

**Commercial in Confidence**

Meridian Energy Limited  
PO BOX 2128  
Christchurch  
Christchurch 8140

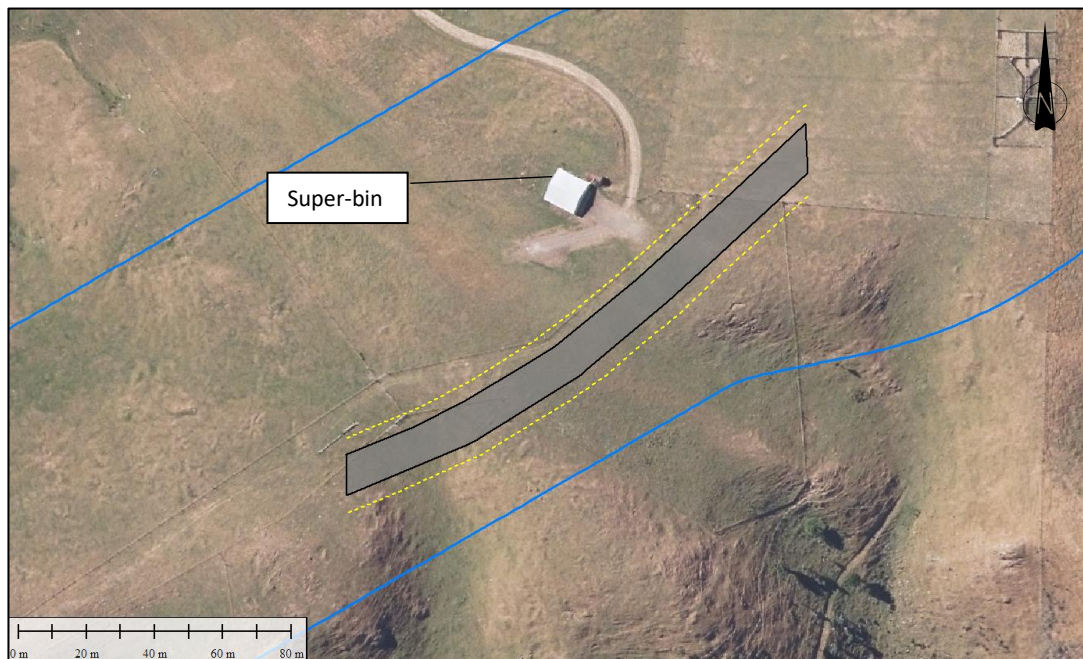
Attention: Nick Bowmar

Dear Nick

**Mount Munro Windfarm Development  
Super Bin Ground Contamination Assessment**

**1 Introduction**

Tonkin & Taylor Ltd (T+T) has been commissioned by Meridian Energy Limited to complete an assessment of the area surrounding the super-bin which is within the proposed road envelope of the Mount Munro Windfarm (referred to below as the site). The location of the site, as well as the proposed road envelope and alignment, is presented in Figure 1.1 below.



*Figure 1.1: Super-bin location within proposed road envelope (shown by blue line) and proposed road alignment (formed road in grey and buffer shown by yellow dotted line).*

This report has been prepared in general accordance with the requirements for a DSI referred to in the NESCS regulations, and as outlined in the MfE's Contaminated Land Management Guidelines<sup>1</sup>.

The persons undertaking, managing reviewing and certifying this investigation are suitably qualified and experienced practitioners (SQEP), as required by the NESCS and defined in the NESCS Users' Guide (April 2012).

This report was undertaken in accordance with the Variation Order (VO13) of 9 May 2024 to our signed Services Agreement of 16 November 2021.

## 2 Background and scope

We understand that the proposed road envelope for the Mount Munro Windfarm encompasses the existing super-bin on site, however the super-bin and immediate adjacent area are unlikely to be disturbed as part of the development of the access road. The super-bin area has been identified as an area of concern within the Council's Peer Reviewers comments, within Appendix F of the Section 87F Report<sup>2</sup>.

To address the Council's Peer Reviewers comments within Appendix F of the Section 87F Report, and to undertake the assessment of the potential impacts of the super-bin we have completed the following scope of works additional to the PSI report:

- Preparation for site work (including updating site safety documentation, liaising with laboratory and confirming sampling plan with technical reviewer).
- Carry out a site visit to collect approximately 10 soil samples from the surface and at 0.2 m bgl.
- Submitting samples to, and liaising with, the laboratory. Samples were analysed for contaminants associated with fertiliser storage, including; cadmium and organochlorine pesticides.
- Preparation of this letter report interpreting the sample results and responding to the Section 87F comments relating to Contaminated Land.

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<sup>1</sup> Ministry for the Environment, 2021. Contaminated Land Management Guidelines No 1 – Reporting on Contaminated Sites in New Zealand.

<sup>2</sup> 15 March 2024, Section 87F Report of Sarah Newall – Site Contamination, on behalf of Manawatū-Whanganui Regional Council, Greater Wellington Regional Council, Tararua District Council and Masterton District Council.

### 3 General information on super phosphate storage bins

Super-bins have historically been used in New Zealand for storage of single superphosphate (SSP: a mixture of monocalcium phosphonate and gypsum) to enable aerial topdressing of hill country farms. The storage bin allows for bulk storage for rapid reloading of planes next to topdressing airstrips. The bins are concrete based and protected from moisture entry with a retractable roof.

The nutrient profile in SSP is 9-10% phosphorus, 11-12% sulphur and 20% calcium. SSP contains an impurity profile of toxic metals, these differ depending on the origin of the phosphate rock, however in practice blending of different rocks by the fertiliser companies to meet quality standards means that final fertiliser batches are typically consistent in composition. The contaminant of primary concern to human health in SSP is cadmium. Currently New Zealand operates to a voluntary industry standard of 280 mg Cd/kg P, this has been in place since 1997. The Fertiliser Association of New Zealand (FANZ) reported that the median cadmium concentration in 7803 samples over the years 2005-2023 was 176 mg Cd/kg P. <sup>3</sup>Prior to the mid-1990s there was reliance on Nauru rock phosphate which produced SSP with average cadmium levels of ~550 mg Cd/ kg P. <sup>4</sup> Based on a bulk product containing up to 10% phosphorus the historical range was up 55 mg/kg cadmium, with more recent long-term trends being 17.6 mg/kg.

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<sup>3</sup> FANZ, 2024. Fertiliser use in NZ. [https://www.fertiliser.org.nz/Site/about-fertiliser/fertiliser\\_use\\_in\\_nz.aspx](https://www.fertiliser.org.nz/Site/about-fertiliser/fertiliser_use_in_nz.aspx)

<sup>4</sup> McDowell, R.W., 2012. The rate of accumulation of cadmium and uranium in a long-term grazed pasture: implications for soil quality. New Zealand Journal of Agricultural Research 55, 133-146.

## 4 Soil sampling

Surface soil sampling was undertaken at 10 locations within the project site. The objective of the soil sampling was to undertake a preliminary assessment of potential contaminant concentrations in soils that are adjacent to the super-bin and within the proposed road envelope.

The following observations were made during the site visit:

- A gravelled area containing the access track to the super-bin and a truck turn around area is present to the east of the super-bin. The remaining area is grassed, with no plant stress evident.
- Samples SB\_SS01-SS04 were predominantly silty topsoil with some gravels, increasing in number and size with depth. Samples SB\_SS05-SS10 were adjacent to and within the gravelled area and the material encountered in these locations was a silty gravel. Due to the gravels being tightly packed beneath the surface locations SB\_SS05-SS08 and SS10 were unable to be excavated to 0.2 m bgl. These locations were outside of the area most likely to be used for the development of the access road.
- An area of spilled fertiliser with visible small green pellets (prills), likely where equipment is loaded, was observed on the southern end of the gravelled track. Sample SB\_SS07 was collected within this area and tested for barium and selenium on the basis the pellets could be a barium selenate fertiliser.

The sampling plan showing the sampling locations and nearby features is included in Appendix A Figure 1.

### 4.1 Soil sampling procedure

Sampling was undertaken on 15 May 2024 by a T+T contaminated land consultant in general accordance with the requirements of the NESCS<sup>5</sup> and CLMG No. 5<sup>6</sup>, using the following procedure:

- Freshly gloved hands, a spade and a hand-trowel, were used to collect samples directly from the surface soils and sub-surface soil. Surface samples were collected between depths of 0.0 m bgl to 0.1 bgl and deeper samples were collected between 0.15 – 0.2 m bgl.
- Samples were placed into laboratory supplied sample containers.
- The spade and trowel were decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent).
- Samples were delivered to IANZ accredited Hill Laboratories under chain of custody documentation for analysis.
- Surface samples collected were selected for initial analysis. Based on the results of these samples, no further analysis on the deeper samples has been required to complete the assessment.

<sup>5</sup> Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

<sup>6</sup> Ministry for the Environment. Updated 2021. Contaminated Land Management Guidelines No. 5: Site investigation and Analysis of Soils. Ministry for the Environment, Wellington.

## 4.2 Analytical results

The assessment criteria were selected in accordance with the requirements of the regulatory framework, in particular, in accordance with the MfE Methodology<sup>7</sup>. Commercial/industrial land use criteria were used to provide an assessment for workers completing the construction of the access road. The ecological soil guidance value investigation trigger has been used to assess environmental risk<sup>8</sup>.

A summary table of the analytical results for the tested samples is included as Table 1 in Appendix B and full laboratory transcripts are included in Appendix C. The results indicate:

- Cadmium concentrations were found to be below the human health criteria for a commercial/industrial land use, in all samples.
- Cadmium concentrations were found to be above the applicable background concentrations<sup>9</sup> in samples collected within 30 m east of the super-bin. Along the transect sample line, concentrations decreased with distance from the super-bin and equipment filling areas, to being below the criteria after 30 m from the source.
- The average cadmium concentration (0.47 mg/kg) across the three sample locations within the proposed roadway area (SB\_SS01-03) is below the applicable background criteria of 0.65 mg/kg.
- Cadmium concentrations are highest in the area where the top-dressing plane may be loaded and/or start its take-off, this is consistent with previous reporting of top dressing airstrips.<sup>10</sup>
- Cadmium concentrations did not exceed the ecological soil guidance value investigation trigger.
- Barium was detected in sample SB\_SS07-0-0.02, where fertiliser and prills were observed on the ground surface. This may relate to a barium salt used in the prills or accumulation over time from the barium content in the SSP. Selenium was not detected in this sample.
- Both metals were found to be below Class A Landfill Screening Criteria, therefore the material is likely to be suitable for landfill disposal, subject to the landfill operators' approval.
- No organochlorine pesticides were detected above laboratory detection limit, in any of the analysed samples.

## 4.3 Implications for site development

The sample results in the area surrounding the super-bin show that there are no significant constraints, relating to contamination, for the development of the roadway in the proposed alignment, shown in Figure 1.1.

As the result of the samples collected from the area of the proposed roadway were found to be below the applicable background concentration for a rural scenario, the National Environmental Standards for Assessing and Managing Contamination in Soil to Protect Human Health<sup>11</sup> (NESCS) will not apply to the development of the roadway in the proposed alignment.

<sup>7</sup> Ministry for the Environment, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment. Criteria for residential (25% produce) land use used.

<sup>8</sup> Cavanagh, J., Harmsworth, G., 2022. Exploring the implementation of ecological soil guideline values for soil contaminants

<sup>9</sup> Ministry for Primary Industries, 2008. Report One – Cadmium in New Zealand Agriculture. National Cadmium Background Concentration.

<sup>10</sup> Taylor, M., Kratz, S., Kim, N., Drewry, J., 2014. Fertiliser associated trace elements in 2 transects of soils away from an airfield fertiliser bin sampled 20 years apart. Proceedings of the NZ Trace Elements Group Conference 2014, Wellington.

<sup>11</sup> Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

## 5 Summary

T+T has been commissioned by Meridian Energy Limited to undertake a Ground Contamination Assessment for the super-bin located within the Mount Munro Windfarm development area.

A summary of the findings is below:

- The average cadmium concentration across the three sample locations within the proposed roadway area (SB\_SS01-03) is below the applicable background criteria.
- Cadmium was found to be above background concentrations within 30 m of the super-bin, however below the relevant human health and soil ecological risk criteria. Cadmium concentrations present in soils, show decreasing concentrations with distance from the super-bin and area where fertiliser spreading equipment is loaded. The results show that the material is below the Class A Landfill Screening Criteria and, subject to approval from the landfill operator, is likely to be suitable for disposal to a landfill facility.

## 6 Applicability

This report has been prepared for the exclusive use of our client Meridian Energy Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that this report will be used by Masterton District Council, Tararua District Council, Greater Wellington regional Council and Horizons Regional Council in undertaking their regulatory functions in connection with assessing the consent application for the development of the Mount Munro Windfarm.

Tonkin & Taylor Ltd

Report prepared by:



Kasey Pitt  
Contaminated Land Consultant

Authorised for Tonkin & Taylor Ltd by:



Nick Peters  
Project Director

Report certified by a suitably qualified and experienced practitioner as prescribed under the NESCS and the NESCS Users Guide (April 2012):



Dr Andrew Pearson  
Senior Environmental Consultant

8-Jul-24

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## **Appendix A      Sample Location Plan**

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## **Appendix B      Results Summary Table**

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Table 1: Soil Samples Results - Mount Munro Windfarm Super-Bin <sup>1</sup>

Sample ID	SB_SS01_0-0.1	SB_SS02_0-0.1	SB_SS03_0-0.1	SB_SS04_0-0.1	SB_SS05_0-0.02	SB_SS06_0-0.05	SB_SS07_0-0.02	SB_SS08_0-0.1	SB_SS09_0-0.1	SB_SS09_0.2	SB_SS10_0-0.02	DUP1 Duplicate of SS06_0-0.02	National Background Range <sup>2</sup>	Eco-SGVs Combined Site Investigation Trigger Values <sup>3</sup>	Soil Contaminant Standard for Outdoor Worker (unpaved) <sup>4</sup>	Class A Landfill Screening Criteria <sup>5</sup>
Laboratory Reference	3582667.01	3582667.03	3582667.05	3582667.07	3582667.09	3582667.1	3582667.11	3582667.12	3582667.13	3582667.14	3582667.15	3582667.16				
Date	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024				
Depth (m)	0-0.1	0-0.1	0-0.1	0-0.1	0-0.02	0-0.05	0-0.02	0-0.1	0-0.1	0.2	0-0.02	0-0.02				
Geological unit	SILT	SILT	SILT	SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT				
Heavy Metals																
Barium	-	-	-	-	-	-	171	-	-	-	-	-	-	-	750 <sup>5</sup>	2,000
Cadmium	0.22	0.38	0.81	0.78	1.57	1.12	7.2	6.9	0.82	0.29	1.05	1.04	0.65	12	1,300	20
Selenium	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	80 <sup>5</sup>	200
Organochlorine Pesticides (OCPs) <sup>7</sup>																

Notes:

7.2	Exceeds applicable background concentration
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1. All results in mg/kg  
2. Upper limit of background concentrations from Landcare Research, 2016. Predicted background soil concentrations for sandstone soil type.  
3. Criteria from MPI, 2008. Report One: Cadmium in New Zealand Agriculture. National Cadmium Background Concentration.  
4. Criteria from MfE, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (unless otherwise stated).  
5. Criteria from Canadian Council of Ministers of the Environment, 2013. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Agricultural Land Use.  
6. Criteria from MfE, 2004. Landfill Waste Acceptance Criteria and Landfill Classification.  
7. No OCPS were detected above laboratory detection limit and therefore have not been included within the results table.

## **Appendix C      Laboratory Transcript**

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## Certificate of Analysis

Page 1 of 3

<b>Client:</b>	Tonkin & Taylor	<b>Lab No:</b>	3582667	SPV1
<b>Contact:</b>	Kasey Pitt	<b>Date Received:</b>	16-May-2024	
	C/- Tonkin & Taylor	<b>Date Reported:</b>	22-May-2024	
	PO Box 2083	<b>Quote No:</b>	130984	
	Wellington 6140	<b>Order No:</b>	1016884.0003	
		<b>Client Reference:</b>	1016884.0003	
		<b>Submitted By:</b>	Kasey Pitt	

### Sample Type: Soil

Sample Name:	SB_SS01_0-0.1	SB_SS02_0-0.1	SB_SS03_0-0.1	SB_SS04_0-0.1	SB_SS05_0-0.02
	15-May-2024	15-May-2024	15-May-2024	15-May-2024	15-May-2024
Lab Number:	3582667.1	3582667.3	3582667.5	3582667.7	3582667.9

#### Individual Tests

Dry Matter	g/100g as rcvd	72	78	73	69	84
Total Recoverable Cadmium	mg/kg dry wt	0.22	0.38	0.81	0.78	1.57

#### Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
alpha-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
beta-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
delta-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.09	< 0.08	< 0.08	< 0.09	< 0.08
Dieldrin	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endosulfan I	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endosulfan II	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endrin	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endrin ketone	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Heptachlor	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Methoxychlor	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012

Sample Name:	SB_SS06_0-0.05	SB_SS07_0-0.02	SB_SS08_0-0.1	SB_SS09_0-0.1	SB_SS09_0.2
	15-May-2024	15-May-2024	15-May-2024	15-May-2024	15-May-2024
Lab Number:	3582667.10	3582667.11	3582667.12	3582667.13	3582667.14

#### Individual Tests

Dry Matter	g/100g as rcvd	83	80	85	80	78
Total Recoverable Barium	mg/kg dry wt	-	171	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	1.12	7.2	6.9	0.82	0.29
Total Recoverable Selenium	mg/kg dry wt	-	< 20	-	-	-



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

Sample Type: Soil						
Sample Name:		SB_SS06_0-0.05 15-May-2024	SB_SS07_0-0.02 15-May-2024	SB_SS08_0-0.1 15-May-2024	SB_SS09_0-0.1 15-May-2024	SB_SS09_0.2 15-May-2024
Lab Number:		3582667.10	3582667.11	3582667.12	3582667.13	3582667.14
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
alpha-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
beta-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
delta-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	< 0.07	< 0.08	< 0.08
Dieldrin	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endosulfan I	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endosulfan II	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endrin	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endrin ketone	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Heptachlor	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Methoxychlor	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013

Sample Name:		SB_SS10_0-0.02 15-May-2024		DUP1 15-May-2024	
Lab Number:		3582667.15		3582667.16	
Individual Tests					
Dry Matter	g/100g as rcvd	79		83	
Total Recoverable Cadmium	mg/kg dry wt	1.05		1.04	
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.013		< 0.012	
alpha-BHC	mg/kg dry wt	< 0.013		< 0.012	
beta-BHC	mg/kg dry wt	< 0.013		< 0.012	
delta-BHC	mg/kg dry wt	< 0.013		< 0.012	
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013		< 0.012	
cis-Chlordane	mg/kg dry wt	< 0.013		< 0.012	
trans-Chlordane	mg/kg dry wt	< 0.013		< 0.012	
2,4'-DDD	mg/kg dry wt	< 0.013		< 0.012	
4,4'-DDD	mg/kg dry wt	< 0.013		< 0.012	
2,4'-DDE	mg/kg dry wt	< 0.013		< 0.012	
4,4'-DDE	mg/kg dry wt	< 0.013		< 0.012	
2,4'-DDT	mg/kg dry wt	< 0.013		< 0.012	
4,4'-DDT	mg/kg dry wt	< 0.013		< 0.012	
Total DDT Isomers	mg/kg dry wt	< 0.08		< 0.08	
Dieldrin	mg/kg dry wt	< 0.013		< 0.012	
Endosulfan I	mg/kg dry wt	< 0.013		< 0.012	
Endosulfan II	mg/kg dry wt	< 0.013		< 0.012	
Endosulfan sulphate	mg/kg dry wt	< 0.013		< 0.012	
Endrin	mg/kg dry wt	< 0.013		< 0.012	
Endrin aldehyde	mg/kg dry wt	< 0.013		< 0.012	
Endrin ketone	mg/kg dry wt	< 0.013		< 0.012	
Heptachlor	mg/kg dry wt	< 0.013		< 0.012	
Heptachlor epoxide	mg/kg dry wt	< 0.013		< 0.012	

Sample Type: Soil			
Sample Name:		SB_SS10_0-0.02 15-May-2024	DUP1 15-May-2024
Lab Number:		3582667.15	3582667.16
Organochlorine Pesticides Screening in Soil			
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.012
Methoxychlor	mg/kg dry wt	< 0.013	< 0.012

## 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, 7, 9-16
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1, 3, 5, 7, 9-16
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1, 3, 5, 7, 9-16
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 3, 5, 7, 9-16
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 5, 7, 9-16
Total Recoverable Barium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	11
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1, 3, 5, 7, 9-16
Total Recoverable Selenium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	11

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

Testing was completed between 17-May-2024 and 22-May-2024. For completion dates of individual analyses please contact the laboratory.

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

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



Kim Harrison MSc  
Client Services Manager - Environmental