

***DETAILED SITE INVESTIGATION
1738 STATE HIGHWAY 1
WARKWORTH
AUCKLAND***

For the Attention of:

Thriving Development Limited

C/o McKenzies & Co Limited

Reference: FES 1297.001 October 2019





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Detailed Site Investigation

Thriving Development Limited - 1738 State Highway 1, Warkworth

October 2019



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Executive Summary

Focus Environmental Services Limited was contracted by Thriving Development Limited to carry out a Detailed Site Investigation of the property at 1738 State Highway 1, Warkworth.

This investigation was completed to provide information on potential contamination at the site as a result of historical and/or current land uses, and may be used to support an application to develop the site.

This Detailed Site Investigation has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No.1 and No.5 (Ministry for the Environment, 2011).

The history of the site was researched by Focus Environmental Services personnel, which involved a review of the available historical aerial photographs of the site, a review of the Auckland Council property file, an enquiry to Auckland Council REC Contamination, a review of the historical certificate of title and an onsite interview. A preliminary geotechnical appraisal report was also made available during this investigation. During the review of the available information any potentially contaminating activities or land uses were identified.

During the review of the available information it was noted that the site may have been potentially impacted by spray drift from the horticultural land use on the adjacent properties. In addition, potentially uncertified fill materials were also noted in specific areas of the site. Furthermore, due to the age of the site buildings, there may be soil contamination present due the use of lead-based paints.

Following the desk top assessment, the site was visited and a site inspection and walk over was carried out. The site was inspected by Focus Environmental Services Limited personnel on the 2nd of October 2019. During the site inspection, any potentially contaminating activities or land uses were identified.

During the site walkover and inspection two potential spray races were identified. Additionally, it was determined that the two areas of fill identified in the geotechnical report were sourced from onsite sources.

Due to the potential sources of contamination identified, it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

Following the site inspection and walkover, the intrusive investigation was carried out by Focus Environmental Services Limited personnel. Twelve discrete samples were taken from across the area of potential horticulture spray drift and composited at the laboratory to form three composite samples (4:1). Additionally, ten discrete soil samples were taken from the areas of potential lead-based paint contamination, fill material, and spray races.

The samples were analysed for contaminants that could be present due to the potentially hazardous activities carried out at the site. The results of the site investigation have indicated that the activities carried out at the site have slightly impacted the site soils.

Concentrations heavy metals, organo-chlorine pesticides and polycyclic aromatic hydrocarbons detected in the site soils were below the Soil Contaminant Standards for health (SCSS_(health)) for rural residential land use (25% produce consumption) as outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) and the discharge criteria of the Auckland Unitary Plan: Operative in Part (AUP: OP).

However, concentrations of arsenic and copper were detected in localised areas elevated above the maximum background concentrations for non-volcanic soils in Auckland.

Based on the results of the sampling and analysis, the site soils investigated are considered suitable for retention onsite following future proposed development. However, due to the low-level contamination identified in localised areas, the site soils in these locations are not suitable for classification as cleanfill and any materials removed from these areas of the site will require disposal at a suitably licensed disposal facility unless further sampling and analysis demonstrates otherwise.

Prior to development of the site, it is recommended that a Site Management Plan (SMP) be prepared to ensure that the soils containing low-levels of heavy metal contamination are handled in a controlled manner and, if removed from the site, disposed of to a suitable disposal location.

Submitted by,



David O'Reilly
Principal Environmental Consultant
Focus Environmental Services Limited

1.0 Scope

- 1.1 This report has been prepared at the request of Thriving Development Limited (“the Client”) in terms of the Focus Environmental Services Agreement (“Agreement”).
- 1.2 The following report is based on:
 - *Information provided by the client;*
 - *A review of historical aerial photographs available for the site;*
 - *A search of the Auckland Council Property File;*
 - *An enquiry to Auckland Council REC Contamination;*
 - *A review of the Historical Certificate of Title;*
 - *A site walkover and inspection; and*
 - *A site investigation and soil sampling.*
- 1.3 We have not independently verified the information provided to us by the Client or its completeness. We do not express an opinion on the accuracy or the reliability of such information.
- 1.4 No warranties are given, intended or implied.
- 1.5 Opinion, inferences, assumptions and interpretations made in this report should not be construed as legal opinion.
- 1.6 Where an assessment is given in this report, the Client must also rely upon their own judgement, knowledge and assessment of the subject of this report before undertaking any action.
- 1.7 This report must not be used in any other context or for any other purpose other than that for which it has been prepared without the prior written consent of Focus Environmental Services.
- 1.8 This report is strictly confidential and intended for the sole use of the Client and shall not be disclosed without the prior written consent of Focus Environmental Services.

2.0 Site Identification

The legal descriptions of the site are Pt Allot 72 Psh Of Mahurangi SO 891, Pt Allot 73 Psh Of Mahurangi SO 891E, Pt Allot 64 Psh of Mahurangi SO 891E, Pt Allot 72 Psh Of Mahurangi SO 891, and Pt Allot 73 Psh Of Mahurangi SO 891E. The site has an approximate area of 46.4736 ha and is located at national grid reference 1748060mE and 5967760mN. The site location is shown in Figure 1 attached.

The site is irregular in shape and under the Auckland Unitary Plan – Operative in Part (AUP: OP) the northern portion of the site is zoned ‘Future Urban Zone’ and a small area in the southern portion of the site is zoned ‘Rural – Rural Production Zone’.

There is currently no proposal to develop the site.

3.0 Site Topography

The property at 1738 State Highway 1, Warkworth has an undulating landscape with a steep slope in the southern portion of the site.

The site contour plan is presented in Appendix A.

4.0 Geology and Hydrology

Published geological maps¹ indicate the site is underlain with volcanic rich sedimentary rock of the Pakiri Formation. A description of the underlying geologies is presented in Table 1 below.

Table 1: Geology of 1738 State Highway 1, Warkworth.

Key name	Pakiri Formation of Warkworth Subgroup (Waitemata Group)
Simple name	Neogene sedimentary rocks
Main rock name	Turbidite
Description	Alternating thick-bedded, volcanic rich, graded sandstone and siltstone, with volcanoclastic grit beds
Subsidiary rocks	‘volcanic sandstone’ siltstone grit
Key group	Waitemata Group
Stratigraphic lexicon name	Pakiri Formation
Absolute age (min)	16.4 million years
Absolute age (max)	23.8 million years
Rock group	Alternating sandstone/siltstone
Rock class	Clastic sediment

¹ Geology of the Auckland Area (Institute of Geological & Nuclear Sciences 1:25,000 geological map 3, 2011)

No groundwater investigation was completed as part of this investigation.

The nearest surface water body to the site is an unnamed tributary of the Mahurangi River located in the north-eastern corner of the site.

A total of two hand augers were extended to a maximum depth of 1.0 m below ground level in order to characterise the potential ground contamination associated with the fill materials identified in the geotechnical appraisal report.

The hand augers completed across the area of potentially uncertified fill materials typically encountered light brown silty clays. It was determined the fill was from onsite sources.

No groundwater was encountered in any of the hand augers completed across the site.

The hand auger core logs and hand auger core photographs are presented as Appendix B.

5.0 Regulatory Framework

5.1 The National Environmental Standard

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES) came into effect on the 1st of January 2012 and supersedes any District Plan rules that related to contaminated land. Any Regional Plan rules relating to contaminated land are still applicable.

In brief, the objective of the NES is to ensure that land affected by contaminants is identified and assessed and, if necessary, remediated or managed to protect human health. The NES only applies to the activities: removing or replacing all, or part of, a fuel storage system; sampling the soil; disturbing the soil; subdividing the land; and changing the land use, and where an activity or industry described in the Hazardous Activities and Industries List (HAIL) is being, has been, or is more likely than not to have been undertaken on the piece of land.

The NES also contains reference to the soil contaminant standards for human health (SCS_(health)), for a variety of land use scenarios along with reference to best practice reporting documents.

5.2 Auckland Unitary Plan: Operative in Part

The contaminated land rules of the Auckland Unitary Plan: Operative in Part (AUP: OP) have immediate legal effect following its notification. As the AUP: OP was notified on the 15th of November 2016 the contaminated land rules must be considered.

In brief, the objective of the AUP: OP is to manage land containing elevated levels of contaminants to protect human health and the environment and to enable the effective use of the land.

The contaminated land rules of the AUP: OP apply when the land contains contaminants above those levels specified in Table E30.6.1.4.1 of Chapter E30 of the AUP: OP.

6.0 Site History

The history of the site was researched by Focus Environmental Services personnel, which involved a review of the available historical aerial photographs of the site, a review of the Auckland Council property file, an enquiry to Auckland Council REC Contamination and a review of the historical Certificate of Title.

6.1 Historical Aerial Photographs

Descriptions of the historical aerial photographs for the subject site are presented in Table 2 below. The historical site photographs are presented in Appendix C.

Table 2: Historical Photographs: 1738 State Highway 1, Warkworth

Date	Description
1966	The 1966 historical photograph shows the subject site forming part of a large plot of land and in use for rural purposes. The site is covered in grassland with a few small areas of bush. Although the image is of poor resolution, three buildings (dwelling, wool shed and wooden storage shed) can be observed in the north-western portion of the site and one building (painted tin shed) in the eastern portion of the site. State Highway 1 can be seen running along the northern and western boundaries of the property with the surrounding properties predominantly utilised for rural purposes. The site directly to the north of the property can be seen in use for horticultural purposes.
1976 & 1982	The 1976 historical photograph shows the subject site remaining mostly in use for rural purposes. No additional buildings appear to have been erected since the 1966 photograph. The surrounding properties remain predominantly utilised for rural purposes and the site directly to the north of the property remains in use for horticultural purposes. The 1982 photograph shows the subject site and surrounding properties as relatively unchanged and no additional buildings can be observed.
1992 & 1996	The 1992 photograph is of better resolution and a small cluster of buildings (dwelling, unit and shed) can be observed in the centre of the site where in previous photos they appeared as just one building. The site appears relatively unchanged from the 1982 photograph. The site remains in use for rural purposes, with surrounding properties also in use for rural or horticultural purposes. The 1996 photograph is of poor resolution and shows no visible changes from the 1992 photograph.
2010	The 2010 historical photograph shows the site in use for rural purposes. A barn and two additional accessory buildings appear to have been erected in the north-central area of the site. Raceways can be observed in a formed condition throughout the site. A horse ring can also be observed in the north-central portion of the site. Trees have been planted along the paddock boundaries. Rain water tanks can be observed near the southern boundary of the site. The surrounding sites remain mostly in use for rural purposes with the site to the north remaining in use for horticultural purposes.
2017	The 2017 historical photograph depicts the subject site as it currently appears and relatively unchanged from the 2010 photograph. The site remains in use for rural purposes with the only visible difference being the construction of a horse arena in the central-northern portion of the site. The surrounding properties remain in use for rural purposes, with the site to the north remaining in use for horticultural purposes.

Due to the age of some of the site buildings; the dwelling, residential unit, shearing shed, wooden storage sheds, and painted tin shed (pre 1966), it is considered that lead-based paints or asbestos containing materials may have potentially been utilised in the construction of these buildings identified at the site.

It should be noted that no areas of potential filling were identified during the review of the available historical photographs.

6.2 Previous Investigations

There are no previous environmental investigations relating to soil or groundwater contamination associated with the site at 1738 State Highway 1, Warkworth on file with Auckland Council.

The report titled '*Preliminary Geotechnical Appraisal Report, 1738 State Highway 1, Warkworth*' dated August 2019 and prepared by Lander Geotechnical Consultants Limited, was made available during this investigation.

In brief, during the geotechnical investigation, six hand auger boreholes (HA01 – HA06) were extended to a maximum depth of 3.0m in the northern half of the site. Non-engineered fill materials were encountered in HA05 at the surface to a depth of 0.6m. Groundwater was encountered in hand auger locations HA01, HA04 and HA05. The report also identified an area of potential fill in the centre of the site; however, this was not sampled as part of the geotechnical investigation.

6.3 Auckland Council Property File Search

The results of the council search showed eight consents relating to the site at 1738 State Highway 1, Warkworth. The relevant details of the Property File search are presented in Table 3 below.

Table 3: Relevant Property File Information: 1738 State Highway 1, Warkworth

Proposed Activity	Applicant	Reference	Date
Building permit to erect wool shed	J Miller	BPA 41721	28/04/1961
Building permit to extent dwelling	J Miller	CO32147	09/02/1971
Subdivision	J Miller	R12024	18/09/1974
Building permit to erect garage and garden shed	D & P Lawson	F042083	08/03/1988
Building permit for new garage storage building	M G Donnelly	ABA 950934	05/05/1995
Building permit to install new fireplace	M G Donnelly	ABA 11333	29/06/2001
Installation of swimming pool	Vaquero Farms Limited	ABA 32147	08/01/2008
Certificate of Acceptance for pergola	J R Melling	ABA 10100334	18/05/2012

6.4 Auckland Council REC Contamination Enquiry

An enquiry with Auckland Councils Environmental Health Unit of the Licensing and Compliance Services Department contained no information regarding contamination for the property at 1738 State Highway 1, Warkworth.

The Auckland Council REC Contamination Enquiry is presented in Appendix D.

6.5 Historical Certificate of Title Review

The historical certificate of title review was completed for the property at 1738 State Highway 1, Warkworth.

Following the review of the historical certificate of title no companies/entities were listed that would suggest that the site has been utilised for an activity described in the HAIL.

The historical certificate of title is presented in full as Appendix E.

6.6 Onsite Interview

An interview with the current owner/occupier of the site provided the following insight about the property:

- They advised they had never burnt refuse on the property;
- The occupier had used one of the spray races for drenching; and
- The property was currently in use as a stud farm and for grazing cattle.

7.0 Site Walkover and Inspection

The site inspection and walk over was carried out by Focus Environmental Services Limited personnel on the 2nd of October 2019. The site inspection was carried out during a period of relatively fine weather. The site was accessed from State Highway 1 via a gravel driveway in the northern portion of the site. The driveway led to the central-northern area of the site. The centre of the site was separated into three distinct areas; the residential area, central-eastern area and the central-western area of the site.

The residential area of the property consisted of a single storey dwelling, a residential unit, a swimming pool, a pergola and a shed. Concrete surrounded the entire residential area. The dwelling, residential unit and the shed were constructed of stained wood with a tiled roof and no soffits. No Potentially Asbestos Containing Material (PACM) were observed on the exterior of these buildings. The shed was observed to have a concrete base and was in use for general storage. No visual or olfactory evidence of contamination was observed in or around the residential area of the site.

The central-eastern area of the site consisted of a horse arena, a horse ring, a small stable and two sheds (1 & 4). Both the horse arena and the horse ring had sand bases with wooden fencing. The two sheds and stable were constructed of unpainted wood with a tin roof. They were all concrete lined and in use for general horse equipment storage and horse grooming area. No visual or olfactory evidence of contamination was observed in or around the central-eastern area of the site.

The central western area of the site consisted of two potential spray races, a shearing shed, a barn, concrete water tank and a shed (2). Both spray races and stock loading areas had hardstand bases, and no visual signs of contamination were observed within them. The shearing shed was constructed of wood with wooden lining, a tin roof, and was painted in a deteriorated state. A pile of unused bricks and a broken concrete water tank were located adjacent to the shearing shed. No visual evidence was observed around this pile.

To the south of the shearing shed, a barn and adjacent concrete rainwater tank were identified. The barn was in good condition and constructed of painted tin with a concrete base. The barn was in use for general storage. No visual evidence of contamination was observed in or around the barn. To the south of the barn, a wooden storage shed (2) was located adjacent to spray race (2). The shed was constructed of unpainted wood with a tin roof and was concrete lined.

A gravel raceway led to the south and east of the site. Towards the south of the site, a small area of potential fill which was identified in the preliminary geotechnical appraisal report. The fill was deemed to be sourced from onsite sources. Two plastic rain water tanks were present along the southern boundary of the site.

A painted tin shed was located on the north-eastern portion of the site. The shed was locked, had a hardstand base, was in a deteriorated condition and not in use. A concrete stream stop bank was located adjacent to the shed along the western boundary of the site. No visual evidence of contamination was observed around the stop bank.

The remainder of the site was largely covered in pasture for stock grazing. Multiple races and concrete water troughs were located around the site. No visual evidence of contamination was observed in or around any of the races or water troughs.

Additionally, during the site walkover, it was determined that the two areas of potential fill identified in the geotechnical report were sourced from onsite sources.

The site inspection photographs are presented as Appendix F.

8.0 Surrounding Environment

The surrounding environment appeared to be predominantly rural residential in use with large portions of the neighbouring properties being coved in pasture.

At the time of the site walkover and inspection no activities or land uses described in the HAIL were observed on the properties that directly bordered the subject site.

However, the property on the opposite side of State Highway 1 to the north of the subject site was in use for horticultural purposes.

The neighbouring environment is presented in Figure 3.

9.0 Asbestos Management

No external asbestos containing materials (ACM) were identified during the site walk over and investigation, however, in the event of that ACM is discovered at the site the removal of ACM will need to be conducted in accordance with the Health and Safety at Work (Asbestos) Regulations (MBIE, 2016) and the Approved Code of Practice for the Management and Removal of Asbestos (WorkSafe New Zealand, 2016).

10.0 Potentially Contaminating Activities or Land Uses

Following a review of the history and the available information relating to the site located at 1738 State Highway 1, Warkworth, the following potential contaminating land uses and/or activities have been identified:

- Potential soil contamination associated with lead-based paint;
- Potential spray drift from adjacent horticulture activities;
- Two potential spray races; and
- Potentially uncertified fill material.

11.0 Conceptual Model of Exposure Pathways

The assessment provided in Table 4 below expands on the potential sources of contamination identified within the site and exposure pathways and was based on the potential effects of the change of land use and soil disturbance activities on human health and the environment associated with potential future development.

Table 4: Conceptual Site Model: 1738 State Highway 1, Warkworth

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health - Rural Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health - Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Ingestion of Contaminated Soils	Human Health - Rural Residential Land Use	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
		Human Health - Commercial/Industrial Outdoor Worker	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Inhalation of Vapours/Fibres	Human Health - Rural Residential Land Use	Incomplete: No evidence of potential vapours or fibres identified at the site.
		Human Health - Commercial/Industrial Outdoor Worker	Incomplete: No evidence of potential vapours or fibres identified at the site.
	Surface Water Run-off	Ecological Receptors - Unnamed Tributary Mahurangi River	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.
	Migration of Groundwater	Ecological Receptors - Unnamed Tributary Mahurangi River	Potentially Complete: Sampling and analysis is recommended to confirm the concentrations of contaminants in soil.

12.0 Sampling and Analysis Plan and Sampling Method

Environmental Sampling was carried out in accordance with the Contaminated Land Management Guidelines No.5 (MfE, 2011).

Twelve discrete surface soil samples (0.0 - 0.15m) were taken from the areas of potential historical horticultural use at the site. All twelve samples were sent under full chain of custody documentation to an IANZ accredited laboratory and composited at the laboratory to form three composite samples (4:1).

The three composite samples were analysed for:

- Total recoverable arsenic, copper, lead; and
- Organo-chlorine pesticides.

In addition, two surface samples were taken from the soils immediately surrounding the buildings potentially containing lead-based paint. Both samples were sent under full chain of custody documentation to an IANZ accredited laboratory and analysed for:

- Total recoverable lead.

Furthermore, four samples were taken from the surface soils within the two potential spray races and sent under full chain of custody documentation to an IANZ accredited laboratory and analysed for:

- Total recoverable arsenic, copper, lead; and
- Organo-chlorine pesticides.

Additionally, two hand-augers were completed to a maximum depth of 1.0m in the two areas of potential fill identified in the geotechnical report and two representative samples from the fill material were sent under full chain of custody documentation to an IANZ accredited laboratory and analysed for:

- Total recoverable arsenic, cadmium, chromium, copper, lead, nickel and zinc;
- Organo-chlorine pesticides;
- Polycyclic aromatic hydrocarbons; and
- Benzo[a]pyrene equivalent (BaP eq.).

The sample location plan is presented as Figure 3.

13.0 Field Sampling Quality Assurance

All sampling implements were triple washed between samples using clean tap water, followed by a solution of laboratory grade phosphate free detergent (Decon 90), and a final rinse with clean water.

Clean, latex gloves were worn when handling each sample. Samples were stored in laboratory cleaned glass jars and immediately placed in an iced cooler. The samples were transported under full chain of custody documentation to an IANZ accredited laboratory for analysis.

14.0 Laboratory Quality Assurance

Routine laboratory quality assurance procedures include analysis of laboratory blanks and spiked samples. All analyses were carried out using industry standard methods as follows:

- Total Recoverable Metals - Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.
- Organo-chlorine pesticides - sonication extraction - OCP Screen method, air dry, grind, sonication extraction GC-ECD.
- Poly-Aromatic Hydrocarbons - Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines.

15.0 Basis for Guideline Values

There is currently no proposal to develop the site. Therefore, as a conservative approach the guideline values of the Soil Contaminant Standards for health (SCS_(health)) for rural residential / lifestyle block land use (25% produce consumption), as outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES), and the discharge criteria of the Auckland Unitary Plan: Operative in Part (AUP: OP) are considered relevant and have been adopted as the site assessment criteria.

Furthermore, as a conservative approach, the concentrations of heavy metals detected will be compared to the maximum background levels for non-volcanic soils in Auckland² (TP153). The relevant values of the above guidelines have been reproduced in Table 2 below.

Table 5: Site Assessment Criteria: 1738 State Highway 1, Warkworth (mg/kg)

Parameter	NES (SCS _(health))	AUP: OP	TP153
Arsenic	17	100	12
Cadmium	0.8	7.5	0.65
Chromium	290	400	55
Copper	NL	325	45
Lead	160	250	65
Nickel	400 ¹	105	35
Zinc	7400 ¹	400	180
Total DDT	45	12	-
Dieldrin	1.1	0.5 ²	-
BaP eq.	6	20	-

Note: NL = Not Limited. This is where the derived values exceed 10,000mg/kg; 1. = No Soil Contaminant Standards for health (SCS_(health)) given, guideline values derived in accordance with the Contaminated Land Management Guidelines number 2 - Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011), and taken from the National Environment Protection (Assessment of Site Contamination) Measure 1999 for Low Density Residential land use, 2= Soil Guideline Values to protect on-site ecological receptors taken from Ministry for the Environment Guidelines for Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites, November 2006.

Furthermore, the natural background levels of organo-chlorine pesticides and polycyclic aromatic hydrocarbons are considered to be below the analytical levels of detection and hence the detection of these analytes would restrict material from being classified as cleanfill material.

² Background Concentrations of Inorganic Elements in Soils from the Auckland Region, Technical Publication No.153, Auckland Regional Council, 2001.

16.0 Soil Sampling Results

Tabulated soil sampling results are presented in Tables 6, 7 and 8 below and laboratory transcripts are provided in Appendix G.

16.1 Heavy Metals

Table 6: Heavy Metals Results: 1738 State Highway 1, Warkworth (mg/kg).

Sample	As	Cd	Cr	Cu	Pb	Ni	Zn
COMP01	1.8	-	-	10.0	5.07	-	-
COMP02	1.8	-	-	9.08	5.69	-	-
COMP03	1.7	-	-	5.8	4.8	-	-
PB01	-	-	-	-	7.90	-	-
PB02	-	-	-	-	15.7	-	-
SR01	4.1	-	-	48.1	6.19	-	-
SR02	2.3	-	-	26.8	10.6	-	-
SR03	<i>14.1</i>	-	-	37.3	6.87	-	-
SR04	3.8	-	-	34.2	6.86	-	-
HA01 0.3m	1.4	0.038	18.2	2.3	8.95	2.4	10.6
HA02 0.4m	0.40	0.014	14.2	0.83	3.7	3.4	6.17

Note: Results in **red** exceed the Soil Contaminant Standards for health (SCS_(health)) for rural residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the maximum Auckland background concentrations for non-volcanic soils outlined in the Auckland Regional Council Technical Publication No.153, Oct 2001.

The concentrations of arsenic detected in sample SR03 was elevated above the maximum Auckland background concentrations for non-volcanic soils. The concentrations of arsenic detected in all samples analysed were below the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria as outlined in the AUP: OP.

The concentrations of cadmium detected in all samples analysed were below the maximum Auckland background concentrations for non-volcanic soils, the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria as outlined in the AUP: OP.

The concentrations of chromium detected in both samples analysed were below the maximum Auckland background concentrations for non-volcanic soils. The concentrations of chromium detected in both of the samples analysed were also below the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria as outlined in the AUP: OP.

The concentrations of copper detected in sample SR01 was elevated above the maximum Auckland background concentrations for non-volcanic soils. The concentrations of copper detected in all of the samples analysed were below the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria as outlined in the AUP: OP.

The concentrations of lead detected in all samples analysed were below the maximum Auckland background concentrations for non-volcanic soils, the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria as outlined in the AUP: OP.

The concentrations of nickel detected in both of the samples analysed were below the maximum Auckland background concentrations for non-volcanic soils, the adopted human health criteria and the discharge criteria as outlined in the AUP: OP.

The concentrations of zinc detected in both samples analysed were below the maximum Auckland background concentrations for non-volcanic soils. The concentrations of zinc detected in both samples analysed were also below the adopted human health criteria and the discharge criteria as outlined in and the AUP: OP.

16.2 Organochlorine Pesticides

Table 7: Organochlorine Pesticide Results: 1738 State Highway 1, Whitford (mg/kg).

Sample	Total DDT	Dieldrin
COMP01	<0.02	<0.05
COMP02	<0.02	<0.05
COMP03	<0.02	<0.05
SR01	<0.02	<0.05
SR02	<0.02	<0.05
SR03	<0.02	<0.05
SR04	<0.02	<0.05
HA01 0.3m	<0.02	<0.05
HA02 0.4m	<0.02	<0.05

Note: * = Residual levels of contaminants detected. Results in **red** exceed the Soil Contaminant Standards for health (SCS_(health)) for rural residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

The concentrations of organo-chlorine pesticides in all samples were below the analytical levels of detection and therefore the cleanfill criteria.

Therefore, the concentrations of organo-chlorine pesticides in all samples analysed were also below the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

16.3 Polycyclic Aromatic Hydrocarbons

Table 8: Polycyclic Aromatic Hydrocarbon Results: 1738 State Highway 1, Warkworth mg/kg).

Sample	BaP eq.
HA01 0.3m	<0.01
HA02 0.4m	<0.01

Note: * = Residual levels of contaminants detected. Results in **red** exceed the Soil Contaminant Standards for health (SCS_(health)) for rural residential land use. Results in **Bold** exceed the discharge criteria as outlined in the Auckland Unitary Plan: Operative in Part. Results in *Italics* exceed the cleanfill criteria.

The concentrations of Polycyclic Aromatic Hydrocarbons in all samples were below the analytical levels of detection, and therefore below the cleanfill criteria.

Therefore, the concentrations in both samples were also below the SCS_(health) for rural residential land use as outlined in the NES and the discharge criteria of the AUP: OP.

17.0 Extent of Contamination

The results of the sample analysis indicate that the site soils in the areas of samples SR01 and SR03 contain levels of heavy metals elevated above the maximum Auckland background concentrations for non-volcanic soils. Due to this, the site soils in these areas will require management during development.

The surface sample SR01 which was taken from the area of spray race 1 was elevated above the maximum Auckland background concentrations for non-volcanic soils for copper.

In addition, surface sample SR03 which was taken from the area of spray race 2 was elevated maximum Auckland background concentrations for non-volcanic soils for arsenic.

18.0 Revised Conceptual Model of Exposure Pathways

The revised conceptual site model provided in Table 10 below expands on the potential sources of contamination (as identified above), following sampling and analysis, and exposure pathways and was based on the potential effects of future soil disturbance activities on human health and the environment.

Table 10: Revised Conceptual Site Model: 1738 State Highway 1, Warkworth

Potential Source	Potential Pathways	Potential Receptors	Assessment
Contaminated Soil	Dermal Contact with Contaminated Soils	Human Health - Rural Residential Land Use	Incomplete: Concentrations of contaminants not above the SCS _(health) for rural residential land use.
		Human Health - Commercial/Industrial Outdoor Worker	Incomplete: Concentrations of contaminants not above the SCS _(health) for commercial/industrial land use.
	Ingestion of Contaminated Soils	Human Health - Rural Residential Land Use	Incomplete: Concentrations of contaminants not above the SCS _(health) for rural residential land use.
		Human Health - Commercial/Industrial Outdoor Worker	Incomplete: Concentrations of contaminants not above the SCS _(health) for commercial/industrial land use.
	Inhalation of Vapours/Fibres	Human Health - Rural Residential Land Use	Incomplete: No evidence of potential vapours or fibres identified at the site.
		Human Health - Commercial/Industrial Outdoor Worker	Incomplete: No evidence of potential vapours or fibres identified at the site.
	Surface Water Run-off	Ecological Receptors - Unnamed tributary of Mahurangi River	Incomplete: Concentrations of contaminants not above the discharge criteria of the AUP: OP.
	Migration of Groundwater	Ecological Receptors - Unnamed tributary of Mahurangi River	Incomplete: Concentrations of contaminants not above the discharge criteria of the AUP: OP.

19.0 Conclusions and Recommendations

This Detailed Site Investigation has been prepared in general accordance with the requirements of the Contaminated Land Management Guidelines No.1 and No.5 (Ministry for the Environment, 2011).

The history of the site was researched by Focus Environmental Services personnel, which involved a review of the available historical aerial photographs of the site, a review of the Auckland Council property file, an enquiry to Auckland Council REC Contamination, a review of the historical certificate of title and an onsite interview. A preliminary geotechnical appraisal report was also made available during this investigation. During the review of the available information any potentially contaminating activities or land uses were identified.

During the review of the available information it was noted that the site may have been potentially impacted by spray drift from the horticultural land use on the adjacent properties. In addition, potentially uncertified fill materials were also noted in specific areas of the site. Furthermore, due to the age of the site buildings, there may be soil contamination present due the use of lead-based paints.

Following the desk top assessment, the site was visited and a site inspection and walk over was carried out. The site was inspected by Focus Environmental Services Limited personnel on the 2nd of October 2019. During the site inspection, any potentially contaminating activities or land uses were identified.

During the site walkover and inspection two potential spray races were identified. Additionally, it was determined that the two areas of fill identified in the geotechnical report were sourced from onsite sources.

Due to the potential sources of contamination identified, it is considered that there is evidence to suggest that an activity outlined in the Hazardous Activities Industries List (HAIL) has been, or is more likely than not to have been undertaken at the site.

Following the site inspection and walkover, the intrusive investigation was carried out by Focus Environmental Services Limited personnel. Twelve discrete samples were taken from across the area of potential historical horticulture and composited at the laboratory to form three composite samples (4:1). Additionally, ten discrete soil samples were taken from the areas of potential lead-based paint contamination, fill material, and spray races.

The samples were analysed for contaminants that could be present due to the potentially hazardous activities carried out at the site. The results of the site investigation have indicated that the activities carried out at the site have slightly impacted the site soils.

Concentrations heavy metals, organo-chlorine pesticides and polycyclic aromatic hydrocarbons detected in the site soils were below the Soil Contaminant Standards for health (SCS_(health)) for rural residential land use (25% produce consumption) as outlined in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) and the discharge criteria of the Auckland Unitary Plan: Operative in Part (AUP: OP).

However, concentrations of arsenic and copper were detected in localised areas elevated above the maximum background concentrations for non-volcanic soils in Auckland.

Based on the results of the sampling and analysis, the site soils investigated are considered suitable for retention onsite following future proposed development.

However, due to the low-level contamination identified in localised areas, the site soils in these locations are not suitable for classification as cleanfill and any materials removed from these areas of the site will require disposal at a suitably licensed disposal facility unless further sampling and analysis demonstrates otherwise.

Prior to development of the site, it is recommended that a Site Management Plan (SMP) be prepared to ensure that the soils containing low-levels of heavy metal contamination are handled in a controlled manner and, if removed from the site, disposed of to a suitable disposal location.

Figures

Figure 1 - Site Location Plan

Figure 2 - Site Features Plan

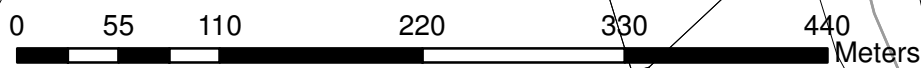
Figure 3 - Sample Location Plan

Figure 4 - Surrounding Environment



Legend


Site Location




Focus Environmental Services Limited
 PO Box 11455
 Ellerslie
 Auckland 1542
 Ph: +64 9 579 4155
 www.focusenvironmental.co.nz

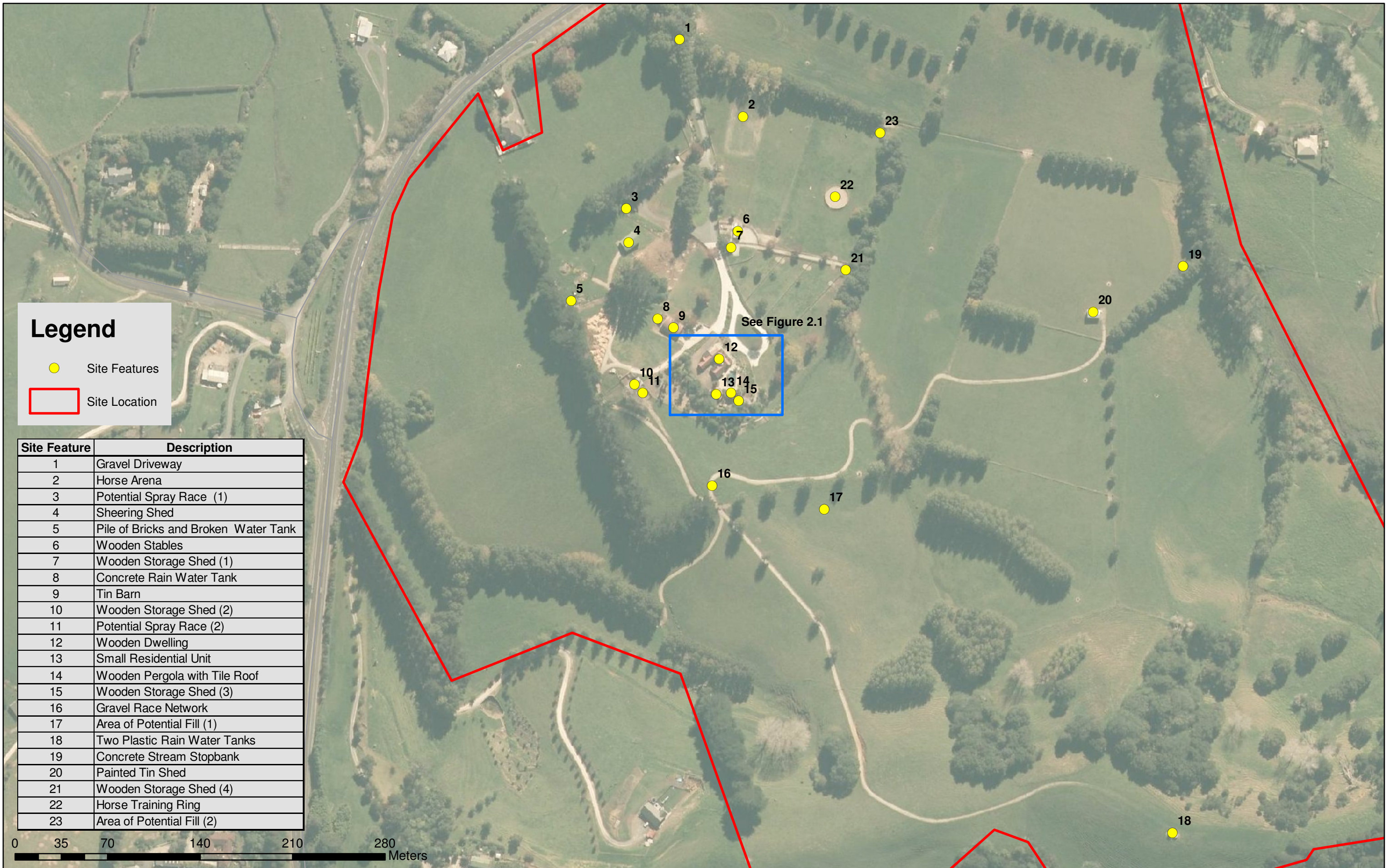
Thriving Development Limited
 1738 State Highway 1
 Warkworth
 Auckland

Figure 1: Site Location Plan
 Detailed Site Investigation



1297.001

Drawing Number: 1297.001.01
Drawn By: PS
Checked By: DO'R
Date: 01/10/2019



Legend

- Site Features
- Site Location

Site Feature	Description
1	Gravel Driveway
2	Horse Arena
3	Potential Spray Race (1)
4	Sheering Shed
5	Pile of Bricks and Broken Water Tank
6	Wooden Stables
7	Wooden Storage Shed (1)
8	Concrete Rain Water Tank
9	Tin Barn
10	Wooden Storage Shed (2)
11	Potential Spray Race (2)
12	Wooden Dwelling
13	Small Residential Unit
14	Wooden Pergola with Tile Roof
15	Wooden Storage Shed (3)
16	Gravel Race Network
17	Area of Potential Fill (1)
18	Two Plastic Rain Water Tanks
19	Concrete Stream Stopbank
20	Painted Tin Shed
21	Wooden Storage Shed (4)
22	Horse Training Ring
23	Area of Potential Fill (2)


0 35 70 140 210 280 Meters



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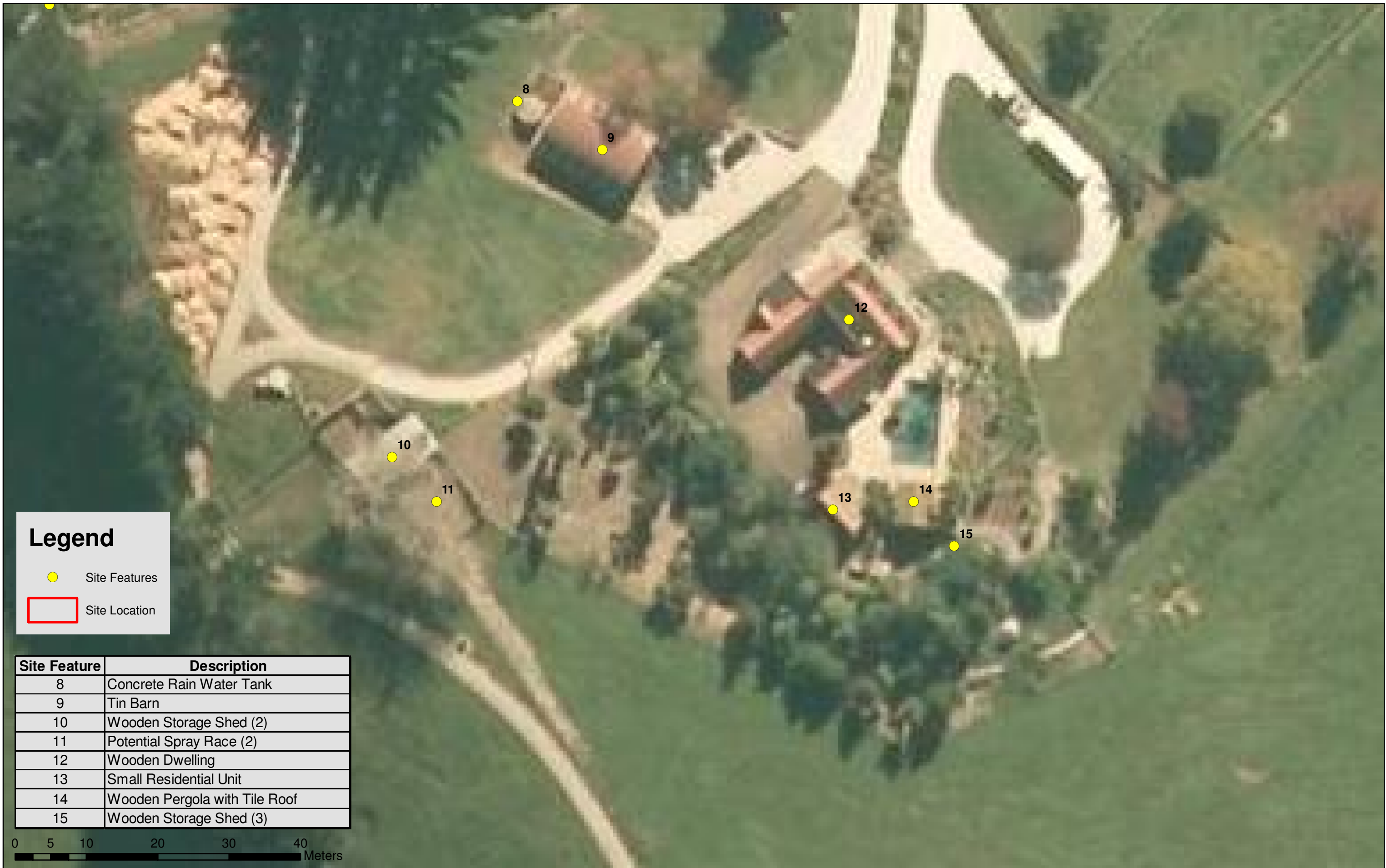
Thriving Development Limited
 1738 State Highway 1
 Warkworth
 Auckland

Figure 2: Site Features Plan
 Detailed Site Investigation



1297.001

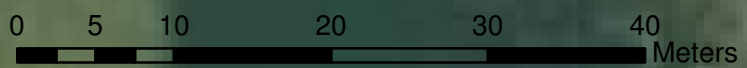
Drawing Number: 1297.001.02
 Drawn By: PS
 Checked By: DO'R
 Date: 02/10/2019



Legend

- Site Features
- Site Location


Site Feature	Description
8	Concrete Rain Water Tank
9	Tin Barn
10	Wooden Storage Shed (2)
11	Potential Spray Race (2)
12	Wooden Dwelling
13	Small Residential Unit
14	Wooden Pergola with Tile Roof
15	Wooden Storage Shed (3)




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 Warkworth
 Auckland

Figure 2.1: Site Features Plan
 Detailed Site Investigation

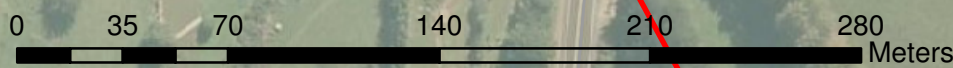


1297.001	Drawing Number: 1297.001.02.1
	Drawn By: PS
	Checked By: DO'R
	Date: 02/10/2019



Legend


- Discrete Sample Locations
- ⊕ Hand Auger Locations
- Composite Sample Locations
- Composite Areas
- Site Location




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 Auckland

Figure 3: Sample Location Plan
 Detailed Site Investigation


 1297.001



Drawing Number: 1297.001.03
Drawn By: PS
Checked By: DO'R
Date: 02/10/2019



Legend

 Site Location



 <p>Focus Environmental Services Limited PO Box 11455 Ellerslie Auckland 1542 Ph: +64 9 579 4155 www.focusenvironmental.co.nz</p>	<p>Thriving Development Limited 1738 State Highway 1 Warkworth Auckland</p>	<p>Figure 4: Surrounding Environment Detailed Site Investigation</p>		<p>Drawing Number: 1297.001.04</p>
				<p>Drawn By: PS</p>
				<p>Checked By: DO'R</p>
				<p>Date: 08/10/2019</p>
			<p>1297.001</p>	

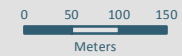
Appendices

Appendix A - Site Contour Plan



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Site Contour Plan



Scale @ A4
= 1:8,000

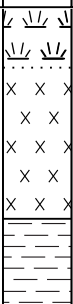
Date Printed:
1/10/2019



Appendix B - Hand Auger Logs

PROJECT NUMBER 1297.001	DRILLING DATE 2/10/2019	COORDINATES -
PROJECT NAME Detailed Site Investigation	DRILLING COMPANY Focus Environmental Servi	COORD SYS NZTM
CLIENT Thriving Development Limited	DRILLER EDH	SURFACE ELEVATION -
ADDRESS 1738 State Highway 1, Warkworth	DRILLING METHOD Hand Auger	LOGGED BY PS
	TOTAL DEPTH 1.0 m	CHECKED BY DO'R

COMMENTS




Depth (m)	Graphic Log	Moisture	Samples	Material Description	Additional Observations
				Organic topsoil	
0.5			0.3m	Light brown clayey SILT unconsolidated	Onsite sourced fill
				Stiff light brown slity CLAY with grey inclusions	
1				Termination Depth at:1.0 m	
1.5					
2					
2.5					
3					
3.5					
4					
4.5					

HA01



PROJECT NUMBER 1297.001	DRILLING DATE 2/10/2019	COORDINATES -
PROJECT NAME Detailed Site Investigation	DRILLING COMPANY Focus Environmental Servi	COORD SYS NZTM
CLIENT Thriving Development Limited	DRILLER EDH	SURFACE ELEVATION -
ADDRESS 1738 State Highway 1, Warkworth	DRILLING METHOD Hand Auger	LOGGED BY PS
	TOTAL DEPTH 1.0 m	CHECKED BY DO'R

COMMENTS

Depth (m)	Graphic Log	Moisture	Samples	Material Description	Additional Observations
				Organic topsoil	
0.5			0.3m	Grey silty CLAY	Onsite sourced fill
				Light brown silty CLAY	
1				Termination Depth at:0.8 m	
1.5					
2					
2.5					
3					
3.5					
4					
4.5					

HA02



Appendix C - Historical Site Photographs

Historical Aerial Photographs

1738 State Highway 1 Warkworth

by Focus Environmental Services Limited

1966 Historical Photograph



Source: NZ Aerial Mapping

1976 Historical Photograph



Source: NZ Aerial Mapping

1982 Historical Photograph



Source: NZ Aerial Mapping

1992 Historical Photograph

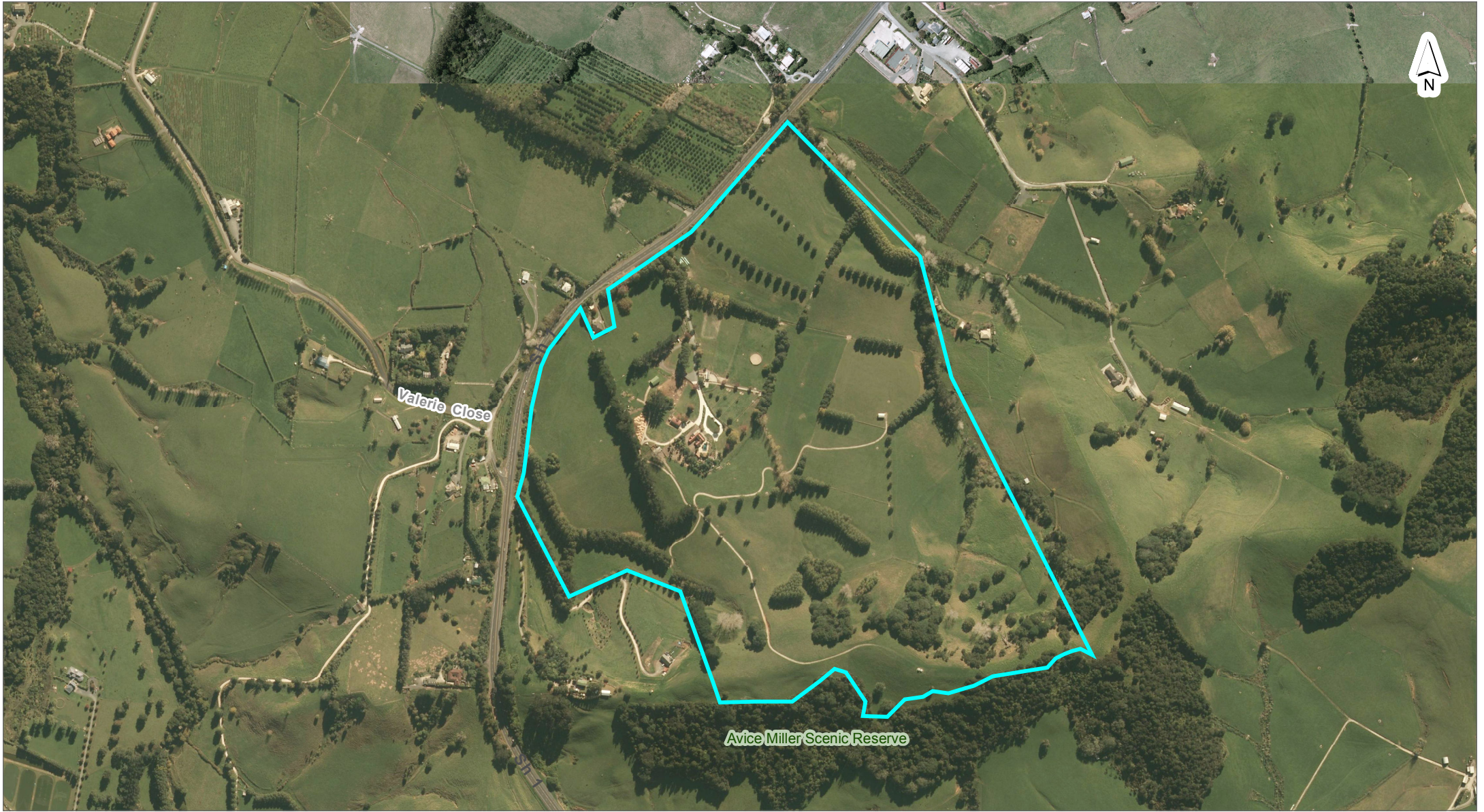


Source: NZ Aerial Mapping

1996 Historical Photograph

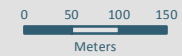


Source: NZ Aerial Mapping



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2010 Historical Photograph



Scale @ A4
= 1:8,000

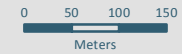
Date Printed:
1/10/2019





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2017 Historical Photograph



Scale @ A4
= 1:8,000

Date Printed:
1/10/2019



Appendix D - Auckland Council REC Contamination Enquiry

From: Rachel Terlinden <rachel.terlinden@aucklandcouncil.govt.nz> on behalf of RECContamination <recontamination@aklc.govt.nz>
Sent: Tuesday, October 1, 2019 10:02 AM
To: cari@focusenvironmental.co.nz
Subject: RE: 1738 State Highway 1, Warkworth

Hi Cari,

This email is in response to your recent enquiry requesting available site contamination information that was held within the Environmental Health Unit of the Licensing and Compliance Services Department (LCS).

There is no contamination information held within our records for the site 1738 State Highway 1, Warkworth.

Please note that only council's soil contamination records within the LCS department and GIS map have been checked. There may be other soil contamination information held within:

1. A Contaminated Sites Enquiry report, which contains the following information only:

(A search area of radius 200m is applied by default)

- Pollution Incidents (incl. air discharges, oil or diesel spills)
- Bores
- Contaminated site, air discharge and industrial trade process consents
- Closed Landfills (council- owned closed landfill sites only)
- Air quality permitted activities

How to apply for a Contaminated Sites Enquiry Response: DO NOT apply for this as part of a Property File request. Please follow this link --> <https://www.aucklandcouncil.govt.nz/building-and-consents/types-resource-consents/earthworks/Pages/order-site-contamination-enquiry-report.aspx>

Please take note of the following when applying:

- Apply under the Company Name if request is on behalf of the company.
- Legal Description(s) of the physical site(s) is/are stated clearly. This is to ensure accurate representation of data.
- Enter preferred Postal Address or PO Box instead of physical address of company.
- Contact Person: Please enter your full name, including e-mail address.

2. Property File for viewing reports or all relevant information relating to the property -Requested from the local service centre, by phone, 09 3010101.

Please note:

If you are demolishing any building that may have asbestos containing materials (ACM) in it:

1. *You have obligations under the relevant regulations for the management and removal of asbestos, including the need to engage a Competent Asbestos Surveyor to confirm the presence or absence of any ACM.*
2. *Work may have to be carried out under the control of the person holding a WorkSafe NZ Certificate of Competence (CoC) for restricted works.*
3. *If any ACM is found, removal or demolition will have to meet the requirements of the Health and Safety at Work (Asbestos) Regulations 2016.*

4. Information on asbestos containing materials and your obligations can be found at www.worksafe.govt.nz.

If ACM is found on site following the demolition or removal of the existing buildings, you may be required to remediate the site and carry out validation sampling. Dependent on the amount of soil disturbance a further consent application may be required.

Paints used on external parts of properties up until the mid-1970's routinely contained lead, a poison and a persistent environmental pollutant. Older paints dating from before 1945 often contained extremely high levels of lead. Dust and flakes from painted surfaces in poor condition are a major cause of lead poisoning in both adults and children. You are advised to ensure that soils affected by old, peeling or flaking paint are assessed in relation to the proposed use of the property. Very sensitive uses such as residential with young children, childcare centres, play areas or recreational land should be considered as high risk. In services or working environments other regulatory requirements may require risk assessment and mitigation.

Ngā mihi,
Rachel

**Rachel Terlinden | Technical Officer – Contamination, Air & Noise
Specialist Input | Resource Consents**

Mob 021956763

Auckland Council, Level 2, 35 Graham Street, Auckland

Visit our website: www.aucklandcouncil.govt.nz

From: cari@focusenvironmental.co.nz <cari@focusenvironmental.co.nz>

Sent: Monday, 30 September 2019 4:25 PM

To: RECContamination <reccontamination@aklc.govt.nz>

Cc: paula@focusenvironmental.co.nz

Subject: 1738 State Highway 1, Warkworth

Good Afternoon,

I have attached a site map for 1738 State Highway 1, Warkworth

Could you please advise whether there are any contaminated land records held by Auckland Council for this site?

Kind Regards

Cari Llewellyn

Environmental Technician/Asbestos Surveyor

Focus Environmental Services Limited

Tel. +64 9 579 4155

Mob. +64 275431561

PO Box 11455

Ellerslie, Auckland 1542

Web. www.focusenvironmental.co.nz





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Appendix E - Historic Certificate of Title



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Limited as to Parcels
Historical Search Copy**




R. W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier NA67B/483
Land Registration District North Auckland
Date Issued 07 December 1987

Prior References

NA31C/1294

Estate Fee Simple
Area 46.4736 hectares more or less
Legal Description Part Allotment 64 and Part Allotment
72-73 Parish of Mahurangi

Original Registered Owners

Maxwell Gerald Donnelly

Interests

Appurtenant hereto is a right of way created by Conveyance 233624 (affects part Allotment 64 Parish of Mahurangi)

Subject to Section 36 (4) Counties Amendment Act 1961

Subject to Section 59 Land Act 1948(affects part)

Subject to Section 8 Coal Mines Amendment Act 1950(affects part)

Appurtenant hereto is a right of way created by Transfer 191332.4

The easements created by Transfer 191332.4 are subject to Section 37 (1) (a) Counties Amendment Act 1961

464508.1 Gazette Notice (N.Z. Gazette No. 112 3.11.1877 2868) declaring the adjoining State Highway No:1 to be a limited access road - 28.11.1988 at 1.47 pm

7188737.1 CAVEAT BY JASON TROY MELLING - 12.1.2007 at 9:00 am

7220140.1 Withdrawal of Caveat 7188737.1 - 7.2.2007 at 9:00 am

7220140.2 Transfer to Vaquero Farms Limited - 7.2.2007 at 9:00 am

8187028.1 Mortgage to Rabobank New Zealand Limited - 15.6.2009 at 11:39 am

10136312.1 CAVEAT BY JUAN XU - 27.7.2015 at 5:06 pm

10066428.1 Discharge of Mortgage 8187028.1 - 31.7.2015 at 4:00 pm

10321051.1 Withdrawal of Caveat 10136312.1 - 2.2.2016 at 5:03 pm

10321051.2 Transfer to Thriving Development Limited - 2.2.2016 at 5:03 pm

References

Prior C/T 31C/1294

Transfer No.

N/C. Order No. B.761215.4

(Limited as to parcels)



REGISTER

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of December one thousand nine hundred and eightyseven under the seal of the District Land Registrar of the Land Registration District of NORTH AUCKLAND

WITNESSETH that DAVID MALCOLM LAWSON of Waipukurau, farmer and PAULINE ANNE LAWSON his wife are

seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 46.4736 hectares more or less being part Allotments 64, 72 and 73 Parish of Mahurangi.



Interests at date of issue:

Subject to Section 36 (4) Counties Amendment Act 1961.

Subject (as to part) to the reservation and conditions imposed by Section 59 Land Act 1948 and by Section 8 of the Coal Mines Amendment Act 1950

464508.1 Gazette Notice (N.Z. Gazette No. 112 3.11.1877 2868) decalaring State Highway No: 1 to be a limited access road - 28.11.1988 at 1.47 o'c.

Appurtenant hereto is a right of way over part Allotment 64 Parish of Mahurangi. (Part CT 553/301) created by Conveyance 233624

Appurtenant hereto is a right of way over part Lot 1 Plan 74485 (CT 30B/1341) marked A and B on Plan 74485 created by Transfer 191332.4

The above Easement created by Transfer 191332.4 is subject to Section 37 (1) (a) Counties Amendment Act 1961.

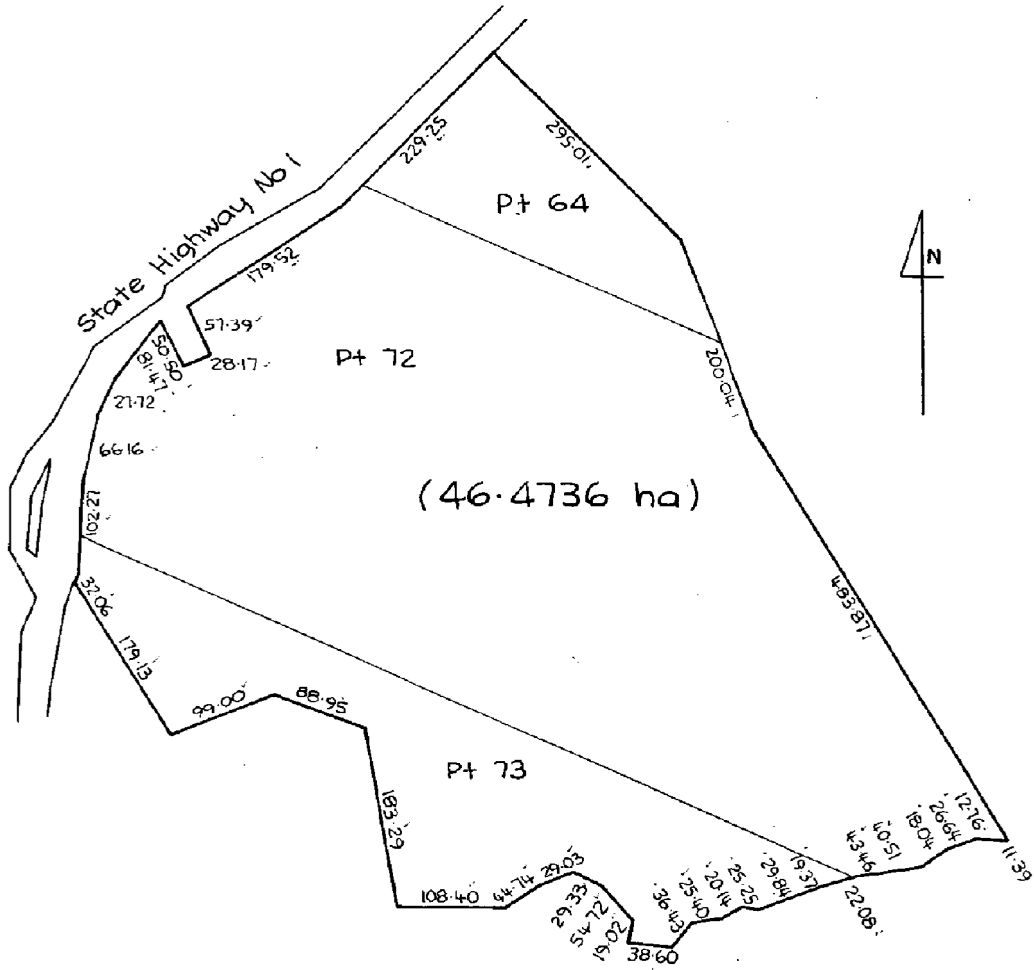
Measurements are Metric

C.687494.1 Transfer to Maxwell Gerald Donnelly of Auckland company director - 30.11.1994 at 10.46 oc

Curmy
A.L.R.

CERTIFICATE OF TITLE No. 67B/483

RODNEY COUNTY



Measurements are Metric
SO 891E
EXD DLH Wg.

58201A-50,000/7/86 MK



Appendix F - Site Inspection Photographs

Site Inspection Photographs

1738 State Highway 1
Warkworth

by Focus Environmental Services Limited



Gravel Driveway



Horse Arena with Sand Base



Potential Spray Race (1)



Wooden Painted Shearing Shed



Interior of Shearing Shed



Pile of Bricks and Broken Concrete
Water Tank



Wooden Horse Stables



Wooden Storage Shed (1)



Concrete Rain Water Tank



Painted Tin Barn



Wooden Storage Shed (2)



Potential Spray Race (2)



Unpainted Wooden Dwelling



Unpainted Wooden Residential Unit



Unpainted Wooden Pergola with Tiled Roof



Unpainted Wooden Storage Shed (3)



Gravel Raceway



Area of Potential Fill (1)



Plastic Rain Water Tanks



Concrete Stream Stopbank



Painted Tin Shed



Wooden Storage Shed (4)



Area of Potential Fill (2)



Grazing Paddocks

Appendix G - Laboratory Transcripts



Certificate of Analysis

Focus Environmental Services Ltd
 415 Great South Road, Ellerslie
 Auckland
 Attention: Paula Stevenson
 Phone: 0276662232
 Email: paula@focusenvironmental.co.nz

Lab Reference: 19-34261
 Submitted by: PS & EDH
 Date Received: 3/10/2019
 Date Completed: 8/10/2019
 Order Number:
 Reference: 1297.001

Sampling Site: 1738 State Highway 1, Warkworth

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

AMENDED REPORT. This report replaces in full a previous version R00 sent on 7/10/2019. Added Zinc results to samples 19 and 20.

Elements in Soil

Client Sample ID			PB01 SUR	PB02 SUR	SR01 SUR	SR02 SUR	SR03 SUR
Date Sampled			2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-1	19-34261-2	19-34261-3	19-34261-4	19-34261-5
Lead	mg/kg dry wt	0.05	7.90	15.7	6.19	10.6	6.87
Arsenic	mg/kg dry wt	0.125			4.1	2.3	14.1
Copper	mg/kg dry wt	0.075			48.1	26.8	37.3

Elements in Soil

Client Sample ID			SR04 SUR	Composite (COMP01A, COM P01B, COMP01C, COMP01D)	Composite (COMP02A, COM P02B, COMP02C, COMP02D)	Composite (COMP03A, COM P03B, COMP03C, COMP03D)
Date Sampled			2/10/2019	2/10/2019	2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-6	19-34261-21	19-34261-22	19-34261-23
Lead	mg/kg dry wt	0.05	6.86	5.07	5.69	4.8
Arsenic	mg/kg dry wt	0.125	3.8	1.8	1.8	1.7
Copper	mg/kg dry wt	0.075	34.2	10.0	9.08	5.8

Heavy Metals in Soil

Client Sample ID			HA01 0.3m 0.3	HA02 0.4m 0.3
Date Sampled			2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-19	19-34261-20
Arsenic	mg/kg dry wt	0.125	1.4	0.40
Cadmium	mg/kg dry wt	0.005	0.038	0.014
Chromium	mg/kg dry wt	0.125	18.2	14.2
Copper	mg/kg dry wt	0.075	2.3	0.83
Nickel	mg/kg dry wt	0.05	2.4	3.4
Lead	mg/kg dry wt	0.05	8.95	3.7
Zinc	mg/kg dry wt	0.05	10.6	6.17

Organochlorine Pesticides - Soil

Client Sample ID			SR01 SUR	SR02 SUR	SR03 SUR	SR04 SUR	HA01 0.3m 0.3
Date Sampled			2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-3	19-34261-4	19-34261-5	19-34261-6	19-34261-19
2,4'-DDD	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	0.003	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	100.9	99.7	98.3	100.9	96.7

Organochlorine Pesticides - Soil

Client Sample ID			HA02 0.4m 0.3	Composite (COMP01A,COMP P01B,COMP01C, COMP01D)	Composite (COMP02A,COMP P02B,COMP02C, COMP02D)	Composite (COMP03A,COMP P03B,COMP03C, COMP03D)
Date Sampled			2/10/2019	2/10/2019	2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-20	19-34261-21	19-34261-22	19-34261-23
2,4'-DDD	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulfate	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	100.5	100.3	99.7	98.2

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			HA01 0.3m 0.3	HA02 0.4m 0.3
Date Sampled			2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-19	19-34261-20
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.01	<0.01
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.01	<0.01
Acenaphthene	mg/kg dry wt	0.01	<0.01	<0.01
Acenaphthylene	mg/kg dry wt	0.01	<0.01	<0.01
Anthracene	mg/kg dry wt	0.01	<0.01	<0.01
Benz[a]anthracene	mg/kg dry wt	0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg dry wt	0.01	<0.01	<0.01
Benzo[b]&[j] fluoranthene	mg/kg dry wt	0.02	<0.02	<0.02
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	<0.02	<0.02
Benzo[k]fluoranthene	mg/kg dry wt	0.01	<0.01	<0.01
Chrysene	mg/kg dry wt	0.01	<0.01	<0.01
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	<0.01	<0.01
Fluoranthene	mg/kg dry wt	0.02	<0.02	<0.02

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			HA01 0.3m 0.3	HA02 0.4m 0.3
Date Sampled			2/10/2019	2/10/2019
Fluorene	mg/kg dry wt	0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	<0.01	<0.01
Naphthalene	mg/kg dry wt	0.01	<0.01	<0.01
Phenanthrene	mg/kg dry wt	0.01	<0.01	<0.01
Pyrene	mg/kg dry wt	0.02	<0.02	<0.02
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.03	0.03
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	<0.01	<0.01
Anthracene-d10 (Surrogate)	%	1	94.7	93.9

Moisture Content

Client Sample ID			HA01 0.3m 0.3	HA02 0.4m 0.3
Date Sampled			2/10/2019	2/10/2019
Analyte	Unit	Reporting Limit	19-34261-19	19-34261-20
Moisture Content	%	1	18	16

Method Summary

Elements in Soil Acid digestion followed by ICP-MS analysis. (US EPA method 200.8). Results are based on a dried sample passed through a 2 mm sieve.

OCP in Soil Samples are extracted with hexane, pre-concentrated then analysed by GC-MSMS. (In-house procedure). (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor)

Total DDT Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)

PAH in Soil Solvent extraction, silica cleanup, followed by GC-MS analysis.
Benzo[a]pyrene TEQ (LOR): The most conservative TEQ estimate, where a result is reported as less than the limit of reporting (LOR) the LOR value is used to calculate the TEQ for that PAH.
Benzo[a]pyrene TEQ (Zero): The least conservative TEQ estimate, PAHs reported as less than the limit of reporting (LOR) are not included in the TEQ calculation.
 Benzo[a]pyrene toxic equivalence (TEQ) is calculated according to 'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health'. Ministry for the Environment. 2011.

Moisture Moisture content is determined gravimetrically by drying at 103 °C.



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