Ryans Road Fast Track

Detailed Site Investigation

Carter Group Ltd

Reference: 773-CHCGE377712

7 February 2025

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1. INTRODUCTION

Carter Group Limited (CGL) engaged Tetra Tech Coffey (NZ) Limited (Tetra Tech Coffey) to conduct a detailed site investigation (DSI) to support the Ryans Road Fast Track Application at 104 Ryans Road, Yaldhurst, Christchurch.

This DSI was completed in accordance with Tetra Tech Coffey's proposal dated 13 November 2024 and reviewed by a SQEP (curriculum vitae attached in Appendix B) as required by the Ministry for Environment's (MfE's) Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS) and as per the certifying statement attached in Appendix B.

1.1 BACKGROUND

The site is proposed to be developed for industrial use. Currently, it is covered with grass and has a relatively level terrain with a gentle fall to the east. The proposed development will involve soil disturbance including cutting and filling. Topsoil stripped from the site will be replaced on lots or to landscape areas with surplus materials removed from the site to a soil disposal facility as necessary.

Previously, the site was utilised for farming activities, primarily cropping and grazing.

Due to the potential historical Hazardous Activities and Industries List (HAIL) activities, consideration of NESCS applies to the soil disturbance on pieces of land that are being / have been / are more likely than not to have been subject to certain activities or industries listed on the HAIL. This DSI is therefore required under the NESCS prior to disturbing soil and redevelopment for industrial use (change of land use).

1.2 SCOPE OF WORK

The scope of work was undertaken in general accordance with the MfE Contaminated Land Management Guidelines (CLMG) No. 5: Site Investigation and Analysis of Soils (revised 2021) and results have been reported in accordance with the MfE CLMG No.1: Reporting on Contaminated Sites in New Zealand (revised 2021). Both the above documents are incorporated by reference into the NESCS.

In summary, the scope of this DSI included the following:

- Desk study assessment to review aerial photographs.
- A site walkover to confirm ongoing site activities identified from the desk study.
- Collection of samples from site soils (refer to Drawings 1 and 2 in Appendix A) at various locations and depths across the site and analysis for the specific contaminants of concern for the location investigated, to provide information in relation to the potential human health risk at the site and inform possible options for management and/or offsite disposal of site soils.
- All samples were sent to Hill Laboratories, an Internationally Accredited New Zealand (IANZ) laboratory, under standard Tetra Tech Coffey chain of custody procedures.
- Comparison of laboratory results against published guidelines for the protection of human health and the environment.
- Preparation of this DSI report. As required by the NES, the report has been signed-off by a suitably qualified and experienced practitioner (SQEP).

2. SITE INFORMATION

2.1 SITE DESCRIPTION

The site is situated on the north side of Ryans Road, adjacent to Christchurch International Airport. The site is currently zoned and used for rural purposes with a combined total land area of approximately 55.5 Hectares (Ha).

104 Ryans Road is currently occupied by a single house and several sheds of varying sizes all of which are in the southeast corner of the property. The site is generally flat with a gentle slope from west to east and the majority of the site is grassed with some vegetation around the property.

The site is covered by three lots legally known as:

- Part Lot 2 DP 22679
- Lot 4 DP 22679
- Part Lot 1 DP 2837

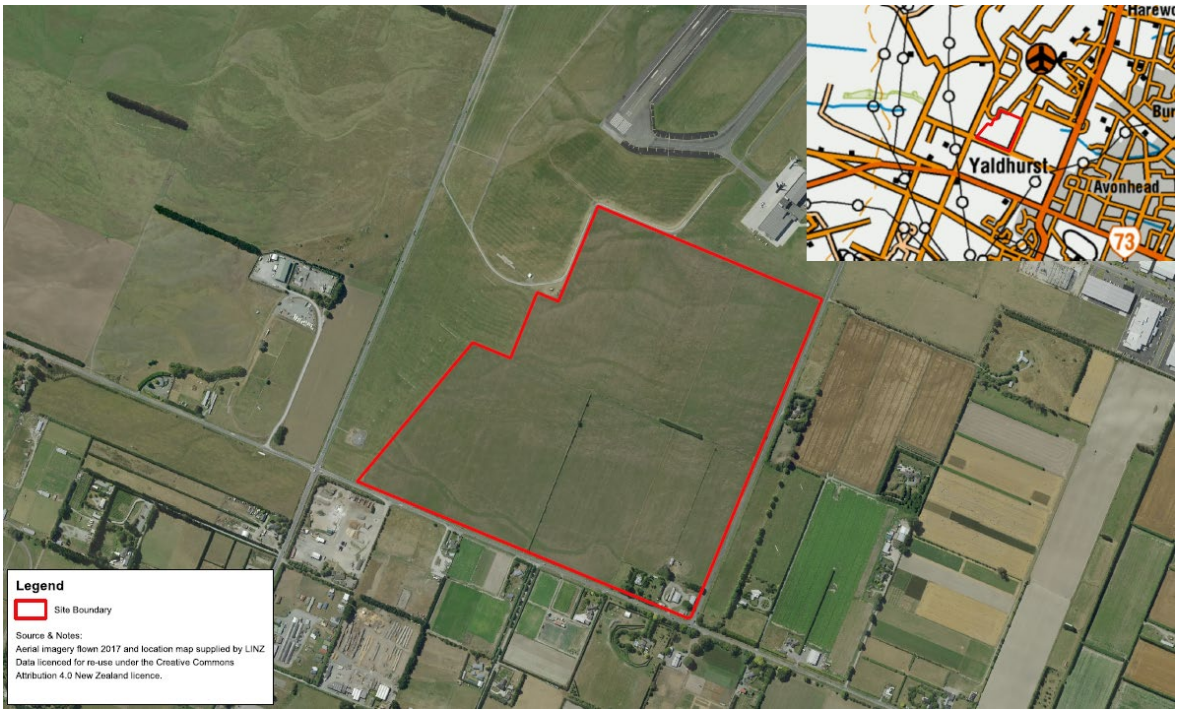

Figure 1: Site location.

The site geology and hydrogeology are described in Table 1 below and was sourced from the GNS online geology map (GNS, 2024).

Table 1: Site Geology and Hydrogeology

Site Condition	Description
Geology	The site is underlain by Holocene river deposits consisting of OIS1 (Holocene) river deposits which comprise gravel described Modern river floodplain/low-level degradation terrace. Unweathered, variably sorted gravel/sand/silt/clay (GNS, 2024).
Topography	The site is approximately rectangular in shape and has generally flat topography
Groundwater	The estimated depth of groundwater on the site is 10 m – 14 m and flows in an easterly direction (Environment Canterbury, 2018).

2.2 SITE HISTORY

As part of the DSI, the site history was investigated by reviewing publicly available information and is summarised below.

2.2.1 Listed Land Use Register

Environment Canterbury's Listed Land Use Register (LLUR) was accessed on 20 November 2024, and it was noted that the LLUR did not contain any information on possible HAIL activities occurring or having occurred on the site. A Preliminary Site Investigation (PSI) is noted to cover the site but also covers the wider Christchurch International Airport property and was not reviewed as part of this investigation as a specific walkover and sampling programme was carried out for the proposed 104 Ryans Road development.

2.2.2 Property File

The Property File for 104 Ryans Road was obtained from Christchurch City Council was reviewed and is summarised below.

Table 2: Property File summary

Date	Description
8/12/1983	**Dispensation 746** Extension to an existing shed on the site
1991	**Drainage or Plumbing Alternation Application** Application in alter the sewer system of the residential dwelling.
4/08/2006	**Complaint Notice** The complainant was alleging that stockpiling and burning of tree waste from other parts of the city was occurring at 104 Ryans Road.
23/07/2009	Building Consent for Foundation for two Silos
14/07/2009	Project Information Memorandum (PIM)
19/09/2009	Building Consent Application for foundation of two silo
23/07/2017	Land Information Memorandum

No building permit/consent are available for the dwelling at 104 Ryans Road and no information is held by Christchurch City Council relating to the materials, construction or year the dwelling was built.

2.2.3 Historical aerial photographs

Historical aerial photographs from 1940, 1950, 1961, 1973, 1975, 1984, 1994, 2004, 2009, 2014, 2018 and 2024 were sourced from Retrolens and Google Earth Pro and were reviewed in the table below (2024; Google, 2024; LGGA, 2024).

Table 3: Summary of historical aerial photographs

Year	Description
1940	Aside from the residential building at the southeast corner of the property, the rest of the site is largely pastoral land. The surrounding properties are mostly vacant, with only a few scattered structures. Ryans Road to the south, Grays Road to the east, and Pound Road to the west are already graded. Possible stock / sheep trails observed in some paddocks.
1950	No significant changes observed.
1961	It appears that the majority of the site is being used for some type of crop cultivation.
1973	No significant changes are observed on the site. However, an airport runway (Christchurch Airport) is built ~200m to the north of the site. Properties to the south of the site are in the process of development.
1975	No significant changes observed.
1984	No significant changes observed.
1994	No significant changes observed.
2004	No significant changes observed.
2009	No significant changes observed.
2014	No significant changes observed.
2018	No significant changes observed. A new aviation building is built to the north of the site
2024	No significant changes observed.

A review of the site historical aerial photographs indicated that the site consisted of agricultural / crop land with a residential building and associated sheds in the southeast of the site. Airport runway and associated aviation buildings are present to the north of the site.

A small piece of land is proposed for a stormwater reserve to the east of Grays Road (as shown on the Capture plans). Aerial photographs were reviewed for this area and did not note any land change / disturbance in the photographs reviewed from the 1940s to 2020s.

Aerial photos are presented in Appendix C.

3. SITE WALKOVER

Tetra Tech staff conducted site walkovers on 11 and 13 November 2024 and are summarised below. Photographs from the site walkover are covered in the Section 3.1.

- The majority of the site is grassland for agricultural use, and buildings along with various sheds are located in the southeastern corner of the site.
- Disused old (constructed before 1940) wool and shearing shed located in the southeastern corner of the site. Metal cans including one open showing green chemical and sacks of yellow/cream coloured chemicals were observed (HAIL A2 ‘chemical manufacture, formulation or bulk storage’).
- Large tanks used for the storage of grains were located north of the area of buildings in the southeastern corner of the site.

- Large barrels likely used for oil located south of the residential dwelling and north of the long central shed, however no staining was observed at the time of the site visit.
- Residential dwelling no longer occupied and area largely overgrown.
- Multiple sheds of steel, timber and corrugated iron construction likely previously used for the storage of farm equipment. Possible oil staining and several yellow stains were observed.
- Concrete slab shed of timber steel and corrugated iron construction located on the eastern border of the site used for the storage of farming equipment.
- Stockpiles of soils were located north of the shed areas (HAIL I).

During the site visit, the potential HAIL activities observed were HAIL A2 ‘Chemical manufacture, formulation or bulk storage’ and stockpiling of soils HAIL 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’.

3.1 SITE PHOTOGRAPHS

The following photographs were taken on site to illustrate site conditions.

Photo 1: Shearing shed looking west

Photo 2: Historic residential dwelling looking north

Photo 3: Inside shearing shed looking west

Photo 4: Chemical storage below shearing platform

Photo 5: Further storage of cans of chemicals

Photo 6: empty Shed partially used for hay storage

Photo 7: Agricultural land looking north

Photo 8: Stockpiles of soil located north of site sheds

Photo 9: Shed located along site southern boundary

Photo 10: open sheds for storage of farm equipment

Photo 11: Open shed of timber and iron construction

4. SOIL SAMPLING

Based on the walkover and for the sake of certainty and for potential off-site soil disposal, the decision was made to undertake sampling around the farm sheds and buildings to assess if significant storage/spillage of persistent pesticides had occurred. Sampling of the fields was also undertaken to assess soil disposal requirements.

Soil sampling was undertaken by Tetra Tech Coffey staff between 11 and 13 November 2024. Soil sampling was undertaken in a general grid layout across the site and with targeted sampling around buildings. All soil sample locations are indicated on Drawings 1 and 2 in Appendix A.

4.1 SAMPLING METHODOLOGY

Soil sampling was undertaken in general accordance with the *Contaminated Land Management Guidelines* (CLMG) *No. 5: Site Investigation and Analysis of Soils* (revised 2021) (MfE, 2011b).

The sampling works comprised:

- Collection of soil samples from 48 locations for a total of 51 samples (43 of which analysed) as shown in Drawings 1 and 2 in Appendix A, 8 samples were kept in cold storage.

All samples of soil were analysed for Heavy Metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc) and OCPs typically associated with persistent pesticide bulk storage or use. Some samples were also analysed for asbestos due to potential asbestos-containing material (ACM) from building locations. Some samples from around the buildings were also assessed for polycyclic aromatic hydrocarbons (PAHs).

For all sampling:

- Individual soil samples were collected directly by hand auger / hand trowel using a clean pair of nitrile gloves for each sample in accordance with Tetra Tech Coffey standard operating procedures (SOPs). Samples were placed into laboratory supplied sample containers.
- Prior to sampling at each location, the hand auger / hand trowel was decontaminated by washing with potable water.

- Placement of all soil samples directly into chilled storage. Samples were transported to Hill Laboratories[1], under standard Tetra Tech Coffey chain of custody procedure.

On the basis of the potential contaminating activities that were initially identified at the site, the soil samples were selectively analysed for metals, asbestos, PAHs and organochlorine pesticides (OCPs).

4.2 QUALITY ASSURANCE / QUALITY CONTROL

The quality assurance / quality control (QA / QC) procedures employed during the works included:

- Collection of soil samples by suitably qualified staff under standard operating procedures.
- Collection of samples into laboratory supplied containers and storage in a chilled box during site works and transport to the laboratory.
- Submission of all samples to the analytical laboratory under industry standard chain of custody documentation and within the acceptable holding times for the contaminants of concern.
- Sample analysis by Hill Laboratories, which are accredited by IANZ for the analyses performed.

5. ASSESSMENT CRITERIA

The following section details what assessment criteria were used to screen the sample results.

5.1 BACKGROUND CONCENTRATIONS FOR SOIL CONTAMINANTS

According to Regulation 5(9) of the NESCS, if a DSI can demonstrate that any contaminants on a HAIL site are at, or below, background concentrations, then the NESCS regulations do not apply. To assess metal results, background concentrations were taken from a report produced by Tonkin and Taylor (2006): Background Concentrations for the Canterbury region. For some contaminants (e.g., OCPs), results above laboratory detection limits would be considered above background.

5.2 SOIL CONTAMINANT STANDARDS (NESCS)

The NESCS (MfE, 2012) details Soil Contaminant Standards (SCSs) for seven inorganic substances and five organic compounds (or groups of compounds). SCSs are available for these substances and compounds when present in land used for five land use exposure scenarios. The contaminants analysed at this site for which SCSs are available include arsenic, cadmium, chromium, copper and lead. For this site, large scale industrial development is proposed so a commercial / industrial land use scenario was adopted as the most conservative of the proposed land uses, which includes the following source-pathway-receptor assumptions:

- The selected commercial / industrial SCS's assume that this industrial site will have varying degrees of exposed soil.
- Potential receptors include the exposure to outdoor workers to near-surface soil during earthworks, routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (i.e., a caretaker or site maintenance personnel). Also, conservatively applicable to outdoor workers on a largely unpaved site.
- The NESCS adopted standards for industrial development land use have been used to assess risks to both site workers and end users of the site.
- The soil pH is assumed to be 5, and that all lead is present in inorganic form.

[1] New Zealand accredited laboratory by International Accreditation New Zealand (IANZ)

5.3 OTHER APPLICABLE HUMAN HEALTH STANDARDS

For non-priority contaminants, the NESCS references the hierarchy defined in the MfE Contaminated Land Management Guideline No.2 – *Hierarchy and Application in New Zealand of Environmental Guideline Values* (MfE 2011e).

In accordance with this hierarchy, the Australian National Environment Protection Council (NEPC) (1999 rev: 2013) National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM) has been used for two metals (nickel and zinc). Health-based investigation levels for 'industrial' land use have been selected in accordance with the proposed end use of the site and to protect site workers during the development work.

5.4 SOIL DISPOSAL CRITERIA

In addition to specifying human health criteria, an assessment of offsite disposal options for any excess spoil generated during site earthworks has been included.

As disposal to a cleanfill site represents the preferable disposal option, the soil results have been compared to the definition of cleanfill in the Ministry for the Environment's 'A Guide to the Management of Cleanfills (2002):

Cleanfill material means material that when buried will have no adverse effect on people or the environment. Cleanfill material includes virgin natural materials such as clay, soil and rock, and other inert materials such as concrete or brick that are free of:

(a) Combustible, putrescible, degradable or leachable components.

(b) Hazardous substances.

(c) Products or materials derived from hazardous waste treatment, hazardous waste stabilisation or hazardous waste disposal practices.

(d) Materials that may present a risk to human or animal health such as medical and veterinary waste, asbestos or radioactive substances.

(e) Liquid waste.

The requirement for the material to be "free" of "hazardous substances" effectively requires the concentrations of non-naturally occurring compounds to be below the level of analytical detection. In terms of naturally occurring compounds, it is generally recognised that cleanfill acceptance criteria are defined by the background concentrations of these compounds in the relevant local or regional environment. Therefore, for disposal purposes, soil samples were also compared against the adopted background concentrations.

6. RESULTS

Laboratory analytical results of the samples collected are summarised in the following section of this report.

6.1 ANALYTICAL RESULTS

The analytical results were compared to background concentrations and the Human Health Guidelines by NES 1and MfE Hierarchy – Commercial / industrial land use scenario (mg/kg)[2]. A summary of the soil analytical results is provided in Appendix D with the laboratory analytical reports provided in Appendix E.

Laboratory analytical results of the soil samples analysed are summarised below.

[2] Ministry for the Environment. 2012. Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment

6.1.1 Around Buildings (Targeted sampling)

- Asbestos sampling was undertaken around the house (samples S101-S104) as this building was considered most likely location. No asbestos was detected.
- Two samples (S113 0.0-0.2m and S116 0.0-0.2m), exceeded adopted screening criteria (*Human Health Guidelines by NES 1 and MfE Hierarchy – Commercial / industrial*) due to the presence of arsenic.
- No other metals, DDT or other organochlorine pesticides exceed adopted screening criteria (*Human Health Guidelines by NES 1 and MfE Hierarchy - Commercial / industrial*) around other structures.
- One or more metals were detected above background concentrations in most samples around buildings.
- Total DDT isomers were detected above background concentrations in most samples collected around buildings.
- Dieldrin was detected in approximately half the samples around buildings but all results were below human health guidelines.
- No PAHs were noted above human health guidelines. Where tested, PAH concentrations were above background concentrations.

6.1.2 In Fields (Grid based sampling)

- No metals, DDT or other organochlorine pesticides exceed adopted screening criteria (*Human Health Guidelines by NES 1 and MfE Hierarchy - Commercial / industrial*) throughout the fields.
- In two locations (TP-19 and TP-25), metals were detected only slightly above background concentrations in topsoil samples.
- 4,4'-DDE was above detection limits in multiple locations (TP-01, TP-03 to TP-09, TP-13 to TP-15).
- 4,4'-DDT was above detection limits in multiple locations (TP-06 to TP-09, TP-11, TP-13).
- Total DDT isomers were below detection limit in all samples.
- Dieldrin was below detection limit in all samples.

7. REGULATORY CONSIDERATIONS (CONTAMINATED LAND)

7.1 NESCS

The NESCS regulation applies to activities of soil disturbance on a piece of land where a HAIL activity is being / has been / more likely than not to have been undertaken and contaminants are present above background concentrations. The results of the historical review did not identify any HAIL activities to have occurred on the site. The results of soil sampling and analysis returned concentrations of contaminants above background, so the NESCS applies to this site.

Tables43 and 5 provide NESCS checklist and assessment against the specified criteria.

Table 4: NESCS checklist

Is an activity described on the HAIL currently being undertaken on the piece of land to which this application applies?	No
Has an activity described on the HAIL ever been undertaken on the piece of land to which this application applies?	Yes
Is it more likely than not that an activity described on the HAIL is being or has been undertaken on the piece of land to which this application applies?	Yes

If 'Yes' to any of the above, then the NES for Assessing and Managing Contaminants in Soil to Protect Human Health may apply. Check the five activities to which the NES applies:	
Is the activity you propose to undertake removing or replacing a fuel storage system or parts of it?	No
Is the activity you propose to undertake sampling soil?	Yes
Is the activity you propose to undertake disturbing soil?	Yes
Is the activity you propose to undertake subdividing land?	Yes
Is the activity you propose to undertake changing the use of the land?	Yes
If also 'Yes' to any of the above activities, then the NES for Assessing and Managing Contaminants in Soil to Protect Human Health is likely to apply.	

Table 5: Assessment against NESCS criteria

Permitted Activity Criteria		Compliance?
8 (3) Disturbing Soil		
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.	Yes, earthworks controls will be in place during development.
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.	Unknown.
C)	The volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2	Development is likely to exceed these volumes for disturbance.
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 m^3 per 500 m^2 of soil may be taken away per year.	Development is likely to exceed these volumes for disturbance

E)	**Soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind.**	Yes, any soil that exceeds background criteria and is not retained on site will be disposed of at an appropriate fill facility.
F)	**The duration of the activity must be no longer than 2 months.**	Development is likely to exceed this period.
G)	**The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.**	Not relevant
8 (4) Subdividing or Changing land use		
A)	**A preliminary site investigation of the land or piece of land must exist.**	This document
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**	Included in this document.
C)	**The report must be accompanied by a relevant site plan to which the report is referenced**	Included in this document.
D)	**The consent authority must have the report and the plan**	This document will be provided at the time of consent application.

7.2 ENVIRONMENTAL

In general terms, the Canterbury Land and Water Regional Plan (CRC, 2015) contains policies to avoid adverse effects on ecosystems and the health of people in relation to contaminated discharges from contaminated sites. Based on the low concentrations of contaminants, and depth to groundwater, the risk to groundwater is considered low.

Standard earthworks and sediment controls employed during the subdivision development and control of non-cleanfill materials will also reduce any risk of discharges occurring off site. In addition, the mixing and dilution that will occur as a result of stockpiling and respreading of topsoil on lots, will likely reduce the concentration of contaminants.

8. DISCUSSIONS AND CONCLUSIONS

Carter Group Limited engaged Tetra Tech Coffey (NZ) Limited (Tetra Tech Coffey) to conduct a DSI to support the proposed Ryans Road industrial development at 104 Ryans Road. This investigation included reviewing the site's history, field observations and the collection and analysis of soil samples.

The conclusions made as part of this investigation include the following:

- A total of 51 soil samples were collected from a total of 48 sampling locations to target contaminants typically associated with agriculture and to provide preliminary disposal information for excavated soils. A total of 43 of the 51 samples were analysed and 8 were kept in cold storage. Laboratory analysis of these samples found the following:
  - Concentrations of potential contaminants were below human health guidelines except two samples in the area of the buildings in the southeast of the site where arsenic exceeded the human health guidelines in the topsoil samples (most likely due to pesticide storage).

  - All soils can be retained onsite as concentrations of contaminants in all soil samples were below human health guidelines except the two locations noted near buildings which require further testing to delineate the extent of contamination prior to development in this area.
  - Topsoil from all fields sampled is considered to be free from contaminants and can be reused on site or removed to be used for agricultural or residential use.
  - Further sampling will be required to validate the site post building/shed removal.
- A Remediation Action Plan (RAP) will be required prior to earthworks commencing on-site to outline remediation requirements.
- A Site Validation Report (SVR) will be completed once remediation works are undertaken.

Standard environmental controls including sediment management and controlling the movement of cleanfill and topsoil during development will reduce any discharges to the environment.

9. REFERENCES

Australian National Environment Protection Council (NEPC) (1999 rev: 2013) National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM).

BRANZ (2017). New Zealand Guidelines for Assessing and Managing Asbestos in Soil. 2017

Google Earth Pro (2023). Accessed 07/09/2023.

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

MFE (2003). Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (revised 2021).

MFE (2003). Contaminated Land Management Guidelines No. 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011).

MFE (2004). Contaminated Land Management Guidelines No. 3: Risk Screening System.

MFE (2006). Contaminated Land Management Guidelines No. 4: Classification and information management protocols.2006.

MFE (2004). Contaminated Land Management Guidelines No. 5: Site investigation and analysis of soils (revised 2021).

RetroLens (2024). RetroLens: Historical Image Resource. Accessed Online: http://retrolens.nz/. [Date Accessed: November 2024].

Tetra Tech Coffey (2025): Geotechnical Assessment Report, ref. 773-CHCGE377712

IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY ENVIRONMENTAL REPORT

Introduction

This report has been prepared by Tetra Tech Coffey for you, as Tetra Tech Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Tetra Tech Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Tetra Tech Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Tetra Tech Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Tetra Tech Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Tetra Tech Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Tetra Tech Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Tetra Tech Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Tetra Tech Coffey prepared the report and has familiarity with the site, Tetra Tech Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Tetra Tech Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

APPENDIX A: TEST LOCATION PLANS

Environmental Sampling Test Results

- Below Background Concentrations
- At/Slightly Above Background Concentrations
- Above Background Concentrations, Below Human Health Guidelines
- Above Human Health Guidelines

TETRA TECH COFFEY
Christchurch Geotech
+64 3 374 9600
1/254 Montreal Street
Christchurch
8013 New Zealand

DRAWN	J. Monk
APPROVED	C. Thompson
SHEET NUMBER	1 of 1
SCALE	1:4,000

PROJECT
Carter Group Limited
Ryans Road Fast-Track Application

SHEET
Environmental Sampling Location Plan 1

PROJECT NUMBER	REVISION DATE	REVISION
773-CHCGE377712	12/02/2025	R0

Original Sheet Size: A3 [W = 420, H = 297] Plot Date: 2025-02-12 14:19:42 by Monk, Joseph (joseph.monk) File Ref: \\tt.local\cof\S809\F\GENZ\Projects\03 TETRALINX PROJECTS\370000 - 379999\377712 - Ryans Rd\6 Drafting\3_GIS\Ryans Road Environmental Sampling.qgz

Environmental Sampling Test Results

- Below Background Concentrations
- At/Slightly Above Background Concentrations
- Above Background Concentrations, Below Human Health Guidelines
- Above Human Health Guidelines

TETRA TECH COFFEY
Christchurch Geotech
+64 3 374 9600
1/254 Montreal Street
Christchurch
8013 New Zealand

DRAWN	APPROVED
J. Monk	C. Thompson
SHEET NUMBER	SCALE
1 of 1	1:500

PROJECT
Carter Group Limited
Ryans Road Fast-Track Application

SHEET
Environmental Sampling Location Plan 2

PROJECT NUMBER	REVISION DATE	REVISION
773-CHCGE377712	12/02/2025	R0

Original Sheet Size: A3 [W = 420, H = 297] Plot Date: 2025-02-12 14:21:09 by Monk, Joseph (joseph.monk) File Ref: \\tt.local\cof\S809\F\GENZ\Projects\03 TETRALINX PROJECTS\370000 - 379999\377712 - Ryans Rd\6 Drafting\3_GIS\Ryans Road Environmental Sampling.qgz

APPENDIX B: CERTIFYING STATEMENT

Certifying Statement

I, Tim Shanahan of Tetra Tech Coffey, certify that:

1. This detailed site investigation meets the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NESCS) because it has been:
   A. done by a suitably qualified and experienced practitioner, and
   B. done in accordance with the current edition of Contaminated land management guidelines No 5 – Site investigation and analysis of soils, and.
   C. reported on in accordance with the current edition of Contaminated land management guidelines No 1 – Reporting on contaminated sites in New Zealand, and.
   D. the report is certified by a suitably qualified and experienced practitioner.

2. This detailed site investigation concludes that:
   A- [For activities under R9 of the NESCS] does not exceed the applicable standard in Regulation 7 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations

Evidence of the qualifications and experience of the suitably qualified and experienced practitioner(s) who have done this investigation and certified this report can be requested if required.

07/02/25

For and on behalf of Tetra Tech Coffey

Tim Shanahan

Principal Environmental Engineer

Tim Shanahan
Principal Environmental Engineer

EDUCATION

Bachelor of Environmental Engineering

SPECIFIC AREAS OF EXPERTISE

Contaminated site assessment

Environmental risk assessments

Work Health and Safety Act

EMS compliance and audit

Stakeholder consultancy

ENTITY

Tetra Tech Coffey

YEARS OF EXPERIENCE

20+

CONTACT

Tim.Shanahan@coffey.com

T (+61) (3) 9290 7000

M (+61) (0) 406 382 824

EXPERIENCE SUMMARY

Tim has over 20 years of experience in environmental engineering, contaminated land assessment, aerial surveying and project management. He also has extensive hands on experience in the design and execution of contaminated site assessments on heavy industrial and petrochemical sites as well as childcare centres and school sites.

Tim has provided expert witness statement investigation and support to EPA Victoria as well as supporting expert witnesses in the Supreme Court.

In completing larger site assessments he has worked closely with key community groups and project stakeholders, with routine updates and meetings relating to cultural heritage, UXO/EOW flora and fauna and community relations prior to initiating any potentially disruptive works (including requisite departmental approvals for demolition). He has completed HSSE supervision of cultural heritage surveys, cultural heritage management plan implementation and archaeological salvage.

RELEVANT PROJECT EXPERIENCE

2021 – Present – Lemon Springs Remediation Project

Engaged by EPS to provide technical direction and project management of an Environmental Site Assessment to support a statutory audit of the remediation works conducted on the major industrial waste site in Western Victoria.

More information is provided on the EPA website below.

Alleged illegal dump site at Lemon Springs | Environment Protection Authority Victoria (epa.vic.gov.au)

2021 Seymour College – Soil Heptachlor and Chlordane Remediation VSBA. Project Director.

Remediation of heptachlor impacted soil identified during upgrade works at the Seymour College. Works included identification, delineation and remediation of pesticide impacted soil from an old building footprint (building I).

2013 to 2015, Department of Justice, Ravenhall Prison Assessment, Project Manager

Completion of contamination assessments for a proposed prison sites (80 Ha) which had formerly been a Defence Munitions Storage and Research and Development Site. Significant UXO contamination was discovered at site and all works/plans had to be developed around mitigation of UXO risks.

2005/2006 - National Childcare Contract Management – ABC Childcare

Site assessments for ABC Childcare in the role National Client Manager. The projects involved the nationwide coordination of resources to deliver base line site assessment and project objectives within tight timeframes. Portfolio included over 90 sites nationwide and included assessment against "*Assessing the soil in children's services – guidelines for environmental consultants" DET 2001.*

CLIENT REFEREES

Name and title: Julie King, Director
Organisation: Kings Self Storage
T: 0419 352 387
Name and title: Johan Top, Deputy Project Director
Organisation: Department of Justice and Regulation
T: 0438 044 106
Name and title: Helen Szabo
Organisation: EPA Victoria
T: 0427 863 334

APPENDIX C: HISTORIC AERIAL PHOTOS

A	Original Issue	HY	MC	21/11/24

N

0 100 200 m

drawn	HY
approved	MC
date	21/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client:	Rolleston Industrial Developments Ltd
project:	104 Ryans Road,Yaldhurst, Christchurch
title	Historical Aerial: 1940 (Source: Retrolens)
project no:	773-CHCGE377712
figure no:	N/A
rev:	A

A	Original Issue	HY	MC	21/11/24

0 100 200 m

drawn	HY
approved	MC
date	21/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road,Yaldhurst, Christchurch

title: Historical Aerial: 1950 (Source: Retrolens)

project no: 773-CHCGE377712 figure no: N/A rev: A

A	Original Issue	HY	MC	21/11/24

N

0 100 200 m

drawn	HY
approved	MC
date	21/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road,Yaldhurst, Christchurch

title: Historical Aerial: 1961 (Source: Retrolens)

project no: 773-CHCGE377712 figure no: N/A rev: A

A	Original Issue	HY	MC	21/11/24

N

0 100 200 m

drawn	HY
approved	MC
date	21/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road,Yaldhurst, Christchurch

title: Historical Aerial: 1973 (Source: Retrolens)

project no: 773-CHCGE377712 figure no: N/A rev: A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road,Yaldhurst, Christchurch

title: Historical Aerial: 1975

project no: 773-CHCGE377712 figure no: - rev: A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road, Yaldhurst, Christchurch

title: Historical Aerial: 1984

project no: 773-CHCGE377712 figure no: - rev: A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client:	Rolleston Industrial Developments Ltd
project:	104 Ryans Road, Yaldhurst, Christchurch
title	Historical Aerial: 1994
project no:	773-CHCGE377712
figure no:	-
rev:	A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client:	Rolleston Industrial Developments Ltd
project:	104 Ryans Road, Yaldhurst, Christchurch
title	Historical Aerial: 2004
project no:	773-CHCGE377712
figure no:	-
rev:	A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road, Yaldhurst, Christchurch

title: Historical Aerial: 2009

project no: 773-CHCGE377712 figure no: - rev: A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road, Yaldhurst, Christchurch

title: Historical Aerial: 2014

project no: 773-CHCGE377712 figure no: - rev: A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client: Rolleston Industrial Developments Ltd

project: 104 Ryans Road, Yaldhurst, Christchurch

title: Historical Aerial: 2024

project no: 773-CHCGE377712 figure no: - rev: A

A	Original Issue	TBD	MC	20/11/24

N

0 100 200 m

drawn	TBD
approved	MC
date	20/11/24
scale	AS SHOWN
original size	A3

TETRA TECH COFFEY

client:	Rolleston Industrial Developments Ltd
project:	104 Ryans Road, Yaldhurst, Christchurch
title	Historical Aerial: 2024
project no:	773-CHCGE377712
figure no:	-
rev:	A

APPENDIX D: ANALYTICAL RESULTS TABLES

TETRA TECH COFFEY

Table 1: Summary of Soil Analytical Results

Discrete Sample Identification / Analyte	Human Health Guidelines by NES[1] and MfE Hierarchy (mg/kg)	Background Concentrations[2] (mg/kg)	S101 Depth 0 - 0.2 m	S102 Depth 0 - 0.2 m	S103 Depth 0 - 0.2 m	S104 Depth 0 - 0.2 m	S107 Depth 0 - 0.2 m	S108 Depth 0 - 0.2 m	S109 Depth 0 - 0.2 m	S110 Depth 0 - 0.2 m	S111 Depth 0 - 0.2 m	S112 Depth 0 - 0.2 m	S113 Depth 0 - 0.2 m	S114 Depth 0 - 0.2 m	S116 Depth 0 - 0.2 m	S118 Depth 0 - 0.2 m	S119 Depth 0 - 0.2 m	S120 Depth 0 - 0.1 m	S121 Depth 0 - 0.2 m	S123 Depth 0 - 0.2
Heavy metals																				
Arsenic	70	12.58	11	14	19	10	6	6	25	25	10	5	142	5	210	18	9	22	39	13
Cadmium	1,300	0.19	0.53	0.55	0.49	0.52	1.54	8.1	1.29	0.32	1.01	2.3	3.7	0.27	2.3	1.44	0.83	16.7	9.7	0.34
Chromium	>10,000	22.7	16	19	16	18	16	94	17	14	20	20	25	12	35	25	16	69	68	19
Copper	>10,000	20.3	14	23	39	27	20	57	44	28	27	46	70	11	154	40	19	390	95	22
Lead	3,300	40.96	890	640	490	310	133	230	270	700	67	80	210	56	1,210	380	112	420	440	86
Nickel[4]	6,000	20.7	13	12	12	12	11	33	11	7	14	14	17	10	22	11	11	34	37	12
Zinc[4]	400,000	93.9	580	810	380	490	910	500	310	93	320	940	380	141	770	1880	810	1270	930	117
Asbestos																				
Presence/Absence	-	-	Asbestos Not Detected	Asbestos Not Detected	Asbestos Not Detected	Asbestos Not Detected	-	-	-	-		-	-	-						-
Organochlorine pesticides																				
2,4'-DDD	-	<LOR	-	-	-	-	< 0.015	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011	< 0.014	< 0.012	0.017	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDD	-	<LOR	-	-	-	-	< 0.015	0.014	0.24	< 0.11 #3	< 0.012	< 0.011	< 0.014	< 0.012	0.051	< 0.014	< 0.011	0.017	0.036	< 0.011
2,4'-DDE	-	<LOR	-	-	-	-	< 0.015	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDE	-	<LOR	-	-	-	-	< 0.015	0.017	0.46	0.52	0.016	< 0.011	< 0.014	< 0.012	0.153	< 0.014	< 0.011	0.051	0.031	< 0.011
2,4'-DDT	-	<LOR	-	-	-	-	< 0.015	< 0.014	0.84 #1	< 0.11 #3	< 0.012	< 0.011	< 0.014	0.58 #1	0.48	< 0.014	< 0.011	0.092	< 0.012	< 0.011
4,4'-DDT	-	<LOR	-	-	-	-	< 0.015	0.174	7.9 #1	5.7	0.043	< 0.011	< 0.014	0.180 #1	2.6	< 0.014	< 0.011	0.41	0.156	< 0.011
Total DDT Isomers	70	<LOR	-	-	-	-	< 0.09	0.2	9.5	6.2	< 0.07	< 0.07	< 0.09	0.76	3.4	< 0.09	< 0.07	0.57	0.23	< 0.07
Dieldrin	2.6	<LOR	-	-	-	-	< 0.015	0.061	< 0.011	< 0.011	< 0.012	< 0.011	< 0.014	< 0.012	0.133	< 0.014	< 0.011	0.73	0.052	< 0.011
Polycyclic aromatic hydrocarbons (PAHs)																				
1-Methylnaphthalene		<LOR							9.2			2.8	1.1							< 0.3
2-Methylnaphthalene		<LOR							0.012			< 0.011	< 0.014							< 0.011
Acenaphthylene		<LOR							0.02			< 0.011	< 0.014							< 0.011
Acenaphthene		<LOR							0.025			< 0.011	0.016							< 0.011
Anthracene		<LOR							< 0.011			0.011	< 0.014							< 0.011
Benzo[a]anthracene	500 [4]	<LOR							< 0.011			< 0.011	0.016							< 0.011
Benzo[a]pyrene (BAP)	800 [4]	<LOR							0.073			< 0.11	0.024							0.011
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	9,000 [4]	<LOR							0.081			< 0.11	0.025							0.017
Benzo[a]pyrene Toxic Equivalence (TEF)		<LOR							0.192			< 0.26	0.043							< 0.026
Benzo[b]fluoranthene + Benzo[j]fluoranthene		<LOR							0.181			< 0.26	0.043							< 0.026
Benzo[e]pyrene		<LOR							0.36			0.12	0.039							0.023
Benzo[g,h,i]perylene		<LOR							0.195			0.11	0.067							0.013
Benzo[k]fluoranthene		<LOR							0.187			< 0.11	0.091							0.015
Chrysene		<LOR							0.111			< 0.11	< 0.014							< 0.011
Dibenzo[a,h]anthracene		<LOR							0.30 #2			< 0.11	0.022							0.015
Fluoranthene		<LOR							0.026			< 0.11	< 0.014							< 0.011
Fluorene		<LOR							1.05			0.195	0.044							0.028
Indeno(1,2,3-c,d)pyrene	800 [4]	<LOR							0.051			0.095	< 0.014							< 0.011
Naphthalene		<LOR							0.165			< 0.11	0.048							0.015
Perylene	69 [5]	<LOR							< 0.06			< 0.06	< 0.07							< 0.06
Phenanthrene	900 [4]	<LOR							0.017			< 0.11	< 0.014							< 0.011
Pyrene	1,600 [5]	<LOR							2.3			0.46	0.05							0.015
																-	-	-	-	0.034

Highlighted, coloured cell indicates samples exceeds human health guideline, permitted activity criterion or background concentration

Notes:

mg/kg = milligrams per kilogram

A hyphen (-) indicates criteria are not available or sample not tested for this analyte

< LOR Indicates less than laboratory level of reporting. In the case of cadmium the predicted background concentration is lower than the laboratory limit of reporting (LOR) so the LOR is used as the background.

1. Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES). Criterial selected for commercial/industrial
2. Tonkin & Taylor. (2007). Background concentrations of selected trace elements in Canterbury soils. Christchurch, New Zealand: Environment Canterbury.
3. Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). 2024. Australian and New Zeland Guidelines for Fresh and Marine Water Quality: Toxicant default guideline values for sediment quality. Retrieved from https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants
4. National Environmental Protection Measure (Assessment of Site Contamination)1999, update 2013 Schedule B1, Land use Class commercial/industrial

TETRA TECH COFFEY

Table 1: Summary of Soil Analytical Results

Discrete Sample Identification / Analyte	Human Health Guidelines by NES[1] and MfE Hierarchy (mg/kg)	Background Concentrations[2] (mg/kg)	TP-01 Depth 0 - 0.1 m	TP-02 Depth 0 - 0.1 m	TP-03 Depth 0 - 0.1 m	TP-04 Depth 0 - 0.1 m	TP-05 Depth 0 - 0.1 m	TP-06 Depth 0 - 0.1 m	TP-07 Depth 0 - 0.1 m	TP-08 Depth 0 - 0.1 m	TP-09 Depth 0 - 0.1 m	TP-10 Depth 0 - 0.1 m	TP-11 Depth 0 - 0.1 m	TP-12 Depth 0 - 0.1 m	TP-13 Depth 0 - 0.1 m	TP-14 Depth 0 - 0.1 m	TP-15 Depth 0 - 0.1 m
Heavy metals																	
Arsenic	70	12.58	5	10	9	7	5	5	5	7	5	4	5	5	5	6	5
Cadmium	1,300	0.19	0.16	0.12	0.16	0.19	0.15	0.18	0.14	0.17	0.17	0.16	0.15	0.12	0.16	0.17	0.13
Chromium	>10,000	22.7	16	17	17	17	16	16	16	16	15	15	16	16	16	16	16
Copper	>10,000	20.3	9	9	10	10	9	9	9	10	9	8	8	8	9	9	8
Lead	3,300	40.96	17.4	17.1	17.2	19.2	17.7	17	17.6	17.2	15	14	16	16	17	17	16
Nickel[4]	6,000	20.7	13	13	14	14	13	13	13	14	12	12	13	12	12	13	13
Zinc[4]	400,000	93.9	63	58	63	67	61	61	60	62	57	55	55	58	61	63	59
Organochlorine pesticides																	
2,4'-DDD	-	<LOR	< 0.011	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
4,4'-DDD	-	<LOR	< 0.011	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
2,4'-DDE	-	<LOR	< 0.011	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
4,4'-DDE	-	<LOR	0.018	< 0.012	0.014	0.011	0.019	0.028	0.013	0.017	0.033	< 0.011	< 0.011	< 0.011	0.022	0.018	0.013
2,4'-DDT	-	<LOR	< 0.011	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
4,4'-DDT	-	<LOR	< 0.011	< 0.012	< 0.011	< 0.012	< 0.012	0.018	0.015	0.018	0.023	< 0.011	0.012	< 0.011	0.018	< 0.011	< 0.011
Total DDT Isomers	70	<LOR	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	2.6	<LOR	< 0.011	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011

Highlighted, coloured cell indicates samples exceeds human health guideline, permitted activity criterion or background concentration

Notes:

mg/kg = milligrams per kilogram

A hyphen (-) indicates criteria are not available or sample not tested for this analyte

< LOR Indicates less than laboratory level of reporting. In the case of cadmium the predicted background concentration is lower than the laboratory limit of reporting (LOR) so the LOR is used as the background.

1. Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES). Criterial selected for commercial/industrial
2. Tonkin & Taylor. (2007). Background concentrations of selected trace elements in Canterbury soils. Christchurch, New Zealand: Environment Canterbury.

3. Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). 2024. Australian and New Zeland Guidelines for Fresh and Marine Water Quality: Toxicant default guideline values for sediment quality. Retrieved from https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants

4. National Environmental Protection Measure (Assessment of Site Contamination)1999, update 2013 Schedule B1, Land use Class commercial/industrial

TETRA TECH COFFEY

Table 1: Summary of Soil Analytical Results

Discrete Sample Identification / Analyte	Human Health Guidelines by NES[1] and MfE Hierarchy (mg/kg)	Background Concentrations[2] (mg/kg)	TP-16 Depth 0 - 0.1 m	TP-17 Depth 0 - 0.1 m	TP-18 Depth 0 - 0.1 m	TP-19 Depth 0 - 0.1 m	TP-20 Depth 0 - 0.1 m	TP-21 Depth 0 - 0.1 m	TP-22 Depth 0 - 0.1 m	TP-23 Depth 0 - 0.1 m	TP-24 Depth 0 - 0.1 m	TP-25 Depth 0 - 0.1 m
Heavy metals												
Arsenic	70	12.58	5	5	5	13	5	5	5	5	11	5
Cadmium	1,300	0.19	0.15	0.16	0.17	0.17	0.13	0.15	0.13	0.14	0.18	0.25
Chromium	>10,000	22.7	17	16	18	18	17	16	17	16	15	17
Copper	>10,000	20.3	9	9	10	10	8	8	9	8	8	9
Lead	3,300	40.96	18.1	17	20	20	15.7	16.9	17.1	16.7	19	18
Nickel[4]	6,000	20.7	14	13	15	14	14	13	14	13	13	13
Zinc[4]	400,000	93.9	63	61	69	65	59	58	62	60	63	66
Organochlorine pesticides												
2,4'-DDD	-	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012
4,4'-DDD	-	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012
2,4'-DDE	-	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012
4,4'-DDE	-	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012
2,4'-DDT	-	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012
4,4'-DDT	-	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012
Total DDT Isomers	70	<LOR	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	2.6	<LOR	< 0.012	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011	< 0.011	< 0.012	< 0.012

Highlighted, coloured cell indicates samples exceeds human health guideline, permitted activity criterion or background concentration

Notes:

mg/kg = milligrams per kilogram

A hyphen (-) indicates criteria are not available or sample not tested for this analyte

< LOR Indicates less than laboratory level of reporting. In the case of cadmium the predicted background concentration is lower than the laboratory limit of reporting (LOR) so the LOR is used as the background.

1. Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES). Criterial selected for commercial/industrial
2. Tonkin & Taylor. (2007). Background concentrations of selected trace elements in Canterbury soils. Christchurch, New Zealand: Environment Canterbury.
3. Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). 2024. Australian and New Zeland Guidelines for Fresh and Marine Water Quality: Toxicant default guideline values for sediment quality. Retrieved from https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants
4. National Environmental Protection Measure (Assessment of Site Contamination)1999, update 2013 Schedule B1, Land use Class commercial/industrial

APPENDIX E: LABORATORY RESULTS

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Certificate of Analysis

Client:	Rolleston Industrial Developments Limited	**Lab No:**	3720278 SPv1
Contact:	Mark Crooks C/- Tetra Tech Coffey (NZ) Limited PO Box 8261 Symonds Street Auckland 1050	**Date Received:**	20-Nov-2024
		Date Reported:	29-Nov-2024
		Quote No:	86992
		Order No:	773-CHCGE377712
		Client Reference:	104 Ryans Road
		Submitted By:	Nathan Cash

Sample Type: Soil

Sample Name:		S101 0-0.2 11-Nov-2024	S102 0-0.2 11-Nov-2024	S103 0-0.2 11-Nov-2024	S104 0-0.2 11-Nov-2024	S107 0-0.2 11-Nov-2024
Lab Number:		3720278.1	3720278.3	3720278.5	3720278.8	3720278.12
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	-	66
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	14	19	10	6
Total Recoverable Cadmium	mg/kg dry wt	0.53	0.55	0.49	0.52	1.54
Total Recoverable Chromium	mg/kg dry wt	16	19	16	18	16
Total Recoverable Copper	mg/kg dry wt	14	23	39	27	20
Total Recoverable Lead	mg/kg dry wt	890	640	490	310	133
Total Recoverable Nickel	mg/kg dry wt	13	12	12	12	11
Total Recoverable Zinc	mg/kg dry wt	580	810	380	490	910
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	-	< 0.015
alpha-BHC	mg/kg dry wt	-	-	-	-	< 0.015
beta-BHC	mg/kg dry wt	-	-	-	-	< 0.015
delta-BHC	mg/kg dry wt	-	-	-	-	< 0.015
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	-	< 0.015
cis-Chlordane	mg/kg dry wt	-	-	-	-	< 0.015
trans-Chlordane	mg/kg dry wt	-	-	-	-	< 0.015
2,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.015
4,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.015
2,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.015
4,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.015
2,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.015
4,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.015
Total DDT Isomers	mg/kg dry wt	-	-	-	-	< 0.09
Dieldrin	mg/kg dry wt	-	-	-	-	< 0.015
Endosulfan I	mg/kg dry wt	-	-	-	-	< 0.015
Endosulfan II	mg/kg dry wt	-	-	-	-	< 0.015
Endosulfan sulphate	mg/kg dry wt	-	-	-	-	< 0.015
Endrin	mg/kg dry wt	-	-	-	-	< 0.015
Endrin aldehyde	mg/kg dry wt	-	-	-	-	< 0.015
Endrin ketone	mg/kg dry wt	-	-	-	-	< 0.015
Heptachlor	mg/kg dry wt	-	-	-	-	< 0.015
Heptachlor epoxide	mg/kg dry wt	-	-	-	-	< 0.015
Hexachlorobenzene	mg/kg dry wt	-	-	-	-	< 0.015
Methoxychlor	mg/kg dry wt	-	-	-	-	< 0.015

Sample Type: Soil						
	Sample Name:	S108 0-0.2 11-Nov-2024	S109 0-0.2 11-Nov-2024	S110 0-0.2 11-Nov-2024	S111 0-0.2 11-Nov-2024	S112 0-0.2 11-Nov-2024
	Lab Number:	3720278.13	3720278.14	3720278.15	3720278.16	3720278.17
Individual Tests						
Dry Matter	g/100g as rcvd	75	96	92	89	94
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	25	25	10	5
Total Recoverable Cadmium	mg/kg dry wt	8.1	1.29	0.32	1.01	2.3
Total Recoverable Chromium	mg/kg dry wt	94	17	14	20	20
Total Recoverable Copper	mg/kg dry wt	57	44	28	27	46
Total Recoverable Lead	mg/kg dry wt	230	270	700	67	80
Total Recoverable Nickel	mg/kg dry wt	33	11	7	14	14
Total Recoverable Zinc	mg/kg dry wt	500	310	93	320	940
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
alpha-BHC	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	0.115
beta-BHC	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
delta-BHC	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDD	mg/kg dry wt	0.014	0.24	< 0.11 #3	< 0.012	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDE	mg/kg dry wt	0.017	0.46	0.52	0.016	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.014	0.84 #1	< 0.11 #3	< 0.012	< 0.011
4,4'-DDT	mg/kg dry wt	0.174	7.9 #1	5.7	0.043	< 0.011
Total DDT Isomers	mg/kg dry wt	0.20	9.5	6.2	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	0.061	< 0.011	< 0.011	< 0.012	< 0.011
Endosulfan I	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Endosulfan II	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Endrin	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Endrin ketone	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Heptachlor	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Methoxychlor	mg/kg dry wt	< 0.014	< 0.011	< 0.011	< 0.012	< 0.011
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	9.2	-	-	2.8
1-Methylnaphthalene	mg/kg dry wt	-	0.012	-	-	< 0.011
2-Methylnaphthalene	mg/kg dry wt	-	0.020	-	-	< 0.011
Acenaphthylene	mg/kg dry wt	-	0.025	-	-	< 0.011
Acenaphthene	mg/kg dry wt	-	< 0.011	-	-	0.011
Anthracene	mg/kg dry wt	-	< 0.011	-	-	< 0.011
Benzo[a]anthracene	mg/kg dry wt	-	0.073	-	-	< 0.11
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.081	-	-	< 0.11
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	0.192	-	-	< 0.26
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	0.181	-	-	< 0.26
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.36	-	-	0.12
Benzo[e]pyrene	mg/kg dry wt	-	0.195	-	-	0.11
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.187	-	-	< 0.11
Benzo[k]fluoranthene	mg/kg dry wt	-	0.111	-	-	< 0.11
Chrysene	mg/kg dry wt	-	0.30 #2	-	-	< 0.11
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.026	-	-	< 0.11

Sample Type: Soil						
Sample Name:		S108 0-0.2 11-Nov-2024	S109 0-0.2 11-Nov-2024	S110 0-0.2 11-Nov-2024	S111 0-0.2 11-Nov-2024	S112 0-0.2 11-Nov-2024
Lab Number:		3720278.13	3720278.14	3720278.15	3720278.16	3720278.17
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Fluoranthene	mg/kg dry wt	-	1.05	-	-	0.195
Fluorene	mg/kg dry wt	-	0.051	-	-	0.095
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.165	-	-	< 0.11
Naphthalene	mg/kg dry wt	-	< 0.06	-	-	< 0.06
Perylene	mg/kg dry wt	-	0.017	-	-	< 0.11
Phenanthrene	mg/kg dry wt	-	2.3	-	-	0.46
Pyrene	mg/kg dry wt	-	4.2	-	-	1.47

Sample Name:		S113 0-0.2 11-Nov-2024	S114 0-0.2 11-Nov-2024	S116 0-0.2 11-Nov-2024	S118 0-0.2 11-Nov-2024	S119 0-0.2 11-Nov-2024
Lab Number:		3720278.18	3720278.19	3720278.20	3720278.22	3720278.23
Individual Tests						
Dry Matter	g/100g as rcvd	72	83	89	75	89
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	142	5	210	18	9
Total Recoverable Cadmium	mg/kg dry wt	3.7	0.27	2.3	1.44	0.83
Total Recoverable Chromium	mg/kg dry wt	25	12	35	25	16
Total Recoverable Copper	mg/kg dry wt	70	11	154	40	19
Total Recoverable Lead	mg/kg dry wt	210	56	1,210	380	112
Total Recoverable Nickel	mg/kg dry wt	17	10	22	11	11
Total Recoverable Zinc	mg/kg dry wt	380	141	770	1,880	810
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
alpha-BHC	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
beta-BHC	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
delta-BHC	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.014	< 0.012	0.017	< 0.014	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.014	< 0.012	0.051	< 0.014	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
4,4'-DDE	mg/kg dry wt	< 0.014	< 0.012	0.153	< 0.014	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.014	0.58 #1	0.48	< 0.014	< 0.011
4,4'-DDT	mg/kg dry wt	< 0.014	0.180 #1	2.6	< 0.014	< 0.011
Total DDT Isomers	mg/kg dry wt	< 0.09	0.76	3.4	< 0.09	< 0.07
Dieldrin	mg/kg dry wt	< 0.014	< 0.012	0.133	< 0.014	< 0.011
Endosulfan I	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Endosulfan II	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Endrin	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Endrin ketone	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Heptachlor	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Methoxychlor	mg/kg dry wt	< 0.014	< 0.012	< 0.011	< 0.014	< 0.011
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	1.1	-	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.014	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	-	-	-	-
Acenaphthylene	mg/kg dry wt	0.016	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.014	-	-	-	-
Anthracene	mg/kg dry wt	0.016	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	0.024	-	-	-	-

Sample Type: Soil						
Sample Name:		S113 0-0.2 11-Nov-2024	S114 0-0.2 11-Nov-2024	S116 0-0.2 11-Nov-2024	S118 0-0.2 11-Nov-2024	S119 0-0.2 11-Nov-2024
Lab Number:		3720278.18	3720278.19	3720278.20	3720278.22	3720278.23
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.025	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.043	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.043	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.039	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	0.067	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.091	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	-	-	-	-
Chrysene	mg/kg dry wt	0.022	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	-	-	-	-
Fluoranthene	mg/kg dry wt	0.044	-	-	-	-
Fluorene	mg/kg dry wt	< 0.014	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.048	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	-	-	-	-
Perylene	mg/kg dry wt	< 0.014	-	-	-	-
Phenanthrene	mg/kg dry wt	0.050	-	-	-	-
Pyrene	mg/kg dry wt	0.64	-	-	-	-

Sample Name:		S120 0-0.1 13-Nov-2024	S121 0-0.1 13-Nov-2024	S123 0-0.2 13-Nov-2024	TP-01 11-Nov-2024	TP-02 11-Nov-2024
Lab Number:		3720278.24	3720278.25	3720278.26	3720278.27	3720278.28
Individual Tests						
Dry Matter	g/100g as rcvd	94	84	89	90	88
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	22	39	13	5	10
Total Recoverable Cadmium	mg/kg dry wt	16.7	9.7	0.34	0.16	0.12
Total Recoverable Chromium	mg/kg dry wt	69	68	19	16	17
Total Recoverable Copper	mg/kg dry wt	390	95	22	9	9
Total Recoverable Lead	mg/kg dry wt	420	440	86	17.4	17.1
Total Recoverable Nickel	mg/kg dry wt	34	37	12	13	13
Total Recoverable Zinc	mg/kg dry wt	1,270	930	117	63	58
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
alpha-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
beta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
delta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
4,4'-DDD	mg/kg dry wt	0.017	0.036	< 0.011	< 0.011	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
4,4'-DDE	mg/kg dry wt	0.051	0.031	< 0.011	0.018	< 0.012
2,4'-DDT	mg/kg dry wt	0.092	< 0.012	< 0.011	< 0.011	< 0.012
4,4'-DDT	mg/kg dry wt	0.41	0.156	< 0.011	< 0.011	< 0.012
Total DDT Isomers	mg/kg dry wt	0.57	0.23	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	0.73	0.052	< 0.011	< 0.011	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
Endrin	mg/kg dry wt	0.039	< 0.012	< 0.011	< 0.011	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
Endrin ketone	mg/kg dry wt	0.022	< 0.012	< 0.011	< 0.011	< 0.012
Heptachlor	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012

Sample Type: Soil						
Sample Name:		S120 0-0.1 13-Nov-2024	S121 0-0.1 13-Nov-2024	S123 0-0.2 13-Nov-2024	TP-01 11-Nov-2024	TP-02 11-Nov-2024
Lab Number:		3720278.24	3720278.25	3720278.26	3720278.27	3720278.28
Organochlorine Pesticides Screening in Soil						
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
Hexachlorobenzene	mg/kg dry wt	0.102	1.67	< 0.011	< 0.011	< 0.012
Methoxychlor	mg/kg dry wt	< 0.011	< 0.012	< 0.011	< 0.011	< 0.012
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.3	-	-
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.011	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.011	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.011	-	-
Acenaphthene	mg/kg dry wt	-	-	< 0.011	-	-
Anthracene	mg/kg dry wt	-	-	< 0.011	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	0.011	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	0.017	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.026	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.026	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	0.023	-	-
Benzo[e]pyrene	mg/kg dry wt	-	-	0.013	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	0.015	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.011	-	-
Chrysene	mg/kg dry wt	-	-	0.015	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.011	-	-
Fluoranthene	mg/kg dry wt	-	-	0.028	-	-
Fluorene	mg/kg dry wt	-	-	< 0.011	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	0.015	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.06	-	-
Perylene	mg/kg dry wt	-	-	< 0.011	-	-
Phenanthrene	mg/kg dry wt	-	-	0.015	-	-
Pyrene	mg/kg dry wt	-	-	0.034	-	-

Sample Name:		TP-03 11-Nov-2024	TP-04 11-Nov-2024	TP-05 11-Nov-2024	TP-06 11-Nov-2024	TP-07 11-Nov-2024
Lab Number:		3720278.29	3720278.30	3720278.31	3720278.32	3720278.33
Individual Tests						
Dry Matter	g/100g as rcvd	90	88	89	87	88
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	9	7	5	5	5
Total Recoverable Cadmium	mg/kg dry wt	0.16	0.19	0.15	0.18	0.14
Total Recoverable Chromium	mg/kg dry wt	17	17	16	16	16
Total Recoverable Copper	mg/kg dry wt	10	10	9	9	9
Total Recoverable Lead	mg/kg dry wt	17.2	19.2	17.7	17.0	17.6
Total Recoverable Nickel	mg/kg dry wt	14	14	13	13	13
Total Recoverable Zinc	mg/kg dry wt	63	67	61	61	60
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
alpha-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
beta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
delta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
4,4'-DDE	mg/kg dry wt	0.014	0.011	0.019	0.028	0.013

Sample Type: Soil						
Sample Name:		TP-03 11-Nov-2024	TP-04 11-Nov-2024	TP-05 11-Nov-2024	TP-06 11-Nov-2024	TP-07 11-Nov-2024
Lab Number:		3720278.29	3720278.30	3720278.31	3720278.32	3720278.33
Organochlorine Pesticides Screening in Soil						
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.012	< 0.012	0.018	0.015
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Endosulfan I	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Endosulfan II	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Endrin	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Endrin ketone	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Heptachlor	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011
Methoxychlor	mg/kg dry wt	< 0.011	< 0.012	< 0.012	< 0.012	< 0.011

Sample Name:		TP-08 11-Nov-2024	TP-09 13-Nov-2024	TP-10 11-Nov-2024	TP-11 11-Nov-2024	TP-12 13-Nov-2024
Lab Number:		3720278.34	3720278.35	3720278.36	3720278.37	3720278.38
Individual Tests						
Dry Matter	g/100g as rcvd	89	89	89	89	90
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	7	5	4	5	5
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.17	0.16	0.15	0.12
Total Recoverable Chromium	mg/kg dry wt	16	15	15	16	16
Total Recoverable Copper	mg/kg dry wt	10	9	8	8	8
Total Recoverable Lead	mg/kg dry wt	17.2	15.3	14.3	15.8	16.2
Total Recoverable Nickel	mg/kg dry wt	14	12	12	13	12
Total Recoverable Zinc	mg/kg dry wt	62	57	55	55	58
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
alpha-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
beta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
delta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
4,4'-DDE	mg/kg dry wt	0.017	0.033	< 0.011	< 0.011	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
4,4'-DDT	mg/kg dry wt	0.018	0.023	< 0.011	0.012	< 0.011
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Endrin	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011

Sample Type: Soil						
Sample Name:		TP-13 11-Nov-2024	TP-14 11-Nov-2024	TP-15 11-Nov-2024	TP-16 11-Nov-2024	TP-17 13-Nov-2024
Lab Number:		3720278.39	3720278.40	3720278.41	3720278.42	3720278.43
Individual Tests						
Dry Matter	g/100g as rcvd	88	88	87	86	87
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	6	5	5	5
Total Recoverable Cadmium	mg/kg dry wt	0.16	0.17	0.13	0.15	0.16
Total Recoverable Chromium	mg/kg dry wt	16	16	16	17	16
Total Recoverable Copper	mg/kg dry wt	9	9	8	9	9
Total Recoverable Lead	mg/kg dry wt	17.3	17.4	16.0	18.1	17.0
Total Recoverable Nickel	mg/kg dry wt	12	13	13	14	13
Total Recoverable Zinc	mg/kg dry wt	61	63	59	63	61
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
alpha-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
beta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
delta-BHC	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDE	mg/kg dry wt	0.022	0.018	0.013	< 0.012	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
4,4'-DDT	mg/kg dry wt	0.018	< 0.011	< 0.011	< 0.012	< 0.011
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Endrin	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.012	< 0.011

Sample Name:		TP-18 13-Nov-2024	TP-19 13-Nov-2024	TP-20 11-Nov-2024	TP-21 11-Nov-2024	TP-22 13-Nov-2024
Lab Number:		3720278.44	3720278.45	3720278.46	3720278.47	3720278.48
Individual Tests						
Dry Matter	g/100g as rcvd	87	87	85	88	92
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	13	5	5	5
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.17	0.13	0.15	0.13
Total Recoverable Chromium	mg/kg dry wt	18	18	17	16	17
Total Recoverable Copper	mg/kg dry wt	10	10	8	8	9
Total Recoverable Lead	mg/kg dry wt	20	20	15.7	16.9	17.1
Total Recoverable Nickel	mg/kg dry wt	15	14	14	13	14
Total Recoverable Zinc	mg/kg dry wt	69	65	59	58	62
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
alpha-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
beta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
delta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011

Sample Type: Soil						
Sample Name:		TP-18 13-Nov-2024	TP-19 13-Nov-2024	TP-20 11-Nov-2024	TP-21 11-Nov-2024	TP-22 13-Nov-2024
Lab Number:		3720278.44	3720278.45	3720278.46	3720278.47	3720278.48
Organochlorine Pesticides Screening in Soil						
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Endosulfan I	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Endosulfan II	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Endrin	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Endrin ketone	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Heptachlor	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011
Methoxychlor	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.011	< 0.011

Sample Name:		TP-23 13-Nov-2024	TP-24 11-Nov-2024	TP-25 13-Nov-2024
Lab Number:		3720278.49	3720278.50	3720278.51
Individual Tests				
Dry Matter	g/100g as rcvd	91	86	88
Heavy Metals, Screen Level				
Total Recoverable Arsenic	mg/kg dry wt	5	11	5
Total Recoverable Cadmium	mg/kg dry wt	0.14	0.18	0.25
Total Recoverable Chromium	mg/kg dry wt	16	15	17
Total Recoverable Copper	mg/kg dry wt	8	8	9
Total Recoverable Lead	mg/kg dry wt	16.7	19.0	18.1
Total Recoverable Nickel	mg/kg dry wt	13	13	13
Total Recoverable Zinc	mg/kg dry wt	60	63	66
Organochlorine Pesticides Screening in Soil				
Aldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.012
alpha-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.012
beta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.012
delta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.012	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.012	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.012	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.012	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Endosulfan I	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Endosulfan II	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Endrin	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Endrin ketone	mg/kg dry wt	< 0.011	< 0.012	< 0.012

Sample Type: Soil				
	Sample Name:	TP-23 13-Nov-2024	TP-24 11-Nov-2024	TP-25 13-Nov-2024
	Lab Number:	3720278.49	3720278.50	3720278.51
Organochlorine Pesticides Screening in Soil				
Heptachlor	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.012	< 0.012
Methoxychlor	mg/kg dry wt	< 0.011	< 0.012	< 0.012

Analyst's Comments

#1 DDT prill confirmed by re-analysis.

#2 Chrysene is higher than expected when compared to Benzo[a]anthracene. It is possible that Benzo(l)phenanthrene is present which co-elutes with Chrysene.

#3 Due to some interference found in the chromatography, the sample was diluted and re-analysed. Hence the higher detection limit reported.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1, 3, 5, 8, 12-20, 22-51
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	14, 17-18, 26
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, 8, 12-20, 22-51
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	12-20, 22-51
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	14, 17-18, 26
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	12-20, 22-51
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.	0.024 mg/kg dry wt	14, 17-18, 26
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).	0.024 mg/kg dry wt	14, 17-18, 26

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

Testing was completed between 21-Nov-2024 and 28-Nov-2024. For completion dates of individual analyses please contact the laboratory.

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

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Rolleston Industrial Developments Limited	**Lab No:**	3720281	A2Pv1
Contact:	Mark Crooks C/- Tetra Tech Coffey (NZ) Limited PO Box 8261 Symonds Street Auckland 1050	**Date Received:**	20-Nov-2024	
		Date Reported:	22-Nov-2024	
		Quote No:	86992	
		Order No:	773-CHCGE377712	
		Client Reference:	104 Ryans Road	
		Submitted By:	Nathan Cash	

Sample Type: Soil

Sample Name:		S101 0-0.2 11-Nov-2024	S102 0-0.2 11-Nov-2024	S103 0-0.2 11-Nov-2024	S104 0-0.2 11-Nov-2024
Lab Number:		3720281.1	3720281.3	3720281.5	3720281.8
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	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	708.0	738.4	748.4	674.5
Dry Weight	g	563.4	600.7	571.9	485.8
Moisture*	%	20	19	24	28
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	21.9	40.9	34.8	57.0
Sample Fraction <2mm	g dry wt	540.9	557.9	535.5	427.2
<2mm Subsample Weight	g dry wt	51.3	53.6	52.8	56.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001

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.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1, 3, 5, 8
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1, 3, 5, 8
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1, 3, 5, 8
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1, 3, 5, 8
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; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1, 3, 5, 8
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1, 3, 5, 8
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1, 3, 5, 8
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1, 3, 5, 8
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; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1, 3, 5, 8
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, 3, 5, 8
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1, 3, 5, 8
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, 3, 5, 8
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1, 3, 5, 8
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, 3, 5, 8
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, 3, 5, 8

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

Testing was completed on 22-Nov-2024. For completion dates of individual analyses please contact the laboratory.

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

Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos