

# APPENDIX 10

## NES Soil Contamination Report

# Envirochem Evaluation Ltd

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## Preliminary Site Investigation (PSI) Report

635 State Highway 23, Whatawhata

*Prepared for*

G. & S. Singleton Heritage Ltd

*Prepared by*

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May 2019

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*Attachments:*        *Hill Laboratories Report 2157726*  
                              *635 SH23 WDC HAIL Report*

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## Executive Summary

Envirochem Evaluation Ltd was engaged by G. & S. Singleton Heritage Ltd to determine the National Environment Standard (NES) soil contamination status of eight intended house sites at 635 SH23, Whatawhata. The prospective rural-residential sites are on Lots 1-7 & 10 of a proposed subdivision.

The subdivision site was a golf course, initiated in approximately 1970, indicating the two HAIL activities of (1) A10. *Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds* and (2) A17. *Storage tanks or drums for fuel, chemicals or liquid waste* are likely to have occurred. The bulk storage of chemicals and fuel is most likely directly associated with the greenkeepers' sheds at the site. Historically, the subdivision site was predominantly production pastoral land.

Considering the positions of the apparent previous site activities, the subdivision design and results of preliminary screening soil testing, the existing levels of soil contamination at the proposed house sites and conceptualised curtilages are considered highly unlikely to be a significant risk to public health. The soil at the eight intended house sites is considered suitable for the proposed rural-residential land use. This conclusion is consistent with the proposed *subdivision* and subsequent *change of use* at the specified areas of intended Lots 1-7 & 10 being permitted activities as stated in 8(4(b)) of the Resource Management (National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

To finalise this PSI, it is recommended that further preliminary soil sampling for arsenic is performed over the intended building site on Lot 1, to ascertain the significance of the slightly elevated W1 sampling result for arsenic. If the additional sampling indicates that widespread elevated arsenic is present on Lot 1, a Detailed Site Investigation is recommended.



## 1 Introduction

G. & S. Singleton Heritage Ltd has proposed a subdivision at 635 SH23, Whatawhata (Figure 1). Envirochem Evaluation Ltd was engaged by G. & S. Singleton Heritage Ltd to assess the contamination status of soil at the eight intended rural-residential building sites. This report presents an assessment of soil contamination risk, with respect to the proposed *subdivision* and subsequent *change of use* from recreational parkland to rural-residential land on Lots 1-7 & 10, by consideration of previous activities at the specified locations and the analysis results of preliminary soil sampling. According to NES guidelines, there is no requirement under NES regulations to investigate Lots 8 & 9, or the existing house on Lot 10, as land use is not currently proposed to change in these areas.<sup>1</sup>

This Preliminary Site Investigation (PSI) Report intends to fulfil the requirements of the Resource Management (National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. This report has been prepared in general accordance with the following three MfE guideline documents for investigating contaminated sites: Contaminated Land Management Guidelines No 1 – Reporting on Contaminated Sites in New Zealand (2011), Contaminated Land Management Guidelines No 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (2011) and Contaminated Land Management Guidelines No 5 – Site Investigation and Analysis of Soils (2011).

## 2 Scope of Work

The purpose of this document is to assess the likely suitability of soil for the proposed *change of use* at the specified house sites on proposed Lots 1-7 & 10 (Figure 1), through consideration of previous land use and preliminary soil analysis results. The assessment of this report will determine if a Detailed Site Investigation Report (DSI) is required, based on the likelihood of significant health risk due to soil contamination at the eight intended rural-residential locations.

## 3 Site Identification

The subdivision site is 635 State Highway 23, Whatawhata, Lots 1 & 2 DPS 12627 (Figure 1).

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<sup>1</sup> Refer to:

National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health. Information for Landowners and Developers. MfE. Publication # INFO 650 Here it is noted that - *The regulations do not apply to existing uses (including consented activities before January 2012) on HAIL land.*

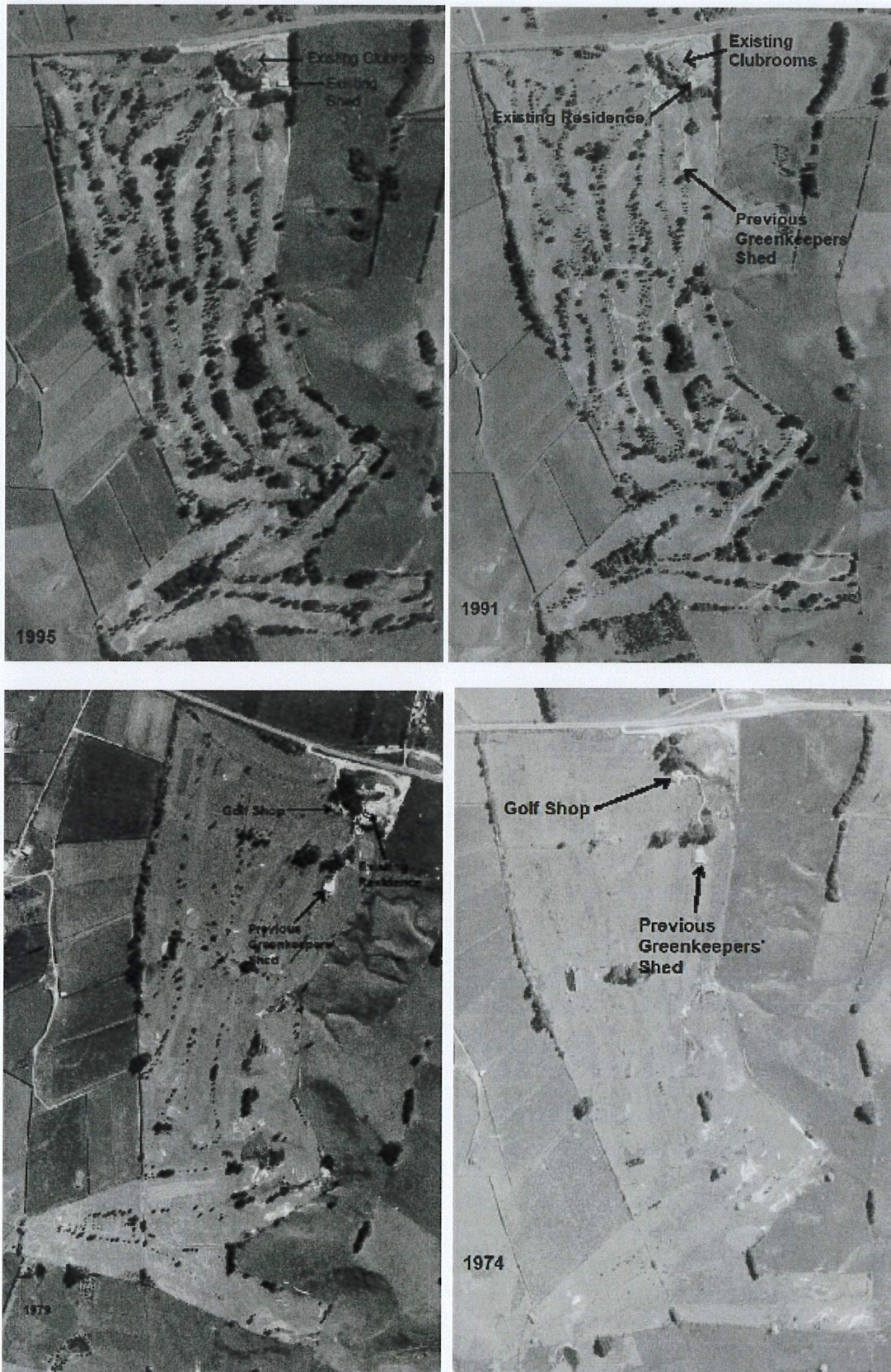
Users' Guide: NES for Assessing and Managing Contaminants in Soil to Protect Human Health (2012) p 55. Case Study 7 – Subdivision of production land and land-use change. Variation A. Here it is noted that *The NES will apply to the piece of land on which the new residence (farmhouse) is to be constructed, the immediate vicinity of the residence (generally the farmhouse garden/lawn areas) and the area where a vegetable garden is intended to be located...There is no requirement under the NES to investigate the rest of the newly subdivided property, as this will continue to be used for production land. Similarly, there is no requirement under the NES to investigate the original farm or residence, as these land uses are not changing.*





**Figure 1.** Proposed 635 State Highway 23 subdivision showing soil sampling positions of W1-7 & W10 (red dots) and WMR1-3 (orange dots) and previous position of greenkeepers' shed (yellow rectangle)

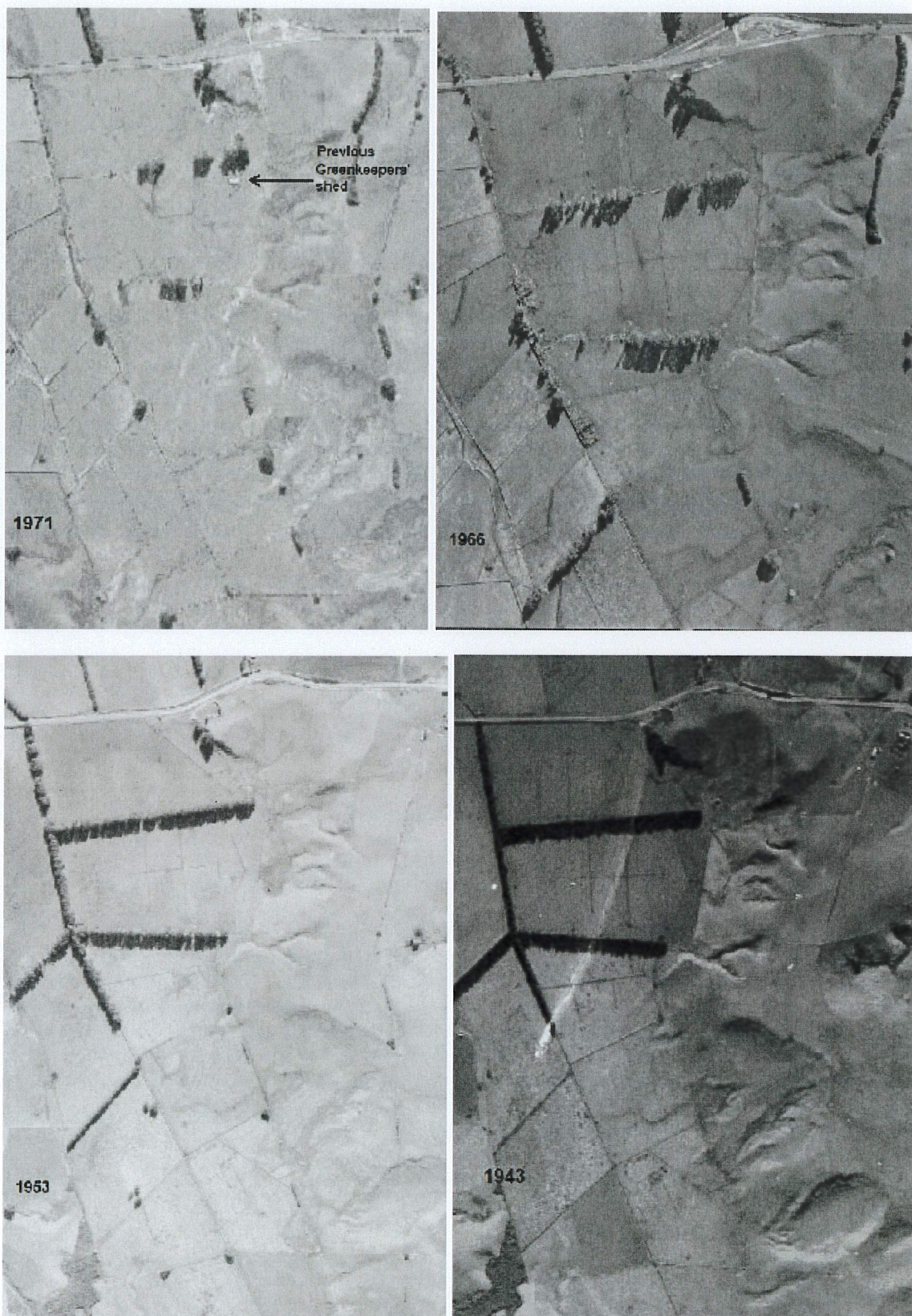




Photos sourced from <http://retrolens.nz> and licensed by LINZ CC-BY 3.0

**Figure 2. 1995-1974 aerial photography of intended subdivision (refer to Figure 1)**





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**Figure 3. 1971-1943 aerial photography of intended subdivision (refer to Figure 1)**



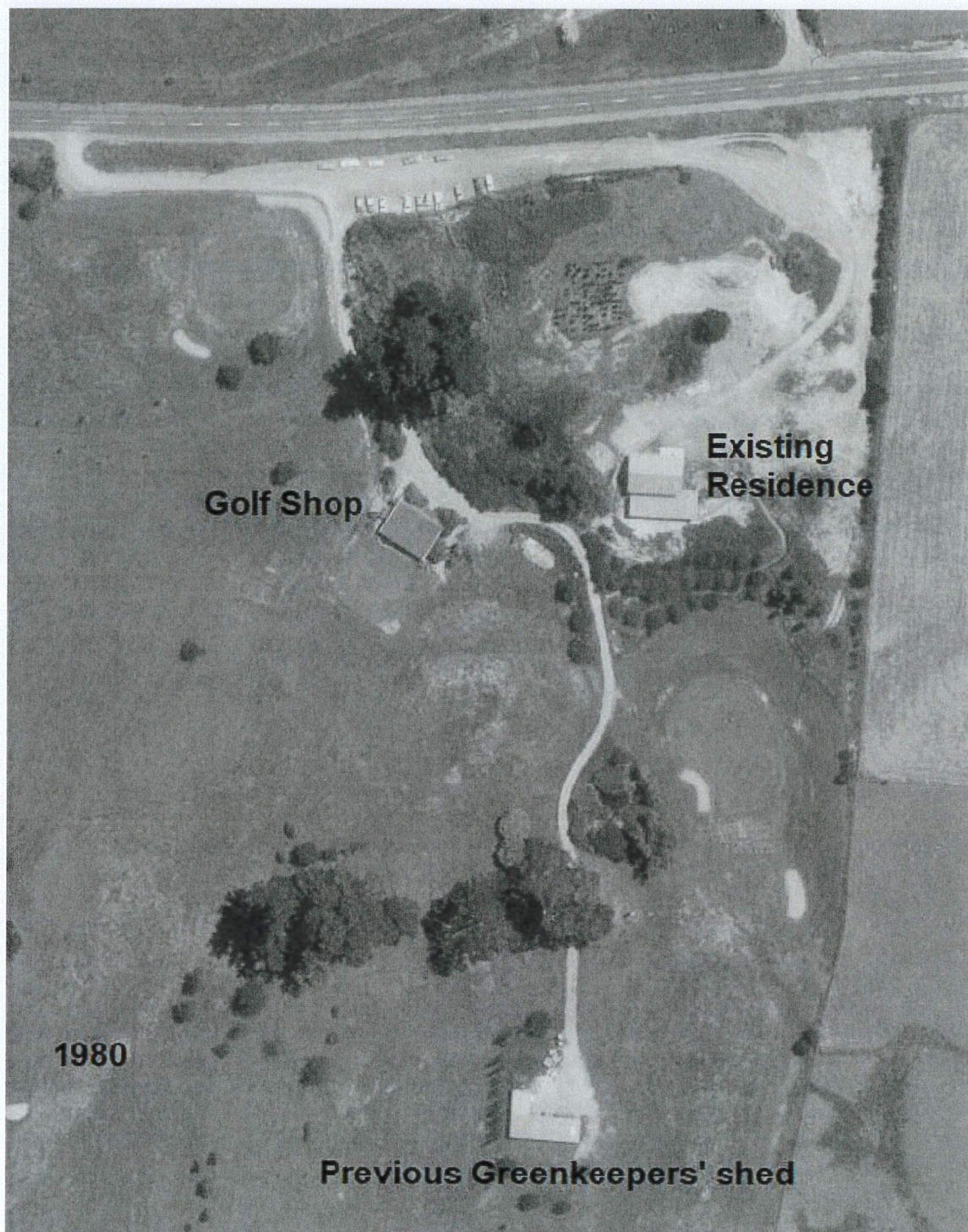


Photo sourced from <http://retrolens.nz> and licensed by LINZ CC-BY 3.0

**Figure 4.** 1980 aerial photograph of northwest corner of subdivision site



## 4 Site Conditions

The eight intended residential sites are open parkland areas, featuring mature trees from the previous golf course and flat to moderate contours (Figure 1). The intended residential sites are generally elevated with clay or clay-loam soils, although Lots 1 & 4 may feature peat-loam soils on the lower contours.

## 5 Site History

Historical aerial photography from 1943, 1953 and 1966 reveals the area proposed for subdivision as pastoral grazing land (Figure 2), with no significant evidence for farming or residential buildings. The original greenkeepers' implement shed is apparent in the 1971 aerial photo, situated within the newly developed Westlands Golf Course. (The golf course was established by the then landowners John and Margaret Mortimer.)

The original golf shop (within intended Lot 9) and existing residence (within intended Lot 10) are apparent in the 1974 & 1979 aerial photography. The original golf shop appears to have been extended/modified into the existing Golf Pro Store/Café (Figure 1).

After approval in 1987, the Cardrona building was moved to the site (within intended Lot 8) from Hamilton City to provide golf clubrooms (Figures 1 & 2). Subsequently, the new owner Chang-Ho Choi gained consent with council in 2005 to convert the Cardrona building into a golf academy with sleeping accommodation for golf students. The accommodation provided for up to 36 students and 4 staff at any one time. Golf course usage declined over the following years until final discontinuance and eventual sale to the subdivision applicant in 2015.

The previous greenkeepers shed is depicted in the displayed 1980 aerial photography (Figure 4), along with the existing residence & original golf shop. The existing shed at the site within intended Lot 10 (Figure 1) was also likely used for greenkeepers' activity and appears in the 1995 aerial photography (Figure 2); the previous greenkeepers' shed (or parts thereof) may have been relocated (and modified) after 1991 to form the existing shed (Figure 2).

The Waikato District & Regional Councils currently hold records of HAIL at the site, specifically (1) A10. *Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds* and (2) A17. *Storage tanks or drums for fuel, chemicals or liquid waste*, which are routinely associated with golf course activity (see attached WDC HAIL Report).



## 6 Conceptual Site Model

If soil contamination is present at significant levels in a rural-residential land use scenario, there could be potential harm to human health. The two major exposure pathways are (1) direct contact and (2) consumption of produce grown at the site. This investigation was primarily designed to provide an initial assessment of the health risk due to soil contamination for people living at the eight intended rural-residential house sites on Lots 1-7 & 10 (Figure 1).

New Zealand commercial orchards operating before 1975 typically used soil-persistent pesticide sprays containing arsenic, lead, copper and DDT. Significant arsenic contamination is also possible in rural locations where farm animals were treated with arsenical chemicals or CCA-treated timber was stored. Lead and zinc contamination from deteriorated paint and materials is usually detected in soil adjacent to long-term historic dwellings and farm buildings. Soil adjacent to farm buildings is also potentially contaminated with pesticides and hydrocarbon fuels, particularly in storage areas or where equipment was washed.

Aerial photos revealed no significant evidence for previous orchards, structures or buildings at or near the eight intended rural-residential building sites (Figures 1-3); based on the aerial photos the eight subject areas are conceptualised predominantly as long-term pastoral production land, that was converted to recreation golf course land in approximately 1970. The soil at or near the eight intended rural-residential building sites is considered at risk of cadmium contamination because any previously applied superphosphate included cadmium as an impurity.

The two HAIL activities of (1) A10. *Persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds* and (2) A17. *Storage tanks or drums for fuel, chemicals or liquid waste* are likely to have occurred in and around the greenkeepers' sheds (see attached WDC HAIL Report). The previous greenkeepers' shed position and existing shed are located at the north-western end of intended Lot 10 and are not near any proposed new rural-residential sites under the current subdivision design (Figure 1). Soil-persistent pesticides may have been applied to the golf course after 1970, although it is noted that many soil-persistent pesticides were being phased out during the 1970's.

There is no current intention to change the use of the existing residence (Lot 10), Golf Pro Shop/Café (Lot 9) or Golf Clubrooms (Lot 8) as a result of the subdivision (Figure 1).<sup>1</sup> A barn was constructed within intended Lot 3 recently, using modern building materials (Figure 5); it is unlikely that this building has significantly contaminated the adjacent soil, with respect to the construction of a modern residential dwelling.

Due to the apparent absence of significant soil contaminating activity at the eight intended rural-residential building sites, it was considered likely that soil contaminant levels would not be significantly elevated in these specific areas. A preliminary soil screening sampling program (including an assessment of cadmium levels) was considered sufficient to support this initial proposed soil contamination status.



## 7 Sampling Methodology and Laboratory Data Evaluation

The soil sampling intended to verify the initial conceptual site model and soil contamination status at the eight proposed rural-residential building sites (Figure 1 & Section 6). All soil samples were collected in containers supplied by Hill Laboratories. Surface vegetation was cleared before soil sampling was performed with a stainless-steel trowel that had been washed thoroughly with town supply water. The soil samples were collected from 0-10 cm depth.

The soil sampling collected a discrete soil sample from each of the intended eight building sites on proposed Lots 1-7 & 10 (W1-7 & W10 – see red dots in Figure 1). W1-7 & W10 were tested for seven heavy metals, including arsenic, cadmium, lead and zinc (Table 1 and see attached Hill Lab Report 2157726).

Three 3-core composite samples were taken from the site, representing the intended eight building sites on proposed Lots 1-7 & 10 (WMR1-3 – see orange dots in Figure 1). WMR1 represented previous areas used as golf putting greens. In contrast, WMR2 & 3 represented fairway areas. Each of the three homogenised composite samples were analysed with the Hill Laboratories Multi-Residue Pesticide test, which focuses on an extensive range of soil-persistent pesticides that were known to be applied in New Zealand (see attached Hill Lab Report 2157726).

Details of the analytical methods used by Hill Laboratories and laboratory accreditation for analytical methods are in the attached Hill Laboratories report. All standard laboratory procedures were adhered to by Hill Laboratories who are accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported in this document have been performed in accordance with the terms of accreditation, with the exception of those marked \*.



## 8 Analysis Results

**Table 1. NES SCS and W1-7 & W10 analysis results**

<i>Values in mg/kg</i>	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
NES SCS Residential (Appendices 1 & 2)	17	0.8	290 Cr (VI)	Not Limiting	160	Not Limiting	Not Limiting
Typical Waikato Background Concentrations <sup>2</sup> (average)	1-25 (5.1)	0.03-0.3 (0.11)	1-150 (18)	4-55 (16)	3-32 (11)	0.5-21 (3.9)	11-58 (28)
W1	26	0.34	7	13	16.9	5	30
W2	6	0.23	10	8	29	3	42
W3	6	0.26	10	9	26	3	47
W4	4	0.18	5	6	11.8	2	16
W5	7	0.16	10	14	21	4	33
W6	6	0.19	9	8	17.4	4	36
W7	6	0.29	8	14	16.7	4	47
W10	7	0.19	9	9	36	3	38

The NES Soil Contaminant Standards (SCS) for rural-residential (Appendix 2) are consistent with the principles of the current Contaminated Land Management Guidelines No 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE 2011). Appendix 1 outlines the Residential NES Soil Contaminant Standards (SCS) which are applicable in this investigation relating to 7(1(b)) in the Resource Management (National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

## 9 Results Discussion

Cadmium was detected in samples W1-7 & W10 at levels considered to be slightly exceeding natural background concentrations but not exceeding the applicable rural-residential NES SCS of 0.8 mg/kg (Table 1 and see attached Hill Laboratories report), which is protective of human health (Appendix 1). The observed cadmium concentrations are consistent with occasional applications of superphosphate on the previous golf course and/or pastoral grazing land. The measured arsenic, copper, chromium, lead, nickel and zinc concentrations in samples W1-7 & W10 were generally considered to be at, or not significantly above, natural background concentrations (Table 1). However, slightly elevated arsenic was detected in sample W1 (26 mg/kg), considered to be exceeding natural background concentrations and breaching NES rural-residential standards (Table 1). All of the pesticide chemicals analysed for in samples WMR1-3 were below analytical detection limits (see attached Hill Lab Report 2157726).

<sup>2</sup> M. D. Taylor and N. D. Kim. Dealumination as a mechanism for increased acid recoverable aluminium in Waikato mineral soils. *Australian Journal of Soil Research*, 2009, 47, 828–838



## 10 Site Characterisation

A rural-residential subdivision has been proposed at 635 State Highway 23, Whatawhata (Figure 1). The historic aerial photography presented in this report indicates the land proposed for subdivision was predominantly long-term pastoral production land, before being converted to the Westlands Golf Course in approximately 1970.

A residential dwelling, greenkeepers' shed and previous position of a greenkeepers' shed are present at the north-western end of intended Lot 10, but not in the vicinity of any proposed new rural-residential sites (Figure 1). Golf clubroom and golf pro-shop/café buildings are established on intended Lots 8 & 9 respectively. There is no intention to change the use of the existing residential dwelling, shed, golf clubroom and pro-shop/café buildings under the current subdivision proposal (Figure 1).

Eight rural-residential construction sites are proposed on Lots 1-7 & 10 of the subdivision, as indicated by the circles in Figure 1. Soil testing of the likely residential construction sites has indicated the average topsoil (0–10 cm) concentration of cadmium is slightly elevated (most likely due to occasional use of superphosphate) but the average level is unlikely to exceed the applicable residential NES SCS (Table 1). The soil analysis concentrations of arsenic, copper, chromium, lead, nickel and zinc were generally consistent and considered to be at, or not significantly above, natural background concentrations (Table 1). This is consistent with the apparent absence of significant historical buildings, orchards and structures at the sampling locations (Figures 1-3). Soil sample W1 revealed a slightly elevated arsenic concentration (26 mg/kg), that was relatively high (Table 1). Although this result is potentially isolated, it could indicate widespread elevated arsenic is present on the intended Lot 1 building site (Figure 1).



**Figure 5.** Photos of intended Lot 1 house site (top left), modern barn on Lot 3 (top right), previous position of greenkeepers' shed on Lot 10 (lower left) & golf clubrooms on Lot 8 (lower right)



## 11 Conclusion and Recommendations

After a site inspection and considering the historical aerial photography, previous site activities and soil testing results, this Preliminary Site Investigation Report (PSI) concludes that soil contamination currently at the specified proposed building sites on intended Lots 1-7 & 10 is highly unlikely to pose a significant risk to human health. This current conclusion is consistent with proposed *subdivision* at 635 State Highway 23, Whatawhata (Figure 1) and the subsequent *change of use* on intended Lots 1-7 & 10 being permitted NES activities as stated in 8(4(b)) of the Resource Management (National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. This conclusion applies only to the intended building sites on Lots 1-7 & 10, positions as specified by the circles in Figure 1.

It is recommended that further preliminary soil sampling for arsenic is performed over the intended building site on Lot 1, to ascertain the significance of the W1 sampling result for arsenic (26 mg/kg). Where the additional sampling indicates the W1 result was isolated, this PSI can be finalised with the results. Where the additional sampling indicates that widespread elevated arsenic is present, a Detailed Site Investigation is recommended.

There is no intention to change the existing use of the residential dwelling (Lot 10), shed (Lot 10), golf clubrooms (Lot 8) and golf pro-shop/café buildings (Lot 9) under the current subdivision design. However, it is recommended that the Territorial Authority advises that further NES assessment would be required if new residential dwellings are proposed in the future at different sites, particularly if in close proximity to the buildings observed in the historical aerial photography (Figures 1-3), particularly the greenkeepers' facilities.



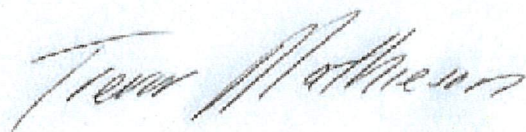
## 12 Limitations

This document was prepared by Envirochem Evaluation Ltd at the request of the Client, G. & S. Singleton Heritage Ltd. The conclusions and recommendations conveyed in this document are based on information supplied by the Client, historical aerial photography and the analytical results of representative soil sampling at the time of investigation. While the soil sampling was carried out according to appropriate scientific practice, no guarantee of public health risk due to soil contamination at the site is given. The analytical results are directly related to the soil cores taken, which are only representations of the total area of subject land. The results are only an estimation of ground conditions between and around the sampling points and it is possible that undetected contamination exists in locations not directly sampled. Potentially contaminating anthropogenic structures may have remained undetected at the site, for example, covered landfills or short-term buildings. Envirochem Evaluation Ltd accepts no responsibility for site conditions that were not evident based on the analysis results of the representative sampling performed during this investigation.

The Client indicated the intended eight rural-residential building sites within the proposed subdivision (circles in Figures 1). The soil sampling was performed to represent these prospective building sites and a surrounding conceptualised curtilage. At the discretion of the local Territorial Authority, further NES assessment should be required if new dwellings are proposed in future at different sites, particularly if in close proximity to the buildings and structures observed in the historical aerial photography (Figures 1-3).

This report was prepared for the single specific purpose of investigating the NES soil contamination status of eight potential rural-residential house sites on Lots 1-7 & 10 within the subdivision proposed by the Client at 635 State Highway 23, Whatawhata, Lots 1 & 2 DPS 12627 (circles in Figure 1). Envirochem Evaluation Ltd is not responsible for the use of this document for any other purpose.

**Report prepared by Envirochem Evaluation Ltd**



***Dr Trevor Mathieson (Director)***



## Appendix 1. NES Soil Contaminant Standards (SCS) Protective of Human Health – 2012

Soil contaminant standards for health ( $SCS_{(health)}$ ) for inorganic substances

	Arsenic	Boron	Cadmium (pH 5) <sup>1</sup>	Chromium		Copper	Inorganic lead	Inorganic mercury
				III	VI			
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Rural residential / lifestyle block 25% produce	17	>10,000	0.0	>10,000	290	>10,000	160	200
Residential 10% produce	20	>10,000	3	>10,000	460	>10,000	210	310
High-density residential	45	>10,000	230	>10,000	1,500	>10,000	500	1,000
Recreation	30	>10,000	400	>10,000	2,700	>10,000	860	1,800
Commercial / industrial outdoor worker (unpaved)	70	>10,000	1,300	>10,000	6,300	>10,000	3,300	4,200

Notes: All concentrations refer to dry weight (ie, mg/kg dry weight).

<sup>1</sup> Default value is for soil that is pH 5. Concentrations increase with increasing pH (see *Methodology*).

## Appendix 2. NES Land Use Scenarios

Land-use scenarios

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land.  Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site specific basis.
Residential	Standard residential lot, for single dwelling sites with gardens, including home grown produce consumption (10 per cent).
High density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption) applicable to urban townhouses, flats and ground floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.





## Certificate of Analysis

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<b>Client:</b>	Envirochem Evaluation (ECE) Limited	<b>Lab No:</b>	2157726	POPv1
<b>Contact:</b>	Trevor Mathieson	<b>Date Received:</b>	09-Apr-2019	
	C/- Envirochem Evaluation (ECE) Limited	<b>Date Reported:</b>	12-Apr-2019	
	31B Appleton Lane	<b>Quote No:</b>	98450	
	RD 7	<b>Order No:</b>	128	
	Hamilton 3287	<b>Client Reference:</b>	Whatawhata	
		<b>Submitted By:</b>	Trevor Mathieson	

### Sample Type: Soil

Sample Name:	W1 09-Apr-2019 11:00 am	W2 09-Apr-2019 11:00 am	W3 09-Apr-2019 11:00 am	W4 09-Apr-2019 11:00 am	W5 09-Apr-2019 11:00 am
Lab Number:	2157726.1	2157726.2	2157726.3	2157726.4	2157726.5
Heavy Metals, Screen Level					
Analytes Detected:	7	7	7	7	7
Total Recoverable Arsenic mg/kg dry wt	26	6	6	4	7
Total Recoverable Cadmium mg/kg dry wt	0.34	0.23	0.26	0.18	0.16
Total Recoverable Chromium mg/kg dry wt	7	10	10	5	10
Total Recoverable Copper mg/kg dry wt	13	8	9	6	14
Total Recoverable Lead mg/kg dry wt	16.9	29	26	11.8	21
Total Recoverable Nickel mg/kg dry wt	5	3	3	2	4
Total Recoverable Zinc mg/kg dry wt	30	42	47	16	33

Please refer to the detection limits table for the list of analytes screened and their detection limits.

Sample Name:	W6 09-Apr-2019 11:00 am	W7 09-Apr-2019 11:00 am	W10 09-Apr-2019 11:00 am	WMR1 09-Apr-2019 11:00 am	WMR2 09-Apr-2019 11:00 am
Lab Number:	2157726.6	2157726.7	2157726.8	2157726.9	2157726.10
Heavy Metals, Screen Level					
Analytes Detected:	7	7	7	Not Analysed	Not Analysed
Total Recoverable Arsenic mg/kg dry wt	6	6	7		
Total Recoverable Cadmium mg/kg dry wt	0.19	0.29	0.19		
Total Recoverable Chromium mg/kg dry wt	9	8	9		
Total Recoverable Copper mg/kg dry wt	8	14	9		
Total Recoverable Lead mg/kg dry wt	17.4	16.7	36		
Total Recoverable Nickel mg/kg dry wt	4	4	3		
Total Recoverable Zinc mg/kg dry wt	36	47	38		
Multiresidue Pesticides in Soil samples by GCMS					
Analytes Detected:	Not Analysed	Not Analysed	Not Analysed	None	None
Individual Tests					
Dry Matter g/100g as rcvd	-	-	-	74	77

Please refer to the detection limits table for the list of analytes screened and their detection limits.

Sample Name:	WMR3 09-Apr-2019 11:00 am	WpH1 09-Apr-2019 11:00 am	WpH7 09-Apr-2019 11:00 am	WpH10 09-Apr-2019 11:00 am	
Lab Number:	2157726.11	2157726.12	2157726.13	2157726.14	
Multiresidue Pesticides in Soil samples by GCMS					
Analytes Detected:	None	Not Analysed	Not Analysed	Not Analysed	
Individual Tests					
Dry Matter g/100g as rcvd	72	-	-	-	-
pH* pH Units	-	5.8	5.8	6.9	-

Please refer to the detection limits table for the list of analytes screened and their detection limits.



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



## Analyst's Comments

Appendix No.1 - Chain of Custody

## Summary of Methods

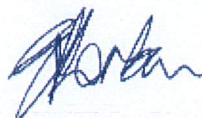
The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8, 12-14
Soil Prep Dry & Sieve for Agriculture	Air dried at 35°C and sieved, <2mm fraction.	-	12-14
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8
Multiresidue Pesticides in Soil samples by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample, then results corrected to a dry weight basis using the separate Dry Matter result.	0.003 - 0.06 mg/kg dry wt	9-11
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed), US EPA 3550.	0.10 g/100g as rcwd	9-11
pH*	1:2 (v/v) soil : water slurry followed by potentiometric determination of pH.	0.1 pH Units	12-14

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.

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



Graham Corban MSc Tech (Hons)  
Client Services Manager - Environmental



# Detection Limits

Analytes	Detection Limit	Analytes	Detection Limit	Analytes	Detection Limit
<b>Individual Tests</b>		Endosulfan sulphate	0.013 mg/kg dry wt	Carboxin	0.009 mg/kg dry wt
<b>Sample Number(s):</b>	12-14	Endrin	0.013 mg/kg dry wt	Chlorfluazuron	0.009 mg/kg dry wt
pH*	0.1 pH Units	Endrin aldehyde	0.013 mg/kg dry wt	Chlorothalonil	0.009 mg/kg dry wt
<b>Sample Number(s):</b>	9-11	Endrin ketone	0.013 mg/kg dry wt	Chlorpropham	0.017 mg/kg dry wt
Dry Matter	0.10 g/100g as rcvd	Esfenvalerate	0.011 mg/kg dry wt	Chlorpyrifos	0.009 mg/kg dry wt
<b>Heavy Metals, Screen Level</b>		Fenvalerate	0.011 mg/kg dry wt	Chlorpyrifos-methyl	0.009 mg/kg dry wt
<b>Sample Number(s):</b>	1-8	Heptachlor	0.013 mg/kg dry wt	Chlortoluron	0.017 mg/kg dry wt
Total Recoverable Arsenic	2 mg/kg dry wt	Heptachlor epoxide	0.013 mg/kg dry wt	Chlozolinate	0.009 mg/kg dry wt
Total Recoverable Cadmium	0.10 mg/kg dry wt	Hexachlorobenzene	0.013 mg/kg dry wt	Coumaphos	0.017 mg/kg dry wt
Total Recoverable Chromium	2 mg/kg dry wt	Methoxychlor	0.013 mg/kg dry wt	Cyanazine	0.009 mg/kg dry wt
Total Recoverable Copper	2 mg/kg dry wt	Pyrifeno	0.011 mg/kg dry wt	Cyhalothrin	0.009 mg/kg dry wt
Total Recoverable Lead	0.4 mg/kg dry wt	<b>Sample Number(s):</b>	11	Cyproconazole	0.017 mg/kg dry wt
Total Recoverable Nickel	2 mg/kg dry wt	Acetochlor	0.009 mg/kg dry wt	Cyprodinil	0.009 mg/kg dry wt
Total Recoverable Zinc	4 mg/kg dry wt	Atrazine	0.009 mg/kg dry wt	Total DDT Isomers	0.09 mg/kg dry wt
<b>Multiresidue Pesticides in Soil samples by GCMS</b>		Atrazine-desethyl	0.009 mg/kg dry wt	Deltamethrin (including Tralomethrin)	0.009 mg/kg dry wt
<b>Sample Number(s):</b>	10	Atrazine-desisopropyl	0.017 mg/kg dry wt	Demeton-S-methyl	0.017 mg/kg dry wt
Aldrin	0.013 mg/kg dry wt	Azaconazole	0.005 mg/kg dry wt	Diazinon	0.005 mg/kg dry wt
alpha-BHC	0.013 mg/kg dry wt	Azinphos-methyl	0.017 mg/kg dry wt	Dichlobenil	0.009 mg/kg dry wt
beta-BHC	0.013 mg/kg dry wt	Benalaxyl	0.005 mg/kg dry wt	Dichlofenthion	0.009 mg/kg dry wt
delta-BHC	0.013 mg/kg dry wt	Bendiocarb	0.009 mg/kg dry wt	Dichlofuanid	0.009 mg/kg dry wt
gamma-BHC (Lindane)	0.013 mg/kg dry wt	Benodanil	0.017 mg/kg dry wt	Dicofol	0.05 mg/kg dry wt
cis-Chlordane	0.013 mg/kg dry wt	Bifenthrin	0.005 mg/kg dry wt	Dicrotophos	0.009 mg/kg dry wt
trans-Chlordane	0.013 mg/kg dry wt	Bitertanol	0.017 mg/kg dry wt	Dimethoate	0.017 mg/kg dry wt
Chlorfenvinphos	0.011 mg/kg dry wt	Bromacil	0.009 mg/kg dry wt	Dinocap	0.10 mg/kg dry wt
Cypermethrin	0.019 mg/kg dry wt	Bromophos-ethyl	0.009 mg/kg dry wt	Diphenylamine	0.017 mg/kg dry wt
2,4'-DDD	0.013 mg/kg dry wt	Bromopropylate	0.009 mg/kg dry wt	Disulfoton	0.009 mg/kg dry wt
4,4'-DDD	0.013 mg/kg dry wt	Bupirimate	0.009 mg/kg dry wt	Diuron	0.009 mg/kg dry wt
2,4'-DDE	0.013 mg/kg dry wt	Buprofezin	0.009 mg/kg dry wt	EPN	0.009 mg/kg dry wt
4,4'-DDE	0.013 mg/kg dry wt	Butachlor	0.009 mg/kg dry wt	Ethion	0.009 mg/kg dry wt
2,4'-DDT	0.013 mg/kg dry wt	Captafol	0.05 mg/kg dry wt	Etrimfos	0.009 mg/kg dry wt
4,4'-DDT	0.013 mg/kg dry wt	Captan	0.017 mg/kg dry wt	Famphur	0.009 mg/kg dry wt
Dieldrin	0.013 mg/kg dry wt	Carbaryl	0.009 mg/kg dry wt	Fenamiphos	0.009 mg/kg dry wt
Difenoconazole	0.011 mg/kg dry wt	Carbofenothion	0.009 mg/kg dry wt	Fenanimol	0.009 mg/kg dry wt
Endosulfan I	0.013 mg/kg dry wt	Carbofuran	0.009 mg/kg dry wt		
Endosulfan II	0.013 mg/kg dry wt				



Analytes	Detection Limit	Analytes	Detection Limit	Analytes	Detection Limit
Multiresidue Pesticides in Soil samples by GCMS		Myclobutanil	0.009 mg/kg dry wt	Sulfentrazone	0.05 mg/kg dry wt
<b>Sample Number(s):</b>	11	Naled	0.05 mg/kg dry wt	Sulfotep	0.009 mg/kg dry wt
Fenitrothion	0.009 mg/kg dry wt	Nitrofen	0.017 mg/kg dry wt	TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	0.017 mg/kg dry wt
Fenpropathrin	0.009 mg/kg dry wt	Nitrothal-isopropyl	0.009 mg/kg dry wt	Tebuconazole	0.009 mg/kg dry wt
Fenpropimorph	0.009 mg/kg dry wt	Norflurazon	0.017 mg/kg dry wt	Tebufenpyrad	0.005 mg/kg dry wt
Fensulfothion	0.009 mg/kg dry wt	Omethoate	0.05 mg/kg dry wt	Terbacil	0.009 mg/kg dry wt
Fenthion	0.009 mg/kg dry wt	Oxadiazon	0.009 mg/kg dry wt	Terbufos	0.009 mg/kg dry wt
Fluazifop-butyl	0.009 mg/kg dry wt	Oxychlorane	0.005 mg/kg dry wt	Terbumeton	0.009 mg/kg dry wt
Fluometuron	0.009 mg/kg dry wt	Oxyfluorfen	0.005 mg/kg dry wt	Terbuthylazine	0.005 mg/kg dry wt
Flusilazole	0.009 mg/kg dry wt	Paclobutrazol	0.009 mg/kg dry wt	Terbuthylazine-desethyl	0.009 mg/kg dry wt
Folpet	0.017 mg/kg dry wt	Parathion-ethyl	0.009 mg/kg dry wt	Terbutryn	0.009 mg/kg dry wt
Furalaxyl	0.005 mg/kg dry wt	Parathion-methyl	0.009 mg/kg dry wt	Tetrachlorvinphos	0.009 mg/kg dry wt
Haloxifop-methyl	0.009 mg/kg dry wt	Penconazole	0.009 mg/kg dry wt	Thiabendazole	0.05 mg/kg dry wt
Hexaconazole	0.009 mg/kg dry wt	Pendimethalin	0.009 mg/kg dry wt	Thiobencarb	0.009 mg/kg dry wt
Hexazinone	0.005 mg/kg dry wt	Phorate	0.017 mg/kg dry wt	Thiometon	0.017 mg/kg dry wt
Hexythiazox	0.05 mg/kg dry wt	Phosmet	0.009 mg/kg dry wt	Tolylfluanid	0.005 mg/kg dry wt
Imazalil	0.05 mg/kg dry wt	Phosphamidon	0.009 mg/kg dry wt	Triadimefon	0.009 mg/kg dry wt
Indoxacarb	0.009 mg/kg dry wt	Pirimicarb	0.009 mg/kg dry wt	Triazophos	0.009 mg/kg dry wt
Iodofenphos	0.009 mg/kg dry wt	Pirimiphos-methyl	0.009 mg/kg dry wt	Trifluralin	0.009 mg/kg dry wt
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	0.05 mg/kg dry wt	Prochloraz	0.05 mg/kg dry wt	Vinclozolin	0.009 mg/kg dry wt
Isazophos	0.009 mg/kg dry wt	Procymidone	0.009 mg/kg dry wt	<b>Sample Number(s):</b>	9, 11
Isofenphos	0.005 mg/kg dry wt	Prometryn	0.005 mg/kg dry wt	Aldrin	0.014 mg/kg dry wt
Kresoxim-methyl	0.005 mg/kg dry wt	Propachlor	0.009 mg/kg dry wt	alpha-BHC	0.014 mg/kg dry wt
Leptophos	0.009 mg/kg dry wt	Propazine	0.005 mg/kg dry wt	beta-BHC	0.014 mg/kg dry wt
Linuron	0.009 mg/kg dry wt	Propetamphos	0.009 mg/kg dry wt	delta-BHC	0.014 mg/kg dry wt
Malathion	0.009 mg/kg dry wt	Propham	0.009 mg/kg dry wt	gamma-BHC (Lindane)	0.014 mg/kg dry wt
Metalaxyl	0.009 mg/kg dry wt	Prothiofos	0.009 mg/kg dry wt	cis-Chlordane	0.014 mg/kg dry wt
Methacrifos	0.009 mg/kg dry wt	Pyrazophos	0.009 mg/kg dry wt	trans-Chlordane	0.014 mg/kg dry wt
Methamidophos	0.05 mg/kg dry wt	Pyrimethanil	0.009 mg/kg dry wt	Chlorfenvinphos	0.012 mg/kg dry wt
Methidathion	0.009 mg/kg dry wt	Pyriproxyfen	0.009 mg/kg dry wt	Cypermethrin	0.02 mg/kg dry wt
Methiocarb	0.009 mg/kg dry wt	Quintozone	0.017 mg/kg dry wt	2,4'-DDD	0.014 mg/kg dry wt
Metribuzin	0.009 mg/kg dry wt	Quizalofop-ethyl	0.009 mg/kg dry wt	4,4'-DDD	0.014 mg/kg dry wt
Mevinphos	0.017 mg/kg dry wt	Simazine	0.009 mg/kg dry wt	2,4'-DDE	0.014 mg/kg dry wt
Molinate	0.017 mg/kg dry wt	Simetryn	0.009 mg/kg dry wt	4,4'-DDE	0.014 mg/kg dry wt



Analytes	Detection Limit	Analytes	Detection Limit	Analytes	Detection Limit
Multiresidue Pesticides in Soil samples by GCMS		Buprofezin	0.008 mg/kg dry wt	EPN	0.008 mg/kg dry wt
<b>Sample Number(s):</b>	9, 11	Butachlor	0.008 mg/kg dry wt	Ethion	0.008 mg/kg dry wt
2,4'-DDT	0.014 mg/kg dry wt	Captafol	0.04 mg/kg dry wt	Etrimfos	0.008 mg/kg dry wt
4,4'-DDT	0.014 mg/kg dry wt	Captan	0.016 mg/kg dry wt	Famphur	0.008 mg/kg dry wt
Dieldrin	0.014 mg/kg dry wt	Carbaryl	0.008 mg/kg dry wt	Fenamiphos	0.008 mg/kg dry wt
Difenoconazole	0.012 mg/kg dry wt	Carbofenothion	0.008 mg/kg dry wt	Fenarimol	0.008 mg/kg dry wt
Endosulfan I	0.014 mg/kg dry wt	Carbofuran	0.008 mg/kg dry wt	Fenitrothion	0.008 mg/kg dry wt
Endosulfan II	0.014 mg/kg dry wt	Carboxin	0.008 mg/kg dry wt	Fenpropathrin	0.008 mg/kg dry wt
Endosulfan sulphate	0.014 mg/kg dry wt	Chlorfluazuron	0.008 mg/kg dry wt	Fenpropimorph	0.008 mg/kg dry wt
Endrin	0.014 mg/kg dry wt	Chlorothalonil	0.008 mg/kg dry wt	Fensulfothion	0.008 mg/kg dry wt
Endrin aldehyde	0.014 mg/kg dry wt	Chlorpropham	0.016 mg/kg dry wt	Fenthion	0.008 mg/kg dry wt
Endrin ketone	0.014 mg/kg dry wt	Chlorpyrifos	0.008 mg/kg dry wt	Fluazifop-butyl	0.008 mg/kg dry wt
Esfenvalerate	0.012 mg/kg dry wt	Chlorpyrifos-methyl	0.008 mg/kg dry wt	Fluometuron	0.008 mg/kg dry wt
Fenvalerate	0.012 mg/kg dry wt	Chlortoluron	0.016 mg/kg dry wt	Flusilazole	0.008 mg/kg dry wt
Heptachlor	0.014 mg/kg dry wt	Chlzolinate	0.008 mg/kg dry wt	Folpet	0.016 mg/kg dry wt
Heptachlor epoxide	0.014 mg/kg dry wt	Coumaphos	0.016 mg/kg dry wt	Furalaxyl	0.004 mg/kg dry wt
Hexachlorobenzene	0.014 mg/kg dry wt	Cyanazine	0.008 mg/kg dry wt	Haloxyp-methyl	0.008 mg/kg dry wt
Methoxychlor	0.014 mg/kg dry wt	Cyhalothrin	0.008 mg/kg dry wt	Hexaconazole	0.008 mg/kg dry wt
Pyriproxyfen	0.012 mg/kg dry wt	Cyproconazole	0.016 mg/kg dry wt	Hexazinone	0.004 mg/kg dry wt
<b>Sample Number(s):</b>	9-10	Cyprodinil	0.008 mg/kg dry wt	Hexythiazox	0.04 mg/kg dry wt
Acetochlor	0.008 mg/kg dry wt	Total DDT Isomers	0.08 mg/kg dry wt	Imazalil	0.04 mg/kg dry wt
Atrazine	0.008 mg/kg dry wt	Deltamethrin (including Tralomethrin)	0.008 mg/kg dry wt	Indoxacarb	0.008 mg/kg dry wt
Atrazine-desethyl	0.008 mg/kg dry wt	Demeton-S-methyl	0.016 mg/kg dry wt	Iodofenphos	0.008 mg/kg dry wt
Atrazine-desisopropyl	0.016 mg/kg dry wt	Diazinon	0.004 mg/kg dry wt	IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	0.04 mg/kg dry wt
Azaconazole	0.004 mg/kg dry wt	Dichlobenil	0.008 mg/kg dry wt	Isazophos	0.008 mg/kg dry wt
Azinphos-methyl	0.016 mg/kg dry wt	Dichlofenthion	0.008 mg/kg dry wt	Isofenphos	0.004 mg/kg dry wt
Benalaxyl	0.004 mg/kg dry wt	Dichlofluanid	0.008 mg/kg dry wt	Kresoxim-methyl	0.004 mg/kg dry wt
Bendiocarb	0.008 mg/kg dry wt	Dicofol	0.04 mg/kg dry wt	Leptophos	0.008 mg/kg dry wt
Benodanil	0.016 mg/kg dry wt	Dicrotophos	0.008 mg/kg dry wt	Linuron	0.008 mg/kg dry wt
Bifenthrin	0.004 mg/kg dry wt	Dimethoate	0.016 mg/kg dry wt	Malathion	0.008 mg/kg dry wt
Bitertanol	0.016 mg/kg dry wt	Dinocap	0.09 mg/kg dry wt	Metalaxyl	0.008 mg/kg dry wt
Bromacil	0.008 mg/kg dry wt	Diphenylamine	0.016 mg/kg dry wt	Methacrifos	0.008 mg/kg dry wt
Bromophos-ethyl	0.008 mg/kg dry wt	Disulfoton	0.008 mg/kg dry wt	Methamidophos	0.04 mg/kg dry wt
Bromopropylate	0.008 mg/kg dry wt	Diuron	0.008 mg/kg dry wt	Methidathion	0.008 mg/kg dry wt
Bupirimate	0.008 mg/kg dry wt				



Analytes	Detection Limit	Analytes	Detection Limit	Analytes	Detection Limit
Multiresidue Pesticides in Soil samples by GCMS		Pyrimethanil	0.008 mg/kg dry wt	Permethrin	0.003 mg/kg dry wt
<b>Sample Number(s):</b>	9-10	Pyriproxyfen	0.008 mg/kg dry wt	Propanil	0.03 mg/kg dry wt
Methiocarb	0.008 mg/kg dry wt	Quintozene	0.016 mg/kg dry wt	Propiconazole	0.006 mg/kg dry wt
Metribuzin	0.008 mg/kg dry wt	Quisqualop-ethyl	0.008 mg/kg dry wt		
Mevinphos	0.016 mg/kg dry wt	Simazine	0.008 mg/kg dry wt		
Molinate	0.016 mg/kg dry wt	Simetryn	0.008 mg/kg dry wt		
Myclobutanil	0.008 mg/kg dry wt	Sulfentrazone	0.04 mg/kg dry wt		
Naled	0.04 mg/kg dry wt	Sulfotep	0.008 mg/kg dry wt		
Nitrofen	0.016 mg/kg dry wt	TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	0.016 mg/kg dry wt		
Nitrothal-isopropyl	0.008 mg/kg dry wt	Tebuconazole	0.008 mg/kg dry wt		
Norflurazon	0.016 mg/kg dry wt	Tebufenpyrad	0.004 mg/kg dry wt		
Omethoate	0.04 mg/kg dry wt	Terbacil	0.008 mg/kg dry wt		
Oxadiazon	0.008 mg/kg dry wt	Terbufos	0.008 mg/kg dry wt		
Oxychlorane	0.004 mg/kg dry wt	Terbumeton	0.008 mg/kg dry wt		
Oxyfluorfen	0.004 mg/kg dry wt	Terbuthylazine	0.004 mg/kg dry wt		
Paclobutrazol	0.008 mg/kg dry wt	Terbuthylazine-desethyl	0.008 mg/kg dry wt		
Parathion-ethyl	0.008 mg/kg dry wt	Terbutryn	0.008 mg/kg dry wt		
Parathion-methyl	0.008 mg/kg dry wt	Tetrachlorvinphos	0.008 mg/kg dry wt		
Penconazole	0.008 mg/kg dry wt	Thiabendazole	0.04 mg/kg dry wt		
Pendimethalin	0.008 mg/kg dry wt	Thiobencarb	0.008 mg/kg dry wt		
Phorate	0.016 mg/kg dry wt	Thiometon	0.016 mg/kg dry wt		
Phosmet	0.008 mg/kg dry wt	Tolylfluanid	0.004 mg/kg dry wt		
Phosphamidon	0.008 mg/kg dry wt	Triadimefon	0.008 mg/kg dry wt		
Pirimicarb	0.008 mg/kg dry wt	Triazophos	0.008 mg/kg dry wt		
Pirimiphos-methyl	0.008 mg/kg dry wt	Trifluralin	0.008 mg/kg dry wt		
Prochloraz	0.04 mg/kg dry wt	Vinclozolin	0.008 mg/kg dry wt		
Procymidone	0.008 mg/kg dry wt				
Prometryn	0.004 mg/kg dry wt	<b>Sample Number(s):</b>	9-11		
Propachlor	0.008 mg/kg dry wt	Alachlor	0.006 mg/kg dry wt		
Propazine	0.004 mg/kg dry wt	Total Chlordane [(cis+trans)* 100/42]	0.04 mg/kg dry wt		
Propetamphos	0.008 mg/kg dry wt	Cyfluthrin	0.010 mg/kg dry wt		
Propham	0.008 mg/kg dry wt	Dichloran	0.03 mg/kg dry wt		
Prothiofos	0.008 mg/kg dry wt	Dichlorvos	0.010 mg/kg dry wt		
Pyrazophos	0.008 mg/kg dry wt	Fluvalinate	0.006 mg/kg dry wt		
		Metolachlor	0.006 mg/kg dry wt		





# Hill Laboratories

TRIED, TESTED AND TRUSTED

Quote No 98450

Primary Contact Trevor Mathieson 180501

Submitted By Trevor Mathieson 180501

Client Name Envirochem Evaluation (ECE) Limited 180500

Address 31B Appleton Lane, RD 7

Hamilton 3287

Phone Mobile 021 890 046

Email envirochemevaluation@gmail.com

Charge To Envirochem Evaluation (ECE) Limited 180500

Client Reference Whatawhata

Order No 128

Results To Reports will be emailed to Primary Contact by default.  
Additional Reports will be sent as specified below.☒ Email Primary Contact ☐ Email Submitter ☐ Email Client☐ Email Other☐ Other

## Quoted Sample Types

Soil (silt), Ground Water (GW)

K J Hill Laboratories Limited  
28 Duke Street Frankton 3204  
Private Bag 3205  
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)  
T +64 7 858 2000  
E mail@h.hill-labs.co.nz  
W www.hill-laboratories.com

Job No. Date Recv 09-Apr-19 12:29

215 7726

Received by: Jason Meadows



Sent to Hill Laboratories

Date &amp; Time: 7/4/19 14:00

☐ Tick if you require COC  
to be emailed back

Name: Trevor Mathieson

Signature: [Signature]

Received at Hill Laboratories

Date &amp; Time:

Name:

Signature:

Condition

Temp:

☐ Room Temp ☐ Chilled ☐ Frozen☐ Sample & Analysis details checked

Signature:

Priority ☐ Low ☐ Normal ☒ High☐ Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:00 pm, 5 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	W1 - 7 nos 10	7/4/19 14:00	Soil	W1 10 Soil / in 8 samples
2	W1A 1 - 3	7/4/19 14:00	Soil	W1A 10 3 samples
3	W1PH 1, 7, 8, 10	7/4/19 14:00	Soil	W1PH 10 3 samples
4				
5				
6				
7				
8				
9				
10				



Your Ref

In reply please quote  
HAIL0192/19

If calling, please ask for  
Alan Parkes



11 April 2019

Postal Address  
Private Bag 544, Ngaruawahia 3742  
New Zealand

0800 492 452  
[www.waikatodistrict.govt.nz](http://www.waikatodistrict.govt.nz)

McCracken Surveys Limited  
PO Box 19182  
Hamilton 3244

Dear Sir/Madam

### **Property Enquiry - HAIL report**

Further to your request for details of whether or not council records indicate that an activity or industry described in the Ministry for the Environment Hazardous Activities and Industries List (HAIL) is being, has been or is more likely than not to have been undertaken on a piece of land I can advise the following:

**Property address:** 635 State Highway 23 WHATAWHATA  
**VNZ Property ID:** 04420/041.00  
**Legal description:** LOTS 1 2 DPS 12627 BLK 1 HAMILTON SD

The following HAIL activity or activities are or are likely to be associated with the property:

- A10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
- A17. Storage tanks or drums for fuel, chemicals or liquid waste

### **Source Document(s):**

Waikato District Council file records; Waikato Regional Council Land Use Information Register

### **Comments:**

The site has been used as a golf course established in the late 1960s. File records identify that the site held a dangerous goods licence for 600 litres of class 3a and 1000 litres of class 3c fuels in above ground tanks

Please be advised that the review identified structures on the property present in 1968 and an older building relocated to the site in 1985. These structures are likely to have used asbestos containing materials (ACM) and/or lead based paint given the era of construction. Whilst such activities are not specifically identified on the HAIL, the use of lead based paint and presence of ACM can result in the presence of such contaminants at elevated concentrations in the surrounding soil.



The following records (where applicable) were reviewed in this assessment:

Property file including any parent property file from which the property was developed

Waikato District Council Land Use Register

Waikato Regional Council Selected Land Use Register

Subdivision Consent files

Land Use Consent files

Building Consent files

Historical Dangerous Goods files

Aerial Photography:

1943, 1953, 1966

Site is vacant pastoral land. Some felled trees are visible midway down the site near the western side in the 1966 aerial.

1971, 1974

The golf course is now established with two buildings present toward the north-eastern end of the site below the hill, consistent with 1968 building permits for a golf house and implement shed. Club rooms are now present at the top of the hill consistent with a 1977 building permit.

1977, 1979, 1980

1991, 1995, 2002, 2008

A new large club rooms is now established at the top of the hill consistent with a 1985 building permit to resite the Cardrona reception rooms to the site from Hamilton City.

#### **Disclaimer:**

This information is based on records held by the Council and/or Waikato Regional Council and reflects the council's current understanding of the site. The council does not accept any liability for any inaccuracy of this information or liability for any loss or damage suffered by any person acting or refraining from acting on this information.

If this information indicates that no record of a HAIL activity has been identified on council records, this does not imply that no HAIL activity has been undertaken on the site. This simply means that the council holds no record of a HAIL activity being undertaken on the property at this point in time. However, council records may be incomplete. Similarly, if one HAIL activity is identified, this does not preclude another HAIL activity having been undertaken of which no record is held. If an activity is proposed to be undertaken on the site that is covered by the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES), council retains the right to seek further information on the site history of the subject property. Where pastoral farming activities have been identified, Council may seek information in respect of cadmium in soil resulting from application of superphosphate fertiliser if residential activities are proposed.

If you have any queries please feel free to call me.

Yours faithfully



Alan Parkes

**Contaminated Land Specialist**



1943

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1953

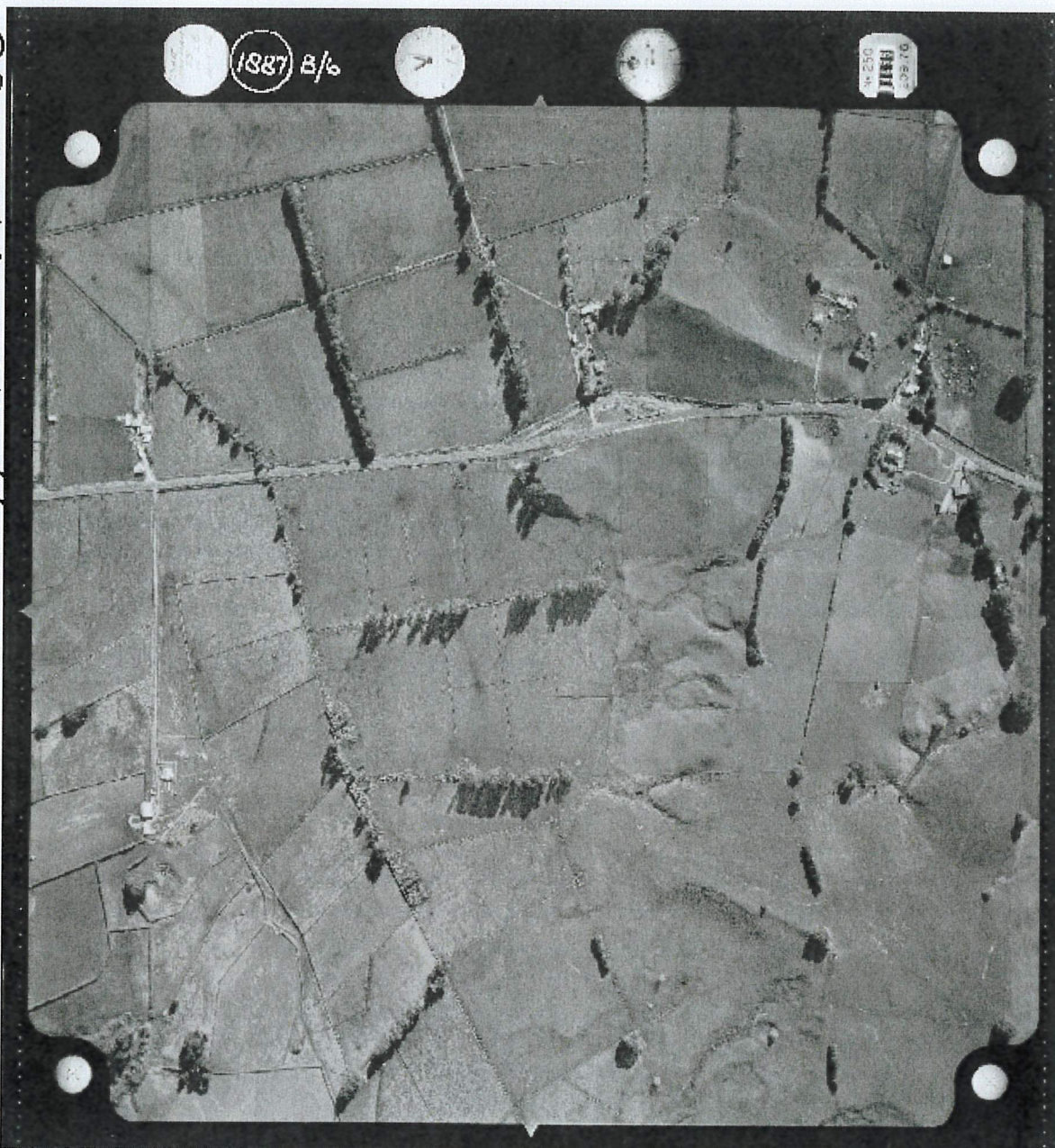


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1966

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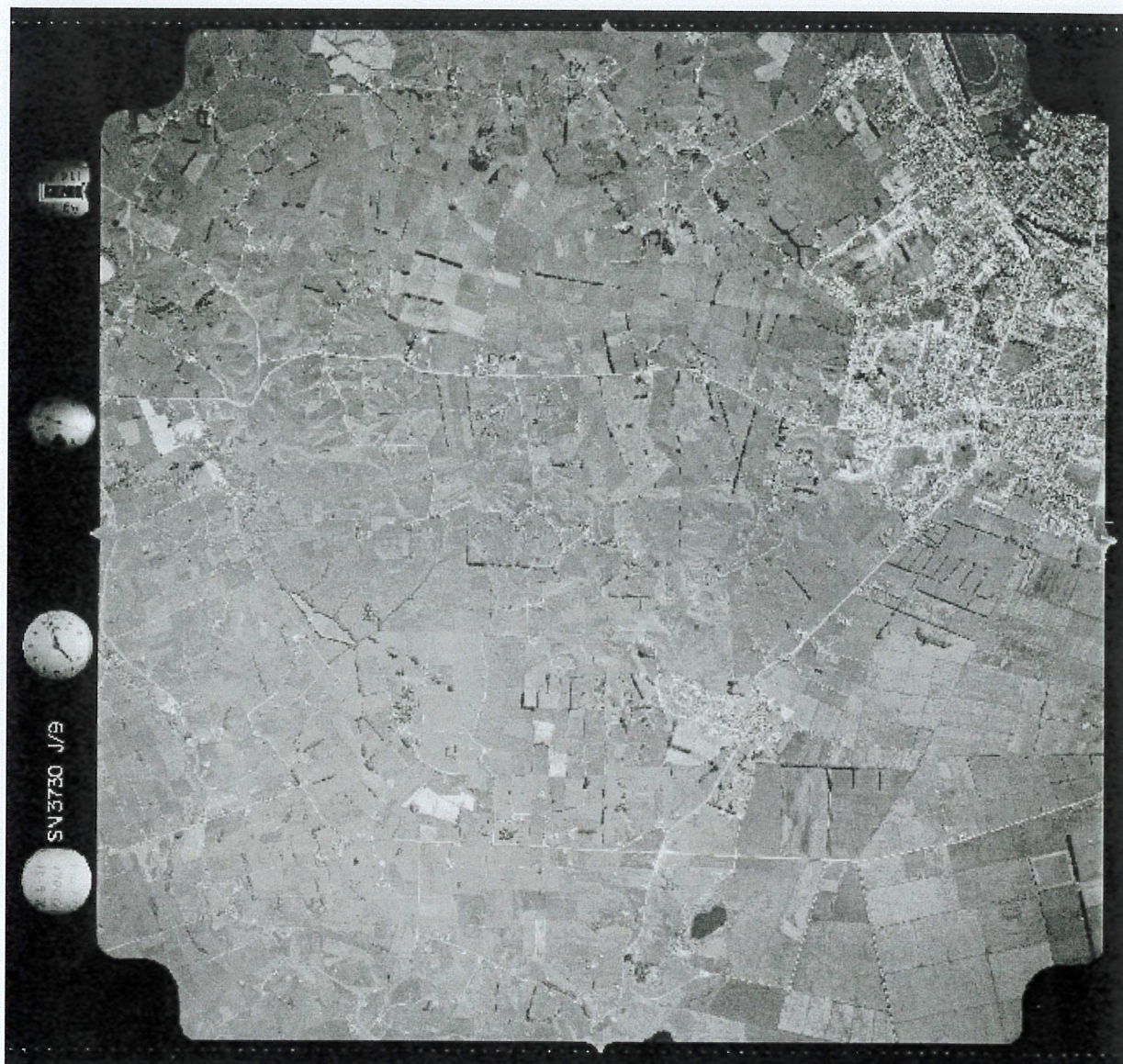
1971



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1974



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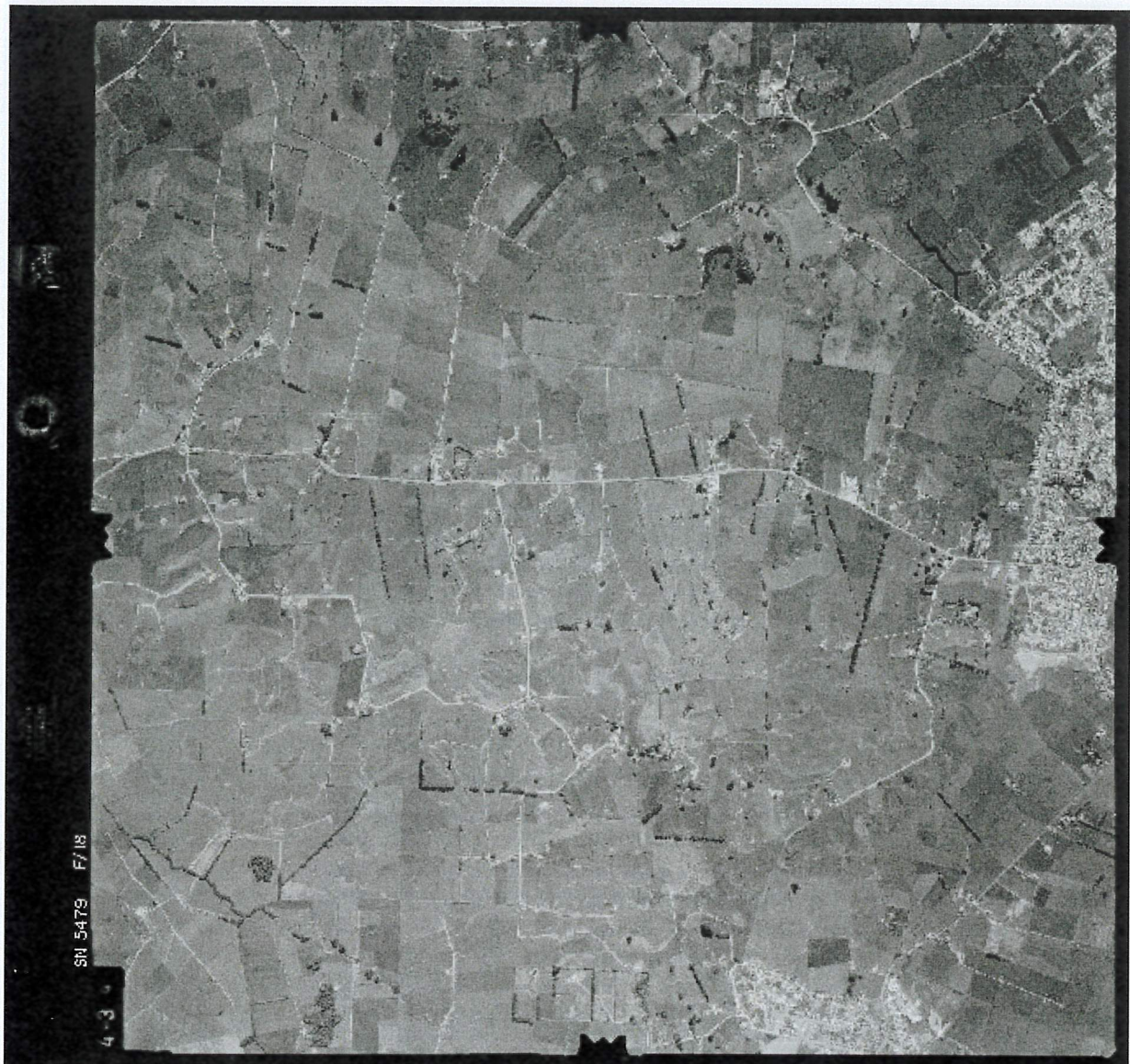
1977



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1979



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1980

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1991

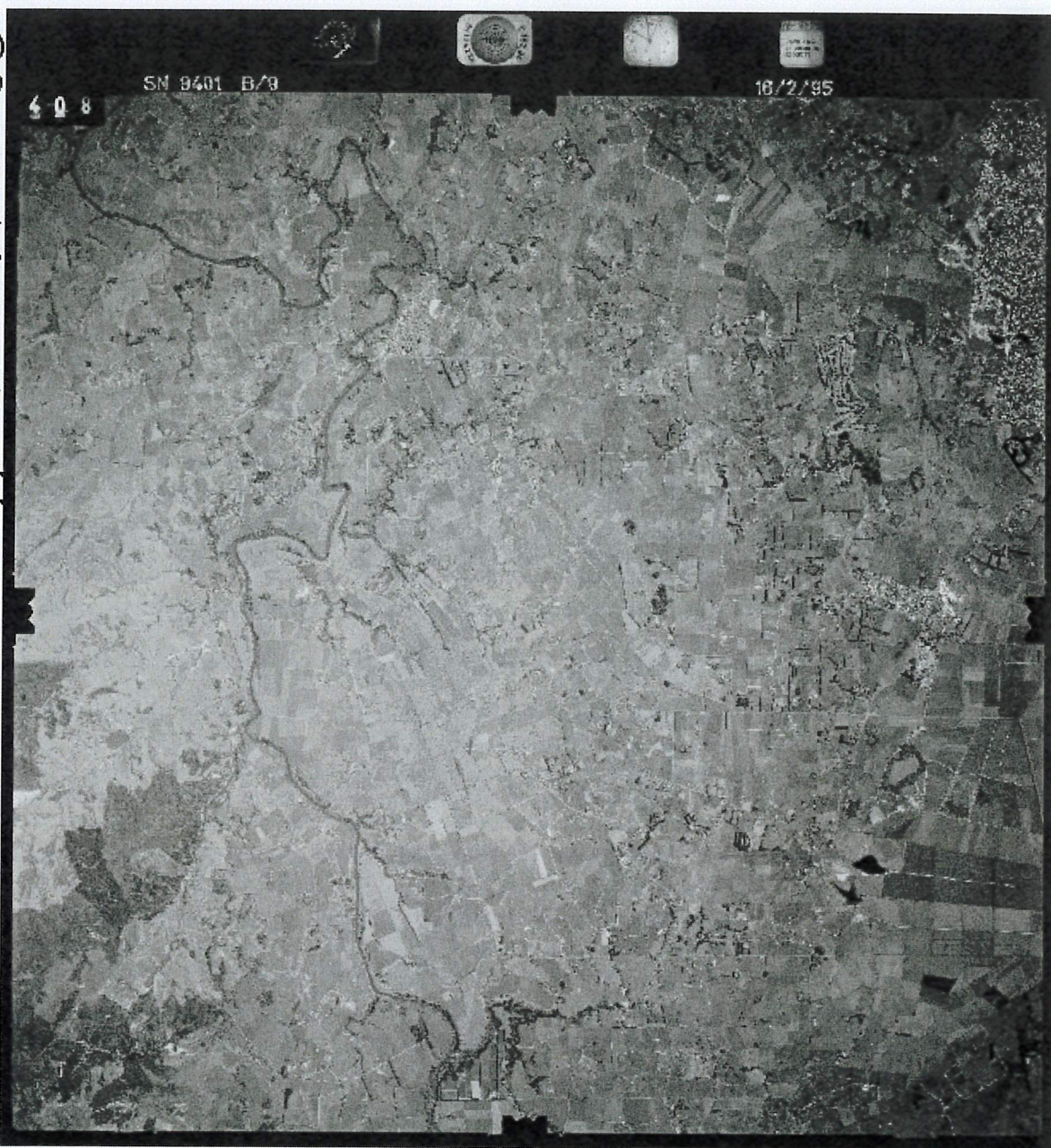


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1995

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2002



## 635 State Highway 23 Whatawhata 2002



Scale 1:3761

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Projection: New Zealand Transverse Mercator  
Datum: New Zealand Geodetic Datum 2000

Print Date: 11/01/2015

A3



2008



## 635 State Highway 23 Whatawhata 2008



Scale 1:276

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Projection: New Zealand Transverse Mercator  
Datum: New Zealand Geodetic Datum 1980

Print Date: 11/06/08

A3



# APPENDIX 11

## Site Tree Survey



**635 Whatawhata Road, Singleton Property**  
**Survey of Recently Planted Trees. March 2018**

Individual trees marked with a dot and number on the aerial. Groups of trees bounded in blue ink on aerial, numbered.						
(Group) Tree No	Name (Vernacular)	Size (m)	Useful life expectancy (in years or self-sustaining group)	Health (Good Fair Poor)	Special features, notes	
1	Himalayan Birch	To 2.5	30	Fair	A bit exposed. Several dead or dying	
2	Evergreen magnolia/grandiflora	2.5	30	Good	Should grow well.	
3	Evergreen magnolia/grandiflora	2.5	30	Good	Should grow well.	
4	3x Evergreen magnolia/grandiflora	2.5	30	Good	Should grow well.	
5	13x London plane	3	50	Good	Only 6m from the overhead lines. Will need heavy pruning in ten years or so. Consider shifting back	
6	30x coastal redwood	500mm	30	Some dying	Urgent weeding needed	
7	Plane (London x oriental?)	2	30	Fair only	If the redwoods are to grow satisfactorily, the planes will need to be removed in about ten years.	
8	30 x coastal redwoods	500mm	30	Fair only	Weeding required	
9	London plane	2.5	50	Good	Will grow well	
10	London plane	2.5	50	Good		
11	London plane	2.5	50	Fair		
12	London plane	2.5	50	Good		
13	Dawn Redwood	1.8	50	Fair		
14	Dawn Redwood	1.8	50	Fair		
15	Dawn Redwood	1.8	50	Fair		
16	Manuka and wetland trees, shrubs and grasses	1 – 1.8	Not quite self sustaining, 20	Fair to good	Major privet problem. Other weeds are overpowering several smaller spp.	
17	Manuka and wetland trees, shrubs and grasses	1 – 1.8	Not quite self sustaining, 20	Fair to good		
18	Manuka and wetland trees, shrubs and grasses	1 – 1.8	Not quite self sustaining, 20	Fair to good	The poplar trees will be a headache to remove with without major damage. Start removal process soon	
19	Swamp cypress	10	30	Fair	Getting suppressed by the poplars	
20	Manuka and wetland trees, shrubs and grasses	1 – 1.8	Not quite self sustaining, 20	Fair to good	Major privet problem. Other weeds are overpowering several smaller spp.	
21						
22						
23	Manuka and wetland trees, shrubs and grasses – larger area	1 – 2.5	Self sustaining, 20	Fair to good	Remove the exotics within 5 years	



Individual trees marked with a dot and number on the aerial. Groups of trees bounded in blue ink on aerial, numbered.					
(Group) Tree No	Name (Vernacular)	Size (m)	Useful life expectancy (in years or self-sustaining group)	Health (Good Fair Poor)	Special features, notes
24	Manuka and wetland trees, shrubs and grasses – larger area	1 – 2.5	self sustaining, 20	Fair to good	Major privet problem. Other weeds are overpowering several smaller spp.
25	Manuka and wetland trees, shrubs and grasses – larger area	1 – 1.8	self sustaining, 20	Fair to good	Major privet problem. Other weeds are overpowering several smaller spp.
26	Liquidamber/sweetgum	2	30	Fair	Will need careful formative pruning in the next few years
27	5 of Pin oak	2.5	40+	Fair	A bit unstable at present. Maybe cut back and allow new growth. Ideal trees for damp ground
28	29 of silver birch ( <i>B. jacquemontii</i> )	2.5	20	Fair	A couple or so are dying. Check the stakes. Check regularly to ensure they develop properly white bark
29	Liquidamber	3	30+	Good	
30	Liquidamber	3	30+	Good	Grafted specimens? Typically, they will require careful form pruning
31	Golden elm	2.5	30+	Good	Reduce the stake height
32	Claret ash	1.8	20	Good	Keep on form pruning – they are inclined to be unstable
33	Ribbonwood, cabbage tree, sedges and others	800mm	20	Good	Excellent selection of infill spp. Weeding for two or three more years
34	Manuka, ribbonwood and other native spp.	1.8	Could be self sustaining group	Good	Doing well. Keep well weeded
35	Golden totara	5	60+	Good	Needs crown lifting and thinning to look like a tree and not a yellow blob. (there seem to be a lot of these trees, all about the same age)
36	Golden totara	5	60+	Good	Needs crown lifting and thinning to look like a tree and not a yellow blob.
37	Dawn redwood	25+ m	30	Good	A really good specimen. There are several others in the property most of which are in good condition and thriving.
38	Native spp. kahikatea, and others	800mm	20+	Good	Lining a drainage ditch. The planting is not wide enough to be self sufficient
39	Native spp. inc kowhai	1.8mm	20+	Good	Lining a drainage ditch. The planting is not wide enough to be self sufficient
40	Group of 4 london planes	2.0	50+	1 good, 3 not	One plane tree will be adequate here
41	Manuka, cabbage tree, kauri and others	2.0	50+	Good 2 kauri dying	Why are the kauri dying?
42	Szyzygium 'Burgundy Glow'	1.0	10 – 15?	Good	Why are these trees even here? They interrupt the natural view lines, they get in the way of mowing. Nasty suburban things
43	10 of kowhai and manuka	1.0	20+	Fair	Stability of the kowhai will be an on going issue
44	Flax, kowhai cabbage tree, many other native spp.	2.0	Self sustaining	Good	Lovely spot in the property.
45	Flax and cabbage trees	600mm	10 – 20	Good	A maintenance nightmare. Could do with some redesign. (The planting is a continuation of group 38)
46	Small group of native by the bamboo	2.0	20	Good	Close to the duckpond. The area will probably be inundated by the bamboo – best to take precautions now.
47	4 of liquidamber	2.0	20	Fair	One dying. Why were liquidamber planted here?
48	Native boundary planting	1.0	50+	Good	2 – 3m wide strip along the boundary. NEEDS WEEDING



Individual trees marked with a dot and number on the aerial. Groups of trees bounded in blue ink on aerial, numbered.					
(Group) Tree No	Name (Vernacular)	Size (m)	Useful life expectancy (in years or self-sustaining group)	Health (Good Fair Poor)	Special features, notes
49	London plane	2.5	50+	Fair	
50	3 of dawn redwood and some native spp	2	50+	Fair	
51	Native spp. Mahoe lining a drain/road	1	20	Fair	
52	Native strip along bdry.	1.5	20 – 30	Fair	
53	2 of <i>Glyptostrobus lineatus</i>	25m	40+	Good	These are <b>very rare</b> trees and it is important that they are properly documented in the NZ register of heritage trees and also as protected trees in the Waikato District Plan
54	Golden totara	4	40+	Fair	Prune if this is to be kept
55	London plane	3	50+	Poor	
56	6 of dawn redwood and manuka	2	30+	Fair	
57	Native planting on boundary	1.5	25 - 50	Fair	
58	Native planting on boundary	1.5	25 – 50	Fair.	Many of the rewarewa seem to be dead.
59	12 liquidamber	2.0	20+	Fair	Not sure why these trees were planted here. It is potentially a good location, but the nearby trees are still viable
60	37 London plane	3	50+	Good	Excellent choice of tree for an avenue. Some might want removing after about 20 years.
61	4 magnolia, 1 tulip tree and 5 tupelo	2	20 - 80	Fair	Lovely choice of trees – will need considerable as time goes on
62	5 pin oak	2.5	50	Good	Will be spectacular
63	3 dawn redwood, coastal redwood	2.0 and 500mm	50+	Good	Remove the larger trees – the Gleditsia and silk trees.
64	Golden totara	5	60+	Good	Needs crown lifting and thinning to look like a tree and not a yellow blob.
65	2 of evergreen magnolia	10	20+	Fair	Mature trees. Examples of the eventual shape of these overused trees.
66	Golden totara	5	60+	Good	Needs crown lifting and thinning to look like a tree and not a yellow blob.
67	Selection of NZ wetland spp. Inc kahikatea	1	30+	Fair	Weeding
68	Group of several pittos and titoki	1.5	Almost self sustaining	Fair	Weeding
69	Pittosporum, Schefflera and other spp.	1.5	Self sustaining	Fair	Weeding
70	Pond cypress	20	30	Good	Prune, form, tidy
71	Pond cypress and golden totara	20 and 5	30	Good	Form prune.
72	Wetland spp. Native and exotic	To 8	20 – 50+	Good	Attractive spot and charming trees
73	6 of red maple	3	30	Good	



Individual trees marked with a dot and number on the aerial. Groups of trees bounded in blue ink on aerial, numbered.					
(Group) Tree No	Name (Vernacular)	Size (m)	Useful life expectancy (in years or self-sustaining group)	Health (Good Fair Poor)	Special features, notes
74	Group of 20+birch, kauri and native spp.	2.5	Self sustaining	Good	Lovely arrangement of trees
75	Group of Silver birch	2	20	Good	Good location on either side of the driveway – will they do well?
76	Orchard trees	To 2.5	10+	good	
77	London plane	3	50+	Good	
78	Native spp. Akeake, lacebark, and others	To 3	20	Good	Altogether the overhead pine trees present a challenge to the livelihood of these trees.
<p><b>The new planting.</b></p> <p>The new plantings around the boundaries of the property are currently in good health, but are in danger of imminent inundation by weeds. It is vitally important to make sure that these young trees are all weeded and cleared around in order for them to become well established in root and stem strength.</p> <p>Generally, the choice of species has been well suited to the conditions, and the effect should start to show within the next 4 years.</p> <p>Some of the larger specimens of the new trees are in need of formative pruning and should be revisited every couple of years for say the first six years after planting.</p> <p>Stakes should be removed after three years, preferably after 18 months. If the trees are not standing firmly after that, they should be closely examined to establish the cause and given some form of remedial treatment (e.g. hard pruning, removal and replacement).</p> <p>There are two London plane trees in the avenue ( Group 60) that have been damaged by tree felling. Proper pruning, re-staking and tying will enable the trees to catch up with their peers within three growing seasons.</p> <p>A major concern is the difficulty/cost of removing larger unwanted trees growing above newly planted trees – in particular Group 18 with the large poplars and Group 78 with the large pine trees.</p> <p>There are a few small, slow growing trees such as the golden totara trees located at odd points in the site; these could be pruned into well shaped specimens and retained as minor focal points. Golden foliage is an uncompromising feature and is usually out of place in a large landscape.</p>					
<p><b>The tree felling programme.</b></p> <p>I did not enquire into the planned removal of many of the trees; however, it is clear that most of the trees felled so far have been poor quality specimens that would detract from the visual appeal of the new and younger trees.</p> <p>I am not certain how many more large trees will be felled.</p> <p>None of the trees is on any tree register or heritage list and the owner may remove as many as he wishes without the need for any local authority consent.</p>					
<p><b>The mature and large trees on site</b></p> <p>It became evident that the trees in the peat soils are generally unthrifty and unstable, whereas the trees further into the site, on slightly elevated soils are inclined to be healthier and larger. That is not to say that they are all worthy of long term retention. Many of them are short lived species such as sheoke and silky oak.</p> <p>Trees that are of major significance to the site or to the local heritage are:</p> <ul style="list-style-type: none"> <li>the redwoods close to the driveway leading to the house at the rear of the site – if each of the newly planted redwoods grow with such vigour the park will soon fully treed.</li> <li>The dawn redwood trees – there are about 15 or more and they all appear to be growing with great vigour and good form.</li> <li>The 2 <i>Glyptostrobus lineatus</i> trees halfway down the western boundary. The species is rare in its native country and these two would be the two biggest examples in New Zealand. They represent a very important seed and propagation source.</li> </ul> <p>I had planned on surveying all the larger trees on the site, but following a conversation with Graham Singleton, we decided that from a long term perspective, the new plantings are of more importance than most of the older trees. This was decided partly as a matter of cost control – my initial estimate of ten days would have been far too low.</p> <p>Other surveys can be carried out on established trees at a later date when housing sites are being formulated.</p> <p>This survey sheet is to be read in conjunction with the marked up aerial photo.</p>					
<p><b>John Wakeling</b> Consulting Arborist</p>					



Individual trees marked with a dot and number on the aerial. Groups of trees bounded in blue ink on aerial, numbered.				
(Group) Tree No	Name (Vernacular)	Size (m)	Useful life expectancy (in years or self-sustaining group)	Health (Good Fair Poor)
Special features, notes				
March 19 2018				



11<sup>th</sup> May 2019

To whom it may concern,

John and I had a real passion for the planting and development of our original farmland. We extensively planted out the golf course and what is now known as the Taitua Arboretum. We donated the Arboretum to the Hamilton City and sold the golf course which has had various owners over the last 50 years, until the Singletons brought it in a very rundown condition in 2015.

John and I visited the property and the Singletons showed us what they had been doing to restore the property back to its former state. I have since revisited, spending the morning with the family to give them the history of the land and was excited to see the ongoing restoration and development of the whole site.

I fully endorse the vision of the Westlands Heritage Trust and what they are doing in the planting and landscaping for future generations. I am so pleased that they are carrying on what John and I started 50 years ago.

Yours faithfully,



Bunny Mortimer