ANNEXURE 7 **Preliminary Site Investigation Report**

Preliminary Site Investigation
Hauschilds Rd
Tai Tapu

Prepared for Jonathon Williams
Sharon & Zane Croft

August 2015

Tasman Environmental Management
29 Wilkie St
Motueka 7120
Ph 027 277 3566

Quality Assurance

Title:	Preliminary Site Investigation Hauschilds Rd, Tai Tapu		
Client:			
Filename:	Documents/TEM/15041-Hauschild Rd/150821.mo.pre.rpt.Hauschild.v1.docx		
Version:	1		
Date:	August 2015		
Project No:	15041		
Prepared By:	Martyn O'Cain Environmental Scientist	Signature:	
Approved for Issue by a qualified practitioner as prescribed under the NES (2011)	Martyn O'Cain	Signature:	

This document has been prepared for the benefit of J. Williams, S & Z Croft and the Selwyn District Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

Should anyone wish to discuss the content of this report with Tasman Environmental Management Ltd, they are welcome to contact us on 027 277 3566.

Contents

1. Introduction

J Williams and S & Z Croft are proposing to subdivide approximately 8.1 ha located on Hauschilds Rd in Tai Tapu. The National Environmental Standard (NESCS) for Assessing and Managing Contaminants in Soil to Protect Human Health (2011) requires a property to be assessed when it is undergoing a subdivision or change of land use. Before the local Council can authorise such changes a Preliminary Site Investigation (PSI) must be undertaken with regard to the regulations in the NESCS. The land use history of the site will be assessed against the Hazardous Activities and Industries List (HAIL). The HAIL is a list of activities and industries that have the potential to contaminate soil. The investigation will indicate whether or not the site is fit for the proposed purpose or additional information is required.

During the preparation of this report Information has been sought from Environment Canterbury, discussions with the current owners, historical aerial photographs and by visiting the site.

2. Site Identification

Owners:	J Williams S & Z Croft
Site address:	Cnr Lincoln Tai Tapu Rd and Hauschilds Rd
Locality:	Tai Tapu
Legal description:	Lot 1 DP 436571 Lot 2 DP 436571
Total Area:	4.05 ha 4.05 ha
Map reference:	Longitude: 172.543751 Latitude: -43.664346 (Figure 1 & 2)
District Plan Zoning:	Inner Plains

3. Proposed Development

This PSI has been prepared to support an application for a proposed plan change and subdivision consent. The likely subdivision will involve creating sixteen new titles. The size of the new properties will range between 2,520 m² and 9,160 m².

A proposed scheme plan showing the likely new lots and building areas is attached as Appendix 1. Please note that the attached scheme plan is only a draft proposal and may be subject to change.

Figure 1 – Site location map

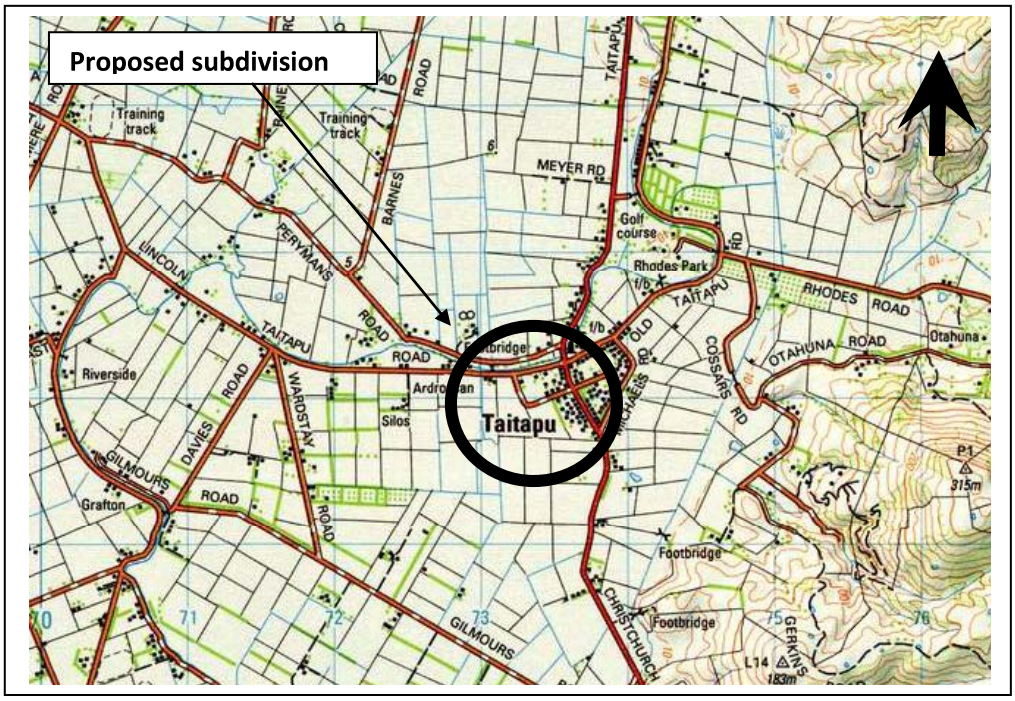
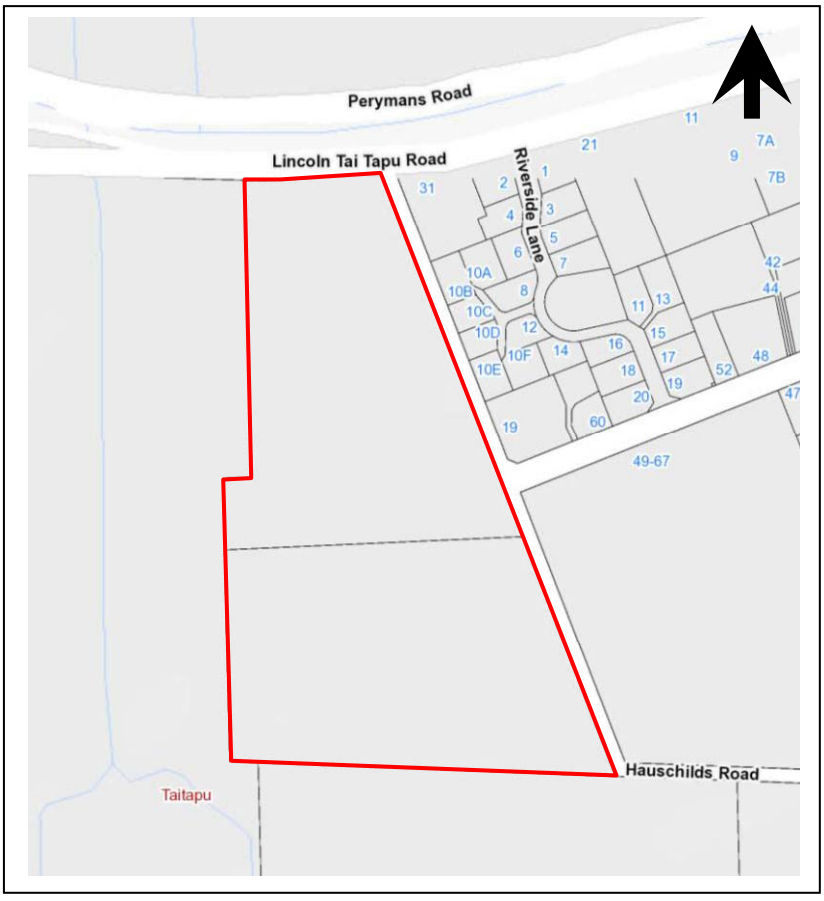


Figure 2 – Location map showing the area to be developed



4. Site Conditions and Surrounding Environment

The property being developed covers a total area of approximately 8.1 ha. The site is flat with an elevation of less than 3 m above sea level. The eastern side of the property is bound by Hausechilds Rd while the northern boundary is immediately adjacent to Lincoln Tai Tapu Rd. To the west and south is existing farm land.

The property is currently being used for pastoral farming. There were no structures on the property at the time of the investigation. Recent aerial photographs show an anomalous area at the southern end of the property. At the time of the investigation this area was not vegetated and appeared to have been recently worked. The current owner of the property, Mrs S Croft, explained that this was a natural low point in the land that is part of a swale that runs west east across the paddock. They have imported natural topsoils from adjacent residential land to fill this area. The stockpiles of fill are evident in the 2012 aerial photograph shown in Section 5 below. A shallow test pit (0.5 m) showed topsoil material with some organics and some gravel confirming the comments from Mrs Croft.

The geology of the property being developed, as described by GNS Science web map, is Holecene River deposits being modern river floodplain/low-level degredation terrace. Unweathered, variably sorted gravel/sand/silt/clay. Surfaces < 2 degree slope.

The site is predominantly surrounded by rural land uses however adjacent to the eastern boundary is a residential subdivision which is part of the Tai Tapu township. As discussed earlier there are no structures or buildings on the investigation area however immediately adjacent to the western boundary and at the northern end is the original farm yard area from when the surrounding land was being run as one farm. The yard includes sheds, stock yards and a former sheep spray.

Figure 3 shows an aerial photograph of the site while Figure 4 shows the former sheep spray on the adjacent property.

5. Site History

Previous land uses associated with a site can be visually tracked through historical aerial photographs if they are available. Environment Canterbury online database (Canterbury Maps) provide aerial photographs for 1973 and 1984. These are shown as Figures 5 & 6 respectively. Google Earth images show the site in 2004 and 2012 (Figures 7 & 8)

The historical aerial photographs show that the area being proposed for development has primarily been used for pastoral grazing purposes. It is unlikely that the property was used for anything other than grazing before 1973. It is evident in Figure 5 that the surrounding land, including the adjacent farm yard area was all part of the same farm property. The sheep spray located within the yard area is clearly visible and appears to be operational in 1973. There is a small anomaly shown in the northern paddock in 1973 however a hand dug test pit in this area showed no indication of any introduced or uncontrolled fill.

Figure 3 – Aerial photograph of the property

Figure 4 – the sheep spray located on the adjacent property

Figure 6 shows the site in 1984. Very little has changed with regard to the general use of the property however at the southern end of the property is an anomalous feature that requires further investigation.

The site was not listed on Environment Canterbury's Listed Land Use Register (LLUR). The LLUR statements are attached as Appendix 2.

Figure 5 – Hauschilds Rd 1973

Figure 6 – Hauschilds Rd 1984

Figure 7 – Hauschilds Rd 2004

Figure 8 – Hauschilds Rd 2012

6. Conceptual Site Model

A conceptual site model helps to identify whether or not a complete exposure pathway exists. An exposure pathway must include a contaminant source, a transport mechanism and a receptor. If one of these components does not exist or can be removed then the exposure pathway is incomplete. If the exposure pathway is incomplete then there is little risk to human health at this location. For an agricultural site the possible HAIL activities associated with this land use type is bulk storage, use and disposal of persistent pesticides, refuse pits, fuel storage, commercial work shops and former sheep dip or spray sites. A conceptual site model has been prepared for the site and is included as Figure 9. An assessment of the exposure pathway will be discussed below in Section 8 – Site Characterisation.

7. Soil Sample Analysis

The conceptual site model identifies sheep dips or sprays as a potential contamination source. Sheep sprays are known to have used persistent priority contaminants such as arsenic, dieldrin and DDT as part of the sheep treatment process. Typically sheep were moved through the dip or spray and then held in concrete based pens to dry before being let out into adjacent paddocks. Unfortunately, it was also common to release the sheep into adjacent paddocks straight after being treated and not giving them time to fully dry thus the spray or dip chemicals were released on to the surrounding land area.

As discussed earlier, a former sheep spray has been identified on the adjacent property. That property and the property under investigation once operated as one farm. It is therefore possible that sheep may have been released from the sheep spray and directed on to the property being investigated via a set of adjoining gates. To identify whether or not spray contaminants were carried into the adjacent paddocks, three surface soil samples were collected from the area immediately adjacent to the gate entrance. The soil sample locations are shown in Figure 10.

Sampling was undertaken on 5 August 2015. Soil samples were collected using a stainless steel trowel and placed directly into clean jars provided by Hill Laboratories Ltd.

All sampling equipment was cleaned in Decon 90 and rinsed in freshwater before collecting the sample. Field staff wore clean gloves when collecting each sample to minimise the potential for cross contamination. The samples were delivered to Hill Laboratories in Christchurch the same day they were collected. Hill Laboratories are an internationally recognised laboratory that is endorsed by International Accreditation New Zealand (IANZ).

Each soil sample was analysed for arsenic, zinc and organochlorine pesticides (OCP).

The results of the soil samples are shown in Table 1 and compared to the NESCS rural residential trigger values. Only contaminants that showed a concentration above laboratory detection limit are included in Table 1. The full Hill Laboratories report is attached as Appendix 3.

Figure 9 – Conceptual site model

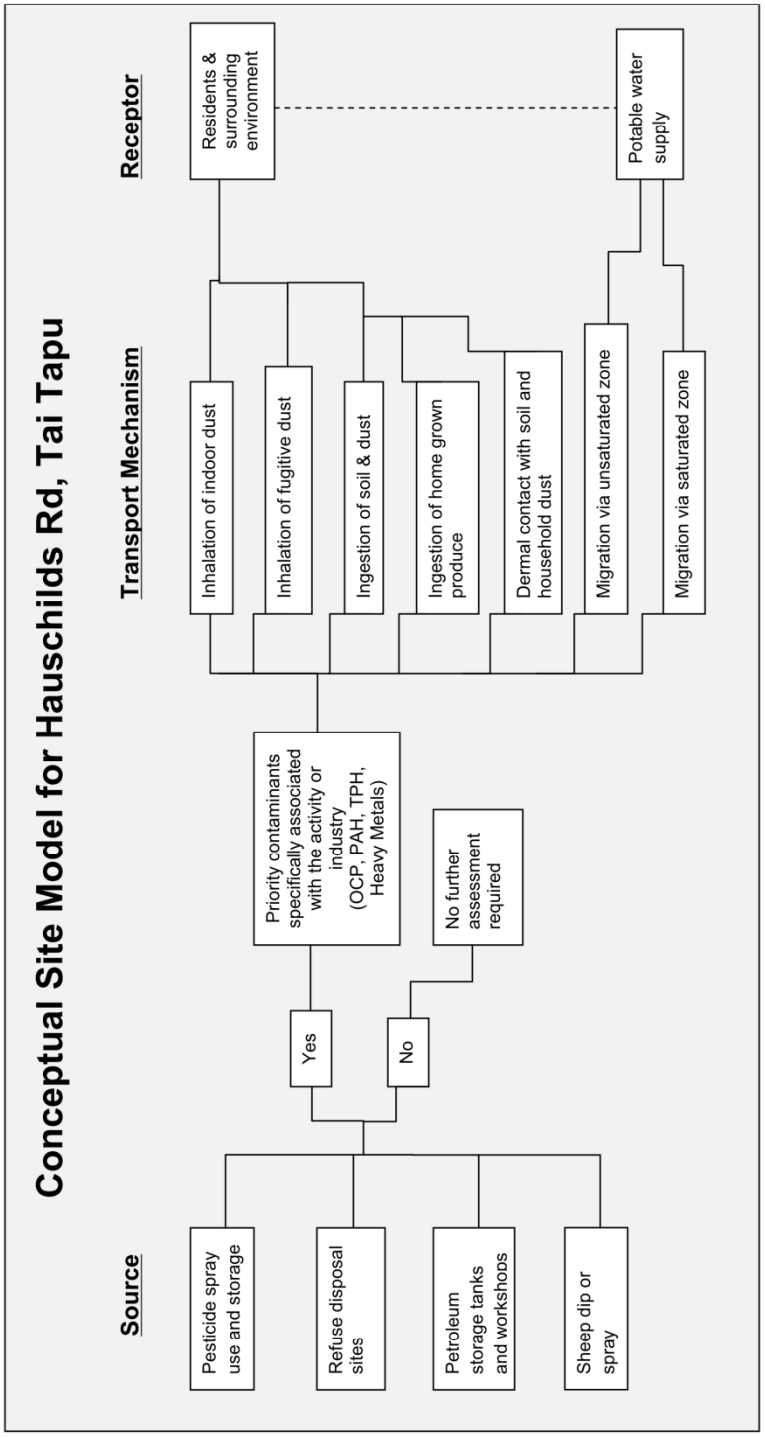


Figure 10 – soil sample locations

Table 1 – Analytical results

mg/kg	TT1	TT2	TT3	NESCS Trigger Value
Arsenic	**21**	**20**	13	17
Zinc	139	131	116	720*
DDT	0.66	0.99	1.14	45
Dieldrin	0.154	0.164	0.097	1.1

* The NESCS does not provide a rural residential trigger value for zinc therefore the value shown in Table 1 is from the 'Dutch Guidelines' (Ministry of Housing, Spatial Planning and the Environment - 2000) for a residential land use.

The results in Table 2 show that two of the three arsenic concentrations are above the relevant trigger value.

8. Site Characterisation

The conceptual site model identifies sheep dips / sprays, refuse pits, fuel storage, pesticide use and storage and workshops as possible HAIL activities that may cause contaminant concentrations in the soil to be elevated. The property being investigated has primarily been used for pastoral grazing purposes. No structures have been associated with the site therefore the storage of fuel and pesticides is unlikely to have occurred while pastoral grazing is not considered as a land use that was exposed to the extensive application of persistent pesticides.

A natural low area at the southern end of the property has been filled in with natural soils by the current owners. There is no evidence that the material used to fill the area was taken from a known contaminated site. A shallow test pit confirmed that the material is made up of natural topsoil. A second possible fill area was identified in the 1973 aerial photograph however subsurface investigations did not identify any uncontrolled fill at this location.

A former sheep spray has been identified on the adjacent property. Given the location and layout of the facility, three soil samples were collected from t a location where treated sheep were likely to have entered the investigation property. The analytical results showed elevated arsenic concentrations that are above the NESCS trigger value for a rural residential land use therefore a complete exposure pathway may exist if the development is to go ahead. It is anticipated that contamination is most likely highest at this point and decreases in concentration with distance away from the entry point onto the property, however this will need to be shown through further investigation.

9. Recommendation

The following recommendations are suggested:

- Prior to the property being subdivided, further investigation is required to ascertain the depth and extent of the arsenic contamination that has been identified along the western boundary and shown in Figure 10;
- A site remedial action plan will be required following the additional investigation and prior to any earthworks being undertaken;
- No other HAIL activities associated with agricultural land use practices have been identified;
- While the information that has been sought as part of this investigation indicates that some soil contaminant concentrations have been identified that may pose a risk to human health, it would be prudent to highlight to contractors undertaking earthworks on any part of the property, that if by discovery odorous, discoloured or uncontrolled fill is observed (including buried refuse) then the appropriate authorities should be contacted.

10. Limitations

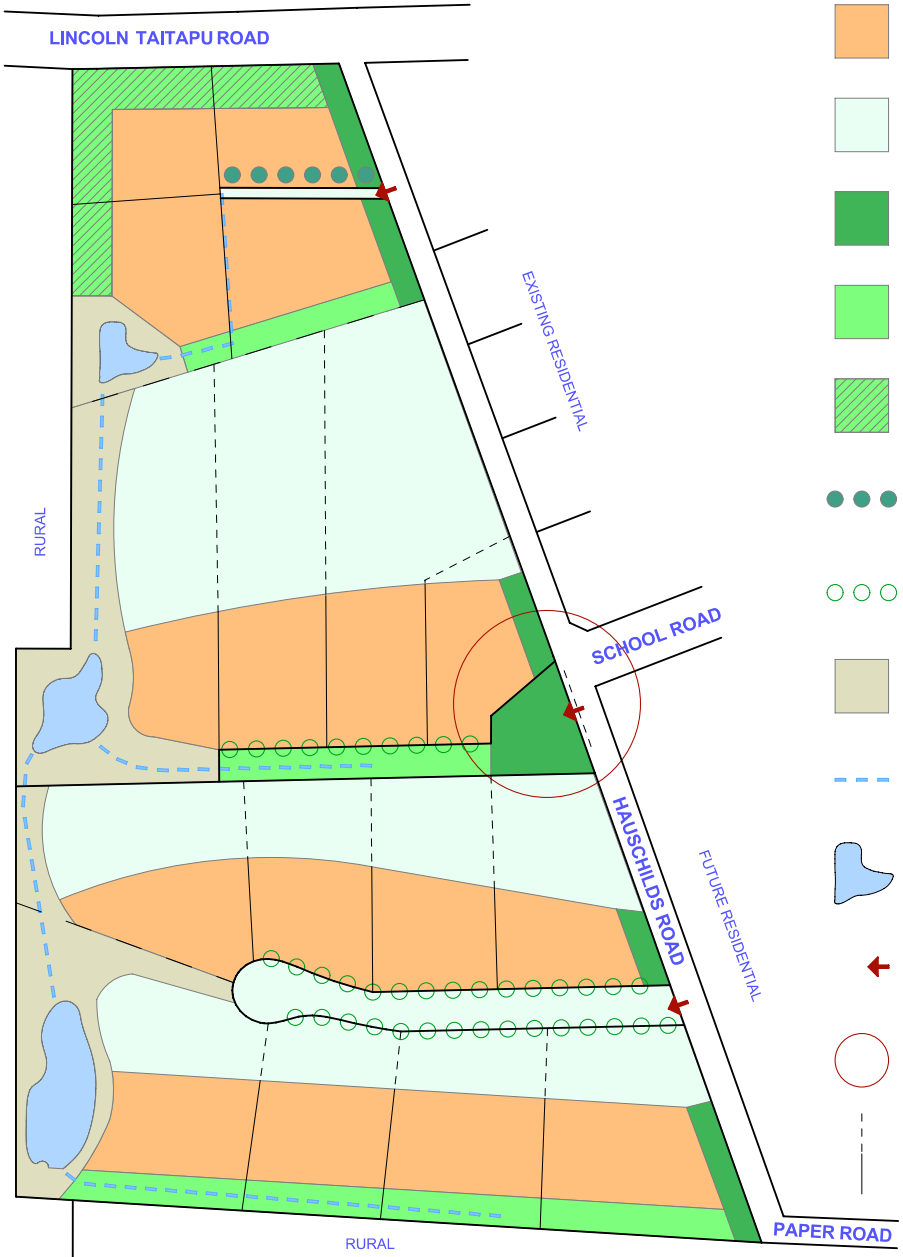
This report has been prepared based on site conditions as they exist at the time of writing and the information that has been assessed. If subsequent investigations involving earthworks or remedial actions are undertaken from the date of this report then certain aspects of this report may no longer be relevant or require amendment. In addition, if HAIL activities occur on the site after the date of this report then the conclusions and recommendations presented in this report may no longer be relied on.

People associated with the property have provided information in regard to certain activities that may or may not have been associated with the site. The information they have provided is included in the assessment of the property and has been accepted in good faith by the author.

This investigation was carried out solely for the purpose of assessing contaminants in the soil associated with the land being suitable for residential occupation only. It has purposely not assessed the possible impacts of contaminants on ecological values associated with the site. Any other investigations that are required to determine the suitability of this property are outside the scope of this report.

Appendix 1

Proposed Scheme Plan



Building Areas

No built areas to secure viewshafts for existing residential development (rural outlook)

Cohesive buffer planting of rural scale to screen houses

Strategic planting to provide shelter

Landscaped setback from Road

Existing vegetation to be retained if suitable

Landscape treatment to access Road

Storm water Management Area

Naturalized swale

Storm water detention pond

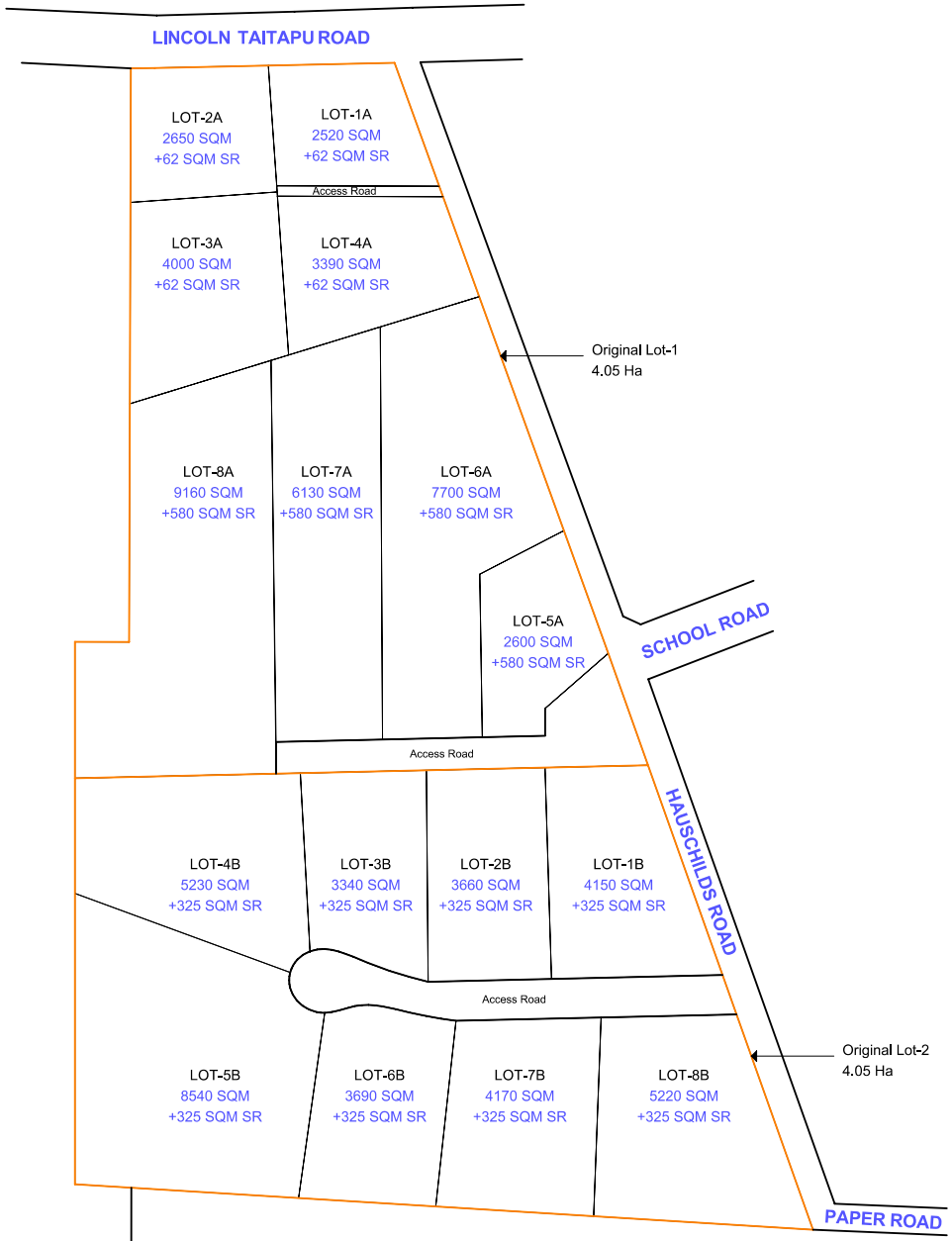
Access point off Hauschilds Road

Specific Gateway Entry Design

Fencing controls to protect "open views" + provides privacy between lots

DRAFT

SCHEMATIC CONCEPT PLAN-4



SCHEME PLAN

a+urban
architecture masterplanning urban design
LBP : Nicole Lauenstein No. : BP117740
a.plus@clear.net.nz
phone 64 3 3394466
mobile 021 878934
135 cashmere road
christchurch 8025, nz

Tai Tapu Hauschild Road Development

Scale : 1:2000 @ A3
Date : 7/29/2015
Designed / Drawn : N.L

A1-01

REV

Appendix 2
LLUR Statements

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks have the potential to cause contamination.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information.
For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

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Christchurch 8140

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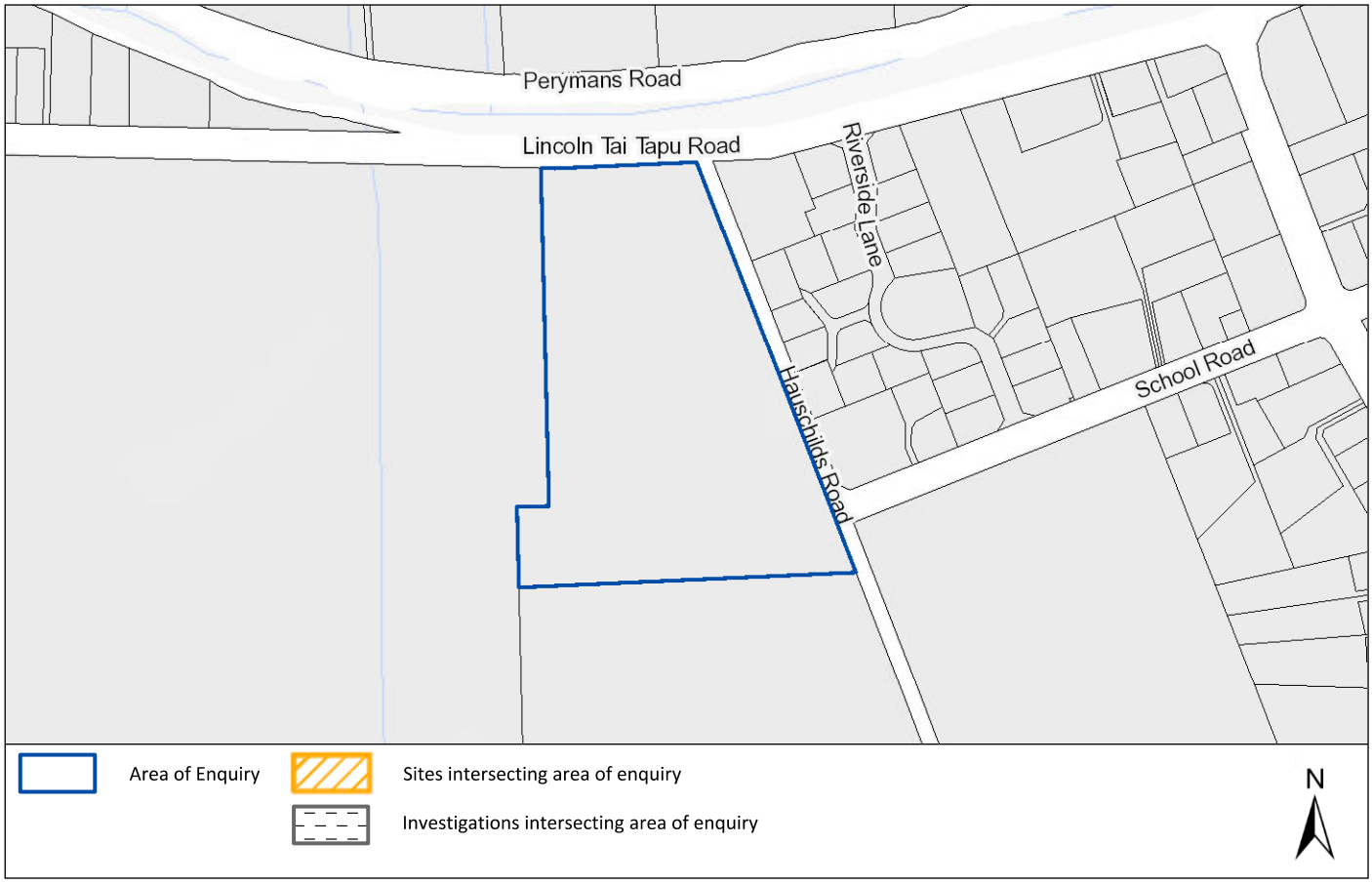
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	31 August 2015	
Land Parcels:	Lot 1 DP 436571	Valuation No(s): 2356413200



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Summary of sites:

There are no sites associated with the area of enquiry.

Information held about the sites on the Listed Land Use Register

There are no sites associated with the area of enquiry.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ106960.

Disclaimer:

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

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For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

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Christchurch 8140

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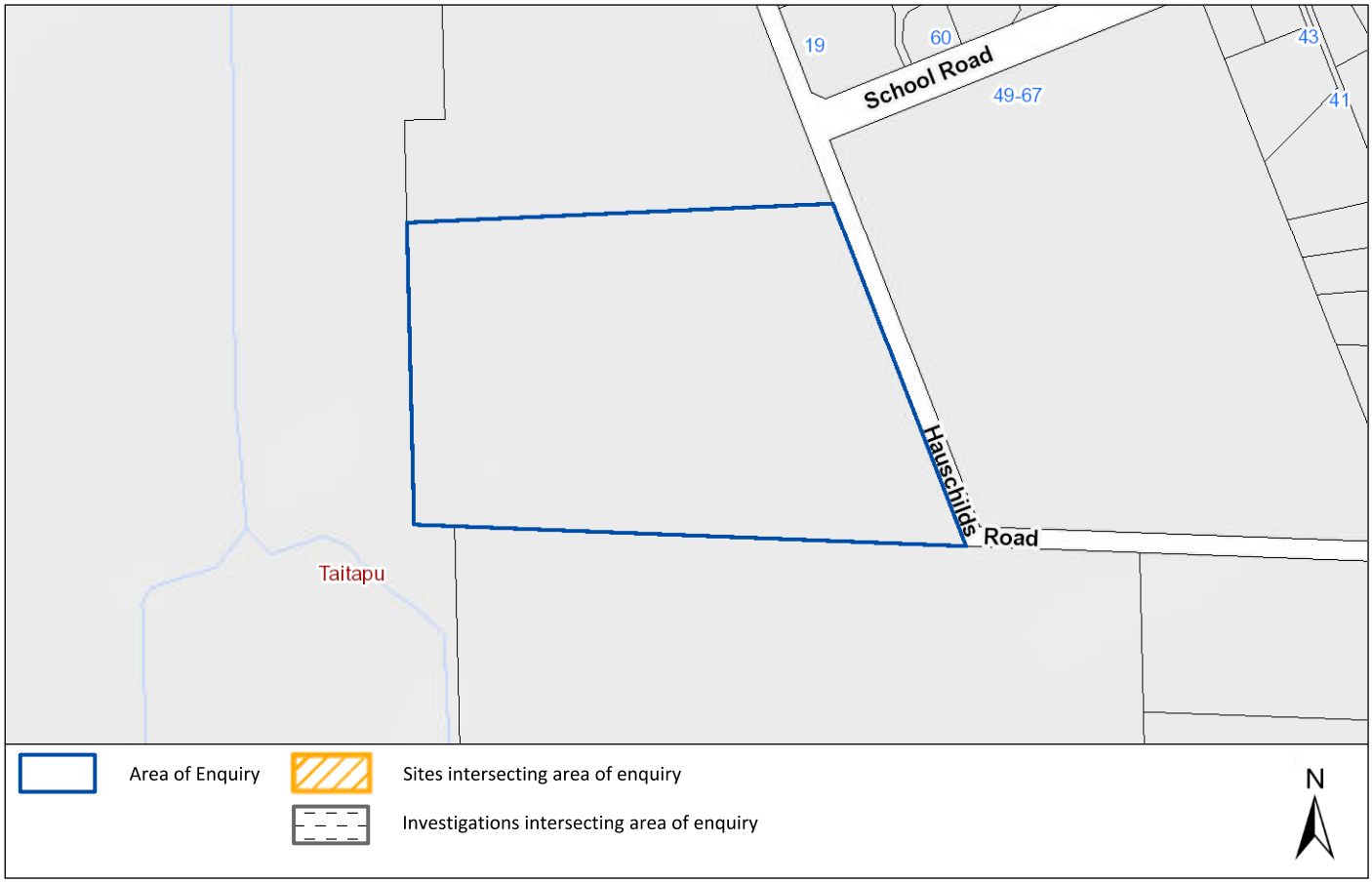
www.ecan.govt.nz

Date:	31 August 2015	
Land Parcels:	Lot 2 DP 436571	Valuation No(s): 2356413202



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Summary of sites:

There are no sites associated with the area of enquiry.

Information held about the sites on the Listed Land Use Register

There are no sites associated with the area of enquiry.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ106961.

Disclaimer:

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Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Appendix 3
Hill Laboratories Report

Hill Laboratories
BETTER TESTING BETTER RESULTS

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

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

ANALYSIS REPORT

Client:	Tasman Environmental Management	**Lab No:**	1459218	SPv1
Contact:	M O'Cain	**Date Registered:**	06-Aug-2015	
	C/- Tasman Environmental Management	**Date Reported:**	12-Aug-2015	
	29 Wilkie Street	**Quote No:**	70639	
	MOTUEKA 7120	**Order No:**		
		Client Reference:	Tai Tapu	
		Submitted By:	M O'Cain	

Sample Type: Soil

Sample Name:		TT1 05-Aug-2015	TT2 05-Aug-2015	TT3 05-Aug-2015		
Lab Number:		1459218.1	1459218.2	1459218.3		
Individual Tests						
Total Recoverable Arsenic	mg/kg dry wt	21	20	13	-	-
Total Recoverable Zinc	mg/kg dry wt	139	131	116	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
4,4'-DDD	mg/kg dry wt	< 0.010	0.018	0.019	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
4,4'-DDE	mg/kg dry wt	0.55	0.77	0.87	-	-
2,4'-DDT	mg/kg dry wt	0.019	0.030	0.037	-	-
4,4'-DDT	mg/kg dry wt	0.090	0.180	0.22	-	-
Dieldrin	mg/kg dry wt	0.154	0.164	0.097	-	-
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endrin aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082).. Tested on dried sample	0.010 - 0.04 mg/kg dry wt	1-3
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-3
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	1-3

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

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

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