

# ENCLOSURE P

Preliminary (Contaminated Soil) Site Investigation

EAM Environmental Consultants

# PRELIMINARY SITE INVESTIGATION

## 996 STATE HIGHWAY 2 WHIRINAKI

PROJECT NO. EAM2238-01

PREPARED FOR  
STAN EVANS

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FEBRUARY 2022


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## 1 INTRODUCTION

EAM NZ Limited (EAM) has been engaged by Stan Evans undertake a Preliminary Site Investigation (PSI), at 996 State Highway 2, Whirinaki (hereon in referred to as the Site). It is our understanding that the site is proposed for residential development.

This PSI has been undertaken to provide a contamination assessment of the Site and to evaluate human health risks at the Site. A phased approach has been adopted for this investigation with an initial investigation, assembling background information to identify potential sources of contamination from past and present activities. This information is then used to develop a conceptual Site model and investigation strategy.

This report provides the following information:

- Background information.
- Site history.
- A conceptual Site model.
- Site visit and sampling
- Laboratory results.
- Conclusions and recommendations.

This investigation has been carried out in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES).

### 1.1 SCOPE

The following scope of work was completed:

- Review of available information from Hastings District Council, namely, the Listed Land Use Register (LLUR), historical aerial photographs, and available environmental reports.
- Review of the environmental setting of the site
- Collection of soil samples.
- Analysis of soil samples at an accredited laboratory for:
  - Heavy metals
  - OCP
- Preparation of a PSI report, including presentation and interpretation of results in accordance with the requirements of the NESCS and with the current edition of the 2021 MfE Contaminated Land Management Guidelines No. 1 and No. 5.

This assessment has been undertaken by a Suitably Qualified Environmental Practitioner (SQEP) in the field of contaminated land assessments. The SQEP holds a BSc Degree in Environmental Science.

## 1.2 LIMITATIONS

This report: has been prepared by EAM for STAN EVANS and may only be used and relied on by Hastings District Council for the purpose agreed between EAM and STAN EVANS as set out in section 1.1 of this report. EAM otherwise disclaims responsibility to any person other than STAN EVANS arising in connection with this report. EAM also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by EAM in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. EAM has no responsibility or obligation to update this report to account for events or changes occurring after the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by EAM described in this report (refer section(s) 1.3 of this report). EAM disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the site conditions, such as the location of buildings, services, and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. EAM does not accept responsibility arising from, or in connection with, any change to the site conditions. EAM is also not responsible for updating this report if the site conditions change.

EAM has prepared this report based on information provided STAN EVANS and others who provided information to EAM (including Government authorities), which EAM has not independently verified or checked beyond the agreed scope of work. EAM does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Notwithstanding the Report Limitations, we confirm that Hastings District Council can rely on this report for the purposes of determining compliance with the NES guidelines with respect to the development identified in this assessment.

## 1.3 ASSUMPTIONS

EAM has made the following assumptions during the preparation of this report:

- Information obtained from third parties and STAN EVANS is complete and accurate.
- The observed and inferred conditions are representative of the actual conditions associated with HAIL sites and / or other sites not directly assessed.
- That the future land use of the site will remain residential.

## 2 SITE DETAILS

### 2.1 SITE DESCRIPTION

The Site is located at 996 State Highway 2 with the legal description SECS 44 PT 25 BLK XII PUKETAPU SD LOT 8 DP 381095 LOT 101 DP 505383 LOT 1 DP 3354 LOT 2 PT 1 DP 4741 LOT 1 DP 9884. This investigation is restricted to Lot 101 DP505383. The site is classified as rural residential and occupies an area of approximately 9.45Ha.

Figure 1, Appendix A details the site boundaries.

## 3 ENVIRONMENTAL SETTING

Soils at the site are described by Landcare Research (2020) as Brown Soils. Soils at the Site are described by Landcare Research (2020) as being Brown Soils. Brown soils are typically found in areas where and soils remain damp throughout the year. They are found in areas of high rainfall; hence soils are prone to leaching of nutrients, which makes them acidic. Brown soils have limited fertility and they typically present as dark grey-brown topsoils, caused by thin coatings of oxides weathered from parent material. Sub soils are brown, or yellow brown in colour.

Groundwater in the area is sourced from the Esk (Whirinaki-Bayview) aquifer System. This system consists of river and beach gravel sediments adjacent to the coast, along with mixed silts and sands (Dravid, 1997). Here, coastal gravels overlie a limestone unit, which forms an interconnected unconfined-confined aquifer system. Groundwater flow is towards the coast, and unconfined aquifer water levels are typically less than 10m. Groundwater levels are influenced by rainfall and ocean tides.

A review of groundwater wells within 1km of the site was completed based on data sourced from Hawkes Bay Regional Council (HBRC). The review found twenty-one groundwater wells within 300m of the site. Static water levels in these wells typically range between 6-8m bgl, with all drilled to depths less than 12 meters.

The nearest significant surface waterway is the Esk River, located approximately 200m to the south and west of the Site. A tributary of this river travels along the western boundary of the site, draining southwards. The Esk River is one of the major rivers in Hawkes Bay, which originates in the Maungaharuru Ranges north of Napier. It travels southwards to Eskdale, where it then travels eastwards, eventuating at the Pacific Ocean.

## 4 PROPERTY HISTORY

A desktop study was undertaken to gain an understanding of the history of the site. The review looks to determine potential contaminants which may be present at the site because of past and present land uses. The following information was sourced to establish the history of the site:

- Hastings District Council Property Search
- Historical Aerial Photographs
- HAIL review
- Site Visit

### 4.1 HASTINGS DISTRICT COUNCIL PROPERTY SEARCH

A review of Hastings District Council Property records found no reference to potential contaminant sources.

## 4.2 HISTORICAL AERIAL PHOTOGRAPHS

Historical aerial photographs of the site, from 1936 through to 2021, were sourced from Retrolens, Hastings District Council and Google Maps. Aerial photographs for the years 1936, 1948, 1953, 1964, 1981, 1988, 1999, 2009, 2018 and 2021 are presented in Appendix B.

The earliest historical imagery available is from 1936 and shows the site as bare land, most likely used for farming. The site remains in this same configuration with no significant changes right through until the current day.

## 4.3 HAZARDOUS ACTIVITIES AND INDUSTRIES LIST

The site is not considered to have HAIL activities undertaken at the site.

## 4.4 SITE VISIT

A site visit was completed on Thursday 3rd February. Site photographs are presented in Appendix C.

The site is a large vacant allotment which is currently grassed. It is fenced with conventional fencing on all boundaries. Access is via double gates off North Shore Road. The ground surface is relatively flat and firm. Residential development extends along the northern and eastern boundaries. To the immediate west is a small tributary of the Esk River which travels the entire length of the western boundary. Across the tributary to the west, and south of the site is farmland.

# 5 CONCEPTUAL SITE MODEL

## 5.1 RATIONALE

The overall rationale for the site investigation was to determine whether historical activities on the Site may have caused soil contamination that might impact site workers or occupiers of the site, during the construction phase of the extension. The following is an analysis of potential contaminants, receptors, and pathways between potentially contaminated soils, and the proposed Industrial land use.

### 5.1.1 HAZARDOUS SUBSTANCES AND POTENTIAL CONTAMINANTS OF CONCERN

For the purposes of this investigation, the following contaminants were considered.

- Metals
- Organo-Chlorine Pesticides (OCP)

These contaminants were considered for analysis to assess for historical contaminants which might be found because of orchard pesticides.

OCP was considered based on the site being farmland since 1936. Farmland can be associated with soil contamination due to historical pesticide use, particularly metal-based applications, and Organochlorine Pesticides. Analysis was completed to confirm that OCP had not been used on the site.

Metals occur naturally in the soil environment from the process of weathering of parent materials. Soils may become contaminated by the accumulation of metals and through leaded paints, land application of fertilisers, animal manures, sewage, pesticides, leaching from treated timber and wastewater irrigation. Most metals do not undergo microbial or chemical degradation hence, their total concentration in soils persists for a long time.

### 5.1.2 POTENTIALLY RELEVANT SENSITIVE HUMAN AND ECOLOGICAL RECEPTORS

The site is rural residential land use (25% produce), which is considered the most sensitive of land uses. The MFEs National Environmental Standard (NESCS) for soil contaminants, considers that residential landowners may use the land for activities such as vegetable gardening or fruit trees. These activities pose a risk to the consumer/landowner's where contaminated soils are involved in an exposure pathway.

The following potential receptors were identified as being relevant to the Site:

- Earthworks, construction, maintenance, and excavation contractors who may encounter potentially contaminated soil during the proposed works via inhalation (dusts).
- Future residents at the Site via inhalation (dusts) and/or ingestion of contaminated soil.

### 5.1.3 EXPOSURE PATHWAYS

A human health risk can only occur when there is a direct link between contaminant source and receptor. Potential complete pathways for this Site may include:

- Dermal (skin) contact with soil, for gardening, construction.
- Direct contact and inhalation of dusts and soil during construction and site works.
- Consumption of foods grown in contaminated soils.
- Consumption of soils, particularly by small children.

## 6 FIELD INVESTIGATION

### 6.1 RATIONALE OF SAMPLE COLLECTION

Sampling locations across the Site were established using reference to the "Contaminated Land Guidelines No. 5" (MfE 2021). These guidelines set out (in Table B1; p91), indicate the *"number of samples required to detect hotspot with 95 percent confidence"*. Samples were collected from six locations and are shown in Figure 2, Appendix A.

Samples were collected using a 150mm soil augur.

Samples were collected directly into laboratory supplied containers and were placed in a chilly bin with ice packs for transport. Samples were couriered to an IANZ accredited laboratory (Hills Laboratories) under standard chain of custody procedures.

### 6.2 SITE LITHOLOGY

Site soils were observed to be consistent across the site as consisting of light brown SILTY sand.

#### 6.2.1 FIELD QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Quality Assurance and Quality Control procedures undertaken during sampling included the following:

- Changing of disposable gloves after each sample.
- Decontamination and rinsing of augur between each sample.
- Collection of soil samples in new, clean, appropriately labelled sample bags and jars.

- Use of chain of custody procedures and forms.
- Use of IANZ accredited laboratories with in-house QA/QC procedures for the analyses requested.

## 7 ASSESSMENT CRITERIA

The following soil assessment criteria have been selected for the site.

### 7.1 THE NATIONAL ENVIRONMENTAL STANDARD FOR ASSESSING AND MANAGING CONTAMINANTS IN SOIL TO PROTECT HUMAN HEALTH (NESCS)

The NESCS sets national standards for contaminants in soil to protect human health. It contains a national set of soil contaminant standards (SCS) for 12 priority contaminants for five standard land use scenarios. The land use category selected for this investigation was Rural Residential (25% Produce) as described in the NES CS User Guide.

### 7.2 THE NATIONAL ENVIRONMENTAL PROTECTION MEASURE

In the absence of New Zealand specific risk-based human health criteria for beryllium, nickel and zinc, the Australian National Environment Protection Measure 2013 (NEPM) guidelines have been adopted for this investigation. The intention of the NEPM is to enable safe use of contaminated land to ensure that contaminated land is appropriately assessed prior to development. The NEPM covers a range of land uses. For the purposes of this assessment, the NEPM Health-based Investigation Level A (Residential land use) have been selected based on the land use and Site attributes.

### 7.3 BACKGROUND CONCENTRATIONS OF HEAVY METALS

Established background concentrations are based on the analysis of soil sample sets collected from major soil types in the Hawkes Bay Region for selected heavy metals. If concentrations of contaminants are found to be at or less than typical background concentrations, then the NES CS does not apply.

## 8 ANALYTICAL RESULTS

The following sections discusses the analytical results by analyte and compares against the adopted human health guideline criteria. In this case, the most appropriate SCS is likely to be those for the NES land use scenario of Rural Residential (25% Produce). The NES description of this land use is as follows:

*“Including home grown produce consumption (25%). Applicable to the residential vicinity of farmhouses for the protection of farming families, but not the productive parts of agricultural land”.*

The analytical results are summarised in Table 1 and 2 in Appendix D, along with the laboratory reports. The results of analysis have been compared directly against appropriate (where available) Soil Contaminant Standards (SCS) from the NES Priority contaminants list (MfE, 2012).

### 8.1 BACKGROUND SOIL CONCENTRATIONS

All soil metal concentrations reported by the laboratory are well below the Hawkes Bay Uncontaminated Background Soils standards. Soils at the site are representative of an uncontaminated background soil.

## 8.2 METALS/METALLOIDS

Laboratory analysis reported all samples well below the NES residential (25% produce) standard.

## 8.3 ORGANOCHLORINE PESTICIDES

Trace concentrations of 4,4' DDT Isomers were reported by the laboratory; however, all concentrations were within the NES (25% produce). All other OCP analytes were below the laboratory detection limits.

## 8.4 QUALITY ASSURANCE AND QUALITY CONTROL

### 8.4.1 FIELD DUPLICATES

Duplicate analysis was completed as a means for determining uncertainty, accuracy, and precision of laboratory analysis. One duplicate sample was collected during sampling at the same sample location and depth interval as Samples #4 and labelled as Duplicate 1.

The RPD between samples was calculated according to the following formula:

$$RPD = \frac{(Result\ No.\ 1 - Result\ No.\ 2) \times 100}{(Mean\ of\ result\ No.\ 1 + result\ No.\ 2)}$$

The typical data quality objective is for an RPD to be within 30 – 50% (MfE, 2011a). The RPD results are highly reliable and accurate. RPD calculations are presented in Table 3, Appendix D.

## 8.5 RISK ASSESSMENT

A hazard – pathway – receptor pollution linkage is considered to aid assessment of risk associated with results of the site investigation.

For contaminated soils to pose a risk to a receptor, a complete pathway must exist between the contamination source and the identified receptor(s). If there is an incomplete pathway, then there is no risk. In this instance the results show there is no risk to human health.



## 9 CONCLUSIONS AND RECOMMENDATIONS

From this investigation, due consideration was given to the full range of potential contaminants that might be expected to occur at this site. The following key points summarise this investigation:

- A detailed site history was undertaken to review the historical land use at the site.
- The site has been bare land, likely used for grazing since at least 1936, right through until the present day.
- Six soil samples were collected from across the site to confirm that OCP or heavy metal use had not been utilised as part of farmland pesticide practices.
- two, three-part composite sample was analysed for Organochlorine Pesticides. Analytical results reported trace concentrations of DDT in one composite sample, below the NES rural residential (25% produce).
- All soil metal results are an uncontaminated Hawkes Bay Background Soil.
- All metal results are well below the NES rural residential (25% produce) standard.
- The site is not considered HAIL.
- The site is compliant with NES.

This analysis suggests that historical land use has had environmental impact on the site soils in relation to OCP and heavy metals.

This Site requires no further assessment. It is considered highly unlikely to present a risk to human health.

## 10 REFERENCES

MfE 2021 Contaminated Land Management Guidelines No.1 Reporting on Contaminated Sites in New Zealand. Ministry for the Environment.

MfE 202 Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment.

MfE 2021 Contaminated Land Management Guidelines No.5; Site Investigation and Analysis of Soil. Ministry for the Environment.

Hawkes Bay Region: Background Soil Concentrations for Managing Soil Quality, Landcare Research, 2014.

<https://soils-maps.landcareresearch.co.nz> (2020)



## APPENDIX A-FIGURES

FIGURE 1. SITE BOUNDARIES





FIGURE 2. SAMPLE LOCATIONS



## APPENDIX B- AERIAL PHOTOGRAPY













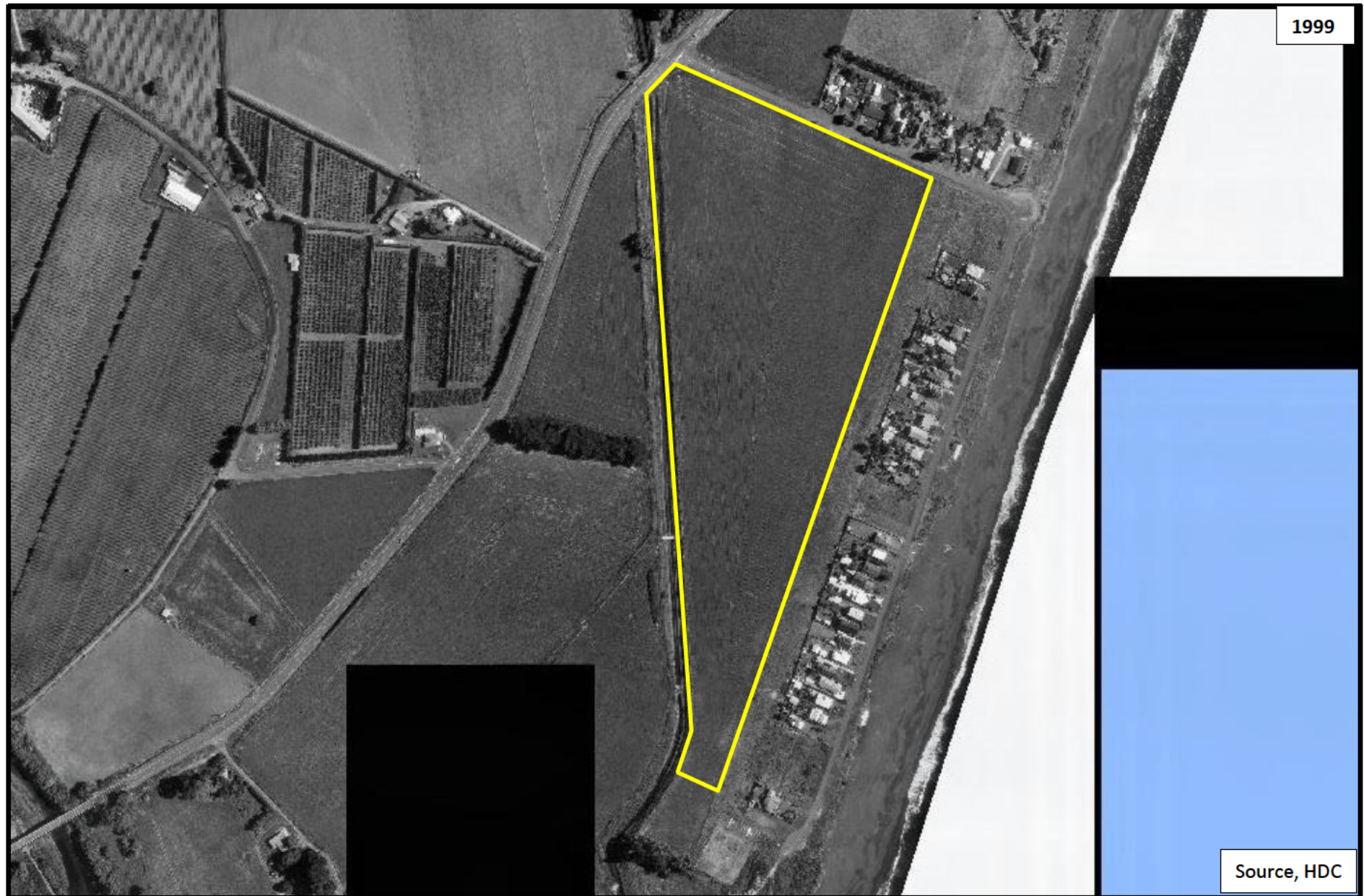
























## APPENDIX C- SITE PHOTOGRAPHS





**Top.** Looking West. **Middle.** Looking South **Bottom.** Looking North





**Top.** Eskdale River tributary on western boundary. **Middle and Bottom.** Additional photos of the site.

## APPENDIX D- ANALYTICAL RESULTS

TABLE 1. SOIL METAL RESULTS

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
Sample Name:	mg/kg dry wt	mg/kg dry wt	mg/kg dry wt	mg/kg dry wt	mg/kg dry wt	mg/kg dry wt	mg/kg dry wt
#1 03-Feb-2022 10:00 am	4	< 0.10	15	7	10.9	12	54
#2 03-Feb-2022 10:00 am	4	< 0.10	16	7	11.3	12	63
#3 03-Feb-2022 10:00 am	4	< 0.10	15	6	8.5	11	57
#4 03-Feb-2022 10:00 am	4	< 0.10	14	7	8.7	11	52
#5 03-Feb-2022 10:00 am	3	< 0.10	14	5	8.8	11	49
#6 03-Feb-2022 10:00 am	4	< 0.10	14	5	8	10	51
HB Background Soil	9	0.7	24	32	27	69	105
NES Rural Residential (25% produce)	17	0.8	290	>10,000	160		
NEPM Residential A						400	7400

TABLE 2. SOIL OCP RESULTS

Organochlorine Pesticides Screening in Soil	units	Adopted Guidelines	Composite of #1, #2 & #3	Composite of #4, #5 & #6
Aldrin	mg/kg dry wt	1.1 <sup>1</sup>	< 0.011	< 0.011
alpha-BHC	mg/kg dry wt		< 0.011	< 0.011
beta-BHC	mg/kg dry wt		< 0.011	< 0.011
delta-BHC	mg/kg dry wt		< 0.011	< 0.011
gamma-BHC (Lindane)	mg/kg dry wt		< 0.011	< 0.011
cis-Chlordane	mg/kg dry wt		< 0.011	< 0.011
trans-Chlordane	mg/kg dry wt	50 <sup>2</sup>	< 0.011	< 0.011
2,4'-DDD	mg/kg dry wt		< 0.011	< 0.011
4,4'-DDD	mg/kg dry wt		< 0.011	< 0.011
2,4'-DDE	mg/kg dry wt		< 0.011	< 0.011
4,4'-DDE	mg/kg dry wt		< 0.011	< 0.011
2,4'-DDT	mg/kg dry wt		< 0.011	< 0.011
4,4'-DDT	mg/kg dry wt		< 0.011	0.011
Total DDT Isomers	mg/kg dry wt	45 <sup>1</sup>	< 0.07	< 0.07
Dieldrin	mg/kg dry wt	1.1 <sup>1</sup>	< 0.011	< 0.011
Endosulfan I	mg/kg dry wt	270 <sup>2</sup>	< 0.011	< 0.011
Endosulfan II	mg/kg dry wt		< 0.011	< 0.011
Endosulfan sulphate	mg/kg dry wt		< 0.011	< 0.011
Endrin	mg/kg dry wt	10 <sup>1</sup>	< 0.011	< 0.011
Endrin aldehyde	mg/kg dry wt		< 0.011	< 0.011
Endrin ketone	mg/kg dry wt		< 0.011	< 0.011
Heptachlor	mg/kg dry wt	6 <sup>2</sup>	< 0.011	< 0.011
Heptachlor epoxide	mg/kg dry wt		< 0.011	< 0.011
Hexachlorobenzene	mg/kg dry wt	10 <sup>2</sup>	< 0.011	< 0.011
Methoxychlor	mg/kg dry wt	300 <sup>2</sup>	< 0.011	< 0.011

<sup>1</sup>-MfE, June 2011. Resource Management (National Environmental Standard for Assessing and managing contaminants in Soil to Protect Human Health) Regulations 2011

<sup>2</sup>-National Environmental Protection (Assessment of Site Contamination) Measure, 1999

TABLE 3. RELATIVE PERCENTILE DIFFERENCES

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
#4 03-Feb-2022 10:00 am	4	< 0.10	14	7	8.7	11	52
Duplicate 1 03-Feb-2022 10:00 am	4	< 0.10	14	7	8.7	11	56
mean	4	0	14	7	8.7	11	54
RPD %	0	0	0	0	0	0	-7





**Hill Laboratories**  
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## Job Information Summary

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<b>Client:</b>	EAM NZ Limited	<b>Lab No:</b>	2854593
<b>Contact:</b>	Karen Toulmin	<b>Date Registered:</b>	04-Feb-2022 12:37 pm
	C/- EAM NZ Limited	<b>Priority:</b>	High
	233B Thompson Road	<b>Quote No:</b>	72316
	RD 10	<b>Order No:</b>	
	Hastings 4180	<b>Client Reference:</b>	Stan Evans
		<b>Add. Client Ref:</b>	
		<b>Submitted By:</b>	Karen Toulmin
		<b>Charge To:</b>	EAM NZ Limited
		<b>Target Date:</b>	10-Feb-2022 4:30 pm

## Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	#1 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level; Composite Environmental Solid Samples
2	#2 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level; Composite Environmental Solid Samples
3	#3 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level; Composite Environmental Solid Samples
4	#4 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level; Composite Environmental Solid Samples
5	#5 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level; Composite Environmental Solid Samples
6	#6 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level; Composite Environmental Solid Samples
7	Duplicate 1 03-Feb-2022 10:00 am	Soil	cpBag	Heavy Metals, Screen Level
8	Composite of #1, #2 & #3	Soil	OrgComp	Organochlorine Pesticides Screening in Soil
9	Composite of #4, #5 & #6	Soil	OrgComp	Organochlorine Pesticides Screening in Soil

## Summary of Methods

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-7
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	1-7
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	8-9
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	8-9
Composite Environmental Solid Samples	Individual sample fractions mixed together to form a composite fraction.	-	1-6

Lab No: 2854593

Hill Laboratories

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**Hill Laboratories**  
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## Certificate of Analysis

Page 1 of 2

<b>Client:</b>	EAM NZ Limited	<b>Lab No:</b>	2854593	SPv1
<b>Contact:</b>	Karen Toulmin	<b>Date Received:</b>	04-Feb-2022	
	C/- EAM NZ Limited	<b>Date Reported:</b>	16-Feb-2022	
	233B Thompson Road	<b>Quote No:</b>	72316	
	RD 10	<b>Order No:</b>		
	Hastings 4180	<b>Client Reference:</b>	Stan Evans	
		<b>Submitted By:</b>	Karen Toulmin	

### Sample Type: Soil

	<b>Sample Name:</b>	#1 03-Feb-2022 10:00 am	#2 03-Feb-2022 10:00 am	#3 03-Feb-2022 10:00 am	#4 03-Feb-2022 10:00 am	#5 03-Feb-2022 10:00 am
	<b>Lab Number:</b>	2854593.1	2854593.2	2854593.3	2854593.4	2854593.5
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	4	4	4	3
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	16	15	14	14
Total Recoverable Copper	mg/kg dry wt	7	7	6	7	5
Total Recoverable Lead	mg/kg dry wt	10.9	11.3	8.5	8.7	8.8
Total Recoverable Nickel	mg/kg dry wt	12	12	11	11	11
Total Recoverable Zinc	mg/kg dry wt	54	63	57	52	49

	<b>Sample Name:</b>	#6 03-Feb-2022 10:00 am	Duplicate 1 03-Feb-2022 10:00 am	Composite of #1, #2 & #3	Composite of #4, #5 & #6
	<b>Lab Number:</b>	2854593.6	2854593.7	2854593.8	2854593.9

### Individual Tests

Dry Matter	g/100g as rcvd	-	-	92	90	-
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### Heavy Metals, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	4	4	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	14	14	-	-	-
Total Recoverable Copper	mg/kg dry wt	5	7	-	-	-
Total Recoverable Lead	mg/kg dry wt	8.0	8.7	-	-	-
Total Recoverable Nickel	mg/kg dry wt	10	11	-	-	-
Total Recoverable Zinc	mg/kg dry wt	51	56	-	-	-

### Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	-	-	< 0.011	< 0.011	-
alpha-BHC	mg/kg dry wt	-	-	< 0.011	< 0.011	-
beta-BHC	mg/kg dry wt	-	-	< 0.011	< 0.011	-
delta-BHC	mg/kg dry wt	-	-	< 0.011	< 0.011	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.011	< 0.011	-
cis-Chlordane	mg/kg dry wt	-	-	< 0.011	< 0.011	-
trans-Chlordane	mg/kg dry wt	-	-	< 0.011	< 0.011	-
2,4'-DDD	mg/kg dry wt	-	-	< 0.011	< 0.011	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.011	< 0.011	-
2,4'-DDE	mg/kg dry wt	-	-	< 0.011	< 0.011	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.011	< 0.011	-
2,4'-DDT	mg/kg dry wt	-	-	< 0.011	< 0.011	-
4,4'-DDT	mg/kg dry wt	-	-	< 0.011	0.011	-
Total DDT Isomers	mg/kg dry wt	-	-	< 0.07	< 0.07	-
Dieldrin	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Endosulfan I	mg/kg dry wt	-	-	< 0.011	< 0.011	-



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						
<b>Sample Name:</b>		#6 03-Feb-2022 10:00 am	Duplicate 1 03-Feb-2022 10:00 am	Composite of #1, #2 & #3	Composite of #4, #5 & #6	
<b>Lab Number:</b>		2854593.6	2854593.7	2854593.8	2854593.9	
Organochlorine Pesticides Screening in Soil						
Endosulfan II	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Endrin	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Endrin aldehyde	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Endrin ketone	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Heptachlor	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.011	< 0.011	-
Methoxychlor	mg/kg dry wt	-	-	< 0.011	< 0.011	-

## Summary of Methods

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-7
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	1-7
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	8-9
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) . gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	8-9
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction.	-	1-6

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

Testing was completed between 10-Feb-2022 and 16-Feb-2022. For completion dates of individual analyses please contact the laboratory.

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

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Ara Heron BSc (Tech)  
Client Services Manager - Environmental