respectively under high flow conditions. The concentration of dissolved and total copper is likely to range between 0.0003 and 0.0029 mg/L, and < 0.002 mg/L respectively.

In the Mazengarb Drain, the concentration of dissolved and total zinc is likely to range between 0.007 and 0.093 mg/L, and 0.010 and 0.026 mg/L respectively, while for copper, the concentrations are likely to lie between 0.0013 and 0.0014 mg/L, and < 0.002 mg/L.

7.3.3. Potential adverse effects to aquatic life

Nutrient Enrichment

The results of the ambient water quality monitoring programme showed that most of the watercourses across the Project extent showed water quality degradation due to nutrient enrichment. Catchment sources of nitrogen and phosphorus include pastoral farming, fertilisers, sewer overflows, decomposing organic wastes and road runoff. When nutrients are present in excess, detrimental impacts on aquatic life may occur due to prolific growth of aquatic weed and algae.

The Wharemauku Stream, Mazengarb Drain and Kakariki Stream were found to contain both elevated dissolved and particulate forms of inorganic and organic nitrogen, as well as elevated phosphorus. Dissolved inorganic forms of nitrogen and phosphorus are immediately available for uptake by algae. If conditions permit, much of the inorganic nitrogen could also become available for algal growth.

Other nutrient sources which could contribute to the growth of aquatic plants and algae include ammonia-nitrogen, which is primarily derived from effluent (human and livestock), and the decomposition of organic matter. In the latter case, degradation of organic matter by aerobic bacteria

usually lowers dissolved oxygen with the potential to develop anoxic and/or hypoxic conditions. If such conditions occur, the watercourses across the Project extent are at risk of having adverse effects on aquatic life, particularly during warmer summer months.

7.3.4. Toxic effects due to metals

The results of the ambient water monitoring showed that both zinc and copper in the Wharemauku Stream and Mazengarb Drain showed periodic exceedances of the corresponding ANZECC (2000) guideline trigger values at the 95% level of protection. In aqueous systems, heavy metals generally take two chemical forms according to an operationally defined particle size limit. These are dissolved metals (< 0.45 µm) and those present as particulate forms (> 0.45 µm). Both forms were measured as part of this study.

Figure 5: Zinc in the Wharemauku Stream

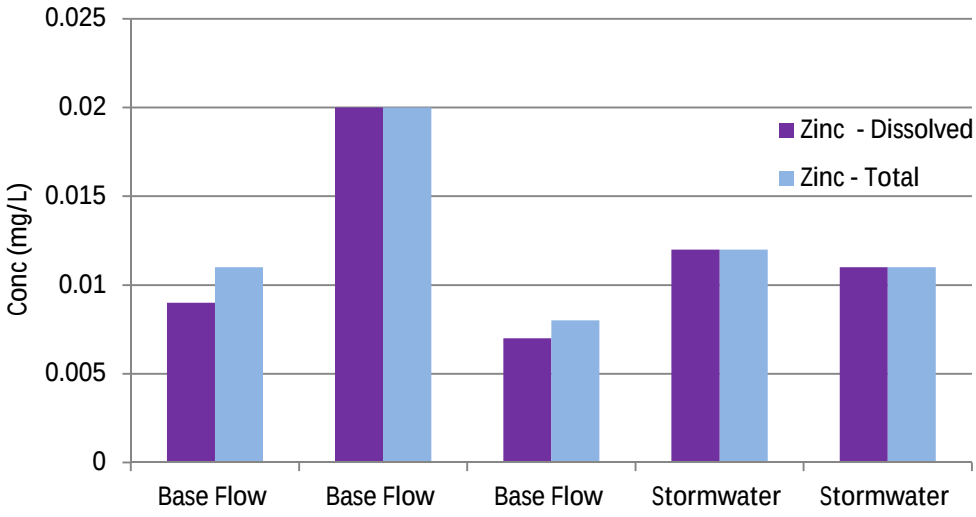
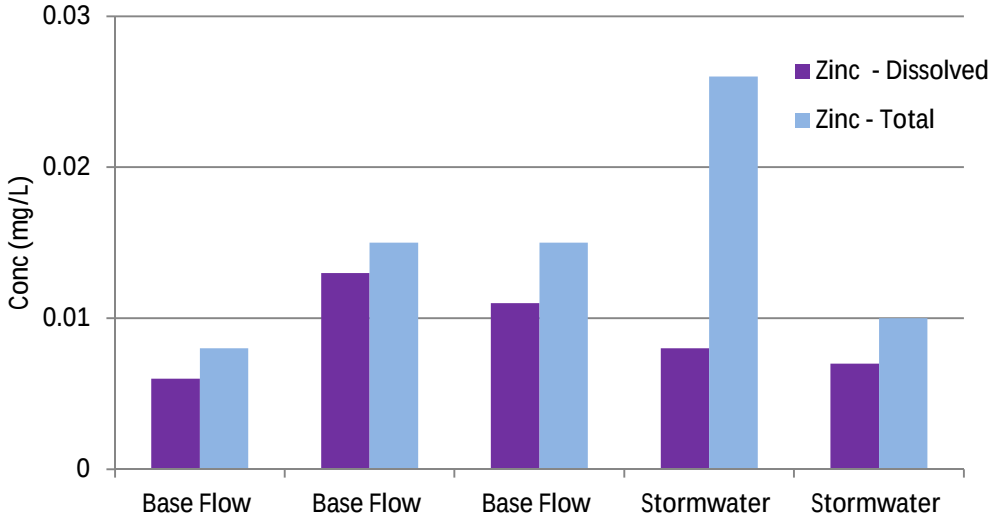


Figure 6: Zinc in the Mazengarb Stream



During base flow conditions, almost all zinc in the Wharemauku Stream and Mazengarb Drain was found to be present as dissolved forms with no clear increase in the particulate fraction during high flow sampling events. The dissolved forms are more readily available for uptake by organisms and therefore, more capable of causing toxic effects at elevated concentrations. This suggests that there is likely to be a long-term potential for adverse effects on aquatic life in these watercourses in the area near the proposed Expressway. Note that the ANZECC (2000) guideline trigger values are generally chronic values and therefore interpretation of the stormwater concentrations against the guideline values may not necessarily be representative of long-term adverse effects.

7.4. Summary

The results of the ambient water quality monitoring programme found that in general, the watercourses along the proposed Expressway are characteristic of lowland waterways draining predominantly agricultural land use with elevated nutrient concentrations, some elevated bacteriological counts and low toxicant concentrations. Nevertheless, there were some clear differences between watercourses with the water quality at each sampling location generally reflecting the catchment area which it drains. Key findings are as follows:

- All metal and organic contaminant concentrations in the bed sediment samples collected from the sites sampled in the major watercourses along the Project extent were below the corresponding guideline value indicating that the sediment presents a low risk of adverse effects on aquatic life.
- The water quality at the sampling location in the Wharemauku Stream, west of the proposed Expressway, was ‘poor’ due to pastoral, residential and industrial/commercial land use activities in the upstream drainage area. The base and high flow waters had elevated nutrient concentrations, ammoniacal-nitrogen, and dissolved and total zinc relative to the corresponding guideline trigger

values. This indicates the potential for adverse effects on the aquatic life at this site from the current land use.

- The base flow and stormwater quality at the sampling location in the Mazengarb Drain was 'poor' with elevated nutrients, ammoniacal-nitrogen, suspended solids, organic matter, copper and zinc. As well as urban land use activities, the water quality at this sampling location is likely to be impacted in part, by the 'eastern' tributary of the Otaihanga Landfill which discharges into the Mazengarb Drain upstream of the sampling location.
- The water quality at the site sampled in the Kakariki Stream west of SH1 was 'poor' due to elevated nutrient concentrations, suspended solids and bacterial counts. The water quality in the Waimeha Stream was generally good however there were some slightly elevated nutrient concentrations and suspended solids in some of the waters sampled. The water quality of both sites is likely to be impacted by agricultural land use activities.
- The water quality of the base flow waters in the Waikanae River and Hadfield Drain/Te Kowhai Stream was generally good with most indicators and contaminant concentrations within the limits of the corresponding guideline values. However, during high flow conditions, the water quality in the Hadfield Drain/Te Kowhai Stream appeared to be 'poor' due to elevated suspended solids, ammoniacal-nitrogen, nutrients and bacterial counts. This is most likely due to stormwater runoff from agricultural land use activities in the upstream drainage area.
- All organic and total petroleum hydrocarbons concentrations in the base and high flow water samples collected from the watercourses across the Project extent were below the analytical detection limits. This suggests a low level of risk from toxicological effects to aquatic life.
- The total and dissolved aluminium was above the corresponding guideline trigger value at many of the sites sampled in the watercourses across the Project extent. This is due to elevated background soil concentrations across the Wellington region. The concentration of total aluminium was higher in almost all stormwater samples relative to base flow water due to eroded soils from the wider catchment area and a corresponding increase in the aqueous suspended solids concentration.
- All organic contaminants (SVOCs and TPH) in the base and high flow waters sampled across the Project extent were below the analytical detection limits except for TPH (C7 – C36), which was present as a low, but measurable concentration in the Wharemauku Stream during one low flow sampling event.
- Except for aluminium, there was little difference in the concentration of most metal and organic contaminants between the base and high flow sampling events. However, copper and zinc are likely to exceed the corresponding guideline values at the 95% level of detection in some base and high flow waters. During high flow conditions, the dissolved and total zinc in the Wharemauku Stream is likely to range between 0.012 and 0.031 mg/L, and 0.011 and 0.012 mg/L respectively, while dissolved copper is likely to range between 0.0003 and 0.0029 mg/L. In the Mazengarb

Drain, the concentration of dissolved and total zinc is likely to range between 0.007 and 0.093 mg/L, and 0.010 and 0.026 mg/L respectively, while dissolved copper is likely to lie between 0.0013 and 0.0014 mg/L. The total copper concentration in all high flow waters is likely to be < 0.002 mg/L.

8. Otaihanga landfill sediment and water quality investigation

A snapshot surface water and sediment quality investigation was undertaken along the western edge of the Otaihanga Landfill and Mountain Bike Park. The purpose of the investigation was to characterise the sediment quality in the wetlands within the footprint of the proposed Alignment, and the water quality in the stormwater/leachate drainage channel of the landfill (herein referred to as 'landfill drain'). This section reports the results of the water and sediment investigation.

8.1. Field sampling methodology

The field sampling programme involved the collection and analysis of both water and sediment samples from landfill drains and sediment samples from the wetlands along the western boundary of the landfill. The field sampling was undertaken on Wednesday 22 June 2011. The water and sediment sample site locations are shown in Appendix 24.G. A description of the sediment and water sampling methodology is detailed below.

8.1.1. Sediment sampling

The sediment samples were collected from the southern wetland (OS1), middle wetland (OS2), northern wetland (OS3) and landfill drain (OS4) (Appendix 24.G). Note that the sediment sample collected from the middle wetland (OS2) was sampled on the edge of the main drainage channel that discharges from the landfill drain.

At each location, a composite sediment sample was collected by scooping the top surface layer of fine sediment, where sediment had accumulated, directly into an appropriate sample container. The samples were analysed for the following:

- pH, organic matter, nutrients, total recoverable metals, mercury, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and total petroleum hydrocarbons (TPHs).

All analyses on the sediment samples were carried out by R J Hill Laboratories in Hamilton. Upon collection, the sediment samples were stored in a chillibin with ice and despatched to the laboratory the same day. All sample containers were supplied by Hill Laboratories.

8.1.2. Water sampling

The water samples were collected from three locations in landfill drain and labelled as follows: OW1, OW2 and OW3. At each site, the pH, conductivity, temperature and dissolved oxygen were measured

with a calibrated portable field meter during sampling. The water samples were analysed for the following parameters and contaminants:

- Dissolved reactive phosphorus (DRP), ammoniacal-nitrogen (NH4-N), faecal coliforms, metals (dissolved and total), anions, cations, mercury (dissolved and total), volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs) and TPHs.

All analyses on the water samples were carried out by R J Hill Laboratories in Hamilton. The water samples were collected directly into sample containers, stored in a chillibin with ice, and despatched to the laboratory the same day. All sample containers were supplied by Hill Laboratories.

8.1.3. Guideline Values

The data collected from the field sampling programme were, where applicable, mostly compared of the corresponding trigger values in the Australia and New Zealand Environment and Conservation Council (ANZECC, 2000) *Guidelines for Fresh and Marine Water Quality* in order to assess the current water and sediment quality. For the water samples, the heavy metal and organic contaminant concentrations were compared to the ANZECC (2000) at the 80% level of protection. The 80% level of protection applies to highly modified environments.

In terms of the sediment samples, the concentration of heavy metals and organic compounds in the sediment samples were compared to the to the ANZECC (2000) ISQG (interim sediment quality guidelines) low and high guideline values. The guidelines are used to identify contaminants where the concentrations are likely to result in adverse effects on sediment ecological health.

8.2. Results

The results of the sediment and water analyses collected are given in Hill Laboratories Report No. 908218 and 907986 (Appendix 24.H). An interpretation of the results against the guideline values is given below.

8.2.1. Sediment sample results

A summary of the sediment sample results is given in Table 20. Note that only the heavy metal and organic contaminant concentrations at detectable levels in at least one sediment sample are shown in Table 20.

The sediment samples collected from both the southern (OS1) and northern (OS3) wetlands were generally similar in composition. The sediment was mostly organic as shown by the elevated organic matter content (79 and 51%), total organic carbon (25 and 22 g/100g) and total nitrogen (1.16 and 1.14 g/100g). This was confirmed by the pH, which was 5.0 and 5.8 in the southern (OS1) and northern wetland (OS3) sediment samples respectively, typical of peat and/or organic soils. In comparison, the pH of the sediment collected from the middle wetland (OS2) and landfill drain (OS4) was near-neutral

with values of 7.5 and 7.1 respectively, reflecting the lower organic matter content of these sediment samples. The sediment from the landfill drain (OS4) was primarily inorganic as shown by a low organic matter (6.9%) and total organic carbon content (2.4 g/100g). Likewise, the composition of the sediment collected from the middle wetland (OS2) was predominantly inorganic as shown by an organic matter content of 36% and total carbon content of 17.5 g/100g. The sediment sampled from this (OS2) comprised significantly higher levels of ammoniacal-nitrogen (450 mg/kg), iron (51,000 mg/kg), phosphorus (2,500 mg/kg), manganese (1,290 mg/kg) and boron (39 mg/kg) than the sediment from the other sites sampled. It is likely that the sediment sampled from this location is impacted by stormwater/leachate discharges from the landfill.

The concentration of all heavy metal concentrations in the sediment samples were below the corresponding guideline values except arsenic and zinc in the sediment from the middle wetland (OS2). The sediment sampled from this location had an arsenic concentration of 23 mg/kg, slightly above the ANZECC (2000) ISQG-low guideline value, while the concentration of zinc was 480 mg/kg and exceeded the ISQG-high guideline value.

Most of the organic contaminants measured in the sediment samples were below the analytical detection limits. Of the organic compounds at detectable levels, most were generally very low or below the corresponding ISQG-low value, where available. Dieldrin was the only organic contaminant above the guideline value with the concentration in the sediment from the northern wetland (OS3) slightly above the ISQG-low value while the sediment from the middle wetland (OS2) exceeded the guideline value by 30 times. All water samples had elevated faecal coliforms with the *E. coli* counts at levels which exceeded the action mode level for recreational purposes.

Table 20: Sediment Sample Results

Sample Location		Southern Wetland (OS1)	Middle Wetland (OS2)	Northern Wetland (OS3)	Landfill Drain (OS4)	ISQG-Low ANZECC (2000)[1]
pH		5.0	7.5	5.8	7.1	-
Organic Matter	g/100g	79	36	51	6.9	-
Ammonium-N	mg/kg	92	450	143	101	-
Total organic carbon	g/100g	25	17.5	22	2.4	-
Total nitrogen	g/100g	1.16	1.46	1.14	0.17	-
Arsenic	mg/kg	2.1	23	1.7	4.5	20 (70)
Cadmium	mg/kg	0.25	0.35	0.28	0.076	1.5
Chromium	mg/kg	4.4	17.6	4.6	13.0	80
Copper	mg/kg	9.4	15.8	11.4	18.9	65
Lead	mg/kg	3.9	27	7.4	22	50
Mercury	mg/kg	0.072	0.083	0.127	0.050	0.15

Sample Location		Southern Wetland (OS1)	Middle Wetland (OS2)	Northern Wetland (OS3)	Landfill Drain (OS4)	ISQG-Low ANZECC (2000)[1]
Nickel	mg/kg	3.5	8.7	2.5	9.8	21
Zinc	mg/kg	137	480	70	87	200 (410)
4, 4'-DDE	mg/kg	0.0004*	0.0003*	0.0003*	0.002*	0.002[2] (0.027)
4, 4'-DDT	mg/kg	0.00008*	< 0.0010	0.0001*	< 0.0010	0.0016[3] (0.046)
Dieldrin	mg/kg	< 0.0010	0.0006*	0.00005*	< 0.0010	0.00002 (0.008)
Endosulfan sulphate	mg/kg	0.0029	< 0.0010	< 0.0010	< 0.0010	
Hexachlorobenzene	mg/kg	< 0.0010	< 0.0010	0.0015	0.0019	
3&4 Methylphenol	mg/kg	< 1.9	< 1.3	< 1.5	0.4	
Bis(2-ethylhexyl) phthalate	mg/kg	< 4	< 3	< 3	0.7	
Toluene	mg/kg	0.064*	< 0.9	< 1.0	0.20*	0.8[4]
4-Isopropyltoluene	mg/kg	9.0	< 0.5	21	< 0.06	

Exceedances of the guideline in bold

* Normalised for organic carbon content

[1] ANZECC (2000) ISQG-low value given with ISQG-high value in brackets

[2] Guideline for p,p'-DDE

[3] Guideline for Total DDT

[4] Guideline value for industrial land uses CCME (2002)

8.2.2. Water sample results

The results of the *in situ* field measurements undertaken in the landfill drain are shown in Table 21. A summary of the results of the water analyses is given in Table 22 with the corresponding ANZECC (2000) guideline trigger value at the 80% level of protection. Note that only those heavy metal and organic contaminants at detectable levels in at least one water sample are shown in Table 22.

Table 21: *In situ* Field Measurements

Sample Location		OW1	OW2	OW3
pH		6.45	6.64	6.78
Dissolved oxygen	mg/L	2.4	0.15	0.24
Conductivity	µS/cm	3,323	542	2,434
Temperature	˚C	11.8	13.5	16.01

In general, the results of the field measurements and water analyses showed that the water quality in the landfill drain was 'poor' with a high potential risk of adverse effects on aquatic life. The waters were slightly acidic (pH between 6.45 and 6.78), of low dissolved oxygen (0.15 to 2.4 mg/L), had elevated conductivity (542 to 3,323 µS/cm) and shared a temperature variation between samples of 3°C.

All water samples had a high suspended solids content (45 and 92 mg/L), elevated bacteriological counts and ammoniacal-nitrogen concentrations (39 to 90 mg/L). The cBOD5 ranged between 6.5 and 7.2 g O2/m3 while the chemical oxygen demand (COD) ranged between 163 and 220 gO2/m3. This is indicative of waters enriched in biodegradable carbonaceous material, and oxidisable inorganic and organic compounds.

The heavy metals, organic contaminants, ammoniacal-nitrogen and nitrate concentrations in the waters sampled were compared to the ANZECC (2000) guideline trigger values for freshwaters at the 80% level of protection. Most of the dissolved and total heavy metal contaminants measured in the water samples were below the corresponding guideline trigger values. However, total aluminium was above the guideline value in two water samples (OW2 and OW3) while both dissolved and total manganese was above the guideline value in one water sample (OW3). In all water samples, total zinc was above the guideline trigger value while dissolved zinc was above the trigger value in two water samples (OW1 & OW2).

Most of the organic contaminants measured in the sediment samples were below the analytical detection limits. However, molinate (a herbicide) and naphthalene were detected in one water sample each. In both cases, the concentration was below the ANZECC (2000) guideline trigger value at the 80% level of detection.

Table 22: Water Sample Results

Water Quality Parameters	Units	OW1	OW2	OW3	ANZECC (2000) T
Total suspended solids	mg/L	72	45	92	
Chloride	mg/L	80	93	113	
cBOD5	g O_2/m^3	7.2	6.5	6.7	
Chemical oxygen demand	g O_2/m^3	163	220	220	
Faecal coliforms	cfu/100mL	3,700	1,700	4,400	
Escherichia coli	cfu/100mL	3,100	1,500	3,700	260/550[1]
Molinate	mg/L	0.0011	< 0.0007	< 0.0007	0.057
Naphthalene	mg/L	< 0.0003	< 0.0003	0.0006	0.085
Dissolved aluminum	mg/L	0.012	0.065	0.017	0.150
Total aluminum	mg/L	0.134	0.38	0.188	0.150
Dissolved arsenic	mg/L	< 0.002	0.004	0.004	0.140
Total arsenic	mg/L	0.0058	0.0082	0.0160	0.140
Dissolved boron	mg/L	0.70	0.65	0.97	1.3
Total boron	mg/L	0.65	0.62	0.78	1.3
Dissolved chromium	mg/L	0.0051	0.0064	0.0070	0.040
Total chromium	mg/L	0.0072	0.0090	0.0138	0.040
Dissolved cobalt	mg/L	0.0029	0.0059	0.0066	
Total cobalt	mg/L	0.0031	0.0062	0.0066	
Dissolved copper	mg/L	0.0008	< 0.0005	< 0.0010	0.0025
Total copper	mg/L	0.0021	0.00199	0.00172	0.0025
Dissolved iron	mg/L	0.18	1.66	0.29	
Total iron	mg/L	20	12.4	29	
Dissolved lead	mg/L	0.00078	0.00010	< 0.00010	0.0094
Total lead	mg/L	0.00147	0.00111	0.00080	0.0094
Dissolved manganese	mg/L	1.85	2.9	4.5	3.6
Total manganese	mg/L	2.3	3.6	5.5	3.6
Dissolved nickel	mg/L	0.0017	0.0028	0.0026	0.017
Total nickel	mg/L	0.0028	0.0039	0.0043	0.017
Dissolved zinc	mg/L	0.049	0.034	0.018	0.031
Total zinc	mg/L	0.196	0.102	0.064	0.031
Ammoniacal-N	mg/L	39	64	90	1.43[2]
Nitrate-N	mg/L	0.65	0.25	0.050	0.7
DRP	mg/L	< 0.004	0.061	< 0.004	0.021

Exceedances of the guideline in bold

[1] Alert mode > 260 cfu/100mL, action mode (> 550 cfu/100mL) (MfE, 2003)

[2] Guideline for ammonia as total ammonia as (NH3-N) at pH = 8

8.3. Summary

- The composition of the sediment samples collected from both the southern (OS1) and northern (OS3) wetlands was largely organic material. All heavy metal and organic contaminants were below the corresponding guideline value except dieldrin in the sediment collected from the northern wetland (OS3).
- The sediment sample collected from landfill drain (OS4) was predominantly inorganic material however all heavy metal and organic contaminants were below the relevant guideline trigger values.
- The sediment sample collected from the middle wetland (OS2) comprised mineral-enriched inorganic material. The arsenic concentration in the sediment was at levels slightly above the ANZECC (2000) ISQG-low guideline value while the concentration of zinc exceeded the ISQG-high value. It is likely that the sediment sampled from this location is impacted by discharges from the landfill.
- The results showed that the water quality in landfill drain is 'poor'. The waters sampled were 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 water quality results were compared to the ANZECC (2000) guideline trigger value at the 80% level of protection. Total aluminium was above the guideline trigger value in two water samples while both dissolved and total manganese were above the guideline value in one water sample. Total zinc was above the guideline trigger value in all water samples while dissolved zinc was above the trigger value in two samples. The organic contaminant concentrations were all below the ANZECC (2000) guideline trigger value at the 80% level of detection.

9. Characterisation of groundwater associated with peat soils

The potential effects on streams and rivers across the Project area as a result of changes to water chemistry and/or the discharge of contaminants through removal and storage of peat were investigated by collection and testing of the groundwater associated with the saturated peat. Six water samples were collected during excavation of three test pits in QE Park and tested for a range of water quality parameters and contaminants. In addition, a peat soil sample was collected from each pit and subject to a synthetic precipitation leaching procedure (SPLP) with analyses undertaken on the resulting leachate. The results of the peat investigations are presented and discussed in this section.

9.1. Purpose

The purpose of this investigation is to assist in assessing the potential effects on the receiving environment from removal and storage of peat required as part of the proposed Expressway

Alignment. Peat forms a significant soil component along the Alignment of the proposed Expressway route. As such, its removal and disposal may have adverse effects on surface water quality through changes to water chemistry and/or the discharge of contaminants through subsoil and surface runoff. The objective of this investigation is to characterise the groundwater associated with the peat in order to assist with determining the potential effects on water quality from its removal and disposal.

9.2. Methodology

In this section, the methodology used to undertake the field sampling is described as well as the tests undertaken on the samples collected.

9.2.1. Groundwater collection and testing

Three test pits in QE Park were excavated on 28 March 2011 as part of Geotechnical investigations. A total of six groundwater samples, two from each test pit, were collected as described in Table 23.

The pH, dissolved oxygen and temperature were measured in the water collected at the base of test pits TP204 and TP203 with a calibrated portable field meter during sampling (note that there was insufficient water collected at the base of test pit TP206 for *in situ* field testing). All remaining analyses were carried out at R.J Hill Laboratories Ltd (Hill Laboratories) in Hamilton. The water samples were collected directly into supplied sample containers (Plate 5), stored in a chillibin with ice and dispatched to the laboratory the same day. Where possible, a groundwater sample was filtered *in situ* for analysis of dissolved metal concentrations. The following analyses were carried out on the samples:

- Apparent and true colour
- Total suspended solids
- Nutrient suite
- cBOD
- Total and dissolved organic carbon
- Basic metal suite (dissolved and total)
- Tannins.

Table 23: Sampling Methodology

Test Pit No.	Subsample	Sampling Methodology
TP206	S1	Sample collected as water flowing in from the sides of the test pit during excavation. Sample collected included both groundwater and peat. Sample filtered for dissolved metals (Plate 1).
	S2	Sample collected from the bucket of the digger during excavation. Sample unable to be filtered due to high suspended solids content (Plate 2).

Test Pit No.	Subsample	Sampling Methodology
TP204	S1	Sample collected as water flowing in from the sides of the pit during excavation. Sample collected included both groundwater and peat. Sample unable to be filtered due to high suspended solids content.
	S2	Sample collected directly from the base of pit. Sample filtered for dissolved metals (Plate 3).
TP203	S1	Sample collected as water flowing in from the sides of the pit during excavation. Sample collected included both groundwater and peat. Sample was filtered for dissolved metals.
	S2	Excavated peat material placed on a tarpaulin and compressed with the bucket of the digger. A sample was collected as liquid seep from compressed material. Sample was filtered for dissolved metals (Plate 4).

Plate 1: Test Pit TP206

Plate 2: Bucket of Excavator TP206

Plate 3: Test Pit TP204

Plate 4: Liquid Seep TP203

Plate 5: Groundwater Sample TP203

Plate 6: Excavated Peat Soil TP204

9.2.2. Synthetic precipitation leaching procedure

A representative peat soil sample was collected from the excavated material from each test pit and subject to a SPLP (Plate 6). The SPLP is a batch leaching procedure used to determine the mobility and leachability of contaminants from soil and other solid materials. The sample is mixed with deionised water at a 1:20 ratio followed by rotation on an end-over-end mixer for 18 hours. The supernatant is then filtered and analysed for those parameters and/or contaminants of interest.

The SPLP testing and leachate analyses were undertaken at RJ Hill Laboratories Ltd in Hamilton. The resultant leachate from the SPLP was analysed for those parameters/contaminants given in Section 8.2.1 in addition to the following tests:

- pH
- Chemical oxygen demand (COD)
- Total phosphorus
- Total nitrogen
- Total kjeldahl nitrogen.

9.2.3. Guideline values

The results of the water quality testing were compared to the ANZECC (2000) guideline trigger values at the 95% level of protection. The trigger values are designed to protect 95% of species in slightly-to-moderately disturbed ecosystems. The pH and dissolved oxygen concentrations were compared to relevant guidelines given in ANZECC (1992) and RMA 1991 Third Schedule respectively.

9.3. Results

The Hill Laboratory Reports with the results of the analyses undertaken on each groundwater sample are presented in Appendix 24.I. The results of the groundwater sample analyses collected on 28 March 2011 are given in Hill Laboratories Report No. 882225 while that for the SPLP leachate analyses are given in Report No. 885101.

The median *in situ* field measurements undertaken in the base of test pits TP204 and TP203 are presented in Table 24. The minimum and maximum concentrations across all six groundwater samples collected and analysed are given in Table 25. Note that in Table 25, only those metals likely to be of most environmental significance (relative the corresponding guideline value) are shown.

Table 24: *In Situ* Median Field Measurement Results

	TP204	TP203	Guideline
pH	4.4	4.2	6.5 – 9.0
Dissolved Oxygen (mg/L)	3.9	2.0	> 6.0 mg/L
Temperature (ºC)	16.0	15.6	-

Table 25: Range for Selected Groundwater Results (Units mg/L unless otherwise indicated)

	Minimum	Maximum	ANZECC (2000)	Max Guideline Exceedance
True Hazen Colour (HU)	620	1350	-	-
Total Organic Carbon	560	750	-	-
cBOD5 (g O_2/m^3)	5	220	[ ]-	-
Dissolved Organic Carbon	38	74	-	-
Tannin	178	1810	-	-
Total Suspended Solids	400	27,000	-	-
Total Aluminium	4.0	400	0.055[1]	73 – 7000
Total Chromium	< 0.0053[2]	0.33	0.001[3]	< 1 - 330
Total Copper	0.0055	0.41	0.0014	4 - 293
Total Lead	0.0046	0.48	0.0034	1 - 140
Total Nickel	< 0.0053	0.22	0.011	< 1 - 20
Total Zinc	< 0.011	1.61	0.008	1 - 200
Total Ammoniacal-N	0.032	2.1	0.021[4]	2 - 86
Dissolved Reactive P	0.013	0.54	0.010	1 – 54

*Note that due to the high suspended solids content, the true hazen colour has little valid meaning.

[1] Guideline value for waters with pH > 6.5

[2] Note that the analytical detection limit is higher than the ANZECC (2000) guideline trigger value.

[3] Guideline value for Cr (VI)

[4] Guideline value for NH_4-N. Total ammoniacal-nitrogen includes both NH_4-N and NH_3. At the pH of the groundwaters sampled, it is likely that all ammoniacal-nitrogen is in the form of NH_4-N.

The *in situ* field testing results showed that the groundwater associated with the peat had low pH (4.2 – 4.4) and dissolved oxygen (2.0 – 3.9 mg/L). In general, the groundwater samples had high suspended solids (400 to 36,000 mg/L) and were rich in organic matter as shown by the elevated total (560 to 750 mg/L) and dissolved (51 to 72 mg/L) organic carbon. The groundwater samples also had some elevated ammoniacal-nitrogen and dissolved reactive phosphorus concentrations. The ammoniacal-

nitrogen concentration exceeded the corresponding guideline value up to 86 times and dissolved reactive phosphorus, up to 54 times.

There were some elevated metal concentrations in the groundwater samples however these were almost all associated with the suspended solids content of the samples. The dissolved metal concentrations were generally either below detection or at levels which were not considered to be environmentally significant. The total metals showing the highest exceedance against the ANZECC (2000) guideline values were aluminium, chromium, copper, lead, nickel and zinc. Peat is often rich in manganese and iron however the results showed that these weren't particularly elevated in the groundwater samples at QE Park.

Results of the SPLP

The results of the analyses undertaken on the supernatant of the SPLP tests (Table 26), in most cases, showed a large reduction in the measured water quality parameters and contaminant levels to that shown in Table 25. This is expected on the basis that the samples had been prepared by dilution at a ratio of 1:20 with water and filtration had been undertaken to remove the suspended solids content prior to analysis.

Nevertheless, the total organic carbon (which is largely a measure of humic acids, tannins and lignins) in the supernatant were elevated ranging between 50 to 82 mg/L. The hazen colour, which is an indicator of dissolved organic substances, ranged between 100 to 300 mg/L. All tannin concentrations were < 10 mg/L.

The nutrient concentrations in the supernatant were generally elevated relative to the ANZECC (2000) guideline values. The ammoniacal-nitrogen concentrations ranged between 0.068 and 0.23 mg/L while the dissolved reactive phosphorus ranged between 0.008 and 0.106 mg/L, maximum exceedances of the corresponding guideline values by 10 in both cases.

There were some metals in the SPLP leachate which showed an exceedance of the corresponding guideline value. These were aluminium, copper and zinc. Copper and aluminium showed a maximum exceedance of 20 and 12 times the guideline value respectively.

Table 26: Selected Results for the SPLP Analyses (Units mg/L unless otherwise indicated)

	Minimum	Maximum	ANZECC (2000)	Approx Maximum Guideline Exceedance
True Hazen Colour (HU)	100	300		
Dissolved Reactive-P	0.008	0.106	0.010	1 – 10
Total Nitrogen	0.71	1.02	0.614	1 – 2
Total Kjeldahl Nitrogen	0.70	0.96		

	Minimum	Maximum	ANZECC (2000)	Approx Maximum Guideline Exceedance
Total Ammoniacal-N	0.068	0.23	0.021	3 – 10
Total Organic Carbon	22	130		
Tannin	7.1	8.6		
Total Aluminium	0.26	0.67	0.055	5 – 12
Total Copper	0.0045	0.026	0.0014	3 – 20
Total Zinc	< 0.0011	0.0146	0.008	< 1 – 2

9.4. Discussion

The results of the investigation showed that the water quality of the groundwater and supernatant from the SPLP was generally typical of that expected from peat soils with both elevated organic carbon and some nutrient concentrations. Peat is the remains of partially decomposed plant material. It is often found in wetland environments where the addition of new plant material is faster than the decomposition of the accumulated plant material. The conditions that contribute to the formation of peat include saturated conditions, low temperatures and low dissolved oxygen (the latter slow the rate of decomposition).

As peat is often rich in phosphorus, nitrogen and other minerals, these may be elevated in receiving waterways. Organic carbon is commonly elevated (20 – 60 mg/L) in waterways draining organically-polluted, waterlogged and/or peat soils. Reduced and leachable organic carbon may impart a 'tea' to dark brown coloured staining to waterways due to the presence of tannins, fulvic and humic acids. This may lead to reduced water clarity and increased turbidity.

The total nitrogen comprised mostly organic nitrogen forms (as shown by the TKN), which generally indicates accumulation and breakdown of plant material. Organic nitrogen forms are also often elevated in waterways associated with peat however these forms usually have limited availability in terms of plant growth. In comparison, ammoniacal-nitrogen and nitrate are readily available for uptake by plants. Ammoniacal-nitrogen, which forms during the decomposition of peat organic matter, is readily converted to nitrate by bacteria in the soil.

The groundwater samples collected from the test pits are not likely to be representative of the expected surface runoff from the peat due to unconstrained disturbance of the soils during excavation and the disproportionally high levels of suspended solids. Nevertheless, the particulate fraction was found to have some elevated nutrient and metal concentrations and as such, for any peat soil disturbance and/or removal along the proposed Alignment as part of the construction works, effects on receiving surface waters from the potential discharge of raw groundwater should be minimised by appropriate groundwater treatment. Note that upon exposure to air and subsequent oxidation, an

increase in the binding of contaminants to particulate matter occurs leading to reduced mobility and a lower risk of deposition in receiving waterways.

The water quality of the supernatant from the SPLP may be more representative of potential surface runoff generated during any peat disturbance activities as the suspended solids content has been removed (via filtration) prior to analysis. In this case, measurement only includes the dissolved and mobile forms of contaminants and hence, those most likely to be transported via surface runoff to nearby waterways under suitable water quality conditions.

Nevertheless, the water chemistry at any time is dependent on a number of factors and therefore it is difficult to estimate representativeness of the supernatant relative to potential runoff from the peat. Waterways draining significant areas of peat are often acidic and oxygen depleted, particularly when the main source of recharge is sub-surface groundwater and rainfall-generated runoff. The supernatant from the SPLP has undergone significant oxidation during sampling and the SPLP procedure which has likely altered the water chemistry of the solution. Conversely, the SPLP is a vigorous extraction process which is likely to overestimate the mobility/bioavailability of contaminants. Nevertheless, the results do provide an indication of the water quality conditions and contaminants most likely to be associated with the groundwater saturated peat.

9.5. Summary and recommendations

9.5.1. Summary

The results of the study can be summarised as follows:

- The *in situ* field testing results showed that the groundwater associated with the peat had low pH and dissolved oxygen. At the levels measured, the groundwaters would have adverse effects on aquatic life.
- The results of the investigation showed that runoff of groundwaters from the peat may have elevated organic carbon and nutrient concentrations. The elevated levels of reduced and leachable organic carbon may impart a ‘tea’ to dark brown coloured staining to receiving waterways due to the presence of tannins, fulvic and humic acids. This may lead to reduced water clarity and increased turbidity. When containing elevated suspended solids, the groundwater may contain elevated metal concentrations and as such effects on receiving surface waters should be minimised by appropriate treatment.

9.5.2. Recommendations

The drainage released from the disturbance and removal of peat may have direct adverse effects on the quality of waters in the receiving environment. An appropriate management plan should be implemented during any peat removal and/or transport activities such that any runoff from the peat

does not discharge directly to nearby waterways. Alternatively, the effluent may be allowed to flow slowly over undisturbed land so that dissolved substances can be adsorbed and solids settle.

10. Summary

A summary of the results for each component comprising the baseline water and sediment quality investigation is given below.

10.1. Literature review of existing information

A review of existing studies was undertaken to characterise the water and sediment quality in the watercourses along the proposed route. A summary of key findings for each major watercourse along the Project extent is given below:

Whareroa Stream

The water quality of the Whareroa Stream was found to be 'poor' with elevated nutrient concentrations, suspended solids and bacteriological counts. A lack of riparian planting, erosion, nutrient runoff and contamination by stock is likely to be contributing to poor water quality in the watercourse within QE Park.

Wharemauku Stream

Existing studies showed that the stormwater quality in the Wharemauku Stream is generally 'poor' with some evidence of localised stream bed sediment degradation. The stormwater quality in the Wharemauku Stream at both Weka Road (downstream of the proposed Alignment) and Riwai Street (upstream of the Alignment east of SH1) was 'poor' with many water quality parameters and metal contaminants at levels which did not meet the applicable guideline value (SKM, 2010). These included pH, dissolved oxygen, *E. coli*, acid soluble aluminium and dissolved copper. Dissolved zinc was elevated in the stormwater samples collected from the sampling location at Weka Road which may be in part be due to commercial/industrial activities along Rimu Road/Ihakara Street.

Mazengarb Drain

The stormwater quality at Mazengarb Reserve (downstream of the Alignment) was generally 'poor' with many water quality indicators and metal contaminants at levels which did not meet the relevant guideline value. These included dissolved oxygen, *E. coli* counts, acid soluble aluminium, and dissolved copper and zinc. Potential point source discharges of contamination to the Mazengarb Drain include the Paraparaumu WWTP and the 'eastern' tributary that drains the Otaihanga Landfill. Elevated zinc and other heavy metals in the stormwater samples collected from the Mazengarb Reserve may be due to potential discharges from the Te Roto Drive drainage area.

Waikanae River

Existing studies suggest that the water quality of the Waikanae River is generally 'good'. The water quality at Greenaway Road was mostly good except for some periodic exceedances of the corresponding guideline value for some nutrients. At the same sampling location, dissolved zinc may periodically exceed the corresponding guideline value. The results of stormwater quality sampling at Jim Cooke Park (upstream of the Alignment) showed that the only parameters and/or contaminants above the relevant guideline values were *E. coli* and acid soluble aluminium.

Waimeha Stream

Existing studies have shown that the Waimeha Stream is characteristic of a lowland waterway draining predominantly agricultural land with elevated nutrients, bacteriological counts and low toxicant concentrations. Except for some elevated nutrient concentrations, most parameters/contaminants were below the corresponding guideline value during base flow conditions. Stormwater sampling results showed elevated *E. coli* counts at Te Moana Road (downstream of the Alignment).

Ngarara Stream

Studies have shown that the water quality of the watercourses in the Ngarara Stream catchment are typical of sites draining predominantly agricultural land, with elevated nutrient concentrations, bacteriological counts and low toxicant concentrations. The water quality of the sites sampled in the Ngarara Stream watercourses had elevated turbidity, while some sites had low dissolved oxygen and pH indicative of organic matter degradation. These results were generally consistent with the water quality at Field Way (note that this sampling site is below the confluence of the Ngarara and Waimeha streams) which also showed dissolved copper at concentrations that periodically exceeded the corresponding guideline at the 95% level of protection.

10.2. Ambient water quality monitoring prorgramme

An ambient water and sediment quality monitoring programme was undertaken at key sites in the watercourses across the proposed Expressway in order to generate a database of information from which the existing water and sediment quality can be assessed. The field sampling programme involved the collection and analysis of base and high flow water samples, and sediment from the watercourses along the Project extent.

The results of the ambient water quality monitoring programme found that in general, the watercourses along the proposed Expressway are characteristic of lowland waterways draining predominantly agricultural land with some elevated nutrient concentrations, bacteriological counts and low toxicant concentrations. Nevertheless, there were some clear differences between watercourses with the water quality at each sampling location generally reflecting the catchment area which it drains. Key findings are as follows:

- All metal and organic contaminant concentrations in the bed sediment samples were below the corresponding guideline value indicating that the sediment in the watercourses along the proposed Project extent presents a low risk of adverse effects to aquatic life.
- The water quality at the sampling location in the Wharemauku Stream, west of the proposed Expressway, was 'poor' with elevated nutrient concentrations, ammoniacal-nitrogen, and dissolved and total zinc relative to the corresponding guideline trigger values. This is likely to be due to pastoral, residential and industrial/commercial land use activities in the upstream drainage area.
- The water quality in the Mazengarb Drain was 'poor' with elevated nutrients, ammoniacal-nitrogen, suspended solids, organic matter, copper and zinc. As well as urban land use activities, the water quality at this sampling location is likely to be impacted in part, by the 'eastern' tributary of the Otaihanga Landfill which discharges into the Mazengarb Drain upstream of the sampling location.
- The water quality at the site sampled in the Kakariki Stream west of SH1 was 'poor' due to elevated nutrient concentrations, suspended solids and bacterial counts. The water quality in the Waimeha Stream was generally good however there were some slightly elevated nutrient concentrations and suspended solids in some of the waters sampled. The water quality of both sites is likely to be impacted by agricultural land use activities.
- The water quality of the base flow waters in the Waikanae River and Hadfield Drain/Te Kowhai Stream was generally good with most indicators and contaminant concentrations within the limits of the corresponding guideline values.
- All organic contaminants (SVOCs and TPH) in the base and high flow waters sampled across the Project extent were mostly below the analytical detection limits. However, in the Wharemauku Stream and Mazengarb Drain, the concentration of copper and zinc may exceed the corresponding guideline value at the 95% level of detection during both base and high flow conditons. The total and dissolved aluminium was above the corresponding guideline trigger value in many of the sites sampled in the watercourses across the Project extent. This is likely to be due to elevated background soil concentrations across the Wellington region.

10.3. Otaihanga landfill sediment and water quality investigation

A snapshot surface water and sediment quality investigation was undertaken along the western edge of the Otaihanga Landfill and Mountain Bike Park. The purpose of the investigation was to characterise the sediment quality in the wetlands within the footprint of the proposed Alignment, and the water quality in the stormwater/leachate drainage channel of the landfill. The key findings are summarised as follows:

- All heavy metal and organic contaminants in the sediment from both the southern and northern wetlands were below the corresponding guideline value except for dieldrin in the sediment from the northern wetland. All heavy metal and organic contaminants in the sediment collected from the stormwater/leachage drainage channel were below the relevant guideline trigger value.

- The arsenic and zinc concentration in the sediment from the middle wetland were at levels slightly above the ANZECC (2000) ISQG-low and high values respectively. It is likely that the sediment sampled from this location is impacted by discharges from the landfill.
- The water quality in the stormwater/leachate drainage channel was 'poor'. The waters were slightly acidic, had low dissolved oxygen and elevated conductivity. All water samples had elevated faecal coliform counts with *E. coli* at levels which exceeded the action mode level for recreational purposes. There were some exceedances of the dissolved and total aluminium, manganese and zinc concentrations relative to the ANZECC (2000) guideline trigger values at the 80% level of protection. All organic contaminant concentrations were below the ANZECC (2000) guideline trigger value at the 80% level of detection.

10.4. Characterisation of groundwater associated with peat soils

The groundwater associated with the peat along the Project extent was characterised in order to assist with determining the potential effects on surface watercourses from its removal and storage. Peat forms a significant soil component along the Alignment of the proposed Expressway route. The key findings are summarised as follows:

- The drainage released from the disturbance and removal of peat may have direct adverse effects on the water quality in the receiving environment. The results showed that runoff of groundwater from the peat may contain elevated organic carbon and nutrient concentrations. Elevated levels of organic carbon compounds may impart a 'tea' to dark brown coloured staining to receiving waterways. The groundwater may also contain elevated metal concentrations in situations where there is a high suspended solids load. An appropriate management plan should be implemented during any peat removal and/or transport activities such that any runoff from the peat does not discharge directly to nearby waterways.

11. References

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Ground Model Appendix 24.A

Location of Sampling Sites

Drawing Plotted: 26/3/12. Author: AYF

Paraparaumu Beach
Waikanae River
Waikanae Beach
Raumati Beach
Raumati South
Wharemauku Stream
Tikotu Creek
Peka Peka Beach
PAETAWA ROAD
Maungakotukutuku Stream
Raikorangi Stream

SKM0154
Wharemauku Stream at Weka Road

Site 1
Wharemauku Stream

SKM0382
Mazengarb Stream at Mazengarb Reserve

Site 2
Mazengarb Drain

Site 3
Waikanae River

Site 5
Waimeha Stream

RS08
Ngarara Stream at Field Way

SKM0070
Waimeha Stream at Te Moana Road

RS10
Waikanae River at Greenaway Road

Site 6
Kakariki Stream (Ngarara Catchment)

SKM0101
Waikanae River at Jim Cooke Park

Site 7
Hadfield Drain/Kowhai Stream

RS12
Whareroa Stream at Queen Elizabeth Park

SKM0166
Wharemauku Stream at Riwai Street

Site 8
Wharemauku Stream - Upper Catchment

RS11
Whareroa Stream at Waterfall Road

Site 4
Waikanae River - Upper Catchment

RS09
Waikanae River at Mangaone Walkway

Legend

- Sampling Locations
- Major Watercourses
- Existing Culverts
- State Highway 1 (SH1)
- Draft Alignment

Catchments for Water Quality Sampling Locations

- Waikanae River - Upper Catchment
- Hadfield Drain/Kowhai Stream
- Kakariki Stream (Ngarara Catchment)
- Mazengarb Drain
- Waikanae River
- Waimeha Stream
- Wharemauku Stream - Upper Catchment
- Wharemauku Stream - West of SH1

0 0.5 1 2 km

Path: P:\318\318-AKL\3320901\TGIS5_Workspaces\01_mxd\GIS-3320901-66a_Location_of_Sample_Sites.mxd

Notes:

Reference to sites as follows:
Site 1 to 8 (this study)
RS08 to RS12 (GWRC)
Waikanae River at Jim Cook Parke (SKM0101/PH16)
Waimeha Stream at Te Moana Road (SKM0070)
Mazengarb Stream at Mazengarb Reserve (SKM0382/61154)
Wharemauku Stream at Riwai Street (SKM0166)
Wharamauku Stream at Weka Road (SKM0154)

Revision.	Amendment.	Approved	Date
B	Catchment boundaries modified	AH4	26/03/12
A	Template Modified.	AH4	08/11/11

NZ TRANSPORT AGENCY
WAKA KOTAHI

Project:
MACKAYS TO PEKA PEKA EXPRESSWAY

Title
Location of Sampling Sites

Status:

Document ID:

Drawing No:
GIS-3320901-66a

Rev.
A

Document created for NZTA by M2PP Alliance, Level 2, 17-21 Whitmore St, WELLINGTON

Appendix 24.B

Location of Ngarara Stream Sampling Sites

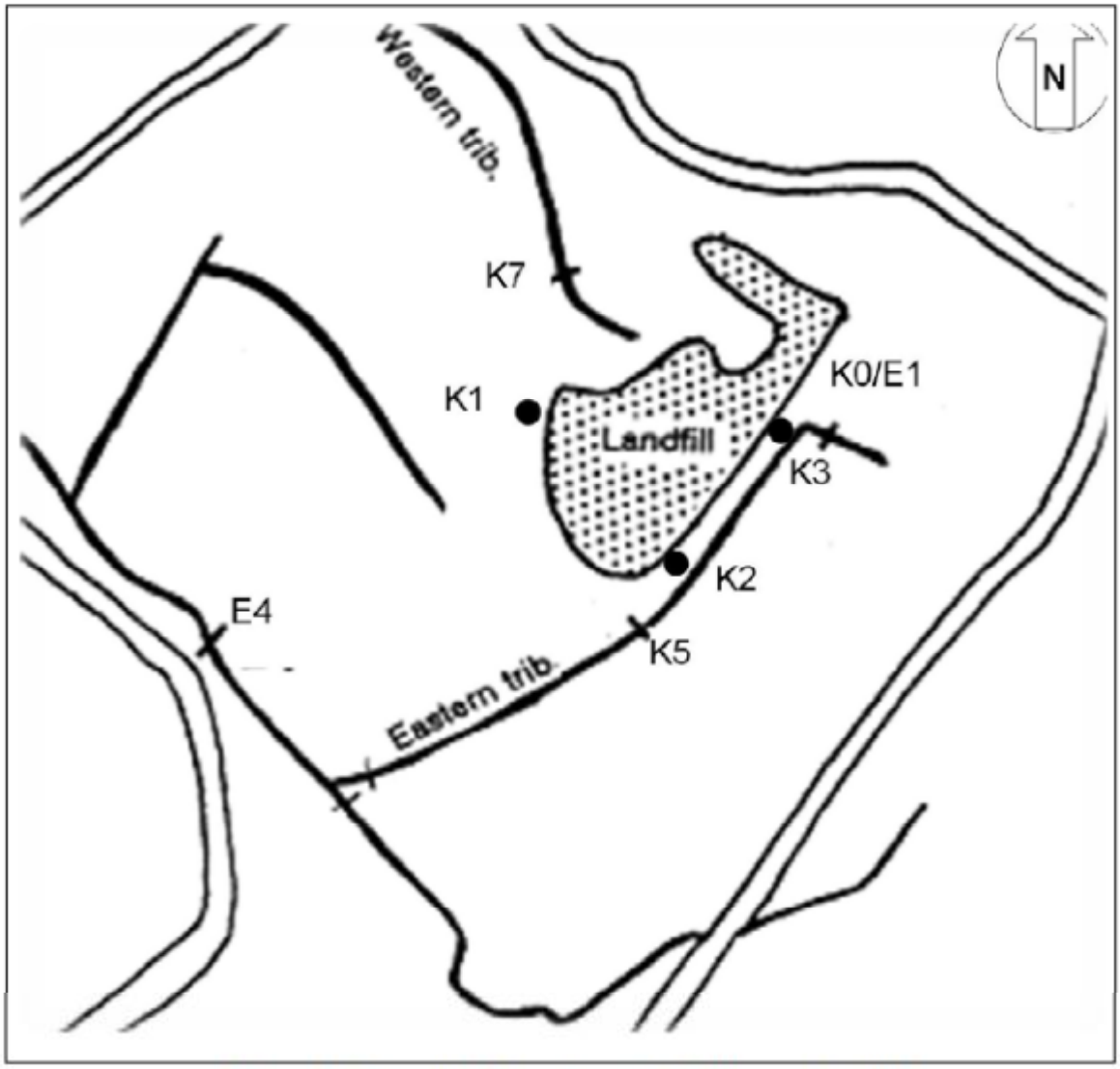
(SKM, 2008)

Figure 1 Location of the Ngarara property and sampling sites

Appendix 24.C

Otaihanga Landfill Sampling Site Locations

(MWH, 2010)


Western trib.
N
K7
K1
K0/E1
Landfill
K3
K2
E4
K5
Eastern trib.

Appendix 24.D

ELS Report No. 11/9526 (2 May 2011)

APPENDIX D ELS Report No. 11/9526 (2 May 2011)

1C Quadrant Drive, Waiwhetu
PO Box 31242, Lower Hutt 5010
Wellington, New Zealand

T 64 4 5708800
F 64 4 5708176
W www.asurequality.com

Certificate of Analysis

Date Issued: 13 May 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 03 May 2011

AsureQuality Lab. Reference: 93854

Sample Type(s): Sediment

Analysis: **Semi Volatile Organic Contaminants**

Method:
The sample was extracted with organic solvent and the extract analysed by gas chromatography - mass spectrometry. Non-target compounds are identified by a mass spectral library search and where possible quantified against an authentic standard.

Results are reported to two significant figures in milligrams per kilogram (mg/kg), equivalent to ppm, on a dry weight basis. Detection limits are reported to one significant figure.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Jayanthi Ranasinghe
Scientist
AsureQuality Limited

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 01Wharemaku Stream,West of SH1 Sediment

Laboratory Reference: 93854-1 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 02 Mazengarb Drain Sediment

Laboratory Reference: 93854-2 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 03 Waikanae River Sediment

Laboratory Reference: 93854-3 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 04Waikanae River,Upper Catchment Sediment

Laboratory Reference: 93854-4 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 05 Waimeha Stream Sediment

Laboratory Reference: 93854-5 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 06 Ngarara Stream Sediment

Laboratory Reference: 93854-6 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 07 Hadfield Drain/Kowhai Stream Sediment

Laboratory Reference: 93854-7 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9526 08Wharemaku Stream,Upper Catchment Sediment

Laboratory Reference: 93854-8 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: Laboratory Blank

Laboratory Reference: 93854 BLANK

Date Received: Not applicable

Date Extracted: 11 May 2011

Date Analysed: 11 May 2011

Analyte	Conc. † (mg/kg)	Analyte	Conc. † (mg/kg)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.1	Pirimiphos methyl	< 0.2
heptachlor	< 0.1	Chlorpyrifos	< 0.2
aldrin	< 0.1	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.1	**Plasticisers**	
Procymidone	< 0.2	dimethyl phthalate	< 2
Alpha-chlordane	< 0.1	diethyl phthalate	< 2
Gamma-chlordane	< 0.1	di-n-butyl phthalate	< 2
pp-DDE	< 0.1	benzyl butyl phthalate	< 2
dieldrin	< 0.1	di(2-ethylhexyl) adipate	< 2
pp-DDD	< 0.1	di(2-ethylhexyl) phthalate	< 2
pp-DDT	< 0.2	**Polychlorinated Biphenyls**	
Methoxychlor	< 0.2	PCB congener #8	< 0.1
Cis permethrin	< 0.2	PCB congener #28	< 0.1
Trans permethrin	< 0.2	PCB congener #101	< 0.1
alpha-BHC	< 0.1	PCB congener #138	< 0.1
beta-BHC	< 0.1	PCB congener #183	< 0.1
Delta-BHC	< 0.1	**Polycyclic Aromatic Hydrocarbons**	
endosulfan I	< 0.1	naphthalene	< 0.2
endosulfan II	< 0.1	acenaphthylene	< 0.1
Endosulfan sulfate	< 0.1	acenaphthene	< 0.1
endrin	< 0.1	fluorene	< 0.1
Endrin aldehyde	< 0.1	phenanthrene	< 0.1
Endrin ketone	< 0.1	anthracene	< 0.1
Organonitrogen Herbicides		fluoranthene	< 0.2
Trifluralin	< 0.2	pyrene	< 0.2
Simazine	< 0.1	benz[a]anthracene	< 0.1
Atrazine	< 0.1	chrysene	< 0.1
Terbuthylazine	< 0.2	benzo[b]fluoranthene	< 0.1
Propanil	< 0.1	benzo[k]fluoranthene	< 0.1
Alachlor	< 0.2	benzo[a]pyrene	< 0.1
Metolachlor	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Pendimethalin	< 0.2	dibenz[a,h]anthracene	< 0.2
Molinate	< 0.1	benzo[g,h,i]perylene	< 0.2
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are calculated using the average weight of samples in this batch.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JR Authorised: Jayanthi Ranasinghe

AsureQuality

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Certificate of Analysis

Date Issued:	13 May 2011
Client:	Environmental Laboratory Services PO Box 36 105 Moera Lower Hutt 5045 Wellington
Attention:	Rob Deacon
Date Received:	03 May 2011
AsureQuality Lab. Reference:	93854
Sample Type(s):	Sediment
Analysis:	**Volatile Organic Contaminants**

Method:

The sample was analysed by purge trap - gas chromatography - mass spectrometry.

Results are reported to two significant figures in milligrams per kilogram (mg/kg), equivalent to ppm, on an as received basis. Detection limits are reported to one significant figure.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Andrew Steedman
Scientist
AsureQuality Limited

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 01Wharemaku Stream,West of SH1 Sediment

Laboratory Reference: 93854-1 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 02 Mazengarb Drain Sediment

Laboratory Reference: 93854-2 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 03 Waikanae River Sediment

Laboratory Reference: 93854-3 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 04Waikanae River,Upper Catchment Sediment

Laboratory Reference: 93854-4 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 05 Waimeha Stream Sediment

Laboratory Reference: 93854-5 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 06 Ngarara Stream Sediment

Laboratory Reference: 93854-6 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 07 Hadfield Drain/Kowhai Stream Sediment

Laboratory Reference: 93854-7 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: 11/9526 08Wharemaku Stream,Upper Catchment Sediment

Laboratory Reference: 93854-8 Date Received: 03 May 2011

Date Extracted: 04 May 2011 Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: AL Authorised: Andrew Steedman

Results: Volatile Organic Contaminants

Sample Identification: Laboratory Blank
Laboratory Reference: 93854 BLANK
Date Received: Not applicable
Date Extracted: 04 May 2011
Date Analysed: 04 May 2011

Analyte	Conc.† (mg/kg)	Analyte	Conc.† (mg/kg)
Aromatics		**Halogenated Alkanes and Alkenes**	
benzene	< 0.5	vinyl chloride	< 1
toluene	< 1	chloroethane	< 1
ethylbenzene	< 0.5	1,1-dichloroethene	< 0.5
m+p-xylene	< 0.5	trans-1,2-dichloroethene	< 0.5
o-xylene	< 0.5	1,1-dichloroethane	< 0.5
styrene	< 0.5	2,2-dichloropropane	< 0.5
isopropylbenzene	< 0.5	cis-1,2-dichloroethene	< 0.5
n-propylbenzene	< 0.5	bromochloromethane	< 0.5
1,3,5-trimethylbenzene	< 0.5	1,1,1-trichloroethane	< 0.5
tert-butylbenzene	< 0.5	tetrachloromethane	< 0.5
1,2,4-trimethylbenzene	< 0.5	1,1-dichloropropene	< 0.5
sec-butylbenzene	< 0.5	1,2-dichloroethane	< 0.5
4-isopropyltoluene	< 0.5	trichloroethene	< 1
n-butylbenzene	< 0.5	1,2-dichloropropane	< 0.5
Halogenated Aromatics		dibromomethane	< 0.5
chlorobenzene	< 0.5	cis-1,3-dichloropropene	< 0.5
bromobenzene	< 0.5	trans-1,3-dichloropropene	< 0.5
2-chlorotoluene	< 0.5	1,1,2-trichloroethane	< 0.5
4-chlorotoluene	< 0.5	tetrachloroethene	< 0.5
1,3-dichlorobenzene	< 0.5	1,3-dichloropropane	< 0.5
1,4-dichlorobenzene	< 0.5	1,2-dibromoethane	< 0.5
1,2-dichlorobenzene	< 0.5	1,1,1,2-tetrachloroethane	< 0.5
1,2,4-trichlorobenzene	< 0.5	1,1,2,2-tetrachloroethane	< 0.5
1,2,3-trichlorobenzene	< 0.5	1,2,3-trichloropropane	< 0.5
Trihalomethanes		1,2-dibromo-3-chloropropane	< 0.5
chloroform	< 0.5	hexachlorobutadiene	< 0.5
bromodichloromethane	< 0.5		
chlorodibromomethane	< 0.5		
bromoform	< 0.5		

† = Results are calculated using the average weight of samples in this batch.
< = Less than limit of detection.

Lab Analyst: LR
Data Analyst: AL
Authorised: Andrew Steedman

1C Quadrant Drive, Waiwhetu
PO Box 31242, Lower Hutt 5010
Wellington, New Zealand

T 64 4 5708800
F 64 4 5708176
W www.asurequality.com

Certificate of Analysis

Date Issued: 13 May 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 03 May 2011

AsureQuality Lab. Reference: 93854

Sample Type(s): Sediment

Analysis: **Total Petroleum Hydrocarbons**

Method:

The samples were extracted with an organic solvent. The extracts were analysed by gas liquid chromatography using a flame ionisation detector.

Results are reported to two significant figures in milligrams per kilogram (mg/kg), equivalent to ppm, on a dry weight basis. Detection limits are reported to one significant figure. Total (C7-C36) is reported both including and excluding the limits of detection values, reflecting maximum and minimum levels respectively.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Paul Wilson
Analyst
AsureQuality Limited

13 May 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 01Wharemaku Stream,West of SH1 Sediment

Laboratory Reference: 93854-1 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 02 Mazengarb Drain Sediment

Laboratory Reference: 93854-2 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 03 Waikanae River Sediment

Laboratory Reference: 93854-3 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**
C7-C9 as C9	< 5
C10-C11 as C11	< 5
C12-C14 as C14	< 5
C15-C20 as C20	< 5
C21-C25 as C25	< 5
C26-C36 as C25	< 5
Total C7-C36 (minimum):	0
Total C7-C36 (maximum):	30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

13 May 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 04Waikanae River,Upper Catchment Sediment

Laboratory Reference: 93854-4 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

13 May 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 05 Waimeha Stream Sediment

Laboratory Reference: 93854-5 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

13 May 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 06 Ngarara Stream Sediment

Laboratory Reference: 93854-6 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

13 May 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 07 Hadfield Drain/Kowhai Stream Sediment

Laboratory Reference: 93854-7 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9526 08Wharemaku Stream,Upper Catchment Sediment

Laboratory Reference: 93854-8 Date Received: 03 May 2011

Date Extracted: 11 May 2011 Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**	
C7-C9 as C9	<	5
C10-C11 as C11	<	5
C12-C14 as C14	<	5
C15-C20 as C20	<	5
C21-C25 as C25	<	5
C26-C36 as C25	<	5
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		30.0

† = Results are reported on a dry weight basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

13 May 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: Laboratory Blank

Laboratory Reference: 93854 BLANK | Date Received: Not applicable

Date Extracted: 11 May 2011 | Date Analysed: 11 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/kg)**
C7-C9 as C9	< 5
C10-C11 as C11	< 5
C12-C14 as C14	< 5
C15-C20 as C20	< 5
C21-C25 as C25	< 5
C26-C36 as C25	< 5
Total C7-C36 (minimum):	0
Total C7-C36 (maximum):	30.0

† = Results are calculated using the average weight of samples in this batch.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Environmental Laboratory Services Ltd.

Analytical Report

Boffa Miskell - M2PP Project
PO Box 11-340
Wellington
6142

Report Number: 11/9526
Issue: 1
30 May 2011

Attention: Matiu Park

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-01	Wharemauku Stream # West of SH1 Sediment		02/05/2011 11:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	11,600	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	3.1	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.05	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	18.5	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	8.1	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	13.0	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	20,800	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	13.3	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	326	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	16.6	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	112	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

85 Port Road Seaview
Lower Hutt New Zealand
Phone: (04) 576 5016 Fax: (04) 576 5017
Email: mailto:reports@els.co.nz Website: http://www.els.co.nz

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-02	Mazengarb Drain Sediment		02/05/2011 11:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	12,100	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	3.5	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.05	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	6.4	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	4.3	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	7.4	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	11,700	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	4.2	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	140	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	5.6	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	47.7	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-03	Waikanae River Sediment		02/05/2011 12:28	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	11,300	mg/Kg		Sharon van

85 Port Road Seaview
Lower Hutt New Zealand
Phone: (04) 576 5016 Fax: (04) 576 5017
Email: mailto:reports@els.co.nz Website: http://www.els.co.nz

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-03	Waikanae River Sediment		02/05/2011 12:28	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6503	Arsenic - Total Recoverable	3.6	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.04	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	15.3	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	5.2	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	8.2	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	18,500	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	10.3	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	306	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	12.4	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	50.3	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-04	Waikanae River # Upper Catchment Sediment		02/05/2011 13:20	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	11,000	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	3.8	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.07	mg/Kg		Tracy

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-04	Waikanae River # Upper Catchment Sediment		02/05/2011 13:20	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6511	Chromium - Total Recoverable	13.5	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	5.1	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	10.6	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	17,900	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	11.0	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	323	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	11.6	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	50.4	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-05	Waimeha Stream Sediment		02/05/2011 13:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	8,660	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	1.7	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.04	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	7.3	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	3.3	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	4.5	mg/Kg		Tracy

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-05	Waimeha Stream Sediment		02/05/2011 13:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6517	Iron - Total Recoverable	10,700	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	5.0	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	136	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	6.3	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	32.8	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-06	Ngarara Stream Sediment		02/05/2011 14:22	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	8,720	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	2.8	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.03	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	7.1	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	3.7	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	4.8	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	12,200	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	3.2	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	152	mg/Kg		Tracy Morrison KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-06	Ngarara Stream Sediment		02/05/2011 14:22	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6524	Nickel - Total Recoverable	5.8	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	30.2	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-07	Hadfield Drain/Kowhai Stream Sediment		02/05/2011 14:55	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	8,750	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	1.9	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.04	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	8.1	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	3.8	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	10.1	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	11,000	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	9.1	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	139	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	6.7	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	38.9	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9526-08	Wharemauku Stream # Upper Catchment Sediment		02/05/2011 15:37	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0293	Volatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
6501	Aluminium - Total Recoverable	10,100	mg/Kg		Sharon van Soest KTP/LAS
6503	Arsenic - Total Recoverable	3.2	mg/Kg		Tracy Morrison KTP/LAS
6507	Boron - Total Recoverable	< 7	mg/Kg		Tracy Morrison KTP/LAS
6508	Cadmium - Total Recoverable	0.09	mg/Kg		Tracy Morrison KTP/LAS
6511	Chromium - Total Recoverable	22.0	mg/Kg		Tracy Morrison KTP/LAS
6512	Cobalt - Total Recoverable	8.9	mg/Kg		Tracy Morrison KTP/LAS
6513	Copper - Total Recoverable	12.0	mg/Kg		Tracy Morrison KTP/LAS
6517	Iron - Total Recoverable	20,200	mg/Kg		Sharon van Soest KTP/LAS
6518	Lead - Total Recoverable	10.3	mg/Kg		Tracy Morrison KTP/LAS
6521	Manganese - Total Recoverable	454	mg/Kg		Tracy Morrison KTP/LAS
6524	Nickel - Total Recoverable	21.1	mg/Kg		Tracy Morrison KTP/LAS
6538	Zinc - Total Recoverable	62.5	mg/Kg		Tracy Morrison KTP/LAS
P1862	Total Recoverable Metals	Completed			Deb Bottrill

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Total Petroleum Hydrocarbons	Subcontracted to AsureQuality NZ	n/a
Volatile Organic Compounds	Subcontracted to AsureQuality NZ.	Trace levels
SemiVolatile Organic Compounds	Subcontracted to AsureQuality NZ.	Trace levels
Aluminium - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	5 mg/Kg
Arsenic - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.05 mg/Kg

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Test	Methodology	Detection Limit
Boron - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	3 mg/Kg
Cadmium - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.01 mg/Kg
Chromium - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.2 mg/Kg
Cobalt - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.5 mg/Kg
Copper - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.3 mg/Kg
Iron - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	3 mg/Kg
Lead - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 mg/Kg
Manganese - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 mg/Kg
Nickel - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	0.2 mg/Kg
Zinc - Total Recoverable	ICP-MS following APHA 21st edition method 3125 (modified)	1 mg/Kg
Total Recoverable Metals	Follows in-house method based on US EPA 200.2. All results analysed by ICPMS or ICPOES are reported as total recoverable on a dry weight basis.	n/a

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

414
639

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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ANALYSIS REPORT

Client:	Environmental Laboratory Services	**Lab No:**	905466	SPv1
Contact:	D Bottrill	**Date Registered:**	15-Jun-2011	
	C/- Environmental Laboratory Services	**Date Reported:**	27-Jun-2011	
	PO Box 36105	**Quote No:**	44291	
	Wellington Mail Centre	**Order No:**	14894 R	
	LOWER HUTT 5045	**Client Reference:**	11/9526	
		Submitted By:	D Bottrill	

Sample Type: Sediment

		Sample Name:	11/9526-01	11/9526-02	11/9526-03	11/9526-04	11/9526-05
		Lab Number:	905466.1	905466.2	905466.3	905466.4	905466.5
Organic Matter*	g/100g dry wt		1.77	1.53	1.57	1.22	1.08
Dry Matter	g/100g as rcvd		80	73	78	80	73
Ash*	g/100g dry wt		98	98	98	99	99
Total Recoverable Phosphorus	mg/kg dry wt		500	390	410	430	270
pH*	pH Units		6.8	6.1	6.7	7.4	5.2
Ammonium-N*	mg/kg dry wt		< 5	< 5	< 5	< 5	< 5
Total Organic Carbon	g/100g dry wt		0.20	0.31	0.15	0.18	0.18
Total Nitrogen	g/100g dry wt		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbon:Nitrogen Ratio			6.2	8.4	5.8	5.7	6.4

		Sample Name:	11/9526-06	11/9526-07	11/9526-08		
		Lab Number:	905466.6	905466.7	905466.8		
Organic Matter*	g/100g dry wt		1.50	1.76	2.1	-	-
Dry Matter	g/100g as rcvd		74	81	77	-	-
Ash*	g/100g dry wt		98	98	98	-	-
Total Recoverable Phosphorus	mg/kg dry wt		390	270	450 #1	-	-
pH*	pH Units		6.1	6.8	7.1	-	-
Ammonium-N*	mg/kg dry wt		< 5	< 5	6	-	-
Total Organic Carbon	g/100g dry wt		0.25	0.31	0.16	-	-
Total Nitrogen	g/100g dry wt		< 0.05	< 0.05	< 0.05	-	-
Carbon:Nitrogen Ratio			8.9	8.6	4.3	-	-

Analyst's Comments

#1 It should be noted that the replicate analyses performed on this sample as part of our in-house Quality Assurance procedures showed greater variation than would normally be expected. 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: Sediment

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
Organic Matter*	Calculation: 100 - Ash (dry wt).	0.04 g/100g dry wt	1-8
Soil Prep Dry & Sieve for Agriculture	Air dried at 35°C and sieved, <2mm fraction.	-	1-8
Total Organic Carbon and Total Nitrogen	Catalytic Combustion (900°C, O^2), separation, Thermal Conductivity Detector [Elementar Analyser]	-	1-8
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

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Samples**
2M KCl Extraction*	2M potassium chloride extraction of as received fraction for analysis of NH4N, NO2N and NO3N. Analyst, 109, 549, (1984).	-	1-8
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-8
Ash*	Ignition in muffle furnace 550°C, 6hr, gravimetric. APHA 2540 G 21st ed. 2005.	0.04 g/100g dry wt	1-8
Total Recoverable Phosphorus	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	40 mg/kg dry wt	1-8
pH*	1:2 (v/v) soil : water slurry followed by potentiometric determination of pH.	0.1 pH Units	1-8
Ammonium-N*	2M potassium chloride extraction on as received fraction. Phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-NH_3 G 21st ed. 2005.	5 mg/kg dry wt	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.

Martin Cowell - BSc (Chem)
Client Services Manager - Environmental Division

Appendix 24.E

ELS Reports No. 11/9525 (2 May 2011) & 11/11320 (23 May 2011) & 11/13096 (16 June 2011)

APPENDIX E ELS Reports No. 11/9525 (2 May 2011) & 11/11320 (23 May 2011) & 11/13096 (16 June 2011)

Environmental Laboratory Services Ltd.

Analytical Report

Boffa Miskell - M2PP Project
PO Box 11-340
Wellington
6142

Attention: Matiu Park

Report Number: 11/9525
Issue: 1
19 May 2011

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-01	Wharemaku Stream # West of SH1 Water		02/05/2011 10:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	25.2	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	4.20	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	120	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.02	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.61	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.63	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.17	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.2	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.045	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.04	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.092	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-01	Wharemaku Stream # West of SH1 Water		02/05/2011 10:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.184	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.011	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.013	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.42	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.172	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.009	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-01	Wharemaku Stream # West of SH1 Water		02/05/2011 10:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	14.5	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.9	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-02	Mazengarb Drain Water		02/05/2011 11:30	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	29.2	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	33	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	17.6	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	160	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.07	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.59	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.66	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.48	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.2	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	17.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	1.0	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.091	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.68	g/m³		Divina

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-02	Mazengarb Drain Water		02/05/2011 11:30	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6601	Aluminium - Total	0.212	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	0.06	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	3.4	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.417	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.008	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.054	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.06	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0012	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	1.32	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-02	Mazengarb Drain Water		02/05/2011 11:30	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6721	Manganese - Dissolved	0.396	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0013	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.006	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	13.8	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.3	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-03	Waikanae River Water		02/05/2011 12:15	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.8	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.77	NTU		Gordon McArthur KTP/LAS
0098	E. coli	40	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.26	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.27	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.8	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	59.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Rob Deacon KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-03	Waikanae River Water		02/05/2011 12:15	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
2080	Total Phosphorus	0.013	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.008	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.35	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.027	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.003	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.010	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-03	Waikanae River Water		02/05/2011 12:15	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6717	Iron - Dissolved	0.02	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0025	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	13.0	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	10.6	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-04	Waikanae River # Upper Catchment Water		02/05/2011 13:05	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.4	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.58	NTU		Gordon McArthur KTP/LAS
0098	E. coli	52	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.27	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.27	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-04	Waikanae River # Upper Catchment Water		02/05/2011 13:05	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
0994d	Flow Rate	0.5	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	33.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.014	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.32	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.030	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.011	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-04	Waikanae River # Upper Catchment Water		02/05/2011 13:05	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	< 0.01	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0005	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	12.0	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	10.8	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-05	Waimeha Stream Water		02/05/2011 13:35	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	14.5	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	1.61	NTU		Gordon McArthur KTP/LAS
0098	E. coli	260	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-05	Waimeha Stream Water		02/05/2011 13:35	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.52	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.52	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.03	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.1	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	91.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.023	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.55	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.029	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.4	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.028	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-05	Waimeha Stream Water		02/05/2011 13:35	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.15	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0283	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	14.9	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	7.9	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-06	Ngarara Stream Water		02/05/2011 14:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	8	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.9	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	7.23	NTU		Gordon McArthur KTP/LAS
0098	E. coli	2,100	cfu/100mL		Sunita Raju KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-06	Ngarara Stream Water		02/05/2011 14:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.02	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.67	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.68	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.04	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.5	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.065	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.015	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.06	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.205	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.5	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.093	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-06	Ngarara Stream Water		02/05/2011 14:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6638	Zinc - Total	0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.033	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0009	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.16	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0113	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.20			Jacinta Hira-Wilson KTP
O1311	Temperature	14.3	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.2	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-07	Hadfield Drain/Kowhai Stream Water		02/05/2011 14:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	8	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	18.7	mS/m		Gordon McArthur KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-07	Hadfield Drain/Kowhai Stream Water		02/05/2011 14:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	2.71	NTU		Gordon McArthur KTP/LAS
0098	E. coli	140	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.01	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	<0.05	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.1	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	10.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.022	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.011	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.32	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.082	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.2	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-07	Hadfield Drain/Kowhai Stream Water		02/05/2011 14:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.010	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.049	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.64	g/m³		Tracy Morrison KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0870	g/m³		Tracy Morrison KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	13.9	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.5	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-08	Wharemaku Stream # Upper Catchment Water		02/05/2011 15:20	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	8.9	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	1.64	NTU		Gordon McArthur KTP/LAS
0098	E. coli	260	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.85	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.86	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.3	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	12.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.034	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.028	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.13	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.066	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-08	Wharemaku Stream # Upper Catchment Water		02/05/2011 15:20	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.005	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.120	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.07	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0047	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	14.0	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	9.8	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

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Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA 21st Edition Method 2540 D	3 g/m³
Conductivity at 25°C	APHA 21st Edition Method 2510 B. LAS official test 5.02.	0.1 mS/m
Chemical Oxygen Demand	APHA 21st Edition Method 5220 D. LAS official test 5.09.	15 g/m³
Turbidity	Turbidity Meter following APHA 21st Edition Method 2130 B. LAS official test 5.04.	0.01 NTU
E. coli	APHA 21st Edition 9222 G, 2005; MIMM 11.5, 2005	1 cfu/100mL
BOD5 - Carbonaceous	APHA 21st Edition Method 5210 B with nitirification inhibitor.	1 g/m³
Total Petroleum Hydrocarbons	Subcontracted to AsureQuality NZ	n/a
SemiVolatile Organic Compounds	Subcontracted to AsureQuality NZ. LAS official tests 5.35, 5.36.	Trace levels
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified). LAS official test 5.13.	0.01 g/m³
Total Oxidised Nitrogen	By Calculation. Nitrite Nitrogen + Nitrate Nitrogen. Also known as Nitrate-Nitrite Nitrogen.	0.05 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500 NH3 H. LAS official test 5.10.	0.01 g/m³
Flow Rate	Data measured on site.	0.1 m/sec
Approximate Depth	Data measured on site.	1 Centimetres
Total Kjeldahl Nitrogen	By Calculation - Total Nitrogen minus NNN	0.1 g NH3-N/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Persulphate digestion follows APHA 21st Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Official LAS test 5.15.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-NO3 I. Persulphate digestion follows APHA 21st Edition 4500-N C.	0.05 g/m³
Aluminium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Arsenic - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Boron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.05 g/m³
Cadmium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Chromium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Cobalt - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Copper - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Iron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 g/m³
Lead - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Manganese - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Nickel - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Zinc - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.17	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.18	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.19	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.20	0.0002 g/m³

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Test	Methodology	Detection Limit
Chromium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.22	0.001 g/m³
Cobalt - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified)	0.0005 g/m³
Copper - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.23	0.0005 g/m³
Iron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.25	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.26	0.0005 g/m³
Manganese - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.28	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.46	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.33	0.002 g/m³
pH - onsite reading	Analysed on site by sampler.	
Temperature	Analysed on site by sampler.	0.1 Deg C
Dissolved Oxygen	Analysed on site by sampler.	0.1 g O2/m³
Aqueous Total Metal Digestion	Follows APHA 21st Edition Method 3030E (modified) using nitric acid.	n/a

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

414
639

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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Certificate of Analysis

Date Issued: 13 May 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 03 May 2011

AsureQuality Lab. Reference: 93855

Sample Type(s): Aqueous

Analysis: **Total Petroleum Hydrocarbons**

Method:

The samples were extracted with an organic solvent. The extracts were analysed by gas liquid chromatography using a flame ionisation detector.

Results are reported to two significant figures in milligrams per litre (mg/L), equivalent to ppm, on an as received basis. Detection limits are reported to one significant figure. Total (C7-C36) is reported both including and excluding the limits of detection values, reflecting maximum and minimum levels respectively.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Paul Wilson
Analyst
AsureQuality Limited

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 01Wharemaku Stream,West of SH1 Water

Laboratory Reference: 93855-1 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25		**0.049**
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0.0490
Total C7-C36 (maximum):		0.909

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 02 Mazengarb Drain Water

Laboratory Reference: 93855-2 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 03 Waikanae River Water

Laboratory Reference: 93855-3 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 04Waikanae River,Upper Catchment Water

Laboratory Reference: 93855-4 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 05 Waimeha Stream Water

Laboratory Reference: 93855-5 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 06 Ngarara Stream Water

Laboratory Reference: 93855-6 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 07 Hadfield/Drain Kowhai Stream Water

Laboratory Reference: 93855-7 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 08Wharemaku Stream,Upper Catchment Water

Laboratory Reference: 93855-8 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: Laboratory Blank
Laboratory Reference: 93855 BLANK
Date Received: Not applicable
Date Extracted: 05 May 2011
Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

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Certificate of Analysis

Date Issued: 13 May 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 03 May 2011

AsureQuality Lab. Reference: 93855

Sample Type(s): Aqueous

Analysis: **Semi Volatile Organic Contaminants**

Method:
The sample was extracted with organic solvent and the extract analysed by gas chromatography - mass spectrometry.

Results are reported to two significant figures in micrograms per litre (µg/L), equivalent to ppb, on an as received basis. Detection limits are reported to one significant figure.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Jayanthi Ranasinghe
Scientist
AsureQuality Limited

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 01Wharemaku Stream,West of SH1 Water

Laboratory Reference: 93855-1 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 02 Mazengarb Drain Water

Laboratory Reference: 93855-2 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 03 Waikanae River Water

Laboratory Reference: 93855-3 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 04Waikanae River,Upper Catchment Water

Laboratory Reference: 93855-4 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 05 Waimeha Stream Water

Laboratory Reference: 93855-5 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 06 Ngarara Stream Water

Laboratory Reference: 93855-6 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 07 Hadfield/Drain Kowhai Stream Water

Laboratory Reference: 93855-7 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 08Wharemaku Stream,Upper Catchment Water

Laboratory Reference: 93855-8 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: Laboratory Blank

Laboratory Reference: 93855 BLANK

Date Received: Not applicable

Date Extracted: 10 May 2011

Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Environmental Laboratory Services Ltd.

Analytical Report

Boffa Miskell - M2PP Project
PO Box 11-340
Wellington
6142

Attention: Matiu Park

Report Number: 11/11320
Issue: 1
08 June 2011

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-01	Wharemauku Stream # West of SH1 Water		23/05/2011 11:40	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	4	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.1	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	25	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	7.84	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	310	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.90	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.91	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.19	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.3	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.068	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.35	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.171	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-01	Wharemauku Stream # West of SH1 Water		23/05/2011 11:40	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.9	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.219	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.020	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.042	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0009	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0014	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	1.03	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.221	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-01	Wharemauku Stream # West of SH1 Water		23/05/2011 11:40	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6724	Nickel - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.020	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	6.90			Jacinta Hira-Wilson KTP
O1311	Temperature	13.6	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	9.4	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-02	Mazengarb Drain Water		23/05/2011 12:13	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	12	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	27.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	41	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	21.4	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	570	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.04	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.50	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.54	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.54	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.2	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	22.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	1.2	g NH3-N/m³		Jacinta

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-02	Mazengarb Drain Water		23/05/2011 12:13	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP
2080	Total Phosphorus	0.139	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.76	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.416	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	3.8	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.446	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.015	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.172	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.05	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0021	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-02	Mazengarb Drain Water		23/05/2011 12:13	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6713	Copper - Dissolved	0.0018	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	2.06	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.431	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0015	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.013	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.00			Jacinta Hira-Wilson KTP
O1311	Temperature	12.8	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.1	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-03	Waikanae River Water		23/05/2011 12:50	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	4.64	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	52	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.18	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.18	g/m³		Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-03	Waikanae River Water		23/05/2011 12:50	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.6	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	63.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.1	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.018	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.013	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.32	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.183	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.2	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.007	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.028	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-03	Waikanae River Water		23/05/2011 12:50	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0043	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.30			Jacinta Hira-Wilson KTP
O1311	Temperature	12.1	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	11.1	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-04	Waikanae River # Upper Catchment Water		23/05/2011 13:21	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.5	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.56	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	28	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-04	Waikanae River # Upper Catchment Water		23/05/2011 13:21	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.25	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.25	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.7	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	41.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.016	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.008	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.30	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.032	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.001	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-04	Waikanae River # Upper Catchment Water		23/05/2011 13:21	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.011	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.01	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	12.1	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	11.2	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-05	Waimeha Stream Water		23/05/2011 13:42	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	14.2	mS/m		Vinia Buntoro KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-05	Waimeha Stream Water		23/05/2011 13:42	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.67	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	160	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.59	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.59	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.02	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	< 0.1	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	88.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.017	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.65	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.008	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.3	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-05	Waimeha Stream Water		23/05/2011 13:42	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.030	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.15	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0314	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.003	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	6.70			Jacinta Hira-Wilson KTP
O1311	Temperature	14.7	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.5	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-06	Ngarara Stream Water		23/05/2011 14:05	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	8	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	32	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	7.38	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	720	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.63	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.64	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.04	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.5	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.5	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.072	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.014	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.13	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.303	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-06	Ngarara Stream Water		23/05/2011 14:05	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.7	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.116	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.080	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0008	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.91	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.107	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.004	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	13.3	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.4	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-07	Hadfield Drain/Kowhai Stream Water		23/05/2011 14:25	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	17.3	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	3.27	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	190	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.12	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.13	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.1	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	5.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.032	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.009	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.45	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.163	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-07	Hadfield Drain/Kowhai Stream Water		23/05/2011 14:25	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.4	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.019	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.048	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0013	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.16	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0173	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.003	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.00			Jacinta Hira-Wilson KTP
O1311	Temperature	13.5	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.8	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-07	Hadfield Drain/Kowhai Stream Water		23/05/2011 14:25	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-08	Wharemauku Stream # Upper Catchment Water		23/05/2011 14:58	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	17.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	1.60	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	230	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	1.19	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	1.19	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.4	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	16.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.2	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.035	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.024	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.40	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.063	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-08	Wharemauku Stream # Upper Catchment Water		23/05/2011 14:58	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.007	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.022	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0012	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.10	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0069	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-08	Wharemauku Stream # Upper Catchment Water		23/05/2011 14:58	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	13.9	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	9.7	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA 21st Edition Method 2540 D	3 g/m³
Conductivity at 25°C	APHA 21st Edition Method 2510 B. LAS official test 5.02.	0.1 mS/m
Chemical Oxygen Demand	APHA 21st Edition Method 5220 D. LAS official test 5.09.	15 g/m³
Turbidity	Turbidity Meter following APHA 21st Edition Method 2130 B. LAS official test 5.04.	0.01 NTU
E. coli	APHA 21st Edition 9222 G, 2005; MIMM 11.5, 2005	1 cfu/100mL
BOD5 - Carbonaceous	APHA 21st Edition Method 5210 B with nitirification inhibitor.	1 g/m³
Total Petroleum Hydrocarbons	Subcontracted to AsureQuality NZ	n/a
SemiVolatile Organic Compounds	Subcontracted to AsureQuality NZ.	Trace levels
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified). LAS official test 5.13.	0.01 g/m³
Total Oxidised Nitrogen	By Calculation. Nitrite Nitrogen + Nitrate Nitrogen. Also known as Nitrate-Nitrite Nitrogen.	0.05 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500 NH3 H. LAS official test 5.10.	0.01 g/m³
Flow Rate	Data measured on site.	0.1 m/sec
Approximate Depth	Data measured on site.	1 Centimetres
Total Kjeldahl Nitrogen	By Calculation - Total Nitrogen minus NNN	0.1 g NH3-N/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Persulphate digestion follows APHA 21st Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Official LAS test 5.15.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-NO3 I. Persulphate digestion follows APHA 21st Edition 4500-N C.	0.05 g/m³
Aluminium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Arsenic - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Boron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.05 g/m³
Cadmium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³

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Test	Methodology	Detection Limit
Chromium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Cobalt - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Copper - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Iron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 g/m³
Lead - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Manganese - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Nickel - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Zinc - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.17	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.18	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.19	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.20	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.22	0.001 g/m³
Cobalt - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified)	0.0005 g/m³
Copper - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.23	0.0005 g/m³
Iron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.25	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.26	0.0005 g/m³
Manganese - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.28	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.46	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.33	0.002 g/m³
pH - onsite reading	Analysed on site by sampler.	
Temperature	Analysed on site by sampler.	0.1 Deg C
Dissolved Oxygen	Analysed on site by sampler.	0.1 g O2/m³
Aqueous Total Metal Digestion	Follows APHA 21st Edition Method 3030E (modified) using nitric acid.	n/a

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

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Certificate of Analysis

Date Issued: 08 Jun 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 24 May 2011

AsureQuality Lab. Reference: 94832

Sample Type(s): Aqueous

Analysis: **Total Petroleum Hydrocarbons**

Method:

The samples were extracted with an organic solvent. The extracts were analysed by gas liquid chromatography using a flame ionisation detector.

Results are reported to two significant figures in milligrams per litre (mg/L), equivalent to ppm, on an as received basis. Detection limits are reported to one significant figure. Total (C7-C36) is reported both including and excluding the limits of detection values, reflecting maximum and minimum levels respectively.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Paul Wilson
Analyst
AsureQuality Limited

08 June 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 01 Wharemaku Stream West of SH1 Water

Laboratory Reference: 94832-1 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 02 Mazengarb Drain Water

Laboratory Reference: 94832-2 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 03 Waikanae River Water

Laboratory Reference: 94832-3 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 04 Waikanae River Upper Catchment Water

Laboratory Reference: 94832-4 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 05 Waimeha Stream Water

Laboratory Reference: 94832-5 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**
C7-C9 as C9	< 0.2
C10-C11 as C11	< 0.2
C12-C14 as C14	< 0.2
C15-C20 as C20	< 0.2
C21-C25 as C25	< 0.3
C26-C36 as C30	< 0.4
Total C7-C36 (minimum):	0
Total C7-C36 (maximum):	1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 06 Ngarara Stream Water

Laboratory Reference: 94832-6 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

08 June 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 07 Hadfield Drain/Kowhai Stream Water

Laboratory Reference: 94832-7 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/11320 08 Wharemaku Stream Upper Catchment Water

Laboratory Reference: 94832-8 Date Received: 24 May 2011

Date Extracted: 26 May 2011 Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: Laboratory Blank

Laboratory Reference: 94832 BLANK

Date Received: Not applicable

Date Extracted: 26 May 2011

Date Analysed: 26 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: LR Data Analyst: LR Authorised: Paul Wilson

1C Quadrant Drive, Waiwhetu
PO Box 31242, Lower Hutt 5010
Wellington, New Zealand

T 64 4 5708800
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Certificate of Analysis

Date Issued: 08 Jun 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 24 May 2011

AsureQuality Lab. Reference: 94832

Sample Type(s): Aqueous

Analysis: **Semi Volatile Organic Contaminants**

Method:
The sample was extracted with organic solvent and the extract analysed by gas chromatography - mass spectrometry.

Results are reported to two significant figures in micrograms per litre (µg/L), equivalent to ppb, on an as received basis. Detection limits are reported to one significant figure.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Jayanthi Ranasinghe
Scientist
AsureQuality Limited

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 01 Wharemaku Stream West of SH1 Water

Laboratory Reference: 94832-1 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.03	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 02 Mazengarb Drain Water

Laboratory Reference: 94832-2 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.03	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 03 Waikanae River Water

Laboratory Reference: 94832-3 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 04 Waikanae River Upper Catchment Water

Laboratory Reference: 94832-4 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 05 Waimeha Stream Water

Laboratory Reference: 94832-5 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 06 Ngarara Stream Water

Laboratory Reference: 94832-6 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 07 Hadfield Drain/Kowhai Stream Water

Laboratory Reference: 94832-7 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/11320 08 Wharemaku Stream Upper Catchment Water

Laboratory Reference: 94832-8 Date Received: 24 May 2011

Date Extracted: 31 May 2011 Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: Laboratory Blank

Laboratory Reference: 94832 BLANK

Date Received: Not applicable

Date Extracted: 31 May 2011

Date Analysed: 31 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Environmental Laboratory Services Ltd.

Analytical Report

BECA - M2PP Project
PO Box 6345
Auckland 1141

Report Number: 11/13096
Issue: 1
04 July 2011

Attention: Matiu Park

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-01	Wharemauku Stream # West of SH1 Water		16/06/2011 10:56	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 6	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	19.1	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	26	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	6.42	NTU		Gordon McArthur KTP/LAS
0098	E. coli	230	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	1.27	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	1.28	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	0.19	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.5	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	32.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.050	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.009	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.65	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.219	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Lower Hutt New Zealand
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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-01	Wharemauku Stream # West of SH1 Water		16/06/2011 10:56	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.6	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.150	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.008	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.047	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.85	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.151	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.007	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-01	Wharemauku Stream # West of SH1 Water		16/06/2011 10:56	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	10.7 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	10.4	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	93.3	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-02	Mazengarb Drain Water		16/06/2011 11:28	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	26.0	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	52	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	25.6	NTU		Gordon McArthur KTP/LAS
0098	E. coli	240	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.02	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.52	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.54	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	0.70	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.4	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	22.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	1.4	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.139	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.023	g/m³		Divina Lagazon KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-02	Mazengarb Drain Water		16/06/2011 11:28	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
2127	Total Nitrogen	1.96	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.815	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	0.06	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	3.6	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.329	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.015	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.061	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.05	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0015	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0016	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.89	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-02	Mazengarb Drain Water		16/06/2011 11:28	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6721	Manganese - Dissolved	0.333	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0011	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.011	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.00			Jacinta Hira-Wilson KTP
O1311	Temperature	11.1 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	8.2	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	74.0	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-03	Waikanae River Water		16/06/2011 11:59	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 6	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.4	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	0.64	NTU		Gordon McArthur KTP/LAS
0098	E. coli	40	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.35	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.35	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.9	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	70.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Necia Hira

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-03	Waikanae River Water		16/06/2011 11:59	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
2080	Total Phosphorus	0.013	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.40	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.037	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.003	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.015	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-03	Waikanae River Water		16/06/2011 11:59	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6717	Iron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0029	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	10.4 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	11.3	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	100.3	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-04	Waikanae River # Upper Catchment Water		16/06/2011 12:35	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 6	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.2	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	0.57	NTU		Gordon McArthur KTP/LAS
0098	E. coli	24	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.34	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.34	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-04	Waikanae River # Upper Catchment Water		16/06/2011 12:35	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0994d	Flow Rate	1.0	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	37.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.013	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.014	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.38	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.034	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.016	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-04	Waikanae River # Upper Catchment Water		16/06/2011 12:35	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.01	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	10.2 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	11.4	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	100.5	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-05	Waimeha Stream Water		16/06/2011 12:55	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 6	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	13.8	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	0.68	NTU		Gordon McArthur KTP/LAS
0098	E. coli	140	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic	Attached			Jacinta

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-05	Waimeha Stream Water		16/06/2011 12:55	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
	Compounds				KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.68	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.68	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	0.03	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	< 0.1	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	100	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.015	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.75	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.008	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.2	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.024	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.003	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-05	Waimeha Stream Water		16/06/2011 12:55	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.12	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0252	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	6.70			Jacinta Hira-Wilson KTP
O1311	Temperature	13.9 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	8.7	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	84.5	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-06	Ngarara Stream Water		16/06/2011 13:22	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	9	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.0	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	42	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	7.15	NTU		Gordon McArthur KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-06	Ngarara Stream Water		16/06/2011 13:22	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0098	E. coli	200	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 6	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	1.04	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	1.05	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	0.08	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.6	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	34.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	0.5	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.057	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.009	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.56	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.406	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.6	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.127	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.002	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-06	Ngarara Stream Water		16/06/2011 13:22	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.090	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.79	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.122	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.003	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.00			Jacinta Hira-Wilson KTP
O1311	Temperature	11.7 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	8.9	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	82.0	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-07	Hadfield Drain/Kowhai Stream Water		16/06/2011 13:47	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 6	g/m³		Gordon McArthur KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-07	Hadfield Drain/Kowhai Stream Water		16/06/2011 13:47	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0055	Conductivity at 25°C	16.7	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	7.75	NTU		Gordon McArthur KTP/LAS
0098	E. coli	110	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.56	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.57	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	0.02	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.3	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	8.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.041	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.015	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.89	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.660	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-07	Hadfield Drain/Kowhai Stream Water		16/06/2011 13:47	16/06/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6617	Iron - Total	0.6	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.025	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.054	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0008	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.14	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0211	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	11.0 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	10.3	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	93.1	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-08	Wharemauku Stream # Upper Catchment Water		16/06/2011 14:15	16/06/2011	0

Notes: This site is 180m upstream from previous - Major Stream reco nstruction taking place at control site.

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 6	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	19.3	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Graham Waghorn KTP/LAS
0084	Turbidity	2.96	NTU		Gordon McArthur KTP/LAS
0098	E. coli	300	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Gordon McArthur KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Deb Bottrill
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	1.41	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	1.41	g/m³		Sue Meiklen KTP
0760	Ammonia Nitrogen	0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.5	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	12.0	Centimetres		Rob Deacon KTP/LAS
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Necia Hira
2080	Total Phosphorus	0.034	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.030	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.69	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.151	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-08	Wharemauku Stream # Upper Catchment Water		16/06/2011 14:15	16/06/2011	0

Notes: This site is 180m upstream from previous - Major Stream reco nstruction taking place at control site.

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.2	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.013	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.037	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.12	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0104	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.50			Jacinta Hira-Wilson KTP
O1311	Temperature	11.3 Deg C	Deg C		Rob Deacon KTP/LAS
O1312	Dissolved Oxygen	10.6	g O2/m³		Rob Deacon KTP/LAS
O1312B	Saturated Dissolved Oxygen	96.3	% O2		Rob Deacon KTP/LAS
P1855	Aqueous Total Metal Digestion	Completed			Jacinta

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/13096-08	Wharemauku Stream # Upper Catchment Water		16/06/2011 14:15	16/06/2011	0

Notes: This site is 180m upstream from previous - Major Stream reco nstruction taking place at control site.

Test	Result	Units	Comments	Signatory
				KTP

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA 21st Edition Method 2540 D	3 g/m³
Conductivity at 25°C	APHA 21st Edition Method 2510 B. LAS official test 5.02.	0.1 mS/m
Chemical Oxygen Demand	APHA 21st Edition Method 5220 D. LAS official test 5.09.	15 g/m³
Turbidity	Turbidity Meter following APHA 21st Edition Method 2130 B. LAS official test 5.04.	0.01 NTU
E. coli	APHA 21st Edition 9222 G, 2005; MIMM 11.5, 2005	1 cfu/100mL
BOD5 - Carbonaceous	APHA 21st Edition Method 5210 B with nitirification inhibitor.	1 g/m³
Total Petroleum Hydrocarbons	Subcontracted to AsureQuality NZ	n/a
SemiVolatile Organic Compounds	Subcontracted to AsureQuality NZ.	Trace levels
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified). LAS official test 5.13.	0.01 g/m³
Total Oxidised Nitrogen	By Calculation. Nitrite Nitrogen + Nitrate Nitrogen. Also known as Nitrate-Nitrite Nitrogen.	0.05 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500 NH3 H. LAS official test 5.10.	0.01 g/m³
Flow Rate	Data measured on site.	0.1 m/sec
Approximate Depth	Data measured on site.	1 Centimetres
Total Kjeldahl Nitrogen	By Calculation - Total Nitrogen minus NNN	0.1 g NH3-N/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Persulphate digestion follows APHA 21st Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Official LAS test 5.15.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-NO3 I. Persulphate digestion follows APHA 21st Edition 4500-N C.	0.05 g/m³
Aluminium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Arsenic - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Boron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.05 g/m³
Cadmium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Chromium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Cobalt - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Copper - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Iron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 g/m³
Lead - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Manganese - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³

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Test	Methodology	Detection Limit
Nickel - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Zinc - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.17	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.18	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.19	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.20	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.22	0.001 g/m³
Cobalt - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified)	0.0005 g/m³
Copper - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.23	0.0005 g/m³
Iron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.25	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.26	0.0005 g/m³
Manganese - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.28	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.46	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.33	0.002 g/m³
pH - onsite reading	Analysed on site by sampler.	
Temperature	Analysed on site by sampler.	0.1 Deg C
Dissolved Oxygen	Analysed on site by sampler.	0.1 g O2/m³
Saturated Dissolved Oxygen	Analysed on site by sampler.	0.1 % O2
Aqueous Total Metal Digestion	Follows APHA 21st Edition Method 3030E (modified) using nitric acid.	n/a

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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Certificate of Analysis

Date Issued: 01 Jul 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 17 Jun 2011

AsureQuality Lab. Reference: 95974

Sample Type(s): Aqueous

Analysis: **Total Petroleum Hydrocarbons**

Method:

The samples were extracted with an organic solvent. The extracts were analysed by gas liquid chromatography using a flame ionisation detector.

Results are reported to two significant figures in milligrams per litre (mg/L), equivalent to ppm, on an as received basis. Detection limits are reported to one significant figure. Total (C7-C36) is reported both including and excluding the limits of detection values, reflecting maximum and minimum levels respectively.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Paul Wilson
Analyst
AsureQuality Limited

01 July 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 01 Wharemauku Stream, West of SH1 Water

Laboratory Reference: 95974-1 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 02 Mazengarb Drain Water

Laboratory Reference: 95974-2 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**
C7-C9 as C9	< 0.2
C10-C11 as C11	< 0.2
C12-C14 as C14	< 0.2
C15-C20 as C20	< 0.2
C21-C25 as C25	< 0.3
C26-C36 as C30	< 0.4
Total C7-C36 (minimum):	0
Total C7-C36 (maximum):	1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 03 Waikanae River Water

Laboratory Reference: 95974-3 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 04 Waikanae River, Upper Catchment Water

Laboratory Reference: 95974-4 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 05 Waimeha Stream Water

Laboratory Reference: 95974-5 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**
C7-C9 as C9	< 0.2
C10-C11 as C11	< 0.2
C12-C14 as C14	< 0.2
C15-C20 as C20	< 0.2
C21-C25 as C25	< 0.3
C26-C36 as C30	< 0.4
Total C7-C36 (minimum):	0
Total C7-C36 (maximum):	1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

01 July 2011

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 06 Ngarara Stream Water

Laboratory Reference: 95974-6 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**
C7-C9 as C9	< 0.2
C10-C11 as C11	< 0.2
C12-C14 as C14	< 0.2
C15-C20 as C20	< 0.2
C21-C25 as C25	< 0.3
C26-C36 as C30	< 0.4
Total C7-C36 (minimum):	0
Total C7-C36 (maximum):	1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 07 Hadfield Drain/Kowhai Stream Water

Laboratory Reference: 95974-7 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/13096 08 Wharemauku Stream, Upper Catchment Water

Laboratory Reference: 95974-8 Date Received: 17 Jun 2011

Date Extracted: 20 Jun 2011 Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: Laboratory Blank

Laboratory Reference: 95974 BLANK

Date Received: Not applicable

Date Extracted: 20 Jun 2011

Date Analysed: 23 Jun 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.2
C10-C11 as C11	<	0.2
C12-C14 as C14	<	0.2
C15-C20 as C20	<	0.2
C21-C25 as C25	<	0.3
C26-C36 as C30	<	0.4
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		1.50

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: MC Data Analyst: PW Authorised: Paul Wilson

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Certificate of Analysis

Date Issued: 01 Jul 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 17 Jun 2011

AsureQuality Lab. Reference: 95974

Sample Type(s): Aqueous

Analysis: **Semi Volatile Organic Contaminants**

Method:
The sample was extracted with organic solvent and the extract analysed by gas chromatography - mass spectrometry.

Results are reported to two significant figures in micrograms per litre (µg/L), equivalent to ppb, on an as received basis. Detection limits are reported to one significant figure.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Jayanthi Ranasinghe
Scientist
AsureQuality Limited

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 01 Wharemauku Stream, West of SH1 Water

Laboratory Reference: 95974-1 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 02 Mazengarb Drain Water

Laboratory Reference: 95974-2 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 03 Waikanae River Water

Laboratory Reference: 95974-3 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 04 Waikanae River, Upper Catchment Water

Laboratory Reference: 95974-4 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 05 Waimeha Stream Water

Laboratory Reference: 95974-5 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 06 Ngarara Stream Water

Laboratory Reference: 95974-6 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 07 Hadfield Drain/Kowhai Stream Water

Laboratory Reference: 95974-7 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/13096 08 Wharemauku Stream, Upper Catchment Water

Laboratory Reference: 95974-8 Date Received: 17 Jun 2011

Date Extracted: 22 Jun 2011 Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: Laboratory Blank

Laboratory Reference: 95974 BLANK

Date Received: Not applicable

Date Extracted: 22 Jun 2011

Date Analysed: 23 Jun 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: JF Authorised: Jayanthi Ranasinghe

Appendix 24.F

ELS Reports No. 11/11666

(25 May 2010) & 11/12927 (10 June 2011)

APPENDIX F ELS Reports No. 11/11666 (25 May 2010) & 11/12927 (10 June 2011)

Environmental Laboratory Services Ltd.

Analytical Report

Boffa Miskell - M2PP Project
PO Box 11-340
Wellington
6142

Attention: Matiu Park

Report Number: 11/9525
Issue: 1
19 May 2011

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-01	Wharemaku Stream # West of SH1 Water		02/05/2011 10:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	25.2	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	4.20	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	120	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.02	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.61	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.63	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.17	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.2	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.045	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.04	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.092	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

85 Port Road Seaview
Lower Hutt New Zealand
Phone: (04) 576 5016 Fax: (04) 576 5017
Email: mailto:reports@els.co.nz Website: http://www.els.co.nz

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-01	Wharemaku Stream # West of SH1 Water		02/05/2011 10:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.184	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.011	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.013	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.42	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.172	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.009	g/m³		Sharon van

85 Port Road Seaview
Lower Hutt New Zealand
Phone: (04) 576 5016 Fax: (04) 576 5017
Email: mailto:reports@els.co.nz Website: http://www.els.co.nz

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-01	Wharemaku Stream # West of SH1 Water		02/05/2011 10:40	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	14.5	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.9	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-02	Mazengarb Drain Water		02/05/2011 11:30	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	29.2	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	33	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	17.6	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	160	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.07	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.59	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.66	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.48	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.2	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	17.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	1.0	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.091	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.68	g/m³		Divina

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-02	Mazengarb Drain Water		02/05/2011 11:30	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6601	Aluminium - Total	0.212	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	0.06	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	3.4	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.417	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.008	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.054	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.06	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0012	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	1.32	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-02	Mazengarb Drain Water		02/05/2011 11:30	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6721	Manganese - Dissolved	0.396	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0013	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.006	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	13.8	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.3	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-03	Waikanae River Water		02/05/2011 12:15	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.8	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.77	NTU		Gordon McArthur KTP/LAS
0098	E. coli	40	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.26	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.27	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.8	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	59.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Rob Deacon KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-03	Waikanae River Water		02/05/2011 12:15	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
2080	Total Phosphorus	0.013	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.008	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.35	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.027	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.003	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.010	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-03	Waikanae River Water		02/05/2011 12:15	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6717	Iron - Dissolved	0.02	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0025	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	13.0	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	10.6	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-04	Waikanae River # Upper Catchment Water		02/05/2011 13:05	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.4	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.58	NTU		Gordon McArthur KTP/LAS
0098	E. coli	52	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.27	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.27	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-04	Waikanae River # Upper Catchment Water		02/05/2011 13:05	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
0994d	Flow Rate	0.5	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	33.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.014	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.32	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.030	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.011	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-04	Waikanae River # Upper Catchment Water		02/05/2011 13:05	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	< 0.01	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0005	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	12.0	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	10.8	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-05	Waimeha Stream Water		02/05/2011 13:35	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	14.5	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	1.61	NTU		Gordon McArthur KTP/LAS
0098	E. coli	260	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-05	Waimeha Stream Water		02/05/2011 13:35	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.52	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.52	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.03	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.1	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	91.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.023	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.55	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.029	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.4	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.028	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.005	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-05	Waimeha Stream Water		02/05/2011 13:35	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.15	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0283	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	14.9	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	7.9	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-06	Ngarara Stream Water		02/05/2011 14:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	8	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.9	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	7.23	NTU		Gordon McArthur KTP/LAS
0098	E. coli	2,100	cfu/100mL		Sunita Raju KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-06	Ngarara Stream Water		02/05/2011 14:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.02	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.67	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.68	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.04	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.5	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.065	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.015	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.06	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.205	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.5	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.093	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-06	Ngarara Stream Water		02/05/2011 14:10	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6638	Zinc - Total	0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.033	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0009	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.16	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0113	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.20			Jacinta Hira-Wilson KTP
O1311	Temperature	14.3	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.2	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-07	Hadfield Drain/Kowhai Stream Water		02/05/2011 14:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	8	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	18.7	mS/m		Gordon McArthur KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-07	Hadfield Drain/Kowhai Stream Water		02/05/2011 14:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	2.71	NTU		Gordon McArthur KTP/LAS
0098	E. coli	140	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.01	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	<0.05	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.1	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	10.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.022	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.011	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.32	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.082	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.2	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-07	Hadfield Drain/Kowhai Stream Water		02/05/2011 14:45	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.010	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.049	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.64	g/m³		Tracy Morrison KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0870	g/m³		Tracy Morrison KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	13.9	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.5	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-08	Wharemaku Stream # Upper Catchment Water		02/05/2011 15:20	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	8.9	mS/m		Gordon McArthur KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	1.64	NTU		Gordon McArthur KTP/LAS
0098	E. coli	260	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.85	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.86	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.3	m/sec		Rob Deacon KTP/LAS
0995	Approximate Depth	12.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.034	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.028	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.13	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.066	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/9525-08	Wharemaku Stream # Upper Catchment Water		02/05/2011 15:20	02/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.005	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.120	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.07	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0047	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	14.0	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	9.8	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Deb Bottrill

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Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA 21st Edition Method 2540 D	3 g/m³
Conductivity at 25°C	APHA 21st Edition Method 2510 B. LAS official test 5.02.	0.1 mS/m
Chemical Oxygen Demand	APHA 21st Edition Method 5220 D. LAS official test 5.09.	15 g/m³
Turbidity	Turbidity Meter following APHA 21st Edition Method 2130 B. LAS official test 5.04.	0.01 NTU
E. coli	APHA 21st Edition 9222 G, 2005; MIMM 11.5, 2005	1 cfu/100mL
BOD5 - Carbonaceous	APHA 21st Edition Method 5210 B with nitirification inhibitor.	1 g/m³
Total Petroleum Hydrocarbons	Subcontracted to AsureQuality NZ	n/a
SemiVolatile Organic Compounds	Subcontracted to AsureQuality NZ. LAS official tests 5.35, 5.36.	Trace levels
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified). LAS official test 5.13.	0.01 g/m³
Total Oxidised Nitrogen	By Calculation. Nitrite Nitrogen + Nitrate Nitrogen. Also known as Nitrate-Nitrite Nitrogen.	0.05 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500 NH3 H. LAS official test 5.10.	0.01 g/m³
Flow Rate	Data measured on site.	0.1 m/sec
Approximate Depth	Data measured on site.	1 Centimetres
Total Kjeldahl Nitrogen	By Calculation - Total Nitrogen minus NNN	0.1 g NH3-N/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Persulphate digestion follows APHA 21st Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Official LAS test 5.15.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-NO3 I. Persulphate digestion follows APHA 21st Edition 4500-N C.	0.05 g/m³
Aluminium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Arsenic - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Boron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.05 g/m³
Cadmium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Chromium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Cobalt - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Copper - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Iron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 g/m³
Lead - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Manganese - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Nickel - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Zinc - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.17	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.18	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.19	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.20	0.0002 g/m³

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Test	Methodology	Detection Limit
Chromium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.22	0.001 g/m³
Cobalt - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified)	0.0005 g/m³
Copper - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.23	0.0005 g/m³
Iron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.25	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.26	0.0005 g/m³
Manganese - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.28	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.46	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.33	0.002 g/m³
pH - onsite reading	Analysed on site by sampler.	
Temperature	Analysed on site by sampler.	0.1 Deg C
Dissolved Oxygen	Analysed on site by sampler.	0.1 g O2/m³
Aqueous Total Metal Digestion	Follows APHA 21st Edition Method 3030E (modified) using nitric acid.	n/a

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

414
639

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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Certificate of Analysis

Date Issued: 13 May 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 03 May 2011

AsureQuality Lab. Reference: 93855

Sample Type(s): Aqueous

Analysis: **Total Petroleum Hydrocarbons**

Method:

The samples were extracted with an organic solvent. The extracts were analysed by gas liquid chromatography using a flame ionisation detector.

Results are reported to two significant figures in milligrams per litre (mg/L), equivalent to ppm, on an as received basis. Detection limits are reported to one significant figure. Total (C7-C36) is reported both including and excluding the limits of detection values, reflecting maximum and minimum levels respectively.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Paul Wilson
Analyst
AsureQuality Limited

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 01Wharemaku Stream,West of SH1 Water

Laboratory Reference: 93855-1 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25		**0.049**
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0.0490
Total C7-C36 (maximum):		0.909

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 02 Mazengarb Drain Water

Laboratory Reference: 93855-2 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 03 Waikanae River Water

Laboratory Reference: 93855-3 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 04Waikanae River,Upper Catchment Water

Laboratory Reference: 93855-4 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 05 Waimeha Stream Water

Laboratory Reference: 93855-5 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 06 Ngarara Stream Water

Laboratory Reference: 93855-6 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 07 Hadfield/Drain Kowhai Stream Water

Laboratory Reference: 93855-7 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: 11/9525 08Wharemaku Stream,Upper Catchment Water

Laboratory Reference: 93855-8 Date Received: 03 May 2011

Date Extracted: 05 May 2011 Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

Results: Total Petroleum Hydrocarbons

Sample Identification: Laboratory Blank
Laboratory Reference: 93855 BLANK
Date Received: Not applicable
Date Extracted: 05 May 2011
Date Analysed: 05 May 2011

Total Petroleum Hydrocarbon	**Conc.† (mg/L)**	
C7-C9 as C9	<	0.5
C10-C11 as C11	<	0.1
C12-C14 as C14	<	0.03
C15-C20 as C20	<	0.03
C21-C25 as C25	<	0.03
C26-C36 as C30	<	0.2
Total C7-C36 (minimum):		0
Total C7-C36 (maximum):		0.890

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: PW Data Analyst: PW Authorised: Paul Wilson

1C Quadrant Drive, Waiwhetu
PO Box 31242, Lower Hutt 5010
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Certificate of Analysis

Date Issued: 13 May 2011

Client: Environmental Laboratory Services
PO Box 36 105
Moera
Lower Hutt 5045
Wellington

Attention: Rob Deacon

Date Received: 03 May 2011

AsureQuality Lab. Reference: 93855

Sample Type(s): Aqueous

Analysis: **Semi Volatile Organic Contaminants**

Method:
The sample was extracted with organic solvent and the extract analysed by gas chromatography - mass spectrometry.

Results are reported to two significant figures in micrograms per litre (µg/L), equivalent to ppb, on an as received basis. Detection limits are reported to one significant figure.

Unless requested, original samples will be disposed of eight weeks from the date of this report.

Comments:

Jayanthi Ranasinghe
Scientist
AsureQuality Limited

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 01Wharemaku Stream,West of SH1 Water

Laboratory Reference: 93855-1 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 02 Mazengarb Drain Water

Laboratory Reference: 93855-2 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 03 Waikanae River Water

Laboratory Reference: 93855-3 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 04Waikanae River,Upper Catchment Water

Laboratory Reference: 93855-4 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 05 Waimeha Stream Water

Laboratory Reference: 93855-5 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 06 Ngarara Stream Water

Laboratory Reference: 93855-6 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 07 Hadfield/Drain Kowhai Stream Water

Laboratory Reference: 93855-7 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: 11/9525 08Wharemaku Stream,Upper Catchment Water

Laboratory Reference: 93855-8 Date Received: 03 May 2011

Date Extracted: 10 May 2011 Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L)
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are reported on an as received basis.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Results: Semi Volatile Organic Contaminants

Sample Identification: Laboratory Blank

Laboratory Reference: 93855 BLANK

Date Received: Not applicable

Date Extracted: 10 May 2011

Date Analysed: 11 May 2011

Analyte	Conc. † (µg/L)	Analyte	Conc. † (µg/L
Organochlorine Pesticides		**Organophosphorus Pesticides**	
hexachlorobenzene	< 0.1	Diazinon	< 0.1
gamma-BHC (lindane)	< 0.01	Pirimiphos methyl	< 0.2
heptachlor	< 0.01	Chlorpyrifos	< 0.2
aldrin	< 0.01	Azinphos methyl	< 0.8
heptachlor epoxide	< 0.01	**Plasticisers**	
Procymidone	< 0.2	di(2-ethylhexyl) adipate	< 2
Alpha-chlordane	< 0.01	di(2-ethylhexyl) phthalate	< 2
Gamma-chlordane	< 0.1	**Polychlorinated Biphenyls**	
pp-DDE	< 0.1	PCB congener #8	< 0.1
dieldrin	< 0.01	PCB congener #28	< 0.1
pp-DDD	< 0.1	PCB congener #101	< 0.1
pp-DDT	< 0.2	PCB congener #138	< 0.1
Methoxychlor	< 0.2	PCB congener #183	< 0.1
Cis permethrin	< 0.2	**Polycyclic Aromatic Hydrocarbons**	
Trans permethrin	< 0.2	naphthalene	< 0.1
alpha-BHC	< 0.1	acenaphthylene	< 0.1
beta-BHC	< 0.1	acenaphthene	< 0.1
Delta-BHC	< 0.1	fluorene	< 0.1
endosulfan I	< 0.1	phenanthrene	< 0.1
endosulfan II	< 0.1	anthracene	< 0.1
Endosulfan sulfate	< 0.1	fluoranthene	< 0.2
endrin	< 0.1	pyrene	< 0.2
Endrin aldehyde	< 0.1	benz[a]anthracene	< 0.1
Endrin ketone	< 0.1	chrysene	< 0.1
Organonitrogen Herbicides		benzo[b]fluoranthene	< 0.1
Trifluralin	< 0.2	benzo[k]fluoranthene	< 0.1
Simazine	< 0.1	benzo[a]pyrene	< 0.1
Atrazine	< 0.1	indeno[1,2,3-c,d]pyrene	< 0.2
Terbuthylazine	< 0.2	dibenz[a,h]anthracene	< 0.2
Propanil	< 0.1	benzo[g,h,i]perylene	< 0.2
Alachlor	< 0.2		
Metolachlor	< 0.1		
Pendimethalin	< 0.2		
Molinate	< 0.1		
Propazine	< 0.1		
Hexazinone	< 0.1		
Metalaxyl	< 0.1		
Cyanazine	< 0.1		
Oxadiazon	< 0.1		
Metribuzin	< 0.1		
Bromacil	< 0.4		
Oryzalin	< 10		

† = Results are calculated using the average volume of samples in this batch.

< = Less than limit of detection.

Lab Analyst: VK Data Analyst: DC Authorised: Jayanthi Ranasinghe

Environmental Laboratory Services Ltd.

Analytical Report

Boffa Miskell - M2PP Project
PO Box 11-340
Wellington
6142

Report Number: 11/11320
Issue: 1
08 June 2011

Attention: Matiu Park

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-01	Wharemauku Stream # West of SH1 Water		23/05/2011 11:40	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	4	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.1	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	25	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	7.84	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	310	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.90	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.91	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.19	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.3	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.4	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.068	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.35	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.171	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-01	Wharemauku Stream # West of SH1 Water		23/05/2011 11:40	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.9	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.219	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.020	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.042	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0009	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0014	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	1.03	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.221	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-01	Wharemauku Stream # West of SH1 Water		23/05/2011 11:40	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6724	Nickel - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.020	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	6.90			Jacinta Hira-Wilson KTP
O1311	Temperature	13.6	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	9.4	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-02	Mazengarb Drain Water		23/05/2011 12:13	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	12	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	27.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	41	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	21.4	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	570	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 3	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.04	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.50	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.54	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.54	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.2	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	22.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	1.2	g NH3-N/m³		Jacinta

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-02	Mazengarb Drain Water		23/05/2011 12:13	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP
2080	Total Phosphorus	0.139	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.012	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.76	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.416	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	3.8	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.446	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.002	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	0.015	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.172	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.05	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0021	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-02	Mazengarb Drain Water		23/05/2011 12:13	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6713	Copper - Dissolved	0.0018	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	2.06	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.431	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0015	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.013	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.00			Jacinta Hira-Wilson KTP
O1311	Temperature	12.8	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.1	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-03	Waikanae River Water		23/05/2011 12:50	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	7	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	4.64	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	52	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.18	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.18	g/m³		Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-03	Waikanae River Water		23/05/2011 12:50	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.6	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	63.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.1	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.018	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.013	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.32	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.183	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.2	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.007	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.028	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-03	Waikanae River Water		23/05/2011 12:50	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.04	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0043	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.30			Jacinta Hira-Wilson KTP
O1311	Temperature	12.1	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	11.1	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-04	Waikanae River # Upper Catchment Water		23/05/2011 13:21	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	9.5	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.56	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	28	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-04	Waikanae River # Upper Catchment Water		23/05/2011 13:21	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.25	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.25	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.7	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	41.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.016	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.008	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.30	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.032	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	< 0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	0.001	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-04	Waikanae River # Upper Catchment Water		23/05/2011 13:21	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.011	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.01	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0007	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	12.1	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	11.2	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-05	Waimeha Stream Water		23/05/2011 13:42	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	14.2	mS/m		Vinia Buntoro KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-05	Waimeha Stream Water		23/05/2011 13:42	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	0.67	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	160	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.59	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.59	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.02	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	< 0.1	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	88.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	< 0.1	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.017	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.007	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.65	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.008	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.3	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-05	Waimeha Stream Water		23/05/2011 13:42	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.030	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	< 0.002	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.15	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0314	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.003	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	6.70			Jacinta Hira-Wilson KTP
O1311	Temperature	14.7	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.5	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-06	Ngarara Stream Water		23/05/2011 14:05	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	8	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	24.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	32	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	7.38	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	720	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.63	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.64	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	0.04	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.5	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	28.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.5	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.072	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.014	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.13	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.303	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-06	Ngarara Stream Water		23/05/2011 14:05	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	1.7	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.116	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.080	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0008	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.91	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.107	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0005	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.004	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.10			Jacinta Hira-Wilson KTP
O1311	Temperature	13.3	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.4	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-07	Hadfield Drain/Kowhai Stream Water		23/05/2011 14:25	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	17.3	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	3.27	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	190	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	0.12	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	0.13	g/m³		Rob Deacon KTP/LAS
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.1	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	5.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.3	g NH3-N/m³		Rob Deacon KTP/LAS
2080	Total Phosphorus	0.032	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.009	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	0.45	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.163	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-07	Hadfield Drain/Kowhai Stream Water		23/05/2011 14:25	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.4	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.019	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.048	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0013	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.16	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0173	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0010	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	0.003	g/m³		Sharon van Soest KTP/LAS
O1306	pH - onsite reading	7.00			Jacinta Hira-Wilson KTP
O1311	Temperature	13.5	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	8.8	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-07	Hadfield Drain/Kowhai Stream Water		23/05/2011 14:25	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-08	Wharemauku Stream # Upper Catchment Water		23/05/2011 14:58	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
0002	Suspended Solids - Total	< 5	g/m³		Gordon McArthur KTP/LAS
0055	Conductivity at 25°C	17.6	mS/m		Vinia Buntoro KTP/LAS
0081	Chemical Oxygen Demand	< 15	g/m³		Gordon McArthur KTP/LAS
0084	Turbidity	1.60	NTU		Vinia Buntoro KTP/LAS
0098	E. coli	230	cfu/100mL		Sunita Raju KTP/LAS
0184	BOD5 - Carbonaceous	< 1	g/m³		Marylou Cabral KTP/LAS
0291	Total Petroleum Hydrocarbons	Attached			Jacinta Hira-Wilson KTP
0294	SemiVolatile Organic Compounds	Attached			Jacinta Hira-Wilson KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³		Shanel Kumar KTP/LAS
0605	Nitrate - Nitrogen	1.19	g/m³		Shanel Kumar KTP/LAS
0759	Total Oxidised Nitrogen	1.19	g/m³		Jacinta Hira-Wilson KTP
0760	Ammonia Nitrogen	< 0.01	g/m³		Divina Lagazon KTP/LAS
0994d	Flow Rate	0.4	m/sec		Gordon McArthur KTP/LAS
0995	Approximate Depth	16.0	Centimetres		Jacinta Hira-Wilson KTP
1033	Total Kjeldahl Nitrogen	0.2	g NH3-N/m³		Jacinta Hira-Wilson KTP
2080	Total Phosphorus	0.035	g/m³		Divina Lagazon KTP/LAS
2088	Dissolved Reactive Phosphorus	0.024	g/m³		Divina Lagazon KTP/LAS
2127	Total Nitrogen	1.40	g/m³		Divina Lagazon KTP/LAS
6601	Aluminium - Total	0.063	g/m³		Sharon van Soest KTP/LAS
6603	Arsenic - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-08	Wharemauku Stream # Upper Catchment Water		23/05/2011 14:58	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
6607	Boron - Total	< 0.05	g/m³		Sharon van Soest KTP/LAS
6608	Cadmium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6611	Chromium - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6612	Cobalt - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6613	Copper - Total	< 0.002	g/m³		Sharon van Soest KTP/LAS
6617	Iron - Total	0.1	g/m³		Sharon van Soest KTP/LAS
6618	Lead - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6621	Manganese - Total	0.007	g/m³		Sharon van Soest KTP/LAS
6624	Nickel - Total	< 0.001	g/m³		Sharon van Soest KTP/LAS
6638	Zinc - Total	< 0.005	g/m³		Sharon van Soest KTP/LAS
6701	Aluminium - Dissolved	0.022	g/m³		Sharon van Soest KTP/LAS
6703	Arsenic - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6707	Boron - Dissolved	< 0.03	g/m³		Sharon van Soest KTP/LAS
6708	Cadmium - Dissolved	< 0.0002	g/m³		Sharon van Soest KTP/LAS
6711	Chromium - Dissolved	< 0.001	g/m³		Sharon van Soest KTP/LAS
6712	Cobalt - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6713	Copper - Dissolved	0.0012	g/m³		Sharon van Soest KTP/LAS
6717	Iron - Dissolved	0.10	g/m³		Sharon van Soest KTP/LAS
6718	Lead - Dissolved	< 0.0005	g/m³		Sharon van Soest KTP/LAS
6721	Manganese - Dissolved	0.0069	g/m³		Sharon van Soest KTP/LAS
6724	Nickel - Dissolved	0.0006	g/m³		Sharon van Soest KTP/LAS
6738	Zinc - Dissolved	< 0.002	g/m³		Sharon van

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
11/11320-08	Wharemauku Stream # Upper Catchment Water		23/05/2011 14:58	23/05/2011	0

Notes:

	Test	Result	Units	Comments	Signatory
					KTP/LAS
O1306	pH - onsite reading	7.40			Jacinta Hira-Wilson KTP
O1311	Temperature	13.9	Deg C		Jacinta Hira-Wilson KTP
O1312	Dissolved Oxygen	9.7	g O2/m³		Jacinta Hira-Wilson KTP
P1855	Aqueous Total Metal Digestion	Completed			Jacinta Hira-Wilson KTP

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA 21st Edition Method 2540 D	3 g/m³
Conductivity at 25°C	APHA 21st Edition Method 2510 B. LAS official test 5.02.	0.1 mS/m
Chemical Oxygen Demand	APHA 21st Edition Method 5220 D. LAS official test 5.09.	15 g/m³
Turbidity	Turbidity Meter following APHA 21st Edition Method 2130 B. LAS official test 5.04.	0.01 NTU
E. coli	APHA 21st Edition 9222 G, 2005; MIMM 11.5, 2005	1 cfu/100mL
BOD5 - Carbonaceous	APHA 21st Edition Method 5210 B with nitirification inhibitor.	1 g/m³
Total Petroleum Hydrocarbons	Subcontracted to AsureQuality NZ	n/a
SemiVolatile Organic Compounds	Subcontracted to AsureQuality NZ.	Trace levels
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified). LAS official test 5.13.	0.01 g/m³
Total Oxidised Nitrogen	By Calculation. Nitrite Nitrogen + Nitrate Nitrogen. Also known as Nitrate-Nitrite Nitrogen.	0.05 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500 NH3 H. LAS official test 5.10.	0.01 g/m³
Flow Rate	Data measured on site.	0.1 m/sec
Approximate Depth	Data measured on site.	1 Centimetres
Total Kjeldahl Nitrogen	By Calculation - Total Nitrogen minus NNN	0.1 g NH3-N/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Persulphate digestion follows APHA 21st Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-P G. Official LAS test 5.15.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 21st Edition Method 4500-NO3 I. Persulphate digestion follows APHA 21st Edition 4500-N C.	0.05 g/m³
Aluminium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Arsenic - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Boron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.05 g/m³
Cadmium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³

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Test	Methodology	Detection Limit
Chromium - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Cobalt - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Copper - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.002 g/m³
Iron - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.1 g/m³
Lead - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Manganese - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Nickel - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.001 g/m³
Zinc - Total	ICP-MS following APHA 21st edition method 3125 (modified)	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.17	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.18	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.19	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.20	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.22	0.001 g/m³
Cobalt - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified)	0.0005 g/m³
Copper - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.23	0.0005 g/m³
Iron - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.25	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.26	0.0005 g/m³
Manganese - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.28	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.46	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 21st edition method 3125 (modified). LAS official test 5.33	0.002 g/m³
pH - onsite reading	Analysed on site by sampler.	
Temperature	Analysed on site by sampler.	0.1 Deg C
Dissolved Oxygen	Analysed on site by sampler.	0.1 g O2/m³
Aqueous Total Metal Digestion	Follows APHA 21st Edition Method 3030E (modified) using nitric acid.	n/a

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By

Rob Deacon

414
639

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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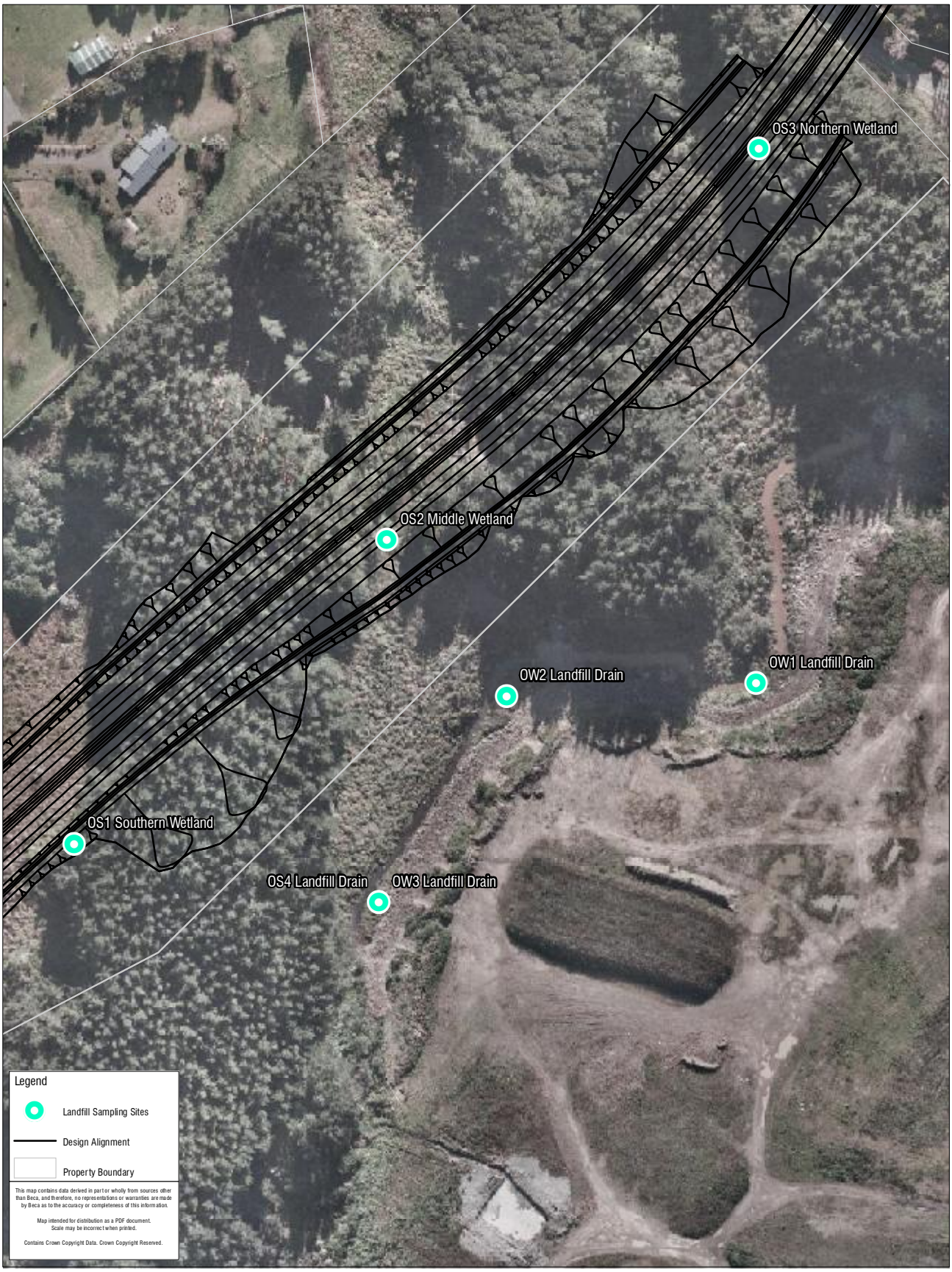
Appendix 24.G

Otaihanga Landfill Water and Sediment Sampling Locations

APPENDIX G Otaihanga Landfill Water and Sediment Sampling Locations



GIS@beca.com

Path: P:\3181818-AKL\3320901\TGIS\5_Workspaces\01_mxd\GIS-3320901-47-Otaihanga Landfill Sampling Sites Plan_A4.mxd

Scale 1:2,000 at A4

0 10 20 40

Metres

Revision	Author	Verified	Approved	Date
1	MGR	AVF	AH4	14-07-2011

Title: **Otaihanga Landfill Sampling Sites**

Client: Fletcher Construction Company Ltd

Project: Mackays to Peka Peka Alliance

N

beca

Discipline: GIS

Drawing No: GIS-3320901-47

Appendix 24.H

Hill Laboratories Report No. 908218 & 907986 (22 June 2011)

APPENDIX H Hill Laboratories Report No. 908218 & 907986 (22 June 2011)

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

ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	908218	SPv1
Contact:	Dr R Bibby	**Date Registered:**	23-Jun-2011	
	C/- Beca Infrastructure Limited	**Date Reported:**	11-Jul-2011	
	PO Box 6345	**Quote No:**	45292	
	Wellesley Street	**Order No:**	3320901/500/021/11:080	
	AUCKLAND 1141	**Client Reference:**	3320901/500/021/11:080	
		Submitted By:	Dr R Bibby	

Sample Type: Sediment

Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Individual Tests						
Organic Matter*	g/100g dry wt	79	36	51	6.9	-
Dry Matter	g/100g as rcvd	11.6	17.4	15.0	69	-
Ash*	g/100g dry wt	21	64	49	93	-
Total Recoverable Aluminium	mg/kg dry wt	5,100	15,500	8,400	14,700	-
Total Recoverable Boron	mg/kg dry wt	10	39	12	5	-
Total Recoverable Cobalt	mg/kg dry wt	1.68	6.5	1.51	7.1	-
Total Recoverable Iron	mg/kg dry wt	10,200	51,000	4,200	17,800	-
Total Recoverable Manganese	mg/kg dry wt	490	1,290	340	360	-
Total Recoverable Phosphorus	mg/kg dry wt	920	2,500	950	480	-
pH*	pH Units	5.0	7.5	5.8	7.1	-
Ammonium-N*	mg/kg dry wt	92	450	143	101	-
Nitrite-N*	mg/kg dry wt	< 5	< 3	< 4	< 1.0	-
Nitrate-N*	mg/kg dry wt	6.6	4.0	< 4.6	< 1.5	-
Nitrate-N + Nitrite-N*	mg/kg dry wt	< 5	3	< 4	< 1.0	-
Total Organic Carbon	g/100g dry wt	25	17.5	22	2.4	-
Total Nitrogen	g/100g dry wt	1.16	1.46	1.14	0.17	-
Heavy metals, trace As,Cd,Cr,Cu,Ni,Pb,Zn,Hg						
Total Recoverable Arsenic	mg/kg dry wt	2.1	23	1.7	4.5	-
Total Recoverable Cadmium	mg/kg dry wt	0.25	0.35	0.28	0.076	-
Total Recoverable Chromium	mg/kg dry wt	4.4	17.6	4.6	13.0	-
Total Recoverable Copper	mg/kg dry wt	9.4	15.8	11.4	18.9	-
Total Recoverable Lead	mg/kg dry wt	3.9	27	7.4	22	-
Total Recoverable Mercury	mg/kg dry wt	0.072	0.083	0.127	0.050	-
Total Recoverable Nickel	mg/kg dry wt	3.5	8.7	2.5	9.8	-
Total Recoverable Zinc	mg/kg dry wt	137	480	70	87	-
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
2,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
4,4'-DDD	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
2,4'-DDE	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
4,4'-DDE	mg/kg dry wt	0.0097	0.0057	0.0065	0.0049	-

Sample Type: Sediment						
Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Organochlorine Pesticides Trace in Soil						
2,4'-DDT	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
4,4'-DDT	mg/kg dry wt	0.0020	< 0.0010	0.0029	< 0.0010	-
Dieldrin	mg/kg dry wt	< 0.0010	0.0110	0.0012	< 0.0010	-
Endosulfan I	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Endosulfan II	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Endosulfan sulphate	mg/kg dry wt	0.0029	< 0.0010	< 0.0010	< 0.0010	-
Endrin	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Heptachlor epoxide	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	< 0.0010	-
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	0.0015	0.0019	-
Methoxychlor	mg/kg dry wt	< 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	-
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Alachlor	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.006	-
Atrazine	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Atrazine-desethyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Azaconazole	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Azinphos-methyl	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Benalaxyl	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Bitertanol	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Bromacil	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Bromopropylate	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Butachlor	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Captan	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Carbaryl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Carbofuran	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Chlorfluazuron	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Chlorothalonil	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Chlorpyrifos	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Chlortoluron	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Cyanazine	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Cyfluthrin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Cyhalothrin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Cypermethrin	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Deltamethrin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Diazinon	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Dichlofluanid	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Dichloran	mg/kg dry wt	< 0.13	< 0.09	< 0.10	< 0.03	-
Dichlorvos	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.010	-
Difenoconazole	mg/kg dry wt	< 0.08	< 0.05	< 0.06	< 0.013	-
Dimethoate	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Diphenylamine	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Diuron	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Fenpropimorph	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Fluazifop-butyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Fluometuron	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Flusilazole	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Fluvalinate	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.007	-

Sample Type: Sediment						
Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS						
Furalaxyl	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Haloxyfop-methyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Hexaconazole	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Hexazinone	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.3	< 0.17	< 0.2	< 0.05	-
Iprodione	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Kresoxim-methyl	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Linuron	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Malathion	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Metalaxyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Methamidophos	mg/kg dry wt	< 0.3	< 0.17	< 0.2	< 0.05	-
Metolachlor	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.006	-
Metribuzin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Molinate	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Myclobutanil	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Naled	mg/kg dry wt	< 0.3	< 0.17	< 0.2	< 0.05	-
Norflurazon	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Oxadiazon	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Oxyfluorfen	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Paclobutrazol	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Parathion-ethyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Parathion-methyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Pendimethalin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Permethrin	mg/kg dry wt	< 0.015	< 0.010	< 0.012	< 0.003	-
Pirimicarb	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Pirimiphos-methyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Prochloraz	mg/kg dry wt	< 0.3	< 0.17	< 0.2	< 0.05	-
Procymidone	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Prometryn	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Propachlor	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Propanil	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.03	-
Propazine	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Propiconazole	mg/kg dry wt	< 0.04	< 0.03	< 0.03	< 0.007	-
Pyriproxyfen	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Quizalofop-ethyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Simazine	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Simetryn	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Sulfentrazone	mg/kg dry wt	< 0.3	< 0.17	< 0.2	< 0.05	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.11	< 0.07	< 0.08	< 0.018	-
Tebuconazole	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Terbacil	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Terbufos	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Terbumeton	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Terbuthylazine	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Terbutryn	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Thiabendazole	mg/kg dry wt	< 0.3	< 0.17	< 0.2	< 0.05	-
Thiobencarb	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Tolylfluanid	mg/kg dry wt	< 0.03	< 0.017	< 0.02	< 0.005	-
Triazophos	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Trifluralin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Vinclozolin	mg/kg dry wt	< 0.06	< 0.04	< 0.04	< 0.009	-
Haloethers Trace in SVOC Soil Samples by GC-MS						

Sample Type: Sediment						
Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Haloethers Trace in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS						
3,3'-Dichlorobenzidine	mg/kg dry wt	< 5	< 4	< 4	< 0.8	-
2,4-Dinitrotoluene	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Nitrobenzene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
N-Nitrosodiphenylamine	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
alpha-BHC	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
beta-BHC	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
delta-BHC	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
gamma-BHC (Lindane)	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
4,4'-DDD	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
4,4'-DDE	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
4,4'-DDT	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Dieldrin	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Endosulfan I	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Endosulfan II	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.5	-
Endosulfan sulphate	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Endrin	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Endrin ketone	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Heptachlor	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Heptachlor epoxide	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Hexachlorobenzene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Anthracene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Benzo[b]fluoranthene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Benzo[k]fluoranthene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Chrysene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Fluorene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Pyrene	mg/kg dry wt	< 0.5	< 0.4	< 0.4	< 0.10	-
Phenols Trace in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.5	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.2	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.2	-
2,4-Dimethylphenol	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.2	-

Sample Type: Sediment						
Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Phenols Trace in SVOC Soil Samples by GC-MS						
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 1.9	< 1.3	< 1.5	0.4	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.2	-
2-Nitrophenol	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 19	< 13	< 15	< 6	-
Phenol	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Plasticisers Trace in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 4	< 3	< 3	0.7	-
Butylbenzylphthalate	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.2	-
Diethylphthalate	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Dimethylphthalate	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Di-n-butylphthalate	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Di-n-octylphthalate	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
1,3-Dichlorobenzene	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
1,4-Dichlorobenzene	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Hexachlorobutadiene	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
Hexachlorocyclopentadiene	mg/kg dry wt	< 5	< 4	< 4	< 0.8	-
Hexachloroethane	mg/kg dry wt	< 1.9	< 1.3	< 1.5	< 0.4	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Other SVOC Trace in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 7	< 8	< 1.6	-
Carbazole	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Dibenzofuran	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Isophorone	mg/kg dry wt	< 1.0	< 0.7	< 0.8	< 0.16	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 120	< 80	< 90	< 11	-
C10 - C14	mg/kg dry wt	< 300	< 150	< 180	< 30	-
C15 - C36	mg/kg dry wt	< 500	< 300	< 400	< 50	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 900	< 600	< 600	< 80	-
BTEX in VOC Soils by Purge&Trap GC-MS						
Benzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Toluene	mg/kg dry wt	1.6	< 0.9	< 1.0	0.47	-
Ethylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
m&p-Xylene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
o-Xylene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Halogenated Aliphatics in VOC Soils by Purge&Trap GC-MS						
Bromomethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.3	-
Carbon tetrachloride	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Chloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Chloromethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2-Dibromo-3-chloropropane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2-Dibromoethane (ethylene dibromide, EDB)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Dibromomethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Dichlorodifluoromethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1-Dichloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2-Dichloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1-Dichloroethene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
cis-1,2-Dichloroethene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-

Sample Type: Sediment						
Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Halogenated Aliphatics in VOC Soils by Purge&Trap GC-MS						
trans-1,2-Dichloroethene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Dichloromethane (methylene chloride)	mg/kg dry wt	< 13	< 9	< 10	< 1.0	-
1,2-Dichloropropane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,3-Dichloropropane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
2,2-Dichloropropane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1-Dichloropropene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
cis-1,3-Dichloropropene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
trans-1,3-Dichloropropene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Hexachlorobutadiene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1,1,2-Tetrachloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1,2,2-Tetrachloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Tetrachloroethene (tetrachloroethylene)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1,1-Trichloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1,2-Trichloroethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Trichloroethene (trichloroethylene)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Trichlorofluoromethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2,3-Trichloropropane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	mg/kg dry wt	< 7	< 5	< 5	< 0.6	-
Vinyl chloride	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Halogenated Aromatics in VOC Soils by Purge&Trap GC-MS						
Bromobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Chlorobenzene (monochlorobenzene)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
2-Chlorotoluene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
4-Chlorotoluene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2-Dichloropropane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2,3-Trichlorobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,3,5-Trichlorobenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Monoaromatic Hydrocarbons in VOC Soils by Purge&Trap GC-MS						
n-Butylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
tert-Butylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Isopropylbenzene (Cumene)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
4-Isopropyltoluene (p-Cymene)	mg/kg dry wt	9.0	< 0.5	21	< 0.06	-
n-Propylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
sec-Butylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Styrene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,2,4-Trimethylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
1,3,5-Trimethylbenzene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Ketones in VOC Soils by Purge&Trap GC-MS						
Acetone	mg/kg dry wt	< 70	< 50	< 50	< 6	-
2-Butanone (MEK)	mg/kg dry wt	< 7	< 5	< 5	< 0.6	-
Methyl tert-butylether (MTBE)	mg/kg dry wt	< 7	< 5	< 5	< 0.6	-
4-Methylpentan-2-one (MIBK)	mg/kg dry wt	< 7	< 5	< 5	< 0.6	-
Trihalomethanes in VOC Soils by Purge&Trap GC-MS						
Bromodichloromethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Bromoform (tribromomethane)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Chloroform (Trichloromethane)	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-

Sample Type: Sediment						
Sample Name:		11:080/OS1 22-Jun-2011 10:00 am	11:080/OS2 22-Jun-2011 10:15 am	11:080/OS3 22-Jun-2011 10:30 am	11:080/OS4 22-Jun-2011	
Lab Number:		908218.1	908218.2	908218.3	908218.4	
Trihalomethanes in VOC Soils by Purge&Trap GC-MS						
Dibromochloromethane	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
Other VOC in Soils by Purge&Trap GC-MS						
Carbon disulphide	mg/kg dry wt	< 7	< 5	< 5	< 0.6	-
Naphthalene	mg/kg dry wt	< 0.7	< 0.5	< 0.5	< 0.06	-
System monitoring Compounds for VOC - % Recovery						
4-Bromofluorobenzene	%	98	96	98	98	-
Toluene-d8	%	101	100	100	99	-

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: Sediment			
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%.	-	1-4
Organic Matter*	Calculation: 100 - Ash (dry wt).	0.04 g/100g dry wt	1-4
Soil Prep Dry & Sieve for Agriculture	Air dried at 35°C and sieved, <2mm fraction.	-	1-4
Heavy metals, trace As,Cd,Cr,Cu,Ni,Pb,Zn,Hg	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, trace level.	-	1-4
Organochlorine/nitro&phosphorus Pest.s Trace in Soils, GC-MS	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-4
Organochlorine Pesticides Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), dual column GC-ECD analysis. Tested on dried sample	-	1-4
Organonitro&phosphorus Pesticides Trace in MR Soil by GCMS*	Sonication extraction, GPC cleanup, GC-MS analysis. Tested on as received sample	-	1-4
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Haloethers Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	1-4
Nitrogen containing compounds Trace in SVOC Soil Samples, GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Organochlorine Pesticides Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Polycyclic Aromatic Hydrocarbons Trace in SVOC Soil Samples	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Phenols Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Plasticisers Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Other Halogenated compounds Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
Other SVOC Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
SMC Compounds Trace in SVOC Soil Samples by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	1-4
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	-	1-4
Volatile Organic Compounds Trace in Soil by Purge&Trap GC-MS	Sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
BTEX in VOC Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
Halogenated Aliphatics in VOC Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
Halogenated Aromatics in VOC Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
Monoaromatic Hydrocarbons in VOC Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Ketones in VOC Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
Trihalomethanes in VOC Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
Other VOC in Soils by Purge&Trap GC-MS	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis. Tested on as received sample	-	1-4
System monitoring Compounds for VOC - % Recovery	Methanol sonication extraction, Purge & Trap, GC-MS FS analysis	-	1-4
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	1-4
2M KCl Extraction*	2M potassium chloride extraction of as received fraction for analysis of NH4N, NO2N and NO3N. Analyst, 109, 549, (1984).	-	1-4
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-4
Ash*	Ignition in muffle furnace 550°C, 6hr, gravimetric. APHA 2540 G 21st ed. 2005.	0.04 g/100g dry wt	1-4
Total Recoverable Aluminium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	10 mg/kg dry wt	1-4
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2.	2 mg/kg dry wt	1-4
Total Recoverable Cobalt	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, trace level. US EPA 200.2.	0.04 mg/kg dry wt	1-4
Total Recoverable Iron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	40 mg/kg dry wt	1-4
Total Recoverable Manganese	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	1.0 mg/kg dry wt	1-4
Total Recoverable Phosphorus	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	40 mg/kg dry wt	1-4
pH*	1:2 (v/v) soil : water slurry followed by potentiometric determination of pH.	0.1 pH Units	1-4
Ammonium-N*	2M potassium chloride extraction on as received fraction. Phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-NH_3 G 21st ed. 2005.	5 mg/kg dry wt	1-4
Nitrite-N*	FIA determination of 2M potassium chloride extraction on as received fraction. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	1.0 mg/kg dry wt	1-4
Nitrate-N*	Calculation: (Nitrate-N + Nitrite-N) - Nitrite-N.	1.5 mg/kg dry wt	1-4
Nitrate-N + Nitrite-N*	Automated cadmium reduction, FIA determination of 2M potassium chloride extraction on as received fraction. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	1.0 mg/kg dry wt	1-4
Total Organic Carbon	Acid pretreatment to remove carbonates if present, Elementar Combustion Analyser.	0.05 g/100g dry wt	1-4
Total Nitrogen	Catalytic Combustion (900°C, O_2), separation, Thermal Conductivity Detector [Elementar Analyser].	0.05 g/100g dry wt	1-4

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.

Peter Robinson MSc (Hons), PhD, FNZIC
Client Services Manager - Environmental Division

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ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	907986	SPv1
Contact:	G Smith	**Date Registered:**	23-Jun-2011	
	C/- Beca Infrastructure Limited	**Date Reported:**	05-Jul-2011	
	PO Box 6345	**Quote No:**	45287	
	Wellesley Street	**Order No:**		
	AUCKLAND 1141	**Client Reference:**	11:071 - 3320901/500/004	
		Submitted By:	G Smith	

Sample Type: Aqueous

Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Individual Tests						
Total Suspended Solids	g/m³	72	45	92	-	-
Dissolved Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	-	-
Total Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	-	-
Chloride	g/m³	80	93	113	-	-
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	g O_2/m³	7.2	6.5	6.7	-	-
Chemical Oxygen Demand (COD)	g O_2/m³	163	220	220	-	-
Faecal Coliforms and E. coli profile						
Faecal Coliforms	cfu / 100mL	3,700	1,700 #2	4,400	-	-
Escherichia coli	cfu / 100mL	3,100	1,500 #2	3,700	-	-
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Acetochlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Alachlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine-desethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine-desisopropyl	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Azaconazole	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Azinphos-methyl	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Benalaxyl	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Bitertanol	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Bromacil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Bromopropylate	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Butachlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Captan	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Carbaryl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Carbofuran	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorfluazuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorothalonil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorpyrifos	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorpyrifos-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlortoluron	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Cyanazine	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Cyfluthrin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Cyhalothrin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Cypermethrin	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Deltamethrin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Diazinon	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Dichlofluanid	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Dichloran	g/m³	< 0.002	< 0.002	< 0.002	-	-
Dichlorvos	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Difenoconazole	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Dimethoate	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Diphenylamine	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Diuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fenpropimorph	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fluazifop-butyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fluometuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Flusilazole	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fluvalinate	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Furalaxyl	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Haloxyfop-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Hexaconazole	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Hexazinone	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m³	< 0.002	< 0.002	< 0.002	-	-
Iprodione	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Kresoxim-methyl	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Linuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Malathion	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Metalaxyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Metolachlor	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Metribuzin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Molinate	g/m³	0.0011	< 0.0007	< 0.0007	-	-
Myclobutanil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Naled	g/m³	< 0.002	< 0.002	< 0.002	-	-
Norflurazon	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Oxadiazon	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Oxyfluorfen	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Paclobutrazol	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Parathion-ethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Parathion-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Pendimethalin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Permethrin	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Pirimicarb	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Pirimiphos-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Prochloraz	g/m³	< 0.002	< 0.002	< 0.002	-	-
Procymidone	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Prometryn	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Propachlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Propanil	g/m³	< 0.002	< 0.002	< 0.002	-	-
Propazine	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Propiconazole	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Pyriproxyfen	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Quizalofop-ethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Simazine	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Simetryn	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Sulfentrazone	g/m³	< 0.002	< 0.002	< 0.002	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Tebuconazole	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbacil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbufos	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Terbumeton	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbuthylazine	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Terbuthylazine-desethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbutryn	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Thiabendazole	g/m³	< 0.002	< 0.002	< 0.002	-	-
Thiobencarb	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Tolylfluanid	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Triazophos	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Trifluralin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Vinclozolin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Leachate metals suite, dissolved, trace						
Dissolved Aluminium	g/m³	0.012	0.065	0.017	-	-
Dissolved Arsenic	g/m³	< 0.002	0.004	0.004	-	-
Dissolved Boron	g/m³	0.70 #1	0.65 #1	0.97 #1	-	-
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	-	-
Dissolved Chromium	g/m³	0.0051	0.0064	0.007	-	-
Dissolved Cobalt	g/m³	0.0029	0.0059	0.0066	-	-
Dissolved Copper	g/m³	0.0008	< 0.0005	< 0.0010	-	-
Dissolved Iron	g/m³	0.18	1.66	0.29	-	-
Dissolved Lead	g/m³	0.00078	0.00010	< 0.00010	-	-
Dissolved Manganese	g/m³	1.85	2.9	4.5	-	-
Dissolved Nickel	g/m³	0.0017	0.0028	0.0026	-	-
Dissolved Zinc	g/m³	0.049	0.034	0.0180	-	-
Leachate metals suite, totals, trace						
Total Aluminium	g/m³	0.134	0.38	0.188	-	-
Total Arsenic	g/m³	0.0058	0.0082	0.0160	-	-
Total Boron	g/m³	0.65 #1	0.62 #1	0.78 #1	-	-
Total Cadmium	g/m³	0.000063	0.000056	0.000055	-	-
Total Chromium	g/m³	0.0072	0.0090	0.0138	-	-
Total Cobalt	g/m³	0.0031	0.0062	0.0066	-	-
Total Copper	g/m³	0.0021	0.00199	0.00172	-	-
Total Iron	g/m³	20	12.4	29	-	-
Total Lead	g/m³	0.00147	0.00111	0.00080	-	-
Total Manganese	g/m³	2.3	3.6	5.5	-	-
Total Nickel	g/m³	0.0028	0.0039	0.0043	-	-
Total Zinc	g/m³	0.196	0.102	0.064	-	-
Nutrient Profile						
Total Ammoniacal-N	g/m³	39	64	90	-	-
Nitrite-N	g/m³	0.053	0.059	0.012	-	-
Nitrate-N	g/m³	0.65	0.25	0.050	-	-
Nitrate-N + Nitrite-N	g/m³	0.70	0.31	0.062	-	-
Dissolved Reactive Phosphorus	g/m³	< 0.004	0.061	< 0.004	-	-
Organochlorine Pesticides Screening in Water, By Liq/Liq						
Aldrin	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
alpha-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
beta-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
delta-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
gamma-BHC (Lindane)	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
cis-Chlordane	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
trans-Chlordane	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
2,4'-DDD	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
4,4'-DDD	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
2,4'-DDE	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
4,4'-DDE	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Organochlorine Pesticides Screening in Water, By Liq/Liq						
2,4'-DDT	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
4,4'-DDT	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Dieldrin	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Endosulfan I	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Endosulfan II	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Endosulfan sulfate	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Endrin	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Endrin aldehyde	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Endrin ketone	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Heptachlor	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Heptachlor epoxide	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Hexachlorobenzene	g/m³	< 0.0008	< 0.0008	< 0.0008	-	-
Methoxychlor	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Total Chlordane [(cis+trans)*100/42]	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Haloethers Trace in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Bis(2-chloroethyl)ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Bis(2-chloroisopropyl)ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4-Bromophenyl phenyl ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4-Chlorophenyl phenyl ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS						
3,3'-Dichlorobenzidine	g/m³	< 0.003	< 0.003	< 0.005	-	-
2,4-Dinitrotoluene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2,6-Dinitrotoluene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Nitrobenzene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
N-Nitrosodi-n-propylamine	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
N-Nitrosodiphenylamine	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS						
Aldrin	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
alpha-BHC	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
beta-BHC	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
delta-BHC	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
gamma-BHC (Lindane)	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4,4'-DDD	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4,4'-DDE	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4,4'-DDT	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Dieldrin	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Endosulfan I	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endosulfan II	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endosulfan sulfate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endrin	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endrin ketone	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Heptachlor	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Heptachlor epoxide	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Hexachlorobenzene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples						
Acenaphthene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Acenaphthylene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Anthracene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Benzo[a]anthracene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Benzo[b]fluoranthene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Benzo[g,h,i]perylene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Benzo[k]fluoranthene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples						
2-Chloronaphthalene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Chrysene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Fluoranthene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Fluorene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2-Methylnaphthalene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Naphthalene	g/m³	< 0.0003	< 0.0003	0.0006	-	-
Phenanthrene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Pyrene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS						
2-Chlorophenol	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2,4-Dichlorophenol	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2,4,6-Trichlorophenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2,4-Dimethylphenol	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2-Methylphenol (o-Cresol)	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2-Nitrophenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Pentachlorophenol (PCP)	g/m³	< 0.010	< 0.010	< 0.02	-	-
Phenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2,4,5-Trichlorophenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS						
Butylbenzylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Diethylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Dimethylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Di-n-butylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Di-n-octylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS						
Bis(2-ethylhexyl)phthalate	g/m³	< 0.003	< 0.003	< 0.004	-	-
Di(2-ethylhexyl)adipate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Other Halogenated compounds Trace (drinkingwater) in SVOC Water						
1,2-Dichlorobenzene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
1,3-Dichlorobenzene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
1,4-Dichlorobenzene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Other Halogenated compounds Trace (non-drinkingwater) in SVOC						
Hexachlorobutadiene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Hexachlorocyclopentadiene	g/m³	< 0.003	< 0.003	< 0.005	-	-
Hexachloroethane	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
1,2,4-Trichlorobenzene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Other SVOC Trace in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m³	< 0.005	< 0.005	< 0.010	-	-
Carbazole	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Dibenzofuran	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Isophorone	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	-	-
BTEX in VOC Water by Purge&Trap GC-MS						
Benzene	g/m³	< 0.005	< 0.005	< 0.005	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
BTEX in VOC Water by Purge&Trap GC-MS						
Toluene	g/m³	< 0.010	< 0.010	< 0.010	-	-
Ethylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
m&p-Xylene	g/m³	< 0.005	< 0.005	< 0.005	-	-
o-Xylene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Halogenated Aliphatics in VOC Water by Purge&Trap GC-MS						
Bromomethane	g/m³	< 0.02	< 0.02	< 0.02	-	-
Carbon tetrachloride	g/m³	< 0.005	< 0.005	< 0.005	-	-
Chloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Chloromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dibromo-3-chloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dibromomethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dichlorodifluoromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloroethene	g/m³	< 0.005	< 0.005	< 0.005	-	-
cis-1,2-Dichloroethene	g/m³	< 0.005	< 0.005	< 0.005	-	-
trans-1,2-Dichloroethene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dichloromethane (methylene chloride)	g/m³	< 0.10	< 0.10	< 0.10	-	-
1,2-Dichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,3-Dichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
2,2-Dichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloropropene	g/m³	< 0.005	< 0.005	< 0.005	-	-
cis-1,3-Dichloropropene	g/m³	< 0.005	< 0.005	< 0.005	-	-
trans-1,3-Dichloropropene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Hexachlorobutadiene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,1,2-Tetrachloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,2,2-Tetrachloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Tetrachloroethene (tetrachloroethylene)	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,1-Trichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
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	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Monoaromatic Hydrocarbons in VOC Water by Purge&Trap GC-MS						
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	%	98	101	98	-	-
Toluene-d8	%	101	99	100	-	-

Analyst's Comments

#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.

#2 Statistically estimated count based on the theoretical countable range for the stated method.

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 Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 21st ed. 2005.	3 g/m³	1-3
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 21st ed. 2005.	-	1-3
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	1-3
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	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/m³	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/m³	1-3
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	0.002 g/m³	1-3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N.	0.002 g/m³	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/m³	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/m³	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, dilutions, seeded. Analysed at; 25 Te Aroha Street, Hamilton. APHA 5210 B 21st ed. 2005.	1.0 g O_2/m^3	1-3
Chemical Oxygen Demand (COD), screen level	Dichromate/sulphuric acid digestion, colorimetry. Screen Level method. APHA 5220 D 21st ed. 2005.	40 g O_2/m^3	1-3
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	1-3
Leachate metals suite, dissolved, trace	0.45µm filtration, ICP-MS, trace level	-	1-3
Leachate metals suite, totals, trace	Nitric acid digestion, ICP-MS, trace level	-	1-3
Nutrient Profile		-	1-3
Organochlorine/Organonitro&phosphorus Pest.s Screen in Water	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	1-3
Organochlorine Pesticides Screening in Water, By Liq/Liq	Liquid / liquid extraction, SPE (if required), dual column GC-ECD analysis	-	1-3
Semivolatile Organic Compounds Trace in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Haloethers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Phenols Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Plasticisers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other Halogenated compounds Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other Halogenated compounds Trace (drinkingwater) in SVOC Water	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other Halogenated compounds Trace (non-drinkingwater) in SVOC	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other SVOC Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
SMC Compounds Trace in SVOC Water Samples 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
BTEX in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Halogenated Aliphatics in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Haloaromatics in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Monoaromatic Hydrocarbons in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Ketones in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Trihalomethanes in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Other VOC in Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
System monitoring Compounds for VOC - % Recovery	Purge & Trap, GC-MS FS analysis	-	1-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9222 D, 21st ed. 2005.	1 cfu / 100mL	1-3
Escherichia coli	Membrane filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, MUG Confirmation Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9222 G, 21st ed. 2005.	1 cfu / 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.

Ara Heron BSc (Tech)
Client Services Manager - Environmental Division

Appendix 24.I

Hill Laboratories Report No. 882225 & 885101(28 March 2011)

APPENDIX I Hill Laboratories Report No. 882225 & 885101 (28 March 2011)

Time Received 29-Mar-2011 10 35 50 am

Job No **882225**

No of Samples **6** No of Fractions **70**

0318822257

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R J Hill Laboratories Limited
1 Clyde Street,
Private Bag 3205
Hamilton, New Zealand
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client

Name: Beca Infrastructure Limited 76225

Address: PO Box 6345, Wellesley Street
AUCKLAND 1141

Phone: 09 300 9000 Fax: 09 300 9300

Client Reference: 11.032 – 3320901/500/021

Quote No: 44187 Order No:

Primary Contact: Emily Sadlier 131644

Submitted By: Emily Sadlier 131644

Charge To: Beca Infrastructure Limited 76225

Results To: Mail Primary Contact / Mail Submitter

Fax Results

✓ Email Results

Chain of custody for samples that arrived this morning (29/03/2011).

Office use only: Job No:

Sent to Hill Laboratories
✓ Please tick if you require COC to be faxed back

Date & Time: 28/03/2011, 5pm
Name: Kate Jackson
Signature: [signature]

Received at Hill Laboratories
Date & Time: 29/3/11 06:53
Name: Pagan
Signature: [signature]

Condition
Room Temp / Chilled / Frozen
Temp: 6.6

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

Ground Water (GW)

Requested Reporting Date:

No	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	11 032 TP205 S1	28/03/11	GW	MWBH, NUTP, CBOD5, TOC, SS, Tcm, Col, MWBcH, DOC
2	11 032 TP205 S2	28/03/11	GW	CBOD5, TOC, SS, Tcm, Col, DOC, MWBH, NUTP
3	11 032 TP204 S1	28/03/11	GW	CBOD5, TOC, SS, Tcm, Col, DOC, MWBcH, ~~BOD~~, NUTP, MWBH
4	11 032 TP204 S2	28/03/11	GW	CBOD5, TOC, SS, Tcm, Col, DOC, MWBH, ~~BOD~~, NUTP
5	11 032 TP206 S1	28/03/11	GW	CBOD5, TOC, SS, Tcm, Col, DOC, MWBH, MWBcH, ~~BOD~~, NUTP
6	11 032 TP206 S2	28/03/11	GW	CBOD5, TOC, SS, Tcm, Col, DOC, MWBH, ~~BOD~~, NUTP
7				
8				
9				
10				

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Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	882225
Contact:	Emily Sadlier	**Date Registered:**	29-Mar-2011 10:41:20 am
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	44187
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	11:032-3320901/500/021
		Add. Client Ref:	
		Submitted By:	Emily Sadlier
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	11:032 TP203 S1 28-Mar-2011	Ground Water	TOC125, cUP250, BOD, cUP1L	Total Organic Carbon (TOC); Dissolved Organic Carbon (DOC); Basic metals suite, dissolved, trace; Basic metals suite, totals, trace; Nutrient Profile; Hazen Colour; Total Suspended Solids; Tannin; Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)
2	11:032 TP203 S2 28-Mar-2011	Ground Water	TOC125, cUP250, BOD, cUP1L	Total Organic Carbon (TOC); Dissolved Organic Carbon (DOC); Basic metals suite, totals, trace; Nutrient Profile; Hazen Colour; Total Suspended Solids; Tannin; Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)
3	11:032 TP204 S1 28-Mar-2011	Ground Water	FN100, BOD, cFN100, cTOC125, cUP250, cUP1L	Basic metals suite, dissolved, trace; Carbonaceous Biochemical Oxygen Demand ($cBOD_5$); Total Organic Carbon (TOC); Hazen Colour; Total Suspended Solids; Tannin; Dissolved Organic Carbon (DOC); Basic metals suite, totals, trace; Nutrient Profile
4	11:032 TP204 S2 28-Mar-2011	Ground Water	cTOC125, cUP250, cBOD, cUP1L	Total Organic Carbon (TOC); Hazen Colour; Total Suspended Solids; Tannin; Carbonaceous Biochemical Oxygen Demand ($cBOD_5$); Dissolved Organic Carbon (DOC); Basic metals suite, totals, trace; Nutrient Profile
5	11:032 TP206 S1 28-Mar-2011	Ground Water	cFN100, cTOC125, cUP250, cBOD, cUP1L	Basic metals suite, dissolved, trace; Total Organic Carbon (TOC); Hazen Colour; Total Suspended Solids; Tannin; Carbonaceous Biochemical Oxygen Demand ($cBOD_5$); Dissolved Organic Carbon (DOC); Basic metals suite, totals, trace; Nutrient Profile
6	11:032 TP206 S2 28-Mar-2011	Ground Water	cTOC125, cUP250, cBOD, cUP1L	Total Organic Carbon (TOC); Hazen Colour; Total Suspended Solids; Tannin; Carbonaceous Biochemical Oxygen Demand ($cBOD_5$); Dissolved Organic Carbon (DOC); Basic metals suite, totals, trace; Nutrient Profile

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
Basic metals suite, dissolved, trace	0.45µm Filtration, ICP-MS, trace level	-	1, 3, 5
Basic metals suite, totals, trace	Nitric acid digestion, ICP-MS, trace level	-	1-6
Nutrient Profile		-	1-6
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-6
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 21st ed. 2005.	-	1-6
True Hazen Colour	Removal of suspended matter by filtration or centrifugation, determination by Lovibond colorimeter. APHA 2120 B 21st ed. 2005.	5 Hazen units	1-6

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Apparent Hazen Colour	Detemined on orginal sample without filtration or centrifugation, determination by Lovibond colorimeter. APHA 2120 B 21st ed. 2005.	5 Hazen units	1-6
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 21st ed. 2005.	3 g/m^3	1-6
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 21st ed. 2005.	-	1
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	1-6
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	0.002 g/m^3	1-6
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N.	0.002 g/m^3	1-6
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	1-6
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	1-6
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, dilutions, seeded. Analysed at; 25 Te Aroha Street, Hamilton. APHA 5210 B 21st ed. 2005.	1.0 g O_2/m^3	1-6
Dissolved Organic Carbon (DOC)	Filtered sample, catalytic oxidation, IR detection. APHA 5310 B 21st ed. 2005.	0.5 g/m^3	1-6
Total Organic Carbon (TOC)	Catalytic oxidation, IR detection, for Total C. Acidification, purging for Total Inorganic C. TOC = TC -TIC. APHA 5310 B 21st ed. 2005.	0.5 g/m^3	1-6
Tannin	Colorimetric with Folin phenol reagent, tannic acid used for calibration. APHA 5550 B 21st ed. 2005.	0.10 g/m^3	1-6

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ANALYSIS REPORT

Client:	Beca Infrastructure Limited	**Lab No:**	907986	SPv1
Contact:	G Smith	**Date Registered:**	23-Jun-2011	
	C/- Beca Infrastructure Limited	**Date Reported:**	05-Jul-2011	
	PO Box 6345	**Quote No:**	45287	
	Wellesley Street	**Order No:**		
	AUCKLAND 1141	**Client Reference:**	11:071 - 3320901/500/004	
		Submitted By:	G Smith	

Sample Type: Aqueous

Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Individual Tests						
Total Suspended Solids	g/m³	72	45	92	-	-
Dissolved Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	-	-
Total Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	-	-
Chloride	g/m³	80	93	113	-	-
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	g O_2/m³	7.2	6.5	6.7	-	-
Chemical Oxygen Demand (COD)	g O_2/m³	163	220	220	-	-
Faecal Coliforms and E. coli profile						
Faecal Coliforms	cfu / 100mL	3,700	1,700 #2	4,400	-	-
Escherichia coli	cfu / 100mL	3,100	1,500 #2	3,700	-	-
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Acetochlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Alachlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine-desethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Atrazine-desisopropyl	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Azaconazole	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Azinphos-methyl	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Benalaxyl	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Bitertanol	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Bromacil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Bromopropylate	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Butachlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Captan	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Carbaryl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Carbofuran	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorfluazuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorothalonil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorpyrifos	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlorpyrifos-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Chlortoluron	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Cyanazine	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Cyfluthrin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Cyhalothrin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Cypermethrin	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Deltamethrin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Diazinon	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Dichlofluanid	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Dichloran	g/m³	< 0.002	< 0.002	< 0.002	-	-
Dichlorvos	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Difenoconazole	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Dimethoate	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Diphenylamine	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Diuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fenpropimorph	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fluazifop-butyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fluometuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Flusilazole	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Fluvalinate	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Furalaxyl	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Haloxyfop-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Hexaconazole	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Hexazinone	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m³	< 0.002	< 0.002	< 0.002	-	-
Iprodione	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Kresoxim-methyl	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Linuron	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Malathion	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Metalaxyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Metolachlor	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Metribuzin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Molinate	g/m³	0.0011	< 0.0007	< 0.0007	-	-
Myclobutanil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Naled	g/m³	< 0.002	< 0.002	< 0.002	-	-
Norflurazon	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Oxadiazon	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Oxyfluorfen	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Paclobutrazol	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Parathion-ethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Parathion-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Pendimethalin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Permethrin	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Pirimicarb	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Pirimiphos-methyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Prochloraz	g/m³	< 0.002	< 0.002	< 0.002	-	-
Procymidone	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Prometryn	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Propachlor	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Propanil	g/m³	< 0.002	< 0.002	< 0.002	-	-
Propazine	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Propiconazole	g/m³	< 0.0003	< 0.0003	< 0.0003	-	-
Pyriproxyfen	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Quizalofop-ethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Simazine	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Simetryn	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Sulfentrazone	g/m³	< 0.002	< 0.002	< 0.002	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	g/m³	< 0.0007	< 0.0007	< 0.0007	-	-
Tebuconazole	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbacil	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbufos	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Terbumeton	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbuthylazine	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Terbuthylazine-desethyl	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Terbutryn	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Thiabendazole	g/m³	< 0.002	< 0.002	< 0.002	-	-
Thiobencarb	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Tolylfluanid	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Triazophos	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Trifluralin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Vinclozolin	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Leachate metals suite, dissolved, trace						
Dissolved Aluminium	g/m³	0.012	0.065	0.017	-	-
Dissolved Arsenic	g/m³	< 0.002	0.004	0.004	-	-
Dissolved Boron	g/m³	0.70 #1	0.65 #1	0.97 #1	-	-
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	-	-
Dissolved Chromium	g/m³	0.0051	0.0064	0.007	-	-
Dissolved Cobalt	g/m³	0.0029	0.0059	0.0066	-	-
Dissolved Copper	g/m³	0.0008	< 0.0005	< 0.0010	-	-
Dissolved Iron	g/m³	0.18	1.66	0.29	-	-
Dissolved Lead	g/m³	0.00078	0.00010	< 0.00010	-	-
Dissolved Manganese	g/m³	1.85	2.9	4.5	-	-
Dissolved Nickel	g/m³	0.0017	0.0028	0.0026	-	-
Dissolved Zinc	g/m³	0.049	0.034	0.0180	-	-
Leachate metals suite, totals, trace						
Total Aluminium	g/m³	0.134	0.38	0.188	-	-
Total Arsenic	g/m³	0.0058	0.0082	0.0160	-	-
Total Boron	g/m³	0.65 #1	0.62 #1	0.78 #1	-	-
Total Cadmium	g/m³	0.000063	0.000056	0.000055	-	-
Total Chromium	g/m³	0.0072	0.0090	0.0138	-	-
Total Cobalt	g/m³	0.0031	0.0062	0.0066	-	-
Total Copper	g/m³	0.0021	0.00199	0.00172	-	-
Total Iron	g/m³	20	12.4	29	-	-
Total Lead	g/m³	0.00147	0.00111	0.00080	-	-
Total Manganese	g/m³	2.3	3.6	5.5	-	-
Total Nickel	g/m³	0.0028	0.0039	0.0043	-	-
Total Zinc	g/m³	0.196	0.102	0.064	-	-
Nutrient Profile						
Total Ammoniacal-N	g/m³	39	64	90	-	-
Nitrite-N	g/m³	0.053	0.059	0.012	-	-
Nitrate-N	g/m³	0.65	0.25	0.050	-	-
Nitrate-N + Nitrite-N	g/m³	0.70	0.31	0.062	-	-
Dissolved Reactive Phosphorus	g/m³	< 0.004	0.061	< 0.004	-	-
Organochlorine Pesticides Screening in Water, By Liq/Liq						
Aldrin	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
alpha-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
beta-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
delta-BHC	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
gamma-BHC (Lindane)	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
cis-Chlordane	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
trans-Chlordane	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
2,4'-DDD	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
4,4'-DDD	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
2,4'-DDE	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
4,4'-DDE	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Organochlorine Pesticides Screening in Water, By Liq/Liq						
2,4'-DDT	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
4,4'-DDT	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Dieldrin	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Endosulfan I	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Endosulfan II	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Endosulfan sulfate	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Endrin	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Endrin aldehyde	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Endrin ketone	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Heptachlor	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Heptachlor epoxide	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Hexachlorobenzene	g/m³	< 0.0008	< 0.0008	< 0.0008	-	-
Methoxychlor	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Total Chlordane [(cis+trans)*100/42]	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Haloethers Trace in SVOC Water Samples by GC-MS						
Bis(2-chloroethoxy) methane	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Bis(2-chloroethyl)ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Bis(2-chloroisopropyl)ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4-Bromophenyl phenyl ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4-Chlorophenyl phenyl ether	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS						
3,3'-Dichlorobenzidine	g/m³	< 0.003	< 0.003	< 0.005	-	-
2,4-Dinitrotoluene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2,6-Dinitrotoluene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Nitrobenzene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
N-Nitrosodi-n-propylamine	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
N-Nitrosodiphenylamine	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS						
Aldrin	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
alpha-BHC	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
beta-BHC	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
delta-BHC	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
gamma-BHC (Lindane)	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4,4'-DDD	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4,4'-DDE	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
4,4'-DDT	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Dieldrin	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Endosulfan I	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endosulfan II	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endosulfan sulfate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endrin	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Endrin ketone	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Heptachlor	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Heptachlor epoxide	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Hexachlorobenzene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples						
Acenaphthene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Acenaphthylene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Anthracene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Benzo[a]anthracene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Benzo[a]pyrene (BAP)	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Benzo[b]fluoranthene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Benzo[g,h,i]perylene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Benzo[k]fluoranthene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples						
2-Chloronaphthalene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Chrysene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Fluoranthene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Fluorene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2-Methylnaphthalene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Naphthalene	g/m³	< 0.0003	< 0.0003	0.0006	-	-
Phenanthrene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Pyrene	g/m³	< 0.0003	< 0.0003	< 0.0005	-	-
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS						
2-Chlorophenol	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2,4-Dichlorophenol	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2,4,6-Trichlorophenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2,4-Dimethylphenol	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2-Methylphenol (o-Cresol)	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
2-Nitrophenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Pentachlorophenol (PCP)	g/m³	< 0.010	< 0.010	< 0.02	-	-
Phenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
2,4,5-Trichlorophenol	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS						
Butylbenzylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Diethylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Dimethylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Di-n-butylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Di-n-octylphthalate	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS						
Bis(2-ethylhexyl)phthalate	g/m³	< 0.003	< 0.003	< 0.004	-	-
Di(2-ethylhexyl)adipate	g/m³	< 0.0010	< 0.0010	< 0.0010	-	-
Other Halogenated compounds Trace (drinkingwater) in SVOC Water						
1,2-Dichlorobenzene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
1,3-Dichlorobenzene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
1,4-Dichlorobenzene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Other Halogenated compounds Trace (non-drinkingwater) in SVOC						
Hexachlorobutadiene	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
Hexachlorocyclopentadiene	g/m³	< 0.003	< 0.003	< 0.005	-	-
Hexachloroethane	g/m³	< 0.0010	< 0.0010	< 0.002	-	-
1,2,4-Trichlorobenzene	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Other SVOC Trace in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m³	< 0.005	< 0.005	< 0.010	-	-
Carbazole	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Dibenzofuran	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Isophorone	g/m³	< 0.0005	< 0.0005	< 0.0010	-	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	-	-
BTEX in VOC Water by Purge&Trap GC-MS						
Benzene	g/m³	< 0.005	< 0.005	< 0.005	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
BTEX in VOC Water by Purge&Trap GC-MS						
Toluene	g/m³	< 0.010	< 0.010	< 0.010	-	-
Ethylbenzene	g/m³	< 0.005	< 0.005	< 0.005	-	-
m&p-Xylene	g/m³	< 0.005	< 0.005	< 0.005	-	-
o-Xylene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Halogenated Aliphatics in VOC Water by Purge&Trap GC-MS						
Bromomethane	g/m³	< 0.02	< 0.02	< 0.02	-	-
Carbon tetrachloride	g/m³	< 0.005	< 0.005	< 0.005	-	-
Chloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Chloromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dibromo-3-chloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dibromoethane (ethylene dibromide, EDB)	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dibromomethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dichlorodifluoromethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,2-Dichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloroethene	g/m³	< 0.005	< 0.005	< 0.005	-	-
cis-1,2-Dichloroethene	g/m³	< 0.005	< 0.005	< 0.005	-	-
trans-1,2-Dichloroethene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dichloromethane (methylene chloride)	g/m³	< 0.10	< 0.10	< 0.10	-	-
1,2-Dichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,3-Dichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
2,2-Dichloropropane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1-Dichloropropene	g/m³	< 0.005	< 0.005	< 0.005	-	-
cis-1,3-Dichloropropene	g/m³	< 0.005	< 0.005	< 0.005	-	-
trans-1,3-Dichloropropene	g/m³	< 0.005	< 0.005	< 0.005	-	-
Hexachlorobutadiene	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,1,2-Tetrachloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,2,2-Tetrachloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
Tetrachloroethene (tetrachloroethylene)	g/m³	< 0.005	< 0.005	< 0.005	-	-
1,1,1-Trichloroethane	g/m³	< 0.005	< 0.005	< 0.005	-	-
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	-	-

Sample Type: Aqueous						
Sample Name:		11:071/OW1 22-Jun-2011 11:00 am	11:071/OW2 22-Jun-2011 11:15 am	11:071/OW3 22-Jun-2011 11:30 am		
Lab Number:		907986.1	907986.2	907986.3		
Monoaromatic Hydrocarbons in VOC Water by Purge&Trap GC-MS						
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	%	98	101	98	-	-
Toluene-d8	%	101	99	100	-	-

Analyst's Comments

#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.

#2 Statistically estimated count based on the theoretical countable range for the stated method.

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 Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 21st ed. 2005.	3 g/m³	1-3
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 21st ed. 2005.	-	1-3
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	1-3
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m³	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/m³	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/m³	1-3
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (Proposed) 21st ed. 2005.	0.002 g/m³	1-3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N.	0.002 g/m³	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/m³	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/m³	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, dilutions, seeded. Analysed at; 25 Te Aroha Street, Hamilton. APHA 5210 B 21st ed. 2005.	1.0 g O_2/m^3	1-3
Chemical Oxygen Demand (COD), screen level	Dichromate/sulphuric acid digestion, colorimetry. Screen Level method. APHA 5220 D 21st ed. 2005.	40 g O_2/m^3	1-3
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	1-3
Leachate metals suite, dissolved, trace	0.45µm filtration, ICP-MS, trace level	-	1-3
Leachate metals suite, totals, trace	Nitric acid digestion, ICP-MS, trace level	-	1-3
Nutrient Profile		-	1-3
Organochlorine/Organonitro&phosphorus Pest.s Screen in Water	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	1-3
Organochlorine Pesticides Screening in Water, By Liq/Liq	Liquid / liquid extraction, SPE (if required), dual column GC-ECD analysis	-	1-3
Semivolatile Organic Compounds Trace in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Haloethers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Nitrogen containing compounds Trace in SVOC Water Samples, GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Organochlorine Pesticides Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Polycyclic Aromatic Hydrocarbons Trace in SVOC Water Samples	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Phenols Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Phenols Trace (drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Phenols Trace (non-drinkingwater) in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Plasticisers Trace (non-drinkingwater) in SVOC Water by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Plasticisers Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Plasticisers Trace (drinkingwater) in SVOC Water Samples by GCMS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other Halogenated compounds Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other Halogenated compounds Trace (drinkingwater) in SVOC Water	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other Halogenated compounds Trace (non-drinkingwater) in SVOC	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
Other SVOC Trace in SVOC Water Samples by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1-3
SMC Compounds Trace in SVOC Water Samples 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
BTEX in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Halogenated Aliphatics in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Haloaromatics in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Monoaromatic Hydrocarbons in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Ketones in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Trihalomethanes in VOC Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3
Other VOC in Water by Purge&Trap GC-MS	Purge & Trap, GC-MS FS analysis	-	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Samples**
System monitoring Compounds for VOC - % Recovery	Purge & Trap, GC-MS FS analysis	-	1-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9222 D, 21st ed. 2005.	1 cfu / 100mL	1-3
Escherichia coli	Membrane filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, MUG Confirmation Analysed at Hill Laboratories - Microbiology; 25 Te Aroha Street, Hamilton. APHA 9222 G, 21st ed. 2005.	1 cfu / 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.

Ara Heron BSc (Tech)
Client Services Manager - Environmental Division