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Dear JP

DETAILED SITE INVESTIGATION - AWATOTO PUMP STATION, AWATOTO, NAPIER

1.0 Introduction

Pattle Delamore Partners Limited (PDP) has been engaged by Hawke's Bay Regional Council (HBRC) to undertake a Detailed Site Investigation (DSI; soil sampling investigation) at the Awatoto Pump Station, located at the end of Waitangi Road on the property legally described as Lot 1 DP 6287, Awatoto, Napier (the site).

The existing pump station is to be upgraded as it was inundated during Cyclone Gabrielle. As part of the upgrade works, it is proposed to excavate approximately 750 m³ of soil to build a secure foundation for the new pump station. We understand that as part of the upgrade, earthworks will extend over an area of approx. 15 m by 10 m and to a depth of 5 m below ground level (bgl). Most of this excavated material is proposed to be moved offsite to an approved disposal facility.

This investigation follows on from a Preliminary Site Investigation (PSI) prepared for the site by PDP entitled *Preliminary Site Investigation: Awatoto Pump Station, Awatoto, Napier*, dated 13 September 2024. Reference is to be made to this previous report however a summary is provided below in Section 3.0.

The soil sampling investigation comprised the collection and analysis of nine soil samples from three test pits (TP01 to TP03) in the general vicinity of the proposed upgrade area.

The objectives of the investigation were to:

- ✧ Determine the contamination status of the soils at the site for any residual contamination as a result of any identified HAIL¹ activities.
- ✧ Assess compliance with the NESCS² regulations due to the proposed soil disturbance as part of the upgrade works at the site.

¹ *The Hazardous Activities and Industries List guidance: Identifying HAIL land* (HAIL; MfE, 2023) is a compilation of activities and industries that are considered likely to cause land contamination resulting from hazardous substance use, storage or disposal. The HAIL is intended to identify most situations in New Zealand where hazardous substances could cause, and in many cases have caused, land contamination.

² *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soils to Protect Human Health) Regulations 2011.*

- ✧ Provide a preliminary assessment for the risk to workers during the excavation works and for future site users associated with any soil contamination identified within the site.
- ✧ Provide initial offsite disposal options for surplus soils generated during the upgrade works.

This assessment has been carried out in general accordance with Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021) (MfE, 2021) and Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils (Revised 2021) (MfE, 2021a). The investigation has been certified by suitably qualified and experienced practitioners as outlined by the NESCS. A certifying statement to this effect is attached.

2.0 Site Details

The site details and description are summarised below in Table 1, while an aerial photograph showing the current site layout (Figure 1) is presented in Appendix A. Figure 2, Appendix A, shows the proposed new layout of the pump station. Photographs of the site and soil sampling investigation are presented in Appendix B.

Table 1: Investigation Area Identification	
Address	N/A
Legal Description	Lot 1 Deposited Plan 6287
Property Owner	Hawke's Bay Regional Council
Grid Reference – Awatoto Pump Station	x - 1936904 y - 5613851 (NZGD2000)
Property Area	530,000 m ²
Site Investigation Area	1,500 m ² (approx.)
Zoning	Main Rural/Main industrial/River Conservation
Land Use	Drains and stop bank
Surrounding Land Use	North - Ravensdown and BioRich are located to the north of the site with the Awatoto drain located between the two industries; East - Ravensdown stormwater pond with railway and State Highway 51 (SH51) then Hawke Bay beyond; South – stop bank with river conservation area and river estuary (junction of Tūtaekurī and Ngaruroro Rivers beyond); and West – The Mission drain, stop bank and BioRich with agricultural land beyond.

3.0 Preliminary Site Investigation Summary

The objective of the PSI was to identify any potential HAIL activities/sources of contamination from past and/or present land use activities at the site and to assess compliance with the NESCS for the upgrade of the pump station.

The investigation included a review of available site history information including historical aerial photographs, Napier City Council (NCC) and HBRC information, and a site walkover.

In summary, the available historical information for the site showed that it had been used as part of the wider catchment drainage system since at least 1939. A pump station building has been on the site from this period, but it was moved to its current location between 1962 and 1964. The pump station was upgraded in 1986. The surrounding land use has been predominantly rural/horticultural. The aerial photography indicates that the land to the north of the site has been developed as part of Ravensdown's operations sometime between 1952 and 1962, and the area currently operated by BioRich started operation between 2005 and 2009.

Cyclone Gabrielle in February 2023 inundated the site and the Mission catchment, including the BioRich and Ravensdown operations. The flood waters covered the site and left a layer of silt. A channel was formed near the pump station leading to the Ravensdown stormwater pond and then through the stopbank to the river beyond. This channel helped drain the catchment and was subsequently filled in with sandy gravel.

Through the process of the review, potential HAIL activities were identified at the site, as follows:

- ✧ HAIL reference G3 - for the imported uncharacterised fill associated with filling the flood channel after Cyclone Gabrielle.
- ✧ HAIL reference H - associated with the movement of materials from adjacent Awatoto Industrial area and agricultural/horticultural sites by wind (dust) and by flood waters.

The PSI report noted that the above HAIL activities would need to be confirmed through a soil sampling investigation. In addition to the two above identified HAIL activities, it was noted that the site soils could contain other contaminants above local background concentrations, primarily as a result of the effects of Cyclone Gabrielle.

Based on a review of the available site history information, and due to the presence of likely HAIL activities at the site, it was concluded that a potential risk exists to human health. Furthermore, it was noted that if the pump station upgrade works were unable to meet the NESCS permitted activity requirements for soil disturbance, then further assessment (e.g. soil sampling investigation) maybe required. Irrespective, a soil sampling investigation maybe required to characterise the soils to be excavated to inform offsite disposal requirements and health and safety management measures for site contractors and future site users.

The primary persistent contaminants of concern associated with the identified HAIL activities over the site include (but not necessarily limited to) heavy metals, organochlorine pesticides (OCPs) and asbestos. With regard to contaminants associated with Cyclone Gabrielle, it is possible for a wide array of contaminants to be present within site soils above local background concentrations including those associated with the Ravensdown and BioRich operations.

The remainder of this letter provides an account of the site investigation works undertaken at the site to assess soil contamination.

4.0 Detailed Site Investigation

4.1 Soil Sampling Strategy

To assess the extent, or otherwise, for residual contaminants to be present within site soils as a result of the identified possible HAIL activities, a detailed site investigation was undertaken, as detailed below.

The soil sampling investigation comprised the collection of 14 soil samples from three test pits (TP01 to TP03) from within the site on 09 October 2024. It was not possible to locate the three test pits directly in the area of proposed pump station upgrade works due to the presence of numerous underground services and overhead power lines. However, based on the site history review, the likely contaminants of concern

and effects of Cyclone Gabrielle (i.e. material deposition), the test pits are considered to be representative of soils to be removed as part of the redevelopment works.

Soil samples were collected from the surface, 0.3 m, 0.5 m and 1.1 m within natural soils, below ground level (bgl) from each test pit. The soil stratigraphy observed within the test pits is summarised in Table 2.

Table 2: Observations at depths during test-pitting investigation

Depth (m bgl)		Observations
0	~ 0.5	FILL. Sandy Gravel, brownish grey, fine to coarse, dry, dense, low to medium compacted, subrounded to subangular. Minor brick pieces, logs, black patches/thin horizons (decomposing vegetation odour found in TP01 & TP02)
~ 0.5	~ 0.8*	FILL. Gravely Sand yellowish, dry to moist, medium to coarse, dense, compacted (observed in TP02 & TP03)
~ 0.8	~1.0	Clayey Silt, brownish grey, moist, firm, non to low plasticity, orange mottles, rootlets. Decomposing vegetation odour
~ 1.0	~ 1.3	Gravels, minor coarse sand, brown, fine to medium size, moist to saturated, dense, subangular-subrounded, medium compacted (encountered in TP03)
Notes: (*) An old and broken concrete pipe with a metal frame were encountered near TP02 at ~0.8 m bgl.		

The test pit locations are shown in Figures 1 and 2, Appendix A and photographs of the investigation works are presented in Appendix B.

The samples were placed directly into glass jars with food plastic sealed lids supplied by Hill Labs (Hills). A clean trowel decontaminated (with Decon 90™) between sample locations was used to ensure there was no cross-contamination between samples. A fresh pair of nitrile gloves was also used at each sample location to prevent cross contamination of the soil sampled and to protect the PDP site worker during sample collection.

Following collection, the samples were placed immediately into a chilly-bin containing frozen ice packs. The chilly-bin was sent with chain of custody documentation to Hills in Hamilton (IANZ accredited laboratory), for analysis. The samples were received the following day after shipment.

Nine soils samples were tested for a suite of seven heavy metals and OCPs, being the likely contaminants of concern, and based on the test pit observations. In addition, the contaminants of concern were based on the findings of the NCC report entitled *Cyclone Gabrielle Response: Silt management in Awatoto Final report*, dated 18 July 2024. Furthermore, no anthropogenic materials were observed during the test pitting investigation that warranted soil asbestos analysis.

Following an initial review of the above analysis three selected soil samples were subsequently analysed for a 'fertilizer suite', including total recoverable phosphorus, sulphate, and fluoride, with the aim of identifying any relevant contaminants from the nearby fertilizer industrial area to the north (refer to Section 4.3 for additional information).

The chain of custody documentation for the soil sampling is presented in Appendix D.

4.2 Selected Guideline Criteria

In order to determine the suitability of the tested soils in the context of a commercial/industrial land use setting (ongoing land use), the following standards and guidelines have been considered:

- ✧ *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* (MfE, 2011a); and
- ✧ *Guideline on the Investigation Levels for Soil and Groundwater* (National Environmental Protection Council) (NEPC, 2013).

4.2.1 Background Concentrations

In addition to the above standards/guidelines, reference has been made to the following document with regards to expected local background soil concentrations for the area (heavy metals):

- ✧ Landcare Research, April 2014: *Hawkes Bay Region: Background soil concentrations for managing soil quality*.

Whilst OCP compounds are anthropogenic it is important to note that due to their historical ubiquitous application in agriculture, parklands and turf management they can be considered to also be present at low but detectable 'background' concentrations. Background concentrations have been sourced from the following document for selected OCP compounds (i.e. for total DDT, referred to as Σ DDT):

- ✧ MfE, 1998. *Ambient Concentrations of Selected Organochlorines in Soils*.

There are no applicable New Zealand human health assessment criteria for the fertilizer-associated analytes (i.e., total recoverable phosphorus (TRP), fluoride, and sulphate). For the purposes of this assessment, selected fertilizer-related compounds have been compared with expected 'background' soil concentrations based on the results of soil samples collected from Clive (Baseline: Clive, collected in a mixed agricultural/horticultural/lifestyle zone immediately adjacent to the Tukituki River to provide a similar background setting to what might be expected in western Awatoto, adjacent to the industrial zone) and Tamatea (Baseline: Tamatea, collected in a residential area representative of undisturbed residential Napier soils). It should be noted that these baseline samples were collected for a previous investigation report, with similar objectives, and not specifically for the purposes of this investigation.

In addition to assessing the suitability for the existing soils to remain onsite, the comparison of the sample results to background concentrations provides an assessment for the disposal of surplus upgrade soils to cleanfill. Concentrations above 'background' levels do not necessarily mean that a risk exists to human health and/or the receiving environment.

4.3 Soil Sampling Results and Comparison to Assessment Criteria

The soil sample test results are displayed in Table A presented in Appendix C. A summary of results is as follows:

4.3.1 Heavy Metals

Eight out of nine analysed soil samples returned cadmium above the local background concentration and one sample returned zinc above the local background concentration. All samples did not exceed the relevant human-based soil contaminant standards (SCS)/guideline values in the context of commercial/industrial land use.

4.3.2 OCPs

Seven out of nine analysed soil samples recorded OCPs (specifically Σ DDT) above the adopted local background concentration. All samples did not exceed the relevant human-based SCS in the context of commercial/industrial land use (i.e. for Σ DDT).

4.3.3 Fertilizer Suite

Analytical results for TRP, fluoride, and sulphate exceeded the indicative background concentrations in all three analysed soil samples.

A copy of the laboratory report is presented in Appendix D.

5.0 Conceptual Site Model

A risk to human health can only exist if there is a *hazard* (i.e. source; contaminated soil, dust or water), a *receptor* (e.g. staff, excavation workers, groundwater) and an exposure *pathway* between the hazard and the receptor. An absence of any one of these components means no risk can exist. A conceptual site model (CSM) is designed to identify the hazards, receptors and possible links between these.

A preliminary CSM for the current investigation site is set out in Table 3, presenting the potential contaminant sources, the future receptors (e.g. users of the site) and the potential pathways whereby the receptors could be exposed directly or indirectly to soil contaminants. The likelihood of contamination, based on the site history, and the likelihood of exposure based on the current and future site use, can then be assessed to determine whether a complete exposure pathway is likely to exist.

Table 3: Conceptual Site Model

SOURCE INFORMATION	
HAIL land use (contaminant source)	✧ HAIL G3 – landfill sites ✧ HAIL H – Migration of hazardous substances from adjacent land
Identified contaminants of concern	✧ Heavy Metals ✧ Organochlorine pesticides, of which DDT would likely be the main contaminant of concern ✧ Other identified contaminants – e.g. phosphorus, fluoride and sulphate ✧ Various landfilling materials
Potential mechanism of soil contamination	✧ Accidental/intentional release/burial of waste products/fill materials ✧ Inundation and settling of floodwater silts in February 2023 ✧ Historical and current airborne deposition of fertilizer related products and associated site operations
PATHWAYS	
Identified pathways	Human Health ✧ Dermal contact and/or incidental ingestion of impacted soils (directly or fugitive dust) ✧ Inhalation of dust Environment ✧ Stormwater migration vertically (to groundwater) and horizontally (to surface waterways) ✧ Migration of dust via air

Table 3: Conceptual Site Model

Potentially complete exposure pathways identified	∴ Dermal contact, ingestion and inhalation of potentially contaminated soils/dust by on site workers, off site workers and general public ∴ Vertical migration of contaminants to groundwater via stormwater discharge to ground ∴ Horizontal migration (overland flow) and discharge of stormwater to nearby drains, rivers and ocean
RECEPTORS	
Identified receptors	Human Health ∴ Onsite workers ∴ General public Environment ∴ Groundwater ∴ Surface waterways – Tūtaekurī River, Waitangi Estuary and Pacific Ocean

From the CSM table above, it can be seen that potential receptors to the identified onsite contaminants include site contractors undertaking any site upgrade works, future site staff post upgrade, and the general public. A potential risk also exists to the underlying groundwater and surface waterways, which groundwater is likely to discharge into.

Potential risks for any remedial works or future site use can be properly taken care of as a workplace issue under the *Health and Safety at Work Act 2015*, by contractors wearing personal protective equipment and minimising contact with soil, and in accordance with a site-specific Site Management Plan (SMP).

Further discussion is provided below with regards to the findings of the test pit soil sampling investigation with respect to human health and the receiving environment.

6.0 Assessment and Discussion

6.1 Site Characterisation

Based on the results of the test pit soil sampling investigation, the concentrations of heavy metals and Σ DDT comply with the adopted human health assessment criteria for the current and proposed site use (commercial/industrial). However, the results show that the tested soils contain these identified contaminants above local background soil concentrations, with heavy metals to at least 1.0 m bgl (base of deepest excavation).

The presence of cadmium and Σ DDT slightly above background levels at the site may be linked to historical application of pesticides or fertilizer manufacture and/or use, particularly given the proximity to the manufacturing plant and former agricultural/horticultural activities to the north. Phosphate-based fertilizers, often containing trace amounts of cadmium as a byproduct, can contribute to long-term accumulation in the soil. Additionally, Σ DDT, although banned for agricultural use, may still persist in the soil from past applications in the wider area and was historically used as a pesticide additive in fertilizers. The redistribution of sediments following Cyclone Gabriel could have further spread these contaminants, reflecting the influence of agricultural activities and the nearby fertilizer plant on local soil conditions.

The results of the fertilizer laboratory analysis showed elevated concentrations consistently through the soil profile from samples collected at depths of 0.3 m, 0.5 m, and 1.0 m, which are likely closer to the real

ground level before the redistribution of sediments caused by Cyclone Gabrielle. The recorded concentrations of the fertilizer compounds were recorded at the highest concentrations at 0.5 m and 1.0 m depths below current ground level and noticeably higher than what would be expected to be typical background concentrations. As noted previously, there are no New Zealand human health acceptance criteria for the fertilizer related compounds.

A review of the fertilizer related compound results does not show any discernible reduction in contaminant concentrations throughout the vertical soil profile, demonstrating the mobility of these compounds. Whilst the bulk of the soil sampling was limited to the top 1.0 m depth of soils over the site, it is most likely that these contaminants will be present above background concentrations below this depth.

Based on the observed site geology it is likely that any stormwater will potentially migrate to the expected shallow groundwater under the site. Site conditions are conducive for contaminants, in particular the fertilizer related compounds, to readily leach into the groundwater. The quality of the shallow groundwater is not known, but based on the site location (i.e. close to the ocean) it is unlikely that the shallow groundwater would be used for human consumption (potable). However, due to the site's location relative to the ocean and river it is more than likely that the shallow groundwater is interconnected with the Tūtaekurī River and the ocean.

Migration of stormwater over the site soils will potentially mobilise contaminants offsite. Site soils could also be mobilised offsite as airborne dust.

6.2 Hawke's Bay Order In Council and Relationship to NESCS

6.2.1 Background

The area over which the activity occurs is regulated by an Order in Council ('OiC'). The OiC makes temporary changes to the Resource Management Act 1991 (RMA) to enable the efficient recovery of people and communities in Hawke's Bay from the effects of Cyclone Gabrielle, and to provide against future flood events. It enables Hawke's Bay local authorities to apply for resource consent under the OiC, as Controlled Activities, where those activities:

- (a) *involve or are concerned with the construction or reinstatement of, making safety enhancements to, or improving the resilience of land and flood protection infrastructure, including stopbanks, spillways, retaining walls, bridges, pump stations, stream realignments, and earthworks; and,*
- (b) *any incidental or subsidiary activity.*

Only a Hawke's Bay local authority may apply for resource consent under the OiC. The matters for control, and pre-set conditions of consent are included in the OiC. These pre-set conditions can be amended by the delegated decision-maker where necessary.

Upon receiving an application made under the OiC, a consent authority (in this specific case NCC) are required to delegate the decision-making powers for the application to a hearings commissioner to then consider, make a decision, and impose conditions of consent on any application made under the OiC.

Under the OiC, contaminated land is defined as land to which the NESCS applies. Accordingly, and given the proposed works for which this DSI relates to are for the construction of a replacement pump station, any resource consent typically required under the NESCS can be applied for under the OiC. Accordingly, the NESCS is evaluated in Section 6.2.2 to determine the need for consent and activity status under the NESCS.

6.2.2 Evaluation of the NESCS

The NESCS controls activities on contaminated land so as to protect human health. The regulations apply to land, which is described as having, has had or is more likely than not to have had an activity or industry described in the HAIL undertaken on it (i.e. the 'piece of land').

As identified in Section 3.0, HAIL activity G3 (landfill sites) may be applicable to the site. This HAIL activity related to the recent backfilling of flood channels following Cyclone Gabrielle. A review of the strata log from a recently drilled investigation bore carried out at the site indicates the fill used to backfill these channels reportedly comprised sandy gravel fill. Given the recent timing of filling these flood channels, it is most likely that the sandy gravel fill would not contain any contaminants of concern. On this basis, it is considered that HAIL activity G3 is not applicable to the site.

With regards to HAIL activity H (migration of hazardous substances from adjacent land), noting the site history, the results of the soil sampling investigation show possible impacts as a result of pesticide application and/or fertilizer related compound deposition and this could be associated with former horticultural land use or fertilizer manufacturing, both located to the north of the site (either as a result of the cyclone or from previous airborne deposition). Whilst the heavy metal and OCP soil concentrations recorded are relatively low (recorded above local background concentrations), the fertilizer related compounds were recorded at notably elevated concentrations compared with what would be expected to be typical background concentrations.

The intent of the NESCS is the protection of human health and therefore, for the purposes of this investigation, and noting the elevated fertilizer related compounds, it is considered that the NESCS would be applicable for the proposed soil disturbance activities associated with the upgrade works.

Based on the results of the soil sampling investigation and presence of contaminants above local background concentrations, coupled with the expected volumes of soil disturbance/offsite disposal exceeding the NESCS Permitted Activity criteria, a **controlled activity** resource consent under the NESCS would ordinarily be required for the development earthworks.

Clause 9 of the NESCS sets out the ordinary matters for control, but these are superseded by the OiC matters of control (see Section 6.2.3 below).

6.2.3 Application of the OiC

Given the contaminated land status of the site, it is considered that the contaminated land provisions of the OiC will apply to the works associated with the upgrade of the pump station. Although the activity status of the proposal was already a controlled activity under the NESCS, and the OiC will not change this, the benefit of applying under the OiC is to benefit from the pre-set conditions of consent alluded to in Section 6.2.1 above and limited matters of control identified in Schedule 3 below.

Accordingly, the following sections of the OiC, which address works on contaminated land are relevant to the upgrade of the pump station.

∴ **Schedule 2, Section 17 – Consent Conditions: Works on contaminated land**

- 2) *The consent holder must ensure that any soil and other materials that are removed from the site and identified as being contaminated are taken to a facility legally authorised to receive soil and materials of that kind.*
- 3) *The consent holder must take all practicable measures to—*
 - a) *prevent the discharge of soil and stormwater from contaminated land to watercourses;*
 - and*

- b) *maintain the integrity of any structure designed to contain contaminated soil or other contaminated materials; and*
- c) *replace the soil to an erosion-resistant state at the completion of the relevant works.*

Schedule 2 will help to form the conditions of consent for the upgrade activities,

∴ **Schedule 3 – Matter of control: Contaminated Land (human health)**

- a) *Potential adverse effects on human health from disturbance or use of contaminated soil.*
- b) *Measures to avoid, remedy, or mitigate those effects, including—*
 - i. *remediation or management methods proposed to reduce risk posed by contaminants; and*
 - ii. *timing of remediation; and*
 - iii. *standard of remediation on completion of works.*

Schedule 3 provides the matters of control retained for the consideration of the consent application. These matters would need to be outlined in a site-specific SMP for the development.

6.3 Protection of Site Workers

While the soil sample results showed the presence of heavy metals, OCP and fertilizer related compounds above background levels, any risk to excavation workers posed by these contaminants would be expected to be managed by appropriate health and safety measures under the *Health and Safety at Work Act 2015* and the preparation of a site-specific SMP. On this basis, coupled with the expected short-term exposure/duration of works, the risk to site workers from these contaminants is considered to be acceptably low.

Contaminant exposure risks can be appropriately mitigated by contractors wearing the appropriate personal protective equipment and minimising direct and indirect contact with soil and undertaking the earthworks in accordance with the site-specific SMP prepared for the site development.

6.4 Offsite Soil Disposal/Onsite Management

6.4.1 Offsite Soil Disposal

If soils are required to be disposed of offsite, based on the soil analytical results, which indicated cadmium and/or zinc, Σ DDT and the fertilizer suite above background concentrations, then the soils do not meet the definition of cleanfill³, which states that '*materials placed within a Class 5 Clean Fill are effectively inert and the regional soil background levels for trace elements should be adopted as the basis for acceptance of materials for these sites*'.

As there are no managed fill⁴ (Class 3) facilities in the Hawke's Bay Region, soils would most likely need to be disposed of at the Ōmarunui Landfill, which has a Class 1 rating and can accept a wider range of contaminated soils. The soil analytical results confirm that the tested soils are suitable for disposal at this facility, where landfill acceptance criteria are available. It is noted that this landfill does not have screening acceptance criteria for TRP and sulphate and therefore the results will need to be discussed with the landfill operators to confirm disposal acceptance of any surplus excavated soils. In addition, it is noted that the landfill's screening criteria for aldrin (an OCP compound – 0.00016 mg/kg) is lower than the

³ As defined in the WasteMINZ (2022) *Technical Guidelines for Disposal to Land – Revision 3*. Dated October 2022.

⁴ The determination of 'Managed Fill' is based on contaminant concentrations which are above the regional background range and below the NESCS SCSs.

laboratory limit of detection for this compound (0.0002 mg/kg for ultra trace analysis). Pre-acceptance must be sought prior to removing any soils offsite.

Alternatively, based on the NCC silt management report (NCC, 2024), surplus soils may be able to be disposed of at Field 1 of the NCC managed silt areas, subject to the approval of the NCC and HBRC.

It is noted that the soil sample collected at a depth of 1 m bgl recorded cadmium and zinc above local background concentrations. This sample depth coincided with approximately 0.3 m below the original ground level pre-cyclone. It is possible that soils below this depth and which require excavation/offsite disposal may contain acceptable contaminant concentrations at or around local background concentrations, although it is possible that deeper soils will contain elevated fertilizer related compounds. In this case, it may be prudent to conduct further soil testing at depths of approximately 0.5 m below pre-cyclone ground level and deeper to assess suitability of deeper soils for possibly more cost-effective disposal facilities in the wider area.

6.4.2 Onsite Management

Whilst the tested soils comply with commercial/industrial land use criteria for heavy metals and OCP compounds, it is considered prudent to have specific management measures in place to address the elevated fertilizer related compounds. Should the current soils remain exposed at the site, specialist health and safety measures may need to be implemented. However, it is likely that the current site soils, if not fully excavated, will either be capped with impervious cover (concrete or asphalt) or with a layer of imported fill material (AP40/AP65 or similar) as part of the upgrade works. It is expected that this cover will provide an effective barrier to the underlying remaining soils.

With regards to the exposure pathways outlined in the conceptual site model, the migration of stormwater offsite via groundwater and stormwater over land runoff may need to be managed. However, it is likely that the contaminants identified within the investigation site most likely extend beyond this area. As such, soils outside of the site investigation area may already be having an impact on groundwater and groundwater discharge points (streams and rivers). This aspect is outside of the current scope of works.

7.0 Summary and Conclusions

PDP has carried out a DSI (site history review and soil sampling investigation) prior to the proposed upgrade development works to the existing Awatoto pump station at the end of Waitangi Road, Awatoto, Napier. The purpose of the investigation was to determine the contamination status of the soils within the site, assess the applicability of the NESCS and relationship to the OiC, assess the risk to workers during the excavation works and for future site users, and assess offsite disposal options for any surplus development soils.

Based on the site history review, HAIL reference G3 - for the imported fill associated with filling the flood channel after Cyclone Gabrielle, and HAIL reference H - associated with the movement of materials from the adjacent Awatoto industrial area and agricultural/horticultural sites by wind (dust) and by flood waters were identified to have possibly taken place within the site. It was noted in the previous PDP PSI that these HAIL activities would need to be confirmed through the completion of a soil sampling investigation.

The soil sampling investigation comprised the collection of fourteen samples from three test pit locations within the site and laboratory testing nine samples for the likely persistent contaminants associated with the identified possible HAIL activities, including heavy metals, OCPs, and a fertilizer suite.

The findings of the soil sampling showed cadmium, zinc and/or Σ DDT above local background soil concentrations at a range of depths over the site. However, all heavy metal and OCP compound concentrations were recorded below the relevant health assessment criteria for the current and proposed

site use (commercial/industrial). The results also indicate widespread impacts primarily associated with fertilizer manufacturing/application activities, as evidenced by elevated concentrations in the fertilizer suite of analytes.

If surplus upgrade soils are to be removed offsite as part of the proposed pump station earthworks, they are considered suitable for disposal as managed fill, subject to approval from the receiving operators (i.e. noting the presence of elevated fertilizer related compounds) or to a Class 1 landfill. These tested soils would not be suitable for disposal as cleanfill. However, additional deeper sampling of soils could be carried out to assess possible alternative more cost-effective disposal options. As a prudent approach, specialist health and safety controls, through the preparation of a SMP, should be implemented during the upgrade earthworks due to the contaminant concentrations being recorded above background concentrations, and in particular due to elevated fertilizer-related compounds recorded throughout the soil profile at the test pits.

As detailed in Section 6.2, based on the site history review and soil sampling results, it is concluded that HAIL activity G3 is not applicable, however HAIL activity H⁵ is applicable. As such, the proposal would ordinarily require a controlled activity consent under the NESCS, however any resource consent typically required under the NESCS can be applied for under the OiC. Under the OiC, the activity status is a **controlled activity**, and pre-set conditions can manage the activity. The controls will predominantly relate to the management of the excavation works and the offsite disposal of surplus soils generated during the works, which would need to be outlined in the site-specific SMP for the development.

8.0 References

- Landcare Research [Manaaki Whenua], 2014. *Hawke's Bay Region: Background soil concentrations for managing soil quality* (Report no. RM 14-03, HBRC plan no. 4611). Envirolink Advice Grant 1443-HBRC194.
- MfE, 1998. *Ambient Concentrations of Selected Organochlorines in Soils*. Ministry for the Environment, Wellington.
- MfE, 2023. *Hazardous Activities and Industries List guidance*. Ministry for the Environment, Wellington, New Zealand.
- MfE, 2011a. *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (Revised 2011)*. Ministry for the Environment, Wellington, New Zealand.
- MfE, 2021. *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021)*. Ministry for the Environment, Wellington, New Zealand.
- MfE, 2021a. *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils (Revised 2021)*. Ministry for the Environment, Wellington, New Zealand.
- MfE, 2023. *Technical Guidelines for Disposal to Land: Version 3.1*. Ministry for the Environment, Wellington, New Zealand.
- Napier City Council, 18 July 2024. *Cyclone Gabrielle Response: Silt management in Awatoto Final report*.
- National Environment Protection Council, 2013. *Guideline on the Investigation Levels for Soil and Groundwater*. National Environment Protection Council Australia.

⁵ HAIL H - Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment.

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

9.0 Limitations

This document has been prepared by Pattle Delamore Partners Limited (PDP) on the specific instructions of Hawke's Bay Regional Council 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.

This document has been prepared by PDP on the basis of information provided by Hawke's Bay Regional 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 document. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This document has been prepared based on: the findings of the Preliminary Site Investigation undertaken by PDP, field data gathered by PDP and the results from laboratory analyses of nine soil samples. The site conditions as described in this document have been interpreted from, and are subject to, this information and its limitations and accordingly PDP does not represent that its interpretation accurately represents the full site conditions.

The advice and opinions expressed in this document are based on the observation and sampling of a series test pits at the site. The geological and associated environmental conditions interpolated between the test holes are not guaranteed to be accurate.

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.

This assessment is limited to 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.

If contaminants have been found at the site, it is possible that the contaminants could extend offsite, 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 offsite, and risks associated with any offsite contaminants, are not considered by this document.

The information contained within this document applies to sampling undertaken on the date stated in this document, or if none is stated, the date of this document. 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.

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Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by



Nicole Bidart

Environmental Scientist: Contaminated Land

Reviewed and Approved by



Guy Knoyle

Technical Director – Contaminated Land

Certifying Statements

I, Guy Knoyle, of Pattle Delamore Partners Limited certify that:

1. This detailed site investigation meets the requirements of the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011* (the NESCS) because it has been:
 - a. done by a suitably qualified and experienced practitioner, and
 - b. done in accordance with the current edition of *Contaminated land management guidelines No 5 – Site investigation and analysis of soils*, and
 - c. reported on in accordance with the current edition of *Contaminated land management guidelines No 1 – Reporting on contaminated sites in New Zealand*, and
 - d. the report is certified by a suitably qualified and experienced practitioner.
2. *For activities under R9 of the NESCS does not exceed the applicable standard in Regulation 7 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations.*

Evidence of the qualifications and experience of the suitably qualified and experienced practitioner(s) who have done this investigation and certified this report is appended to this detailed site investigation report.

Signed:



Guy Knoyle

Technical Director – Contaminated Land

Guy Knoyle – Project Director

Guy is an environmental scientist with over 28 years of experience in undertaking environmental and contaminated land assessments. He has a BSc (Joint Honours) in Environmental Science and Zoology, and a MSc in Applied Hydrobiology, both from the University of Wales, College of Cardiff. Guy currently project manages contaminated land assessments and monitoring programmes for a diverse range of sites including commercial/industrial and largescale residential developments, former market gardens, horticultural and timber treatment sites, pesticide storage depots, landfills, the petroleum industry, former gas works sites and illicit methamphetamine laboratories, with experience attained over several hundred sites.

Guy's experience has involved a wide range of environmental issues, across a broad range of media including soil, sediment, surface water, groundwater, and ground gas; and for a wide range of contaminants including heavy metals, petroleum hydrocarbons, and asbestos.

Guy's knowledge has also allowed him to present technical evidence on behalf of various clients, as part of a multi-disciplinary team, at High and District Courts, Environment Court mediation and at numerous joint territorial and regional authority hearings.

Guy has familiarity with and understanding of the current contaminated land regulation and practice in New Zealand including assessments against the NESCS, and in the consenting of contaminated sites.

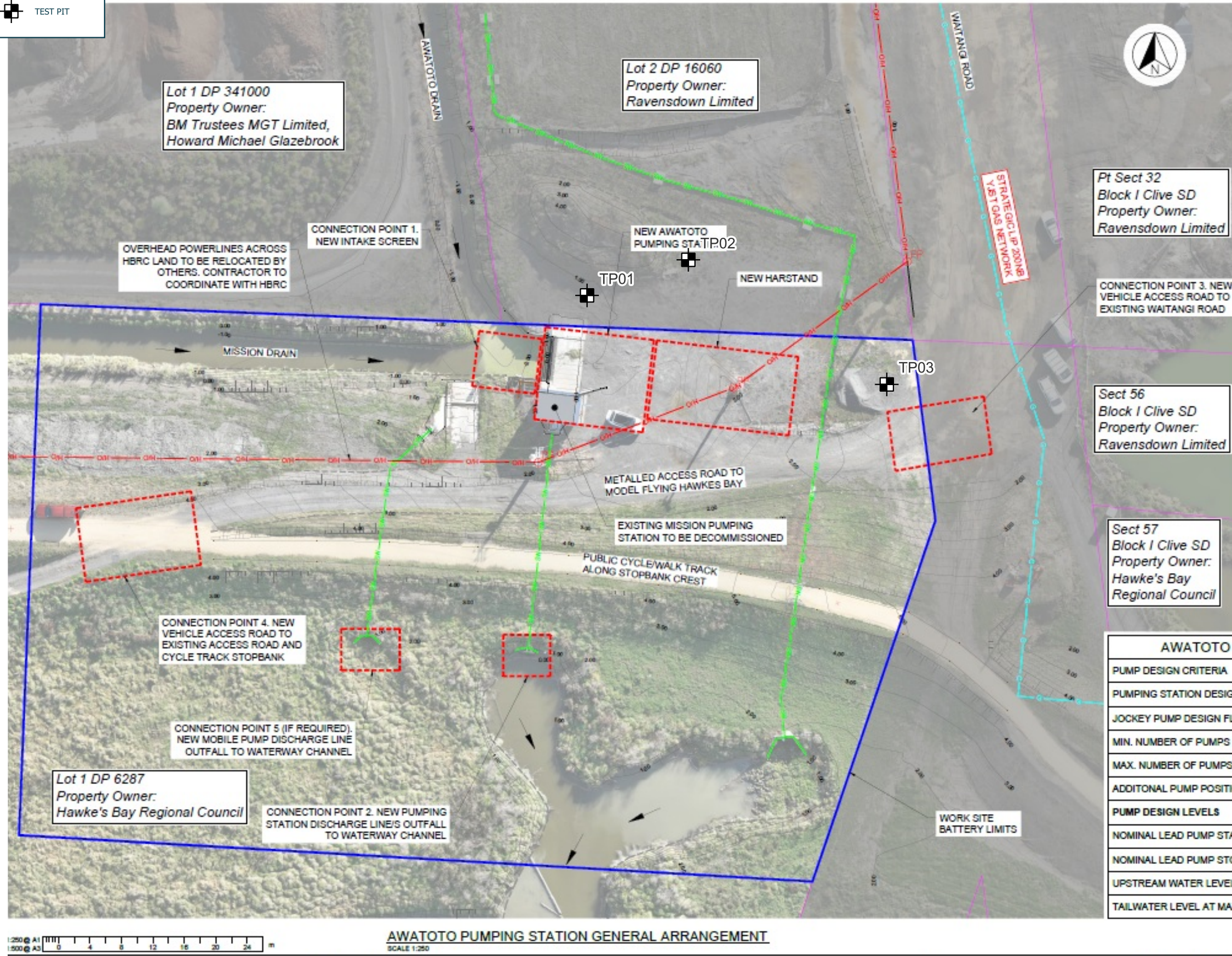
Appendix A: Site Figures



KEY:



TEST PIT



GENERAL NOTES:

1. LOCATE ALL EXISTING SERVICES ON SITE PRIOR TO WORK COMMENCING. EXISTING SERVICES SHOWN ARE INDICATIVE ONLY.
2. CONTRACTOR TO PROTECT ALL EXISTING SERVICES AND IS RESPONSIBLE FOR MAKING GOOD ANY DAMAGE TO EXISTING SERVICES.
3. ALL CONNECTION AND NEW WORKS LOCATIONS ARE SHOWN INDICATIVELY. THE DASHED LINES SHOW THE ANTICIPATED LOCATIONS, BUT THE CONNECTIONS AND NEW WORKS MAY BE LOCATED OUTSIDE THESE AREAS IF REQUIRED.
4. THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION FOR EACH CONNECTION/NEW WORKS.
5. AN EMERGENCY GENERATOR (NOT SHOWN) IS ALSO PART OF THE CONTRACT WORKS.
6. TOPOGRAPHICAL SURVEY CAD FILES PROVIDED BY "THE SURVEY COMPANY" USED ON THIS DRAWING.
7. SURVEYS TO NZTM2000.
8. CONTOUR INTERVAL = 0.25m.
9. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM 2016.
10. BOUNDARIES FROM LINZ SPATIAL DATABASE.
11. BOUNDARIES TO BE SURVEYED BY A REGISTERED SURVEYOR.
12. AERIAL PHOTO SCALED AND MOVED TO MATCH SURVEY CAD INFORMATION.

LEGEND

- EXISTING STORMWATER
- EXISTING OVERHEAD POWER LINES
- EXISTING FENCE
- EXISTING GAS
- TOP OF BANK
- BOTTOM OF BANK
- BOUNDARY
- CONTOURS
- EXISTING POWER POLE
- EXISTING WINGWALL
- CONTRACT WORKS BATTERY LIMITS
- PROPERTY NOT OWNED BY HBRC

AWATOTO PUMPING STATION DESIGN CRITERIA

PUMP DESIGN CRITERIA	UNITS	VALUE
PUMPING STATION DESIGN FLOW RATE	L/s	9.500
JOCKEY PUMP DESIGN FLOWRATE	L/s	290
MIN. NUMBER OF PUMPS	No.	2
MAX. NUMBER OF PUMPS	No.	3
ADDITIONAL PUMP POSITIONS	No.	1
PUMP DESIGN LEVELS		LEVEL (m NZVD2016)
NOMINAL LEAD PUMP START LEVEL		-0.84
NOMINAL LEAD PUMP STOP LEVEL		-1.03
UPSTREAM WATER LEVEL AT MAX. DESIGN FLOW		-0.23
TAILWATER LEVEL AT MAXI. DESIGN FLOW		4.77

WORK IN PROGRESS

PRINTED 20/08/2024 9:40:04 am



0 20 40 60 m
SCALE 1:2000 (A3)
THIS DRAWING REMAINS THE PROPERTY OF PATTLE DELAMORE PARTNERS LTD AND MAY NOT BE REPRODUCED OR ALTERED WITHOUT WRITTEN PERMISSION. NO LIABILITY SHALL BE ACCEPTED FOR UNAUTHORISED USE OF THE DRAWING.

A	FINAL	OCT 29	NB
A	ISSUED FOR REVIEW	OCT 24	NB
NO.	REVISION	DATE	BY

SOURCE:
1. SITE SURVEY AERIAL SOURCED FROM ##DATA SOURCE## PROVIDED ON ##DATE##.
2. BASEMAP AERIAL SOURCED FROM LINZ AERIAL IMAGERY.
3. SITE INVESTIGATION LOCATIONS ARE NOT SURVEYED AND ARE APPROXIMATE.
4. GEOLOGY MAPPING IS BASED ON SITE OBSERVATIONS MADE BY PDP STAFF DURING A SITE VISIT IN ##DATE##. MAPPING IS NOT SURVEYED AND ARE APPROXIMATE.
5. ##OTHER RELEVANT INFORMATION##.



FIGURE
FIGURE 2: Hawke's Bay Regional Council Drawing

PROJECT
HB010960002 - DETAILED SITE INVESTIGATION - AWATOTO PUMPSTATION

Appendix B: Site Photographs



Photograph 1: General view of pumpstation in the carpark, facing southwest.



Photograph 2: View of the pumpstation's electric feed view, facing south toward the stopbank.



Photograph 3: View of the pumpstation access and carpark, facing southeast.



Photograph 4: Test pit TP1, near the pumpstation building, facing north.



Photograph 5: View of test pit TP2, within the carpark, facing north.



Photograph 6: View of test pit TP3 view, near pumpstation access, facing south.



Photograph 7: Final state of test pit TP3 after reinstatement, facing south.



Appendix C: Results Table

Table A: Summary Soil Sample Results - Heavy Metals ¹, Organochlorine Pesticides ¹ and Fertilizer suite ¹

Soil Sample ID	AP_TP01_Sur	AP_TP01_0.3	AP_TP01_0.5	AP_TP02_0.3	AP_TP02_0.5	AP_TP02_1.0	AP_TP03_Sur	AP_TP03_0.3	AP_TP03_0.5	Background Soil Concentration	NESCS ⁴	Waste Acceptance Criteria (WAC) ⁷
Sample Depth	surface	0.3	0.5	0.3	0.5	1.0	surface	0.3	0.5			
Sample Type - Field	Sandy Gravel	Sandy Gravel	Sandy Gravel	Sandy Gravel	Sandy Silt	Sand	Sandy Gravel	Sandy Gravel	Sand	Hawke's Bay Region ²	Commercial/Industrial Outdoor Worker (Unpaved)	Class 1 - Ōmarunui Landfill
Soil Type - MfE	Sand	Sand	Sand	Sand	Sandy Silt	Sand	Sand	Sand	Sand			
Sampling Date	9-Oct-24	9-Oct-24	9-Oct-24	9-Oct-24	9-Oct-24	9-Oct-24	9-Oct-24	9-Oct-24	9-Oct-24			
Laboratory Reference	3690388.1	3690388.2	3690388.3	3690388.6	3690388.7	3690388.8	3690388.10	3690388.11	3690388.12			
Heavy Metals, Screen Level												
Arsenic	5	6	5	5	7	3	4	5	5	9	70	100
Cadmium	1.10	1.59	0.43	1.77	2.5	8.3	0.99	0.82	1.22	0.7	1,300	20
Chromium (Total)	18	19	18	16	17	18	17	15	19	24	6,300 ^{4a}	100
Copper	10	12	6	9	11	8	9	9	10	32	>10,000	100
Lead	12.1	16.8	9.6	16.8	16.5	5.9	12.2	10.9	14.8	27	3,300	100
Nickel	11	11	11	9	13	17	9	10	6	17	6,000 ^{4b}	200
Zinc	69	80	57	60	71	109	54	54	38	105	400,000 ^{4b}	200
Organochlorine Pesticides Screening in Soil												
Aldrin + Dieldrin	< 0.022	< 0.022	< 0.024	< 0.022	< 0.024	< 0.024	< 0.022	< 0.022	< 0.24	-	160	0.00016 + 8
Total DDT Isomers ⁵	0.40	0.23	0.08	0.51	0.45	< 0.07	0.58	0.85	< 0.7	0.053 ³	1,000	-
All other OCPs ⁶	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-
Fertilizer Suite												
Total Recoverable Phosphorus	-	5,900	-	-	-	22,000	-	-	9,100	1,430 ⁸	-	-
Fluoride	-	1,580	-	-	-	1,690	-	-	1,420	380 ⁸	-	4,000
Sulphate	-	3,000	-	-	-	7,000	-	-	9,400	13 ⁸	-	-

109	Concentration above Hawke's Bay Region Background Soil Concentrations
< 0.0022	Concentration below laboratory limit of detection
-	No guideline/data value available

Notes.

- All results in mg/kg.
- Landcare Research, 2014, Hawkes Bay Region: Background soil concentrations for managing soil quality.
- Background soils concentration for ΣDDT - Ministry for the Environment, December 1998. Ambient Concentrations of Selected Organochlorines in Soils. Ministry for the Environment, Wellington. Refer to table 4.
- Ministry for the Environment (MfE), 2011, Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (Revised 2011).
- Guideline value is for Chromium (Total) VI.
- Criteria from National Environment Protection Council, 2013, Schedule B(1) Guideline on Investigation Levels for Soils and Groundwater National Environment Protection Measure - Table 1A(1) Health investigation levels for soil contaminants (mg/kg) - Commercial/Industrial (HIL D).
- The overall detection limit is the sum of the detection limits.
- 'ND' Not Detected = None of the individual compounds were recorded above the laboratory limit of reporting. Refer to laboratory report for full results.
- HBRC Resource Consent AUTH-130324-01 Class A Screening Criteria.
- Indicative background concentrations for fertilizer related compounds, based on soil samples Baseline: Tamatea and Baseline: Clive collected from surrounding area.



Appendix D: Laboratory Report and Chain of Custody Documentation

Certificate of Analysis

Page 1 of 3

Client:	Pattle Delamore Partners Limited	Lab No:	3690388	SPV2
Contact:	Nicole Bidart	Date Received:	10-Oct-2024	
	C/- Pattle Delamore Partners Limited	Date Reported:	06-Dec-2024	(Amended)
	Level 2, 9 Customs Quay	Quote No:	133777	
	Napier 4110	Order No:		
		Client Reference:		
		Submitted By:	Nicole Bidart	

Sample Type: Soil

Sample Name:	AP_TP01_Sur 09-Oct-2024 9:10 am	AP_TP01_0.3 09-Oct-2024 9:20 am	AP_TP01_0.5 09-Oct-2024 9:25 am	AP_TP02_0.3 09-Oct-2024 9:50 am	AP_TP02_0.5 09-Oct-2024 10:00 am
Lab Number:	3690388.1	3690388.2	3690388.3	3690388.6	3690388.7

Individual Tests

Dry Matter	g/100g as rcvd	95	90	87	94	84
Total Recoverable Phosphorus	mg/kg dry wt	-	5,900	-	-	-
Fluoride*	mg/kg dry wt	-	1,580	-	-	-
Sulphate*	mg/kg dry wt	-	3,000	-	-	-

Heavy Metals, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	5	6	5	5	7
Total Recoverable Cadmium	mg/kg dry wt	1.10	1.59	0.43	1.77	2.5
Total Recoverable Chromium	mg/kg dry wt	18	19	18	16	17
Total Recoverable Copper	mg/kg dry wt	10	12	6	9	11
Total Recoverable Lead	mg/kg dry wt	12.1	16.8	9.6	16.8	16.5
Total Recoverable Nickel	mg/kg dry wt	11	11	11	9	13
Total Recoverable Zinc	mg/kg dry wt	69	80	57	60	71

Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
alpha-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
beta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
delta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.012	0.074	< 0.012
4,4'-DDD	mg/kg dry wt	0.118	0.118	0.043	0.26	0.194
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
4,4'-DDE	mg/kg dry wt	0.028	0.030	< 0.012	0.033	0.073
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
4,4'-DDT	mg/kg dry wt	0.26	0.082	0.029	0.146	0.184
Total DDT Isomers	mg/kg dry wt	0.40	0.23	0.08	0.51	0.45
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Endrin	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011	< 0.012



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: Soil					
Sample Name:	AP_TP01_Sur 09-Oct-2024 9:10 am	AP_TP01_0.3 09-Oct-2024 9:20 am	AP_TP01_0.5 09-Oct-2024 9:25 am	AP_TP02_0.3 09-Oct-2024 9:50 am	AP_TP02_0.5 09-Oct-2024 10:00 am
Lab Number:	3690388.1	3690388.2	3690388.3	3690388.6	3690388.7
Organochlorine Pesticides Screening in Soil					
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	< 0.012	< 0.011
Sample Name:	AP_TP02_1.0 09-Oct-2024 11:00 am	AP_TP03_Sur 09-Oct-2024 9:15 am	AP_TP03_0.3 09-Oct-2024 11:30 am	AP_TP03_0.5 09-Oct-2024 11:35 am	
Lab Number:	3690388.8	3690388.10	3690388.11	3690388.12	
Individual Tests					
Dry Matter	g/100g as rcvd	85	94	93	89
Total Recoverable Phosphorus	mg/kg dry wt	22,000	-	-	9,100
Fluoride*	mg/kg dry wt	1,690	-	-	1,420
Sulphate*	mg/kg dry wt	7,000	-	-	9,400
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	3	4	5	5
Total Recoverable Cadmium	mg/kg dry wt	8.3	0.99	0.82	1.22
Total Recoverable Chromium	mg/kg dry wt	18	17	15	19
Total Recoverable Copper	mg/kg dry wt	8	9	9	10
Total Recoverable Lead	mg/kg dry wt	5.9	12.2	10.9	14.8
Total Recoverable Nickel	mg/kg dry wt	17	9	10	6
Total Recoverable Zinc	mg/kg dry wt	109	54	54	38
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
alpha-BHC	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
beta-BHC	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
delta-BHC	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.011	0.045	< 0.12
4,4'-DDD	mg/kg dry wt	< 0.012	0.105	0.119	< 0.12
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
4,4'-DDE	mg/kg dry wt	< 0.012	0.037	0.052	< 0.12
2,4'-DDT	mg/kg dry wt	< 0.012	0.024	0.042	< 0.12
4,4'-DDT	mg/kg dry wt	< 0.012	0.41	0.59	0.18
Total DDT Isomers	mg/kg dry wt	< 0.07	0.58	0.85	< 0.7
Dieldrin	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Endosulfan I	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Endosulfan II	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Endrin	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Endrin ketone	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Heptachlor	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Methoxychlor	mg/kg dry wt	< 0.012	< 0.011	< 0.011	< 0.12
Analyst's Comments					
Due to some interference found in the chromatography for the OCP analysis on sample 3690388.12, the extract was diluted and re-analysed. Hence the higher detection limits reported.					
Amended Report: This certificate of analysis replaces report '3690388-SPv1' issued on 15-Oct-2024 at 4:16 pm. Reason for amendment: Fluoride, Sulphate and phosphorus added to 3 samples.					

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: Soil			
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, 6-8, 10-12
Non-Routine sample preparation. Air drying and 180 um sieving.*	Air dried and sieved, <180 um fraction. Used for sample preparation.	-	2, 8, 12
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 6-8, 10-12
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-3, 6-8, 10-12
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, 6-8, 10-12
0.02M potassium dihydrogen ortho-phosphate extraction*	(1:5) ratio of sample (g):0.02M potassium dihydrogen ortho-phosphate extractant (mL), analysis by Ion Chromatography. In House.	-	2, 8, 12
Total Fluoride in solids alkaline fusion*	Alkaline fusion of sample. Methods of Soil Analysis 2nd Edition, Pt2, 26-4.3.3.	-	2, 8, 12
Total Recoverable Phosphorus	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	40 mg/kg dry wt	2, 8, 12
Total Fluoride in Solids*	Ion selective electrode. Methods of Soil Analysis 2nd Edition, Pt2, 26-4.3.3. (modified).	20 mg/kg dry wt	2, 8, 12
Sulphate*	Ion Chromatography determination of a potassium phosphate extract of an environmental solid. APHA 4110 B (modified) : Online Edition.	3 mg/kg dry wt	2, 8, 12

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

Testing was completed between 10-Oct-2024 and 06-Dec-2024. 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.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Kim Harrison MSc
Client Services Manager - Environmental

Quote No 133777
 Primary Contact Nicole Bidart 313119
 Submitted By Nicole Bidart 313119
 Client Name Pattle Delamore Partners Limited 299985

Address Level 2, 9 Customs Quay

Phone Mobile

Email hills@pdp.co.nz

Charge To Pattle Delamore Partners Limited 299985

Client Reference

Additional Client Ref

Order No

Results To Reports will be emailed to Primary Contact by default.
 Additional Reports will be sent as specified below.

☒ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

Dates of testing are not routinely included in the Certificates of Analysis.
 Please inform the laboratory if you would like this information reported.

ADDITIONAL INFORMATION / KNOWN HAZARDS

Quoted Sample Types

Soil (Soil)

HEAVY METAL & OCP (on request)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	AP-TP01.SUR	9-10-24 9:10	S	HOLD COLD
2	AP-TP01.03	9-10-24 9:20		
3	AP-TP01.05	9-10-24 9:25		
4	AP-TP01.10	9-10-24 9:35		
5	AP-TP01	9-10-24		
6	AP-TP02.SUR	9-10-24 9:00		
7	AP-TP02.03	9-10-24 9:50		
8	AP-TP02.05	9-10-24 10:00		

ANALYSIS REQUEST

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 No Date Recv. 10-Oct-24 07:08

369 0388

Received by: Nathaniel Sue



CHAIN OF CUSTODY RECORD

Sent to Hill Labs

Date & Time: 09-10-24

Name: Nicole Bidart

☐ Tick if you require COC to be emailed back

Signature: [Signature]

Received at Hill Labs

Date & Time:

Name:

Signature:

Condition

Temp:

☐ Room Temp ☐ Chilled ☐ Frozen

6.7

☐ Sample & Analysis details checked

Signature:

Priority

☐ Low

☐ Normal

☒ High

☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date:

AP-TP02.10 9-10-24
11:00

AP-TP02.13 9-10-24
11:15

AP-TP03.02 9-10-24
9:15

AP-TP03.03 9-10-24
11:35

AP-TP03.05 9-10-24
11:35

AP-TP03.10 9-10-24
11:40

AP-TP03.13 9-10-24
11:50

S



WOLD COLD



Job Information Summary

Page 1 of 2

Client:	Pattle Delamore Partners Limited	Lab No:	3690388
Contact:	Nicole Bidart	Date Registered:	10-Oct-2024 11:44 am
	C/- Pattle Delamore Partners Limited	Priority:	High
	Level 2, 9 Customs Quay	Quote No:	133777
	Napier 4110	Order No:	
		Client Reference:	
		Add. Client Ref:	
		Submitted By:	Nicole Bidart
		Charge To:	Pattle Delamore Partners Limited
		Target Date:	14-Oct-2024 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	AP_TP01_Sur 09-Oct-2024 9:10 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
2	AP_TP01_0.3 09-Oct-2024 9:20 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
3	AP_TP01_0.5 09-Oct-2024 9:25 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
4	AP_TP01_1.0 09-Oct-2024 9:35 am	Soil	GSoil300	Hold Cold
5	AP_TP02_Sur 09-Oct-2024 9:00 am	Soil	GSoil300	Hold Cold
6	AP_TP02_0.3 09-Oct-2024 9:50 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
7	AP_TP02_0.5 09-Oct-2024 10:00 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
8	AP_TP02_1.0 09-Oct-2024 11:00 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
9	AP_TP02_1.3 09-Oct-2024 11:15 am	Soil	GSoil300	Hold Cold
10	AP_TP03_Sur 09-Oct-2024 9:15 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
11	AP_TP03_0.3 09-Oct-2024 11:30 am	Soil	cGSoil	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
12	AP_TP03_0.5 09-Oct-2024 11:35 am	Soil	GSoil300	Heavy Metals, Screen Level, Organochlorine Pesticides Screening in Soil
13	AP_TP03_1.0 09-Oct-2024 11:40 am	Soil	GSoil300	Hold Cold
14	AP_TP03_1.3 09-Oct-2024 11:50 am	Soil	GSoil300	Hold Cold

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively 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: Soil			
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, 6-8, 10-12
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 6-8, 10-12

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-3, 6-8, 10-12
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, 6-8, 10-12