04 March 2015

Neil Construction Ltd
PO Box 8751
Symonds Street
Auckland 1150

Ref: LtR-0782/Mar15/Rev1

Attention: David Page
Land Manager

Dear David,

RE: Due Diligence Investigation of 101 & 105-107 Totara Road and 9 McKean Road, Whenuapai.

Following your email request and our subsequent email response (dated 15 January 2016), Geosciences Ltd (GSL) has conducted a due diligence assessment of the property located at 101 & 105-107 Totara Road and 9 McKean road, Whenupai in respect of potential soil contamination issues (locality shown in Figure 1). The property is legally described as Lot 1 DP 170291, Lot 1 DP 52677 & Lot 1 DP 72379, and Lot 3 DP 77541 and is hereafter referred to as 'the site' in this letter report.

This letter report has been prepared in acknowledgement of the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG): No. 1 *"Guidelines for Reporting on Contaminated Sites in New Zealand"*, and No. 5 – *"Site Investigation and Analysis of Soils"*.

1 Background

Neil Construction Ltd is interested in the above properties with respect to potential future urban development. The site is located within a rural / residential area of Whenuapai that contains similar rural residential landuses and some scattered industry. Portions of the site are known to have been used historically for plant nursery activities and potentially other horticultural land uses.

Under the NES, land is considered to be actually or potentially contaminated if an activity or industry on the MfE Hazardous Activities and Industries List (HAIL) has been, is, or is more likely than not to have been, undertaken on the land. While horticultural activities (broad acre crop, pastoral land, plant nurseries etc.) are not specifically encompassed within the HAIL, the bulk storage and use of persistent pesticides associated with horticultural activities is listed as Item A.10. Neil Construction Ltd requested that GSL undertake a high level due diligence assessment of the site to determine the likelihood of soils on site having been impacted by possible former horticultural landuses including the collection of a limited number of soil samples from the known horticultural areas of the properties.

This due diligence assessment has been undertaken to provide an indicative risk assessment of the potential for the properties to have been impacted by current or former activities included on the Ministry of the Environment (MfE) Hazardous Activities and Industries List (HAIL).

2 SCOPE OF WORKS

As part of the due diligence assessment, GSL has undertaken the following investigation, the findings of which are discussed in turn below:

- an historical appraisal of the properties by a study of historical aerial photographs;
- a site inspection and walkover of the properties to collect six composite soil samples, each comprised of four discrete soil samples, from areas of the properties identified as having been the location of horticultural activities;
- the analysis of the composite soil samples for indicative contaminants of concern including, arsenic, copper, lead, and suites of organochlorine (OCPs), and organonitrogen and organophosphate pesticides (ONOPs);
- the preparation of a letter report to comment on the potential liabilities applicable under the National Environmental Standard (NES) regulations, Auckland Council Regional Plan: Air, Land and Water (ACRP:ALW) and Proposed Auckland Unitary Plan (PAUP) rules for the development of the property.

2.1 HISTORICAL AERIAL PHOTOGRAPHY

Auckland Council Archives have historic aerial photographs from 1968, 1975, and 1987, while historic aerials from 1996, 2001, 2006, 2008, and 2010 are available for the site on the Auckland Council Geographical Information Systems (GIS) website. Google Earth has recent aerial photographs available from 2004 to 2015. The findings of the historic aerial photograph review are summarised below, while copies of these aerial photographs have been attached in Appendix A.

1968 This is the earliest photograph available for the site and shows that the majority of the site is apparently covered in pasture. The eastern boundary is bordered by Totara Road, while the southern boundary by McKean Road. Six unidentified structures are located in the northern corner of the site. In the southeastern corner, the aerial photograph shows different colouring and textures in the fields consistent with former horticultural broad acre cropping. An area of disturbance is visible in the centre west of 9 McKean Road, adjacent to a small gully bordering the western boundary.

1975 The 1975 aerial is clearer than the previous plate making the site features discernible. Three additional unidentified structures are visible along the southern boundary of the site, however no other significant changes are observable in respect of the Totara Road Properties. Within the centre west of 9 McKean Road, the identified area of disturbance has expanded laterally. A small gully clearly runs north to south through all the properties parallel to Totara Road.

1987 By 1987 cropping activities are distinct in the southeastern and northeastern portions of the site, encompassing the majority of the properties. In this image, it appears that only the property at 9 McKean Road remains as pastoral land in conjunction with the northwestern corner of 101 Totara Road. A portion of the property at 105-107 Totara Road is obscured by a small fire within 9 McKean Road. Neither of the two identified

gully areas are visible at this time. Storage activities have also commenced on the adjacent McKean Road Properties, appearing to encompass addresses 3, 5 & 7.

1996 The 1996 aerial is the first colour image available for the site and appears generally consistent with the 1987 image, but further clarifies field boundaries. Apart from the property at 9 McKean Road, the majority of the remainder of the site is under broad acre crop, or shows evidence to suggest recent cropping activity. In addition, a section of the northwestern corner of 101 Totara road has been developed into cropped land. A residential dwelling is now clearly evident on the front portion of the 105-107 Totara Road Property. The two gully systems identified historically are faintly visible in this image, although cropping activities at 105 Totara Road appear to encroach into the system. In addition, the storage activities on the adjacent McKean Road properties continue.

2001 - 2009 The 2001 plate shows continued cropping activities within 101 and 105 – 107 Totara Roads, with the distinct addition of plastic ground covering within the portion of 105-107 Totara Road bordering McKean Road. Between 2001 and 2009, intermittent cropping activities remain across these portions of the site, significantly reducing in extent between 2006 and 2009. The identified gully systems have are again clearly visible in this series of images while the storage activities at the adjacent McKean Road site have intensified.

2010 - 2015 By 2010, it appears that all cropping activities have ceased except for the nursery operation along the southern boundary of 105-107 Totara Road where it borders McKean Road. The most recent 2015 aerial image from Google Earth shows that the majority of the site has been returned to pasture, with the exception of a small portion of the nursery area discussed above. Storage activities at the adjacent McKean Road sites show significant coverage of the piece of land.

3 SITE INSPECTION & INFRASTRUCTURE

At the time of the inspection, the site is in the same general configuration as shown in the 2010 to 2015 aerial photographs. That is, the majority of the site is pastoral land, except for a small nursery area on 105-107 Totara Road. At the time inspection, the nursery did not appear to be in use with the area largely overgrown with miscellaneous pasture grasses and weeds, with only a few flax plants remaining within the central rows. Portions of this area remain covered by black plastic weed matting.

Two storage sheds were identified to the south of the nursery, one of which contained a number of pesticide and insecticide containers including Vapor Gard / Wilt Pruf (a terpenic polymer to prevent desiccation), Attack (an organophospahte broad-spectrum insecticide), Asulox selective weedkiller (an acid herbicide), Imidan insecticide (an organophosphate insecticide) and Preeglone Extra (a non-selective herbicide).

The unidentified structures mentioned in the 1975 aerial photograph, located at 101 Totara Road, has been confirmed as a residential dwelling and storage sheds for farm equipment and hay storage. There were no structures on site that could have been spray races or animal dips, and no distinct visual indications were identified that confirm the disturbance identified in the 1968 and 1975 aerial images

is fill activities. However, an overland flow path is apparent from within the storage yard which flows into the gully system parallel to Totara Road and flows south to north. GSL notes that Auckland Council GIS also identifies this flow path on site.

All external areas of the site were accessible, however the scope of works did not include the inspection of the interior of the buildings. Site photographs are attached in Appendix B.

4 SOIL SAMPLING AND ANALYSIS

To provide an initial preliminary screening of the site, GSL collected six composite soil samples from portions of the site used for broad acre and / or nursery activities which were identified within the historic aerial imagery. Each composite soil sample was comprised of four sub-samples, collected within the homogenous field use boundaries identified within the aerial images. All six composite soil samples were submitted for the potential heavy metal contaminants of concern being; arsenic (As), copper (Cu) and lead (Pb). In addition, three of the composite samples from the older cropped areas of the site were submitted for a screen of organochloride pesticides (OCPs) while the three composites from the more recent nursery activities were analysed for a suite of organonitrogen and organophosphate pesticides (ONOPs).

Surface soil samples were collected from the top 150mm of topsoil by means of a stainless steel foot corer. Sampling equipment was decontaminated between each sample in accordance with our internal quality control procedures. A brief sample description was recorded in the field at the time of sample collection. Each soil sample was placed in a plastic zipper bag with the date, sample identification number, location, and initials of sampler noted on the bag.

The sampling protocol followed was in accordance with the Contaminated Land Management Guidelines (CLMG) No. 5 – "*Site Investigation and Analysis of* Soils''. The soil sample locations are shown in Figure 2, and site photographs are attached in Appendix C.

5 LABORATORY ANALYSIS AND QUALITY CONTROL

Sample bags were placed in a box with a chain of custody form (COC) indicating the analysis to be performed.

Soil samples for the analysis of organochlorine pesticides (OCP's) were dispatched to Eurofins laboratories in Melbourne for analysis of contaminants of concern. Eurofins are accredited by the National Association of Testing Authorities (NATA), Australia for the analysis undertaken.

Soil samples for the analysis of organonitrogen and organophosphate pesticides (ONOP's) were dispatched to RJ Hill Laboratories Ltd in Hamilton for analysis of contaminants of concern. RJ Hills Laboratories are accredited by International Accreditation New Zealand (IANZ) for the analysis undertaken.

6 ACCEPTANCE CRITERIA AND RELEVANT CRITERIA

The NES mandates fourteen soil contaminant standards (SCS) for the protection of human health for organic compounds and inorganic elements for various landuse criteria. The NES human health SCS

criteria for a residential block with 10% home-grown produce (residential 10%) have been applied to the proposed change in landuse, subdivision, and development.

The ACRP: ALW and the PAUP also set permitted activity soil acceptance criteria for potentially contaminated land.

Results are also compared to the background concentration ranges of inorganic elements in soils in the Auckland Region for non-volcanic soils

7 ANALYTICAL RESULTS

A comparison of the analytical results with the relevant guideline criteria is provided in Table 1 below. Copies of the laboratory chain of custody document (COC) and analytical transcripts are attached in Appendix C, while a discussion of the results is provided below.

7.1 ORGANIC COMPOUNDS

No soil samples analysed for either OCPs or ONOPs returned detectable concentrations of compounds when analysed by laboratory instruments at screen level and have been subsequently omitted from the table of results.

TABLE 1: HEAVY METALS[1]

	Arsenic	Copper	Lead
SC1	4.6	9.7	8.0
SC2	3.9	16	6.6
SC3	3.5	15	6.7
SC4	**18**	6	24
SC5	5	28	18.4
SC6	5	31	17.8
NES SCS[2]	20	>10,000	210
ACRP: ALW P[3]	100	325	250
Background[4]	0.4 - 12	1 - 45	<1.5 - 65

Notes:

1. All metal concentrations measured in mg/kg.
2. National Environmental Standards (NES) for assessing and managing contaminants in soil to protect human health – residential 10% produce (Reference 1).
3. Auckland Regional Council (2007) — Auckland Council Regional Plan: Air, Land and Water, Chapter 5, Contaminated Land, Auckland (Reference 5).
4. Auckland Regional Council Technical Publication No.153 (2001) (Reference 7).
5. Auckland Council (2013) – Proposed Auckland Unitary Plan, Auckland, New Zealand.
6. Values in **BOLD** exceed the NES criteria, values in **BOLD** exceed the ACRP:ALW criteria, Values in **BOLD** exceed the Background Ranges.
7. NA = Not applicable / NL = No Limit / ND= not detected

7.2 HEAVY METALS

No composite samples returned concentrations of heavy metals that exceeded the NES SCS for residential 10% produce, the Schedule 10 permitted activity criteria of the ACRP:ALW, or the Table 1 permitted activity soil acceptance criteria of the PAUP.

Soil composite SC4 returned a concentration of 18 mg/kg for arsenic which slightly exceeded the expected naturally occurring background ranges for non-volcanic soils of the Auckland Region.

8 POTENTIAL FOR CONTAMINATION

A review of the historic aerial photographs indicate that the properties at 101 and 105 – 107 Totara Road have been utilised for horticultural activities since at least 1975, and potentially prior to 1968. Based on the site inspection, site history, and analytical results, GSL considers that the following potential sources of contaminants exist on site:

Table 2: Potential for Contamination.

Activity / Source	Property	Contaminants of Concern	Comment
Horticultural land use	101 Totara Road and 9 McKean Road	Uniform application of persistent pesticides (As, Cu, Pb, OCPs & ONOPs)	No OCPs or ONPs were detected within the limited soil samples taken.
Horticultural land use	105-107 Totara Road	Uniform application of persistent pesticides (As, Cu, Pb, OCPs & ONOPs)	The detection of arsenic above background indicates that there is a possibility of surface soils being impacted across the site and areas of the site are unlikely to meet the definition of cleanfill.
Farm Structures	105-107 Totara Road	Potential hotspots of persistent pesticides, heavy metals and semi volatile organic compounds	GSL considers that farm structures containing pesticide and insecticide containers at the site represent potential hotspots and as such will require specific investigation as part of a detailed site investigation.
Surface runoff from adjacent storage activities	9 McKean Road	Potential hotspots of heavy metals, solvents, and hydrocarbons	While no distinct visual evidence was encountered, the overland flow paths is marked as running from the north eastern corner of the storage yard into the gully crossing all properties
Localised Fill	9 McKean Road	Heavy metals and semi volatile organic compounds	Localised areas of fill may exist on site as identified by soil disturbance visible on the 1968 and 1975 aerial images.

9 CONCLUSIONS

GSL has undertaken a due diligence investigation of the properties located at 101 and 105 – 107 Totara Roads and 9 McKean Road for the purpose of providing an initial risk assessment to assist Neil Group Ltd in due diligence risk considerations for the purchase of the above properties.

The results of this due diligence investigation indicate that the properties have historically been associated with horticultural landuse in the form of broad acre cropping and / or plant nursery activities. Additionally, the property located at number 105-107 Totara Road remains the location of a nursery operation with remnant insecticide and pesticide chemicals in a storage shed. In addition, historic aerial imagery indicates that portions of the site may have been subject to minor areas of historic fill and an overland flow path has been identified from within the adjacent storage yard property, travelling along the boundary and into the gully system crossing from south to north across all properties.

Analytical results from a limited soil sampling regime conducted via six composite soil samples across six discrete current and historic horticultural land use areas of the site did not detect any concentrations of OCP or ONOP pesticides when analysed by laboratory instruments at screen level. Similarly, five of those six composite soil samples returned concentrations of heavy metals within the expected naturally occurring background concentrations for non-volcanic soils of the Auckland Region. The remaining composite sample, SC4, returned an elevated concentration of arsenic in excess of the expected background concentrations for non-volcanic soils of the Auckland Region.

While additional detailed investigation will likely be required to satisfy the requirements of the NES, ACRP:ALW and PAUP (particularly in relation to the potential sources of contamination identified in Table 2 that were not assessed within this investigation), GSL generally considers that areas of surface soil investigated within this due diligence do not show any significant defined impacts from current or historic horticultural landuse and, with the exception of soil composite four, are generally consistent with the MfE definition of cleanfill.

GSL notes that further investigation may provide suitable evidence that the NES may not ultimately apply to the majority of the site and will determine whether the elevated concentration of arsenic in SC4 is naturally occurring anomaly or a result of historic horticultural landuse.

Thank you for the opportunity to carry out this investigation. Should you have any queries regarding this report please do not hesitate to contact us on 09 475 0222.

Report prepared on behalf of GSL by:	Report reviewed on behalf of GSL by:	Report authorised on behalf of GSL by:
		
Carmen Venter Environmental Scientist Geosciences Ltd	Carl O'Brien Senior Environmental Scientist Geosciences Ltd	Johan Faurie Principal Geosciences Ltd

DISCLAIMER

This report is provided on the condition that Geosciences Ltd disclaims all liability to any person or entity other than the client and Auckland Council in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or in part, on the contents of this report. Furthermore, Geosciences Ltd disclaims all liability in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by the client, or any such person in reliance, whether in whole or any part of the contents of this report of all matters not stated in the brief outlined in our proposal and according to our general terms and conditions and special terms and conditions for contaminated sites.

10 REFERENCES

1 Ministry for the Environment (2012) - Users Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.

2 Ministry for the Environment (2011) – Methodology for Deriving Standards for contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.

3 Ministry for the Environment (2003) — Contaminated Land Management Guidelines No.1: Reporting on contaminated Sites in New Zealand. Ministry for the Environment, Wellington, New Zealand.

4 Ministry for the Environment (2003) — Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils. Ministry for the Environment, Wellington, New Zealand.

5 Auckland Regional Council (2007) — Auckland Council Regional Plan: Air, Land and Water, Chapter 5, Contaminated Land, Auckland.

6 Auckland Council (2013) – Proposed Auckland Unitary Plan, Auckland, New Zealand.

Auckland Regional Council (2001) – Background Concentrations of Inorganic Elements in Soils from the Auckland region (TP153) – Auckland.

7 Edbrooke, S.W (2001) — Geology of the Auckland Urban Area, Institute of Geological and Nuclear Sciences Geological Map 3, Lower Hutt, New Zealand.

8 Auckland Council (2011) - Auckland Council GIS Viewer. http://maps.aucklandcouncil.govt.nz/aucklandcouncilviewer/

9 Gaw, S. K. (2002) - Pesticide Residues in Horticultural Soils in the Auckland Region, Auckland Regional Council Working Report No. 96. Auckland Regional Council, Auckland.

11 LIMITATIONS

The conclusions and all information in this Report are given strictly in accordance with and subject to the following limitations and recommendations:

1. The assessment undertaken to form this conclusion is limited to the scope of work agreed between GSL and the client, or the client's agent as outlined in this Report. This report has been prepared for the sole benefit of the client and neither the whole nor any part of this report may be used or relied upon by any other party.
2. The investigations carried out for the purposes of the report have been undertaken, and the report has been prepared, in accordance with normal prudent practice and by reference to applicable environmental regulatory authority and industry standards, guidelines and assessment criteria in existence at the date of this report.
3. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by GSL for use of any part of this report in any other context.
4. This Report was prepared on the dates and times as referenced in the report and is based on the conditions encountered on the site and information reviewed during the time of preparation. GSL accepts no responsibility for any changes in site conditions or in the information reviewed that have occurred after this period of time.
5. Where this report indicates that information has been provided to GSL by third parties, GSL has made no independent verification of this information except as expressly stated in the report. GSL assumes no liability for any inaccuracies in or omissions to that information.
6. Given the limited Scope of Works, GSL has only assessed the potential for contamination resulting from past and current known uses of the site.
7. Environmental studies identify actual sub-surface conditions only at those points where samples are taken and when they are taken. Actual conditions between sampling locations or differ from those inferred. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated and GSL does not guarantee that contamination does not exist at the site.
8. Except as otherwise specifically stated in this report, GSL makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or materials from such buildings disposed of on the site, the site may contain asbestos or ACM .
9. No investigations have been undertaken into any off-site conditions, or whether any adjoining sites may have been impacted by contamination or other conditions originating from this site. The conclusion set out above is based solely on the information and findings contained in this report.
10. Except as specifically stated above, GSL makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.
11. The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.
12. Use, development or re-development of the site for any purpose may require planning and other approvals and, in some cases, environmental regulatory authority and accredited site auditor approvals. GSL offers no opinion as to whether the current use has any or all approvals required, is operating in accordance with any approvals, the likelihood of obtaining any approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environmental works.
13. GSL makes no determination or recommendation regarding a decision to provide or not to provide financing with respect to the site. The on-going use of the site and/or use of the site for any different purpose may require the owner/user to manage and/or remediate site conditions, such as contamination and other conditions, including but not limited to conditions referred to in this report.
14. Except as required by law, no third party may use or rely on, this report unless otherwise agreed by GSL in writing. Where such agreement is provided, GSL will provide a letter of reliance to the agreed third party in the form required by GSL.
15. To the extent permitted by law, GSL expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Report. GSL does not admit that any action, liability or claim may exist or be available to any third party.
16. Except as specifically stated in this section, GSL does not authorise the use of this report by any third party.

FIGURES

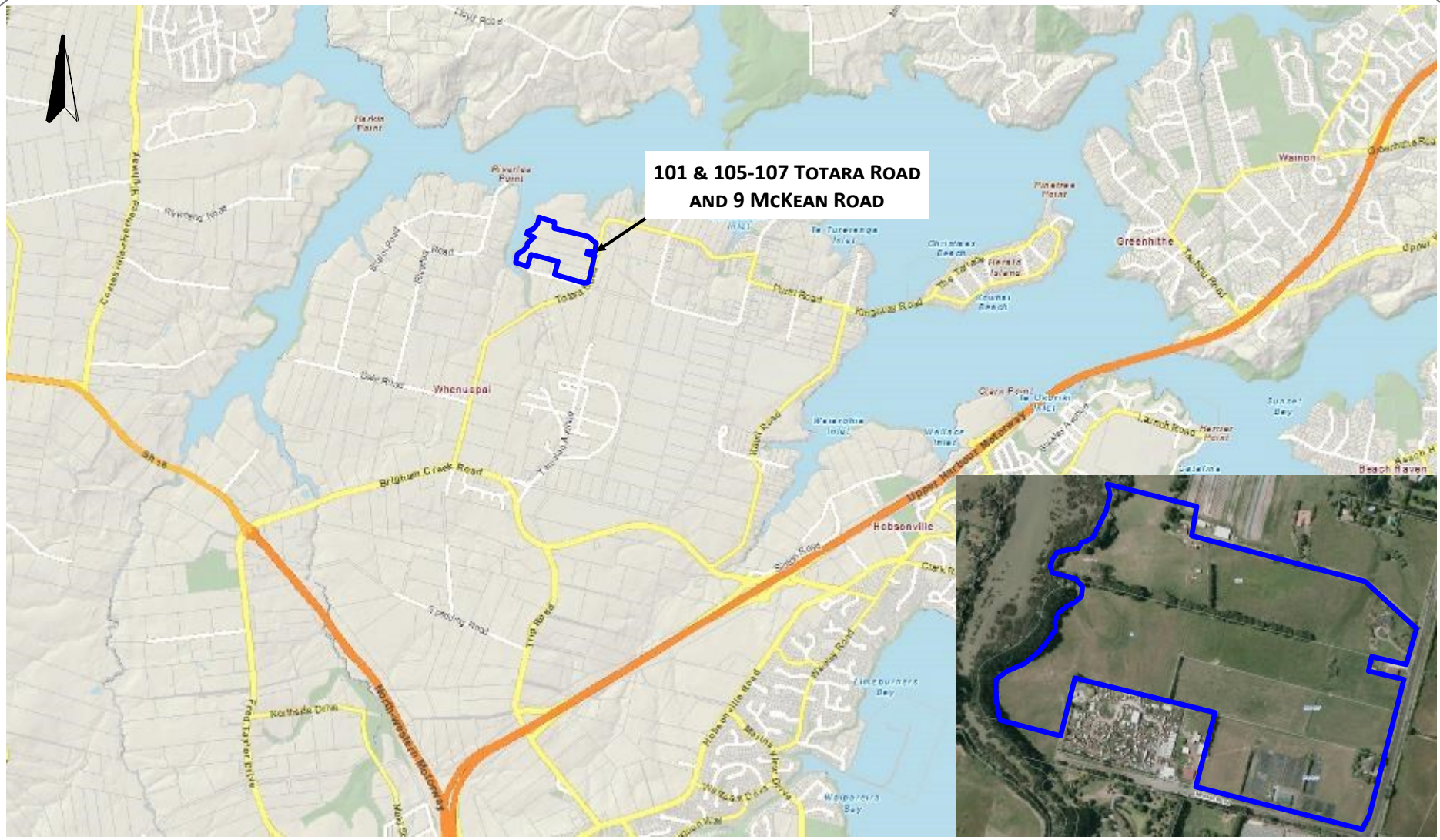


FIGURE 1. SITE LOCALITY

FIGURE 2. SOIL SAMPLING LOCATIONS

SITE LOCATION

FIGURE 3. IMPACTED AREA

SITE LOCATION

APPENDIX A HISTORIC AERIAL PHOTOGRAPHS

Historic Aerial Photography

1968 - 2015

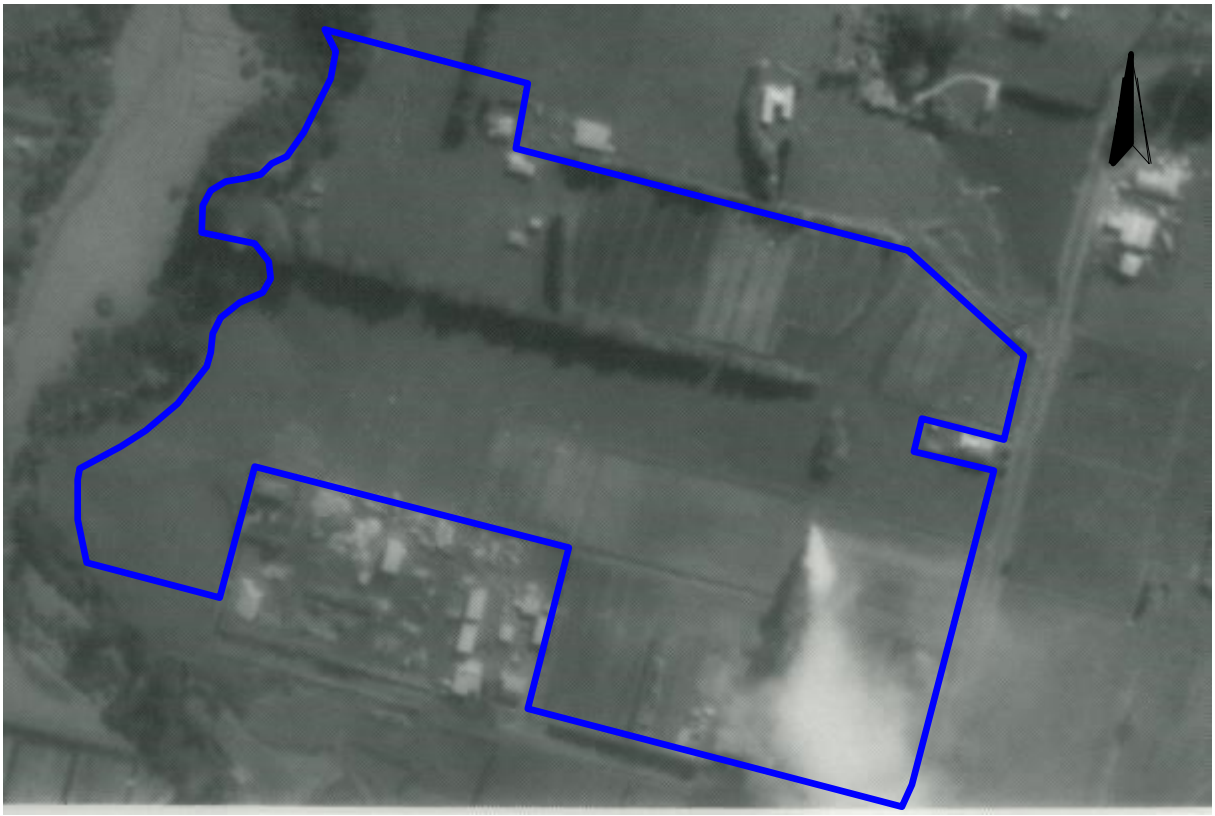
1968 Aerial Photograph

Auckland Council Archives

Site location

1975 Aerial Photograph

Auckland Council Archives



1987 Aerial Photograph

Auckland Council Archives

Site location

1996 Aerial Photograph

Auckland Council

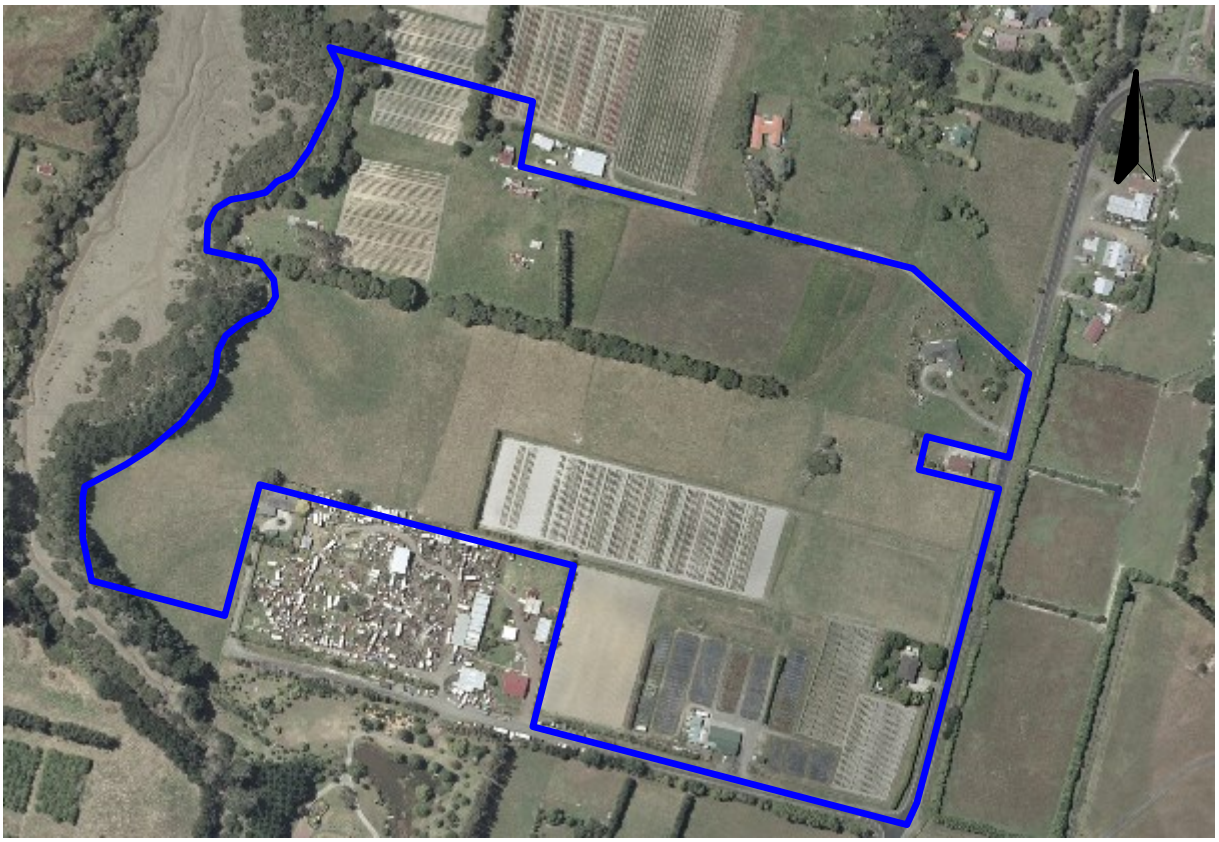
2001 Aerial Photograph

Auckland Council

Site location

2005 Aerial Photograph

Google Earth



2006 Aerial Photograph

Auckland Council

Site location

2008 Aerial Photograph

Auckland Council

2009 Aerial Photograph

Google Earth

Site location

2010 Aerial Photograph

Auckland Council

2015 Aerial Photograph

Google Earth

Site location

APPENDIX B SITE PHOTOGRAPHS

PLATE 1: VIEW SOUTH OF THE NURSERY TOWARD TOTARA ROAD

PLATE 2:STORAGE SHEDS TO THE SOUTH OF THE NURSERY

PLATE 3: VIEW WEST OF 101 TOTARA ROAD

PLATE 4: VIEW EAST OF 9 MCKEAN ROAD

APPENDIX C LABORATORY TRANSCRIPT

eurofins | mgt

Certificate of Analysis

Geosciences Ltd
First Floor, 47 Clyde Road
Browns Bay
Auckland NZ 0630

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Carmen Venter**

Report **487205-S**
Project name 101 & 105-107 TOTARA ROAD
Project ID J0782
Received Date Jan 29, 2016

Client Sample ID			**SC1**	**SC2**	**SC3**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M16-Ja17403**	**M16-Ja17404**	**M16-Ja17405**
Date Sampled			**Jan 27, 2016**	**Jan 27, 2016**	**Jan 27, 2016**
Test/Reference	LOR	Unit			
Organochlorine Pesticides (NZ MfE)					
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	87	112	94
Tetrachloro-m-xylene (surr.)	1	%	142	97	86
Heavy Metals					
Arsenic	2	mg/kg	4.6	3.9	3.5
Copper	5	mg/kg	9.7	16	15
Lead	5	mg/kg	8.0	6.6	6.7
% Moisture	1	%	18	19	21

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Onur Mehmet	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Mele Singh	Senior Analyst-Organic (VIC)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	Geosciences Limited	**Lab No:**	1530348 SPv1
Contact:	Carmen Venter	**Date Registered:**	28-Jan-2016
	C/- Geosciences Limited	**Date Reported:**	10-Feb-2016
	PO Box 35366	**Quote No:**	71917
	Browns Bay	**Order No:**	J0782
	Auckland 0753	**Client Reference:**	101 & 105-107 Totara Road
		Submitted By:	Carmen Venter

Sample Type: Soil

		Sample Name:	SC4 27-Jan-2016	SC5 27-Jan-2016	SC6 27-Jan-2016		
		Lab Number:	1530348.1	1530348.2	1530348.3		
Individual Tests							
Dry Matter	g/100g as rcvd		80	76	76	-	-
Total Recoverable Arsenic	mg/kg dry wt		18	5	5	-	-
Total Recoverable Copper	mg/kg dry wt		6	28	31	-	-
Total Recoverable Lead	mg/kg dry wt		24	18.4	17.8	-	-
Organonitro&phosphorus Pesticides Screen in Soil by GCMS							
Acetochlor	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Alachlor	mg/kg		< 0.05	< 0.05	< 0.05	-	-
Atrazine	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Atrazine-desethyl	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Atrazine-desisopropyl	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Azaconazole	mg/kg		< 0.03	< 0.04	< 0.04	-	-
Azinphos-methyl	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Benalaxyl	mg/kg		< 0.03	< 0.04	< 0.04	-	-
Bitertanol	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Bromacil	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Bromopropylate	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Butachlor	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Captan	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Carbaryl	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Carbofuran	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Chlorfluazuron	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Chlorothalonil	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Chlorpyrifos	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Chlorpyrifos-methyl	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Chlortoluron	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Cyanazine	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Cyfluthrin	mg/kg		< 0.08	< 0.08	< 0.08	-	-
Cyhalothrin	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Cypermethrin	mg/kg		< 0.15	< 0.16	< 0.16	-	-
Deltamethrin (including Tralomethrin)	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Diazinon	mg/kg		< 0.03	< 0.04	< 0.04	-	-
Dichlofluanid	mg/kg		< 0.06	< 0.07	< 0.07	-	-
Dichloran	mg/kg		< 0.2	< 0.2	< 0.2	-	-
Dichlorvos	mg/kg		< 0.09	< 0.09	< 0.09	-	-
Difenoconazole	mg/kg		< 0.09	< 0.09	< 0.09	-	-
Dimethoate	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Diphenylamine	mg/kg		< 0.12	< 0.13	< 0.13	-	-
Diuron	mg/kg		< 0.06	< 0.07	< 0.07	-	-

Sample Type: Soil						
Sample Name:		SC4 27-Jan-2016	SC5 27-Jan-2016	SC6 27-Jan-2016		
Lab Number:		1530348.1	1530348.2	1530348.3		
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Fenpropimorph	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Fluazifop-butyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Fluometuron	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Flusilazole	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Fluvalinate	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Furalaxyl	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Haloxyfop-methyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Hexaconazole	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Hexazinone	mg/kg	< 0.03	< 0.04	< 0.04	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.3	< 0.4	< 0.4	-	-
Kresoxim-methyl	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Linuron	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Malathion	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Metalaxyl (Mefenoxam)	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Methamidophos	mg/kg	< 0.3	< 0.4	< 0.4	-	-
Metolachlor	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Metribuzin	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Molinate	mg/kg	< 0.12	< 0.13	< 0.13	-	-
Myclobutanil	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Naled	mg/kg	< 0.3	< 0.4	< 0.4	-	-
Norflurazon	mg/kg	< 0.12	< 0.13	< 0.13	-	-
Oxadiazon	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Oxyfluorfen	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Paclobutrazol	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Parathion-ethyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Parathion-methyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Pendimethalin	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Permethrin	mg/kg	< 0.03	< 0.03	< 0.03	-	-
Pirimicarb	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Pirimiphos-methyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Prochloraz	mg/kg	< 0.3	< 0.4	< 0.4	-	-
Procymidone	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Prometryn	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Propachlor	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Propanil	mg/kg	< 0.2	< 0.2	< 0.2	-	-
Propazine	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Propiconazole	mg/kg	< 0.05	< 0.05	< 0.05	-	-
Pyriproxyfen	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Quizalofop-ethyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Simazine	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Simetryn	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Sulfentrazone	mg/kg	< 0.3	< 0.4	< 0.4	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole,Busan]	mg/kg dry wt	< 0.12	< 0.13	< 0.13	-	-
Tebuconazole	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Terbacil	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Terbufos	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Terbumeton	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Terbuthylazine	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Terbuthylazine-desethyl	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Terbutryn	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Thiabendazole	mg/kg	< 0.3	< 0.4	< 0.4	-	-
Thiobencarb	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Tolylfluanid	mg/kg	< 0.03	< 0.04	< 0.04	-	-
Triazophos	mg/kg	< 0.06	< 0.07	< 0.07	-	-

Sample Type: Soil						
Sample Name:		SC4 27-Jan-2016	SC5 27-Jan-2016	SC6 27-Jan-2016		
Lab Number:		1530348.1	1530348.2	1530348.3		
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Trifluralin	mg/kg	< 0.06	< 0.07	< 0.07	-	-
Vinclozolin	mg/kg	< 0.06	< 0.07	< 0.07	-	-

Analyst's Comments

It has been noted that the method performance for Iprodione for ONOP analysis is not acceptable therefore we are unable to report this compound at this present time.

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 clean 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.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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%.	-	1-3
Organonitro&phosphorus Pesticides Screen in Soil by GCMS	Sonication extraction, Dilution cleanup, GC-MS analysis. Tested on as received sample	-	1-3
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Lead	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	1-3

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

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental Division