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22 December 2017

Bruce Hodgins
Hutt City Council
30 Laings Road
Lower Hutt
WELLINGTON

Dear Bruce

DETAILED SITE INVESTIGATION – COPELAND STREET RESERVE, EPUNI

1.0 Introduction

Hutt City Council (HCC – the client) has engaged Pattle Delamore Partners Limited (PDP) to undertake a Detailed Site Investigation (DSI) and soil disposal assessment at Copeland Street Reserve, Epuni (legally described at Lot 11 DP 25931).

The property was previously occupied by the Lower Hutt Women's Bowling Club and is comprised of a clubhouse, implement shed, and two disused bowling greens. It is understood that the client has proposed a district plan change which seeks to rezone an 8,288 m^2 portion of land from 'General Recreation Activity' to 'General Residential Medium Density Activity'.

Under the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 (the NESCS), only that land with a potential for contamination (i.e. the bowling greens and the implement sheds – collectively referred to as the site) should be considered as HAIL (Hazardous Activities and Industries List) land. Given the proposed change of use and the potential for soil disturbance and subdivision of the site, a DSI is required for these areas. The remainder of the property would not be subject to the provisions of the NESCS.

The DSI has been undertaken in general accordance with the Ministry for the Environment's (MfE) *Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis of Soils* (MfE, 2011a). This report documents the methodology and findings of the site investigation and has been reported in general accordance with MfE's *Contaminated Site Management Guidelines No. 1 – Guidelines for Reporting on Contaminated Sites in New Zealand revised 2011* (MfE, 2011b).

2.0 Objectives and Scope

The objectives of the DSI are to:

- Undertake soil sampling to characterise and assess contamination of the soils at the site;
- Assess the risk of any identified site contaminants to future users of the site;
- Assess the proposed activity under the NESCS; and,

- Undertake a waste disposal assessment for the site.

The scope of works included:

- Carrying out an intrusive investigation on the basis of historical information including; hand augering and collection of soil samples for laboratory analysis; and,
- The production of this letter report, describing the results of the investigation.

3.0 Site Description and Background

The site covers an approximate area of 3,400 m^2, forming part of the wider 1.2 ha property at Copeland Street Reserve, Epuni (Lot 11 DP 25931). The former bowling club area of the property comprised a clubhouse, implement shed, and two disused bowling greens.

For the purposes of this investigation the site excludes the clubhouse, and has been limited to the two bowling greens and areas in the immediate vicinity of the former implement sheds. A plan of the site in relation to the wider property is shown in Figure 1, appended. Photographs of the site and sample locations are also appended (Photographs 1 – 11).

The site is zoned as "General Recreation" under the HCC District Plan. A brief review of historical aerial imagery (appended) shows the site was used as pastureland prior to being developed into reserve land, which included two bowling greens with an associated clubhouse, by 1958. In addition, two small sheds were identified within the southern corner of the bowling club area, one visible in a 1958 aerial photograph, and the other in a 1977 photograph. A larger shed was identified in the eastern-most corner of the bowling club area, constructed at some point between 1977 and 1988 and removed at some point after 2013.

Land use surrounding the site is as follows:

- North: Residential properties with Witako Street beyond.
- East: Continuation of the reserve and residential properties with Mitchell Street beyond.
- South: Residential properties with Hall Crescent beyond.
- West: Continuation of the reserve and residential properties with the intersection of Witako and Copeland Street beyond.

4.0 Geology and Hydrology

The geological map of the Wellington region indicates that the site is underlain by well-sorted floodplain gravels (Begg & Johnson, 2000).

The Waiwhetu Stream is located approximately 600 m east of the site and The Hutt River is located approximately 1.2 km northwest of the site, both flowing generally to the southwest towards Wellington Harbour. Groundwater is inferred to flow in south-westerly direction following local topography towards Wellington Harbour.

A groundwater bore search was requested from GWRC for groundwater bores and water-take resource consents within the vicinity of the site. The GWRC records identified 3 bores within a 200 m radius of the site, with depths ranging between 1.6 and 12 m below ground level (bgl).

5.0 Investigation Rationale

5.1 Conceptual Site Model

A risk to human health can only arise if there is a hazard (e.g. contaminated soil), a receptor (people or the environment) and an exposure pathway between the hazard and receptor. An absence of any of these components means no risk can exist.

A conceptual site model (CSM) is set out in Table 1, below. The table presents the potential contaminant sources, the future receptors (i.e. users of the site) and the potential pathways whereby the receptors could be exposed directly or indirectly to soil contaminants. The likelihood of contamination, based on the site history, and the likelihood of exposure based on the proposed site use, can then be assessed to determine where a complete pathway is likely to exist. As per the district plan change, the site has been assessed under a residential scenario.

Table 1: Conceptual Site Model – Copeland Street Reserve, Epuni

Source	Exposure Pathway	Receptor	Pathway Linkages
Former pesticide use on the bowling greens	Produce consumption	Future residents	**Potentially complete –** A potential risk to human health could arise if pesticide residues are present.
	Ingestion of soil	Future residents and excavation workers	
	Dermal contact	Future residents and excavation workers	
	Dust inhalation	Future residents and excavation workers	
Hydrocarbon and pesticide spills in the vicinity of implement sheds	Produce consumption	Future residents	**Potentially complete –** A potential risk to human health could arise if pesticide residues are present.
	Ingestion of soil	Future residents and excavation workers	
	Dermal contact	Future residents and excavation workers	
	Dust inhalation	Future residents and excavation workers	

5.2 Sampling Rationale

The site history suggests that any pesticide contamination would be distributed relatively evenly across the bowling greens. Therefore, eight sampling locations (SS01 – SS08) were targeted at the bowling greens, whereby each green was divided into four quadrants with a sample location at the centre of each quadrant.

In order to assess the likelihood of fuel and pesticide spills, three sampling locations (SS09, SS10 and SS13) were chosen to target areas immediately outside of the previous implement sheds situated in the southern and eastern corners of the site. Whilst the more recent aerial images indicate that the majority

of the immediate surrounds of the implement shed situated to the northeast of the club house comprise sealed surfaces, the 1958 image shows areas of grass along the northwest portion of the building. Thus, in order to assess the potential for historical spills in this area, two sampling locations (SS11 and SS12) were chosen under the concrete immediately outside the entrances of the implement shed.

For the bowling green samples, analysis was for the most likely persistent pesticides, being arsenic-based and organochlorine pesticides. In the vicinity of the implement shed a wider range of organic pesticides was also targeted in case less persistent pesticides had been spilled in concentrated form. Petroleum hydrocarbons were also to be analysed for if field screening showed the likely presence of volatile organic compounds from fuel spills.

5.3 Applicable Soil Acceptance Criteria

In accordance with MfE's *Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values* (2011d), New Zealand risk-based standards or guidelines should be used where the exposure assumptions and exposure scenarios are relevant to the site. Where New Zealand guidelines do not exist overseas risk-based guidelines may be used.

There are soil contaminant standards (SCS) contained in MfE (2011c) for dieldrin, DDT and all the heavy metals analysed in the investigation with the exception of nickel and zinc. For endosulfan, nickel and zinc, the results have been compared to the Australian National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 2013) criteria.

Given the proposed district plan change to rezone the site for residential land use, the SCS for residential use (10% produce) have been utilised.

6.0 Site Investigation Activities, Results and Comparison to Acceptance Criteria

Soil sampling was carried out in two stages. The first stage comprised sampling across the site, while the second stage was conducted to further investigate elevated concentrations identified in samples from the first stage of sampling.

6.1 Stage 1 Sampling

6.1.1 Soil Sampling

An initial intrusive investigation, involving hand augering and soil sampling was undertaken on 5 October 2017 to determine the concentrations of the most likely contaminants at the site, with any delineation of identified hotspots to be carried out in a secondary sampling stage at a later date

A total of 13 hand auger locations (SS01 – SS13) were extended to depths ranging 0.5 m below ground level (bgl). Hand auger locations are shown on Figure 1, appended. The sampling was undertaken with a 40 mm diameter hand auger, with samples taken at the surface, at 0.25 m below ground level (bgl), and 0.5 m bgl. A total of 39 soil samples were obtained from the hand auger locations, collected directly from the auger head. Sampling equipment was decontaminated between sample locations and a fresh pair of nitrile gloves was worn to transfer material from the hand auger to a glass sample jar. The jars were placed immediately into a chilly bin containing ice before being sent via courier to Hill Laboratories in Hamilton.

In addition to the samples collected for laboratory analysis, duplicate soil samples were collected for field screening of photo-ionising compound readings using a photo-ionisation detector (PID [1]) from sample locations SS09 – SS13. This was conducted at these locations to assess potential hydrocarbon contamination resulting from fuel spills beside implement sheds. The soil samples for field screening were placed into plastic re-sealable bags which were half-filled and sealed. The samples were allowed to stand for several minutes prior to the bag being pierced and the headspace vapour readings measured with the PID.

6.1.2 Laboratory Analysis

A total of 29 soil samples were analysed at the laboratory. Ten surface soil samples (SS01 – SS08, SS11 – SS12) were analysed for a suite of heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and organochlorine pesticides (OCPs).

In addition, in order to take into account the potential for the addition or removal of material from the bowling greens over time, sixteen deeper samples (0.25 and 0.5 m bgl), SS01 0.25 – SS04 0.25, SS01 0.5 – SS04 0.5, SS05 0.25 – SS08 0.25 and SS05 0.5 – SS08 0.5 were analysed as four composite samples (with each composite sample comprising the individual samples at 0.25 and 0.5 m bgl at each bowling green).

Three samples (SS09, SS10 and SS13) collected from immediately beside previous implement sheds in the southern and eastern corner of the site, were analysed for a suite of heavy metals and a suite of organochlorine, organonitrogen and organophosphate pesticides.

Given the low PID measurements (see 6.1.3) no samples were analysed for petroleum hydrocarbons.

The remaining samples were placed on hold at the laboratory, pending a review of the initial results.

6.1.3 Observations

The geology observed in the auger holes comprised of a dark brown, ~50 mm thick silty topsoil underlain by brown sandy silts to 0.3 – 0.4 m bgl, and brown silty sands from 0.3 – 0.4 m bgl to 0.5 – 0.6 m bgl (Photographs 5 and 8).

Hydrocarbon odours were not identified during the sampling activities. The PID screening results were low at sample locations SS09 – SS13, with a maximum concentration of 3.8 ppm observed in SS12 at a depth of 0.5 m bgl.

6.1.4 Analytical Results

The results of the laboratory analysis are presented in Tables 1 and 2, appended. Copies of the laboratory reports and chain of custody documentation are also appended.

Concentrations of heavy metals above the laboratory detection limit were identified in every surface sample, and most samples returned concentrations of heavy metals typical of background (natural) concentrations (URS, 2003). However in comparison with other surface samples, soil sample SS10 0.0 (located in the southwest corner of the site) reported an elevated arsenic concentration of 42. Lead concentrations were elevated above background levels in three surface samples (SS09 0.0, SS10 0.0 and SS12 0.0) situated outside past and existing implement sheds.

Low concentrations of DDT were identified in surface samples with concentrations ranging from 0.09 to 2.2 mg/kg (samples SS09 0.0 and SS01 0.0, respectively). Dieldrin concentrations ranged from below the

[1] A PID measures most volatile photo-ionisable compounds providing they have an ionisation potential below 10.6 eV. This includes most petroleum hydrocarbon compounds with a carbon range of between 1 and 10.

laboratory level of detection to 0.022 mg/kg (sample SS02 0.0). Endosulfan concentrations were low with concentrations ranging from below the laboratory level of detection to 0.027 mg/kg (SS01 0.0).

Concentrations of heavy metals above the laboratory levels of detection were identified in every composite sample, with the exception of cadmium in composite sample of SS01 – SS04 0.5, and mercury in composite sample of SS05 – SS08 0.5. The reported concentrations of heavy metals in composite samples were relatively consistent.

OCP concentrations in composite samples were below the laboratory detection limit, with the exception of DDT with concentrations ranging from 0.05 (in the composites from 0.5 m bgl) to 0.75 mg/kg (in the composite of SS01 – SS04 0.25).

6.1.5 Comparison of Analytical Results to Applicable Criteria

Soil sample SS10 0.0 exceeded the residential SCS for arsenic (42 mg/kg). No other soil samples exceeded the relevant criteria.

Consequently, the soil in the vicinity of SS10 presents a potential risk to human health should the area be utilised for residential use. The soil underlying the site in the vicinity of the remaining sample locations is considered to have an acceptably low health risk.

6.2 Stage 2 Sampling

6.2.1 Implement Shed Delineation Sampling

The first stage of sampling carried out on 5 October 2017 identified that surface soils at sampling location SS10, in the vicinity of a previous implement shed in the southern corner of the site, contained concentrations of arsenic that exceeded the applicable SCS. Additional soil sampling was conducted on 1 November 2017 to delineate the elevated arsenic concentrations in the vicinity of location SS10, so that practicality of disposal could be established.

A total of eight additional hand auger locations (SS14 – SS21) were extended to depths ranging between 0.25 m and 0.5 m below ground level (bgl). Hand auger locations for the delineation sampling are shown in the inset on Figure 1, appended.

A total of 22 additional soil samples were obtained from the hand auger locations, using the same sampling techniques applied in the first stage of sampling. At all but two locations, samples were collected at the surface, at 0.25 m below ground level (bgl), and at 0.5 m bgl. At two locations (SS18 and SS21), hard ground conditions below 0.25 m bgl prevented collection of the sample at 0.5 m bgl.

6.2.2 Laboratory Analysis

A total of 19 of the additional soil samples were analysed at the laboratory for arsenic. In addition, the two deeper samples from SS10 (SS10 0.25 and SS10 0.5) collected during the first stage of sampling, were also analysed for arsenic. The surface sample from SS10 was already analysed during the first stage of sampling.

6.2.3 Observations

The geology observed in the auger holes during the Stage 2 sampling comprised an approximately 50 mm thick layer of silty topsoil underlain by sandy silts. In six of the locations (SS16 – SS21) the sandy silt was underlain by gravelly sandy silt at 0.25 m bgl. Fragments of concrete and brick were observed at 0.25 m bgl in three locations (SS14, SS17 and SS18), suggesting an earlier ground surface. Sandy gravels were encountered at approximately 0.3 m bgl within two locations (SS18 and SS21).

6.2.4 Delineation Sampling Analytical Results

The results of the laboratory analysis for delineation sampling are presented in Table 3, appended. Copies of the laboratory reports and chain of custody documentation are also appended. Concentrations of arsenic above the laboratory detection limit were identified in all additional samples.

6.2.5 Comparison of Delineation Sampling Results to Applicable Criteria

A total of 13 of the 22 the arsenic hotspot samples (including samples collected at SS10 during the first stage of sampling) exceeded the residential SCS for arsenic. The SCS for arsenic was exceeded in samples collected from the surface at all additional locations apart from SS14, SS15 and SS16, and in samples collected from 0.25 m bgl at five of the nine locations (SS10, SS16, SS17, SS18 and SS19). The SCS for arsenic was exceeded in samples collected at 0.5 m bgl in two locations SS16 and SS17.

Sample location SS16 was situated in an area with an approximately 0.25 m higher elevation than the other delineation sample locations, meaning the samples collected from 0.25 m and 0.5 m bgl at this location, are approximately level with samples collected from 0.0 m and 0.25 m bgl in surrounding locations. It appears that this area has been built up with non-contaminated soil as the surface sample from this location complied with the SCS, while the deeper samples did not.

The soil in the vicinity of the additional delineation sample locations south of the former clubhouse building, presents a potential risk to human health should the area be utilised for residential use.

7.0 Application of the NESCS

The NESCS may apply to a site that falls within one of the descriptions on the MfE's HAIL. Given the long history of use as bowling greens, the site as an intensively managed sports turf falls into HAIL Category A10 (described as "*persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds*"). As such, for the purposes of the NESCS, the HAIL 'piece of land' relates to the bowling greens and immediate vicinity of the implement sheds only. Secondly, as HAIL land, the NESCS will apply if one or more of the five regulated activities takes place, the most likely being subdivision, change of use and soil disturbance/disposal.

Given the 3,400 m^2 site area, should soil disturbance be required for future development, up to 170 m^3 of material may be disturbed and up to 34 m^3 of material disposed of before the permitted activity thresholds of the NESCS are exceeded.

The NESCS aims to control changes of use that are more sensitive than the current use. Given the proposed plan change is to a more sensitive residential use, the provisions of the NESCS would apply, and consent under the HCC would be required prior to any redevelopment for this use.

8.0 Waste Disposal Assessment

To assess soil disposal options, laboratory results have been compared to typical background (natural) concentrations (URS, 2003), and the MfE's *Landfill Waste Acceptance Criteria and Landfill Classification* (MfE, 2004) for Class A and B landfills and the waste acceptance criteria for Silverstream Landfill, this being the closest Class A landfill. The results for the waste disposal assessment are presented in Tables 4 and 5.

All soil samples, except those collected from locations near implement sheds in the southern corner of the site (locations SS09, SS10, SS14-SS21) and northeast of the former clubhouse (SS12 and SS13), reported concentrations of heavy metals typical of background (natural) concentrations (URS, 2003), and can therefore be disposed of at either a Class A or Class B landfill. The heavy metals concentrations that are typical of background concentrations have not been compared to Class B landfill screening criteria.

However, lead concentrations from three surface samples (SS09 0.0, SS10 0.0 and SS12 0.0), arsenic concentrations from the arsenic hotspot delineation samples (locations SS10, SS14-SS21), and zinc concentrations from sample SS13 0.0 have all been compared to Class B landfill screening criteria. All dieldrin, DDT and endosulfan concentrations have been compared to Class B landfill screening criteria.

Lead concentrations from the three surface samples (SS09 0.0, SS10 0.0 and SS12 0.0) exceed Class B landfill criteria. Lead concentrations from two samples (SS09 0.0 and SS10 0.0) and the zinc concentration in one sample (SS13 0.0) marginally exceed Class A and Silverstream Landfill screening criteria.

The majority of the arsenic hotspot delineation samples in the southern corner of the site (locations SS09, SS10, SS14-SS21) reported concentrations of arsenic above background levels and Class B landfill screening criteria, however, these comply with the Class A landfill and Silverstream landfill screening criteria.

All samples reported concentrations of dieldrin, DDT and endosulfan which comply with Class A, Class B and Silverstream landfill screening criteria.

It is therefore considered that material from the bowling green areas may be disposed of to any consented Class A or B landfill, including Silverstream Landfill. The arsenic contaminated soil in the southern corner of the site may be disposed of at a Class A landfill, including Silverstream Landfill. While some lead and zinc concentrations marginally exceeded Class A screening from our experience, it is considered highly unlikely that these concentrations would exceed the relevant leachability limits for Class A landfills, and it is likely that the material from these locations may be disposed at a Class A landfill, including Silverstream Landfill. However, approval will need to be sought by the landfill operator prior to disposal.

9.0 Conclusion

Pattle Delamore Partners Limited was engaged by Hutt City Council to undertake a detailed site investigation and soil disposal assessment of a former bowling club at Copeland Street Reserve, Epuni. It is understood that the Council is preparing a district plan change which would allow the redevelopment of the property for residential use.

An intrusive investigation, involving hand augering and soil sampling, was undertaken on 5 October 2017. A total of 13 auger locations were sampled, with 29 soil samples undergoing laboratory analysis for a combination of a suite of heavy metals, and organochlorine, organonitrogen and organophosphate pesticides.

One initial soil sample situated in the southern corner of the site exceeded the arsenic soil contaminant standard for residential (10% produce), while no other soil samples exceeded the relevant criteria. Consequently, additional sampling was conducted on 1 November 2017 at eight locations to delineate the arsenic hotspot.

The delineation results indicated that soils in the southern corner of the site, south of the former clubhouse between the surface and 0.5 m bgl presents a potential risk to human health should the area be utilised for residential use.

As a result of this arsenic exceedance, should the site be subdivided for residential use, stripping and off-site disposal of the soils where the elevated arsenic exists is recommended. However, the successful removal of the contaminants would need to be confirmed by validation sampling across the stripped area.

Laboratory analysis identified that soil removed from the bowling green areas can be disposed of at any Class A or B landfill, including the Class A Silverstream Landfill. The arsenic contaminated soil in the southern corner of the site may be disposed of at a Class A landfill, including Silverstream Landfill. While some lead and zinc concentrations in the vicinity of implement sheds marginally exceeded Class A

screening criteria, it is considered highly unlikely that these concentrations would exceed the relevant leachability limits for Class A landfills, and it is likely that the material from these locations may be disposed at a Class A landfill, including Silverstream Landfill. However, approval will need to be sought by the landfill operator prior to disposal.

As the site falls within one of the descriptions on the MfE's HAIL, should any future redevelopment at the site, constitute a change of use, the provisions of the NESCS would apply. Given the 3,400 m^2 site area, should soil disturbance be required for future development, up to 170 m^3 of material may be disturbed and up to 34 m^3 of material disposed of before the permitted activity thresholds of the NESCS are exceeded.

10.0 Limitations

This report has been prepared based on the visual observations of the site vicinity, PID results from field headspace analysis, and analysis of 51 soil samples from 21 hand auger locations. All soil samples were analysed by an analytical laboratory variously for a suite of heavy metals and OCPs, OPPs, ONPs and in the case of the delineation samples, for arsenic only. The site conditions as described in this report have been interpreted from, and are subject to, this information and its limitations and accordingly PDP does not represent that its interpretation accurately represents the full site conditions.

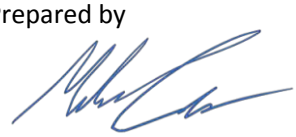
The information contained within this report applies to sampling of soil undertaken on the dates stated in this report. With time, the site conditions and environmental standards could change so that the reported assessment and conclusions are no longer valid. Accordingly, the report should not be used to refer to site conditions and environmental standards applying at a later date without first confirming the validity of the report's information at that time.

This report has been prepared by PDP on the specific instructions of Hutt City Council for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

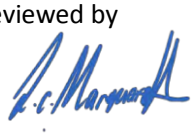
Prepared by



Miles Calder

Environmental Geologist

Reviewed by



Stacey Marquardt

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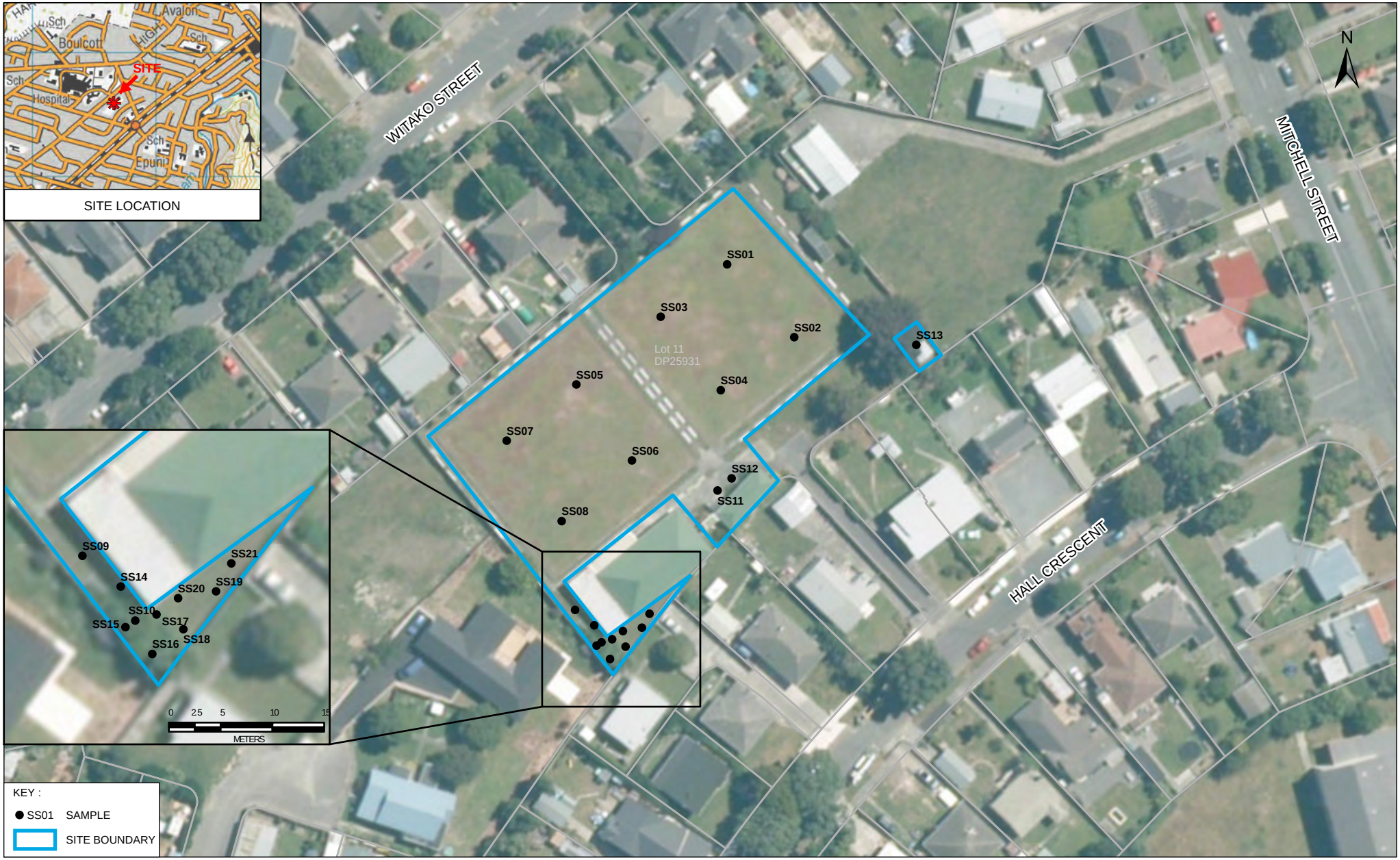
Figures



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1. AERIAL IMAGERY SOURCED FROM THE LINZ DATA SERVICE WWW.LINZ.GOVT.NZ/ABOUT-LINZ/LINZ-DATA-SERVICE/HELP/USING-LINZ-DATA/ATTRIBUTING-AERIAL-IMAGERY-DATA AND LICENCED FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 3.0 NEW ZELAND LICENCE
2. CADASTRAL/TOPOGRAPHICAL INFORMATION AND INSET DERIVED FROM LINZ DATA

FIGURE 1 : SITE LAYOUT AND SAMPLE LOCATIONS

SCALE: 1:1,000 (A4)

0 5 10 20 30
METRES

Tables

Table 1: Soil Sampling Results - Heavy Metals and OCPs

Soil Samples Collected at a Depth of 0.0 m Below Ground Level [1]								
Sample Name	SS01 0.0	SS02 0.0	SS03 0.0	SS04 0.0	SS05 0.0	SS06 0.0	SS07 0.0	Soil Contaminant Standards: Residential (10% produce)[2,3]
Laboratory Reference	1855937.1	1855937.4	1855937.7	1855937.10	1855937.13	1855937.16	1855937.19	
Sample Location	SS01	SS02	SS03	SS04	SS05	SS06	SS07	
Soil Fate	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	
Soil Type - Field	Silt	Silt	Silt	Silt	Silt	Silt	Silt	
Sample Depth (m bgl)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Metals								
Arsenic	8	6	8	5	8	5	8	20
Cadmium	0.14	0.21	0.13	0.13	0.15	0.13	0.13	3
Chromium	15	15	16	15	16	16	17	460
Copper	9	9	8	8	8	7	8	NL[4]
Lead	38	35	43	39	39	31	42	210
Mercury	0.26	0.35	0.3	0.23	0.17	0.19	0.3	310
Nickel	9	8	10	8	10	8	9	400
Zinc	49	44	53	45	51	44	50	7,400
Organochlorine Pesticides [5]								
Dieldrin	<0.015	0.022	0.018	0.014	< 0.013	0.014	0.017	2.6
ΣDDT [6]	2.2	1.31	1.1	0.9	0.38	0.67	0.93	70
Endosulfan [7]	0.027	0.025	ND	ND	ND	ND	ND	270

Soil Samples Collected at a Depth of 0.0 m Below Ground Level [1]							
Sample Name	SS08 0.0	SS09 0.0	SS10 0.0	SS11 0.0	SS12 0.0	SS13 0.0	Soil Contaminant Standards: Residential (10% produce)[2,3]
Laboratory Reference	1855937.22	1855937.25	1855937.28	1855937.31	1855937.34	1855937.37	
Sample Location	SS08	SS09	SS10	SS11	SS12	SS13	
Soil Fate	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	
Soil Type - Field	Silt	Silt	Silt	Silt	Silt	Silt	
Sample Depth (m bgl)	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Metals							
Arsenic	5	11	42	5	8	9	20
Cadmium	0.11	0.23	0.27	0.13	0.18	0.26	3
Chromium	15	17	17	17	17	18	460
Copper	8	17	18	15	14	16	NL[4]
Lead	27	127	103	35	95	72	210
Mercury	0.2	0.13	0.37	0.1	<0.1	0.17	310
Nickel	9	12	11	14	13	8	400
Zinc	50	142	133	79	122	270	7,400
Organochlorine Pesticides [5]							
Dieldrin	<0.013	<0.014	<0.013	<0.013	<0.012	<0.014	2.6
ΣDDT [6]	0.68	0.09	0.64	0.08	0.012	0.26	70
Endosulfan [7]	ND	ND	ND	ND	ND	ND	270

Notes:
1. All results in mg/kg.
2. Arsenic, cadmium, chromium, copper, and lead criteria from MfE (2011c).
3. Nickel, zinc and endosulfan criteria from NEPC (2013).
4. NL = No Limit. Derived value exceeds 10,000 mg/kg (MfE, 2011c).
5. Only those pesticides which have screening criteria and contained concentrations above the laboratory level of detection have been reported.
6. ΣDDT was calculated by adding the laboratory results of the individual DDX compounds with the sum rounded to the least number of significant figures of the results. Where one of the compounds was below the detection limit, a value of half the detection limit was used in the sum. Where all compounds in the sum are non-detects, the overall detection limit is the sum of the detection limits.
7. Endosulfan was calculated by adding the laboratory results of Endosulfan I and Endosulfan II.

Concentration above MfE (2011c) Soil Contaminant Standards - Residential (10% produce)

Table 2: Composite Soil Sampling Results - Heavy Metals and OCPs

Soil Samples Collected at a Depth of 0.25 m Below Ground Level [1]			
Sample Name	Composite of SS01 - SS04 0.25	Composite of SS05 - SS08 0.25	Soil Contaminant Standards: Residential (10% produce)[2,3]
Laboratory Reference	1855937.40	1855937.42	
Sample Location	SS01 - SS04	SS05 - SS08	
Soil Fate	Remaining	Remaining	
Soil Type - Field	Sandy Silt	Sandy Silt	
Sample Depth (m bgl)	0.25	0.25	
Heavy Metals			
Arsenic	6	6	20
Cadmium	0.12	0.13	3
Chromium	17	17	460
Copper	10	12	NL[4]
Lead	33	29	210
Mercury	0.17	0.13	310
Nickel	12	12	400
Zinc	64	65	7,400
Organochlorine Pesticides [5]			
Dieldrin	<0.013	<0.013	2.6
ΣDDT [6]	0.75	0.32	70
Endosulfan [7]	ND	ND	270
Soil Samples Collected at a Depth of 0.5 m Below Ground Level [1]			
Sample Name	Composite of SS01 - SS04 0.5	Composite of SS05 - SS08 0.5	Soil Contaminant Standards: Residential (10% produce)[2,3]
Laboratory Reference	1855937.41	1855937.43	
Sample Location	SS01 - SS04	SS05 - SS08	
Soil Fate	Remaining	Remaining	
Soil Type - Field	Silty Sand	Silty Sand	
Sample Depth (m bgl)	0.5	0.5	
Heavy Metals			
Arsenic	4	4	20
Cadmium	<0.1	0.1	3
Chromium	15	16	460
Copper	9	10	NL[4]
Lead	15	15.3	210
Mercury	0.12	<0.1	310
Nickel	13	13	400
Zinc	60	60	7,400
Organochlorine Pesticides [5]			
Dieldrin	<0.012	<0.012	2.6
ΣDDT [6]	0.05	0.05	70
Endosulfan [7]	ND	ND	270

Notes:
1. All results in mg/kg.
2. Arsenic, cadmium, chromium, copper, and lead criteria from MfE (2011c).
3. Nickel and zinc criteria from NEPC (2013).
4. NL = No Limit. Derived value exceeds 10,000 mg/kg (MfE, 2011c).
5. Only those pesticides which have screening criteria and contained concentrations above the laboratory level of detection have been reported.
6. ΣDDT was calculated by adding the laboratory results of the individual DDX compounds with the sum rounded to the least number of significant figures of the results. Where one of the compounds was below the detection limit, a value of half the detection limit was used in the sum. Where all compounds in the sum are non-detects, the overall detection limit is the sum of the detection limits.
7. Endosulfan was calculated by adding the laboratory results of Endosulfan I and Endosulfan II.

Table 3: Soil Sampling Results - Arsenic Hotspot Delineation

Soil Samples Collected at a Depth of 0.0 m Below Ground Level [1]										
Sample Name	SS10 0.0	SS14 0.0	SS15 0.0	SS16 0.0	SS17 0.0	SS18 0.0	SS19 0.0	SS20 0.0	SS21 0.0	Soil Contaminant Standards: Residential (10% produce)[2]
Laboratory Reference	1855937.28	1870228.1	1870228.3	1870228.5	1870228.7	1870228.9	1870228.11	1870228.13	1870228.15	
Sample Location	SS10	SS14	SS15	SS16	SS17	SS18	SS19	SS20	SS21	
Soil Fate	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	
Soil Type - Field	Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	
Sample Depth (m bgl)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Heavy Metals										
Arsenic	42	11	9	16	47	31	28	20	21	20
Soil Samples Collected at a Depth of 0.25 m Below Ground Level [1]										
Sample Name	SS10 0.25	SS14 0.25	SS15 0.25	SS16 0.25	SS17 0.25	SS18 0.25	SS19 0.25	SS20 0.25	SS21 0.25	Soil Contaminant Standards: Residential (10% produce)[2,3]
Laboratory Reference	1855937.29	1870228.2	1870228.4	1870228.6	1870228.8	1870228.10	1870228.12	1870228.14	1870228.16	
Sample Location	SS10	SS14	SS15	SS16	SS17	SS18	SS19	SS20	SS21	
Soil Fate	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	
Soil Type - Field	Sandy Silt	Sandy Silt	Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt	
Sample Depth (m bgl)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
Heavy Metals										
Arsenic	28	11	19	23	49	27	23	14	14	20
Soil Samples Collected at a Depth of 0.50 m Below Ground Level [1]										
Sample Name	SS10 0.5	SS16 0.5	SS17 0.5	SS19 0.5						Soil Contaminant Standards: Residential (10% produce)[2,3]
Laboratory Reference	1855937.30	1870228.19	1870228.20	1870228.21						
Sample Location	SS10	SS16 0.5	SS17 0.5	SS19						
Soil Fate	Remaining	Remaining	Remaining	Remaining						
Soil Type - Field	Gravelly Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt	Gravelly Sandy Silt						
Sample Depth (m bgl)	0.5	0.5	0.5	0.5						
Heavy Metals										
Arsenic	9	35	35	11						20

Notes:
1. All results in mg/kg.
2. Arsenic criteria from MfE (2011c).

Concentration above MfE (2011c) Soil Contaminant Standards - Residential (10% produce)

Table 4: Soil Sampling Results - Heavy Metals and OCPs Waste Disposal Criteria

Soil Samples Collected at a Depth of 0.0 m Below Ground Level [1]											
Sample Name	SS01 0.0	SS02 0.0	SS03 0.0	SS04 0.0	SS05 0.0	SS06 0.0	SS07 0.0	Expected Background Concentrations for the Hutt Alluvium Soil Type in the Wellington Region [2]	Class A Landfill Screening Criteria [3]	Class B Landfill Screening Criteria [3]	Silverstream Landfill Screening Criteria
Laboratory Reference	1855937.1	1855937.4	1855937.7	1855937.10	1855937.13	1855937.16	1855937.19				
Sample Location	SS01	SS02	SS03	SS04	SS05	SS06	SS07				
Soil Fate	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining				
Soil Type - Field	Silt	Silt	Silt	Silt	Silt	Silt	Silt				
Sample Depth (m bgl)	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Heavy Metals											
Arsenic	8	6	8	5	8	5	8	2 - 7	100	-	100
Cadmium	0.14	0.21	0.13	0.13	0.15	0.13	0.13	<0.1 - 0.2	20	-	20
Chromium	15	15	16	15	16	16	17	9 - 18	100	-	100
Copper	9	9	8	8	8	7	8	5.0 - 19	100	-	28
Lead	38	35	43	39	39	31	42	16.7 - 73.3	100	-	100
Mercury	0.26	0.35	0.3	0.23	0.17	0.19	0.3	<0.1 - 2.6	4	-	4
Nickel	9	8	10	8	10	8	9	5.0 - 14	200	-	40
Zinc	49	44	53	45	51	44	50	38 - 201	200	-	160
Organochlorine Pesticides [4]											
Dieldrin	<0.015	0.022	0.018	0.014	< 0.013	0.014	0.017	-	8	0.8	0.08
ΣDDT [5]	2.2	1.31	1.1	0.9	0.38	0.67	0.93	-	500 [6,7]	50 [5]	500 [5,6]
Endosulfan [8]	0.027	0.025	ND	ND	ND	ND	ND	-	6	0.6	4

Soil Samples Collected at a Depth of 0.0 m Below Ground Level [1]											
Sample Name	SS08 0.0	SS09 0.0	SS10 0.0	SS11 0.0	SS12 0.0	SS13 0.0		Expected Background Concentrations for the Hutt Alluvium Soil Type in the Wellington Region [2]	Class A Landfill Screening Criteria [3]	Class B Landfill Screening Criteria [3]	Silverstream Landfill Screening Criteria
Laboratory Reference	1855937.22	1855937.25	1855937.28	1855937.31	1855937.34	1855937.37					
Sample Location	SS08	SS09	SS10	SS11	SS12	SS13					
Soil Fate	Remaining	Remaining	Remaining	Remaining	Remaining	Remaining					
Soil Type - Field	Silt	Silt	Silt	Silt	Silt	Silt					
Sample Depth (m bgl)	0.0	0.0	0	0.0	0.0	0.0					
Heavy Metals											
Arsenic	5	11	**42**	5	8	9		2 - 7	100	10	100
Cadmium	0.11	0.23	0.27	0.13	0.18	0.26		<0.1 - 0.2	20	2	20
Chromium	15	17	17	17	17	18		9 - 18	100	10	100
Copper	8	17	18	15	14	16		5.0 - 19	100	10	28
Lead	27	**127**	**103**	35	**95**	72		16.7 - 73.3	100	10	100
Mercury	0.2	0.13	0.37	0.1	<0.1	0.17		<0.1 - 2.6	4	0.4	4
Nickel	9	12	11	14	13	8		5.0 - 14	200	20	40
Zinc	50	142	133	79	122	**270**		38 - 201	200	20	160
Organochlorine Pesticides [4]											
Dieldrin	<0.013	<0.014	<0.013	<0.013	<0.012	<0.014		-	8	0.8	0.08
ΣDDT [5]	0.7	0.09	0.64	0.013	0.012	0.26		-	500 [6,7]	50 [5]	500 [5,6]
Endosulfan [8]	ND	ND	ND	ND	ND	ND		-	6	0.6	4

Notes:
1. All results in mg/kg.
2. Criteria for Hutt Alluvium soil type from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003).
3. Screening criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004). Class B criteria only compared to concentrations in samples that are above background concentrations (URS, 2003).
4. Only those pesticides which have screening criteria and contained concentrations above the laboratory level of detection have been reported.
5. ΣDDT was calculated by adding the laboratory results of the individual DDX compounds with the sum rounded to the least number of significant figures of the results. Where one of the compounds was below the detection limit, a value of half the detection limit was used in the sum. Where all compounds in the sum are non-detects, the overall detection limit is the sum of the detection limits.
6. Total concentration from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).
7. Derived from the concentration at which free product would be present in leachate.
8. Endosulfan was calculated by adding the laboratory results of Endosulfan I and Endosulfan II.

42	Concentration above Class B Landfill Screening Criteria
	Concentration above Class A Landfill Screening Criteria and Silverstream Landfill Screening Criteria

Table 4 (continued): Soil Sampling Results - Heavy Metals and OCPs Waste Disposal Criteria

Soil Samples Collected at a Depth of 0.25 m Below Ground Level [1]						
Sample Name	Composite of SS01 - SS04 0.25	Composite of SS05 - SS08 0.25	Expected Background Concentrations for the Hutt Alluvium Soil Type in the Wellington Region [2]	Class A Landfill Screening Criteria [3]	Class B Landfill Screening Criteria [3]	Silverstream Landfill Screening Criteria
Laboratory Reference	1855937.40	1855937.42				
Sample Location	SS01 - SS04	SS05 - SS08				
Soil Fate	Remaining	Remaining				
Soil Type - Field	Silt	Silt				
Sample Depth (m bgl)	0.25	0.25				
Heavy Metals						
Arsenic	6	6	2 - 7	100	-	100
Cadmium	0.12	0.13	<0.1 - 0.2	20	-	20
Chromium	17	17	9 - 18	100	-	100
Copper	10	12	5.0 - 19	100	-	28
Lead	33	29	16.7 - 73.3	100	-	100
Mercury	0.17	0.13	<0.1 - 2.6	4	-	4
Nickel	12	12	5.0 - 14	200	-	40
Zinc	64	63	38 - 201	200	-	160
Organochlorine Pesticides [4]						
Dieldrin	<0.013	<0.013	-	8	0.8	0.08
ΣDDT [5]	0.75	0.32	-	500 [6,7]	50 [5]	500 [5,6]
Endosulfan [8]	ND	ND	-	6	0.6	4
Soil Samples Collected at a Depth of 0.5 m Below Ground Level [1]						
Sample Name	Composite of SS01 - SS04 0.5	Composite of SS05 - SS08 0.5	Expected Background Concentrations for the Hutt Alluvium Soil Type in the Wellington Region [2]	Class A Landfill Screening Criteria [3]	Class B Landfill Screening Criteria [3]	Silverstream Landfill Screening Criteria
Laboratory Reference	1855937.41	1855937.43				
Sample Location	SS01 - SS04	SS05 - SS08				
Soil Fate	Remaining	Remaining				
Soil Type - Field	Silty Sand	Silty Sand				
Sample Depth (m bgl)	0.5	0.5				
Heavy Metals						
Arsenic	4	4	2 - 7	100	-	100
Cadmium	<0.1	0.1	<0.1 - 0.2	20	-	20
Chromium	15	16	9 - 18	100	-	100
Copper	9	10	5.0 - 19	100	-	28
Lead	15	15.3	16.7 - 73.3	100	-	100
Mercury	0.12	<0.1	<0.1 - 2.6	4	-	4
Nickel	13	13	5.0 - 14	200	-	40
Zinc	60	60	38 - 201	200	-	160
Organochlorine Pesticides [4]						
Dieldrin	<0.012	<0.012	-	8	0.8	0.08
ΣDDT [5]	0.05	0.05	-	500 [6,7]	50 [5]	500 [5,6]
Endosulfan [8]	ND	ND	-	6	0.6	4

Notes:
1. All results in mg/kg.
2. Criteria for Hutt Alluvium soil type from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003).
3. Screening criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004). Class B criteria only compared to concentrations in samples that are above background concentrations (URS, 2003).
4. Only those pesticides which have screening criteria and contained concentrations above the laboratory level of detection have been reported.
5. ΣDDT was calculated by adding the laboratory results of the individual DDX compounds with the sum rounded to the least number of significant figures of the results. Where one of the compounds was below the detection limit, a value of half the detection limit was used in the sum. Where all compounds in the sum are non-detects, the overall detection limit is the sum of the detection limits.
6. Total concentration from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).
7. Derived from the concentration at which free product would be present in leachate.
8. Endosulfan was calculated by adding the laboratory results of Endosulfan I and Endosulfan II.

42	Concentration above Class B Landfill Screening Criteria
	Concentration above Class A Landfill Screening Criteria and Silverstream Landfill Screening Criteria

Site Photographs

Photograph 1: Southwest corner of the site, looking northeast. The photograph shows the bowling green and club house located in the western half of the site.

Photograph 2: Northeast corner of the site, looking southwest. The panorama photograph shows the bowling green in the eastern half of the site.

Photograph 3: Southern corner of the site, looking southeast. Sampling location SS09 is shown on the image.

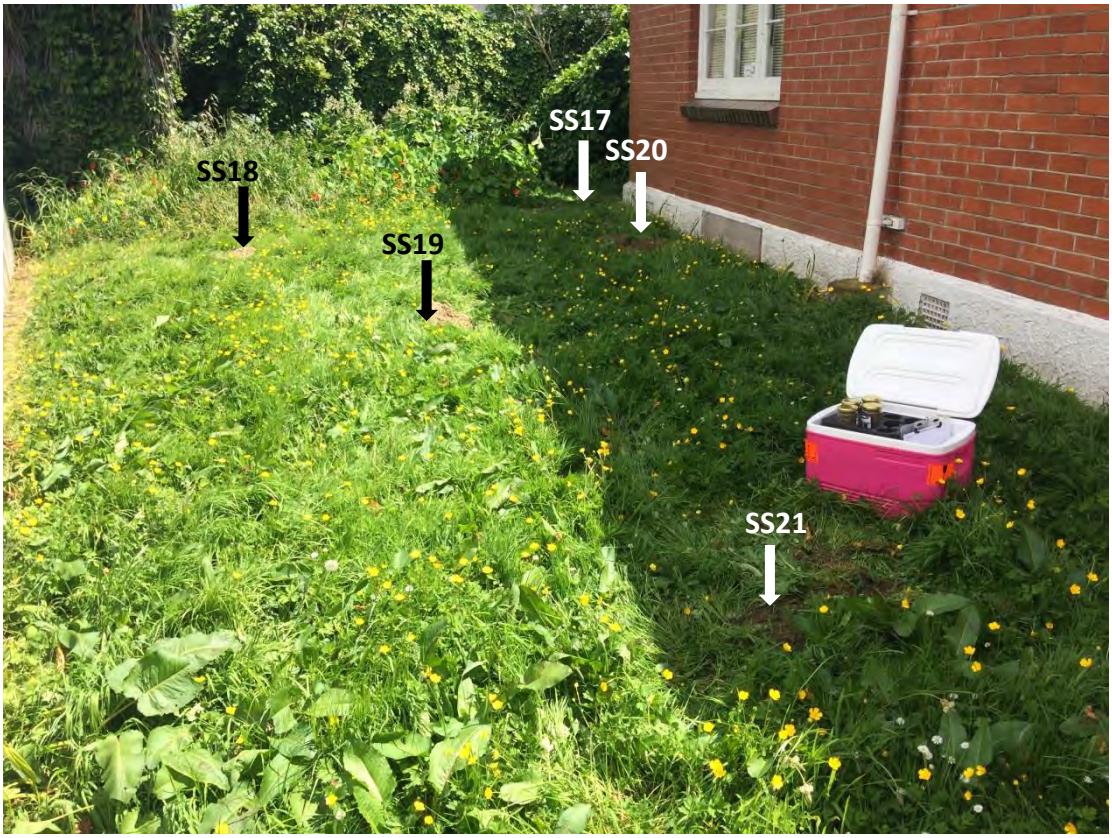
Photograph 4: Southern corner of the site, looking northeast. Sampling location SS10 is shown on the photograph.

Photograph 5: View of hand auger hole at SS09.

Photograph 6: Northeast corner of the site, looking southeast. The photograph shows the foundation of a shed and sampling location SS13.

Photograph 7: View of the implement shed in the southeast portion of the site, looking southeast.

Photograph 8: View of SS11 showing the concrete cut area.



Photograph 9: View of the southern corner of the site showing arsenic hotspot delineation sampling locations, looking southwest.

Photograph 10: View of the southern corner of the site showing the foundation of a shed and sampling location SS14.

Photograph 11: View of the southern corner of the site showing delineation sampling locations, looking northeast.

Historical Aerial Photographs

Historical Aerial Photograph 1: 1941
Source: Hutt City Council

Historical Aerial Photograph 2: 1958
Source: Hutt City Council

Historical Aerial Photograph 3: 1977
Source: Hutt City Council

Historical Aerial Photograph 4: 1988
Source: Hutt City Council

Historical Aerial Photograph 5: 1995
Source: Hutt City Council

Historical Aerial Photograph 6: 2003
Source: Hutt City Council

Historical Aerial Photograph 7: 2013
Source: Hutt City Council

Laboratory Reports

ATTLE DELAMORE PARTNERS LTD

solutions for your environment

Request for Analyses

Job No: 185 5937

Date Recv: 06-Oct-17 06:03

NOTE of th form

Received by: Connor Haisley Bossa

3118559370

From: Pattle Delamore Partners Ltd **To:** MILLS LA

Address (Refer to base of sheet): ☐ PDP Auckland ☑ PDP Wellington ☐ PDP Christchurch Quote No.: _____

Submitted by: Miles Calder Ph No.: 021 419 946 PDP Job No.: WJ2199100

Chain of Custody Record

Sent:
Name: Olga Albot
Signature: ~~Albot~~
Date and time: 6/10/17 11.00am

Received: ☐ Room temp. ☐ Chilled Temp.: ____°C
Name: _____
Signature: _____
Date and time: _____

Notes:

Results by: ☐ Email submitter: miles.calder @pdp.co.nz ☐ Mail (address below)
☐ Email other: bo.simkin @pdp.co.nz ☐ Fax (number below)

Priority: ☐ Normal ☐ High ☐ Urgent
Results required by: ____ / ____ / ____

Invoice to: ☐ PDP ☐ Other:

Sample ID	Sample type	No. bottles	Analyses Requested	Notes
SS01 0.0	S	1	Metals, OCP	metals with mercury
SS01 0.25	"	"	composite with SS02, 03, 04 - 0.25 / Metals, OCP	
SS01 0.50			composite with SS 02, 03, 04 - 0.50 / Metals, OCP	
SS 02 0.0			Metals, OCP	
SS 02 0.25			composite (see SS01 0.25)	
SS 02 0.50			composite (see SS01 0.50)	
SS03 0.0			Metals OCP	
SS 03 0.25			composite (see SS01 0.25)	
SS 03 0.50			composite (see SS01 0.50)	
SS 04 0.0			Metals OCP	
SS 04 0.25			composite (see SS01 0.25)	
SS 04 0.50			composite (see SS01 0.50)	
SS 05 0.0			Metals, OCP	
SS 05 0.25			composite with SS06, 07, 08 - 0.25 / Metals, OCP	
SS 05 0.50			composite with SS06, 07, 08 - 0.50 / Metals, OCP	
SS 06 0.0			Metals, OCP	
SS 06 0.25			composite (see SS05 0.25)	
SS 06 0.50			composite (see SS 05 0.50)	
SS 07 0.0			Metals, OCP	
SS 07 0.25			composite (see SS05 0.25)	
SS 07 0.50			composite (see SS 05 0.50)	
SS08 0.0	"	"	Metals OCP	"

Sample type: S Soil GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geothermal
SED Sediment BIO Biota TW Tradewaste WW Wastewater P Potable Other: _____

Note: Samples may contain dangerous or hazardous substances

DP Auckland
DP House, 235 Broadway, Newmarket, Auckland
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PDP Christchurch
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Tel: +64 3 345 7100 | Fax: +64 3 345 7101
christchurch@pdp.co.nz

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ATTLE DELAMORE PARTNERS LTD

Request for Analyses

NOTE: Please acknowledge receipt of these samples by signing this form and emailing to submitter.

From: Pattle Delamore Partners Ltd **To:** HILLS LABORATORY

Address (Refer to base of sheet): ☐ PDP Auckland ☑ PDP Wellington ☐ PDP Christchurch Quote No.: _____

Submitted by: Miles Calder Ph No.: 021 419 946 PDP Job No.: WD2201100

Chain of Custody Record

Sent:
Name: Olga Abbot
Signature: ~~Abbot~~
Date and time: 6/10/2017 11:00am

Received: ☐ Room temp. ☐ Chilled Temp.: ____°C
Name: _____
Signature: _____
Date and time: _____

Notes:

Results by: ☑ Email submitter: miles.calder @pdp.co.nz ☐ Mail (address below)
☑ Email other: bd.simkin @pdp.co.nz ☐ Fax (number below)

Priority: ☐ Normal ☐ High ☐ Urgent
Results required by: ____ / ____ / ____

Invoice to: ☐ PDP ☐ Other:

Sample ID	Sample type	No. bottles	Analyses Requested	Notes
SS08 0-25	S	1	Composite (see SS05 0-25)	Metals with mercury
SS08 0-50	"	"	Composite (see SS05 0-50)	"
SS09 0-0	"	"	Metals, OCP/ONP/OPP	
SS09 0-25	"	"	Hold cold	
SS09 0-50	"	"	Hold cold	
SS10 0-0	"	"	Metals, OCP/ONP/OPP	
SS10 0-25	"	"	Hold cold	
SS10 0-50	"	"	Hold cold	
SS11 0-0	"	"	Metals, OCP ~~/ONP/OPP~~	
SS11 0-25	"	"	Hold cold	
SS11 0-50	"	"	Hold cold	
SS12 0-0	"	"	Metals, OCP ~~/ONP/OPP~~	
~~SS12 0-0~~				
SS12 0-25	"	"	Hold cold	
SS12 0-50	"	"	Hold cold	
SS13 0-0	"	"	Metals, OCP/ONP/OPP	
SS13 0-25	"	"	Hold cold	
SS13 0-50	"	"	Hold cold	"

Sample type: S Soil GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geothermal
SED Sediment BIO Biota TW Tradewaste WW Wastewater P Potable Other: _____

Note: Samples may contain dangerous or hazardous substances

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wellington@pdp.co.nz

PDP Christchurch
295 Blenheim Road, Upper Riccarton, Christchurch 8041
PO Box 389, Christchurch 8140
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W www.hill-laboratories.com

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	1855937
Contact:	B Simkin	**Date Registered:**	07-Oct-2017 1:12 pm
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 6136	**Quote No:**	81087
	Wellington 6141	**Order No:**	
		Client Reference:	WO2199100
		Add. Client Ref:	
		Submitted By:	M Calder
		Charge To:	Pattle Delamore Partners Limited
		Target Date:	20-Oct-2017 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS01 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
2	SS01 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
3	SS01 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
4	SS02 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
5	SS02 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
6	SS02 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
7	SS03 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
8	SS03 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
9	SS03 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
10	SS04 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
11	SS04 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
12	SS04 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
13	SS05 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
14	SS05 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
15	SS05 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
16	SS06 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
17	SS06 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
18	SS06 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
19	SS07 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
20	SS07 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
21	SS07 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
22	SS08 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
23	SS08 0.25 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
24	SS08 0.50 05-Oct-2017	Soil	GSoil300	Composite Environmental Solid Samples
25	SS09 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
26	SS09 0.25 05-Oct-2017	Soil	GSoil300	Hold Cold
27	SS09 0.50 05-Oct-2017	Soil	GSoil300	Hold Cold
28	SS10 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
29	SS10 0.25 05-Oct-2017	Soil	GSoil300	Total Recoverable Arsenic
30	SS10 0.50 05-Oct-2017	Soil	GSoil300	Total Recoverable Arsenic

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
31	SS11 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
32	SS11 0.25 05-Oct-2017	Soil	GSoil300	Hold Cold
33	SS11 0.50 05-Oct-2017	Soil	GSoil300	Hold Cold
34	SS12 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
35	SS12 0.25 05-Oct-2017	Soil	GSoil300	Hold Cold
36	SS12 0.50 05-Oct-2017	Soil	GSoil300	Hold Cold
37	SS13 0.00 05-Oct-2017	Soil	GSoil300	Heavy Metals with Mercury, Screen Level; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
38	SS13 0.25 05-Oct-2017	Soil	GSoil300	Hold Cold
39	SS13 0.50 05-Oct-2017	Soil	GSoil300	Hold Cold
40	Composite of SS01 0.25, SS02 0.25, SS03 0.25 & SS04 0.25	Soil	cGSoil	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
41	Composite of SS01 0.50, SS02 0.50, SS03 0.50 & SS04 0.50	Soil	cGSoil	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
42	Composite of SS05 0.25, SS06 0.25, SS07 0.25 & SS08 0.25	Soil	cGSoil	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil
43	Composite of SS05 0.50, SS06 0.50, SS07 0.50 & SS08 0.50	Soil	cGSoil	Heavy Metals with Mercury, Screen Level; Organochlorine Pesticides Screening in Soil

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
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%. Analysis performed at 1 Clyde Street, Hamilton.	-	29-30
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40-43
Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS	Sonication extraction, Dilution cleanup, GC-MS analysis. Tested on as received sample Analysis performed at 1 Clyde Street, Hamilton	-	25, 28, 37
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample Analysis performed at 1 Clyde Street, Hamilton	0.010 - 0.06 mg/kg dry wt	1, 4, 7, 10, 13, 16, 19, 22, 31, 34, 40-43
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). Analysis performed at 1 Clyde Street, Hamilton. US EPA 3550.	0.10 g/100g as rcvd	1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40-43
Total Recoverable digestion	Nitric / hydrochloric acid digestion. Analysed at 1 Clyde Street, Hamilton. US EPA 200.2.	-	29-30
Composite Environmental Solid Samples	Individual sample fractions mixed together to form a composite fraction. Analysis performed at 1 Clyde Street, Hamilton.	-	2-3, 5-6, 8-9, 11-12, 14-15, 17-18, 20-21, 23-24
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. Analysed at 1 Clyde Street, Hamilton. US EPA 200.2.	2 mg/kg dry wt	29-30

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ANALYSIS REPORT

Client:	Pattle Delamore Partners Limited	**Lab No:**	1855937	SPv2
Contact:	B Simkin	**Date Received:**	06-Oct-2017	
	C/- Pattle Delamore Partners Limited	**Date Reported:**	19-Oct-2017	**(Amended)**
	PO Box 6136	**Quote No:**	81087	
	Wellington 6141	**Order No:**		
		Client Reference:	WO2199100	
		Submitted By:	M Calder	

Sample Type: Soil

Sample Name:		SS01 0.00 05-Oct-2017	SS02 0.00 05-Oct-2017	SS03 0.00 05-Oct-2017	SS04 0.00 05-Oct-2017	SS05 0.00 05-Oct-2017
Lab Number:		1855937.1	1855937.4	1855937.7	1855937.10	1855937.13
Individual Tests						
Dry Matter	g/100g as rcvd	68	72	79	74	79
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	6	8	5	8
Total Recoverable Cadmium	mg/kg dry wt	0.14	0.21	0.13	0.13	0.15
Total Recoverable Chromium	mg/kg dry wt	15	15	16	15	16
Total Recoverable Copper	mg/kg dry wt	9	9	8	8	8
Total Recoverable Lead	mg/kg dry wt	38	35	43	39	39
Total Recoverable Mercury	mg/kg dry wt	0.26	0.35	0.30	0.23	0.17
Total Recoverable Nickel	mg/kg dry wt	9	8	10	8	10
Total Recoverable Zinc	mg/kg dry wt	49	44	53	45	51
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
alpha-BHC	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
beta-BHC	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
delta-BHC	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
cis-Chlordane	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
trans-Chlordane	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
4,4'-DDD	mg/kg dry wt	0.035	0.030	0.017	0.025	< 0.013
2,4'-DDE	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
4,4'-DDE	mg/kg dry wt	1.13	0.69	0.64	0.43	0.24
2,4'-DDT	mg/kg dry wt	0.124	0.069	0.055	0.067	0.014
4,4'-DDT	mg/kg dry wt	0.89	0.51	0.37	0.37	0.117
Total DDT Isomers	mg/kg dry wt	2.2	1.30	1.08	0.90	0.37
Dieldrin	mg/kg dry wt	< 0.015	0.022	0.018	0.014	< 0.013
Endosulfan I	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Endosulfan II	mg/kg dry wt	0.019	0.018	< 0.013	< 0.014	< 0.013
Endosulfan sulphate	mg/kg dry wt	2.3	1.42	0.069	1.12	0.015
Endrin	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Endrin aldehyde	mg/kg dry wt	0.022	< 0.014	< 0.013	< 0.014	< 0.013
Endrin ketone	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Heptachlor	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Heptachlor epoxide	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Hexachlorobenzene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013
Methoxychlor	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.013

Sample Type: Soil						
	Sample Name:	SS06 0.00 05-Oct-2017	SS07 0.00 05-Oct-2017	SS08 0.00 05-Oct-2017	SS09 0.00 05-Oct-2017	SS10 0.00 05-Oct-2017
	Lab Number:	1855937.16	1855937.19	1855937.22	1855937.25	1855937.28
Individual Tests						
Dry Matter	g/100g as rcvd	75	75	77	72	77
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	8	5	11	42
Total Recoverable Cadmium	mg/kg dry wt	0.13	0.13	0.11	0.23	0.27
Total Recoverable Chromium	mg/kg dry wt	16	17	15	17	17
Total Recoverable Copper	mg/kg dry wt	7	8	8	17	18
Total Recoverable Lead	mg/kg dry wt	31	42	27	127	103
Total Recoverable Mercury	mg/kg dry wt	0.19	0.30	0.20	0.13	0.37
Total Recoverable Nickel	mg/kg dry wt	8	9	9	12	11
Total Recoverable Zinc	mg/kg dry wt	44	50	50	142	133
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
alpha-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
beta-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
delta-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
cis-Chlordane	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
trans-Chlordane	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
4,4'-DDD	mg/kg dry wt	0.015	0.017	0.017	< 0.014	0.013
2,4'-DDE	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
4,4'-DDE	mg/kg dry wt	0.37	0.48	0.35	0.041	0.40
2,4'-DDT	mg/kg dry wt	0.031	0.054	0.038	< 0.014	< 0.013
4,4'-DDT	mg/kg dry wt	0.24	0.37	0.28	0.020	0.21
Total DDT Isomers	mg/kg dry wt	0.66	0.92	0.68	< 0.09	0.62
Dieldrin	mg/kg dry wt	0.014	0.017	< 0.013	< 0.014	< 0.013
Endosulfan I	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Endosulfan II	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Endosulfan sulphate	mg/kg dry wt	0.083	0.20	0.049	< 0.014	< 0.013
Endrin	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Endrin aldehyde	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Endrin ketone	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Heptachlor	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Heptachlor epoxide	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Hexachlorobenzene	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Methoxychlor	mg/kg dry wt	< 0.014	< 0.013	< 0.013	< 0.014	< 0.013
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Acetochlor	mg/kg	-	-	-	< 0.07	< 0.07
Alachlor	mg/kg	-	-	-	< 0.05	< 0.05
Atrazine	mg/kg	-	-	-	< 0.07	< 0.07
Atrazine-desethyl	mg/kg	-	-	-	< 0.07	< 0.07
Atrazine-desisopropyl	mg/kg	-	-	-	< 0.14	< 0.13
Azaconazole	mg/kg	-	-	-	< 0.04	< 0.04
Azinphos-methyl	mg/kg	-	-	-	< 0.14	< 0.13
Benalaxyl	mg/kg	-	-	-	< 0.04	< 0.04
Bitertanol	mg/kg	-	-	-	< 0.14	< 0.13
Bromacil	mg/kg	-	-	-	< 0.07	< 0.07
Bromopropylate	mg/kg	-	-	-	< 0.07	< 0.07
Butachlor	mg/kg	-	-	-	< 0.07	< 0.07
Captan	mg/kg	-	-	-	< 0.14	< 0.13
Carbaryl	mg/kg	-	-	-	< 0.07	< 0.07
Carbofuran	mg/kg	-	-	-	< 0.07	< 0.07
Chlorfluazuron	mg/kg	-	-	-	< 0.07	< 0.07

Sample Type: Soil						
Sample Name:		SS06 0.00 05-Oct-2017	SS07 0.00 05-Oct-2017	SS08 0.00 05-Oct-2017	SS09 0.00 05-Oct-2017	SS10 0.00 05-Oct-2017
Lab Number:		1855937.16	1855937.19	1855937.22	1855937.25	1855937.28
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Chlorothalonil	mg/kg	-	-	-	< 0.07	< 0.07
Chlorpyrifos	mg/kg	-	-	-	< 0.07	< 0.07
Chlorpyrifos-methyl	mg/kg	-	-	-	< 0.07	< 0.07
Chlortoluron	mg/kg	-	-	-	< 0.14	< 0.13
Cyanazine	mg/kg	-	-	-	< 0.07	< 0.07
Cyfluthrin	mg/kg	-	-	-	< 0.09	< 0.08
Cyhalothrin	mg/kg	-	-	-	< 0.07	< 0.07
Cypermethrin	mg/kg	-	-	-	< 0.17	< 0.15
Deltamethrin (including Tralomethrin)	mg/kg	-	-	-	< 0.07	< 0.07
Diazinon	mg/kg	-	-	-	< 0.04	< 0.04
Dichlofluanid	mg/kg	-	-	-	< 0.07	< 0.07
Dichloran	mg/kg	-	-	-	< 0.2	< 0.2
Dichlorvos	mg/kg	-	-	-	< 0.09	< 0.09
Difenoconazole	mg/kg	-	-	-	< 0.10	< 0.09
Dimethoate	mg/kg	-	-	-	< 0.14	< 0.13
Diphenylamine	mg/kg	-	-	-	< 0.14	< 0.13
Diuron	mg/kg	-	-	-	< 0.07	< 0.07
Fenpropimorph	mg/kg	-	-	-	< 0.07	< 0.07
Fluazifop-butyl	mg/kg	-	-	-	< 0.07	< 0.07
Fluometuron	mg/kg	-	-	-	< 0.07	< 0.07
Flusilazole	mg/kg	-	-	-	< 0.07	< 0.07
Fluvalinate	mg/kg	-	-	-	< 0.05	< 0.05
Furalaxyl	mg/kg	-	-	-	< 0.04	< 0.04
Haloxyfop-methyl	mg/kg	-	-	-	< 0.07	< 0.07
Hexaconazole	mg/kg	-	-	-	< 0.07	< 0.07
Hexazinone	mg/kg	-	-	-	< 0.04	< 0.04
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	-	-	-	< 0.4	< 0.4
Kresoxim-methyl	mg/kg	-	-	-	< 0.04	< 0.04
Linuron	mg/kg	-	-	-	< 0.07	< 0.07
Malathion	mg/kg	-	-	-	< 0.07	< 0.07
Metalaxyl (Mefenoxam)	mg/kg	-	-	-	< 0.07	< 0.07
Methamidophos	mg/kg	-	-	-	< 0.4	< 0.4
Metolachlor	mg/kg	-	-	-	< 0.05	< 0.05
Metribuzin	mg/kg	-	-	-	< 0.07	< 0.07
Molinate	mg/kg	-	-	-	< 0.14	< 0.13
Myclobutanil	mg/kg	-	-	-	< 0.07	< 0.07
Naled	mg/kg	-	-	-	< 0.4	< 0.4
Norflurazon	mg/kg	-	-	-	< 0.14	< 0.13
Oxadiazon	mg/kg	-	-	-	< 0.07	< 0.07
Oxyfluorfen	mg/kg	-	-	-	< 0.04	< 0.04
Paclobutrazol	mg/kg	-	-	-	< 0.07	< 0.07
Parathion-ethyl	mg/kg	-	-	-	< 0.07	< 0.07
Parathion-methyl	mg/kg	-	-	-	< 0.07	< 0.07
Pendimethalin	mg/kg	-	-	-	< 0.07	< 0.07
Permethrin	mg/kg	-	-	-	< 0.03	< 0.03
Pirimicarb	mg/kg	-	-	-	< 0.07	< 0.07
Pirimiphos-methyl	mg/kg	-	-	-	< 0.07	< 0.07
Prochloraz	mg/kg	-	-	-	< 0.4	< 0.4
Procymidone	mg/kg	-	-	-	< 0.07	< 0.07
Prometryn	mg/kg	-	-	-	< 0.04	< 0.04
Propachlor	mg/kg	-	-	-	< 0.07	< 0.07
Propanil	mg/kg	-	-	-	< 0.2	< 0.2
Propazine	mg/kg	-	-	-	< 0.04	< 0.04
Propiconazole	mg/kg	-	-	-	< 0.05	< 0.05

Sample Type: Soil						
Sample Name:		SS06 0.00 05-Oct-2017	SS07 0.00 05-Oct-2017	SS08 0.00 05-Oct-2017	SS09 0.00 05-Oct-2017	SS10 0.00 05-Oct-2017
Lab Number:		1855937.16	1855937.19	1855937.22	1855937.25	1855937.28
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Pyriproxyfen	mg/kg	-	-	-	< 0.07	< 0.07
Quizalofop-ethyl	mg/kg	-	-	-	< 0.07	< 0.07
Simazine	mg/kg	-	-	-	< 0.07	< 0.07
Simetryn	mg/kg	-	-	-	< 0.07	< 0.07
Sulfentrazone	mg/kg	-	-	-	< 0.4	< 0.4
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	-	-	-	< 0.14	< 0.13
Tebuconazole	mg/kg	-	-	-	< 0.07	< 0.07
Terbacil	mg/kg	-	-	-	< 0.07	< 0.07
Terbufos	mg/kg	-	-	-	< 0.07	< 0.07
Terbumeton	mg/kg	-	-	-	< 0.07	< 0.07
Terbuthylazine	mg/kg	-	-	-	< 0.04	< 0.04
Terbuthylazine-desethyl	mg/kg	-	-	-	< 0.07	< 0.07
Terbutryn	mg/kg	-	-	-	< 0.07	< 0.07
Thiabendazole	mg/kg	-	-	-	< 0.4	< 0.4
Thiobencarb	mg/kg	-	-	-	< 0.07	< 0.07
Tolylfluanid	mg/kg	-	-	-	< 0.04	< 0.04
Triazophos	mg/kg	-	-	-	< 0.07	< 0.07
Trifluralin	mg/kg	-	-	-	< 0.07	< 0.07
Vinclozolin	mg/kg	-	-	-	< 0.07	< 0.07

Sample Name:		SS10 0.25 05-Oct-2017	SS10 0.50 05-Oct-2017	SS11 0.00 05-Oct-2017	SS12 0.00 05-Oct-2017	SS13 0.00 05-Oct-2017
Lab Number:		1855937.29	1855937.30	1855937.31	1855937.34	1855937.37
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	76	84	73
Total Recoverable Arsenic	mg/kg dry wt	28	9	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	5	8	9
Total Recoverable Cadmium	mg/kg dry wt	-	-	0.13	0.18	0.26
Total Recoverable Chromium	mg/kg dry wt	-	-	17	17	18
Total Recoverable Copper	mg/kg dry wt	-	-	15	14	16
Total Recoverable Lead	mg/kg dry wt	-	-	35	95	72
Total Recoverable Mercury	mg/kg dry wt	-	-	0.10	< 0.10	0.17
Total Recoverable Nickel	mg/kg dry wt	-	-	14	13	8
Total Recoverable Zinc	mg/kg dry wt	-	-	79	122	270
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
alpha-BHC	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
beta-BHC	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
delta-BHC	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
cis-Chlordane	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
trans-Chlordane	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	-	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
4,4'-DDD	mg/kg dry wt	-	-	< 0.013	< 0.012	0.017
2,4'-DDE	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
4,4'-DDE	mg/kg dry wt	-	-	< 0.013	< 0.012	0.039
2,4'-DDT	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
4,4'-DDT	mg/kg dry wt	-	-	< 0.013	< 0.012	0.180
Total DDT Isomers	mg/kg dry wt	-	-	< 0.08	< 0.07	0.24
Dieldrin	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Endosulfan I	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Endosulfan II	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014

Sample Type: Soil						
Sample Name:		SS10 0.25 05-Oct-2017	SS10 0.50 05-Oct-2017	SS11 0.00 05-Oct-2017	SS12 0.00 05-Oct-2017	SS13 0.00 05-Oct-2017
Lab Number:		1855937.29	1855937.30	1855937.31	1855937.34	1855937.37
Organochlorine Pesticides Screening in Soil						
Endosulfan sulphate	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Endrin	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Endrin aldehyde	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Endrin ketone	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Heptachlor	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Methoxychlor	mg/kg dry wt	-	-	< 0.013	< 0.012	< 0.014
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Acetochlor	mg/kg	-	-	-	-	< 0.07
Alachlor	mg/kg	-	-	-	-	< 0.05
Atrazine	mg/kg	-	-	-	-	< 0.07
Atrazine-desethyl	mg/kg	-	-	-	-	< 0.07
Atrazine-desisopropyl	mg/kg	-	-	-	-	< 0.13
Azaconazole	mg/kg	-	-	-	-	< 0.04
Azinphos-methyl	mg/kg	-	-	-	-	< 0.13
Benalaxyl	mg/kg	-	-	-	-	< 0.04
Bitertanol	mg/kg	-	-	-	-	< 0.13
Bromacil	mg/kg	-	-	-	-	< 0.07
Bromopropylate	mg/kg	-	-	-	-	< 0.07
Butachlor	mg/kg	-	-	-	-	< 0.07
Captan	mg/kg	-	-	-	-	< 0.13
Carbaryl	mg/kg	-	-	-	-	< 0.07
Carbofuran	mg/kg	-	-	-	-	< 0.07
Chlorfluazuron	mg/kg	-	-	-	-	< 0.07
Chlorothalonil	mg/kg	-	-	-	-	< 0.07
Chlorpyrifos	mg/kg	-	-	-	-	< 0.07
Chlorpyrifos-methyl	mg/kg	-	-	-	-	< 0.07
Chlortoluron	mg/kg	-	-	-	-	< 0.13
Cyanazine	mg/kg	-	-	-	-	< 0.07
Cyfluthrin	mg/kg	-	-	-	-	< 0.08
Cyhalothrin	mg/kg	-	-	-	-	< 0.07
Cypermethrin	mg/kg	-	-	-	-	< 0.16
Deltamethrin (including Tralomethrin)	mg/kg	-	-	-	-	< 0.07
Diazinon	mg/kg	-	-	-	-	< 0.04
Dichlofluanid	mg/kg	-	-	-	-	< 0.07
Dichloran	mg/kg	-	-	-	-	< 0.2
Dichlorvos	mg/kg	-	-	-	-	< 0.09
Difenoconazole	mg/kg	-	-	-	-	< 0.09
Dimethoate	mg/kg	-	-	-	-	< 0.13
Diphenylamine	mg/kg	-	-	-	-	< 0.13
Diuron	mg/kg	-	-	-	-	< 0.07
Fenpropimorph	mg/kg	-	-	-	-	< 0.07
Fluazifop-butyl	mg/kg	-	-	-	-	< 0.07
Fluometuron	mg/kg	-	-	-	-	< 0.07
Flusilazole	mg/kg	-	-	-	-	< 0.07
Fluvalinate	mg/kg	-	-	-	-	< 0.05
Furalaxyl	mg/kg	-	-	-	-	< 0.04
Haloxyfop-methyl	mg/kg	-	-	-	-	< 0.07
Hexaconazole	mg/kg	-	-	-	-	< 0.07
Hexazinone	mg/kg	-	-	-	-	< 0.04
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	-	-	-	-	< 0.4
Kresoxim-methyl	mg/kg	-	-	-	-	< 0.04
Linuron	mg/kg	-	-	-	-	< 0.07

Sample Type: Soil						
Sample Name:		SS10 0.25 05-Oct-2017	SS10 0.50 05-Oct-2017	SS11 0.00 05-Oct-2017	SS12 0.00 05-Oct-2017	SS13 0.00 05-Oct-2017
Lab Number:		1855937.29	1855937.30	1855937.31	1855937.34	1855937.37
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Malathion	mg/kg	-	-	-	-	< 0.07
Metalaxyl (Mefenoxam)	mg/kg	-	-	-	-	< 0.07
Methamidophos	mg/kg	-	-	-	-	< 0.4
Metolachlor	mg/kg	-	-	-	-	< 0.05
Metribuzin	mg/kg	-	-	-	-	< 0.07
Molinate	mg/kg	-	-	-	-	< 0.13
Myclobutanil	mg/kg	-	-	-	-	< 0.07
Naled	mg/kg	-	-	-	-	< 0.4
Norflurazon	mg/kg	-	-	-	-	< 0.13
Oxadiazon	mg/kg	-	-	-	-	< 0.07
Oxyfluorfen	mg/kg	-	-	-	-	< 0.04
Paclobutrazol	mg/kg	-	-	-	-	< 0.07
Parathion-ethyl	mg/kg	-	-	-	-	< 0.07
Parathion-methyl	mg/kg	-	-	-	-	< 0.07
Pendimethalin	mg/kg	-	-	-	-	< 0.07
Permethrin	mg/kg	-	-	-	-	< 0.03
Pirimicarb	mg/kg	-	-	-	-	< 0.07
Pirimiphos-methyl	mg/kg	-	-	-	-	< 0.07
Prochloraz	mg/kg	-	-	-	-	< 0.4
Procymidone	mg/kg	-	-	-	-	< 0.07
Prometryn	mg/kg	-	-	-	-	< 0.04
Propachlor	mg/kg	-	-	-	-	< 0.07
Propanil	mg/kg	-	-	-	-	< 0.2
Propazine	mg/kg	-	-	-	-	< 0.04
Propiconazole	mg/kg	-	-	-	-	< 0.05
Pyriproxyfen	mg/kg	-	-	-	-	< 0.07
Quizalofop-ethyl	mg/kg	-	-	-	-	< 0.07
Simazine	mg/kg	-	-	-	-	< 0.07
Simetryn	mg/kg	-	-	-	-	< 0.07
Sulfentrazone	mg/kg	-	-	-	-	< 0.4
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	-	-	-	-	< 0.13
Tebuconazole	mg/kg	-	-	-	-	< 0.07
Terbacil	mg/kg	-	-	-	-	< 0.07
Terbufos	mg/kg	-	-	-	-	< 0.07
Terbumeton	mg/kg	-	-	-	-	< 0.07
Terbuthylazine	mg/kg	-	-	-	-	< 0.04
Terbuthylazine-desethyl	mg/kg	-	-	-	-	< 0.07
Terbutryn	mg/kg	-	-	-	-	< 0.07
Thiabendazole	mg/kg	-	-	-	-	< 0.4
Thiobencarb	mg/kg	-	-	-	-	< 0.07
Tolylfluanid	mg/kg	-	-	-	-	< 0.04
Triazophos	mg/kg	-	-	-	-	< 0.07
Trifluralin	mg/kg	-	-	-	-	< 0.07
Vinclozolin	mg/kg	-	-	-	-	< 0.07

Sample Name:		Composite of SS01 0.25, SS02 0.25, SS03 0.25 & SS04 0.25	Composite of SS01 0.50, SS02 0.50, SS03 0.50 & SS04 0.50	Composite of SS05 0.25, SS06 0.25, SS07 0.25 & SS08 0.25	Composite of SS05 0.50, SS06 0.50, SS07 0.50 & SS08 0.50	
Lab Number:		1855937.40	1855937.41	1855937.42	1855937.43	
Individual Tests						
Dry Matter	g/100g as rcvd	78	83	78	82	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	4	6	4	-
Total Recoverable Cadmium	mg/kg dry wt	0.12	< 0.10	0.13	0.10	-
Total Recoverable Chromium	mg/kg dry wt	17	15	17	16	-

Sample Type: Soil						
Sample Name:		Composite of SS01 0.25, SS02 0.25, SS03 0.25 & SS04 0.25	Composite of SS01 0.50, SS02 0.50, SS03 0.50 & SS04 0.50	Composite of SS05 0.25, SS06 0.25, SS07 0.25 & SS08 0.25	Composite of SS05 0.50, SS06 0.50, SS07 0.50 & SS08 0.50	
Lab Number:		1855937.40	1855937.41	1855937.42	1855937.43	
Heavy Metals with Mercury, Screen Level						
Total Recoverable Copper	mg/kg dry wt	10	9	12	10	-
Total Recoverable Lead	mg/kg dry wt	33	15.0	29	15.3	-
Total Recoverable Mercury	mg/kg dry wt	0.17	0.12	0.13	< 0.10	-
Total Recoverable Nickel	mg/kg dry wt	12	13	12	13	-
Total Recoverable Zinc	mg/kg dry wt	64	60	65	60	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
4,4'-DDD	mg/kg dry wt	0.015	< 0.012	< 0.013	< 0.012	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
4,4'-DDE	mg/kg dry wt	0.46	0.017	0.198	0.018	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
4,4'-DDT	mg/kg dry wt	0.26	< 0.012	0.094	< 0.012	-
Total DDT Isomers	mg/kg dry wt	0.74	< 0.08	0.29	< 0.07	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Endosulfan sulphate	mg/kg dry wt	0.164	0.014	0.138	< 0.012	-
Endrin	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.012	< 0.013	< 0.012	-

Analyst's Comments

Amended Report: This report replaces an earlier report issued on 13 Oct 2017 at 4:12 pm
Reason for amendment: Arsenic added to samples SS10 0.25 and SS10 0.50, as per client request.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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%. Analysis performed at 1 Clyde Street, Hamilton.	-	29-30
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40-43
Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS	Sonication extraction, Dilution cleanup, GC-MS analysis. Tested on as received sample Analysis performed at 1 Clyde Street, Hamilton	-	25, 28, 37

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample Analysis performed at 1 Clyde Street, Hamilton	0.010 - 0.06 mg/kg dry wt	1, 4, 7, 10, 13, 16, 19, 22, 31, 34, 40-43
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). Analysis performed at 1 Clyde Street, Hamilton. US EPA 3550.	0.10 g/100g as rcvd	1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40-43
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	29-30
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction. Analysis performed at 1 Clyde Street, Hamilton.	-	2-3, 5-6, 8-9, 11-12, 14-15, 17-18, 20-21, 23-24
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	29-30

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

PATTLE DELAMORE PARTNERS LTD

solutions for your environment

Request for Analyses

NOTE: Please acknowledge receipt of these samples by signing this form and emailing to submitter.

From: Pattle Delamore Partners Ltd **To:** Hill Laboratories

Address (Refer to base of sheet): ☐ PDP Auckland ☑ PDP Wellington ☐ PDP Christchurch Quote No.:

Submitted by: Miles Calder Ph No.: 021499146 PDP Job No.: WO219100

Chain of Custody Record

Sent:	Received: ☐ Room temp. ☐ Chilled Temp.: 17.6 °C	Notes:
Name: Miles Calder	Name:	
Signature:	Signature:	
Date and time: 1/11/17	Date and time:	

Results by: ☑ Email submitter: miles.calder @pdp.co.nz ☐ Mail (address below)
☑ Email other: bo.simkin @pdp.co.nz ☐ Fax (number below)

Priority: ☐ Normal ☐ High ☐ Urgent
Results required by: ____ / ____ / ____

Invoice to: ☐ PDP ☐ Other:

Sample ID	Sample type	No. bottles	Analyses Requested	Notes
SS14 0.0	S	1	Arsenic	
SS14 0.25				
SS15 0.0				
SS15 0.25				
SS16 0.0				
SS16 0.25				
SS17 0.0				
SS17 0.25				
SS18 0.0				
SS18 0.25				
SS19 0.0				
SS19 0.25				
SS20 0.0				
SS20 0.25				
SS21 0.0				
SS21 0.25				
SS14 0.5			Hold Cold.	
SS15 0.5				
SS16 0.5				
SS17 0.5				
SS19 0.5				
SS20 0.5				

Sample type: S Soil GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geothermal
B Biota TW Tradewaste WW Wastewater P Potable Other:

Note: Samples may contain dangerous or hazardous substances

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Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	1870228
Contact:	B Simkin	**Date Registered:**	02-Nov-2017 7:40 pm
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 6136	**Quote No:**	81087
	Wellington 6141	**Order No:**	W02199100
		Client Reference:	
		Add. Client Ref:	
		Submitted By:	M Calder
		Charge To:	Pattle Delamore Partners Limited
		Target Date:	08-Nov-2017 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS14 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
2	SS14 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
3	SS15 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
4	SS15 0.25 01-Nov-2017	Soil	cGSoil	Total Recoverable Arsenic
5	SS16 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
6	SS16 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
7	SS17 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
8	SS17 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
9	SS18 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
10	SS18 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
11	SS19 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
12	SS19 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
13	SS20 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
14	SS20 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
15	SS21 0.0 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
16	SS21 0.25 01-Nov-2017	Soil	GSoil300	Total Recoverable Arsenic
17	SS14 0.5 01-Nov-2017	Soil	GSoil300	Hold Cold
18	SS15 0.5 01-Nov-2017	Soil	GSoil300	Hold Cold
19	SS16 0.5 01-Nov-2017	Soil	GSoil300	Hold Cold
20	SS17 0.5 01-Nov-2017	Soil	GSoil300	Hold Cold
21	SS19 0.5 01-Nov-2017	Soil	GSoil300	Hold Cold
22	SS20 0.5 01-Nov-2017	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
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%.	-	1-16
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-16
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-16

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ANALYSIS REPORT

Client:	Pattle Delamore Partners Limited	**Lab No:**	1870228	SPv2
Contact:	B Simkin	**Date Received:**	02-Nov-2017	
	C/- Pattle Delamore Partners Limited	**Date Reported:**	16-Nov-2017	**(Amended)**
	PO Box 6136	**Quote No:**	81087	
	Wellington 6141	**Order No:**	W02199100	
		Client Reference:		
		Submitted By:	M Calder	

Sample Type: Soil

	Sample Name:	SS14 0.0 01-Nov-2017	SS14 0.25 01-Nov-2017	SS15 0.0 01-Nov-2017	SS15 0.25 01-Nov-2017	SS16 0.0 01-Nov-2017
	Lab Number:	1870228.1	1870228.2	1870228.3	1870228.4	1870228.5
Total Recoverable Arsenic	mg/kg dry wt	11	11	9	19	16

	Sample Name:	SS16 0.25 01-Nov-2017	SS17 0.0 01-Nov-2017	SS17 0.25 01-Nov-2017	SS18 0.0 01-Nov-2017	SS18 0.25 01-Nov-2017
	Lab Number:	1870228.6	1870228.7	1870228.8	1870228.9	1870228.10
Total Recoverable Arsenic	mg/kg dry wt	23	47	49	31	27

	Sample Name:	SS19 0.0 01-Nov-2017	SS19 0.25 01-Nov-2017	SS20 0.0 01-Nov-2017	SS20 0.25 01-Nov-2017	SS21 0.0 01-Nov-2017
	Lab Number:	1870228.11	1870228.12	1870228.13	1870228.14	1870228.15
Total Recoverable Arsenic	mg/kg dry wt	28	23	20	14	21

	Sample Name:	SS21 0.25 01-Nov-2017	SS16 0.5 01-Nov-2017	SS17 0.5 01-Nov-2017	SS19 0.5 01-Nov-2017	
	Lab Number:	1870228.16	1870228.19	1870228.20	1870228.21	
Total Recoverable Arsenic	mg/kg dry wt	14	35	35	11	-

Analyst's Comments

Amended Report: This report replaces an earlier report issued on 07 Nov 2017 at 12:48 pm
Reason for amendment: Arsenic added to 3 samples, as per client request.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
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%.	-	1-16, 19-21
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-16, 19-21
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-16, 19-21

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

pdp solutions for your environment

PATTLE DELAMORE PARTNERS LTD

Request for Analyses

NOTE: Please acknowledge receipt of these samples by signing this form and emailing to submitter.

From: Pattle Delamore Partners Ltd **To:** HILLS LABORATORY

Address (Refer to base of sheet): ☐ PDP Auckland ☑ PDP Wellington ☐ PDP Christchurch Quote No.: _____

Submitted by: Olya Albot Ph No.: 0210236168 1 PDP Job No.: WO2199100

Chain of Custody Record

Sent:
Name: Olya Albot
Signature: Albot
Date and time: 17/10/2017 3:00pm

Received: ☐ Room temp. ☐ Chilled Temp.: ____°C
Name: _____
Signature: _____
Date and time: _____

Notes: The samples were sent through on 5/10/17

Results by: ☑ Email submitter: olya.albot @pdp.co.nz ☐ Mail (address below)
☑ Email other: bo.simkin @pdp.co.nz ☐ Fax (number below)

Priority: ☑ Normal ☐ High ☐ Urgent
Results required by: ____ / ____ / ____

Invoice to: ☐ PDP ☐ Other:

Sample ID	Sample type	No. bottles	Analyses Requested	Notes
SS10 0.25	S	1	Total Arsenic	
SS10 0.50	S	1	Total Arsenic	

Sample type: S Soil; GW Groundwater; SAL Seawater/saline; FW Freshwater; LEACH Leachate; GEO Geothermal; SED Sediment; BIO Biota; TW Tradewaste; WW Wastewater; P Potable; Other: _____

Note: Samples may contain dangerous or hazardous substances

PDP Auckland
PDP House, 235 Broadway, Newmarket, Auckland
PO Box 9528, Newmarket, Auckland 1149
Tel: +64 9 523 6900 | Fax: +64 9 523 6901

PDP Wellington
CSC House, Level 1, 111 Customhouse Quay, Wellington
PO Box 6136, Wellington 6141
Tel: +64 4 471 4130 | Fax: +64 4 471 4131

PDP Christchurch
295 Blenheim Road, Upper Riccarton, Christchurch 804
PO Box 389, Christchurch 8140
Tel: +64 3 345 7100 | Fax: +64 3 345 7101