Comprehensive Stormwater Network Discharge Consent – Soil Quality Compliance Sampling 2025

Prepared for

Christchurch City Council

May 2025

PATTLE DELAMORE PARTNERS LTD
Level 2, 134 Oxford Terrace
Christchurch Central, Christchurch 8011
PO Box 389, Christchurch 8140, New Zealand

Tel +64 3 **345 7100**
Web www.pdp.co.nz

Quality Control Sheet

TITLE	Comprehensive Stormwater Network Discharge Consent – Soil Quality Compliance Sampling 2025
CLIENT	Christchurch City Council
ISSUE DATE	15 May 2025
JOB REFERENCE	C011000028

Revision History

REV	Date	Status/Purpose	Prepared By	Reviewed by	Approved
0	29/04/25	Draft	Miriam Clark	Tracy Singson	Gerard Stark
1	15/05/25	Final	Miriam Clark	Tracy Singson	Gerard Stark

DOCUMENT CONTRIBUTORS

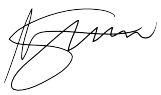
Prepared by

SIGNATURE

Miriam Clark

Reviewed by

SIGNATURE



Tracy Singson

Approved by

Gerard Stark

Limitations:

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Christchurch City Council. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Christchurch 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.

Table of Contents

Table of Figures

Table of Tables

Appendices

1.0 Introduction

Christchurch City Council (CCC) currently holds a global resource consent (CRC252424; Comprehensive Stormwater Network Discharge Consent (CSNDC)) for discharges from its stormwater network across Christchurch. Condition 49 of the CSNDC references an Environmental Monitoring Programme[1] (EMP), which included requirements for soil quality monitoring at identified stormwater infiltration facilities across the city. The purpose of the soil quality monitoring is to ensure that the infiltration treatment facilities do not accumulate contaminants to a point where they may negatively impact ground or surface water quality or pose a human health risk. As such, CCC has engaged Pattle Delamore Partners Limited (PDP) to undertake sampling of the accumulated sediment/soil within the six identified stormwater treatment facilities in compliance with the CSNDC.

This letter outlines the methodology and findings of the sampling activities completed in accordance with the approved Statement of Work, dated 10 February 2025.

2.0 Sampling Activities Completed

On 27 February 2025, a PDP field staff member visited the six stormwater infiltration and treatment facilities to undertake the sampling activities. The details of the stormwater facilities are summarised in Table 1 below and the locations in the attached Figure 1 (Appendix A). Photographs taken during the sampling activities are also attached in Appendix B.

Table 1: Stormwater Facilities Sampled

Location	Type of Facility	Land Use	Year Constructed
Denton Park (DP)	Soakage Basin	Residential	1997
Beckenham Library (BL)	Detention Swale and Basin	Car Park	2005
Tumara Park (TP)	Infiltration and Detention	Large Residential	2003
Hornby Industrial Park (HIP)	Infiltration Basin	Industrial	1995
Richmond Housing Complex (RHC)	Swale and First Flush Basin	High Density Housing	2007
Grove Road (GR)	Rain Garden	Commercial	2015

[1] CCC, 2025. *Environmental Monitoring Programme for the Comprehensive Stormwater Network Discharge Consent – version 10.*

2.1 Sample Collection Methodology

With reference to the EMP sampling methodology, and in accordance with PDP's field sampling and health and safety procedures, the following was completed:

- Collection of samples from swales and basins at a depth of between surface and 50 mm below the ground surface at the lowest point, except for the rain garden where samples were collected at a depth of 100 mm below the base of the mulch layer.
- For swales, samples were collected at four equally spaced locations.
- For basins (e.g. infiltration, detention, first flush) were sampled at the lowest points based on visual observations. Where relevant, the CCC Three-Waters GIS network map was also referred to guide the selection of sampling locations.

All soil samples (see Section 2.2. for number of samples and locations) were collected directly by hand using manual digging tools (i.e. spade, hand trowel and/or soil corer). The sampling equipment was cleaned using Decon 90 (phosphate-free detergent) between sampling points to prevent the possibility of cross contamination. On each occasion, a clean pair of nitrile gloves was used for sample collection to prevent cross contamination between samples and to protect the PDP site worker during sample collection.

All samples were collected and placed directly into laboratory supplied sampling jars, stored into a chilly-bin with ice packs and submitted with PDP's chain-of-custody documentation Hills Laboratories (Hills) in Hamilton for analysis. A copy of the chain-of-custody documentation is attached.

2.2 Facility and Sample Locations

Figures A to F below show the sample locations at each facility. Photographs taken are also attached.

Figure A - Soil sample locations at Denton Park (DP) Soakage Basins.

Figure B - Soil sample locations at Beckenham Library (BL) Detention Swale and Basin.

Figure C - Soil sample locations at Tumara Park (TP) Infiltration and Detention Swale.

Figure D - Soil sample locations at Hornby Industrial Park (HIP) Infiltration Basin.

Figure E - Soil sample locations at Richmond Housing Complex (RHC) Swale and First Flush Basin.

Figure F - Soil sample locations at Grove Road (GR) Rain Garden.

2.3 Sample Analysis

In accordance with the requirements of the EMP, all samples collected from each stormwater facility were analysed for copper, lead, zinc and polycyclic aromatic hydrocarbons (PAH). In the case of the Hornby Industrial Park site, the analysis also included arsenic, cadmium, chromium, nickel and semi-volatile organic compounds (SVOC).

3.0 Sampling Results (2025)

To provide context for the sampling results, reference has been given to the soil quality guideline values outlined in the EMP, as referenced in the consent. These soil quality guideline values have been based on a document prepared by PDP for CCC, entitled *Determination of Soil Quality Guideline Values for Six Stormwater Facilities*, dated June 2021.

3.1 Field Observations

A summary of the field observations is discussed in Table 2 below.

Table 2: Field Observations

Location	Observations
Denton Park	⁘ The soil in the basins in all locations was notably dry (see Photographs 11 and 12). No obvious signs of chemical staining or odours.
Beckenham Library	⁘ The soil in both the swale and basin in most locations was notably dry (see Photographs 6 and 7). No obvious signs of chemical staining or odours.
Tumara Park	⁘ See Photographs 1 to 3. No obvious signs of chemical staining or odours. ⁘ Visual observations of recent water pooling/sediment accumulation at soil sample location TP_SS2_0.0 (southern end of the basin), supported by greener vegetation compared to the surroundings. ⁘ Two inlets at the northern and mid-section of the basin had build-up of debris.
Hornby Industrial Park	⁘ See Photographs 9 and 10. No obvious signs of chemical staining or odours.
Richmond Housing Complex	⁘ See Photographs 4 and 5. Smelly organic odour at RHC_SS1_0.0 near the inlet at the northern end of the basin.

Table 2: Field Observations	
Location	**Observations**
Grove Road	⁘ See Photograph 8. The northern side of the rain garden was inaccessible due tall plant species. ⁘ The outlet flowing towards Hagley Park could not be located at the time of sampling.

3.2 Laboratory Results

The results of the 2025 soil sampling are summarised below and tabulated in the attached Table A, which also includes results from previous monitoring rounds supplied by CCC.

3.2.1 Denton Park

Three samples (DP_SS1 to DP_SS3) were collected within the Denton Park soakage basin, and the results showed:

- All three samples contained copper, lead and zinc concentrations of up to 13 mg/kg, 45 mg/kg and 210 mg/kg, respectively. The highest heavy metal concentrations were all recorded in sample DP_SS1, although the magnitudes were not significantly different to the other samples.
- With regard to key PAHs compounds, benzo(a)pyrene (BaP) and pyrene were recorded in all three samples at concentrations of up to 0.041 mg/kg and 0.067 mg/kg, respectively. Naphthalene was not recorded above the laboratory limit of detection in any of the three samples.
- All sample results comply with the respective soil quality guideline values.

3.2.2 Beckenham Library

Six samples comprising two samples (BL_SS1 and BL_SS2) from the basin and four samples (BL_SS3 to BL_SS6) from the swale and the results showed:

- All six samples contained copper, lead and zinc concentrations of up to 43 mg/kg, 45 mg/kg and 280 mg/kg, respectively. In general, the samples collected from the basin area recorded slightly higher metal concentrations compared those collected from the swale area.
- With regard to key PAHs compounds, BaP and pyrene were recorded in all six samples at concentrations of up to 0.153 mg/kg and 0.27 mg/kg, respectively. Naphthalene was not recorded above the laboratory limit of detection in any of the six samples. In contrast with the metal results, samples collected from the swale area recorded slightly higher PAHs concentrations compared to those collected from the basin area.

- All sample results comply with the respective soil quality guideline values.

3.2.3 Tumara Park

Seven samples comprising three samples (TP_SS1 to TP_SS3) from the basin and four samples (TP_SS5 to TP_SS8) from the swale and the results showed:

- All seven samples contained copper, lead and zinc concentrations of up to 29 mg/kg, 32 mg/kg and 260 mg/kg, respectively. There is no obvious pattern of metals distribution between the swale and the basin area.
- With regard to key PAHs compounds, BaP was recorded in six of seven samples at concentrations of up to 2.6 mg/kg, while all seven samples contained pyrene at concentrations of up to 5.8 mg/kg. Naphthalene was not recorded above the laboratory limit of detection in all but one sample at a concentration of 0.12 mg/kg (TP_SS7). There is no obvious pattern of PAH distribution between the swale and the basin area, although sample TP_SS7 returned an order of magnitude higher than all other samples.
- All sample results comply with the respective soil quality guideline values.

3.2.4 Hornby Industrial Park

Three samples (HIP_SS1 to HIP_SS3) were collected within the Hornby Industrial Park soakage basin and the results showed:

- All three samples contained detectable heavy metals including arsenic of up to 7 mg/kg; cadmium of up to 0.19 mg/kg, chromium of up to 31 mg/kg, copper of up to 47 mg/kg, lead of up to 38 mg/kg nickel of up to 17 mg/kg and zinc of up to 610 mg/kg. The highest heavy metals concentrations were all recorded in sample HIP_SS3, although the magnitudes were not significantly different to the other samples.
- With regard to key PAHs compounds, BaP and pyrene were recorded in all three samples at concentrations of up to 0.048 mg/kg and 0.23 mg/kg, respectively. Naphthalene was only recorded in sample HIP_SS3 (0.08 mg/kg).
- SVOCs were not recorded above the laboratory limit of detection in any of the three samples analysed.
- All sample results comply with the respective soil quality guideline values.

3.2.5 Richmond Housing Complex

Three samples (RHC_SS1 to RHC_SS3) were collected within the Richmond Housing Complex soakage basin and the results showed:

- All three samples contained copper, lead and zinc concentrations of up to 19 mg/kg, 104 mg/kg and 137 mg/kg, respectively. The highest heavy metals concentrations were all recorded in sample RHC_SS3, although the magnitudes were not significantly different to the other samples.
- With regard to key PAHs compounds, BaP and pyrene were recorded in two of three samples at concentrations of up to 0.068 mg/kg and 0.141 mg/kg, respectively. Naphthalene was not recorded above the laboratory limit of detection in any of the three samples.
- All sample results comply with the respective soil quality guideline values.

3.2.6 Grove Road

Two samples (GR_SS1 and GR_SS2) were collected within the Grove Road rain garden and the results showed:

- Both samples contained copper, lead and zinc concentrations of up to 164 mg/kg, 110 mg/kg and 2,300 mg/kg, respectively.
- With regard to key PAHs compounds, both samples contained BaP and pyrene at concentrations of up to 0.169 mg/kg and 0.46 mg/kg, respectively. Naphthalene was only recorded in sample GR_SS02 at 0.06 mg/kg.
- All sample results comply with the respective soil quality guideline values.

4.0 Discussion

The 2025 sampling results indicated that the key contaminants of concern remain present in all sampled stormwater facilities, although the concentrations measured were well below the adopted soil quality guideline values. This indicates there is no significant accumulation of contaminated sediments on the ground surface of the basin/swale areas from the stormwater network discharges. In addition, the results indicate that the potential risk to human health via contact from the continued use of these areas as open/recreation land is considered to be acceptably low. With regard to potential impacts to groundwater quality, the low-level total concentrations reported in the soils indicate a low likelihood of potential impacts to the underlying shallow groundwater via infiltrating stormwater within the basin/swale areas.

4.1 Comparison of Current and Previous Sampling Data

To assist in determining any temporal trends and/or concentration patterns, the heavy metal results from previous and current sampling data (average concentrations) were plotted. Figures G to L below (Section 4.1.1) shows the facility-centric concentration plots, while Figures M to O show the contaminant-

centric concentration plots, including specific trigger guideline values/levels. Based on these plots, the following conclusions were drawn:

- Overall, zinc levels are recorded at higher concentrations across all sampling sites, compared to other contaminants (lead and copper).
- There appears to be an increasing trend of zinc concentration at Tumara Park (see Figure H), Richmond Housing (see Figure K) and Grove Road (see Figure I). Of note, Grove Road showed at least two orders of magnitude increase compared to the previous sampling results, although it should be noted that there are only two sampling rounds completed to date at the Grove Road site. A review of the surrounding land use activities showed presence of several commercial operations including carwash facilities, car dealership and the railway line. Hornby Industrial Park also showed a noticeable increase (see Figure L), although not as significant compared to that observed in Grove Road.
- All other parameters generally fall within the historic range of concentrations measured.
- To date, all contaminant concentrations (heavy metals and PAHs) across the six facilities are well below the applicable soil quality guideline value.

4.1.1 Facility-Centric Concentration Plots

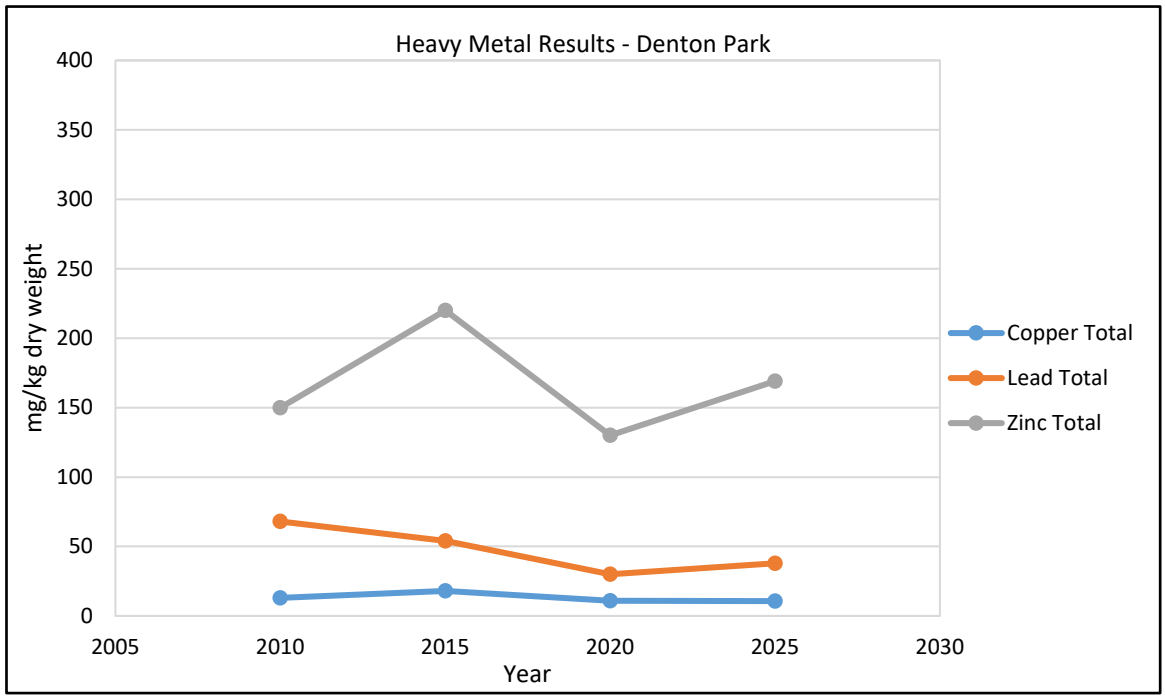


Figure G - Concentration Plot – Denton Park

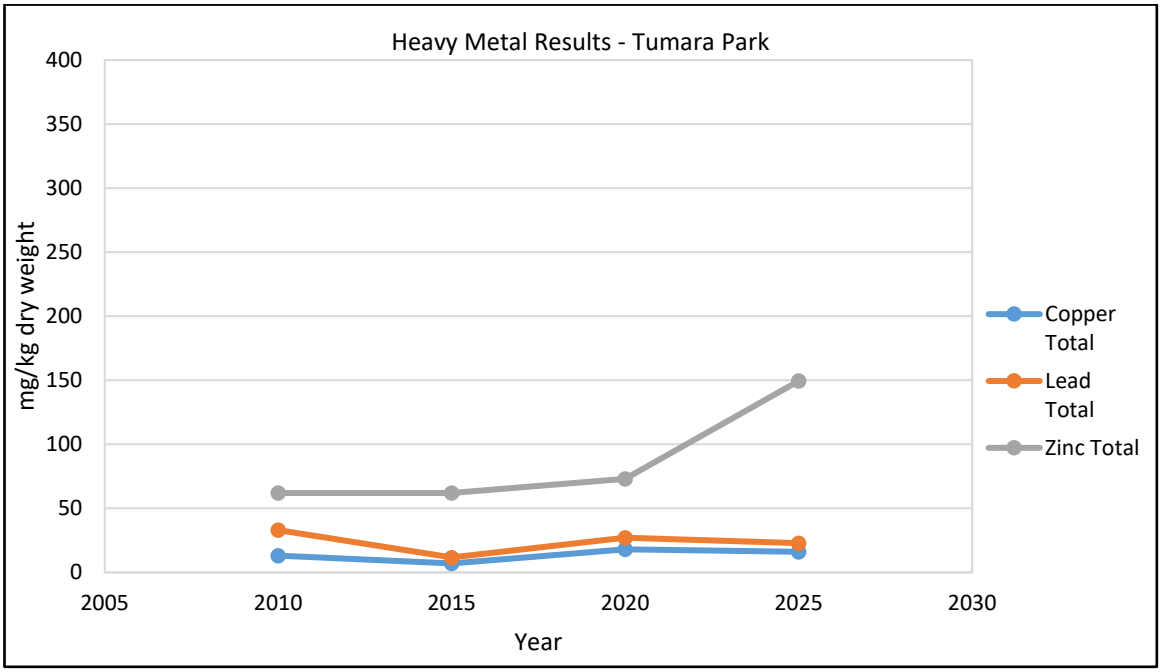


Figure H - Concentration Plot – Tumara Park

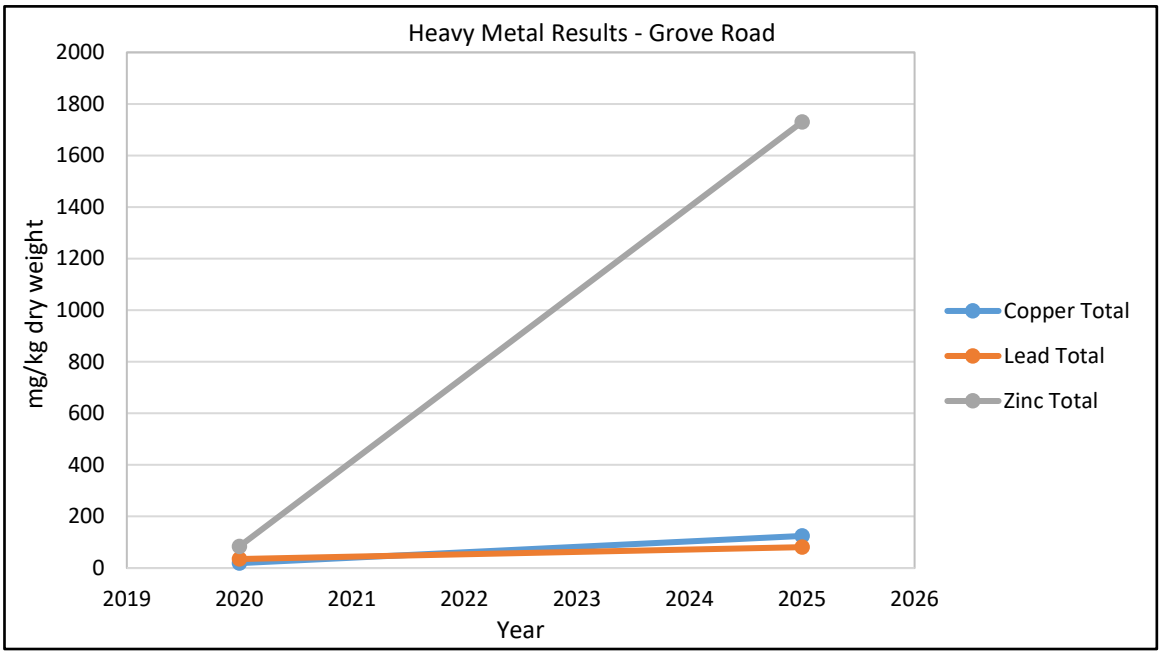


Figure I - Concentration Plot – Grove Road

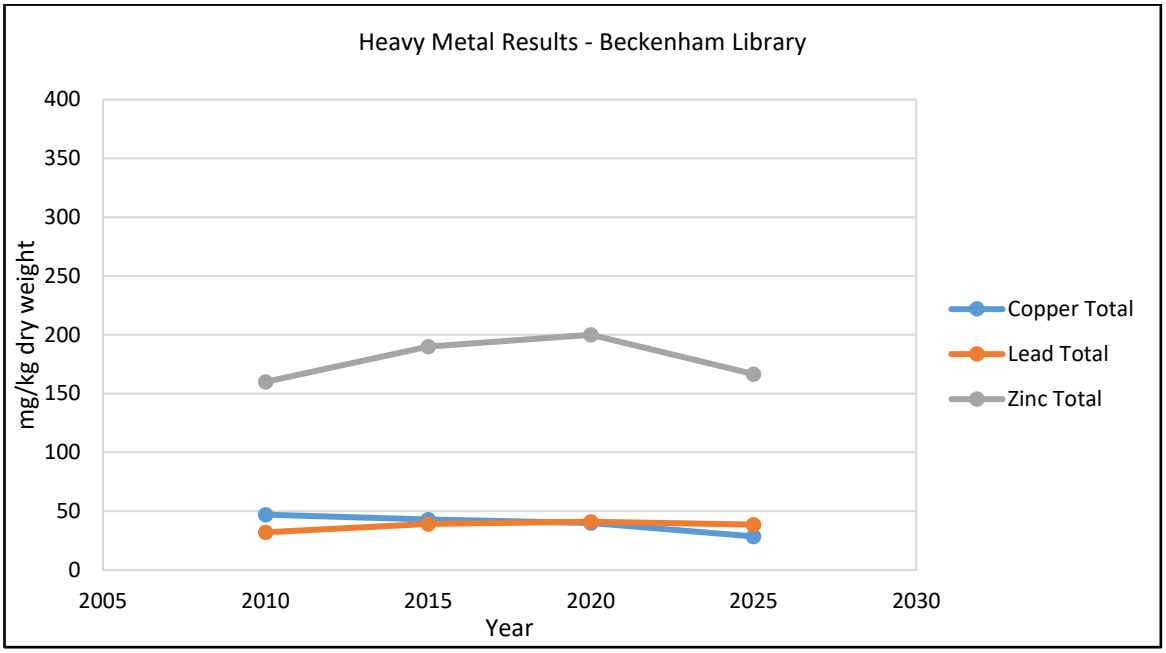


Figure J - Concentration Plot – Beckenham Library

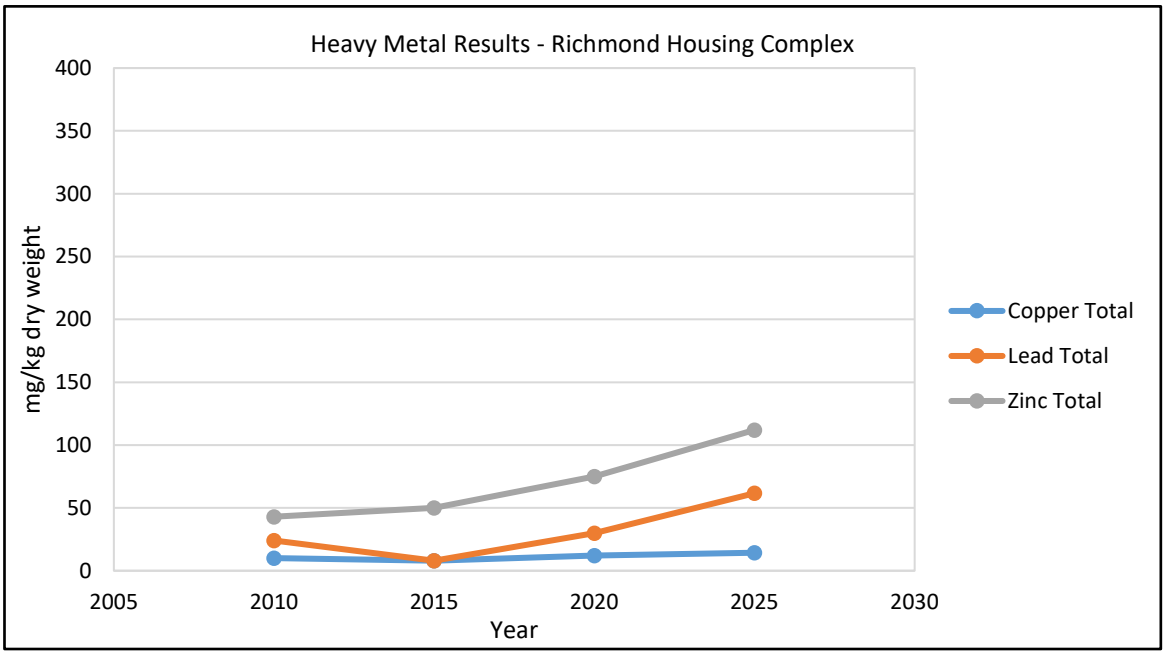


Figure K - Concentration Plot – Richmond Housing Complex

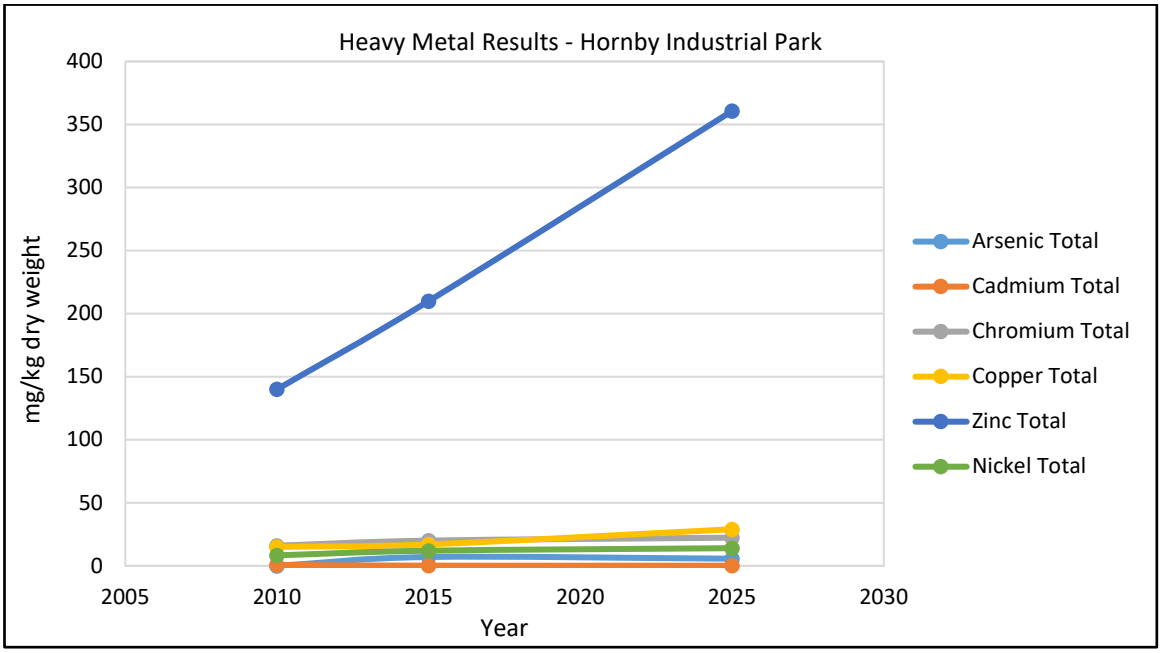


Figure L - Concentration Plot – Hornby Industrial Park

4.1.2 Concentration Plots for Copper, Lead and Zinc

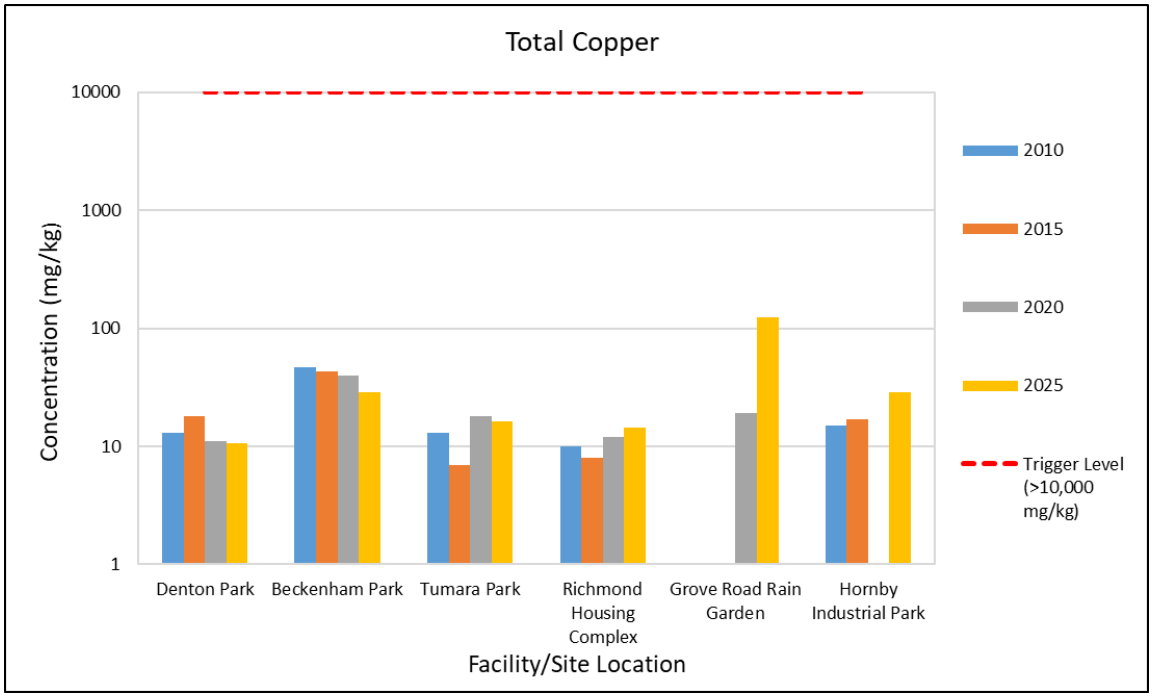


Figure M - Concentration Plot – Copper

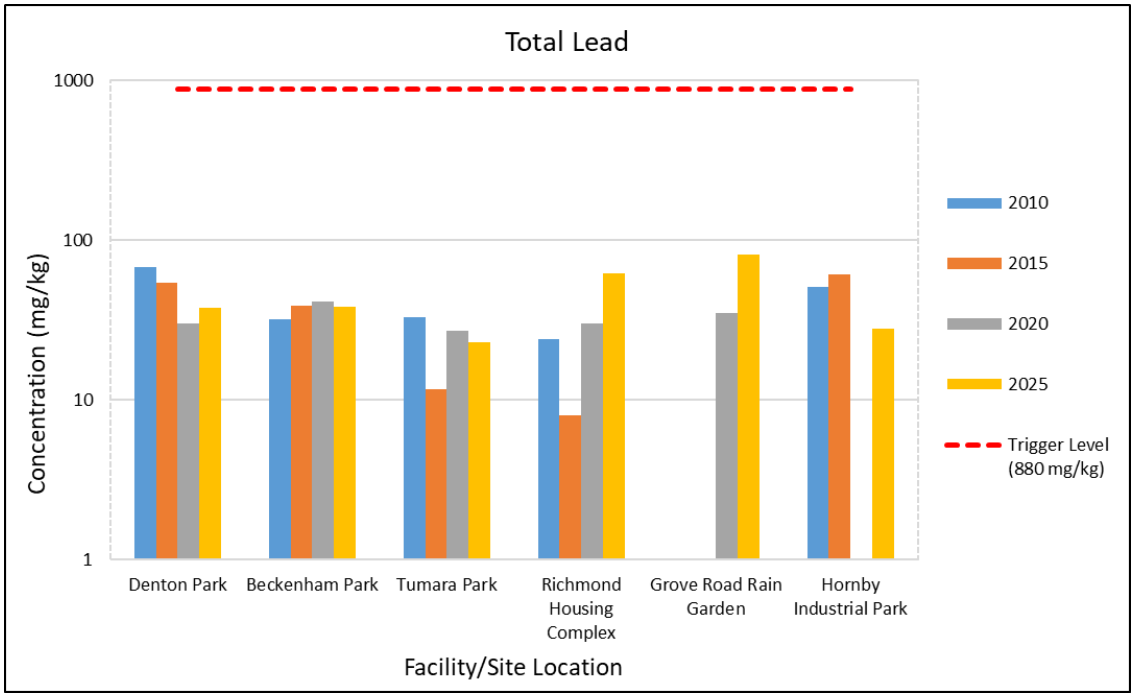


Figure N - Concentration Plot – Lead

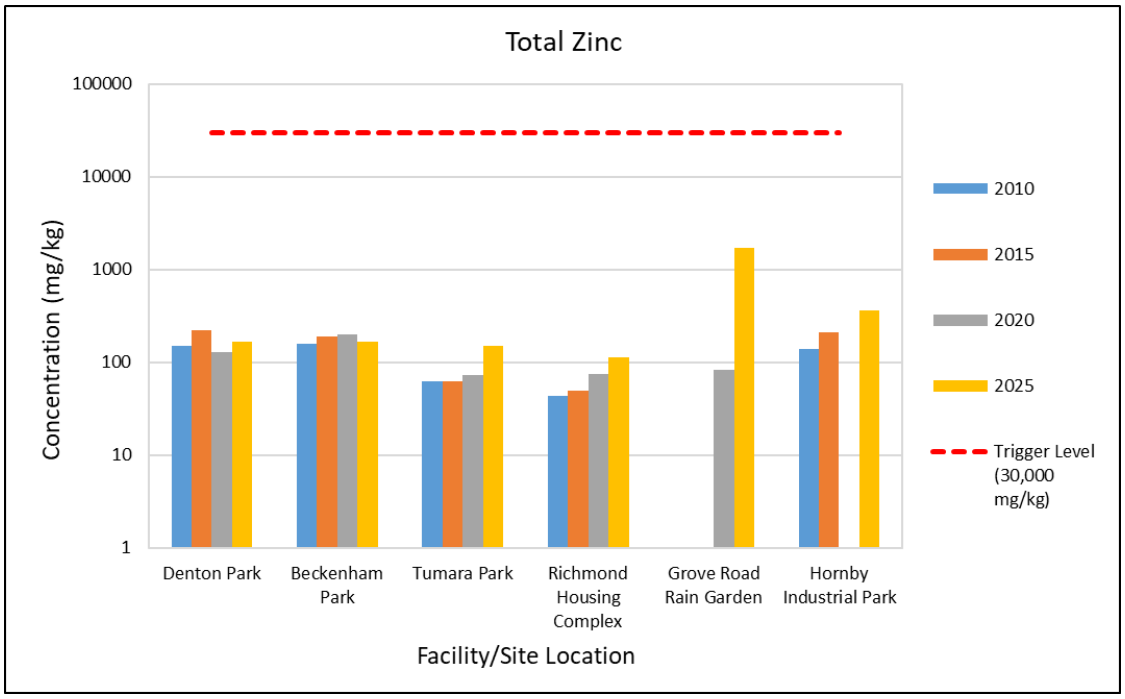


Figure O – Concentration Plot – Zinc

5.0 Conclusion

The findings of the recent sampling activities completed showed that the soil quality within the six stormwater treatment facilities complies with the relevant requirements of the Comprehensive Stormwater Network Discharge Consent (CRC252424). Given the acceptable results, there is currently no requirement to consider any specific remedial works at the six stormwater treatment sites. As such, it is recommended that the 5-yearly monitoring programme continues as per the EMP and the consent, which will be scheduled for 2030.

6.0 Limitations

1) This document has been prepared by Pattle Delamore Partners Limited (PDP) on the specific instructions of Christchurch City Council (CCC) for the limited purposes described in the document. PDP accepts no liability if the document 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.

2) This document has been prepared by PDP based on information provided by CCC and others (not directly contracted by PDP for the work). PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the document. PDP accepts no responsibility for errors or omissions in or the currency or sufficiency of the provided information.

3) This report has been prepared based on visual observations of each site, analysis of 24 soil samples across six stormwater infiltration facilities, and a review of previous soil results from each facility. Soil samples were analysed by an analytical laboratory for copper, zinc, lead and polycyclic aromatic hydrocarbons, with one facility additionally tested for arsenic, cadmium, chromium, nickel and SVOCs. 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.

4) The advice and opinions expressed in this report are based on the observation and collection of a series of shallow samples using hand tools. The geological and associated environmental conditions have been interpolated between the sampling locations and are not guaranteed to be accurate.

5) The laboratory test results provide an approximation of the concentration of the tested analytes and are subject to the inherent limitations of the laboratory techniques used for the tests.

6) This assessment is limited to the collection and analysis of soil samples from discrete sampling locations. Interpretations of subsurface

conditions, including contaminant concentrations, are not guaranteed at distance away from the specific points of sampling.

7) If contaminants have been found at the site, it is possible that the contaminants could extend off-site, or that any contaminants existing on neighbouring sites might have contributed to the contamination that exists at the site. The presence or absence of contaminants off-site, and risks associated with any off-site contaminants are not considered by this report.

8) The information contained within this document applies to soil sampling undertaken on the date stated in this report, or if none is stated, the date of this report. With time, the site conditions and environmental standards may change. Accordingly, the reported assessment and conclusions are not guaranteed to apply at a later date.

9) This document includes a review and comparison of previous soil contaminant results that were not taken by PDP. While every effort has been made to interpret these results accurately, PDP cannot guarantee the accuracy, reliability, or methodology used in the sampling, analysis, and reporting. There may be differences in sampling techniques, laboratory methods, and data interpretation which may affect direct comparisons with PDP results. Accordingly, conclusions drawn from this comparison should be considered in light of these potential discrepancies.

Appendix A: Figure

SOURCE:
1. AERIAL IMAGERY (FLOWN 2018-2019) SOURCED FROM THE LINZ DATA SERVICE https://data.linz.govt.nz/layer/105041-christchurch-0075m-urban-aerial-photos-2018-2019/ AND LICENCED BY ENVIRONMENT CANTERBURY FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE.
2. STORMWATER TREATMETN FACILITY LOCATIONS PROVIDED BY CHRISTCHURCH CITY COUNCIL AND USED WITH PERMISSION.

FIGURE 1 : STORMWATER FACILTIES LOCATION MAP

SCALE : 1:75,000 (A4)

0 250 500 1,000 1,500

METRES

C04394100Z001_LOCATION.mxd 14/06/2021 ISSUE 1

Appendix B: Site Photographs

Photograph 1: View of the infiltration basin at Tumara Park looking northeast.

Photograph 2: View of TP_SS2_0.0 at the southern end of the Tumara Park infiltration basin.

.

Photograph 3: View of the detention swale at Tumara Park looking southeast.

Photograph 4: View of the northern end of the first flush basin at the Richmond Housing Complex. RHC_SS1 was located near the dry grass area in the centre of the photo.

Photograph 5: Soil sample location of RHC_SS2_0.0 showing moist silty soils from 0 to 50 mm bgl.

Photograph 6: View of the detention swale at Beckenham Library looking west.

Photograph 7: Soil sample location BL_SS1_0.0 in the basin at Beckenham Library showing dry silty soil with some sand from 0 to 50 mm bgl.

Photograph 8: Soil sample location GR_SS1_0.0 in the rain garden at Grove Road basin showing silty gravels (rounded) with trace sand from 0 to 100 mm bgl. A piece of plastic was observed.

Photograph 9: View of the infiltration basin at Hornby Industrial Park looking southeast.

Photograph 10: The soil at HIP_SS2_0.0 comprising of silty soils with trace sand.

Photograph 11: View of a soakage basin at Denton Park looking north.

Photograph 12: The soil condition at DP_SS2_0.0 (Denton Park) comprising of dry silt with trace sand.

Appendix C: Results Table

Table A: Soil Sample Results - CCC Stormwater Treatment Facilities

Denton Park Soakage Basin - Residential - Constructed 1997		Units	Trigger Value	2010	2015	2020	2025 (PDP)			
Sample ID							DP_SS1_0.0	DP_SS2_0.0	DP_SS3_0.0	2025 Average
	Heavy Metals									
	Copper Total	mg/kg dw	>10,000	13	18	11	13	10	9	11
	Lead Total	mg/kg dw	880	68	54	30	45	33	36	38
	Zinc Total	mg/kg dw	30,000	150	220	130	210	194	103	169
	Polycyclic Aromatic Hydrocarbon									
	Benzo(a)pyrene: Dry Weight Basis, Trace Level	mg/kg	40	NS	NS	0.018	0.041	0.04	0.025	0.04
	Naphthalene: Dry Weight Basis, Trace Level	mg/kg	63	NS	NS	0.019	< 0.06	< 0.05	< 0.06	0.06
	Pyrene: Dry Weight Basis, Trace Level	mg/kg	1,600	NS	NS	0.052	0.067	0.063	0.041	0.06

Beckenham Library Detention Swale - Carpark - Constructed 2005		Units	Trigger Value	2010	2015	2020	2025 (PDP)						
Sample ID							BL_SS1_0.0	BL_SS2_0.0	BL_SS3_0.0	BL_SS4_0.0	BL_SS5_0.0	BL_SS6_0.0	2025 Average
	Heavy Metals												
	Copper Total	mg/kg dw	>10,000	47	43	40	42	43	26	21	20	19	29
	Lead Total	mg/kg dw	880	32	39	41	45	39	37	39	37	34	39
	Zinc Total	mg/kg dw	30,000	160	190	200	280	200	155	145	118	101	167
	Polycyclic Aromatic Hydrocarbon												
	Benzo(a)pyrene: Dry Weight Basis, Trace Level	mg/kg	40	NS	NS	0.26	0.032	0.044	0.101	0.13	0.153	0.067	0.09
	Naphthalene: Dry Weight Basis, Trace Level	mg/kg	63	NS	NS	0.031	< 0.07	< 0.06	< 0.07	< 0.06	< 0.07	< 0.06	0.07
	Pyrene: Dry Weight Basis, Trace Level	mg/kg	1,600	NS	NS	0.84	0.053	0.079	0.184	0.24	0.27	0.121	0.16

Tumara Park Infiltration and Detention - Large Residential - Constructed 2003		Units	Trigger Value	2010	2015	2020	2025 (PDP)							
Sample ID							TP_SS1_0.0	TP_SS2_0.0	TP_SS3_0.0	TP_SS5_0.0	TP_SS6_0.0	TP_SS7_0.0	TP_SS8_0.0	2025 Average
	Heavy Metals													
	Copper Total	mg/kg dw	>10,000	13	7	18	20	6	22	13	12	11	29	16
	Lead Total	mg/kg dw	880	33	11.7	27	25	12.2	32	22	21	18.2	30	23
	Zinc Total	mg/kg dw	30,000	62	62	73	189	61	220	104	106	106	260	149
	Polycyclic Aromatic Hydrocarbon													
	Benzo(a)pyrene: Dry Weight Basis, Trace Level	mg/kg	40	NS	NS	0.028	0.028	< 0.013	0.048	0.028	0.06	2.6	0.057	0.4
	Naphthalene: Dry Weight Basis, Trace Level	mg/kg	63	NS	NS	<0.0014	< 0.07	< 0.07	< 0.08	< 0.07	< 0.06	0.12	< 0.10	0.12
	Pyrene: Dry Weight Basis, Trace Level	mg/kg	1600	NS	NS	0.093	0.057	0.015	0.084	0.052	0.115	5.8	0.147	0.9

Hornby Industrial Park Infiltration Basin - Industrial - Constructed 1995		Units	Trigger Value	2010	2015	2020	2025 (PDP)			
Sample ID							HIP_SS1_0.0	HIP_SS2_0.0	HIP_SS3_0.0	2025 Average
	Heavy Metals									
	Arsenic Total	mg/kg dw	80	<4	7	NS	5	5	7	6
	Cadmium Total	mg/kg dw	400	0.7	0.13	NS	< 0.10	0.11	0.19	0.13
	Chromium Total	mg/kg dw	2700	16	20	NS	17	19	31	22
	Copper Total	mg/kg dw	>10,000	15	17	NS	17	24	46	29
	Lead Total	mg/kg dw	880	51	61	NS	21	25	38	28
	Zinc Total	mg/kg dw	30,000	140	210	NS	182	290	610	361
	Nickel Total	mg/kg dw	1,200	8.3	12	NS	12	13	17	14
	Polycyclic Aromatic Hydrocarbons									
	Benzo(a)pyrene (BAP)	mg/kg	40	<1.2	<1.3	NS	0.025	0.028	0.048	0.034
	Naphthalene: Dry Weight Basis, Trace Level	mg/kg	63	<0.6	<0.7	NS	< 0.06	< 0.06	0.08	0.07
	Pyrene: Dry Weight Basis, Trace Level	mg/kg	1,600	<0.6	<0.7	NS	0.057	0.074	0.23	0.12

Richmond Housing Complex Swale and First Flush Basin - Large Residential - Constructed 2007		Units	Trigger Value	2010	2015	2020	2025 (PDP)			
Sample ID							RHC_SS1_0.0	RHC_SS2_0.0	RHC_SS3_0.0	2025 Average
	Heavy Metals									
	Copper Total	mg/kg dw	>10,000	10	8	12	12	12	19	14
	Lead Total	mg/kg dw	880	24	8	30	21	60	104	62
	Zinc Total	mg/kg dw	30,000	43	50	75	114	85	137	112
	Polycyclic Aromatic Hydrocarbon									
	Benzo(a)pyrene: Dry Weight Basis, Trace Level	mg/kg	40	NS	NS	0.063	< 0.016	0.037	0.068	0.040
	Naphthalene: Dry Weight Basis, Trace Level	mg/kg	63	NS	NS	0.014	< 0.08	< 0.08	< 0.08	0.08
	Pyrene: Dry Weight Basis, Trace Level	mg/kg	1600	NS	NS	0.24	< 0.016	0.077	0.141	0.078

Grove Road Rain Garden - Commercial - Constructed 2015		Units	Trigger Value	2010	2015	2020	2025 (PDP)		
Sample ID							GR_SS1_0.0	GR_SS2_0.0	2025 Average
	Heavy Metals								
	Copper Total	mg/kg dw	>10,000	NO	NO	19	85	164	125
	Lead Total	mg/kg dw	880	NO	NO	35	52	110	81
	Zinc Total	mg/kg dw	30,000	NO	NO	84	1,160	2,300	1,730
	Polycyclic Aromatic Hydrocarbon								
	Benzo(a)pyrene: Dry Weight Basis, Trace Level	mg/kg	40	NO	NO	0.21	0.147	0.169	0.158
	Naphthalene: Dry Weight Basis, Trace Level	mg/kg	63	NO	NO	0.024	< 0.06	0.06	0.06
	Pyrene: Dry Weight Basis, Trace Level	mg/kg	1,600	NO	NO	1	0.196	0.46	0.33

Notes

	Exceeds Trigger Parameter
NS	Not Sampled
NO	Not Operational

All parameters without trigger limits are not tabulated.

Appendix D: Laboratory Reports and Chain of Custody Documentation

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

Office: ☐ Auckland ☐ Hamilton ☐ Tauranga ☐ Wellington ☒ Christchurch ☐ Invercargill

Submitted by: Miriam Clark Ph No.: 0224519662

To: Hill Labs

Quote No.: /

PDP Job No.: C01100028

Chain of Custody Record

Job No: 379 2261 Date Recv: 27-Feb-25 17:28

Sent:

Name: Miriam Clark

Signature:

Date and time: 27/2 15:20

Received:

Received by: Brittney McLean

Name:

Signature 3137922613

Date and time:

5.2 °C

Additional Information

Screening level tests only

Results to: ☐ lab.samples@pdp.co.nz

☒ Email submitter: miriam.clark @pdp.co.nz

☒ Email other: tracy.singson @pdp.co.nz

Priority: ☐ Normal ☒ High ☐ Urgent

Results required by: / /

Invoice to: ☒ PDP ☐ Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
BL_SS1_0.0	27/2	/	SED	Cu, Zn, Pb, PAH	See additional notes above
BL_SS2_0.0	↓	↓	↓	↓	↓
BL_SS3_0.0					
BL_SS4_0.0					
BL_SS5_0.0					
BL_SS6_0.0					

Sample type: S Soil; GW Groundwater; SAL Saline; FW Freshwater; GEO Geothermal; SW Stormwater; SED Sediment; BIO Biota; WW Wastewater; P Potable; O Other:

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792261
Contact:	T Singson	**Date Registered:**	28-Feb-2025 8:34 am
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Add. Client Ref:	
		Submitted By:	Miriam Clark
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	06-Mar-2025 4:30 pm

* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	BL_SS1_0.0 27-Feb-2025 1:55 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
2	BL_SS2_0.0 27-Feb-2025 1:49 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
3	BL_SS3_0.0 27-Feb-2025 1:39 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
4	BL_SS4_0.0 27-Feb-2025 1:28 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
5	BL_SS5_0.0 27-Feb-2025 1:20 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
6	BL_SS6_0.0 27-Feb-2025 1:10 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-6
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-6
Polycyclic Aromatic Hydrocarbons Screening in Solids	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-6
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-6
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-6

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-6
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-6

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

Office: ☐ Auckland ☐ Hamilton ☐ Tauranga ☐ Wellington ☒ Christchurch ☐ Invercargill

Submitted by: Miriam Clark Ph No.: 0224519667

To: Hill Labs

Quote No.: /

PDP Job No.: CO11000028

Chain of Custody Record

Sent:

Name: Miriam Clark

Signature:

Date and time: 27/2 17:23

Job No: 379 2262

Date Recv: 27-Feb-25 17:28

Recei

Received by: Brittney McLean

Name:

Signatu

3137922625

5.2 °C

Date and time:

Additional Information

Screen level tests only

Results to: ☐ lab.samples@pdp.co.nz

☒ Email submitter: miriam.clark @pdp.co.nz

☒ Email other: tracy.singson @pdp.co.nz

Priority: ☐ Normal ☒ High ☐ Urgent

Results required by: / /

Invoice to: ☒ PDP ☐ Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
HIP_SS1_0.0	27/2	/	SED	As, Cd, Cr, Cu, Ni, Pb, Zn, PAH, SVOCs	See add.
HIP_SS2_0.0	↓	↓	↓	↓	notes above
HIP_SS3_0.0	↓	↓	↓	↓	↓

Sample type: S Soil | GW Groundwater | SAL Saline | FW Freshwater | GEO Geothermal | SW Stormwater

SED Sediment | BIO Biota | WW Wastewater | P Potable | O Other:

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792262
Contact:	T Singson	**Date Registered:**	28-Feb-2025 8:19 am
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Add. Client Ref:	
		Submitted By:	Miriam Clark
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	06-Mar-2025 4:30 pm

* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	HIP_SS1_0.0 27-Feb-2025 3:55 pm	Sediment	GSoil300	Heavy metals screen level As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Solids, Semivolatile Organic Compounds Screening in Soil by GC-MS
2	HIP_SS2_0.0 27-Feb-2025 3:49 pm	Sediment	GSoil300	Heavy metals screen level As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Solids, Semivolatile Organic Compounds Screening in Soil by GC-MS
3	HIP_SS3_0.0 27-Feb-2025 3:37 pm	Sediment	GSoil300	Heavy metals screen level As,Cd,Cr,Cu,Ni,Pb,Zn, Polycyclic Aromatic Hydrocarbons Screening in Solids, Semivolatile Organic Compounds Screening in Soil by GC-MS

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
Heavy metals screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1-3
Polycyclic Aromatic Hydrocarbons Screening in Solids	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.024 - 30 mg/kg dry wt	1-3
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3

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

Office: ☐ Auckland ☐ Hamilton ☐ Tauranga ☐ Wellington ☒ Christchurch ☐ Invercargill

Submitted by: Miriam Clark Ph No.: 0224519462

To: Hill Labs

Quote No.: /

PDP Job No.: C01100028

Chain of Custody Record

Sent:

Name: Miriam Clark

Signature:

Date and time: 27/2 17:20

Job No: 379 2263 Date Recv: 27-Feb-25 17:29

Receiv ___°C

Name: Received by: Brittney McLean

Signatu

Date an 3137922637 5.2

Additional Information

Screening level tests only

Results to: ☐ lab.samples@pdp.co.nz

☒ Email submitter: Miriam.clark @pdp.co.nz

☒ Email other: tracy.singson @pdp.co.nz

Priority: ☐ Normal ☒ High ☐ Urgent

Results required by: ___ / ___ / ___

Invoice to: ☒ PDP ☐ Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
GR_SS1_0.1	27/2	/	SED	Cu, Zn, Pb, PAH	See additional info above
GR_SS2_0.1	↓	↓	↓	↓	

Sample type: S Soil; SED Sediment; GW Groundwater; BIO Biota; SAL Saline; WW Wastewater; FW Freshwater; P Potable; GEO Geothermal; SW Stormwater; O Other:

For physical address see www.pdp.co.nz

Note: Samples may contain dangerous or hazardous substances

PDP Auckland Tel: +64 9 523 6900
PDP Hamilton Tel: +64 7 949 7880
PDP Tauranga Tel: +64 7 985 6440
PDP Wellington Tel: +64 4 471 4130
PDP Christchurch Tel: +64 3 345 7100
PDP Invercargill Tel: +64 3 422 1690

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792263
Contact:	T Singson	**Date Registered:**	28-Feb-2025 8:40 am
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Add. Client Ref:	
		Submitted By:	Miriam Clark
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	06-Mar-2025 4:30 pm

* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	GR_SS1_0.0 27-Feb-2025 2:40 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
2	GR_SS2_0.0 27-Feb-2025 2:40 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2
Polycyclic Aromatic Hydrocarbons Screening in Solids	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-2
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-2
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-2
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-2
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-2

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:** Hill Labs

Office: ☐ Auckland ☐ Hamilton ☐ Tauranga ☐ Wellington ☒ Christchurch ☐ Invercargill Quote No.: /

Submitted by: Miriam Clark Ph No.: 0224519662 PDP Job No.: C01100028

Chain of Custody Record

Sent:

Name: Miriam Clark

Signature:

Date and time: 27/2/25 1715

Received Job No: 379 2264 Date Recv: 27-Feb-25 17:29 ___°C

Name: Received by: Brittney McLean

Signature 3137922649 5.2

Date and time:

Additional Information

screening level tests only

Results to: ☐ lab.samples@pdp.co.nz

☒ Email submitter: miriam.clark @pdp.co.nz

☒ Email other: tracy.singson @pdp.co.nz

Priority: ☐ Normal ☒ High ☐ Urgent

Results required by: ___ / ___ / ___

Invoice to: ☒ PDP ☐ Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
TP_SS1_0.0	27/2	/	SED	Cu, Zn, Pb, PAH	See additional info above
TP_SS2_0.0	↓	↓	↓	↓	
TP_SS3_0.0					
TP_SS4_0.0				– HOLD COLD	
TP_SS5_0.0				Cu, Zn, Pb, PAH	
TP_SS6_0.0					
TP_SS7_0.0					
TP_SS8_0.0	↓	↓	↓	↓	

Sample type: S Soil; **SED Sediment**; GW Groundwater; BIO Biota; SAL Saline; WW Wastewater; FW Freshwater; P Potable; GEO Geothermal; SW Stormwater; O Other:

For physical address see www.pdp.co.nz

Note: Samples may contain dangerous or hazardous substances

PDP Auckland Tel: +64 9 523 6900
PDP Hamilton Tel: +64 7 949 7880
PDP Tauranga Tel: +64 7 985 6440
PDP Wellington Tel: +64 4 471 4130
PDP Christchurch Tel: +64 3 345 7100
PDP Invercargill Tel: +64 3 422 1690

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792264
Contact:	T Singson	**Date Registered:**	28-Feb-2025 8:31 am
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Add. Client Ref:	
		Submitted By:	Miriam Clark
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	06-Mar-2025 4:30 pm

* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	TP_SS1_0.0 27-Feb-2025 9:15 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
2	TP_SS2_0.0 27-Feb-2025 10:00 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
3	TP_SS3_0.0 27-Feb-2025 9:45 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
4	TP_SS4_0.0 27-Feb-2025 9:35 am	Sediment	GSoil300	Hold Cold
5	TP_SS5_0.0 27-Feb-2025 10:52 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
6	TP_SS6_0.0 27-Feb-2025 10:41 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
7	TP_SS7_0.0 27-Feb-2025 10:32 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
8	TP_SS8_0.0 27-Feb-2025 10:26 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3, 5-8
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3, 5-8
Polycyclic Aromatic Hydrocarbons Screening in Solids	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3, 5-8
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3, 5-8

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3, 5-8
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3, 5-8
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3, 5-8
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3, 5-8

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:** Hill Labs

Office: ☐ Auckland ☐ Hamilton ☐ Tauranga ☐ Wellington ☒ Christchurch ☐ Invercargill Quote No.: /

Submitted by: Miriam Clark Ph No.: PDP Job No.: CO11000028

Chain of Custody Record

Job No: 379 2265 Date Recv: 27-Feb-25 17:29

Sent:

Name: Miriam Clark

Signature:

Date and time: 27/2/25 17:15

Received

Received by: Brittney McLean

Name:

Signature: 3137922652

Date and time:

5.2 °C

Additional Information

Screening level tests only

Results to: ☐ lab.samples@pdp.co.nz

☒ Email submitter: miriam.clark @pdp.co.nz

☒ Email other: tracy.singson @pdp.co.nz

Priority: ☐ Normal ☒ High ☐ Urgent

Results required by: / /

Invoice to: ☒ PDP ☐ Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
RHC_SS1_0.0	27/2	/	SED	Cu, Zn, Pb, PAH	See addition
RHC_SS2_0.0	↓	↓	↓	↓	note above
RHC_SS3_0.0	↓	↓	↓	↓	↓

Sample type: S Soil; SED Sediment; GW Groundwater; BIO Biota; SAL Saline; WW Wastewater; FW Freshwater; P Potable; GEO Geothermal; SW Stormwater; O Other:

For physical address see www.pdp.co.nz

Note: Samples may contain dangerous or hazardous substances

PDP Auckland Tel: +64 9 523 6900
PDP Hamilton Tel: +64 7 949 7880
PDP Tauranga Tel: +64 7 985 6440
PDP Wellington Tel: +64 4 471 4130
PDP Christchurch Tel: +64 3 345 7100
PDP Invercargill Tel: +64 3 422 1690

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792265
Contact:	T Singson	**Date Registered:**	28-Feb-2025 8:38 am
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Add. Client Ref:	
		Submitted By:	Miriam Clark
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	06-Mar-2025 4:30 pm

* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	RHC_SS1_0.0 27-Feb-2025 11:57 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
2	RHC_SS2_0.0 27-Feb-2025 11:44 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
3	RHC_SS3_0.0 27-Feb-2025 11:35 am	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
Polycyclic Aromatic Hydrocarbons Screening in Solids	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3

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

Office: ☐ Auckland ☐ Hamilton ☐ Tauranga ☐ Wellington ☒ Christchurch ☐ Invercargill

Submitted by: Miriam Clark Ph No:

To: Hill Labs

Quote No.:

PDP Job No.: C01/000028

Job No: **379 2270**

Date Recv: 27-Feb-25 17:41

Chain of Custody Record

Sent:

Name: Miriam Clark

Signature:

Date and time: 27/2 17.25

Received: ☐ Received by: Emma Sapi

Name:

Signature:

Date and time:

3137922702

5.2

C

Additional Information

Screen level tests only

Results to: ☐ lab.samples@pdp.co.nz

☒ Email submitter: miriam.clark @pdp.co.nz

☒ Email other: tracy.singson @pdp.co.nz

Priority: ☐ Normal ☐ High ☐ Urgent

Results required by: / /

Invoice to: ☐ PDP ☐ Other:

Sample ID	Date	Time	Sample type	Analyses Requested	Notes
DP_SS1_0.0	27/2	~	SED	Cu, Zn, Pb, PAH	See add. info above
DP_SS2_0.0	↓	↓	↓	↓	
DP_SS2_0.0	↓	↓	↓		

Sample type: S Soil; GW Groundwater; SAL Saline; FW Freshwater; GEO Geothermal; SW Stormwater; SED Sediment; BIO Biota; WW Wastewater; P Potable; O Other:

For physical address see www.pdp.co.nz

Note: Samples may contain dangerous or hazardous substances

PDP Auckland Tel: +64 9 523 6900
PDP Hamilton Tel: +64 7 949 7880
PDP Tauranga Tel: +64 7 985 6440
PDP Wellington Tel: +64 4 471 4130
PDP Christchurch Tel: +64 3 345 7100
PDP Invercargill Tel: +64 3 422 1690

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.**hill-labs**.co.nz

Job Information Summary

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792270
Contact:	T Singson	**Date Registered:**	28-Feb-2025 8:36 am
	C/- Pattle Delamore Partners Limited	**Priority:**	High
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Add. Client Ref:	
		Submitted By:	Miriam Clark
		Charge To:	Pattle Delamore Partners Limited
		Target Date*:	06-Mar-2025 4:30 pm

* As the samples require analysis at a Hill Labs location that is different to where they were received, the Target Date for reporting has been extended.

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	DP_SS1_0.0 27-Feb-2025 4:24 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
2	DP_SS2_0.0 27-Feb-2025 4:33 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc
3	DP_SS3_0.0 27-Feb-2025 4:39 pm	Sediment	GSoil300	Polycyclic Aromatic Hydrocarbons Screening in Solids, Total Recoverable Copper, Total Recoverable Lead, Total Recoverable Zinc

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
Polycyclic Aromatic Hydrocarbons Screening in Solids	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792261 SPv1
Contact:	T Singson	**Date Received:**	27-Feb-2025
	C/- Pattle Delamore Partners Limited	**Date Reported:**	05-Mar-2025
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Submitted By:	Miriam Clark

Sample Type: Sediment

Sample Name:		BL_SS1_0.0 27-Feb-2025 1:55 pm	BL_SS2_0.0 27-Feb-2025 1:49 pm	BL_SS3_0.0 27-Feb-2025 1:39 pm	BL_SS4_0.0 27-Feb-2025 1:28 pm	BL_SS5_0.0 27-Feb-2025 1:20 pm
Lab Number:		3792261.1	3792261.2	3792261.3	3792261.4	3792261.5
Individual Tests						
Dry Matter	g/100g as rcvd	75	91	75	85	77
Total Recoverable Copper	mg/kg dry wt	42	43	26	21	20
Total Recoverable Lead	mg/kg dry wt	45	39	37	39	37
Total Recoverable Zinc	mg/kg dry wt	280	200	155	145	118
Polycyclic Aromatic Hydrocarbons Screening in Solids*						
Total of Reported PAHs in Soil	mg/kg dry wt	0.4	0.5	1.2	1.5	1.7
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.011	0.017	0.021	0.023
Acenaphthene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Anthracene	mg/kg dry wt	< 0.013	< 0.011	0.016	0.026	0.025
Benzo[a]anthracene	mg/kg dry wt	0.022	0.034	0.072	0.089	0.106
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.032	0.044	0.101	0.130	0.153
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.044	0.063	0.149	0.191	0.22
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.043	0.063	0.147	0.189	0.22
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.043	0.055	0.124	0.156	0.183
Benzo[e]pyrene	mg/kg dry wt	0.023	0.027	0.072	0.084	0.103
Benzo[g,h,i]perylene	mg/kg dry wt	0.027	0.032	0.087	0.111	0.125
Benzo[k]fluoranthene	mg/kg dry wt	0.017	0.020	0.044	0.066	0.070
Chrysene	mg/kg dry wt	0.022	0.030	0.076	0.102	0.111
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.011	0.013	0.017	0.014
Fluoranthene	mg/kg dry wt	0.050	0.070	0.171	0.22	0.24
Fluorene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.025	0.032	0.082	0.100	0.116
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.07
Perylene	mg/kg dry wt	< 0.013	< 0.011	0.022	0.029	0.034
Phenanthrene	mg/kg dry wt	0.026	0.027	0.077	0.101	0.103
Pyrene	mg/kg dry wt	0.053	0.079	0.184	0.24	0.27

Sample Name:	BL_SS6_0.0 27-Feb-2025 1:10 pm
Lab Number:	3792261.6

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Sediment		
Sample Name:		BL_SS6_0.0 27-Feb-2025 1:10 pm
Lab Number:		3792261.6
Individual Tests		
Dry Matter	g/100g as rcvd	83
Total Recoverable Copper	mg/kg dry wt	19
Total Recoverable Lead	mg/kg dry wt	34
Total Recoverable Zinc	mg/kg dry wt	101
Polycyclic Aromatic Hydrocarbons Screening in Solids*		
Total of Reported PAHs in Soil	mg/kg dry wt	0.7
1-Methylnaphthalene	mg/kg dry wt	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.012
Acenaphthylene	mg/kg dry wt	< 0.012
Acenaphthene	mg/kg dry wt	< 0.012
Anthracene	mg/kg dry wt	< 0.012
Benzo[a]anthracene	mg/kg dry wt	0.050
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.067
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.089
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.088
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.076
Benzo[e]pyrene	mg/kg dry wt	0.040
Benzo[g,h,i]perylene	mg/kg dry wt	0.046
Benzo[k]fluoranthene	mg/kg dry wt	0.035
Chrysene	mg/kg dry wt	0.051
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012
Fluoranthene	mg/kg dry wt	0.108
Fluorene	mg/kg dry wt	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.046
Naphthalene	mg/kg dry wt	< 0.06
Perylene	mg/kg dry wt	0.014
Phenanthrene	mg/kg dry wt	0.036
Pyrene	mg/kg dry wt	0.121

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-6
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-6
Polycyclic Aromatic Hydrocarbons Screening in Solids*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-6
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-6
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-6
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-6

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Mar-2025 and 05-Mar-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792262 SPv1
Contact:	T Singson	**Date Received:**	27-Feb-2025
	C/- Pattle Delamore Partners Limited	**Date Reported:**	05-Mar-2025
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Submitted By:	Miriam Clark

Sample Type: Sediment

Sample Name:		HIP_SS1_0.0 27-Feb-2025 3:55 pm	HIP_SS2_0.0 27-Feb-2025 3:49 pm	HIP_SS3_0.0 27-Feb-2025 3:37 pm
Lab Number:		3792262.1	3792262.2	3792262.3
Individual Tests				
Dry Matter	g/100g as rcvd	87	86	78
Heavy metals screen level As,Cd,Cr,Cu,Ni,Pb,Zn				
Total Recoverable Arsenic	mg/kg dry wt	5	5	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.11	0.19
Total Recoverable Chromium	mg/kg dry wt	17	19	31
Total Recoverable Copper	mg/kg dry wt	17	24	46
Total Recoverable Lead	mg/kg dry wt	21	25	38
Total Recoverable Nickel	mg/kg dry wt	12	13	17
Total Recoverable Zinc	mg/kg dry wt	182	290	610
Polycyclic Aromatic Hydrocarbons Screening in Solids*				
Total of Reported PAHs in Soil	mg/kg dry wt	0.3	0.4	1.1
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.012	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.012	0.014
Acenaphthylene	mg/kg dry wt	< 0.012	< 0.012	0.016
Acenaphthene	mg/kg dry wt	< 0.012	< 0.012	< 0.013
Anthracene	mg/kg dry wt	< 0.012	< 0.012	0.013
Benzo[a]anthracene	mg/kg dry wt	0.022	0.025	0.042
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.025	0.028	0.048
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.035	0.039	0.082
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.034	0.038	0.081
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.037	0.042	0.085
Benzo[e]pyrene	mg/kg dry wt	0.021	0.026	0.076
Benzo[g,h,i]perylene	mg/kg dry wt	0.028	0.040	0.114
Benzo[k]fluoranthene	mg/kg dry wt	0.012	0.013	0.025
Chrysene	mg/kg dry wt	0.021	0.027	0.055
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012	< 0.012	0.014
Fluoranthene	mg/kg dry wt	0.050	0.055	0.136
Fluorene	mg/kg dry wt	< 0.012	< 0.012	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.016	0.020	0.038
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	0.08
Perylene	mg/kg dry wt	< 0.012	< 0.012	< 0.013
Phenanthrene	mg/kg dry wt	0.021	0.024	0.067
Pyrene	mg/kg dry wt	0.057	0.074	0.23

Sample Type: Sediment				
Sample Name:		HIP_SS1_0.0 27-Feb-2025 3:55 pm	HIP_SS2_0.0 27-Feb-2025 3:49 pm	HIP_SS3_0.0 27-Feb-2025 3:37 pm
Lab Number:		3792262.1	3792262.2	3792262.3
Haloethers in SVOC Soil Samples by GC-MS				
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS				
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.7	< 0.7	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.7	< 0.7	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS				
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.7	< 0.7	< 0.8
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*				
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3

Sample Type: Sediment				
Sample Name:		HIP_SS1_0.0 27-Feb-2025 3:55 pm	HIP_SS2_0.0 27-Feb-2025 3:49 pm	HIP_SS3_0.0 27-Feb-2025 3:37 pm
Lab Number:		3792262.1	3792262.2	3792262.3
Phenols in SVOC Soil Samples by GC-MS				
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3
2-Methylphenol (o-cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS				
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS				
1,2-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.7	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.7	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.7	< 0.7	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.7	< 0.7	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.7	< 0.7	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Other compounds in SVOC Soil Samples by GC-MS				
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
Heavy metals screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1-3
Polycyclic Aromatic Hydrocarbons Screening in Solids*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.024 - 30 mg/kg dry wt	1-3
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Mar-2025 and 05-Mar-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792263 SPv1
Contact:	T Singson	**Date Received:**	27-Feb-2025
	C/- Pattle Delamore Partners Limited	**Date Reported:**	05-Mar-2025
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Submitted By:	Miriam Clark

Sample Type: Sediment

		Sample Name:	GR_SS1_0.0 27-Feb-2025 2:40 pm	GR_SS2_0.0 27-Feb-2025 2:40 pm
		Lab Number:	3792263.1	3792263.2
Individual Tests				
Dry Matter	g/100g as rcvd		85	79
Total Recoverable Copper	mg/kg dry wt		85	164
Total Recoverable Lead	mg/kg dry wt		52	110
Total Recoverable Zinc	mg/kg dry wt		1,160	2,300
Polycyclic Aromatic Hydrocarbons Screening in Solids*				
Total of Reported PAHs in Soil	mg/kg dry wt		1.8	3.1
1-Methylnaphthalene	mg/kg dry wt		0.021	0.068
2-Methylnaphthalene	mg/kg dry wt		0.028	0.083
Acenaphthylene	mg/kg dry wt		0.026	0.060
Acenaphthene	mg/kg dry wt		< 0.012	< 0.013
Anthracene	mg/kg dry wt		0.029	0.057
Benzo[a]anthracene	mg/kg dry wt		0.094	0.147
Benzo[a]pyrene (BAP)	mg/kg dry wt		0.147	0.169
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt		0.23	0.29
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt		0.23	0.29
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt		0.22	0.33
Benzo[e]pyrene	mg/kg dry wt		0.22	0.22
Benzo[g,h,i]perylene	mg/kg dry wt		0.181	0.27
Benzo[k]fluoranthene	mg/kg dry wt		0.074	0.115
Chrysene	mg/kg dry wt		0.087	0.21
Dibenzo[a,h]anthracene	mg/kg dry wt		0.032	0.038
Fluoranthene	mg/kg dry wt		0.174	0.38
Fluorene	mg/kg dry wt		< 0.012	0.017
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt		0.124	0.181
Naphthalene	mg/kg dry wt		< 0.06	0.06
Perylene	mg/kg dry wt		0.037	0.037
Phenanthrene	mg/kg dry wt		0.092	0.23
Pyrene	mg/kg dry wt		0.196	0.46

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-2
Polycyclic Aromatic Hydrocarbons Screening in Solids*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-2
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-2
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-2
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-2
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-2

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Mar-2025 and 05-Mar-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792264	SPv1
Contact:	T Singson	**Date Received:**	27-Feb-2025	
	C/- Pattle Delamore Partners Limited	**Date Reported:**	05-Mar-2025	
	PO Box 389	**Quote No:**	81087	
	Christchurch 8140	**Order No:**		
		Client Reference:	C011000028	
		Submitted By:	Miriam Clark	

Sample Type: Sediment

Sample Name:		TP_SS1_0.0 27-Feb-2025 9:15 am	TP_SS2_0.0 27-Feb-2025 10:00 am	TP_SS3_0.0 27-Feb-2025 9:45 am	TP_SS5_0.0 27-Feb-2025 10:52 am	TP_SS6_0.0 27-Feb-2025 10:41 am
Lab Number:		3792264.1	3792264.2	3792264.3	3792264.5	3792264.6
Individual Tests						
Dry Matter	g/100g as rcvd	73	78	68	80	81
Total Recoverable Copper	mg/kg dry wt	20	6	22	13	12
Total Recoverable Lead	mg/kg dry wt	25	12.2	32	22	21
Total Recoverable Zinc	mg/kg dry wt	189	61	220	104	106
Polycyclic Aromatic Hydrocarbons Screening in Solids*						
Total of Reported PAHs in Soil	mg/kg dry wt	0.4	< 0.4	0.5	0.3	0.7
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Acenaphthene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Anthracene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Benzo[a]anthracene	mg/kg dry wt	0.020	< 0.013	0.038	0.022	0.046
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.028	< 0.013	0.048	0.028	0.060
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.044	< 0.031	0.065	0.037	0.089
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.043	< 0.031	0.064	0.037	0.088
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.039	0.014	0.058	0.033	0.070
Benzo[e]pyrene	mg/kg dry wt	0.024	< 0.013	0.031	0.016	0.038
Benzo[g,h,i]perylene	mg/kg dry wt	0.037	< 0.013	0.040	0.019	0.045
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.013	0.026	< 0.013	0.026
Chrysene	mg/kg dry wt	0.026	< 0.013	0.034	0.021	0.037
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Fluoranthene	mg/kg dry wt	0.049	0.017	0.081	0.044	0.095
Fluorene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.020	< 0.013	0.034	0.019	0.041
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	< 0.07	< 0.06
Perylene	mg/kg dry wt	< 0.014	< 0.013	< 0.015	< 0.013	< 0.012
Phenanthrene	mg/kg dry wt	0.025	< 0.013	0.042	0.022	0.041
Pyrene	mg/kg dry wt	0.057	0.015	0.084	0.052	0.115

Sample Name:	TP_SS7_0.0 27-Feb-2025 10:32 am	TP_SS8_0.0 27-Feb-2025 10:26 am
Lab Number:	3792264.7	3792264.8

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Sediment			
Sample Name:		TP_SS7_0.0 27-Feb-2025 10:32 am	TP_SS8_0.0 27-Feb-2025 10:26 am
Lab Number:		3792264.7	3792264.8
Individual Tests			
Dry Matter	g/100g as rcvd	82	51
Total Recoverable Copper	mg/kg dry wt	11	29
Total Recoverable Lead	mg/kg dry wt	18.2	30
Total Recoverable Zinc	mg/kg dry wt	106	260
Polycyclic Aromatic Hydrocarbons Screening in Solids*			
Total of Reported PAHs in Soil	mg/kg dry wt	36	1.0
1-Methylnaphthalene	mg/kg dry wt	0.178	< 0.019
2-Methylnaphthalene	mg/kg dry wt	0.140	0.020
Acenaphthylene	mg/kg dry wt	0.43	< 0.019
Acenaphthene	mg/kg dry wt	0.34	< 0.019
Anthracene	mg/kg dry wt	1.44	0.026
Benzo[a]anthracene	mg/kg dry wt	2.4	0.051
Benzo[a]pyrene (BAP)	mg/kg dry wt	2.6	0.057
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	3.7	0.093
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	3.6	0.092
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	2.6	0.087
Benzo[e]pyrene	mg/kg dry wt	1.27	0.051
Benzo[g,h,i]perylene	mg/kg dry wt	1.46	0.066
Benzo[k]fluoranthene	mg/kg dry wt	1.09	0.027
Chrysene	mg/kg dry wt	1.85	0.057
Dibenzo[a,h]anthracene	mg/kg dry wt	0.30	< 0.019
Fluoranthene	mg/kg dry wt	5.9	0.138
Fluorene	mg/kg dry wt	0.92	0.020
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	1.50	0.047
Naphthalene	mg/kg dry wt	0.12	< 0.10
Perylene	mg/kg dry wt	0.50	< 0.019
Phenanthrene	mg/kg dry wt	5.4	0.128
Pyrene	mg/kg dry wt	5.8	0.147

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3, 5-8
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3, 5-8
Polycyclic Aromatic Hydrocarbons Screening in Solids*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3, 5-8
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3, 5-8
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3, 5-8
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3, 5-8
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3, 5-8

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3, 5-8

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Mar-2025 and 05-Mar-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792265 SPv1
Contact:	T Singson	**Date Received:**	27-Feb-2025
	C/- Pattle Delamore Partners Limited	**Date Reported:**	05-Mar-2025
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Submitted By:	Miriam Clark

Sample Type: Sediment

Sample Name:		RHC_SS1_0.0 27-Feb-2025 11:57 am	RHC_SS2_0.0 27-Feb-2025 11:44 am	RHC_SS3_0.0 27-Feb-2025 11:35 am
Lab Number:		3792265.1	3792265.2	3792265.3
Individual Tests				
Dry Matter	g/100g as rcvd	63	61	63
Total Recoverable Copper	mg/kg dry wt	12	12	19
Total Recoverable Lead	mg/kg dry wt	21	60	104
Total Recoverable Zinc	mg/kg dry wt	114	85	137
Polycyclic Aromatic Hydrocarbons Screening in Solids*				
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	0.4	0.8
1-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
2-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Acenaphthylene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Acenaphthene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Anthracene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Benzo[a]anthracene	mg/kg dry wt	< 0.016	0.034	0.064
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.016	0.037	0.068
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.038	0.050	0.099
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.038	0.050	0.098
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.016	0.046	0.068
Benzo[e]pyrene	mg/kg dry wt	< 0.016	0.021	0.035
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.016	0.021	0.040
Benzo[k]fluoranthene	mg/kg dry wt	< 0.016	< 0.016	0.030
Chrysene	mg/kg dry wt	< 0.016	0.029	0.048
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Fluoranthene	mg/kg dry wt	< 0.016	0.074	0.131
Fluorene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.016	0.026	0.041
Naphthalene	mg/kg dry wt	< 0.08	< 0.08	< 0.08
Perylene	mg/kg dry wt	< 0.016	< 0.016	< 0.016
Phenanthrene	mg/kg dry wt	< 0.016	0.031	0.058
Pyrene	mg/kg dry wt	< 0.016	0.077	0.141

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
Polycyclic Aromatic Hydrocarbons Screening in Solids*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Mar-2025 and 05-Mar-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Pattle Delamore Partners Limited	**Lab No:**	3792270 SPv1
Contact:	T Singson	**Date Received:**	27-Feb-2025
	C/- Pattle Delamore Partners Limited	**Date Reported:**	05-Mar-2025
	PO Box 389	**Quote No:**	81087
	Christchurch 8140	**Order No:**	
		Client Reference:	C011000028
		Submitted By:	Miriam Clark

Sample Type: Sediment

Sample Name:		DP_SS1_0.0 27-Feb-2025 4:24 pm	DP_SS2_0.0 27-Feb-2025 4:33 pm	DP_SS3_0.0 27-Feb-2025 4:39 pm
Lab Number:		3792270.1	3792270.2	3792270.3
Individual Tests				
Dry Matter	g/100g as rcvd	91	98	91
Total Recoverable Copper	mg/kg dry wt	13	10	9
Total Recoverable Lead	mg/kg dry wt	45	33	36
Total Recoverable Zinc	mg/kg dry wt	210	194	103
Polycyclic Aromatic Hydrocarbons Screening in Solids*				
Total of Reported PAHs in Soil	mg/kg dry wt	0.5	0.4	0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
Acenaphthylene	mg/kg dry wt	0.013	0.012	< 0.011
Acenaphthene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
Anthracene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
Benzo[a]anthracene	mg/kg dry wt	0.023	0.023	0.022
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.041	0.040	0.025
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.063	0.060	0.040
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.062	0.060	0.040
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.067	0.052	0.034
Benzo[e]pyrene	mg/kg dry wt	0.033	0.028	0.016
Benzo[g,h,i]perylene	mg/kg dry wt	0.040	0.036	0.018
Benzo[k]fluoranthene	mg/kg dry wt	0.015	0.021	0.015
Chrysene	mg/kg dry wt	0.035	0.028	0.020
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
Fluoranthene	mg/kg dry wt	0.064	0.057	0.037
Fluorene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.038	0.030	0.018
Naphthalene	mg/kg dry wt	< 0.06	< 0.05	< 0.06
Perylene	mg/kg dry wt	< 0.011	< 0.010	< 0.011
Phenanthrene	mg/kg dry wt	0.026	0.027	0.017
Pyrene	mg/kg dry wt	0.067	0.063	0.041

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Sediment

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-3
Polycyclic Aromatic Hydrocarbons Screening in Solids*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-3
Dry Matter	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). US EPA 3550.	0.10 g/100g as rcvd	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-3
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 01-Mar-2025 and 05-Mar-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental