

GROUND CONTAMINATION ASSESSMENT

116/148 McHughs Road, Mandeville, Canterbury

On behalf of P.G. Harris

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QUALITY CONTROL CERTIFICATE					
All relevant information is identified, has been reviewed and is approved for release.					
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Limitations

This report has been prepared for Mr P.G. Harris according to their instructions and for the particular objectives described in the report. The information contained in the report should not be used by anyone else or for any other purposes.

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The NES guidelines and contaminated land management reports make abundant use of acronyms. Some commonly used abbreviations are:

ACM	Asbestos Containing Material
AST	Above ground Storage Tank
BAP	Benzo-alpha-pyrene
bgl	Below ground level
CCC	Christchurch City Council
CoC	Chain of Custody (Transport and Laboratory Quality Assurance), or
CoC	Contaminants of Concern
CSM	Conceptual Site Model
DSI	Detailed Site Investigation (often referred to as Phase 2)
DOO	Data Quality Objectives
ECan	Environment Canterbury Regional Council
HMs	Heavy metals screen; GC scan for Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc
LLUR	Listed Land Use Register (ECan database of land with known or suspected contamination)
LWRP	Proposed Canterbury Land and Water Regional Plan (ECan 2012)
MfE	Ministry for the Environment
MMP	Monitoring and Management Plan (Phase 5)
NES _(soil)	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Regulations 2011
NRRP	Natural Resources Regional Plan (Environment Canterbury 2011)
OCP	Organochlorine Pesticides
ONOP	Organonitrogen and Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PEF	Potency Equivalent Factors, synonym with TEQ
PCP	Pentachlorophenol
PSI	Preliminary Site Investigation (often referred to as Phase 1)
QC/QA	Quality Control/Quality Assurance
RAP	Remedial Action Plan, often joint with a Health and Safety Plan (HSP) (Phase 3)
SCS _(health)	Soil Contaminant Standard for health for inorganic substances
SPLP	Synthetic Precipitation Leaching Procedure
SVOC	Semi Volatile Organic Compounds
SVR	Site Validation Report (Phase 4)
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin (persistent carcinogenic pollutant of 2,4,5-T; was widely used in forestry as defoliant herbicide in the 1950s-1960s.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalent
TLB	True Left Bank (of a river, as seen in the direction of flow)
TRB	True Right Bank
UST	Underground Storage Tank

A. Executive Summary

1. A ground contamination assessment has been carried out for 116 and 148 McHughs Road in Mandeville, Northern Canterbury. The land (16.1873 hectares) is zoned Rural, but surrounded by residential land along three of the four boundaries.
2. The land comprises two blocks: 148 McHughs Road (4.0468ha) has been excavated 3-4m for the construction of a railway line and roads. This block was planted with *Pinus radiata* between 1995 and 1997.
3. The second block, 116 McHughs Road (12.1405ha) comprises paddocks that are grazed by horses. The paddocks are fertilised and irrigated. The grass, where not grazed, is cropped.
4. This Preliminary Site Investigation is based on:
 - a site walkover and interview with the site owner,
 - the investigation of a high-resolution aerial photograph from 1973 and satellite images of 2004, 2011 and 2013,
 - a search of Waimakariri District Council's property file,
 - a search of Environment Canterbury's Listed Land Use Register, and resource consent database.
5. Soil from the excavation of a domestic swimming pool at 169 McHughs Road is stockpiled on 116 McHughs Road, and the clippings from shelterbelt maintenance and storm damage have been burnt on a paddock near Mandeville Road. Both activities have been further investigated and assessed to be highly unlikely to have resulted in persistent ground contamination. No fill has been placed in the gravel pit, and no further activities that raise any concerns about persistent contamination were detected.
6. It is concluded that, on the balance of probabilities, it is not more likely than not that HAIL activities are taking place, or have taken place on the site in the past. On this basis, it is assessed that it is highly unlikely that ground contamination will be present on the site that exceeds the national environmental standard (NES_{Soil}) by the time the land is used for residential purposes.
7. No detailed site investigation is required.

Table 1. Summary of Ground Contamination Assessment.

Site Addresses	116/148 McHughs Road, Mandeville, North Canterbury
Local Authority	Waimakariri District Council
Resource consents	None
Legal Description, Area	Pt RS 12395, CT 380/236, 16.1873 ha
Owner/occupier	Peter Gerard Harris
Current land use	Pastoral, cropping/grazing horses
Proposed land use	Residential and forestry
LLUR ID	None
Identified HAIL activities	None

1 Introduction

8. Mr P.G. Harris has engaged Eliot Sinclair to undertake a ground contamination assessment of 116/148 McHughs Road near Mandeville, North Canterbury.
9. The report has been prepared in accordance with the National Environmental Standard (NES_{Soil}¹), which ensures that potential contamination from recent or historical HAIL² activities is identified and assessed at the time of development and, if necessary, remediated to make the land safe for human use.
10. The report has also been prepared in accordance with MfE's Contaminated Land Management Guidelines 1-5.
11. The scope of this report comprises;
 - A description of the site and its surrounding environment to support a conceptual site model;
 - Review of the Listed Land Use Register and resource consent database from Environment Canterbury;
 - Review of available information from the property file from the Waimakariri District Council;
 - Review of a historical aerial photograph and recent satellite images;
 - Site investigation and interview with the site owner;
 - Conclusion and recommendations.

¹ Resource Management; National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health; Regulations 2011/361.

² Hazardous Activities and Industries List, published by the Ministry for the Environment (MfE, 2011).

2 Site Description

12. The investigated land is in Mandeville, North Canterbury, to the southwest of the McHughs Road/Mandeville Road intersection. The associated street addresses of the site are 116 and 148 McHughs Road. A site plan is appended in **Attachment A**.

13. **Legal Description:** The legal description, the area and the owner of the land area summarised in **Table 2**.

Table 2. Legal description of the site.

DP	Titles	Area [ha]	Owner	Street Address
Pt RS 12395	CB380/236	12.1405	Peter Gerard Harris	116 McHughs Road
Pt RS12395	CB686/49	4.0468	Peter Gerard Harris	148 McHughs Road

14. **Topography and Surface Runoff:** The elevation of the site ranges from approximately 39m asl at the eastern boundary to approximately 42m asl at the western boundary of the site. This results in an average gradient of 1:275 from west to east.

15. An area of approximately 3.39ha is excavated (3-4m) at 148 McHughs Road. The excavated gravels were used to construct the railway line and Tram Road.

16. A water race runs along the southern boundary, and a farm drain is approximately 580m south of the site. The Old Bed Eyre River is approximately 2km south of the site.

17. **Land Use:** The 12-hectare block is farmed, the 4-hectare block is used as pine plantation.

18. **Soils and Underlying Geology:** Environment Canterbury's GIS identifies the soil on the site as Darnley shallow and stony silt loam, which is an alluvial soil on the Windwhistle formation. Landcare Research classifies the soil as 'moderately well drained' (drainage class 2 out of 5³). The underlying geology comprises alluvial deposits of sandy gravels, silt and loam.

19. **Groundwater:** Environment Canterbury's GIS indicates that unconfined or semiconfined groundwater is approximately 4-6m below ground level. The groundwater level in well M35/0597 at the western end of the excavated area was approximately 300mm bgl on 26 September 2013.

20. **Zoning:** The current zoning of the site is Rural. The surrounding zoning is Residential along the southern, western and northern boundary, and Rural along the eastern boundary.

³ Landcare Research Soil Drainage Classes
Class 1: well drained, Class 2: moderately well drained, Class 3: imperfectly drained, Class 4: poorly drained, Class 5: very poorly drained.

3 Site History

3.1 Environment Canterbury Listed Land Use Register (LLUR)

21. A search of Environment Canterbury's Listed Land Use Register (LLUR) has been undertaken. The LLUR is a database containing all known contaminated and potentially contaminated sites in Canterbury.
22. Environment Canterbury states that there are currently no known or anticipated HAIL activities associated on the site or within a 50m radius of the area of enquiry. This does not necessarily mean that contamination has never occurred, or is not currently occurring. However, it confirms that no obvious past or present sources of contamination are recorded.
23. The LLUR statement is appended in **Attachment C**.
24. **Conclusion:** Neither the site nor the surrounding land are recorded on the Listed Land Use Register.

3.2 Waimakariri District Council Records (Property File)

25. The property file for 116 and 148 McHughs Road was obtained from the Waimakariri District Council in October 2013.
26. The file comprises information on;
 - Correspondence regarding rural residential water supply,
 - Consent applications documents, construction details and approvals granted by the Council under the Building Act for a hay barn, constructed in 1990,
 - Certificate of Title.
27. **Conclusion:** The property files do not raise any specific information about contamination of the site.

3.3 Site Inspections, Interview

28. The site was inspected on 26 September 2013 with the objective of identifying potential contaminants listed on MfE's Hazardous Activities and Industries List (HAIL⁴) such as;

- above ground storage tanks/underground storage tanks (AST/UST) for fuel, chemicals or liquid waste,
- storage, formulation and disposal of herbicides/pesticides,
- sheep dips or spray races including remnants of it,
- fibrous material potentially containing asbestos,
- discoloured (stained e.g. with hydrocarbons or bleached) soils,
- soil mounds or excavations; change in natural contours of the land,
- deposits of refuse, drums, canisters etc., historical landfills,
- disturbed, stressed or discoloured vegetation,
- any other activity that might have led to intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

29. Photographs taken during the site investigation are in **Attachment B**.

30. An interview with Mr Harris (the landowner) was conducted during the site inspection on 26 September 2013.

31. The information from the site inspection and interview is summarised as follows:

- Mr Harris bought the land in 1991 from the previous farmer who used the land for extensive pastoral farming (i.e. non-intensive grazing).
- The land is used to graze (currently four) horses, and to crop grass. Site photos are appended in **Attachment B**.
- The Mandeville area is known for its well-sorted, free-draining gravels. The excavation of 148 McHugh's Road was undertaken to construct a railway line, which was closed in 1959, subsequently removed and replaced by Tram Road (which was named after the removed tram line). A trunk of the railway line extended into the gravel pit and was used for gravel extraction. A railway siding (platform) was at the Tram Road/McHugh's Road intersection. Refer to the historical aerial photograph from 1973 in **Attachment D** for details.
- A *Pinus radiata* plantation was planted in the gravel pit in 1993/1995.
- In the excavated area groundwater used to rise above ground levels during winter⁵. Groundwater levels during recent winters are approximately 200-300mm bgl. A photograph of the well and wellhead is appended (**Attachment B**).

⁴ Ministry for the Environment 2011. Hazardous Activities and Industries List (HAIL).

⁵ Anecdotally, the water was deep enough to conduct jet boat races.

- The western paddock has several mushroom rings, which grow large numbers of mushrooms in summer/autumn. A photo of one of these rings is shown in **Attachment B**.
- The well in the southwest corner of the excavated area (M35/0597, CRC990745) has always been electrically powered, and power is supplied by overhead lines from McHughs Road.
- Soil from the excavation of a domestic swimming pool at 169 McHughs Road is stockpiled on a paddock in the east of 148 McHughs Road. The stockpile is visible on the satellite images, and a photograph is appended in **Attachment B**.
- Slash from tree damage during the 10 September 2013 storm and from shelterbelt maintenance were burnt on the same paddock approximately 50m southwest of the topsoil stockpile. Inspection of the burning area indicated that the activity is temporary, and nothing other than vegetation has been burnt. A photograph of the burning area is appended in **Attachment B**.
- The hay barn was constructed in 1990. The cladding material is corrugated iron. Two garden sheds near the barn contain horse-riding gear. Several empty barrels without lids are used as horse obstacles. Photos of the sheds and barrels are in **Attachment B**.
- No chemicals are stored on the land and no further land uses or activities were observed that could be a risk to human health or the environment.

3.4 Historical Aerial Photographs and Satellite Images

32. A historical aerial photograph from 1973 was obtained from New Zealand Aerial Mapping Ltd. In addition, three recent Google satellite images from 2004, 2011 and 2013 were investigated.

The results from investigating the historical photo and recent satellite images are summarised in **Table 3**.

33. Key features are identified on the 1973 aerial photo and on the satellite images in **Attachment D**.

34. **Conclusion:** The historical aerial photo from 1973 confirms that, apart from a farm shed along the western boundary that still exists today, no buildings or structures are established on the site. No land use is visible that indicates persistent ground contamination.

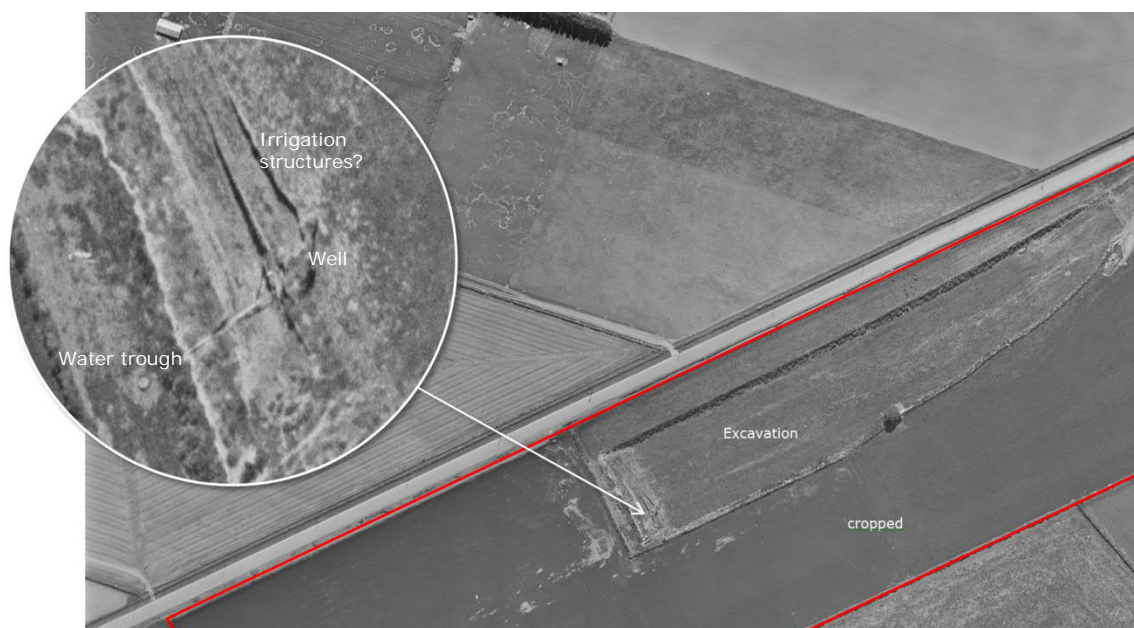


Figure 1. Aerial photo from 1973 showing excavated area and well structures.

Table 3. Summary of information from historical aerial photographs and recent satellite images.

Year (source)	Scale	Description
26/09/1973 (NZAM)	1:10,000	<ul style="list-style-type: none"> Most of the land parcel at 148 McHughs Road is excavated up to 3-4 metres below the original ground level. The invert of the excavated area is flat and vegetated. Cattle are grazed between McHughs Road reserve and the excavated area. A block at the Mandeville Road/McHughs Road intersection is grazed. The balance of the land appears to be sown in a single crop. A shelterbelt is established along the southern boundary of the site. A power pole, pump shed, above ground pipes and a trough are visible in the excavated area near the western boundary. The well is identified as CRC990745 on ECan's GIS. No structures or buildings are on the site. The neighbouring land to the north, west and south is farmed.
14/04/2004 (Google)	n/a	<ul style="list-style-type: none"> A pine tree plantation (<i>Pinus radiata</i>) is established on the 'forestry block'. The canopy is still open, i.e. trees are young. The plantation extends to un-excavated land along McHughs Road, as well as the excavated area. No trees are planted on top of the southern berm of the excavated area. Soil is stockpiled in the east of the site. The owner states that the soil is from the excavation of his swimming pool at his residential property across the road (169 McHughs Road). Refer to satellite images in Attachment D. A hay barn is constructed to the southeast of the pine plantation. The property file indicates construction in 1990. The entire farm block is cropped and grazed by a few horses. The shelterbelt along the southern boundary has been removed. The land adjacent to the north is established residential subdivision. The land adjacent to the south is also subdivided into residential allotments, and most of the lots have newly built houses. The land to the west is still

		farmed (Rural zone).
28/3/2011 (Google)	n/a	<ul style="list-style-type: none"> The pine trees in the plantation have matured and form an almost closed canopy. A horse arena is visible south of the shed. The area is fenced and filled with sand. The balance of the land is cropped (and grazed by four horses). No further buildings or structures visible.
28/02/2013 (Google)	n/a	<ul style="list-style-type: none"> Three north-south running shelterbelts are established. No significant further changes visible.

3.5 Existing Resource Consents (Environment Canterbury)

35. Environment Canterbury's resource consent database shows a filled in historical well (M35/0576) and a surrendered consent (CRC990745) to take groundwater from a well at the SW corner of the forested block (**Figure 2** and **Attachment E**).

36. No effluent discharge, above ground or below ground hazardous storage is, or has been consented.

37. **Conclusion:** Environment Canterbury's resource consent database does not hold specific information about consents that may have caused, or contributed to, persistent ground contamination.

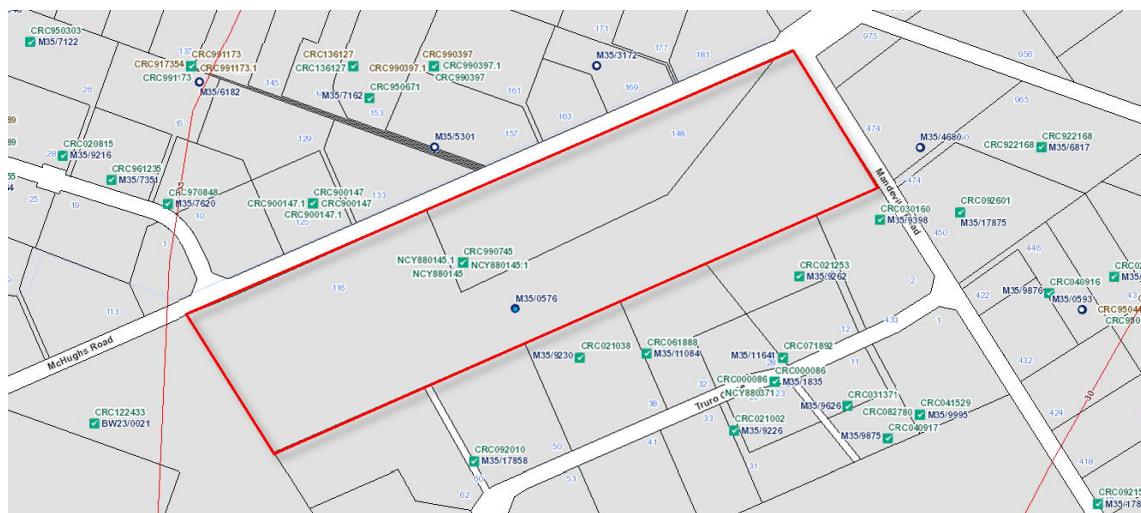


Figure 2. Screen clipping from Environment Canterbury's resource consent database showing a surrendered consent to take groundwater and a filled-in historical well (M35/0576). The red lines denote piezometric contours.

4 Conclusion and Recommendation

38. The investigations for this ground contamination assessment revealed three activities (excavation, stockpiling, burning) which could have resulted in ground contamination. This was found to be highly unlikely for all three activities.

39. Gravel extraction (148 McHughs Road): The investigations indicate that the land at 148 McHughs road was excavated to construct the tramline and road. The excavated area was subsequently forested. Similar excavations are typical in North Canterbury, have been used as rubbish dump, and subsequently backfilled. However, the site inspection did not indicate any areas of backfill or that the excavated area was used to deposit rubbish. It is assessed to be highly unlikely that potentially undetected small-scale backfill would have caused contamination that would affect the proposed development.

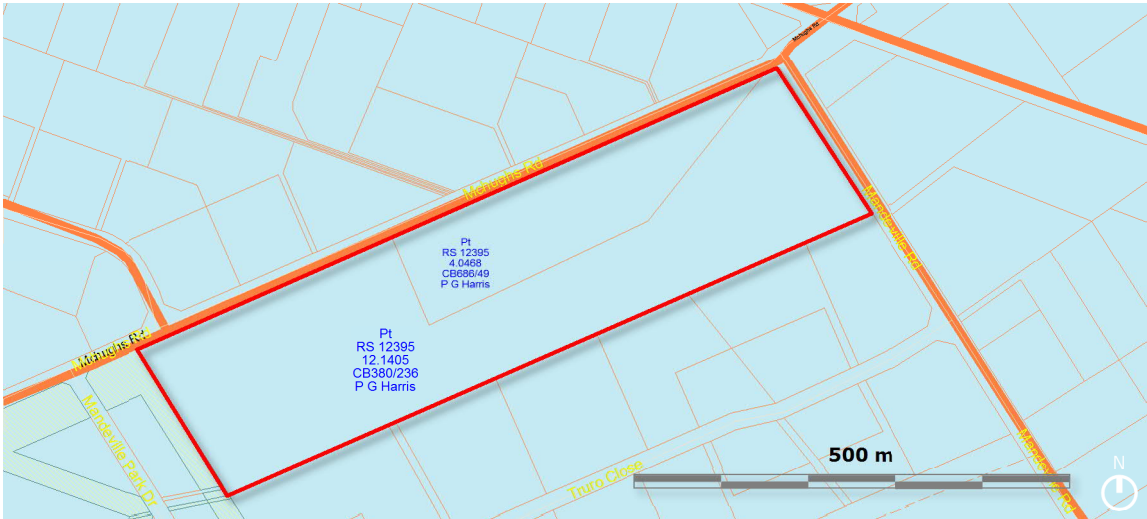
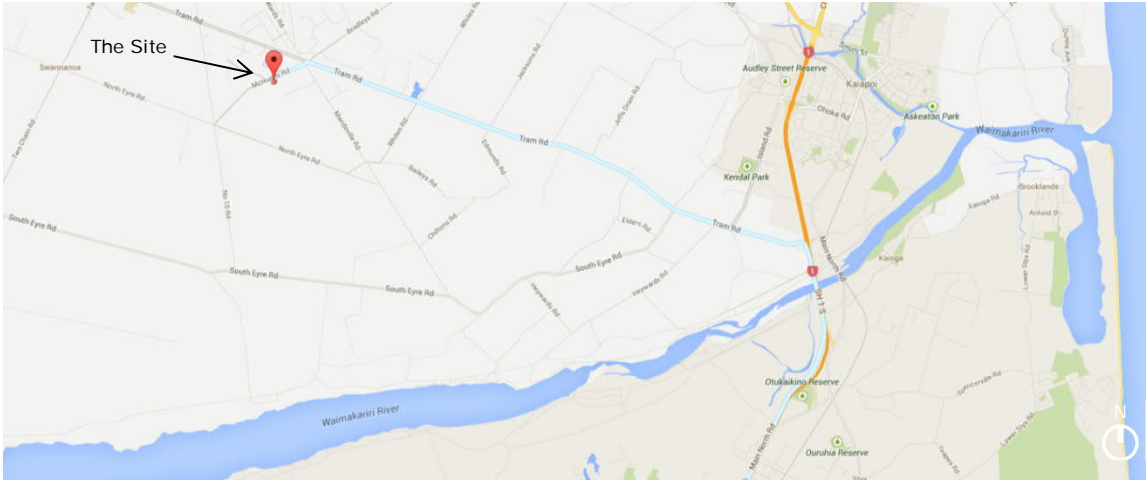
40. Stockpiling (116 McHughs Road): Soil from the excavation of a domestic swimming pool at 169 McHughs Road is stockpiled on the site. The risk that the topsoil might be contaminated from the ubiquitous use of DDT in the area during the 1950s and 1960s is considered to be highly unlikely. The background concentration of DDT is usually low given the time that has elapsed, and assumed to be significantly below the soil contaminand standard (SCS) of 70mg/kg soil for residential land use.

41. Burning (116 McHughs Road): The burn pad where slash from the storm on 10 September 2013 and from shelterbelt maintenance was burnt was found to be a temporary activity. The burn pad is not visible on the Google satellite image from 28 February 2013 (nor on any of the older images). The inspection of the burn pad did not indicate that metals, rubbish or that anything other than vegetation was burnt. Burning vegetation is permitted without resource consent from Environment Canterbury. However, it is likely BaP/PAH concentrations are currently elevated in the ash and topsoil of the burn pad. The US EPA states that biodegradation tests in soils have resulted in a wide range of reported half-lives between 2 days to 1.9 years⁶. It is considered highly unlikely that BaP_{eq} concentrations will be above the soil contaminant standard of 10mg/kg by the time the land use will be residential.

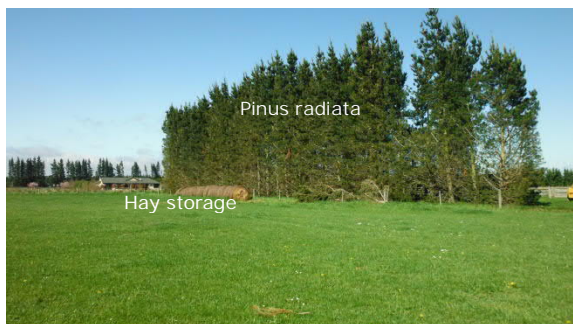
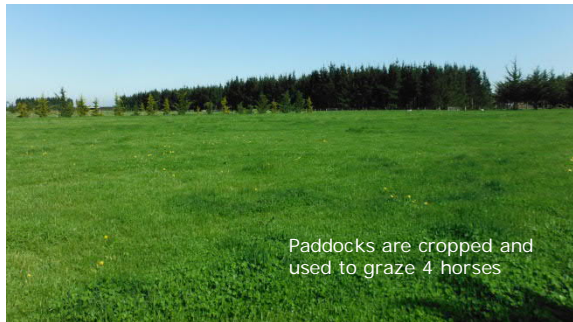
The Preliminary Site Investigation indicates that, on the balance of probabilities, it is not more likely than not that HAIL activities have caused persistent soil contamination. On this basis, it is assessed that it is highly unlikely that ground contamination that exceeds the SCSs for residential land use is present on the site. No further investigation in accordance with the NES_(Soil) is deemed to be required.

⁶ US EPA: Technical Factsheet on: Polycyclic Aromatic Hydrocarbons (PAHs).

Attachment A: Site Plan



Attachment B: Site Photographs (taken on 26 September 2013)



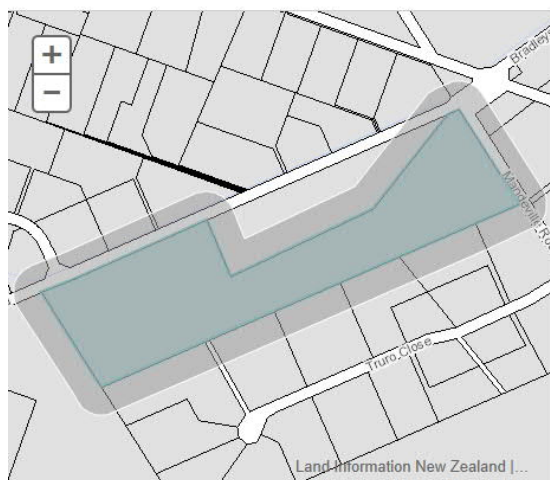


Attachment C: Listed Land Use Register (LLUR)

Listed Land Use Register



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Type your Street Address or Legal Description

116 McHughs Road, Mandeville North, Waimakariri District

(having trouble finding your address? [more info here](#) ..)

Property Search Results

	Legal Description	Titles	Valuation No	Link
1	Part RS 12395	CB380/236	2175035600	Parcel Info

Note!

No Sites have been found within 50 metres of this land parcel.

[Overview](#) [FAQs](#)

What is the Listed Land Use Register (LLUR)?

The LLUR is a land use database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

We need the LLUR to help us manage information about sites that have had hazardous activities or industries on them. By managing this information, we can then help you to manage any potential risks to your health or the environment that the site may pose from exposure to contaminants.



[View LLUR Brochure](#)

We need the LLUR to help us manage the risk posed by hazardous sites to your health and the environment.

Section 30 of the Resource Management Act (RMA) requires Environment Canterbury to collect and manage information about potentially contaminated sites. To do this, we follow guidelines from the Ministry for the Environment (MfE). The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011, which came into effect on the 1st January 2012.





14/04/2004