

## **REAPPRAISAL OF SOIL CONTAMINATION STATUS FOR 1259 HOWARD STREET HASTINGS**



Prepared for: DR KAREN COOPER

Prepared by: Peter Lorentz

23 September 2017

# REAPPRAISAL OF SOIL CONTAMINATION STATUS FOR 1259 HOWARD STREET HASTINGS

## REPORT PREPARATION

**Project:**

**LALSL # 230917**

**Report for:**

**DR Karen Cooper**

**Report by:**

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## PREFACE

Lorentz Agrology have been commissioned by Dr Karen Cooper to undertake a reappraisal of the soil contamination status of her property at 1259 Howard Street.

The request was based on the findings detailed in two previous site assessment reports requested by the Hastings District Council (HDC) from EAM New Zealand Limited (EAM) (EAM June 2016 and EAM Amended June 2017).

The HDC's request for a detailed site assessment to National Environmental Standards for 1259 Howard Street was part of a wider assessment for land between Howard Street and Havelock Road designated for change from 'Plains Production Zone' to 'Hastings General Residential Zone'.

There are two reasons provided for the request for reappraisal. Firstly, the initial and subsequent reports provided by EAM NZ Ltd showed some ambiguity regarding sample designation and labelling. Secondly, the arsenic results (which exceeded the NES guidelines) for the property appeared inconsistent with previous work undertaken (Lorentz Agrology September 2015) despite anecdotal evidence the orchard enterprise had similar management for the whole area.

The assessment and work that is the subject of this report has been undertaken by Lorentz Solutionz Limited trading as Lorentz Agrology.

## EXECUTIVE SUMMARY

- ▶ Lorentz Agrology trading as Lorentz Solutionz Limited were commissioned by Dr Karen Cooper to undertake systematic soil sampling and analysis to determine whether or not her land designated for rezoning exceeds the maximum permissible level for arsenic contained in the Soil Contaminant Standards for Health (SCS<sub>Health</sub>) for Residential 10% produce.
- ▶ The request was based on the following paragraph contained in the two EAM NZ Ltd reports:

“Fourteen composite samples exceeded the NES soil standard values for arsenic (20 mg/kg) for the land use scenario of residential (10% produce). The majority of these samples were located towards the southern end of the Site on properties identified as 180 Havelock Road and 1259 Howard Street. This is not surprising as these two properties were shown to have had orchards on them for many decades going back to at least the 1950s”
- ▶ Designation of the land as contaminated (exceeding NES SCS<sub>Health</sub> Limits) has significant commercial implications and may also influence planning decisions.
- ▶ Previous samples submitted (Lorentz Agrology trading as Lorentz Solutionz Limited) for analysis from a parcel of land on the property designated for sale as a lifestyle block showed arsenic values reflective of uncontaminated soil. Anecdotally, the orchard land at 1259 Howard Street has a similar management history. The inconsistency between the results detailed in the EAM reports and those for the Lorentz Agrology report required further investigation.

- ▶ Soil sampling and analysis for this investigation was in accordance with The Ministry for the Environment publication, Contaminated Land Management Guidelines No. 5 (Site Investigation and Analysis of Soils – Revised 2011).
- ▶ This report shows the arsenic results for the land constituting the same area sampled by EAM NZ Ltd are very likely to be compliant with the Soil contaminant standards for health (SCSs<sub>(health)</sub>). This directly contradicts EAM’s submission to the HDC. It has been necessary to qualify this statement by referring to the Adjusted Guideline Value in the body of the report.
- ▶ It is noted arsenic analysis was undertaken by two different laboratories (ARL and Hill Labs) both of which are IANZ accredited. In an effort to provide some surety regarding the inter-laboratory precision and accuracy between these two laboratories this report provides recent results for arsenic in soil samples submitted to both laboratories as part of a collaborative inter-laboratory exchange program (Appendix 1).

## SAMPLING AND SAMPLES

- ▶ The Ministry for the Environment publication, Contaminated Land Management Guidelines No. 5 (Site Investigation and Analysis of Soils – Revised 2011) has been used to develop sampling and analysis protocols.
- ▶ Samples were taken using a soil auger with swaged tubular stainless steel of 15 cm.
- ▶ The auger was decontaminated between sampling using laboratory distilled water and dried with tissue paper.
- ▶ All sample containers were new/clean and supplied by the laboratory.
- ▶ Samples were submitted to the laboratory the day after sampling, but were maintained at 4 °C – 8 °C overnight.
- ▶ A schematic of the individual sample sites each constituting 12 separate cores to a depth of 15 cm were taken from two diagonal transects.
- ▶ To reduce costs individual samples were composited as follows:

Lab Number	Composite of samples:	Sample Name
1544714	Howard Street #1 + #2	Howard Street COMP A
1544721	Field QC #12 only	Field QC 12
1544715	Howard Street #3 + #4 + #5	Howard Street COMP B
1544716	Howard Street #6 + #7 + #8	Howard Street COMP C
1544717	Howard Street #9 + #10 + #11	Howard Street COMP D
1544718	Howard Street #12 + #13 + #14	Howard Street COMP E
1544719	Howard Street #15 + #16 + #17	Howard Street COMP F
1544720	Howard Street # 12 Only	Howard Street #12

- ▶ Individual samples ( #1 through #17) have been retained by the laboratory for future analysis if needs be.

- ▶ A Quality Control sample was taken to constitute a **field duplicate**. The duplicate was derived by taking 10 replicate cores within a 10 cm radius from sample site #12.
- ▶ Samples were clearly recorded and labelled on site with detailed sample handling instructions provided to the laboratory on the submission form.

## Sampling Plan



## Analysis Plan

Samples were submitted for total acid extractable arsenic only using EPA Method 3035B.

## Chain of Custody

Chain of custody in accordance with paragraph 4.2.2 (Contaminated Land Management Guidelines No. 5) was captured on the submission form accompanying the samples which is auditable through the Laboratory's Information Management Systems (LIMS). Copies of these are available on request.

## RESULTS

The results of the heavy metal analysis are presented in Table 1 below which is a reproduction from the full report of analysis in APPENDIX 2.

Table 1

## SOIL ANALYSIS

Lab Number	Sample Name	Core Length (cm)	EPA-ext Arsenic mg/kg
1544714	Howard Street Comp A	15	9.11
1544721	Feild QC #12	15	5.89
1544715	Howard Street Comp B	15	7.78
1544716	Howard Street Comp C	15	8.22
1544717	Howard Street Comp D	15	7.23
1544718	Howard Street Comp E	15	8.46
1544719	Howard Street Comp F	15	6.13
1544720	Howard Street #12	15	6.12

### Evaluation of Laboratory Quality Control

It is apparent from the results for the Field Duplicate Quality Control sample (#12 and Field QC) that the results are well aligned, with differences within the expected sampling variation due to spatial heterogeneity.

## ADJUSTED GUIDELINE VALUE

### Composite Sampling

For the reconciliation of the results of analysis for compliance with the NES, it is necessary to use the formula for composite sampling contained in paragraph 3.6.4 in the Contaminant Land Management Guidelines No 5. This states that the maximum allowable concentration for composite samples, called the Adjustable Guideline Value, is the NES Guideline Value divided by the number of individual samples used in the composite.

***“Adjusted guideline value = Guideline Value ÷ Number of samples in composite”***

The very low NES threshold value for arsenic in soil for residential land (20 mg/kg As) means arsenic at background levels (5 to 9 mg/kg As) using this formula for composites of 3 samples or more are very likely to fail compliance (10% produce). In this assessment, this is the case for all composites excluding COMP F. In the case of 1259 Howard Street, all arsenic values for the composite samples are indicative of background levels making it extremely likely that all individual samples are compliant. This can easily be confirmed by analysing all individual samples retained at the laboratory.

## CONCLUSIONS

- ▶ The reports provided to the Hastings District Council by EAM New Zealand Limited showing the land owned by Dr Karen Cooper at 1259 Howard Street exceeds the NES threshold for soil arsenic concentration of 20 mg/kg DM is very likely to be erroneous.

- ▶ This reappraisal was initiated on the basis there were sample label and site identification ambiguities and previous site history suggesting only background arsenic levels prevailed over the entire block. This report confirms the errors in the original report.
- ▶ The average arsenic value for the composite samples collected and submitted by EAM NZ Ltd is 26.3 mg/kg As, whereas the average for those collected by Lorentz Agrolgy from the same sites is 7.8 mg/kg As.
- ▶ When the composite samples are adjusted using the formula contained in paragraph 3.6.4 in the Contaminant Land Management Guidelines No. 5, all but one sample still exceeds the adjusted NES for arsenic for residential occupation. However, the author provides evidence that the use of the formula is inappropriate for arsenic because compositing 3 or more samples with background levels (uncontaminated soil) is likely to exceed the adjusted NES value in most cases.
- ▶ Confirmation of compliance with NES for all individual samples will require analysis on sample retentions held at ARL.
- ▶ Previous soil testing and anecdotal evidence the orchard enterprise treated the entire block “as one” suggests the land parcel is free of any contamination in excess of NES.
- ▶ This report provides sufficient and compelling evidence for HDC to make corrections to their records and deem the property at 1259 Howard Street free from contaminants and compliant with NES.

For Lorentz Agrolgy trading as Lorentz Solutionz Limited



Peter Lorentz  
Director

## REFERENCES

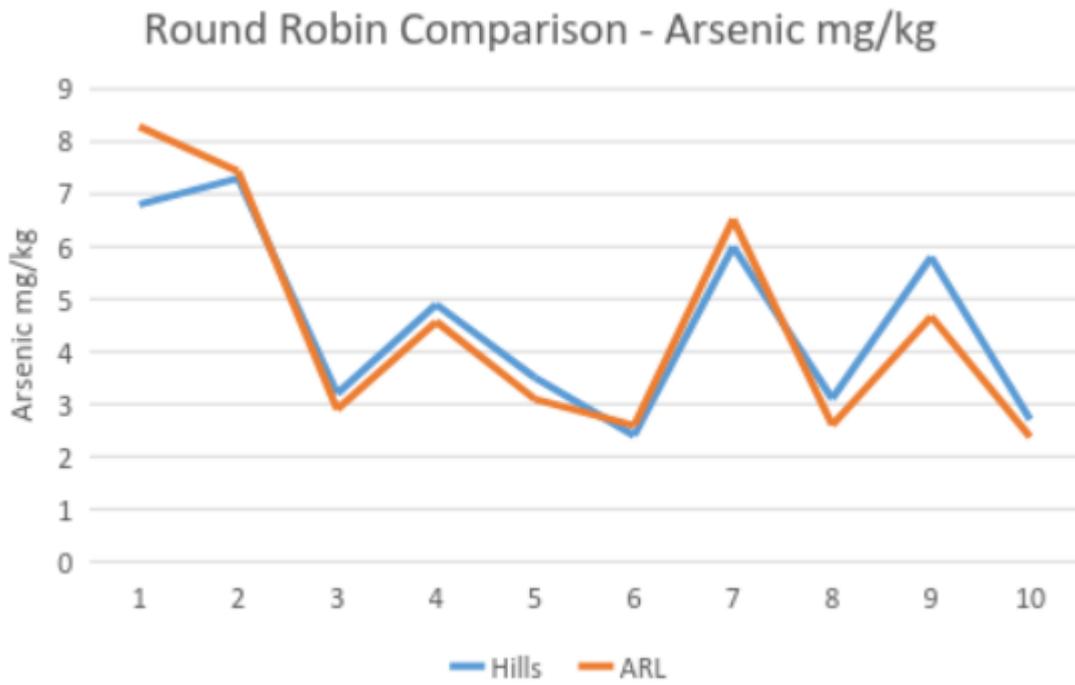
MfE 2011 Contaminated Land Management Guidelines No.1 Reporting on Contaminated Sites in New Zealand. Ministry for the Environment.

MfE 2012 Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment.

MfE 2011 Contaminated Land Management Guidelines No.5; Site Investigation and Analysis of Soil. Ministry for the Environment.

## APPENDIX 1

Inter-Laboratory Comparison Exchange Program 2017. Soil Arsenic EPA Method 3035B





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<b>Customer:</b>	PETER LORENTZ	<b>Customer No:</b>	60874939
	LORENTZ AGROLOGY	<b>Sampled date:</b>	16/08/2017
	8A BALMORAL STREET	<b>Report issued:</b>	31/08/2017
	TARADALE	<b>Samples Received:</b>	16/08/2017
	NAPIER 4112	<b>Order Number:</b>	Howard Street
	06 8448886	<b>Service Person:</b>	Customer Centre
<b>Samples:</b>	8	<b>Name:</b>	
		<b>Email:</b>	customer.centre@ravensdown.co.nz; NZ 60874939-Howard StreetSL

**SOIL ANALYSIS**

Lab Number	Sample Name	Core Length (cm)	EPA-ext Arsenic mg/kg
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1544717	Howard Street Comp D	15	7.23
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1544719	Howard Street Comp F	15	6.13
1544720	Howard Street #12	15	6.12

**Analysis comment:**

**Joseph Holloway for ARL**

- The report applies to samples as submitted by the customer.
  - Results are expressed on a dry weight basis.
  - Summary of methods used and detection limits are available on request.
- Unless prior authorisation is given in writing, this document may only be reproduced in full.

**RPT** - Sample submitted for repeat analysis. **RTF** - Results to follow. **QTU** - Quick test units.



Tests indicated as not accredited are outside the scope of the laboratory's accreditation.

Tests not Accredited

Tests not Requested

Repeat analysis in progress