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Project Number #18634.000.001

**Site Management Plan (SMP) / Remedial
Action Plan (RAP)**

234 Rangiora Road, Ōtaki, Kapiti Coast

Submitted to:
Classic Developments NZ Ltd
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1 Introduction

ENGEO Ltd was requested by Classic Developments NZ Ltd to prepare a Site Management Plan (SMP) / Remedial Action Plan (RAP) for the property at 234 Rangiora Road, Ōtaki, Kapiti Coast (herein referred to as 'the site'). This work has been carried out in accordance with our signed agreement, reference P2021.000.863_01, dated 13 April 2021.

ENGEO understands that the client intends to construct and develop a subdivision at the site consisting of approximately 46 properties.

A combined Preliminary and Detailed Site Investigation (PSI / DSI) report was produced by ENGEO Ltd in May 2021. This SMP / RAP is required due to the presence of arsenic identified in the site soil in exceedance of residential 10% human health criteria.

This SMP / RAP has been prepared in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG) No.1: Reporting on Contaminated Sites in New Zealand (MfE, 2021a).

2 Objectives and Relevance of the SMP / RAP

This SMP / RAP applies to the redevelopment works at the site (Figure 1).

The primary objective of this SMP / RAP is to provide a framework for managing soil contamination hazards on-site. To achieve this objective, this SMP / RAP:

- Details the remedial methodology and procedures for contaminated soil removal;
- Details the soil validation process and remedial goals;
- Identifies controls to help protect human health and the environment during soil disturbance works, including procedures to follow should unexpected contamination be encountered; and
- Details record keeping procedures so that suitable data is recorded to confirm redevelopment works were undertaken in accordance with the SMP / RAP controls.

The provisions of this SMP / RAP are mandatory for all persons entering the site and all contractors and subcontractor employees who will be involved with site work who may come into contact with the site soil. All personnel assigned to this project must sign an Agreement and Acknowledgement Sheet (Appendix 1) or similar, to confirm that they understand and agree to abide by the provisions of this SMP / RAP.

The information and recommendations provided herein are to augment the processes on-site and are not intended to relieve any contractor, or the controller of the place of work, of their responsibility for the health and safety of their workers and contractors. Nor is it intended to relieve contractors undertaking work on the site of their responsibilities under the Health and Safety at Work Act (HSWA) (MoBIE, 2015) and subsequent amendments.

2.1 Site Specific Safety Plan (SSSP)

The contractor shall develop a Site Specific Safety Plan (SSSP) to complement this SMP / RAP to address other health and safety requirements that may be applicable to their site works. This SSSP should be updated based on any additions made, if relevant. This should be in accordance with the HSWA, 2015.

A copy of the updated SSSP should be communicated to all parties before undertaking the work. All site personnel will be required to review this SMP / RAP and the separate SSSP.

At the start of each day a brief “tool box” meeting should be held to review the SSSP and the proposed work for the day, discuss potential perceived health and safety risks as well as environmental management procedures and to communicate these issues to the project team.

Appropriate emergency procedures must be established before the commencement of earthworks on-site. The appointed Contractor is responsible for detailing these procedures, which will include the location of first aid kits and medical emergency numbers.

2.2 WorkSafe

No WorkSafe notification is required for this site. However, in the event that presumed asbestos containing materials (PACM) are discovered, ENGEO should be consulted. This may result in a need for notification to WorkSafe.

3 Site Information and Proposed Activity

Site information for the property is summarised in Table 1 and the site setting is summarised in Table 2.

Table 1: Site Information

Item	Description
Location	234 Rangiora Road, Ōtaki Kapiti Coast
Legal Description	Lot 2 DP 42874
Property Owner	Classic Developments NZ Ltd
Current Land Use	Rural Residential
Proposed Land Use	Residential
Site Area	23,878 m ²
Regional Authority	Greater Wellington Regional Council and Kapiti Coast District Council

Table 2: Site Setting

Item	Description
Topography	The site is generally flat.
Local Setting	The site is located in Ōtaki, to the immediate north of Rangiuuru Road. The site is bounded by residential and lifestyle blocks in each direction with Rangiuuru Road to the immediate south of site. To the north of site is an unnamed stream with Te Kura-ā-lwi O Whakatupuranga Rua Mano (School) and Nga Purapura beyond this.
Nearest Surface Water & Use (GWRC GIS)	An unnamed stream is located approximately 10 m to the north of site. this is a Schedule F1 waterway. Ōtaki River is approximately 1100 m to the southwest of the site.
Geology (GNS, 2000)	The site is underlain by Holocene alluvium consisting of well sorted floodplain gravels.
Hydrogeology (GWRC, 2014)	There is no known aquifer present beneath the site with the aquifer potential indicated to be poor. Based on previous investigations in the area, depth to groundwater is likely to be approximately 1.3 to 1.9 m.
Groundwater Abstractions (GWRC GIS)	There are no noted groundwater abstractions within 250 m of the site location.
Discharge Consents (GWRC GIS)	There are no noted discharge consents within 250 m of the site location.

4 Assessment of Risk

ENGEO carried out a Combined Preliminary and Detailed Site Investigation in May 2021. A summary of the investigation is presented in Appendix 2.

The results indicate that soil remediation or management is required due to the presence of arsenic detected above human health guidelines in eleven samples (TP01, TP01A, TP01C, TP01D, TP01E, TP04, ASA, ASD, PS06, PS14, PS16). The exceedance of arsenic at PS06 (and duplicate PS16) is marginal and, when averaged with the concentrations of samples collected outside of the remedial areas, it is considered unlikely to be a risk. Prior to any earthworks being undertaken, this SMP / RAP was recommended to provide procedures to protect human health and the environment during construction works and to manage / remediate the contaminated soil for future residential site use. The approximate area requiring remediation or management to address human health risks is depicted in Figure 1. This area was determined based on the human health exceedances reported in the ENGEO PSI / DSI.

4.1 Conceptual Site Model

The potential source, pathway, receptor linkages at this subject site are provided in Table 3.

Table 3: Conceptual Site Model

Potential Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Ground disturbance / Undocumented fill <i>Heavy metals</i>	Direct contact Ingestion of soil Inhalation of volatile contaminants or windblown dust	Future site users / site redevelopment workers Surrounding residents and environment including the stream	No In total, six exceedances of arsenic were noted for the selected human health criteria (residential with 10% produce). Remediation or management is required.
Previous site use as arable / market gardens <i>Heavy metals</i>			

5 Regulatory Framework

The regulatory frameworks and rules relating to the management and control of potentially contaminated and contaminated sites in the Wellington Region are specified in two documents: the NES and Proposed National Resource Plan. A summary of each and their implications for the site are provided in the sections below and the relevant regulations are provided in Appendices 3 and 4.

5.1 Resource Management Regulations

The Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, herein referred to as the “NES” (MfE, 2011a, MfE, 2012) came into effect on 1 January 2012.

Disturbing Soil

Soil disturbance on sites with potentially contaminated soils are covered by the NES. The site is being redeveloped and subdivided, therefore it is understood that the site activities could fall under a restricted discretionary activity in accordance with Regulation 10. A resource consent may be required for the works depending on volume of soil to be disturbed / removed off-site.

5.2 Greater Wellington Regional Council Regional Plan

Under the GWRC Proposed Natural Resources Plan (Greater Wellington Regional Council, 2021), Rule R55 potentially applies to the site.

The rules are provided in Appendix 4; further explanation for each rule is provided in the Plan.

6 Remediation Methodology

The remedial methodology will comprise excavation and off-site disposal of soil containing contaminants above the adopted human health criteria.

An estimate of the area requiring remediation based on the existing contaminant distribution data and conceptual site model has been made and is provided in Table 4. Figure 1 highlights those samples above and below Human Health Residential Criteria, and the potential remedial areas. Laboratory results from the combined PSI / DSI are included in Appendix 5.

The advantages of the excavation and off-site disposal remediation strategy are:

- Contaminants permanently removed from site.
- Site will be tagged on LIM as remediated / managed so no further residual liability to owners which potentially improves land value.
- Minimised / eliminated future exposure potential on-site.

Table 4: Remedial Volume Estimation

Site Area	Sample Exceeding Human Health Criterion	Exceedance	Estimated Area of Impact (m ²)	Estimated Depth of Remedial Excavation (m bgl)	Estimated Soil Volume Exceeding Remedial Goal to be Removed (m ³)
23,878 m ²	TP04	Arsenic for residential 10% human health criteria	40	0.3	12
	TP01, TP01A, TP01C, TP01D, TP01E	Arsenic for residential 10% human health criteria	1330	0.3	399
Total					411

7 Remedial Criteria

The remedial goal for arsenic has been referenced from the NES (MfE, 2011a, MfE, 2012) and the MfE Contaminated Land Management Guidelines No. 2 (MfE, 2011b). For residential site use, the remedial value for arsenic is as follows:

Table 5: Arsenic Remedial Criteria

Contaminant	Remedial Criteria – Residential 10% Produce Human Health
Arsenic	20 mg/kg

9 Assessment of Environmental Effects

Based on the requirements of Section 88 of the Resource Management Act 2013 (MfE, 1991) and the framework set out in the Fourth Schedule of the RMA, the actual and potential environmental effects related to on-site contamination that may arise during site redevelopment activities include:

- Groundwater, stormwater, and sediment discharges – Groundwater encountered during intrusive works or rainwater falling on the site prior to building construction have the potential to come into contact with contaminated material and become contaminated.
- Dust - Dust generated during trenching, drilling and fill placement activities has the potential to contain contaminants.
- Tracking of contaminated soil off-site.
- Odours and vapours - Volatile chemical contamination is not anticipated to be of concern at the site; however, this RAP includes procedures to be implemented if odorous soil is encountered.

The measures that will be implemented to avoid, remedy or mitigate the identified adverse effects are summarised in Table 6. Through implementation of these measures, it is concluded that the potential environmental effects associated with the proposed programme of remedial works will be less than minor.

Although asbestos was not identified in the samples tested, it was identified as a potential contaminant of concern. Asbestos is considered primarily a human health contaminant. The potential adverse effects of asbestos on environmental receptors is not currently understood due to the lack of available research data. The risks to environmental receptors are considered likely to be mitigated if the risks to human health are managed.

Table 6: Assessment of Environmental Effects

Schedule Four Item	Assessment of Environmental Effects
Description of the proposal.	Excavation and disposal of arsenic impacted soil off-site.
Where the activity is likely to result in significant adverse effects, a description of the alternatives.	Any actual or potential effects on the environment from the proposed remediation are likely to be minor due to the contaminant properties, site setting, short-term nature of the works and proposed mitigation measures to be employed.
An assessment of actual or potential effects on the environment.	Earthworks shall be conducted in line with consent conditions and mitigation measures discussed herein.
Where the activity includes the discharge of any contaminant, a description of: - Nature of the discharge. - Sensitivity of the receiving environment. - Alternative methods of discharge.	<u>Dust</u> Potential for remedial works to generate minor amounts of dust during the excavation and removal of impacted soil is considered low due to the mitigation measures to be employed. Mitigation will involve dust suppression, limiting drop heights and covering all truck loads leaving the site. <u>Stormwater</u> There is considered to be minimal potential for impact on surface water if suitable control measures are implemented. There is unlikely to be any significant discharge to air or stormwater during the works.
Any effects on ecosystems including plants, or animals, physical disturbance of habitats in the vicinity.	No effects anticipated.
Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual or cultural, or other special values for present or future generations.	No effects anticipated.
Description of the mitigation measures (safeguards and contingency plans) where relevant to be undertaken to help prevent or reduce actual or potential effect.	See Sections 10 through 12 for mitigation measures to be undertaken during the remedial works.
Where the scale or significance of the activity's effect are such that monitoring is required, a description of how, once the proposal is approved, effects will be monitored and by whom.	Scale of proposal is considered minor, however a suitably qualified and experienced practitioner (SQEP) will be engaged to monitor conditions on-site during the remedial works. The Site Supervisor will also qualitatively assess dust during the proposed remedial works.

10 Plan Management and Control

The recommendations for health and safety procedures and protection of the environment are relevant to ALL soil disturbance works at the site.

Intrusive works, soil handling and soil disturbance activities at the site shall be controlled in accordance with the guidance provided in this SMP / RAP. These activities include, but are not limited to:

- Temporary stockpiling of material.
- Loading and transport of material around the site.
- Equipment decontamination.

If contamination is found that varies from what has been assumed in preparing this SMP / RAP, the SMP / RAP will be updated to account for the changed site understanding. If a revised SMP / RAP is prepared, it will be redistributed to Council and the project team (Table 7) prior to earthworks commencing.

All personnel assigned to this project must sign the Agreement and Acknowledgement Sheet to confirm that they understand and agree to abide by the provisions of this SMP / RAP (see Appendix 1).

Table 7: Assigned Responsibilities for Site Work

Role	Responsibility
Site Owner Classic Developments NZ Ltd	To distribute this SMP / RAP and be responsible for ensuring that the site works are undertaken in accordance with this document and any revisions to this document. This also includes ensuring that all site staff and subcontractors are aware of and comply with the procedures and health and safety requirements contained within this document.
Site Contractor TBD	To distribute the SMP / RAP including updated versions, and to ensure that the correct copy of the SMP / RAP is on-site at all times. To provide control and validation of the redevelopment works. It is recommended that a designated, suitably trained Site Supervisor is present to oversee the works. The Site Supervisor would address changes to site procedures, as necessary, should unanticipated conditions arise. It is anticipated that this Site Supervisor would represent the main site contractor. Should an incident occur on-site which may result in discharges, the supervisor will take control of the situation and coordinate the efforts of all on-site to minimise the impact. Health and Safety concerns will take precedence over environmental discharges and, should it be unsafe to employ controls or emergency measures immediately, worker and public health and safety take priority.
Contaminated Land Specialist (SQEP) ENGEO	A SQEP as defined in CLMG No. 5 should be appointed to liaise with the contractor during the course of the works, and to ensure works are conducted in accordance with the SMP / RAP and provide environmental support (if required). The SQEP (or the site contractor) can be responsible for undertaking validation that the equipment and vehicles have been decontaminated.

11 Site Management Practices

This section presents general protocols for remedial earthwork activities at the site. These protocols cover the remediation areas in Figure 1. If additional contaminants are encountered, the protections for workers and remedial goals should be revised, as appropriate.

Many of the proposed control measures are standard construction site procedures; however, the relevance and effectiveness of these protocols (refer to Table 8) shall be reviewed by the contractor's representative (Site Supervisor) during site redevelopment / earthwork activities on a daily basis.

11.1 Health and Safety Management

General protocols for health and safety during general earthwork activities at the site are presented in Table 8.

Table 8: Health and Safety

HEALTH AND SAFETY	
Inductions	Contractor staff, subcontractors and visitors shall be required to undergo a site safety induction before entering and / or commencing work. The purpose of the induction is to ensure that staff, subcontractors and visitors are aware of the potential hazards relating to potentially contaminated soil relevant at and surrounding the site. The following general safety procedures shall be followed by all staff entering and / or working in the immediate area of the remedial earthworks: - Workers shall be made aware of potential hazards and any new hazards that arise on-site. - Site workers shall avoid unnecessary contact with site soils. - Site workers shall wear personal protective clothing and equipment as required. - All incidents shall be reported to the appointed contractor's health and safety advisor, or equivalent responsible person on-site.
Emergency Procedures	Appropriate emergency procedures shall be established by the appointed contractor, before the commencement of earthworks on-site, including the location of first aid kits, emergency telephones and medical emergency numbers.
Training	As required by the HSWA (2015), all staff should be adequately trained for the tasks involved during the redevelopment works. This training should be provided to the appointed primary contractor for all components of the SSSP, including this SMP / RAP.
Personal Protective Equipment (PPE)	Workers coming into contact with the soil may be exposed to contaminants via the incidental ingestion of soil, skin contact with contaminated soil or inhalation of dust. Use of PPE and behavioural practices presented below will minimise the effects of potential contamination exposures: - If visible dust is present, disposable P2 masks and safety glasses shall be worn. - Hands are to be washed in a dedicated area prior to eating, drinking or smoking. As required by the HSWA (2015), a PCBU should provide all staff with adequate personal protective equipment (PPE) required for the works. Based on the nature of the proposed earthworks, the likelihood and significance of exposure of potential contamination is low, however, should conditions change, the workplace Person Conducting a Business or Undertaking (PCBU) must make sure that exposure to contamination is eliminated, so far as is reasonably practicable. If it is not reasonably practicable, they must minimise exposure so far as is reasonably practicable.

11.2 Site Set Up and Management

Intrusive works, soil handling and soil disturbance activities in the areas containing impacted soils at the site shall be controlled in accordance with the guidance provided in this SMP / RAP. These activities include, but are not limited to:

- Temporary storage of contaminated and / or potentially contaminated material.
- Loading and transport of material.
- Appropriate off-site disposal of contaminated and surplus materials.
- Equipment decontamination.

The controls in this document are based on those required for the handling of contaminated and / or potentially contaminated fill.

The site set up and management is provided in Table 9.

Table 9: Site Set-up and Management

SITE SET-UP	
Boundary Control	The areas of the site where earthworks are being undertaken will be fenced to restrict entry to authorised workers and prevent access by the general public – appropriate warning signs (e.g. “Restricted entry”, “Danger open excavations”) shall be erected. Pre-site work discussions shall be held to determine the setting up of clean and dirty areas. During earthworks, the contractor shall be responsible for constructing and maintaining the silt protection, stabilised entrance, and vehicle cleaning facilities. The contractor shall undertake inspections of stormwater control measures on a daily basis and after significant rainfall events.
Sediment Control	Appropriate sediment control measures shall be implemented to minimise sediment runoff from the site, especially towards the Schedule F1 waterway to the north of the site. Minimum controls shall include: - Stabilised site entrance – shall be established by the contractor to minimise the movement of soil off-site. - Silt protection comprising a Super Silt fence shall be placed around the perimeter of the works area by the contractor where there is a potential for runoff and particularly to the north of the earthworks area to protect the stream as shown in the earthworks plans. Appropriate sediment control measures, shall be implemented to conform with the GWRC’s Erosion and Sediment Control Guidelines for the Wellington Region (2021) to minimise sediment runoff from the site.
Noise	Construction noise should be managed through the construction noise controls set out in NZS6803:1999 and adoption of a best practical option approach in accordance with Section 16 of the Act to ensure that the emission of noise from the site does not exceed a reasonable level.
SITE MANAGEMENT	
Traffic / Machinery	It is important not to track potentially impacted soils around the site and off-site. Any machinery used on-site shall be cleaned of loose soil prior to leaving site. Machinery cleaning shall be conducted in a dedicated ‘wash down’ area adjacent to the site boundary or other designated ‘clean area’ (e.g. paved area or area of imported rock / soil) so once loose soil has been removed, the cleaned item can be moved to the clean area. Any wastewater generated should not be discharged off-site and should be allowed to drain back into the site.

SITE MANAGEMENT (continued)	
Dust	Dust production is anticipated to be minimal however, generation of dust shall be appropriately managed by employing standard dust suppression techniques that comply with Council guidance and regulations. These shall include: • Limit vehicle access onto the excavated areas. • Limit drop heights on excavator buckets when depositing soil. • Use a water truck or portable water sprays to dampen surface soil. • Stockpiling soil should be avoided, but where necessary, if dust migration from stockpiles cannot be controlled through wetting during the workday (e.g. during times of high wind), the stockpiles shall be covered (e.g. with plastic). • Use wind screens or avoid work during windy conditions. When utilising water to control dust, the appointed earthworks contractor shall ensure that: • Water is sprayed on using standard pressure (not high pressure) and the volume of water used for dust suppression does not cause surface ponding or run-off. • The application does not cause surface run-off that would discharge into natural water bodies, stormwater drains or across property boundaries. • The application of water does not induce soil erosion. Any visible dust, along with the prevailing weather conditions, shall be recorded in the site logbook by the contractor.
Odour	In the unlikely event that the excavated material is odorous, odour control measures shall be put in place. This would include covering the material with cleanfill, a polythene cover or instituting a deodoriser system. ENGEO should be contacted to advise whether any additional management or analysis is required.

SITE MANAGEMENT (continued)	
Groundwater and Stormwater	If encountered, groundwater shall be managed in the same manner as stormwater. Minimum controls shall include: • Sediment controls shall be placed in or around stormwater drains receiving runoff on / near the site. • Stormwater must be directed away from the stream. • Disposal via ground soakage during the works. Any perched groundwater or surface water encountered within the excavation area <u>requiring removal</u> shall be considered potentially contaminated, and shall either: • Be disposed of by a licensed liquid waste contractor. • Be disposed of into local utilities (e.g. the stormwater or wastewater system), providing the relevant permits are obtained. • Discharged to the stormwater system or surface waters providing testing demonstrates compliance with the Australian and New Zealand Environment Conservation Council (ANZECC) Guidelines for Fresh and marine Water Quality (2000) for the protection of 80 percent of species, except for benzene where 95 percent of species shall apply. Truck wash water shall be managed in the same manner as stormwater.

The management of materials is provided in Table 10.

Table 10: Materials Management

MATERIALS MANAGEMENT	
Stockpiling	Stockpiling should be avoided, but if temporary stockpiling of material is necessary, the material shall be banded and covered if left overnight.
Off-site Disposal	Any excess soil and fill material from the site, as well as used disposable PPE, shall be transported to an appropriate disposal site. Results of the soil testing shall be provided to the chosen facility to confirm acceptance. Landfill weighbridge receipts shall be obtained as evidence of disposal. The following general procedures shall be followed when transporting material off-site: • Trucks shall be loaded within the site where runoff and possible spills during loading will be controlled and contained. • Trucks shall have their loads covered by tarpaulins during off-site transport of material. These shall be secured before leaving site.
Importation of Material	If fill is to be imported to the site, it shall meet the cleanfill definition as outlined in the publication "Technical Guidelines for Disposal to Land" (Waste Management Institute New Zealand (WasteMINZ) 2016) as: <i>"Virgin excavated natural materials (VENM) such as clay, soil and rock that are free of:</i> • <i>Combustible, putrescible, degradable or leachable components;</i> • <i>Hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown;</i> • <i>Products or materials derived from hazardous waste treatment, stabilisation or disposal practices;</i> • <i>Materials such as medical and veterinary waste, asbestos or radioactive substances that may present a risk to human health if excavated;</i> • <i>Contaminated soil and other contaminated materials; and</i> • <i>Liquid waste.</i> <i>When discharged to the environment, cleanfill material will not have a detectable effect relative to the background."</i> Evidence of the type and quantity of imported fill shall be recorded.

11.3 Site Record Keeping

A site logbook shall be maintained on-site and shall contain the following information:

- Weather conditions.
- Site conditions.
- Progress / problems associated with the site work.
- Numbers of personnel on-site and use of personal protective equipment.
- Monitoring data.
- Safety, health and environmental discussions and safety non-compliance issues.
- Third party complaints lodged regarding the works, as well as all corrective measures implemented to limit such complaints from reoccurring.
- All incidents and near misses.
- Any other relevant information.

11.3.1 Spoil and Fill Monitoring

As described in Table 10, all unwanted soil generated from the works shall be disposed of to a suitable landfill licensed to accept materials with contaminants, if present. Any excavated natural soils could go to cleanfill provided additional testing is undertaken.

The following records shall be maintained:

- Waste disposal acceptance receipts, and associated laboratory analysis (if any).
- Excavation records including vertical and lateral extent.
- Sample locations and laboratory analysis of soil and water.
- Evidence to certify that all imported fill is either sourced directly from a licensed quarry or meets the criteria for Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003).

It is anticipated that all contaminated and potentially contaminated materials are to be removed and therefore any potential pathways between the source and receptor of any potential contamination that may be present will be removed by removal of the source.

11.3.2 Health Monitoring

No health monitoring, in addition to that undertaken as a general work practice, is anticipated to be required for these works.

12 Contingency Measures

Should any unanticipated contaminated material be uncovered during any intrusive works, works shall stop in that area and a SQEP shall be consulted to assess the potential risk and advise on what measures should be taken to manage the soils in that area.

In the unlikely event that unsatisfactory dust emissions emanate from the site on a sustained basis or complaints are received in relation to the works, mitigation of the adverse effects shall be applied in accordance with the hierarchy of control described in the Health and Safety at Work Act (MoBIE, 2015) - eliminate or minimise the hazard.

If the emission or discharges persist, professional advice shall be sought in order to define appropriate control measures. It is recommended that consultation with appropriate Council representatives also be undertaken prior to recommencing works.

As the discharge of stormwater from the site shall not be permitted, mitigation of unexpected discharges will be required to be immediately implemented. Controls shall be put into place under the Stormwater and Sediment Plan to ensure stormwater is diverted to an appropriate location on-site, such as an excavated area or stormwater catch pits. If these controls fail, a vacuum truck shall be called to site immediately so that the discharge of stormwater from site is eliminated

12.1 Unanticipated Conditions

Based on the findings of previous investigations the key contaminant on-site is arsenic. The presence of higher concentrations of contamination and / or other contaminants, albeit likely localised, cannot be excluded at this time. Typical indicators of contamination include but are not limited to:

- Buried waste (for example drums or tanks with unknown liquid).
- Odour (petroleum hydrocarbons, oil).
- Discoloured soil (black, purple, or green staining most common).
- Asbestos containing materials (ACM), as fragments are visible with the naked eye.
- Uncontrolled fill material.

Examples of the typical indicators are shown in Table 11 below.

Table 11: Examples of Potential Contamination

 Buried Waste Look out for: • Visual indicators of waste • Staining of surrounding soils • May be mixed with imported gravels	 Uncontrolled Fill Material Look out for: • Visual indicators of fill material • Staining of surrounding soils
 Asbestos Containing Material Look out for: • Visual indicators of Asbestos Containing Material • May be mixed in with other waste and / or fill material • May be intact sheets or broken into smaller pieces	 Hydrocarbon Staining Look out for: • Visual indicators of contamination • Staining of surrounding soils • Hydrocarbon odour in soils and water • Visible hydrocarbon sheen on water

13 Completion Reporting

A Summary of Works report may be required by Council as a condition of consent. This report is prepared following site development activities to confirm controls in the SMP / RAP were adhered to and provides information regarding any unexpected contamination encountered, disposal of material off-site and importation of material.

During the works it is recommended that a SQEP will visit the site to observe site activities and confirm that the works are being performed in accordance with this SMP / RAP.

Site Validation Report

Once the soil has been excavated and disposed of, samples will be taken from the remaining soil to ensure the concentrations are below residential human health criteria. A site validation report (SVR) will be prepared or reviewed by a SQEP in accordance with MfE guidelines and issued to the Council's Team Leader Resource Consents within three months following completion of any remedial works. The SVR will outline the following:

- Details of any testing undertaken for the soil remaining on-site.
- Documentation relating to the importation of cleanfill.
- Documentation relating to the disposal of contaminated soil / fill and water.
- Results of any additional monitoring, if undertaken, during the redevelopment.
- Results of additional sampling and testing performed.

All documents would be prepared in general accordance with the MfE *Contaminated Land Management Guidance No. 1* and signed off by a SQEP.

14 References

GNS. (2001). *Institute of Geological and Nuclear Sciences Ltd.* 2001. 1:250,000 Geological Map 10, Wellington.

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15 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Classic Developments NZ Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (04) 472 0820 if you require any further information.

Report prepared by



Bridget Derham

HSNO Scientist



Gabriela Staehle

Environmental Engineer

Report reviewed by



Karen Jones, CEnvP

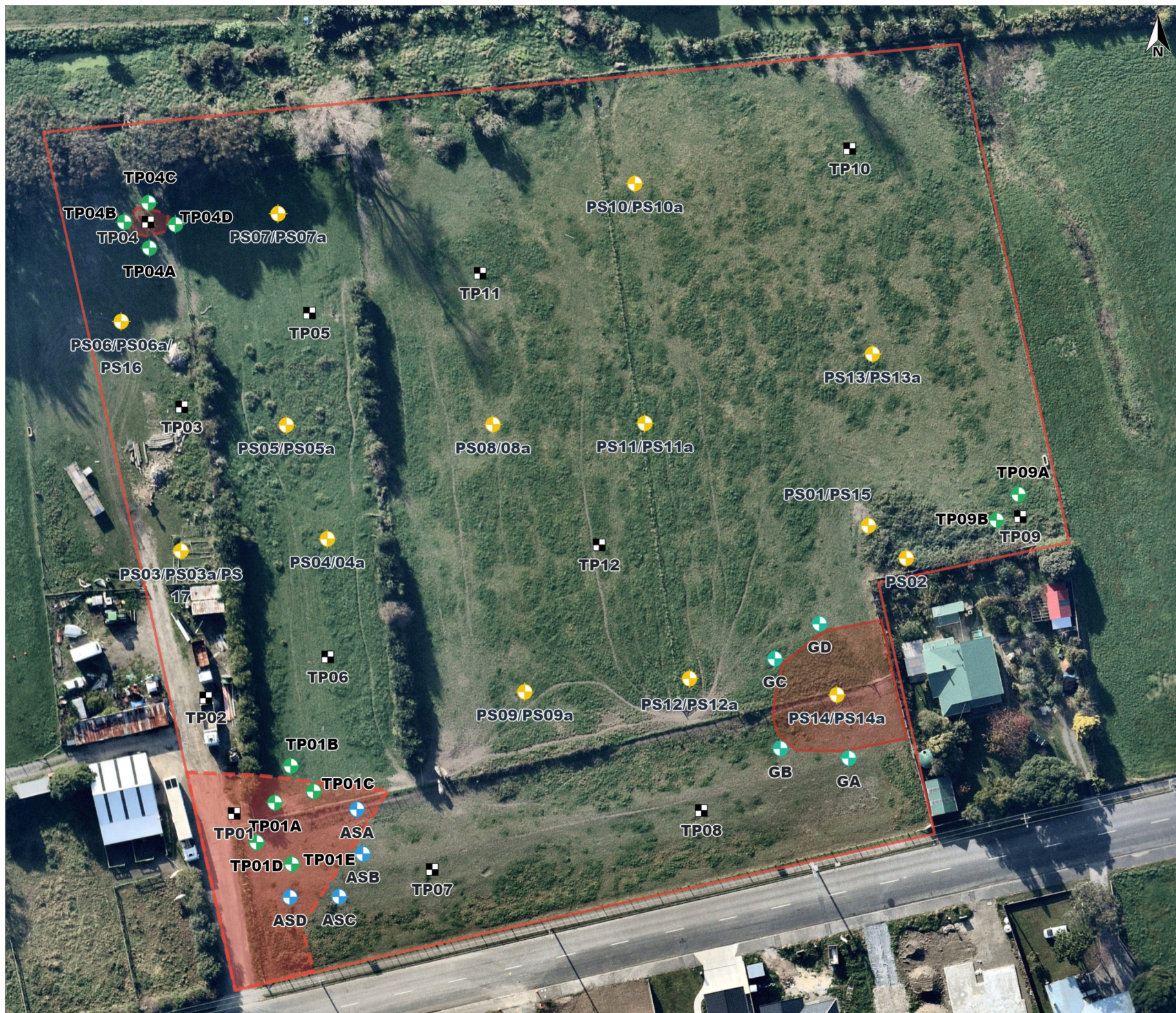
Principal Engineering Geologist



Dave Robotham, CEnvP (SC)

Principal Environmental Consultant

FIGURES



Legend

- Test Pit Location - 15 April 2021
- Sample Location - 11 May 2021
- Sample Location - 16 February 2022
- Sample Location - March & April 2022
- Sample Location - 26 May 2022
- Site Boundary
- Remediation Area

0 10 m 20 m
© Nearmaps

ENGEO

Produced by Datanest.earth

Title: Site Information / Remediation Area

Client: Classic Developments NZ Ltd

Project: 234 Rangiru Road

Drawn: CM

Figure No: 1

Date: 15-04-2021

Checked: N/A

Size: A4

Proj No: 18634.000.001

Scale: 1:964

Version: 1

APPENDIX 1:

Agreement and Acknowledgement Sheet

Agreement and Acknowledgement Sheet

NAME	COMPANY	DATE	SIGNATURE

APPENDIX 2:

Previous Investigation Findings Summary

ENGEO – Combined Preliminary and Detailed Environmental Site Investigation Report - May 2021

ENGEO Ltd was requested by Classic Developments Ltd to undertake a Combined Preliminary and Detailed Environmental Site Investigation (PSI / DSI) at 234 Rangiora Road, the location of a proposed subdivision in Ōtaki.

Assessment of the information collected as part of this investigation identified two HAIL categories that applies to this site:

- **HAIL ID A10:** Chemical manufacture, application and bulk storage – persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds.
- **HAIL ID I:** Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

ENGEO's initial site investigation works comprised sampling and testing soil from 12 test pits. The samples were analysed for a range of analytes including boron, heavy metals including mercury, OCP, PAH, PCP, SQA, SVOC and TPH. Additional sampling to delineate the areas where exceedances of arsenic were noted for residential 10% produce human health criteria were undertaken from 11 locations and the samples were analysed for heavy metals including mercury. The analytical results can be summarised as follows:

- Arsenic exceeded residential 10% produce human health criteria at TP01, TP01A, TP01C, TP01D, TP01E and TP04. One result was noted to equal the human health criteria for residential 10% produce in TP09 at 0.1 m.
- Exceedances of the Wellington region background criteria were noted in all samples for chromium, copper, and nickel. Multiple exceedances were also noted for arsenic, cadmium, mercury and zinc.
- Exceedances of regional background concentrations were recorded for anthracene, benzo[a]pyrene, fluoranthene, naphthalene, phenanthrene and pyrene. In some cases, PAH concentrations were not detected above the LOD, but were still reported as exceeding the regional background criteria because the laboratory LOD is higher than the regional background criteria.
- Copper exceeded landfill Class A disposal criteria in TP01 D.

The results indicate that remediation or management is required due to the presence of arsenic in exceedance of Residential 10% produce human health criteria. The two areas requiring remediation are depicted on Figure 1. Prior to any earthworks being undertaken, a Remedial Action Plan (RAP) / Site Management Plan (SMP) is needed to protect human health and the environment during construction works and for future use.

The nature of the proposed development is not currently known i.e. whether materials are to remain on-site or are to be removed. If remediation of the site by removing all contaminated soils is preferred, validation sampling should be conducted after contamination removal and a validation report should be prepared. Alternatively, contamination may be managed on-site if an acceptable barrier is installed to prevent future residents from encountering potentially contaminated soil. If contamination remains on-site, an Ongoing Site Management Plan will be required.

Landfill Acceptance Criteria

Landfill Class A criteria was exceeded for copper at TP01 D, indicating that additional TCLP analysis of this sample may be required prior to disposal of the material. Acceptance of contaminated material is at the discretion of the landfill manager.

Consent Requirements

Resource consent under the NES may be required for the removal of any contaminated materials from site and disturbance of soil depending on volumes to be disturbed / removed.

APPENDIX 3: Resource Management Act

8 Permitted Activities

Removing or replacing fuel storage system

- (1) Removing or replacing a fuel storage system is a permitted activity while the following requirements are met:
- (a) the activity must be done in accordance with the current edition of *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*, Wellington, Ministry for the Environment:
 - (b) the territorial authority of the district where the system is located must be notified of—
 - (i) the place where the activity is to be done:
 - (ii) the dates on which it is intended that the activity begin and end:
 - (iii) the facility at which it is intended that soil taken away in the course of the activity be disposed of:
 - (c) notification under paragraph (b) must be done no sooner than 1 month and no later than 1 week before the activity begins:
 - (d) the volume of soil disturbed must be no more than 30 m³ for each tank in the system:
 - (e) the volume of soil taken away in the course of the activity must be no more than 30 m³ for each tank in the system:
 - (f) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:
 - (g) the duration of the activity must be no longer than 2 months:
 - (h) the results of the investigation of the piece of land required by the guidelines described in paragraph (a) must be reported to the territorial authority within 3 months after the activity ends.

Sampling soil

- (2) Sampling the soil of the piece of land is a permitted activity while the following requirements are met:
- (a) controls to minimise the exposure of humans to mobilised contaminants must—
 - (i) be in place when the activity begins:
 - (ii) be effective while the activity is done:
 - (iii) be effective until the soil is reinstated to an erosion-resistant state:
 - (b) the soil must be reinstated to an erosion-resistant state within 1 month after the end of the course of sampling for which the activity was done:
 - (c) soil must not be taken away in the course of the activity except as samples taken for the purpose of laboratory analysis:
 - (d) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

Disturbing soil

- (3) Disturbing the soil of the piece of land is a permitted activity while the following requirements are met:
- (a) controls to minimise the exposure of humans to mobilised contaminants must—
 - (i) be in place when the activity begins:
 - (ii) be effective while the activity is done:
 - (iii) be effective until the soil is reinstated to an erosion-resistant state:
 - (b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:
 - (c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m³ per 500 m²:
 - (d) soil must not be taken away in the course of the activity, except that,—
 - (i) for the purpose of laboratory analysis, any amount of soil may be taken away as samples:
 - (ii) for all other purposes combined, a maximum of 5 m³ per 500 m² of soil may be taken away per year:
 - (e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:
 - (f) the duration of the activity must be no longer than 2 months:
 - (g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

Subdividing or changing use

- (4) Subdividing land or changing the use of the piece of land is a permitted activity while the following requirements are met:
- (a) a preliminary site investigation of the land or piece of land must exist:
 - (b) the report on the preliminary site investigation must state that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land:
 - (c) the report must be accompanied by a relevant site plan to which the report is referenced:
 - (d) the consent authority must have the report and the plan.

Consequence if requirement not met

- (5) If a requirement described in any of subclauses (1) to (3) is not met, the activity is a controlled activity under [regulation 9](#) while it meets the requirements in regulation 9(1).
- (6) If a requirement described in subclause (4) is not met, the activity is a controlled activity under [regulation 9](#) while it meets the requirements in regulation 9(3).

9 Controlled Activities

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

- (1) If a requirement described in any of [regulation 8\(1\) to \(3\)](#) is not met, the activity is a controlled activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
 - (b) the report on the detailed site investigation must state that the soil contamination does not exceed the applicable standard in [regulation 7](#):
 - (c) the consent authority must have the report:
 - (d) conditions arising from the application of subclause (2), if there are any, must be complied with.
- (2) The matters over which control is reserved are as follows:
- (a) the adequacy of the detailed site investigation, including—
 - (i) site sampling:
 - (ii) laboratory analysis:
 - (iii) risk assessment:
 - (b) how the activity must be—
 - (i) managed, which may include the requirement of a site management plan:
 - (ii) monitored:
 - (iii) reported on:
 - (c) the transport, disposal, and tracking of soil and other materials taken away in the course of the activity:
 - (d) the timing and nature of the review of the conditions in the resource consent:
 - (e) the duration of the resource consent.

Subdividing or changing use

- (3) If a requirement described in [regulation 8\(4\)](#) is not met, the activity is a controlled activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
 - (b) the report on the detailed site investigation must state that the soil contamination does not exceed the applicable standard in [regulation 7](#):
 - (c) the consent authority must have the report:
 - (d) conditions arising from the application of subclause (4), if there are any, must be complied with.
- (4) The matter over which control is reserved is the adequacy of the detailed site investigation, including—
- (a) site sampling:
 - (b) laboratory analysis:
 - (c) risk assessment.

No public notification of application for resource consent

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

Consequence if requirement not met

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

10 Restricted Discretionary Activities

- (1) This regulation applies to an activity described in any of [regulation 5\(2\) to \(6\)](#) on a piece of land described in regulation 5(7) or (8) that is not a permitted activity or a controlled activity.
- (2) The activity is a restricted discretionary activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
 - (b) the report on the detailed site investigation must state that the soil contamination exceeds the applicable standard in [regulation 7](#):
 - (c) the consent authority must have the report:
 - (d) conditions arising from the application of subclause (3), if there are any, must be complied with.
- (3) The matters over which discretion is restricted are as follows:
- (a) the adequacy of the detailed site investigation, including—
 - (i) site sampling:
 - (ii) laboratory analysis:
 - (iii) risk assessment:
 - (b) the suitability of the piece of land for the proposed activity, given the amount and kind of soil contamination:
 - (c) the approach to the remediation or ongoing management of the piece of land, including—
 - (i) the remediation or management methods to address the risk posed by the contaminants to human health:
 - (ii) the timing of the remediation:
 - (iii) the standard of the remediation on completion:
 - (iv) the mitigation methods to address the risk posed by the contaminants to human health:
 - (v) the mitigation measures for the piece of land, including the frequency and location of monitoring of specified contaminants:
 - (d) the adequacy of the site management plan or the site validation report or both, as applicable:
 - (e) the transport, disposal, and tracking of soil and other materials taken away in the course of the activity:
 - (f) the requirement for and conditions of a financial bond:
 - (g) the timing and nature of the review of the conditions in the resource consent:
 - (h) the duration of the resource consent.

Consequence if requirement not met

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

APPENDIX 4:

Proposed Natural Resources Plan

Rule R55: Discharges from contaminated land

The discharge of a contaminants from contaminated land where a contaminant may enter water is a permitted activity provided the following conditions are met:

(a) a detailed site investigation has been undertaken, reported and provided to Wellington Regional Council in accordance with Rule R54, and

(b) the results of the detailed site investigation indicates that the discharge does not pose unacceptable risks to human health or the environment – on-site or off-site, or

(c) the discharge from SLUR Category III land or SLUR Category IV land does not, or is not likely to, result in:

(i) water quality exceeding the maximum acceptable value (MAV) in the Drinking-Water Standards New Zealand 2005 (Revised 2008) or 50% of the MAV in a community drinking water supply protection area shown on Maps 26, 27a, 27b or 27c at the following locations:

1. at the property boundary, or within 50m from the source of the discharge, whichever is the lesser distance, or

2. in an existing bore within the property boundary or within 50m from the source of the discharge, whichever is the lesser distance, used to abstract water for any use other than water quality monitoring,

(ii) water quality in a surface water body within the property boundary or within 50m from the source of the discharge, whichever is the lesser distance, exceeding a value in Schedule W for the protection of 95% of species.

APPENDIX 5:

PSI / DSI / Delineation Sampling Laboratory Results



Certificate of Analysis

Page 1 of 3

Client:	Engeo Limited	Lab No:	2586321	A2Pv1
Contact:	Roz Cox	Date Received:	16-Apr-2021	
	C/- Engeo Limited	Date Reported:	20-Apr-2021	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:	18634.000.001	
		Add. Client Ref:	Sampled: 15/04/21	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP03 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	
Lab Number:	2586321.1	2586321.2	2586321.3	2586321.4	
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
As Received Weight	g 936.4	g 977.0	g 764.4	g 841.4	-
Dry Weight	g 811.6	g 862.5	g 566.4	g 693.0	-
Moisture	% 13	% 12	% 26	% 18	-
Sample Fraction >10mm*	g dry wt 75.7	g dry wt 154.4	g dry wt 34.2	g dry wt < 0.1	-
Sample Fraction <10mm to >2mm*	g dry wt 361.8	g dry wt 250.7	g dry wt 123.6	g dry wt 72.4	-
Sample Fraction <2mm*	g dry wt 374.1	g dry wt 456.9	g dry wt 408.7	g dry wt 621.2	-
<2mm Subsample Weight*	g dry wt 51.3	g dry wt 50.2	g dry wt 52.8	g dry wt 51.2	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	-



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.

Glossary of Terms

- Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
 - Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
 - ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
 - ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
 - Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
 - Trace - Trace levels of asbestos, as defined by AS4964-2004.
- For further details, please contact the Asbestos Team.

Please refer to the **BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil**.
<https://www.branz.co.nz/asbestos>

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Analyst's Comments
Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) give 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 Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-4
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-4
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-4
Sample Fraction >10mm*	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Sample Fraction <10mm to >2mm*	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Sample Fraction <2mm*	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-4
Description of Asbestos Form	Description of asbestos form and/or shape if present. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	-	1-4
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4
Weight of Asbestos as Fibrous Asbestos (Friable)*	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4

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

Testing was completed on 20-Apr-2021. 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.



Keith Benson HNC Chem
Laboratory Technician - Asbestos



Quote No

Primary Contact · Roz Cox

Submitted By Calum MacRae

Client Name ENGEO

Address Level 18 Plimmer Towers, 2-6 Gilmer Terrace

Postcode 6011

Phone

Mobile

Email

Charge To 18634.000.001

Client Reference

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

ADDITIONAL INFORMATION

SQA = Semi-Quantitative Asbestos, H&C = Hold & Cold

ANALYSIS REQUEST

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

Job No:

Date Recv: 16-Apr-21 09:13

258 6321

T 0508 HILL LAB (44 555 22)

T +64 7 858 2000

E mail@hill-labs.co.nz

W www.hill-laboratories.com

Received by: Kelsey Rohloff



3125863219

CHAIN OF CUSTODY RECORD

Sent to

Hill Laboratories

Date & Time:

Name:

☐ Tick if you require COC
to be emailed back

Signature:

Received at

Hill Laboratories

Date & Time:

Name:

Signature:

Condition

☐ Room Temp☐ Chilled☐ Frozen

Temp:

8.3°C

☐ Sample and Analysis details checked

Signature:

Priority

☐ Low☒ Normal☐ High
☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	TP01 0-0.2	15/04/21	-	SOIL	SQA, heavy metals, TPH, PCP
2	TP01 0.6	15/04/21	-	SOIL	H&C
3	TP02 0-0.2	15/04/21	-	SOIL	SQA, heavy metals, TPH, PAH
4	TP02 0.8	15/04/21	-	SOIL	SVOC
5	TP03 0.1	15/04/21	-	SOIL	heavy metals, TPH, boron, PCP, SQA
6	TP03 0.5	15/04/21	-	SOIL	H&C
7	TP04 0.2	15/04/21	-	SOIL	heavy metals, PAH, OCP
8	TP04 1.0	15/04/21	-	SOIL	H&C
9	TP05 0.1	15/04/21	-	SOIL	heavy metals, PCP
10	TP06 0.1	15/04/21	-	SOIL	OCP
11	TP06 2.0	15/04/21	-	SOIL	SVOC
12	TP07 0.1	15/04/21	-	SOIL	OCP

Continued on next page

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
13	TP07 2.1	15/04/21	-	SOIL	heavy metals
14	TP08 0.1	15/04/21	-	SOIL	boron
15	TP08 0.7	15/04/21	-	SOIL	H&C
16	TP09 0.1	15/04/21	-	SOIL	SQA, heavy metals, PAH, SVOC
17	TP09 1.2	15/04/21	-	SOIL	heavy metals, SVOC
18	TP10 0.1	15/04/21	-	SOIL	heavy metals
19	TP11 0.1	15/04/21	-	SOIL	boron
20	TP12 0.1	15/04/21	-	SOIL	OCP
21	TP12 0.4	15/04/21	-	SOIL	heavy metals
22					
23	ADD 1 MORE SQA				
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					



Certificate of Analysis

Page 1 of 12

Client:	Engeo Limited	Lab No:	2586323	SPv3
Contact:	Roz Cox	Date Received:	16-Apr-2021	
	C/- Engeo Limited	Date Reported:	14-May-2021	(Amended)
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:	18634.000.001	
		Client Reference:	18634.000.001	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Individual Tests						
Dry Matter	g/100g as rcvd	86	84	78	72	80
Total Recoverable Boron	mg/kg dry wt	-	-	-	< 20	-
Total Recoverable Mercury	mg/kg dry wt	0.93	0.26	-	0.13	0.16
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	58	15	-	18	26
Total Recoverable Cadmium	mg/kg dry wt	0.41	0.24	-	0.14	0.18
Total Recoverable Chromium	mg/kg dry wt	18	18	-	16	19
Total Recoverable Copper	mg/kg dry wt	77	36	-	24	42
Total Recoverable Lead	mg/kg dry wt	106	41	-	32	35
Total Recoverable Nickel	mg/kg dry wt	17	16	-	14	18
Total Recoverable Zinc	mg/kg dry wt	141	121	-	103	100
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	-	< 0.013
alpha-BHC	mg/kg dry wt	-	-	-	-	< 0.013
beta-BHC	mg/kg dry wt	-	-	-	-	< 0.013
delta-BHC	mg/kg dry wt	-	-	-	-	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	-	< 0.013
cis-Chlordane	mg/kg dry wt	-	-	-	-	< 0.013
trans-Chlordane	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDE	mg/kg dry wt	-	-	-	-	0.021
2,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.013
Total DDT Isomers	mg/kg dry wt	-	-	-	-	< 0.08
Dieldrin	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan I	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan II	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan sulphate	mg/kg dry wt	-	-	-	-	< 0.013
Endrin	mg/kg dry wt	-	-	-	-	< 0.013
Endrin aldehyde	mg/kg dry wt	-	-	-	-	< 0.013
Endrin ketone	mg/kg dry wt	-	-	-	-	< 0.013
Heptachlor	mg/kg dry wt	-	-	-	-	< 0.013
Heptachlor epoxide	mg/kg dry wt	-	-	-	-	< 0.013
Hexachlorobenzene	mg/kg dry wt	-	-	-	-	< 0.013
Methoxychlor	mg/kg dry wt	-	-	-	-	< 0.013



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Sample Type: Soil						
Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	0.6	-	-	< 0.3
1-Methylnaphthalene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
2-Methylnaphthalene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Acenaphthylene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Acenaphthene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Anthracene	mg/kg dry wt	-	0.022	-	-	< 0.013
Benzo[a]anthracene	mg/kg dry wt	-	0.056	-	-	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.037	-	-	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	0.06	-	-	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	0.06	-	-	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.048	-	-	< 0.013
Benzo[e]pyrene	mg/kg dry wt	-	0.024	-	-	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.027	-	-	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	-	0.020	-	-	< 0.013
Chrysene	mg/kg dry wt	-	0.047	-	-	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Fluoranthene	mg/kg dry wt	-	0.095	-	-	< 0.013
Fluorene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.027	-	-	< 0.013
Naphthalene	mg/kg dry wt	-	< 0.06	-	-	< 0.07
Perylene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Phenanthrene	mg/kg dry wt	-	0.081	-	-	< 0.013
Pyrene	mg/kg dry wt	-	0.096	-	-	< 0.013
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	-	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	-	< 0.05	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-

Sample Type: Soil						
Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	-	< 9	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	< 20	-
C15 - C36	mg/kg dry wt	127	< 40	-	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	131	< 70	-	< 70	-
Sample Name:		TP05 0.1 15-Apr-2021	TP06 0.1 15-Apr-2021	TP06 2.0 15-Apr-2021	TP07 0.1 15-Apr-2021	TP07 2.1 15-Apr-2021
Lab Number:		2586323.9	2586323.10	2586323.11	2586323.12	2586323.13
Individual Tests						
Dry Matter	g/100g as rcvd	79	80	83	82	-
Total Recoverable Mercury	mg/kg dry wt	0.18	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	18	-	-	-	2
Total Recoverable Cadmium	mg/kg dry wt	0.12	-	-	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	17	-	-	-	16
Total Recoverable Copper	mg/kg dry wt	36	-	-	-	13
Total Recoverable Lead	mg/kg dry wt	31	-	-	-	14.9
Total Recoverable Nickel	mg/kg dry wt	18	-	-	-	17
Total Recoverable Zinc	mg/kg dry wt	98	-	-	-	68
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	12	-	8	-
Total Recoverable Cadmium	mg/kg dry wt	-	0.14	-	0.19	-
Total Recoverable Chromium	mg/kg dry wt	-	17	-	18	-
Total Recoverable Copper	mg/kg dry wt	-	30	-	48	-
Total Recoverable Lead	mg/kg dry wt	-	26	-	26	-
Total Recoverable Mercury	mg/kg dry wt	-	0.14	-	0.13	-
Total Recoverable Nickel	mg/kg dry wt	-	16	-	16	-
Total Recoverable Zinc	mg/kg dry wt	-	82	-	93	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
4,4'-DDE	mg/kg dry wt	0.028	0.060	-	0.102	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
4,4'-DDT	mg/kg dry wt	0.025	0.040	-	0.057	-
Total DDT Isomers	mg/kg dry wt	< 0.08	0.10	-	0.16	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endrin	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-

Sample Type: Soil						
Sample Name:		TP05 0.1 15-Apr-2021	TP06 0.1 15-Apr-2021	TP06 2.0 15-Apr-2021	TP07 0.1 15-Apr-2021	TP07 2.1 15-Apr-2021
Lab Number:		2586323.9	2586323.10	2586323.11	2586323.12	2586323.13
Organochlorine Pesticides Screening in Soil						
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	-	-	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		TP05 0.1 15-Apr-2021	TP06 0.1 15-Apr-2021	TP06 2.0 15-Apr-2021	TP07 0.1 15-Apr-2021	TP07 2.1 15-Apr-2021
Lab Number:		2586323.9	2586323.10	2586323.11	2586323.12	2586323.13
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Individual Tests						
Dry Matter	g/100g as rcvd	-	79	89	84	77
Total Recoverable Boron	mg/kg dry wt	< 20	-	-	-	< 20
Total Recoverable Mercury	mg/kg dry wt	-	0.13	0.14	0.20	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	20	3	19	-
Total Recoverable Cadmium	mg/kg dry wt	-	0.27	< 0.10	0.24	-
Total Recoverable Chromium	mg/kg dry wt	-	18	16	21	-
Total Recoverable Copper	mg/kg dry wt	-	50	11	31	-
Total Recoverable Lead	mg/kg dry wt	-	33	18.9	32	-
Total Recoverable Nickel	mg/kg dry wt	-	16	15	19	-
Total Recoverable Zinc	mg/kg dry wt	-	117	62	99	-

Sample Type: Soil						
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	9	-	-	-	10
Total Recoverable Cadmium	mg/kg dry wt	0.23	-	-	-	0.15
Total Recoverable Chromium	mg/kg dry wt	19	-	-	-	19
Total Recoverable Copper	mg/kg dry wt	60	-	-	-	33
Total Recoverable Lead	mg/kg dry wt	29	-	-	-	29
Total Recoverable Mercury	mg/kg dry wt	0.11	-	-	-	0.17
Total Recoverable Nickel	mg/kg dry wt	17	-	-	-	18
Total Recoverable Zinc	mg/kg dry wt	96	-	-	-	91
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
alpha-BHC	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
beta-BHC	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
delta-BHC	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
cis-Chlordane	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
trans-Chlordane	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
2,4'-DDD	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
4,4'-DDD	mg/kg dry wt	-	0.014	-	< 0.012	< 0.013
2,4'-DDE	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
4,4'-DDE	mg/kg dry wt	-	0.061	-	0.024	0.019
2,4'-DDT	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
4,4'-DDT	mg/kg dry wt	-	0.035	-	0.027	0.013
Total DDT Isomers	mg/kg dry wt	-	0.11	-	< 0.07	< 0.08
Dieldrin	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endosulfan I	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endosulfan II	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endosulfan sulphate	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endrin	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endrin aldehyde	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endrin ketone	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Heptachlor	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Heptachlor epoxide	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Hexachlorobenzene	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Methoxychlor	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	< 0.4	-	-	-
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	-	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	-	-
Acenaphthylene	mg/kg dry wt	-	< 0.013	-	-	-
Acenaphthene	mg/kg dry wt	-	< 0.013	-	-	-
Anthracene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[a]anthracene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 0.04	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 0.04	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[e]pyrene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.013	-	-	-
Chrysene	mg/kg dry wt	-	< 0.013	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	-	-	-
Fluoranthene	mg/kg dry wt	-	< 0.013	-	-	-
Fluorene	mg/kg dry wt	-	< 0.013	-	-	-

Sample Type: Soil						
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.013	-	-	-
Naphthalene	mg/kg dry wt	-	< 0.07	-	-	-
Perylene	mg/kg dry wt	-	< 0.013	-	-	-
Phenanthrene	mg/kg dry wt	-	< 0.013	-	-	-
Pyrene	mg/kg dry wt	-	< 0.013	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.7	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.7	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.7	-	-
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.7	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.7	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.7	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.7	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.7	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Sample Name:		TP12 0.1 15-Apr-2021	TP12 0.4 15-Apr-2021			
Lab Number:		2586323.20	2586323.21			
Individual Tests						
Dry Matter	g/100g as rcvd	80	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	-	0.21	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	10	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	-	0.37	-	-	-
Total Recoverable Chromium	mg/kg dry wt	-	18	-	-	-
Total Recoverable Copper	mg/kg dry wt	-	40	-	-	-
Total Recoverable Lead	mg/kg dry wt	-	30	-	-	-
Total Recoverable Nickel	mg/kg dry wt	-	17	-	-	-
Total Recoverable Zinc	mg/kg dry wt	-	88	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.17	-	-	-	-

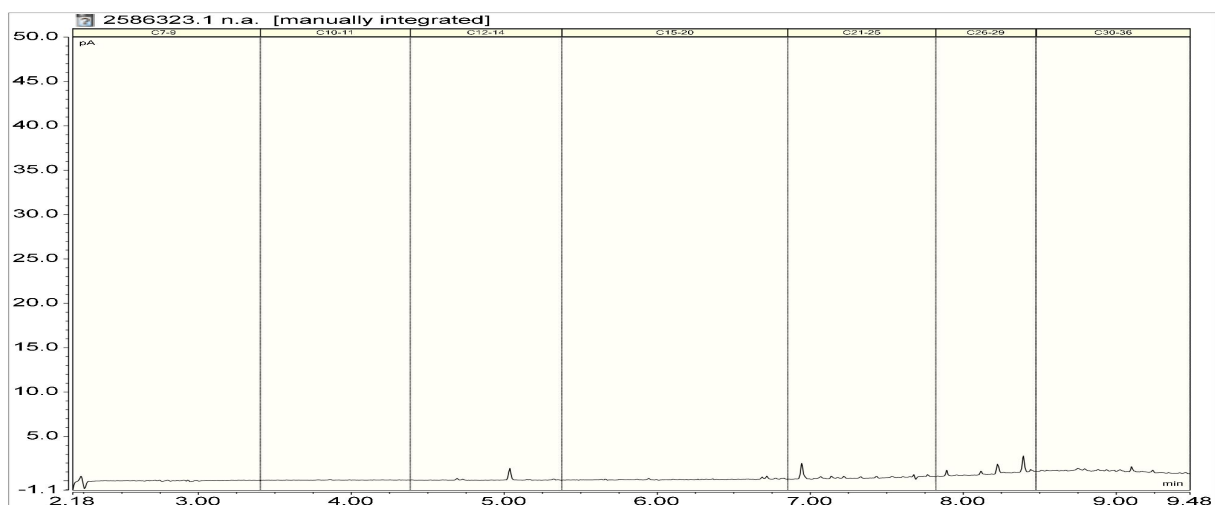
Sample Type: Soil

Sample Name:		TP12 0.1 15-Apr-2021	TP12 0.4 15-Apr-2021			
Lab Number:		2586323.20	2586323.21			
Heavy Metals with Mercury, Screen Level						
Total Recoverable Chromium	mg/kg dry wt	17	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	40	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	27	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	0.16	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	16	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	84	-	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.012	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.012	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.012	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.012	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.012	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.012	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.012	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.012	-	-	-	-
4,4'-DDE	mg/kg dry wt	0.059	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.012	-	-	-	-
4,4'-DDT	mg/kg dry wt	0.038	-	-	-	-
Total DDT Isomers	mg/kg dry wt	0.10	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.012	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.012	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.012	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.012	-	-	-	-
Endrin	mg/kg dry wt	< 0.012	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.012	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.012	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.012	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.012	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.012	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.012	-	-	-	-

2586323.1

TP01 0-0.2 15-Apr-2021

Client Chromatogram for TPH by FID



Analyst's Comments

Amended Report: This certificate of analysis replaces report '2586323-SPv2' issued on 13-May-2021 at 11:32 am.
Reason for amendment: Mercury added as per client request.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively 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 Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 5, 7, 9-10, 12-14, 16-21
Soil Prep Dry for Organics, Trace*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 5, 9
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	3, 7, 16
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 3-5, 7, 9-12, 16-20
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	5, 14, 19
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1, 3, 5, 7, 9, 16-18, 21
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	3, 7, 16
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	3, 7, 16
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	3
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, 5, 7, 9, 13, 16-18, 21
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	10, 12, 14, 19-20
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	7, 9-10, 12, 16, 18-20
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 0.05 mg/kg dry wt	7, 16
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction, LC-MS/MS analysis. Tested on dried sample. In-house.	0.010 mg/kg dry wt	1, 5, 9
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.	0.002 - 30 mg/kg dry wt	4, 11, 17
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1, 3, 5

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1, 3, 5
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1, 3, 5
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1, 3, 5

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

Testing was completed between 20-Apr-2021 and 14-May-2021. 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.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental



Certificate of Analysis

Page 1 of 2

Client:	Engeo Limited	Lab No:	2608815	SPv2
Contact:	Calum MacRae C/- Engeo Limited PO Box 25047 Wellington 6146	Date Received:	11-May-2021	
		Date Reported:	18-May-2021	(Amended)
		Quote No:	82742	
		Order No:		
		Client Reference:	234 Rangioru	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	TP01 A	TP01 B	TP01 C	TP01 D	TP01 E
	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021
Lab Number:	2608815.1	2608815.2	2608815.3	2608815.4	2608815.5

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	48	16	27	60	49
Total Recoverable Cadmium	mg/kg dry wt	0.23	0.21	0.18	0.26	0.25
Total Recoverable Chromium	mg/kg dry wt	16	17	16	16	16
Total Recoverable Copper	mg/kg dry wt	38	44	55	194	77
Total Recoverable Lead	mg/kg dry wt	35	33	34	47	34
Total Recoverable Mercury	mg/kg dry wt	0.13	0.26	0.19	0.31	0.13
Total Recoverable Nickel	mg/kg dry wt	15	16	16	15	16
Total Recoverable Zinc	mg/kg dry wt	111	105	98	128	108

Sample Name:	TP04 A	TP04 B	TP04 C	TP04 D	TP09 A
	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021
Lab Number:	2608815.6	2608815.7	2608815.8	2608815.9	2608815.14

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	16	14	19	18	19
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.13	0.17	0.16	0.33
Total Recoverable Chromium	mg/kg dry wt	15	16	18	15	16
Total Recoverable Copper	mg/kg dry wt	28	32	36	32	46
Total Recoverable Lead	mg/kg dry wt	34	38	46	28	32
Total Recoverable Mercury	mg/kg dry wt	0.14	0.12	< 0.10	0.14	0.12
Total Recoverable Nickel	mg/kg dry wt	15	15	15	14	15
Total Recoverable Zinc	mg/kg dry wt	91	101	115	89	119

Sample Name:	TP09 B				
	11-May-2021				
Lab Number:	2608815.15				

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	18	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.24	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	15	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	44	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	29	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	0.11	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	15	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	109	-	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2608815-SPv1' issued on 14-May-2021 at 11:50 am.
Reason for amendment: Metals added to 3 samples as per client.

Appendix No.1 - Chain of Custody



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.

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 Laboratories, 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%.	-	1-9, 14-15
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-9, 14-15

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

Testing was completed between 14-May-2021 and 18-May-2021. 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.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental



ANALYSIS REQUEST

Quote No

Primary Contact **C MACRAE**

Submitted By

Client Name **ENGEO**

Address

Postcode

Phone

Mobile

Email

Charge To **234 RANGIURU / ENGEO**

Client Reference

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

R J Hill Laboratories Limited
3/204 Thorndon Quay
Pipitea
Wellington 6011
New Zealand

Job No: Date Recv: **11-May-21 12:08**

260 8815

Received by: **Zandra Edwards**

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



3126088154

18.7°C

CHAIN OF CUSTODY RECORD

Sent to

Hill Laboratories

Date & Time:

Name:

☐ Tick if you require COC
to be emailed back

Signature:

Samples will be processed at a Hill Laboratories site with the appropriate
testing capability and capacity. Please inform the Laboratory if you wish
samples to be retained and analysed at the site of receipt.

Received at

Hill Laboratories

Date & Time:

Name:

Signature:

Priority

☐ Low

☒ Normal

☐ High

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

Requested Reporting Date:

Please ensure all asbestos samples are individually
double bagged upon submission to the laboratory.

ADDITIONAL INFORMATION

Hold & Cold = H & C

No.	Sample Name	Sample Material	Sample Location	Sample Date	Tests Required (if not as per Quote)
1	TP01 A	SOIL	-	11/05/21	H & C
2	TP01 B	"	-	"	"
3	TP01 C	"	-	"	"
4	TP01 D	"	-	"	"
5	TP01 E	"	-	"	"
6	TP04 A	"	-	"	"
7	TP04 B	"	-	"	"
8	TP04 C	"	-	"	"
9	TP04 D	"	-	"	"
10	TP04 E	"	-	"	"
	TP04 F	"	"	"	"
	TP04 G	"	"	"	"
	TP04 H	"	"	"	"
	TP09 A	"	"	"	"
	TP09 B	"	"	"	"
	TP09 C	"	"	"	"