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25 November 2021

Our reference:

199 John Road Ltd.
P O Box 945
Christchurch 8140
New Zealand

Risk of Natural Hazards & Soil Contamination at 163 ~ 203 Johns Rd, Rangiora

Eliot Sinclair have been asked to comment on the general geotechnical conditions and the risk of soil contamination for the properties the extend from 163 ~ 203 Johns Rd, Rangiora to support of an application to the Waimakariri District Council (WDC) to rezone the land to 'General Residential Density' and 'Medium Residential Density'.

The properties addressed by this report are listed in Table 1.

Table 1. Properties addressed by this report

Address	Legal Description	Record of Title	Area	Owner
163 Johns Road	Lot 4 DP 333694	138043	6.5875 Ha	Carolina Homes Ltd
191 Johns Road	Lot 1 DP 333694	138040	4.185 Ha	Allan Downs Ltd
199 Johns Road	Lot 2 DP 333694	138041	4.532 Ha	199 Johns Road Ltd
203 Johns Road	Lot 3 DP 333694	138042	4.526 Ha	Carolina Rental Homes Ltd

Eliot Sinclair have previously provided pre-purchase geotechnical and soil contamination advice for 199 and 163 Johns Road. A copy of these two reports are attached.

Eliot Sinclair have now carried out a supplementary review of the geotechnical conditions and risk of soil contamination for 191 and 203 Johns Rd to determine if the conditions at these properties are similar to those documented for 199 and 163 Johns Road.

This letter comments on any obvious or known risk associated with natural hazards, the potential for soil contamination, and provides an opinion on whether the land identified in Table 1 is suitable for the proposed residential land use.

1. Natural Hazards

The geotechnical characteristics of the four properties are summarised below;

Geology[1]	Surface soils typically comprise unweathered, brownish-grey silts and clayey silts, overlying silty gravels.
Topography	The area is generally flat, with a slight fall down to the southeast. There is a shallow depression that is associated with a spring
Risk of Fault Rupture[3]	The Ashley Fault is located approximately 5km north of the site. There are no known Active Faults that are located within 20m of the site. Refer to Appendix C.
Risk of Coastal Inundation & Tsunami	The site is located around 11km inland and is not likely to be affected by Coastal Inundation or Tsunami. Refer to Appendix C.
Risk of Flooding[6]	There is a risk of flooding from a breakout of the Ashley River. Refer to Appendix C. This hazard is identified on WDC Hazard Mapping. This risk has been mitigated. However, this may be able to be avoided or reduced by construction of a flood protection bund & channel to the west to divert surface flooding around the site.
Risk of Erosion & Sedimentation	While there is a risk of surface flooding associated with South Brook, given the existing geomorphology of the area, erosion and sedimentation is unlikely to occur. If a protection bund is formed to protect the site, flood flows from an Ashley River breakout event would be diverted to the west and south of the site. In this case, erosion and sedimentation of the proposed residential land would be unlikely to occur.
Risk of Fault Rupture[7]	The Ashley Fault is located approximately 5km north of the site. There are no known Active Faults that are located within 20m of the site. Refer to Appendix C.
Risk of Liquefaction[3]	The site is located in an area where there is only a 'low risk' of liquefaction occurring. Refer to Appendix C.
Risk of Subsidence due to soft ground or peat	The shallow soils encountered south of Johns Rd typically comprise a clayey silt that is firm to stiff when dry and provides firm bearing conditions that are capable of supporting residential foundation loads. No areas of peat have been found to date. In summary, subsidence due to soft ground and peat is not a likely hazard
Risk of Falling debris	The site is flat. There are no steep slope or areas of forestry that could pose a risk of rockfall, windfall, etc.
Risk of Slope Instability	The site is flat. There is no risk of slope instability associated with the existing topography.

[1] Forsyth, P.J., Barrell, D.J.A., Jongens, R. (2008) (compilers), Geology of the Christchurch Area, Institute of Geological and Nuclear Sciences 1:250 000 geological map 16. 1 sheet. Lower Hutt, New Zealand. GNS Science. ISBN 987-0-478-19649-8

[3] https://data.gns.cri.nz/af/

[6] https://waimakariri.maps.arcgis.com/apps/MapSeries/

[7] https://data.gns.cri.nz/af/

2. Soil Contamination

None of the properties are listed on the LLUR database. However, the potential HAIL activities were identified by Eliot Sinclair's previous reports, or from our more-recent review of the historic aerial photographs that are shown on Canterbury Maps. Refer below;

HAIL Category	Activity Description	Property
HAIL I, HAIL E1	Old house; construction materials may have contained lead-based paint and asbestos-cement cladding.	163 Johns Road
HAIL A8	Livestock dip or spray race	163 Johns Road
HAIL G5	Burn pad; Contaminated ash from burning	163 Johns Road

Both 199 and 203 Johns Road contain dwellings that were constructed sometime between 2004-2010. The historic aerial photographs from this period indicate a large garden was constructed on each of these properties. Given these works were carried out sometime between 2004-2010, it is unlikely the new buildings and gardens will contain unacceptable levels of soil contamination.

Ultimately, a Preliminary Site Investigation report that complies with the requirements of the National Environmental Standard: Contaminated Soil (NEC:CS) will need to be carried out to support any future development proposal, and this will determine the need for further investigation and/or remediation activities (if unacceptably high levels of contaminants in the soil are found to be present).

In summary, while there is a potential for soil contamination to have occurred in some places, the preliminary assessment indicates the extent of potential soil contamination is likely to be relatively small, and it would be reasonable to expect these areas to be relatively easily remediated as part of any future land development activity.

3. Conclusion

In conclusion, while there is a potential risk of inundation associated with a breakout of the Ashley River, and for some areas of soil contamination associated with potential HAIL activities, these risks can be avoided, mitigated or remediated, and would be normally undertaken as part of the land development process, and therefore do not prevent the rezoning of the land for proposed 'General Residential Density' and 'Medium Residential Density' zoning.

Kind regards

John Aramowicz

Geotechnical & Civil Engineer | Director

BE(Hons) Mining CMEngNZ CPEng

john.aramowicz@eliotsinclair.co.nz

Appendix A. Pre-Purchase Reports for 163 Johns Road

Pre-Purchase Geotechnical Desktop Report

163 Johns Road, Rangiora

Prepared for Rochford 163 Ltd

439185

Eliot Sinclair

surveyors | engineers | planners

Pre-Purchase Geotechnical Report

163 Johns Road, Rangiora

Prepared for Rochford 163 Ltd

Quality Control Certificate

Eliot Sinclair
surveyors | engineers | planners

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Action	Name	Signature	Date
Prepared by:	Firas Salman PhD, MSc, BSc, MEngNZ Geotechnical Engineer		26 February 2018
Reviewed and Approved for Release by:	John Aramowicz BEng(Hons) CMEngNZ (1008112) CPEng IntPE Principal Senior Civil & Geotechnical Engineer		26 February 2018
Status:	FINAL		
Release Date:	26 February 2018		
Reference No:	439185		
Distributed to:	Rochford 163 Ltd Eliot Sinclair & Partners Ltd		

Limitations
This report has been prepared for Rochford 163 Ltd according to their instructions and for the particular objectives described in this report. The information contained in this report should not be used by anyone else or for any other purposes.

Contents

Appendices

Executive Summary

Eliot Sinclair were engaged to undertake a desktop review of the geotechnical conditions, and to comment on any obvious risk of natural hazards for 163 Johns Road, Rangiora.

The topography across the site is generally flat, but there is a small slope from the northwest down to the southeast.

On-site and nearby well-logs recorded topsoil and silt which extended to between 0.3m to 2m bgl, overlying clay-bound gravels that extend to at least 12m bgl.

Groundwater was recorded between 0.8m bgl to around 3m bgl between March 1999 and September 2011.

Environment Canterbury's 2012 liquefaction hazard assessment for eastern Canterbury, which includes this site, indicates the site is within an area where '*damaging liquefaction* (is) *unlikely*'.

Deep clay-bound gravels are generally accepted to have a low risk of liquefaction, and therefore the soils recorded by the well-logs are consistent with the conclusions of Environment Canterbury's liquefaction hazard assessment.

The Waimakariri District Plan's Hazards Map indicates there is a '*medium hazard*' of flooding across part of the site, along what may be a shallow surface depression that slopes from the northwest down to the southeast corner of the site.

GNS' Active Faults Database identifies the Ashley and Loburn Faults are 5 to 6km north of the site. The Ministry for the Environment recommends residential buildings be located at least 20m away from any known active faults. There are no known active faults shown on the GNS database that would limit future development of this site.

We are aware that there are areas around the southwest parts of Rangiora that are underlain by shallow clayey soils that tend to be *'slightly reactive'*, i.e. their volume can change with changes in soil moisture content, and seasonal swelling and shrinkage can occur. The nature of the soils across this site, and the reactivity of the shallow soils should be assessed as part of any geotechnical investigation for a future development proposal.

In summary, a future development of the site will need to take into account the potential for inundation across parts of the site, the potential to intercept groundwater by deeper excavations that are undertaken during wet winter/spring conditions, and the potential for reactive clayey soils.

We recommend a shallow site investigation be undertaken as part of any future development proposal in order to investigate the depth of topsoil and surficial silts across the site, the depth to gravels, depth to groundwater, to determine the geotechnical properties of the surficial soils, and to specify any geotechnical requirements that need to be taken into account when designing and constructing services, pavements and foundations for any future land development proposal.

1 Introduction

Further to your instruction, Eliot Sinclair has undertaken a desktop investigation of the published geotechnical conditions that relate to 163 Johns Road, Rangiora (refer to Table 1).

This report comments briefly on the general geotechnical conditions that are recorded across the general area, the risk of inundation, and to provide recommendations for any further investigations that may be needed to support a future development proposal.

The comments made in this report are based on information sourced from the New Zealand Geotechnical Database[1] (NZGD), the Waimakariri District Council, the Institute of Geological and Nuclear Sciences (GNS) Geology Web Map Database[2], GNS Active Faults Database[3], Canterbury Maps[4] and GoogleEarth.

Table 1: Legal Description

Site Information	Details
Legal Description	Lot 4 DP 333694 on Title 138043, 6.5875 ha
Street Address	163 Johns Road, Rangiora

2 Site Location

The site is located southwest of Rangiora, and has road frontage onto Johns Road along the north boundary of the site. Refer to Figure 1 and Figure 2. It comprises a total parcel area of around 6.6ha.

The site is currently zoned "Rural" in the Waimakariri District Plan. Refer to Figure 3.

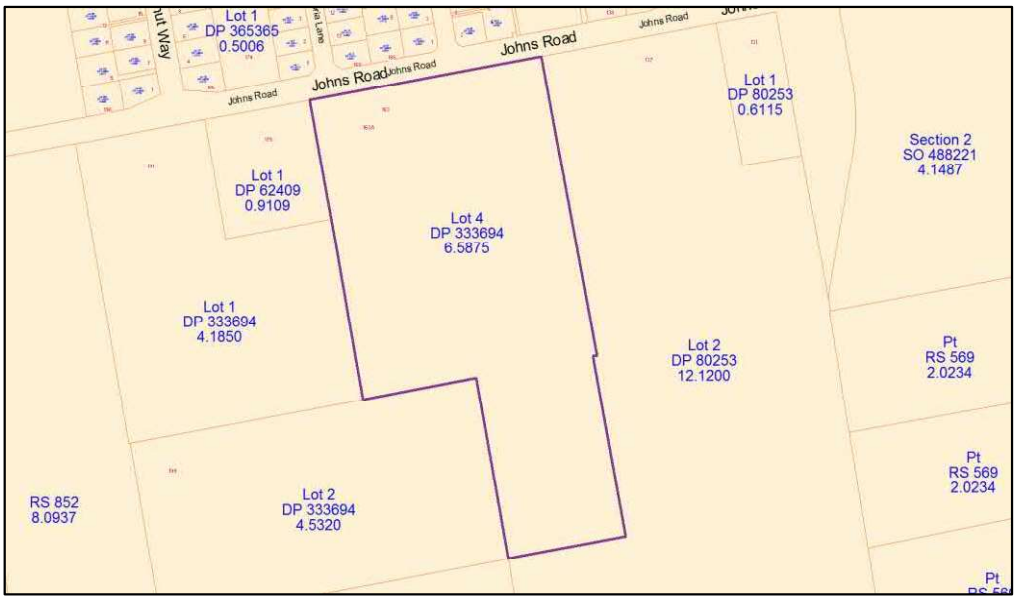


Figure 1: Site location plan. Source: QuickMap V7.5.185, February 2018

[1] New Zealand Geotechnical Database (NZGD). Retrieved in February 2018 from https://www.nzgd.org.nz/Default.aspx
[2] Geological and Nuclear Sciences (2004). Geology Web Map Database. Retrieved February 2018 from http://data.gns.cri.nz/geology/
[3] Geological and Nuclear Sciences (2004). Active Faults Database. Retrieved Feb. 2018 from https://data.gns.cri.nz/af/
[4] Canterbury Maps. Retrieved in February 2018 from https://canterburymaps.govt.nz/

Figure 2: Aerial photo of site. Source: GoogleEarth with approximately boundary in yellow taken from QuickMap. February 2018

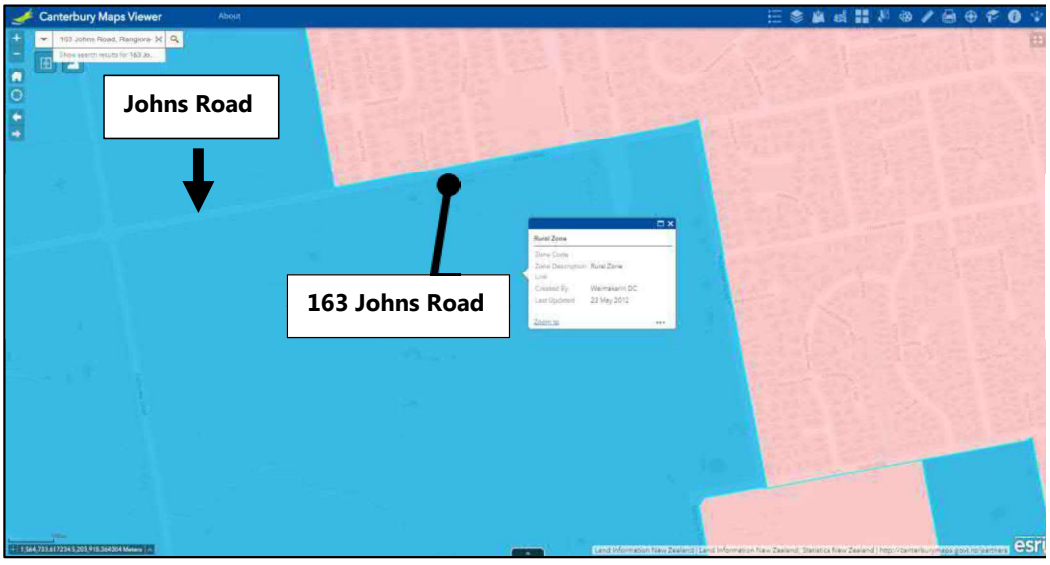


Figure 3: Waimakariri District Council zoning. Source Canterbury Maps4, February 2018

3 Site Geology

Geological mapping infers the site is underlain by '*Brownish-grey river alluvium (Q2a)*'[5]. Refer to Figure 4.

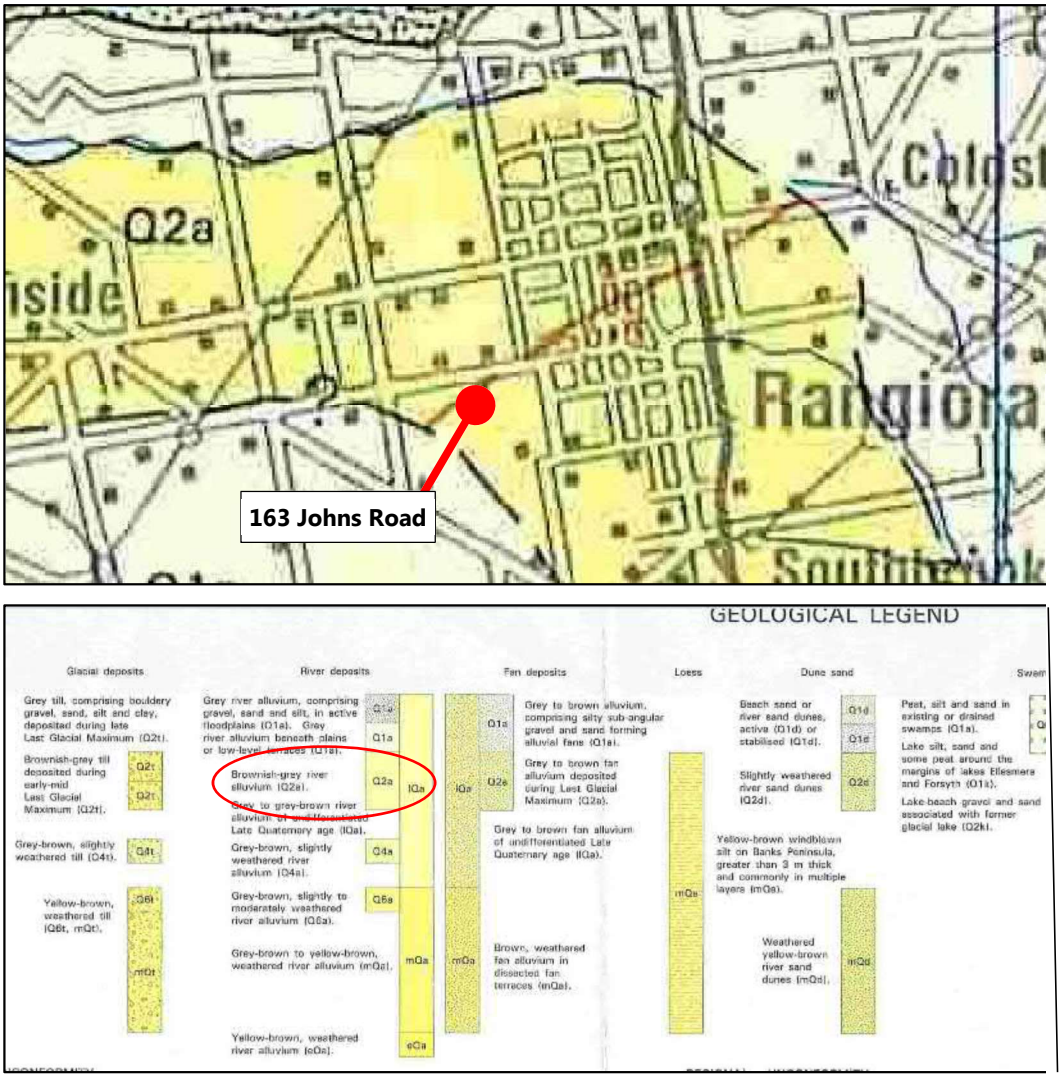


Figure 4: Geology of the Rangiora area[5]

[5] Forsyth, P.J., Barrell, D.J.A., Jongens, R. (2008) (compilers), Geology of the Christchurch Area, Institute of Geological and Nuclear Sciences 1:250 000 geological map 16. 1 sheet. Lower Hutt, New Zealand. GNS Science. ISBN 987-0-478-19649-8

4 Nearby Geotechnical Investigations

4.1 Wells

The well-logs for well M35/18870 (located at the northern part of the site) and wells M35/9868, M35/6708, M35/9869, M35/8035 and M35/8316 (located approximately 20 to 220m from the site's boundary) recorded topsoil, silt and clay to 0.3m to 2m bgl, overlying clay-bound gravels that extend to at least 12m bgl. Refer to Appendix A.

Table 2 summarises the depth to groundwater recorded in nearby wells.

Table 2: Recorded groundwater depth

Test No.	GW depth	Date
Well M35/9868	2.98m below ground level	26 January 2004
Well M35/9869	1.74m below ground level	23 January 2004
Well M35/8035	3.35m below ground level	19 March 1999
Well M35/18870	3.13m below ground level	8 September 2011
Well M35/8316	0.8m below ground level	20 March 1999
Well M35/6708	Not recorded at time of drilling	5 May 1992

4.2 Nearby deep investigation

There is no nearby deep investigation undertaken within 100m from the site. The nearest shallow test that was undertaken just north of the site encountered gravels around 1.4 to 1.7m bgl. Refer to Figure 5.

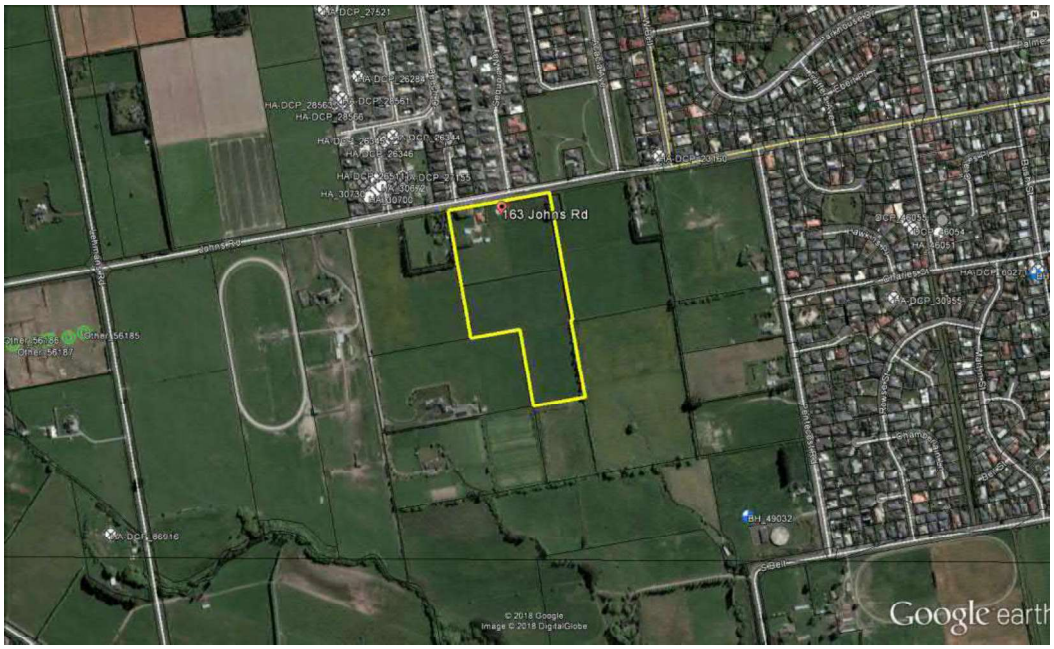


Figure 5: Plan of existing geotechnical deep investigation. Note the recent deep test is located around 400m southeast of the site.

5 MBIE Residential Foundation Technical Category

The site was not assigned a technical land category by CERA after the Canterbury earthquakes, which implies that obvious ground liquefaction did not occur during the Canterbury Earthquake Sequence (CES). Refer to Figure 6.

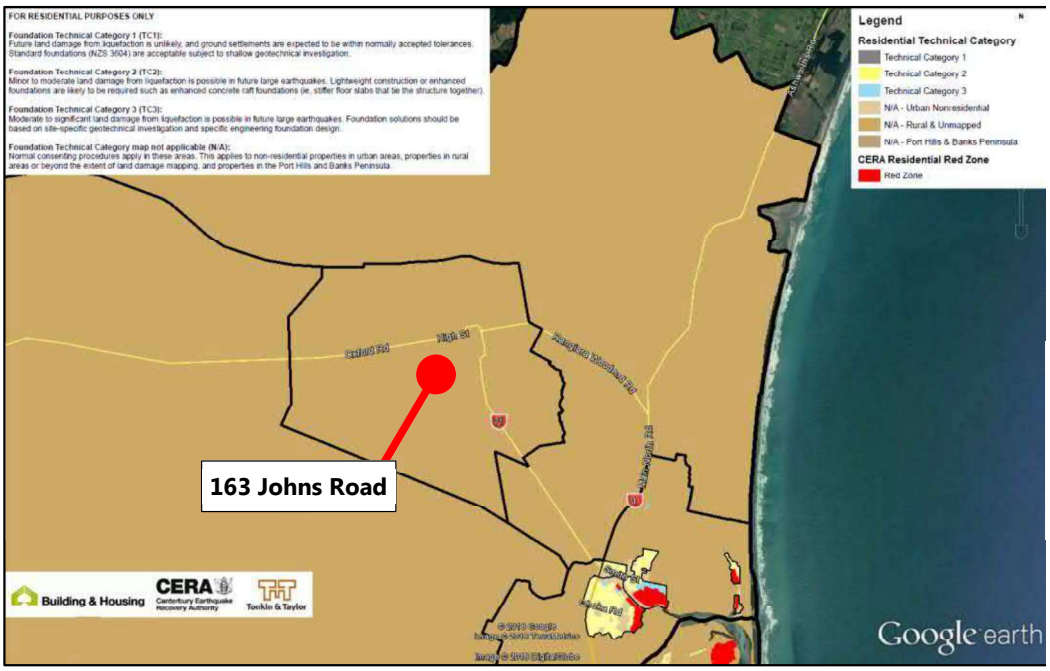


Figure 6: Residential technical category[1].

6 Liquefaction Hazard Assessment

Waimakariri liquefaction susceptibility assessment[6] indicates the site is located in an area classified as '*Zone 2*', and indicates '*Zone of low liquefaction potential - areas of recent Holocene age alluvium (active river beds and flood plains)*'. Refer to Figure 7.

Environment Canterbury's (ECan) 2012 liquefaction hazard assessment for eastern Canterbury[7] indicates the site is within an area where '*damaging liquefaction* (is) *unlikely*'. Refer to Figure 8. This means "*the geological nature of the ground is such that future design-level earthquakes are unlikely to cause land damage from liquefaction*" and "*the ground at this area would likely qualify as TC1.*"

Deep clay-bound gravels are generally accepted to have a low risk of liquefaction, and therefore the soils recorded by the well-logs tend to correlate with Environment Canterbury's liquefaction hazard assessment[7].

[6] Yetton, M; and McCahon, I. (2009): *Earthquake Hazard Assessment for Waimakariri District.* Environment Canterbury report number R09/32
[7] Bracklye, H.L. (complier. 2012. Review of liquefaction hazard information in eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts, GNS Science Consultancy Report 2012/218. 99 p. Environment Canterbury report number R12/83.

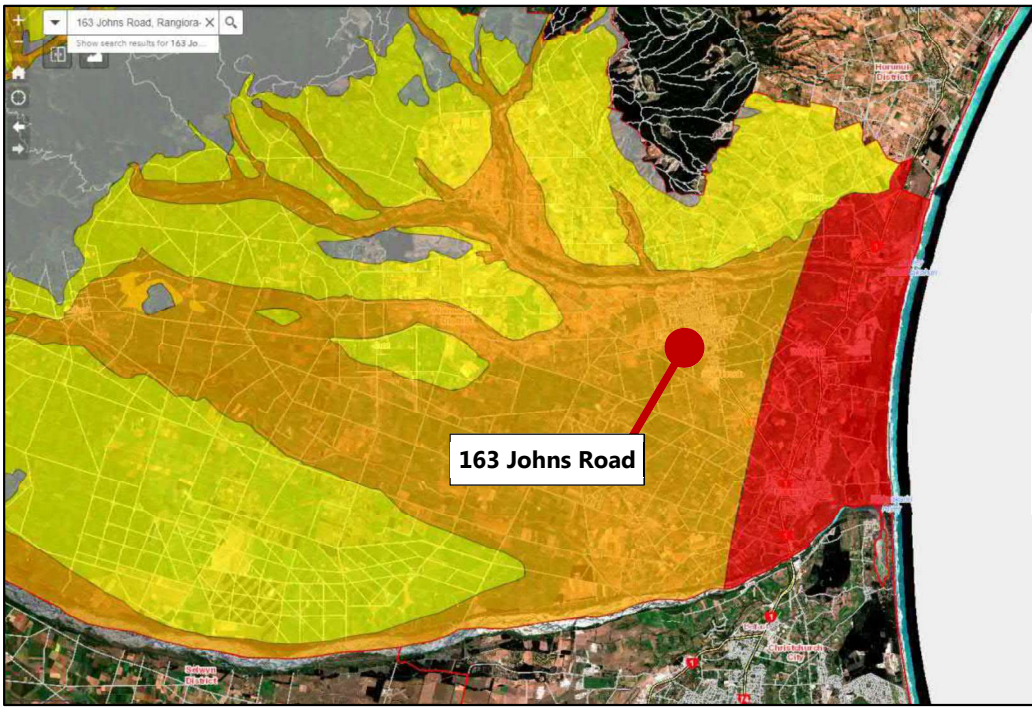


Figure 7: Waimakariri liquefaction susceptibility. Source – Canterbury Maps GIS - WDC, Feb. 2018[6].

Figure 8: ECan's liquefaction assessment[7].

7 Historical Aerial Photography

Refer to Appendix B for historical aerial photography of the site dating from 1940 – 2004.

The historical aerial photography infers the site has been used for cropping/grazing since the 1940's, and any geomorphic features that are obvious in the aerial photography from the 1940s appear to be similar to the features that can be seen in the most recent 2017 aerial photography. This implies the ground surface has not been altered substantially by filling or excavation since the 1940's.

8 Natural Hazards

The Waimakariri District Plan's Hazards Map[8] indicates there is a 'medium hazard' of flooding across the central to south parts of the site, along what may be a shallow surface depression. Refer to Figure 9.

GNS' Active Faults Database[3] identifies the Ashley and Loburn Faults are 5 to 6km north of the site. The Ministry for the Environment[9] recommends residential buildings be located at least 20m away from any known active faults. There are no known active faults that would limit future development of this site. Refer to Figure 10.

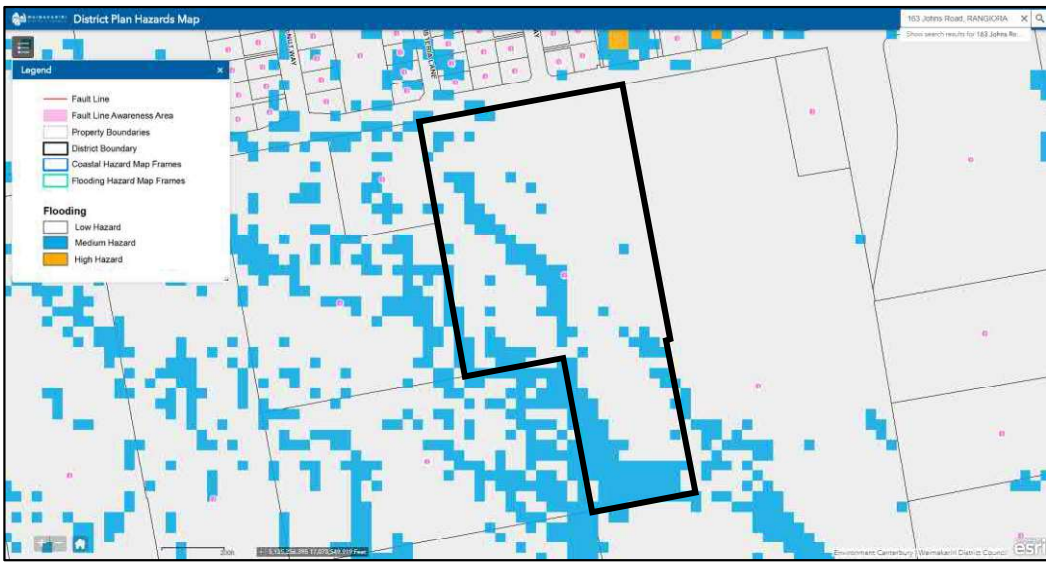


Figure 9: Waimakariri District Plan's Hazards Map, February 2018.

[8] http://waimakariri.maps.arcgis.com/apps/webappviewer/index.html?id=a1508164fb474825bd34c34eebfadc46
[9] Planning for Development of Land on or Close to Active Faults: A Guideline to Assist Resource Management Planners in New Zealand (Published July 2003)

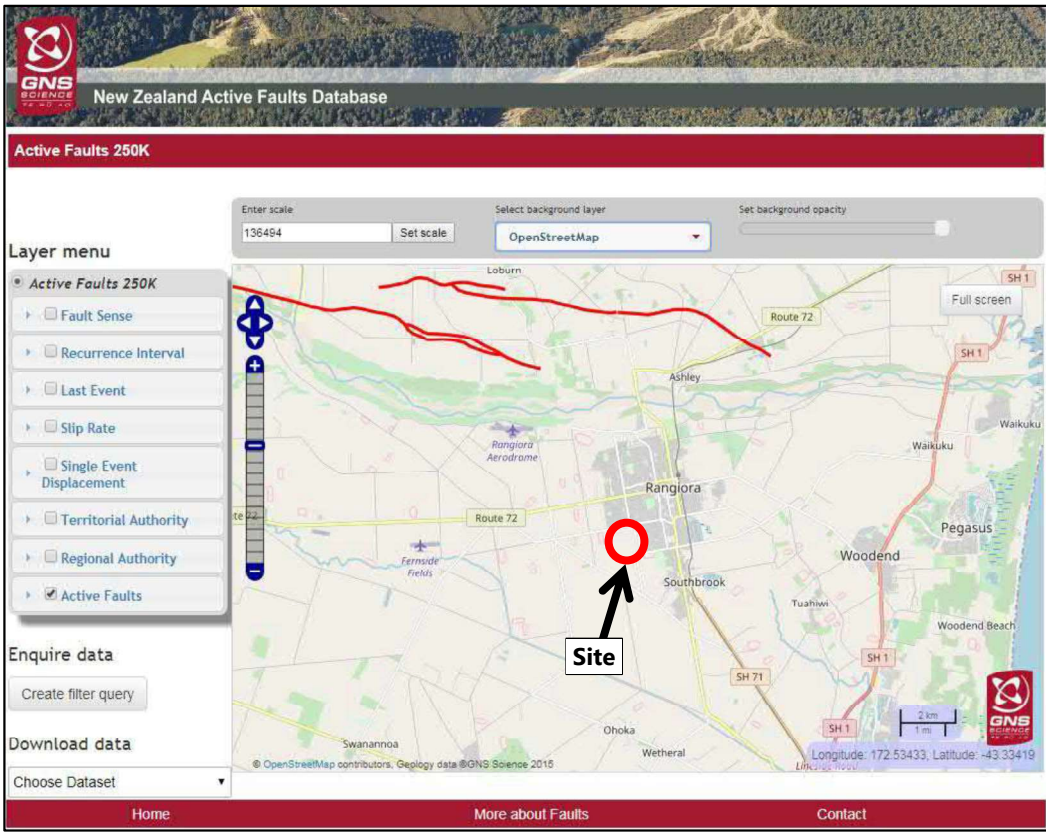


Figure 10: Location of nearest active faults. Ashley and Loburn faults are around 5 to 6km north of the site. Source: GNS Active Faults Database[3], February 2018.

9 ECan's Listed Land Use Register (LLUR)

Site is not listed on the Listed Land Use Register (LLUR)[10] at time of our desktop investigation. Refer to Figure 11.

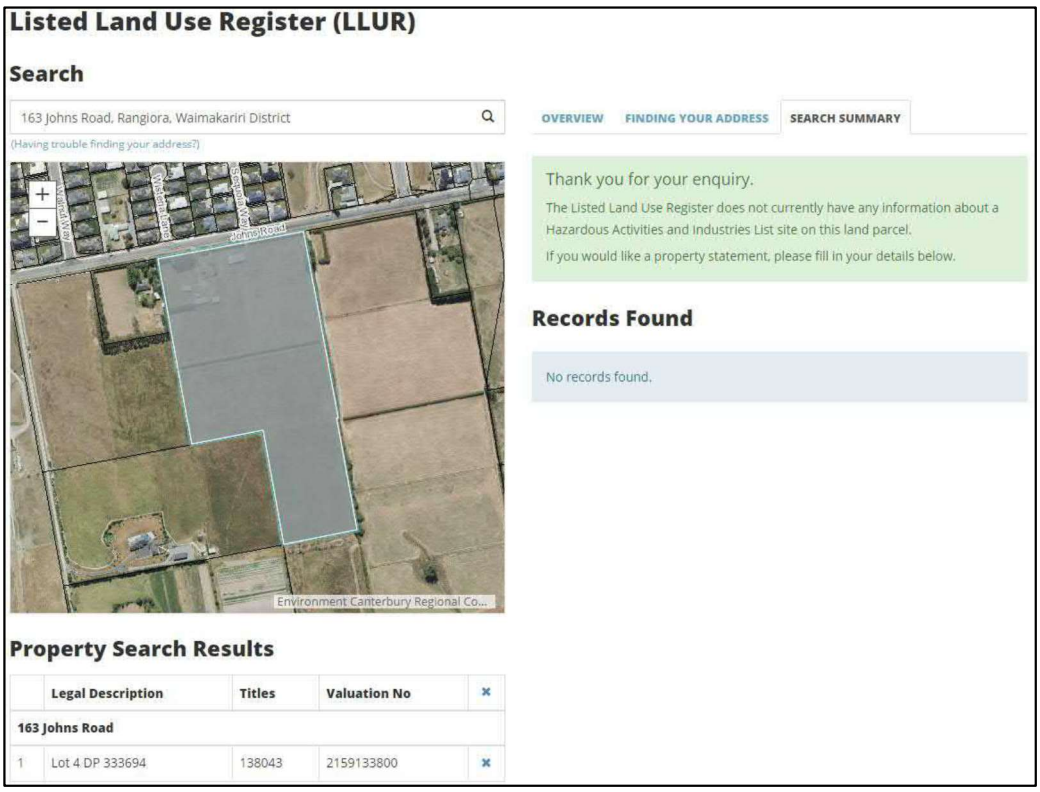


Figure 11: ECan's Listed Land Use Register, February 2018.

[10] http://llur.ecan.govt.nz/Public/

11 Disclaimer

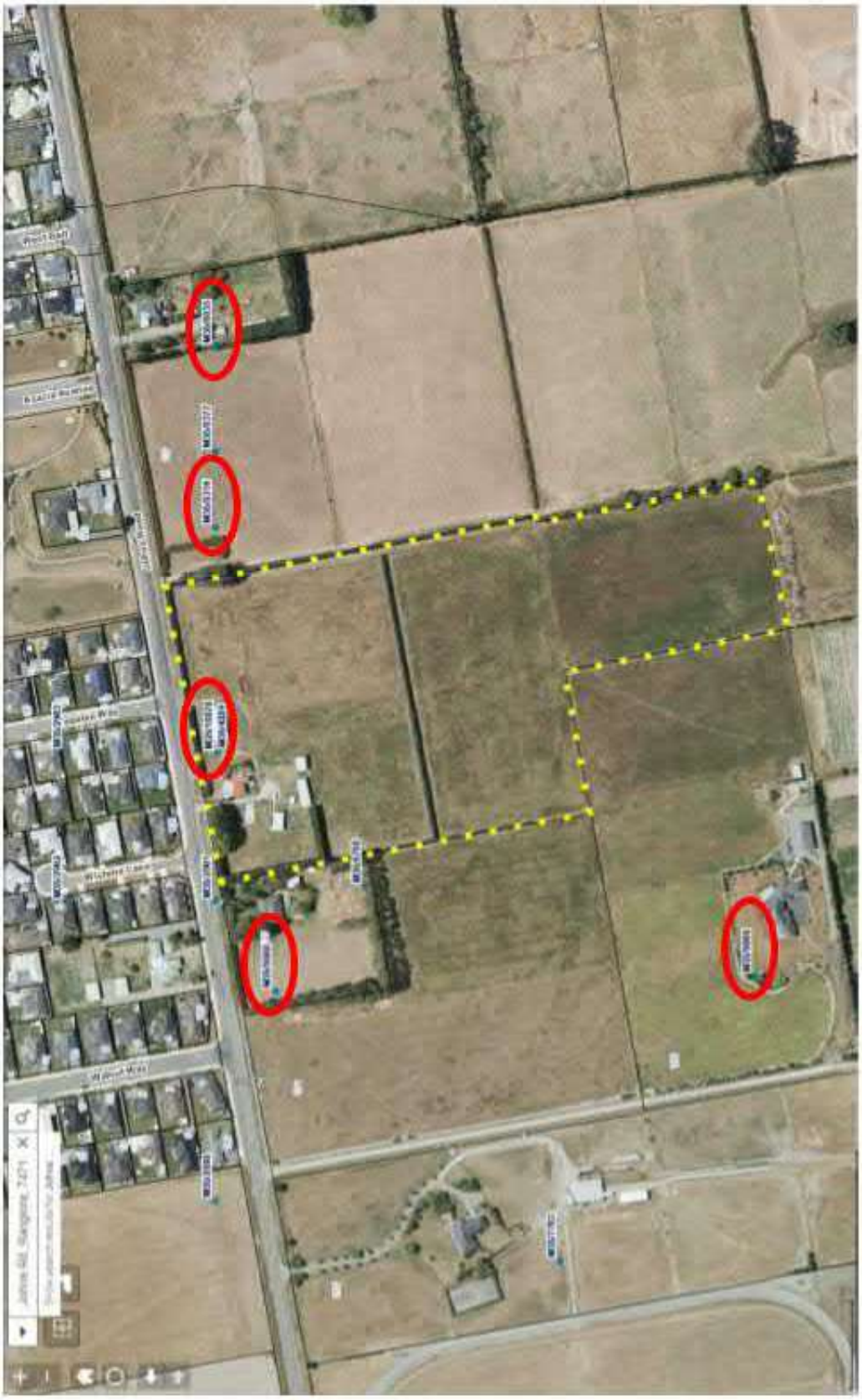
Comments made in this desktop investigation report are intended to provide a brief summary of the relevant published geotechnical information that relates to the site, obtained in February 2018 from the Waimakariri District Council's website, GNS' Active Faults Database, Canterbury Maps website, the New Zealand Geotechnical Database, ECan's Listed Land Use Register website, and QuickMap.

This report should not be used to support an application for subdivision or building consent, unless it is supported by site-specific geotechnical testing and reporting that is undertaken by Eliot Sinclair once the nature of any future development or building proposal is known.

It is possible there may be unidentified subsoil conditions that are not obvious from the information obtained by our desktop investigation, and that differ from the conclusions of this report. Should unusual geotechnical conditions be encountered then Eliot Sinclair should be advised so that they can review any new information and to advise if the recommendations of this report are still valid.

This report has been prepared for the benefit of Rochford 163 Ltd. No liability is accepted by this company or any employee of this company with respect to the use of this report by any other party or for any other purpose other than what is stated in our scope of work.

Appendix A – Well Logs



Bore or Well No	M35/18870
Well Name	163 JOHNS ROAD
Owner	MR GEORGE TIMPERLEY

Well Number	M35/18870	**File Number**	CO6C/24016
Owner	MR GEORGE TIMPERLEY	**Well Status**	Active (exist, present)
Street/Road	163 JOHNS ROAD	**NZTM Grid Reference**	BW24:65700-04278
Locality	Rangiora	**NZTM X and Y**	1565700 - 5204278
Location Description		**Location Accuracy**	10 - 50m
CWMS Zone	Waimakariri	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Ashley	**Water Level Monitoring**	--
Depth	39.21m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	3.13m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation		**Lowest Water Level**	
Elevation Accuracy		**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	5	**Calc Min 95%**	
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	08 Sep 2011	**Max Tested Yield**	1 l/s
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	28 m
Drilling Method	Rotary/Percussion	**Specific Capacity**	0.03 l/s/m
Casing Material	Steel	**Last Updated**	03 May 2016
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	37.21	39.21				500

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
08 Sep 2011	1	0.75	9.898638	27.77	1.5

Comments

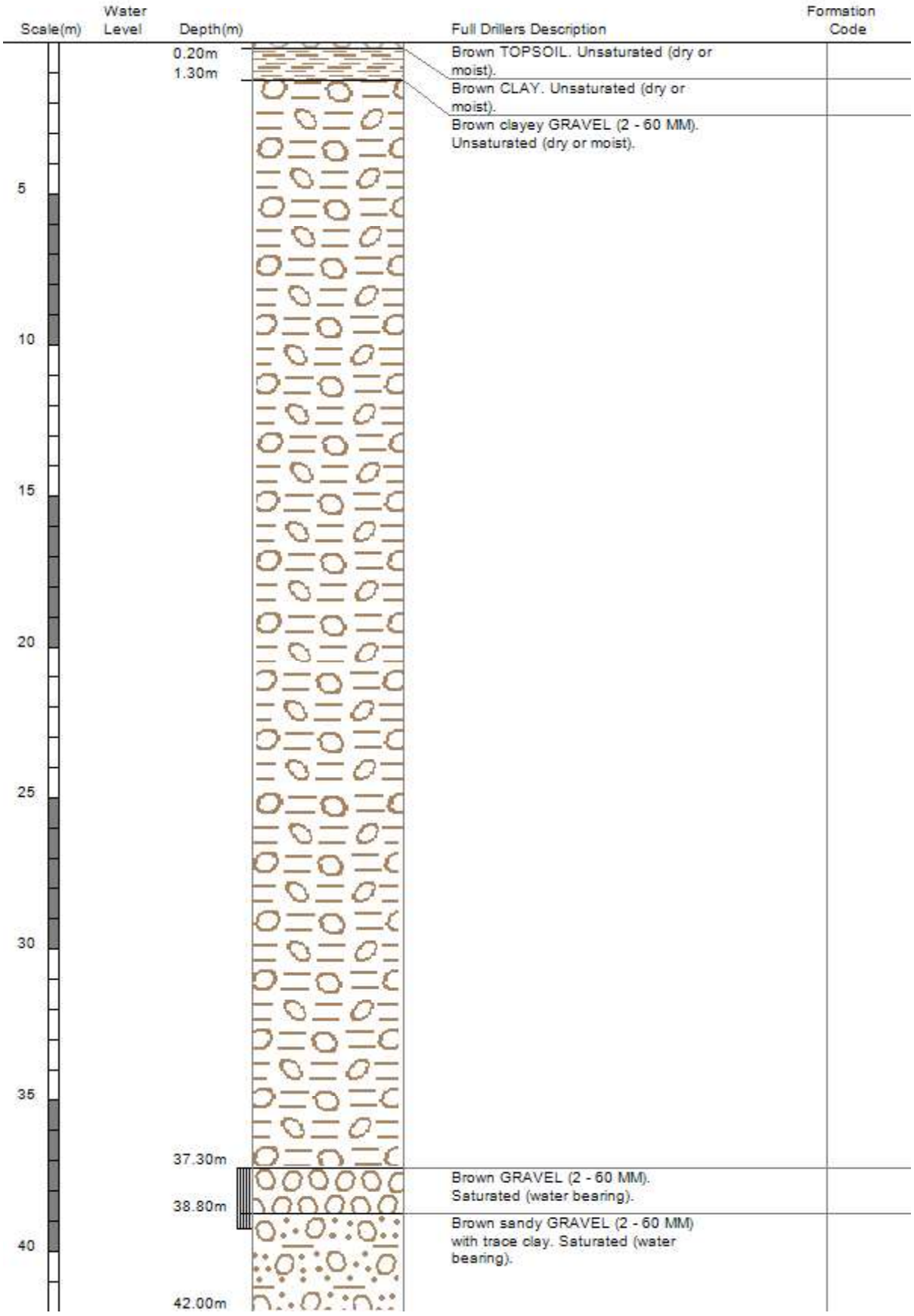
Comment Date	Comment
17 Feb 2012	Emergency Replacement Bore

Bore Log

Borelog for well M35/18870

Grid Reference (NZTM): 1565700 mE, 5204278 mN
Location Accuracy: 10 - 50m
Ground Level Altitude: m +MSD Accuracy:
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 42.0 m Drill Date: 08-Sep-2011

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M35/9868
Well Name	191 Johns Road
Owner	Mr William McDonald

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M35/9868	**File Number**	CO6C/21083
Owner	Mr William McDonald	**Well Status**	Active (exist, present)
Street/Road	191 Johns Road	**NZTM Grid Reference**	BW24:65541-04239
Locality	Rangiora	**NZTM X and Y**	1565541 - 5204239
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Waimakariri	**Use**	Domestic Supply,
Groundwater Allocation Zone	Ashley	**Water Level Monitoring**	--
Depth	19.61m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	2.98m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	33.34m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	5	**Calc Min 95%**	3.70m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	26 Jan 2004	**Max Tested Yield**	2 l/s
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	5 m
Drilling Method	Rotary Rig	**Specific Capacity**	0.46 l/s/m
Casing Material	Steel	**Last Updated**	03 May 2016
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	17.61	19.61				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
26 Jan 2004	1	2.2	29.036005	4.77	2

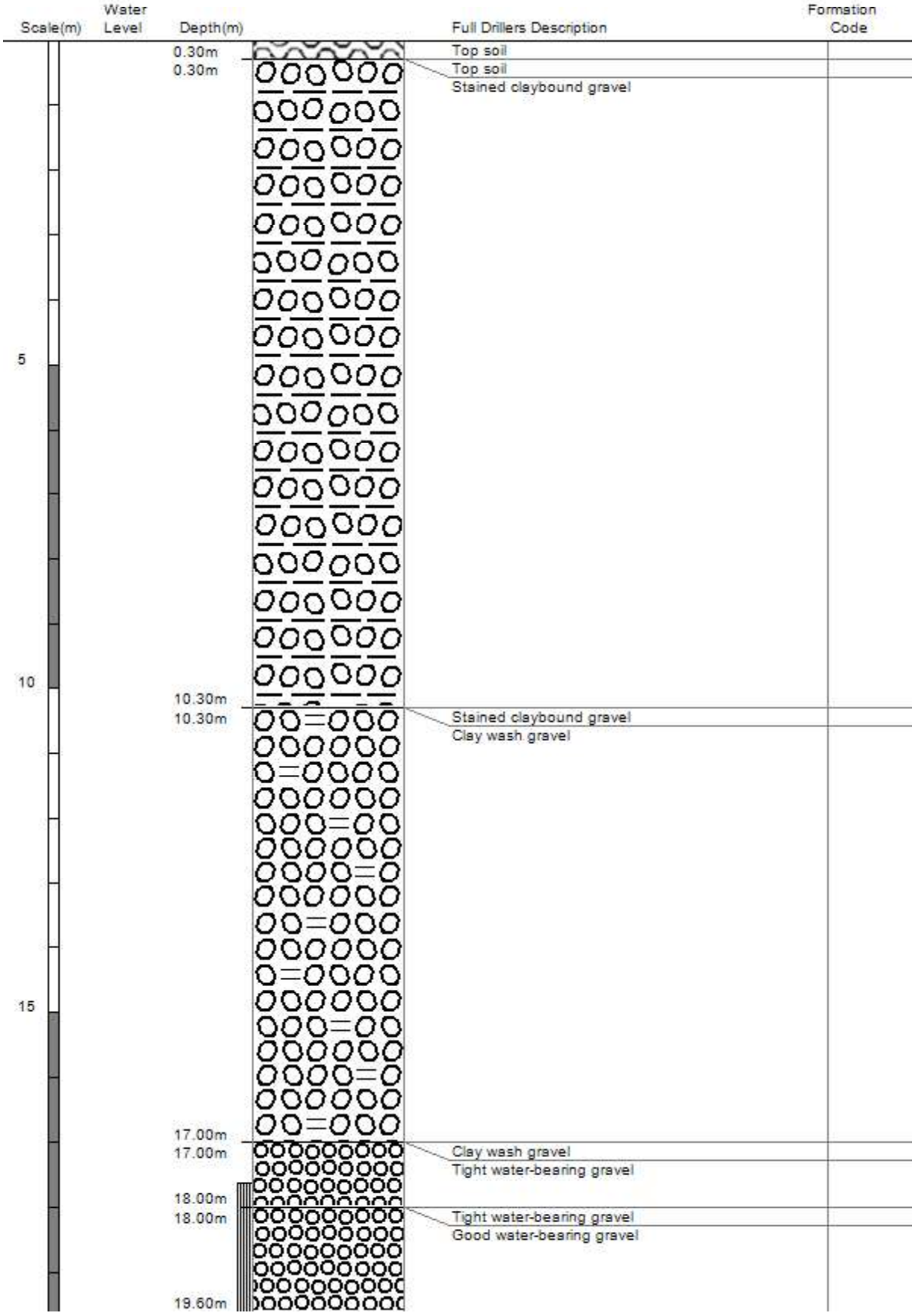
No comments for this well

Bore Log

Borelog for well M35/9868

Grid Reference (NZTM): 1565541 mE, 5204239 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 33.3 m +MSD Accuracy: < 0.5 m
Driller: Clemence Drilling Contractors
Drill Method: Rotary Rig
Borelog Depth: 19.6 m Drill Date: 26-Jan-2004

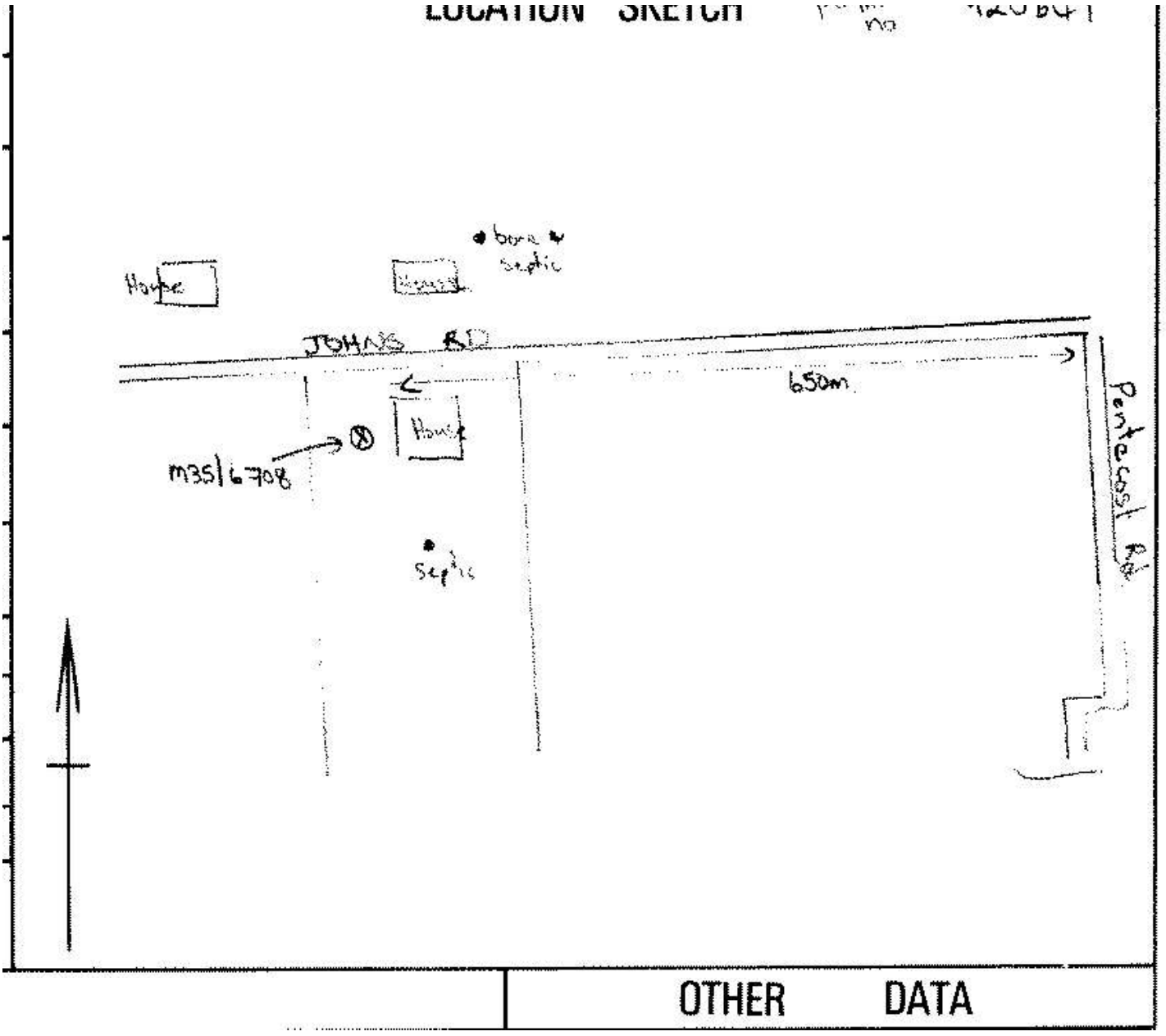
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M35/6708
Well Name	JOHNS RD
Owner	HARNETT J. & S.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M35/6708	**File Number**	CO6C/02631
Owner	HARNETT J. & S.	**Well Status**	Active (exist, present)
Street/Road	JOHNS RD	**NZTM Grid Reference**	BW24:65611-04179
Locality	Rangiora	**NZTM X and Y**	1565611 - 5204179
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Waimakariri	**Use**	Stock Supply,
Groundwater Allocation Zone	Ashley	**Water Level Monitoring**	--
Depth	12.00m	**Water Level Count**	0
Diameter	100mm	**Initial Water Level**	
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	32.87m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	6	**Calc Min 95%**	3.40m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type	Unknown	**Yield Drawdown Tests**	1
Drill Date	05 May 1992	**Max Tested Yield**	5 l/s
Driller	McMillan Drilling Ltd	**Drawdown at Max Tested Yield**	2 m
Drilling Method	Cable Tool	**Specific Capacity**	3.00 l/s/m
Casing Material		**Last Updated**	03 May 2016
Pump Type	Unknown	**Last Field Check**	
Water Use Data	No		



Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	11	12				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
05 May 1992	1	4.5	59.3918266	1.5	0.5

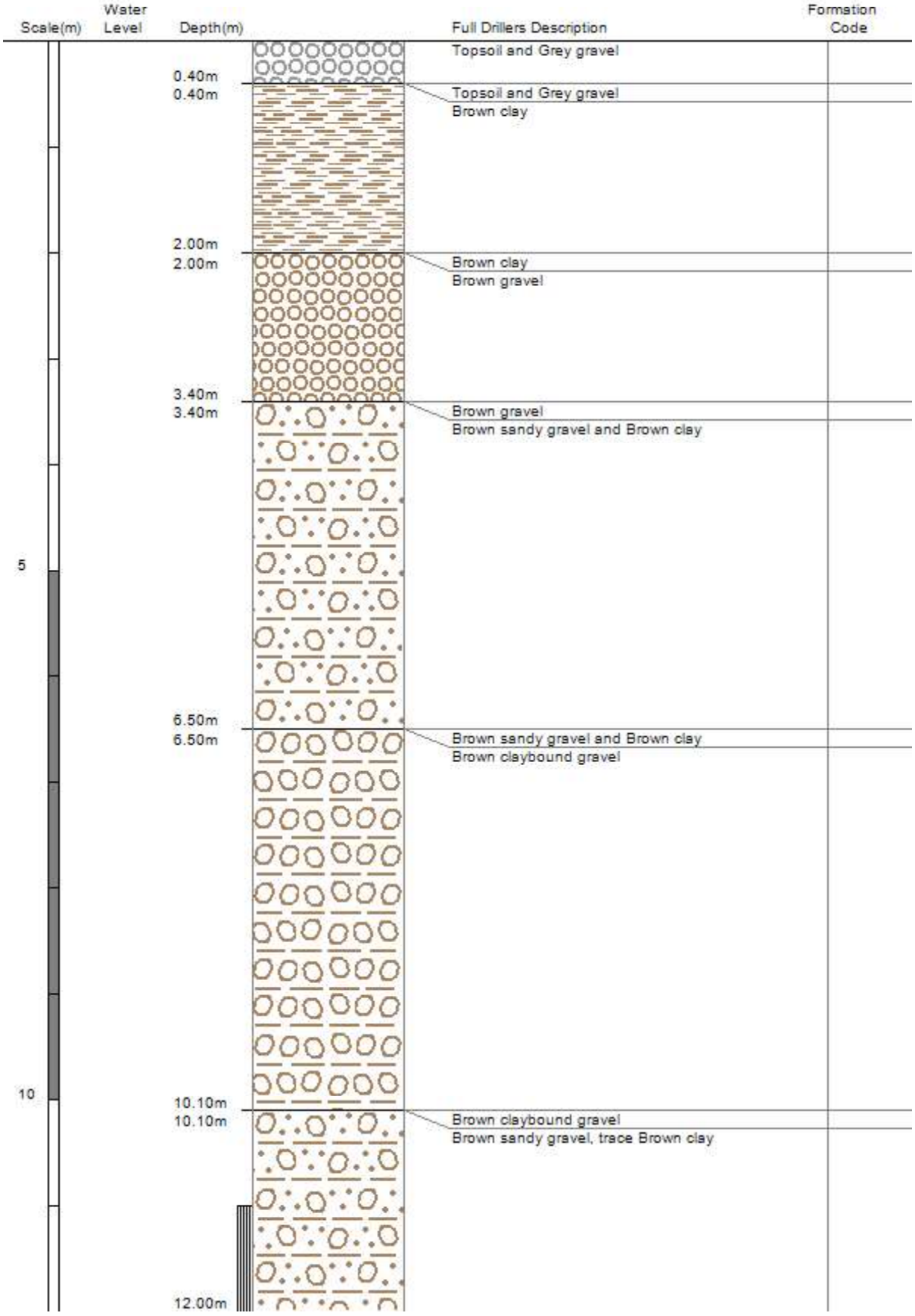
No comments for this well

Bore Log

Borelog for well M35/6708

Grid Reference (NZTM): 1565611 mE, 5204179 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 32.9 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Cable Tool
Borelog Depth: 12.0 m Drill Date: 05-May-1992

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No	M35/9869
Well Name	191 Johns Road
Owner	Mr William McDonald

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M35/9869	**File Number**	CO6C/21083
Owner	Mr William McDonald	**Well Status**	Active (exist, present)
Street/Road	191 Johns Road	**NZTM Grid Reference**	BW24:65551-03919
Locality	Rangiora	**NZTM X and Y**	1565551 - 5203919
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Waimakariri	**Use**	Domestic Supply,
Groundwater Allocation Zone	Ashley	**Water Level Monitoring**	--
Depth	21.04m	**Water Level Count**	0
Diameter	150mm	**Initial Water Level**	1.74m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	32.04m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	10	**Calc Min 95%**	2.80m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	23 Jan 2004	**Max Tested Yield**	2 l/s
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	2 m
Drilling Method	Rotary Rig	**Specific Capacity**	1.37 l/s/m
Casing Material	Steel	**Last Updated**	03 May 2016
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	17.61	21.04				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
23 Jan 2004	1	2.2	29.036005	1.61	2

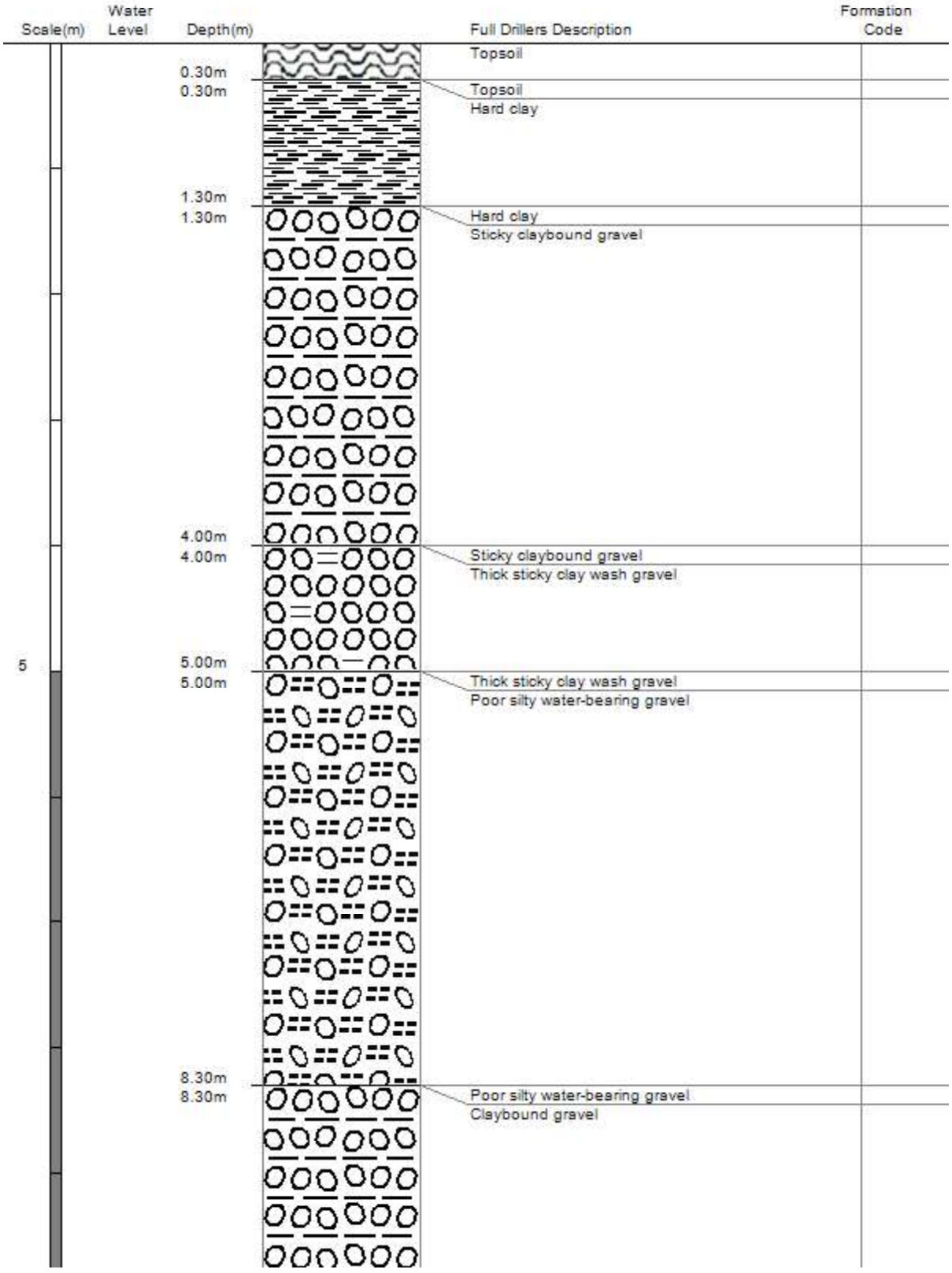
No comments for this well

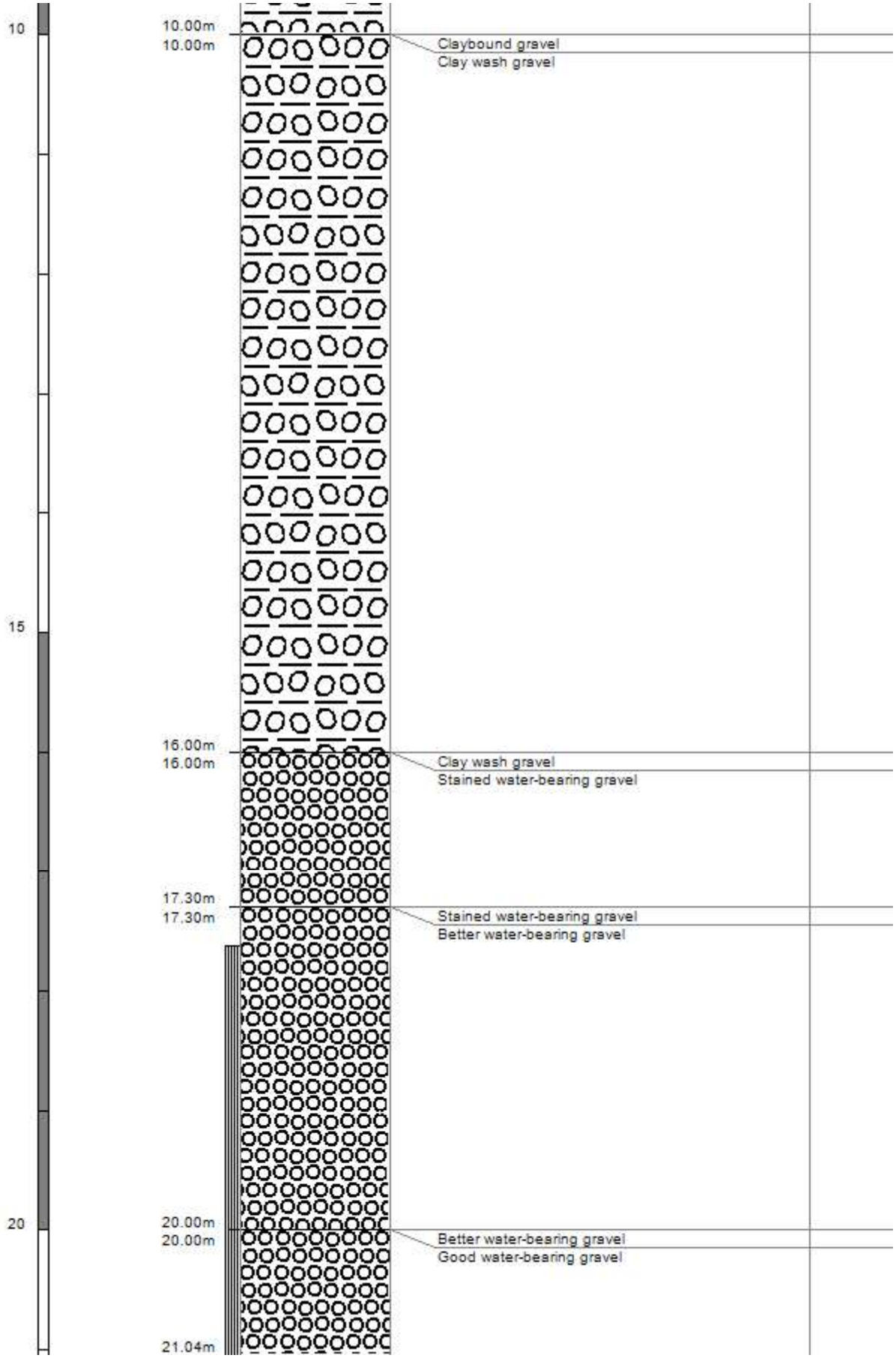
Bore Log

Borelog for well M35/9869

Grid Reference (NZTM): 1565551 mE, 5203919 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 32.0 m +MSD Accuracy: < 0.5 m
Driller: Clemence Drilling Contractors
Drill Method: Rotary Rig
Borelog Depth: 21.0 m Drill Date: 23-Jan-2004

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha




10
15
20
10.00m
10.00m
Claybound gravel
Clay wash gravel
16.00m
16.00m
Clay wash gravel
Stained water-bearing gravel
17.30m
17.30m
Stained water-bearing gravel
Better water-bearing gravel
20.00m
20.00m
Better water-bearing gravel
Good water-bearing gravel
21.04m

Bore or Well No	M35/8035
Well Name	131 JOHNS ROAD
Owner	SCHLUTER, RH & MP

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M35/8035	**File Number**	CO6C/14440
Owner	SCHLUTER, RH & MP	**Well Status**	Active (exist, present)
Street/Road	131 JOHNS ROAD	**NZTM Grid Reference**	BW24:65971-04279
Locality	Rangiora	**NZTM X and Y**	1565971 - 5204279
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Waimakariri	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Ashley	**Water Level Monitoring**	--
Depth	13.98m	**Water Level Count**	0
Diameter	100mm	**Initial Water Level**	3.35m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	31.65m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	9	**Calc Min 95%**	3.30m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	19 Mar 1999	**Max Tested Yield**	3 l/s
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	2 m
Drilling Method	Hydraulic/Percussion	**Specific Capacity**	2.00 l/s/m
Casing Material	STEEL	**Last Updated**	03 May 2016
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	12.975	13.975				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
19 Mar 1999	1	3.3	43.5540047	1.65	2

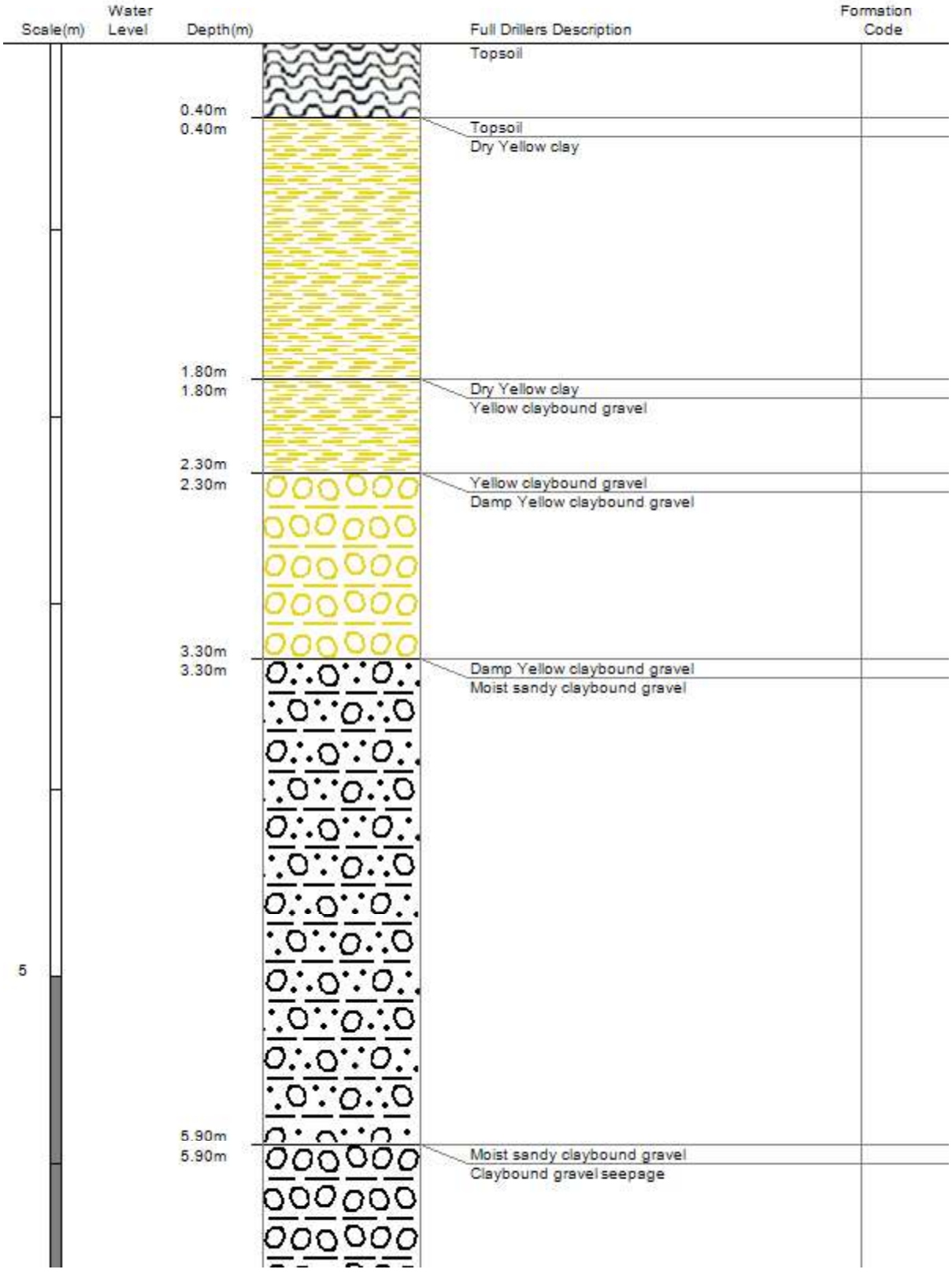
No comments for this well

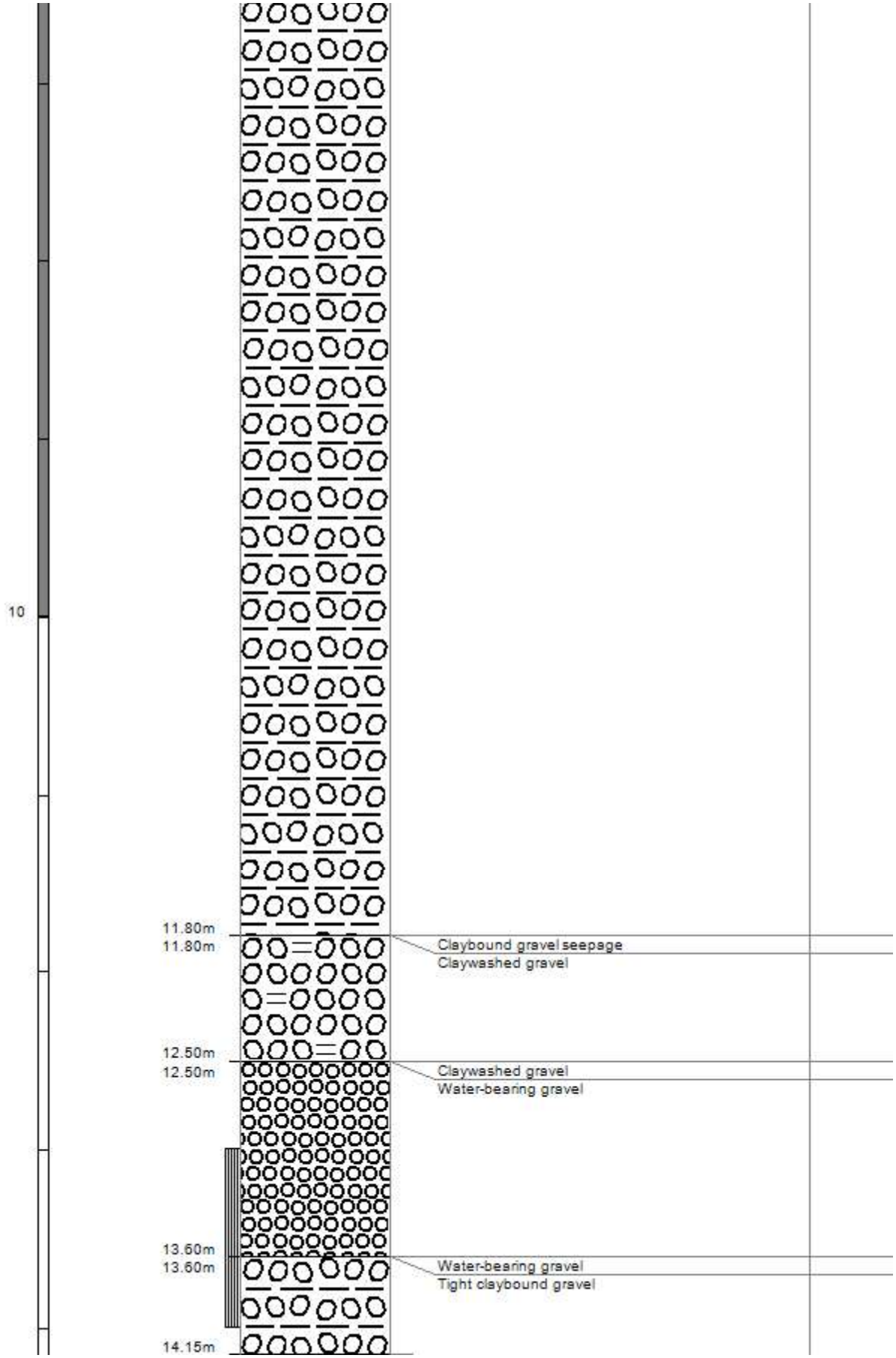
Bore Log

Borelog for well M35/8035

Grid Reference (NZTM): 1565971 mE, 5204279 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 31.7 m +MSD Accuracy: < 0.5 m
Driller: Clemence Drilling Contractors
Drill Method: Hydraulic/Percussion
Borelog Depth: 14.1 m Drill Date: 19-Mar-1999

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha




10
11.80m
11.80m
Claybound gravel seepage
Claywashed gravel
12.50m
12.50m
Claywashed gravel
Water-bearing gravel
13.60m
13.60m
Water-bearing gravel
Tight claybound gravel
14.15m

Bore or Well No	M35/8316
Well Name	JOHNS ROAD
Owner	SCHLUTER, RH

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M35/8316	**File Number**	CO6C/15304
Owner	SCHLUTER, RH	**Well Status**	Active (exist, present)
Street/Road	JOHNS ROAD	**NZTM Grid Reference**	BW24:65851-04279
Locality	Rangiora	**NZTM X and Y**	1565851 - 5204279
Location Description		**Location Accuracy**	50 - 300m
CWMS Zone	Waimakariri	**Use**	Domestic and Stockwater,
Groundwater Allocation Zone	Ashley	**Water Level Monitoring**	--
Depth	12.28m	**Water Level Count**	0
Diameter	100mm	**Initial Water Level**	0.80m below MP
Measuring Point Description		**Highest Water Level**	
Measuring Point Elevation	32.23m above MSL (Lyttelton 1937)	**Lowest Water Level**	
Elevation Accuracy	< 5 m	**First reading**	
Ground Level	0.00m above MP	**Last reading**	
Strata Layers	10	**Calc Min 95%**	3.50m below MP
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	1
Drill Date	20 Mar 1999	**Max Tested Yield**	1 l/s
Driller	Clemence Drilling Contractors	**Drawdown at Max Tested Yield**	4 m
Drilling Method	Hydraulic/Percussion	**Specific Capacity**	0.23 l/s/m
Casing Material	UNKNOWN	**Last Updated**	03 May 2016
Pump Type		**Last Field Check**	
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	11.28	12.28				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
20 Mar 1999	1	1	13.198184	4.38	2

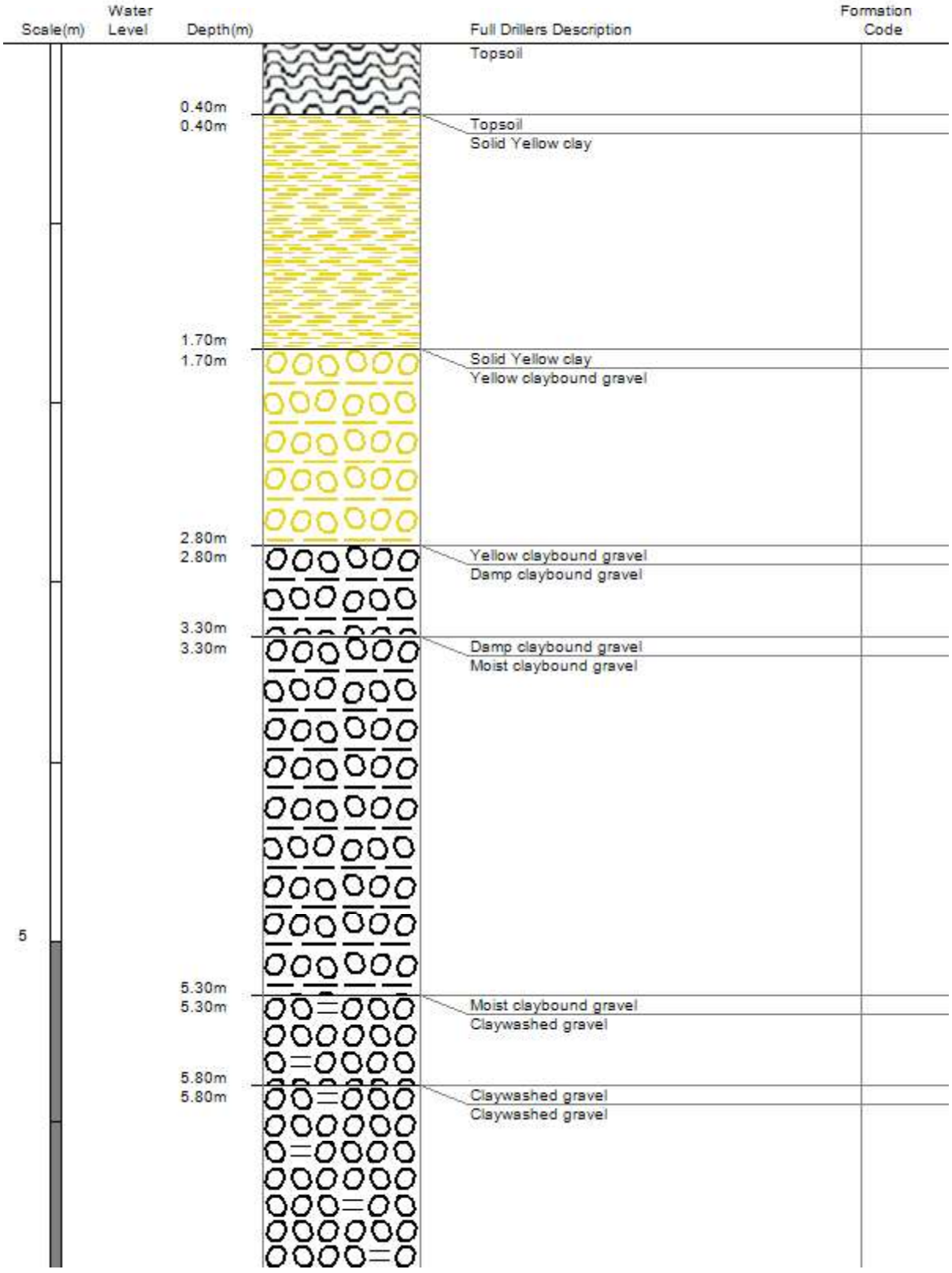
No comments for this well

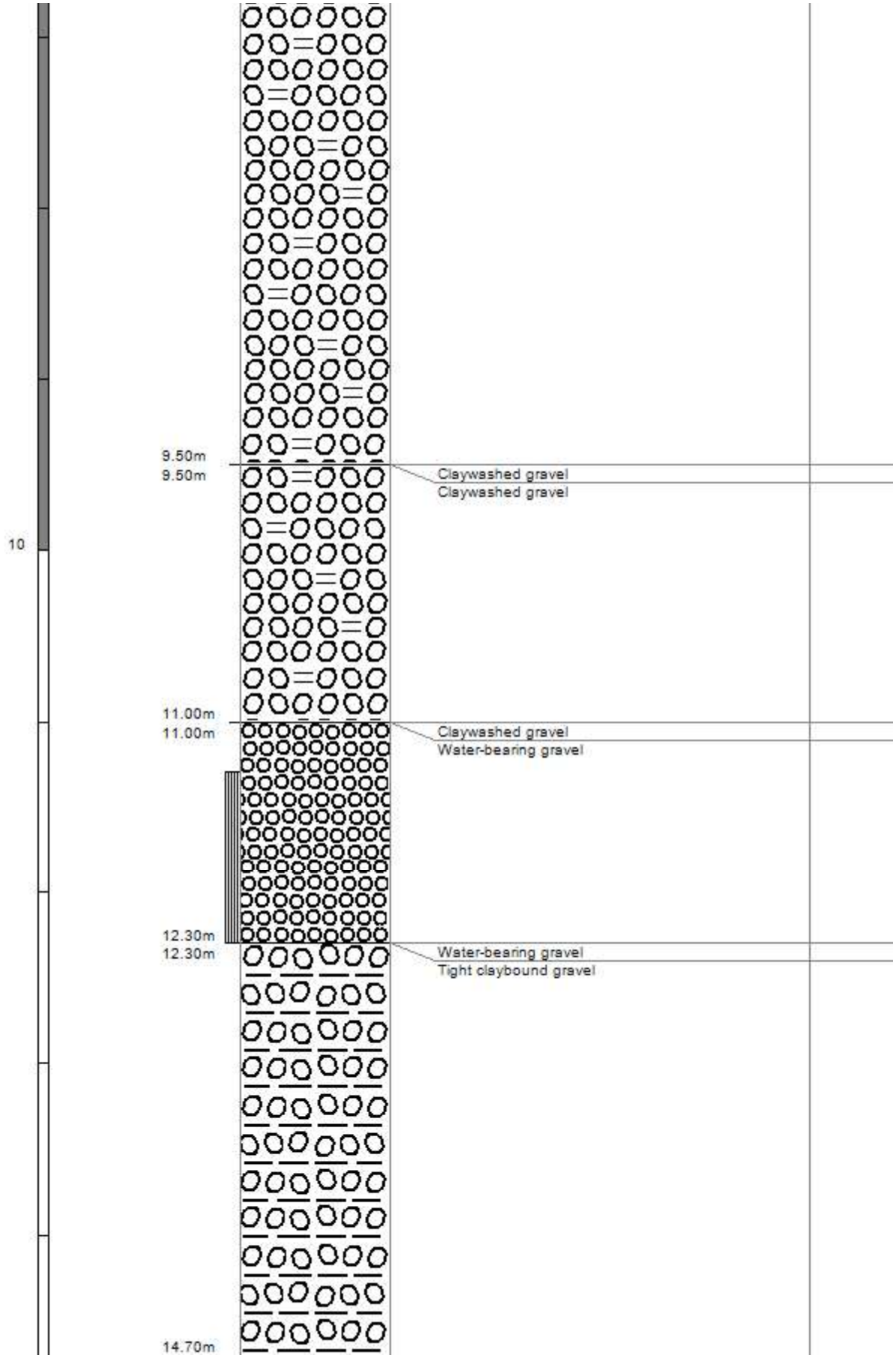
Bore Log

Borelog for well M35/8316

Grid Reference (NZTM): 1565851 mE, 5204279 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 32.2 m +MSD Accuracy: < 0.5 m
Driller: Clemence Drilling Contractors
Drill Method: Hydraulic/Percussion
Borelog Depth: 14.7 m Drill Date: 20-Mar-1999

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha




10
9.50m
9.50m
Claywashed gravel
Claywashed gravel
11.00m
11.00m
Claywashed gravel
Water-bearing gravel
12.30m
12.30m
Water-bearing gravel
Tight claybound gravel
14.70m

Appendix B – Historical Aerial Photography

Eliot Sinclair
surveyors | engineers | planners

1940-1944

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

1960-1964

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

1965-1969

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps

ESP reference:
439185

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149 Phone 03-379 4014 info@eliotsinclair.co.nz www.eliotsinclair.com

Eliot Sinclair
surveyors | engineers | planners

1970-1974

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

1975-1979

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149 Phone 03-379 4014, info@eliotsinclair.co.nz www.eliotsinclair.com

Eliot Sinclair
surveyors | engineers | planners

1990-1994

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

1995-1999

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

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2000-2004

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

October 2017

Client
PO Box 9339
Tower Junction
Christchurch

Scale:
NTS

Date: 9 February 2018
Author: FAS

Sources:
Canterbury Maps GIS

ESP reference:
439185

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149 Phone 03-379 4014 info@eliotsinclair.co.nz www.eliotsinclair.com

Pre-Purchase Ground Contamination Assessment

163 Johns Road, Rangiora

Prepared for Rochford 163 Ltd

439185

Eliot Sinclair

surveyors | engineers | planners

Pre-Purchase Ground Contamination Assessment

163 Johns Road, Rangiora

Prepared for Rochford 163 Ltd

Quality Control Certificate

Eliot Sinclair
surveyors | engineers | planners

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149, NZ
phone 03 379 4014, fax 03 365 2449

Action	Name	Signature	Date
Prepared by:	Jens Zollhofer PhD MSc PGCertRS CEnvP Senior Environmental Scientist, SQEP		26 February 2018
Reviewed and Approved for Release by:	John Aramowicz BEng(Hons) CMEngNZ (1008112) CPEng IntPE Principal Senior Civil & Geotechnical Engineer		26 February 2018
Status:	FINAL		
Release Date:	26 February 2018		
Reference No:	439185		
Distributed to:	Rochford 163 Ltd Waimakariri District Council		

Limitations
This report has been prepared for Rochford 163 Ltd according to their instructions and for the particular objectives described in this report. The information contained in this report should not be used by anyone else or for any other purposes.

Contents

Appendices

1 Introduction and Scope

Eliot Sinclair was commissioned to investigate the history of land at 163 Johns Road in Rangiora with regards to potential contamination from historical and recent land uses.

The scope of this report is to prepare an NES:CS ground contamination assessment for a due diligence (pre-purchase) investigation, to confirm that the land is suitable for residential development.

2 Ground Contamination Assessment Pursuant NES:CS Regulation 6.2[1]

The NES:CS applies to land where HAIL[2] activities are taking place, or when it is more likely than not that they have taken place in the past. This is usually established by conducting a Preliminary Site Investigation (PSI) in accordance with the requirements of MfE's Contaminated Land Management Guidelines (CLMG)[3]. However, NES:CS[1] Regulation 6.2 provides for a second method:

> **6 Methods**
>
> (2) One method is by using information that is the most up-to-date information about the area where the piece of land is located that territorial authority-
>
> (a) holds on its dangerous goods files, property files, or resource consent database or relevant registers; or
>
> (b) has available to it from the regional council.

This method is usually applied to low risk sites, and when detailed reporting is not required. In addition to checking Council records, we have conducted a site walkover inspection in order to identify any obvious common HAIL activities on rural properties that are often only able to be identified in the field.

If HAIL activities are identified during the investigation, then the site is considered 'a piece of land' in terms of the requirements of the NES:CS, and detailed investigation would be required.

3 Site Information

Table 1: Legal description, street address and current land owner.

Site information	Details
Legal description	Lot 4 DP 333694 on Title 138043, 6.5875 ha
Street address	163 Johns Road, Rangiora
Owner	Jennifer Ann Todd[4]
Occupier	Both residential dwellings on site are un-occupied and the farm sheds are empty. Grass is cropped on the balance of the land.

[1] Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.
[2] Ministry for the Environment (MfE). Hazardous Activities and Industries List (HAIL). Available online at www.mfe.govt.nz
[3] Ministry for the Environment (MfE). Contaminated Land Management Guidelines (CLMG). No. 1-5.
[4] Land Information New Zealand records state Clarence Ross Timperley and David George Timperley as owners. This information might by superseded.

4 Records Reviewed & Site Inspection

Table 2: Council records reviewed and site inspection (23 November 2011).

Information sources reviewed	HAIL activity?
Waimakariri District Council Property File	No HAIL activities identified
Environment Canterbury's Listed Land Use Register (LLUR)	The land is not recorded on the LLUR
Environment Canterbury resource consent database	No HAIL activities identified
Environment Canterbury GIS: Historical aerial photos	HAIL I, HAIL A8
Site investigation	HAIL G3, HAIL E1

Correspondence with Waimakariri District Council on 12 February 2018[5] established that the property file contains three building consents (two from the year 2000, and one from 2010). The consents are for a barn extension, the relocation of a flat, and an addition to a building (closing-in of a deck), respectively. None of these records indicate potential ground contamination.

The land is not recorded on Environment Canterbury's Listed Land Use Register (LLUR). A copy of the search record for 163 Johns Road is attached in Appendix A.

The resource consent database holds no records of past or current consented activities for the site. Resource consents on neighbouring land are for the installation of drinking water bores and highly unlikely to have caused ground contamination of the subject site.

The review of eight historical aerial photographs between 1940 and 2016 is summarised in Table 3.

Annotated historical aerial images are attached in Appendix B. The photos show that a residential dwelling and associated farm sheds have been located on the northern part of the site since before the 1940s. Sanding and re-painting weatherboard dwellings with lead-based paint is well known to be a potential source of local contamination of surface soils with lead and/or arsenic[6]. Although these activities are not itemised as a separate HAIL category, they are generally considered as HAIL I[7].

The site was inspected on 13 February 2018. Photos from the walkover are attached in Appendix C, and show that the current landuse is grass cropping (Figure 1, Figure 2). The two residential dwellings are unoccupied, and the farm sheds are empty.

It appears that rubbish was incinerated in a concrete bin behind the original (pre-1940s) dwelling (Figure 3), however, the disposal location of ash is unknown. If it was deposited on site, then it could be the potential source of contamination (HAIL G5).

The exterior cladding of the more recent residential dwelling that was established in the 1980s might contain asbestos (Figure 9). Stippled plaster on the ceiling inside the dwelling might also contain asbestos fibres (Figure 10).

[5] Correspondence with Fiona, Waimakariri District Council, Rangiora office, dated 12 February 2018, 4pm.
[6] The weatherboards of the original pre-1940s dwelling were plastered over, possibly between the 1950s and the 1970s. This reduces the possible contamination with lead/arsenic. However, the soil around the dwelling might have still been exposed to several decades of sanding and re-painting the cladding with lead-based paint.

Table 3: Reviewed historical aerial images with identified HAIL activities.

Year	Landuse	HAIL category
1940 - today	Residential dwelling and associated farm sheds along Johns Rd. The balance of the land is cropped. The residential dwelling has been there since pre-1940s. This is likely to have caused local contamination with lead (e.g. from sanding lead paint), and/or arsenic. Pre-1940s dwellings also might contain building materials containing asbestos. Although these activities do not have a separate HAIL category, they are generally considered as HAIL I[7].	HAIL I
1960-1964	Stockyards (potentially with a livestock dip or spray race operations) and what appears to be an associated shearing shed are located to the east of the residential dwelling. The balance of the land is cropped.	HAIL I HAIL A8
1970-1974	The stockyards and shearing shed appear to be operational. The balance of the land is cropped. No significant change in landuse identified.	HAIL I HAIL A8
1980-1984	The stockyards and shearing shed appear to be operational. A second residential dwelling has been established to the south-west of the original dwelling. The site visit indicated that the materials used for the exterior cladding and internal plaster might contain asbestos, which might have released fibres during construction. The balance of the land is cropped. No further significant change in landuse identified.	HAIL I HAIL A8 HAIL E1
1990-1994	The stockyards appear to have been removed. Most of the land appears to be grazed, a small part is cropped. 0.7 hectares of neighbouring land to the west is used for market gardening. The subject site is separated by a shelterbelt, and the prevailing winds are from the north-east. On this basis it is considered highly unlikely that spray drift of persistent farm chemicals might have caused ground contamination on the subject site.	HAIL I
1995-1999	Some of the stockyard structures have been removed (the area was later used as a horse yard). The balance of the land appears to be grazed.	HAIL I
2000-2004	No significant change in landuse identified	HAIL I
2016	No significant change in landuse identified Neighbouring land to the south-west is used for market gardening. This is assessed not to affect the subject site.	HAIL I

5 Conclusion

The reviewed information from District and Regional Council, along with our observations across the site indicates there is a risk of ground contamination from the pre-1940s weatherboard dwelling (HAIL I), any former livestock dip or spray race operations that may have been located in the stockyard (HAIL A8) between the 1960s and the 1980s, and the potential that contaminated ash (HAIL G5) was deposited on site over an unknown period. Also, if tests confirm the presence of asbestos fibres in the cladding materials of the more recent residential dwelling then there is a risk of asbestos contamination of the soils around the dwelling, particularly during construction and future demolition (HAIL E1).

Due to the persistency of the associated contaminants of concern (arsenic, lead, asbestos and organochlorine pesticides), potential risks from historical contamination might remain to date.

[7] HAIL I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

6 Recommendation

It is recommended to investigate potential ground contamination from the identified HAIL activities with a Detailed Site Investigation.

We recommend this investigation is undertaken before the buildings have been demolished.

7 Accidental Discovery Protocol

This ground contamination assessment pursuant NES:CS Regulation 6.2 is based on a review of Council records accessed on 12 February 2018, and a site inspection conducted on 13 February 2018. It is possible that buried contamination is present on the site and will be discovered during the earthworks. Therefore, if any one of the following materials is encountered during future earthworks the actions provided below must be followed.

Potential contamination:

- Stained or odorous soil
- Slag, ash, charcoal
- Refuse comprising putrescible waste, metal or plastics
- Asbestos (bonded) in cement fibre sheets (ACM) or insulation material (friable)

Actions:

- Works must stop immediately, and the site must be secured to stop people entering the area where potential contamination was encountered
- Contact a contaminated land specialist. **Eliot Sinclair (03 379 4014)** can assist, assess the risk, and can determine a practicable course of action.

8 Disclaimer

The comments made in this desktop investigation and report is based on Council records accessed on 12 February 2018 and a site inspection on 13 February 2018. It is possible these may not provide a complete or accurate assessment of the entire site. As a result, Eliot Sinclair provides this information on the basis that it does not guarantee that the information is complete or without error and accepts no liability for any inaccuracy in, or omission from, this information.

All reasonable effort has been made to ensure that the conclusions drawn in this report are correct at the time of reporting. However, activities described on the HAIL may change in the future as knowledge about potentially hazardous activities develops.

It is possible there may be unidentified subsoil conditions that are not obvious from the information obtained by our desktop investigation, and that differ from the conclusions of this report. Should unusual geotechnical conditions be encountered then Eliot Sinclair should be advised so that they can review any new information and to advise if the recommendations of this report are still valid.

This report has been prepared for the benefit of Rochford 163 Ltd. No liability is accepted by this company or any employee of this company with respect to the use of this report by any other party or for any other purpose other than what is stated in our scope of work.

This report is not intended to relieve contractors of their responsibilities under the Health and Safety at Work Act 2015. Site conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes, at their own expense.

Appendix A: Environment Canterbury Listed Land Use Register (LLUR)

Screen shot of Environment Canterbury's Listed Land Use Register (LLUR), taken on 12 February 2018.

Listed Land Use Register (LLUR)

Search

163 Johns Road, Rangiora, Waimakariri District

(Having trouble finding your address?)

OVERVIEW | FINDING YOUR ADDRESS | SEARCH SUMMARY

Thank you for your enquiry.

The Listed Land Use Register does not currently have any information about a Hazardous Activities and Industries List site on this land parcel.

If you would like a property statement, please fill in your details below.

Records Found

No records found.

Property Search Results

	Legal Description	Titles	Valuation No	
163 Johns Road				
1	Lot 4 DP 333694	138043	2159133800	

Appendix B: Historical Aerial Images

Eliot Sinclair
surveyors | engineers | planners

1940-1944

Eliot Sinclair & Partners
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale: NTS

Date: 12 February 2018
Author: JMZ

Sources: ECan GIS, Google Earth Pro

ESP reference: 439185

Eliot Sinclair
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1960-1964

Eliot Sinclair & Partners
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale:
NTS

Date: 26 February 2018
Author: JMZ

Sources:
ECan GIS, Google Earth Pro

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

1970-1974

Eliot Sinclair & Partners
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale:
NTS

Date: 26 February 2018
Author: JMZ

Sources:
ECan GIS, Google Earth Pro

ESP reference:
439185

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surveyors | engineers | planners

1980-1984

Eliot Sinclair & Partners
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale: NTS

Date: 26 February 2018
Author: JMZ

Sources: ECan GIS, Google Earth Pro

ESP reference: 439185

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1990-1994

Eliot Sinclair & Partners
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale: NTS

Date: 26 February 2018
Author: JMZ

Sources: ECan GIS, Google Earth Pro

ESP reference: 439185

Eliot Sinclair
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1995-1999

Eliot Sinclair & Partners
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale: NTS

Date: 26 February 2018
Author: JMZ

Sources: ECan GIS, Google Earth Pro

ESP reference: 439185

Eliot Sinclair
surveyors | engineers | planners

2000-2004

Eliot Sinclair & Partners Ltd
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale:
NTS

Date: 26 February 2018
Author: JMZ

Sources:
ECan GIS, Google Earth Pro

ESP reference:
439185

Eliot Sinclair
surveyors | engineers | planners

22 January 2016

Eliot Sinclair & Partners Ltd
20 Troup Drive
PO Box 9339
Christchurch 8149

Scale: NTS	Date: 26 February 2018 Author: JMZ
Sources: ECan GIS, Google Earth Pro	ESP reference: 439185

Appendix C: Site Inspection Photographs (13 February 2018)

Figure 1: View to the south-west across the southern part of the site (south of the central shelter belt).

Figure 2: View to the north-west across the northern part of the site with dwellings, farm sheds and Johns Road in the background.

Figure 3: Plastered pre-1940s weather board dwelling.

Figure 4: Concrete bin that appears to have been used to incinerate domestic rubbish. It is not known where potentially contaminated ash has been deposited.

Figure 5: Disused historical stockyard area with potential spray race (approx. 25m east of original dwelling)

Figure 6: Horse stables, originally constructed pre-1940s, presumably as shearing shed.

Figure 7: Disused sheep holding pen and loading ramp (approx. 12m southeast of stockyard area).

Figure 8: More recent residential dwelling, established in the 1980s. The exterior cladding and internal plaster materials might contain asbestos fibres.

Figure 9: Exterior cladding of the more recent residential dwelling (possibly containing asbestos).

Figure 10: Stippled ceiling plaster in the more recent residential dwelling (possibly containing asbestos).

Appendix B. Pre-Purchase Reports for 199 Johns Road

7 June 2019 Our Ref: 500204

Carolina Homes Ltd
c/- 5 Skara Brae
Christchurch 7604

Attention: Justin Busbridge

Dear Justin

Pre-purchase Geotechnical Report for 199 Johns Road, Rangiora (Lot 2 DP 333694)

1 Introduction

Eliot Sinclair & Partners Ltd were engaged by Carolina Homes Ltd to undertake a pre-purchase geotechnical assessment of 199 Johns Road, Rangiora (the 'site') and to report on the geotechnical suitability of the land for a future residential subdivision.

2 Scope of Work

The scope of work for this pre-purchase geotechnical assessment included:

- Review available data from the New Zealand Geotechnical Database[1] (NZGD), Canterbury Maps[2] and the Institute of Geological & Nuclear Sciences' (GNS) Active Faults Database[3],
- Walkover inspection on 21 May 2019,
- Two hand-auger test holes to confirm the nature of the shallow soils at the site,
- Two Scala penetrometer tests to infer the ultimate bearing capacity associated with the soil profile encountered in the hand augers,
- Summarise the results of this work in the Pre-Purchase Geotechnical Report.

3 Site Description

The site is legally described as Lot 2 DP 333694 and is located at 199 Johns Road, Rangiora. The site is bounded by rural properties on all sides. Access to the site is via a right of way from Johns Road to the northwest corner of the property. The site is generally flat with very minor natural undulations. At the time of the investigation on 21 May 2019, there was one existing dwelling and associated outbuildings located near the mid-south boundary of the site. Refer to Figure 1.

[1] New Zealand Geotechnical Database (NZGD). Retrieved in February 2019 from https://www.nzgd.org.nz/
[2] Canterbury Maps. Retrieved in February 2019 from https://mapviewer.canterburymaps.govt.nz
[3] Geological and Nuclear Sciences. (2004). Active Faults Database. Retrieved in February 2019 from http://maps.gns.cri.nz/website/af/viewer.htm

4 Geology

Published geology[4] indicates the site is underlain by river deposits described as '*Unweathered, brownish-grey, variable mix of graves/sands/silt/clay in low river terraces*'. The closest active faults[3] are mapped approximately 5km to the north (Ashley Fault) and 6km to the north (Loburn Fault). The results of our desktop study are in Appendix B.

Figure 1: Existing site layout and approximate geotechnical test locations 1 and 2, 199 Johns Road, Rangiora. Base aerial sourced from www.canterburymaps.govt.nz

Environment Canterbury well reference M35/9869 is located on the site, as shown on Figure 1. Well card details indicate the well was drilled in 2004 to a total depth of 21m below ground level (bgl). The borehole log shows gravel was encountered consistently from a depth of 1.3m bgl. Groundwater was recorded 1.7m bgl at the time of drilling.

5 Flood Hazard

The Waimakariri District Council's Hazard Map[5] notes parts of the site have a "medium" flood hazard

The existing dwelling was constructed in 2008. The Council's 2014 flood hazard map indicates the dwelling is not in an area of medium of high hazard.

The Waimakariri District Council's Ashley River Floodplain Investigation[6] predicts that in a 1% AEP (100 year return period) event with a peak flow of 860m^3/s the site will experience up to 0.5m of surface flooding and in a 0.5% AEP (500 year return period) event with a peak flow of 5,300m^{3}s the site will experience up to 1m of surface flooding.

[4] Forsyth, P.J., Barrell, D.J.A., Jongens, R. (2008) (compilers), Geology of the Christchurch Area, Institute of Geological and Nuclear Sciences 1:250 000 geological map 16. 1 sheet. Lower Hutt, New Zealand. GNS Science. ISBN 987-0-478-19649-8

[5] https://www.waimakariri.govt.nz/have-a-say/lets-talk/closed-consultations2/natural-hazards-management/flood-hazard-areas

[6] Oliver, T., (2008), Ashley River Floodplain Investigation

Eliot Sinclair engaged Fluent Solutions in September 2018 to assess the consequences of a breakout of the Ashley River for the Townsend Fields subdivision to the east of the site. This work concluded that a breakout of the Ashley River, at the location specified by Environment Canterbury, poses a flood hazard at this site. Refer to Appendix B. This hazard would need to be mitigated as part of any future subdivision of the site.

6 Site Investigation

6.1 Geotechnical Testing

Our walkover inspection and shallow soil testing was carried out on 21 May 2019. Two hand auger boreholes and two Scala penetrometer tests were undertaken at locations shown on Figure 1. Test 1 was located near the south eastern corner of the site and Test 2 near the north western corner of the site. Hand auger logs and Scala penetrometer profiles are provided in Appendix A.

The purpose of the testing was to confirm the expected depth to gravel and ground bearing capacity of the overlying soils based on the desktop review and knowledge of the ground conditions encountered within the neighbouring Townsend Fields Subdivision.

The hand auger holes revealed a topsoil thickness of 250 to 350mm, overlying silt/silty clay and silty sand to a depth of approximately 1.4m bgl where gravels were encountered and testing was terminated due to practical refusal. No historical fill was encountered below the topsoil layer at the two locations tested. Groundwater was not present in the shallow boreholes at the time of testing.

Below the topsoil, Scala penetrometer resistances of at least 3 blows per 100mm were recorded. Penetration resistances generally increased with depth until practical refusal on the gravels. This infers the in situ soil overlying the gravel has a static ultimate bearing capacity of at least q_u=300kPa at the time of testing.

The limited testing rationale is based on confirming the underlying conditions do not greatly differ from those nearby. It is acknowledged that former shallow channel features are typical across river terrace formations; however no significant infilled channels were obvious at the time of our walkover inspection or in a review of the historic aerial photographs.

6.2 Floor Levels

Eliot Sinclair measured the floor levels of the dwelling at 199 Johns Road on 21 May 2019. The floor level was 30.22m RL (Lyttelton 1937 datum).

7 Conclusions

There were no unusual geotechnical conditions or evidence of historic uncontrolled fill that was encountered at the time of our investigation.

The shallow geotechnical investigation carried out by Eliot Sinclair indicate the underlying soil and bearing conditions at 199 Johns Road comprise firm to stiff silts and clayey silts that extend to around 1.4m bgl where gravels were present. The site is geotechnically similar to the Townsend Fields subdivision to the east and is deemed geotechnically suitable for future development.

The risk of inundation posed by a breakout of the Ashley River would need to be mitigated as part of a future subdivision of the site.

8 Disclaimer

Comments made in this report are based on information shown on the NZGD, Canterbury Maps, GNS's Active Faults Database, our inspection of the site and limited shallow geotechnical testing.

Whilst every care was taken during our interpretation of the subsurface conditions, there may be subsoil strata and features that were not detected. Additionally, on-going seismicity in the general area may lead to deterioration or additional ground settlement that could not have been anticipated at time of writing of this report. The exposure of such conditions, or occurrence of additional strong seismicity, or any future update of MBIE's guidelines may require review of our recommendations or further investigations. Eliot Sinclair should be contacted if this occurs to confirm the recommendations of this report remain valid.

This report has been prepared for the benefit of Carolina Homes Ltd. This pre-purchase geotechnical report should not be used to support any future consent application without our prior review and approval.

No liability is accepted by this company or any employee of this company with respect to the use of this report by any other party or for any other purpose other than what is stated in our scope of work.

Yours sincerely
ELIOT SINCLAIR & PARTNERS LTD

Prepared By:

Chris O'Connell
BE(Hons) Civil MEngNZ
Geotechnical Engineer

Reviewed and Approved By:

John Aramowicz
BEng(Hons) Mining CMEngNZ IntPE(NZ) CPEng (1008112)
Geotechnical Engineer
Principal

Enclosed:

- Site Investigation Records, 2 pages, dated 21 May 2019
- Results of Desktop Study

Eliot Sinclair
surveyors | engineers | planners

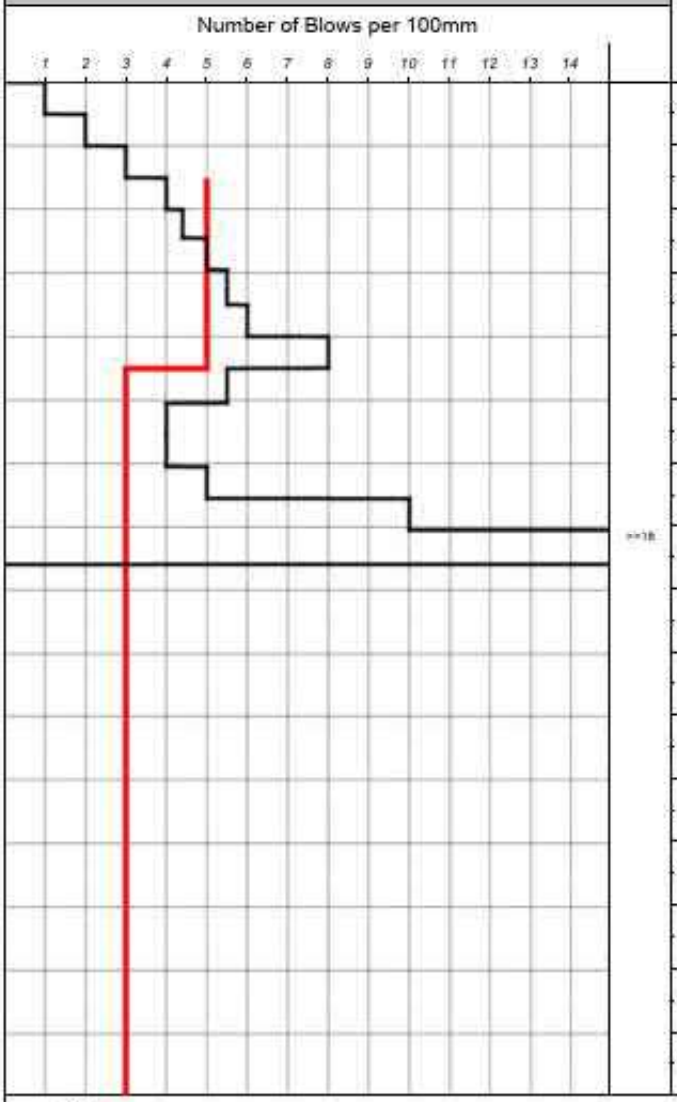
20 Troup Drive, Tower Junction
PO Box 9339, Christchurch 8149
Ph. (03) 379-4014 Fax. (03) 365-2449

Job Number	500204
Date Tested	21-May-2019
Set Page No.	1 of 2
Log Sheet No.	1 of 1
Lot	2
D.P.	333694
Technical Category	N/A - Rural & Unmapped

SITE INVESTIGATION RECORD

Client	Site
Townsend Fields Ltd.	199 Johns Road, Rangiora

SCALA PENETROMETER TEST RESULTS



01
Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

SOIL PROFILE

Depth (m)	Test Location 01	Water
0.2	TS FILL: silty TOPSOIL; dark brown. Non-plastic; moist; trace rootlets.	Groundwater Not Encountered
0.4	SILT; dark brown. Non-plastic; dry; trace iron staining.	
0.6	Silty CLAY; bluish grey with mottled orange. Non-plastic; dry to moist; some iron staining.	
0.8	1.05m: Trace fine sand.	
1.0	1.10m: Trace angular gravel, fine to medium.	
1.2	1.25m: Becoming wet.	
1.4	Sandy SILT; greyish brown. Non-plastic; moist to wet; sand, fine; some iron staining.	
1.6	EOH: 1.45m - Inferred gravel, unable to auger further.	
1.8		
2.0		
2.2		
2.4		
2.6		
2.8		
3.0		

COMMENTS

SITE PLAN (Not to Scale)

Field Staff:	Prepared By:	Investigation Type
CAO/KF	CAO	☑ Hand Auger
Job Manager:	Approved By:	☐ Spade Hole
JTA	JTA	☐ Test Pit

Produced with CORE-GS

Printed: 7/06/2019 4:21:43 p.m.

Eliot Sinclair
surveyors | engineers | planners

20 Troup Drive, Tower Junction
PO Box 9339, Christchurch 8149
Ph. (03) 379-4014 Fax. (03) 365-2449

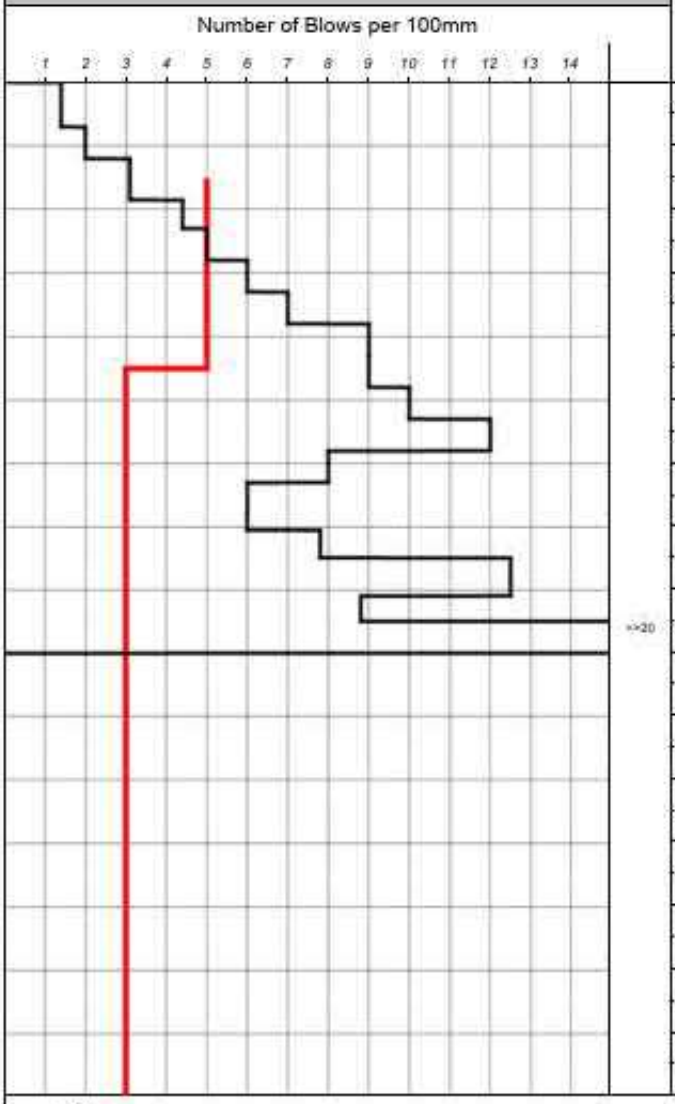
Job Number 500204
Date Tested 21-May-2019
Set Page No. 2 of 2
Log Sheet No. 1 of 1

SITE INVESTIGATION RECORD

Lot 2
D.P. 333694

Client: Townsend Fields Ltd.
Site: 199 Johns Road, Rangiora
Technical Category: N/A - Rural & Unmapped

SCALA PENETROMETER TEST RESULTS



02
Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

SOIL PROFILE

Test Location 02	Water
TS FILL: silty TOPSOIL; dark brown. Non-plastic; moist; trace rootlets.	Groundwater Not Encountered
SILT; dark brown. Non-plastic; dry; trace iron staining.	
Silty CLAY; bluish grey with orange mottles. Non-plastic; dry to moist; some iron staining.	
Silty sandy; greyish brown. Non-plastic; moist; sand, fine; some iron staining.	
EOH: 1.4m - Inferred gravel, unable to auger further.	

COMMENTS

SITE PLAN (Not to Scale)

Field Staff:	Prepared By:	Investigation Type
CAO/KF	CAO	☑ Hand Auger
Job Manager:	Approved By:	☐ Spade Hole
JTA	JTA	☐ Test Pit

Produced with CORE-GS

Printed: 7/06/2019 4:21:43 p.m.

21 May 2019 Our Ref: 500204

Appendix B: Results of Desktop Study

1 Google Earth

Retrieved from Google Earth on 23 May 2019

2 Canterbury Maps

Retrieved from Canterbury Maps on 23 May 2019

3 Quickmaps

Retrieved from Quickmaps on 23 May 2019

4 New Zealand Geotechnical Database

4.1 MBIE Technical Categories

Retrieved from the NZGD on 23 May 2019

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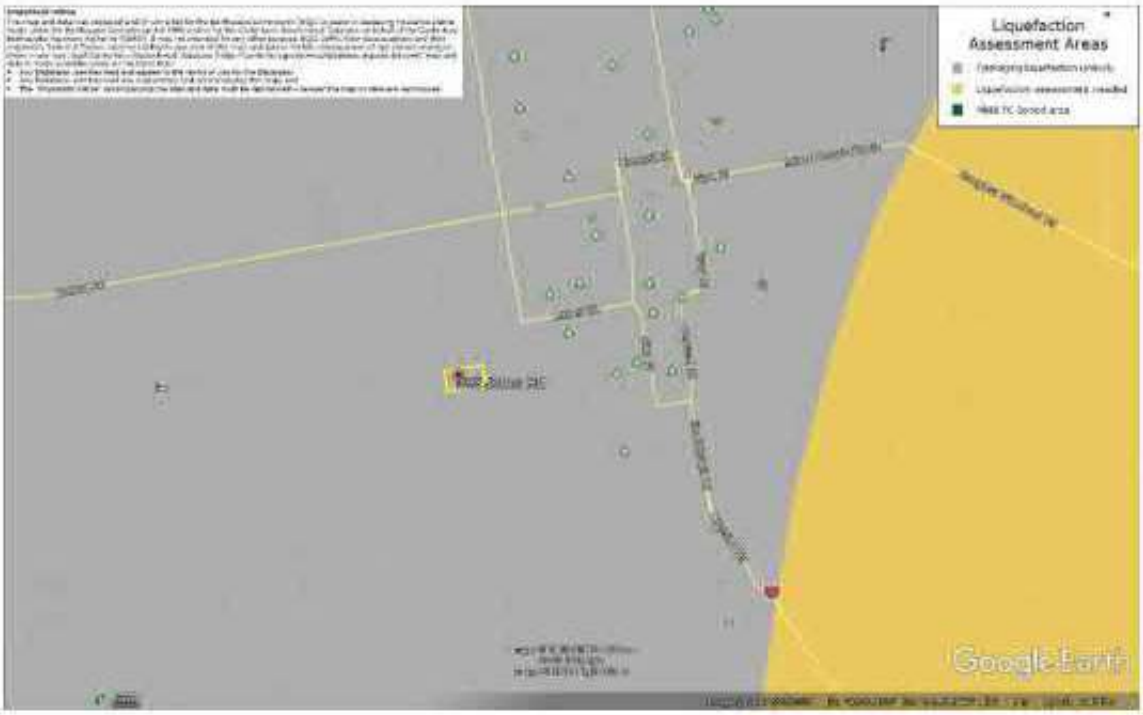
4.2 Geological Maps

Site is underlain by Q2a; 'Brownish grey river alluvium' retrieved from the NZGD on 23 May 2019.

Forsyth, P.J.; Barrel, D.J.A.; Jongens, R. (compliers) 2008: Geology of the Christchurch area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 16. 1 sheet +67 p. Lower Hutt, New Zealand. GNS Science.

4.3 Ecan Liquefaction Assessment Area



Retrieved from the NZGD on 23 May 2019

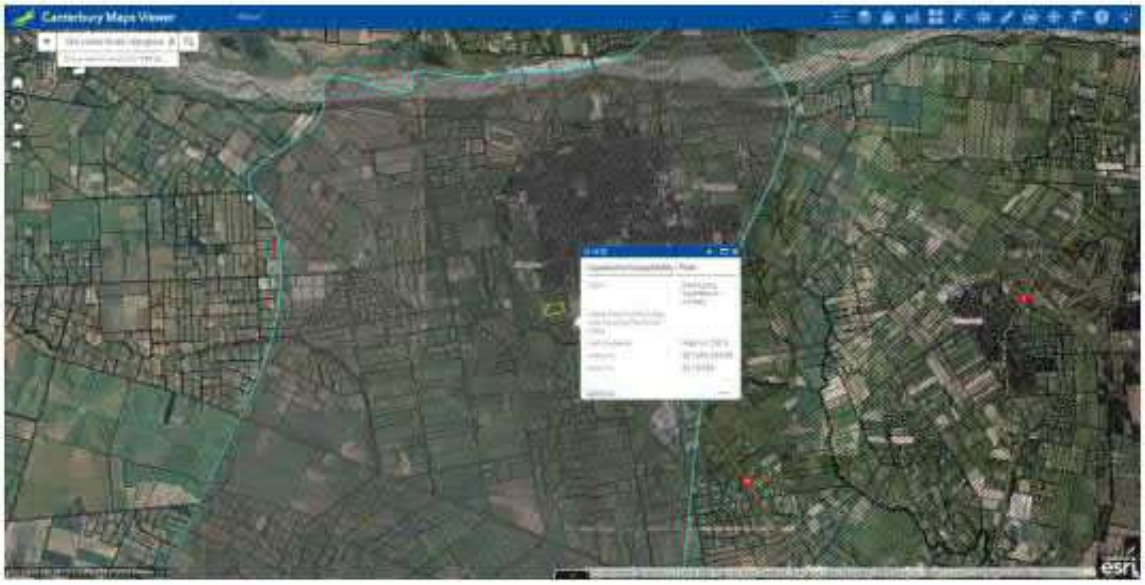
4.4 Earthquake – Post Feb 2011 observations

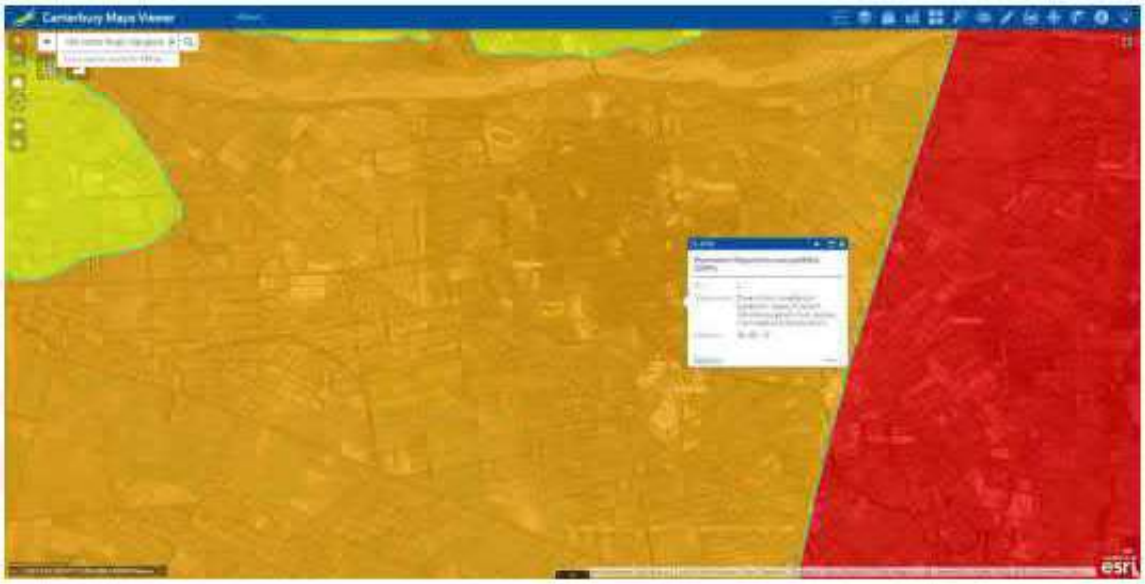
Retrieved from GNS Science on 23 May 2019

Retrieved from Google Earth on 7 June 2019

5 Canterbury Maps Layers

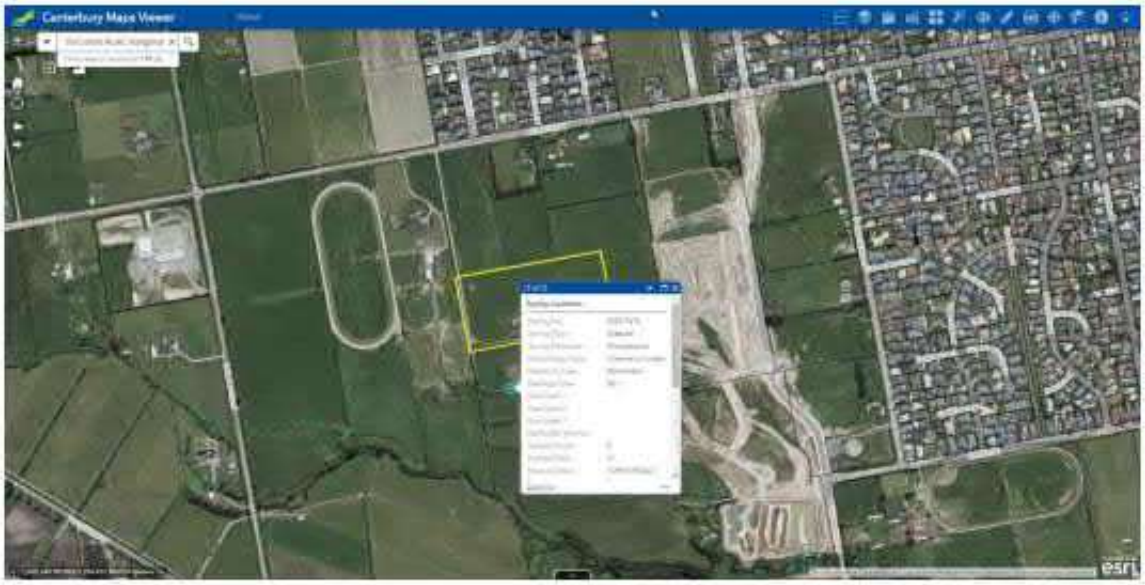
5.1 Liquefaction hazard





Retrieved from Canterbury Maps on 23 May 2019

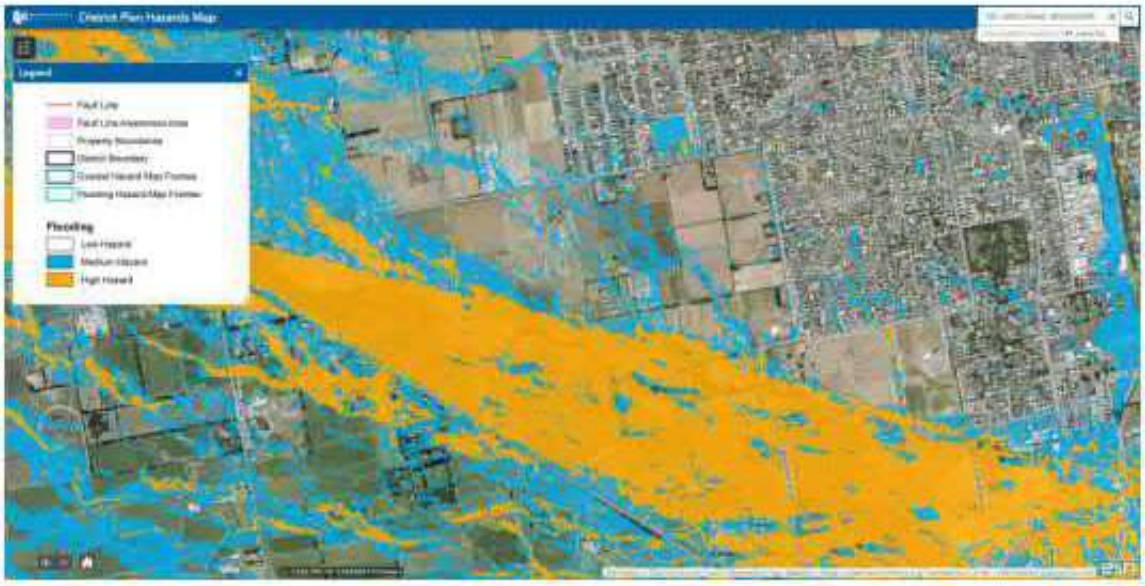
5.2 Spring Locations



Retrieved from Canterbury Maps on 23 May 2019

6 Waimakariri District Council

6.1 District Plan Flood Hazard



Retrieved from Canterbury Maps on 23 May 2019

6.2 Waimakariri District Flood Planning Hazard

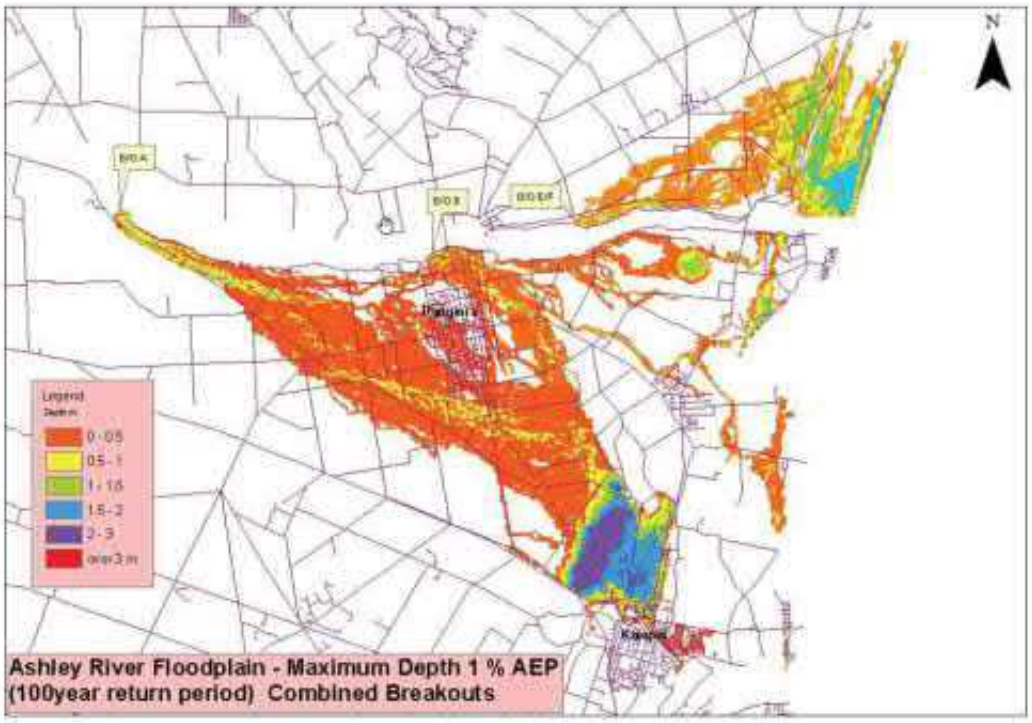


Figure 7:

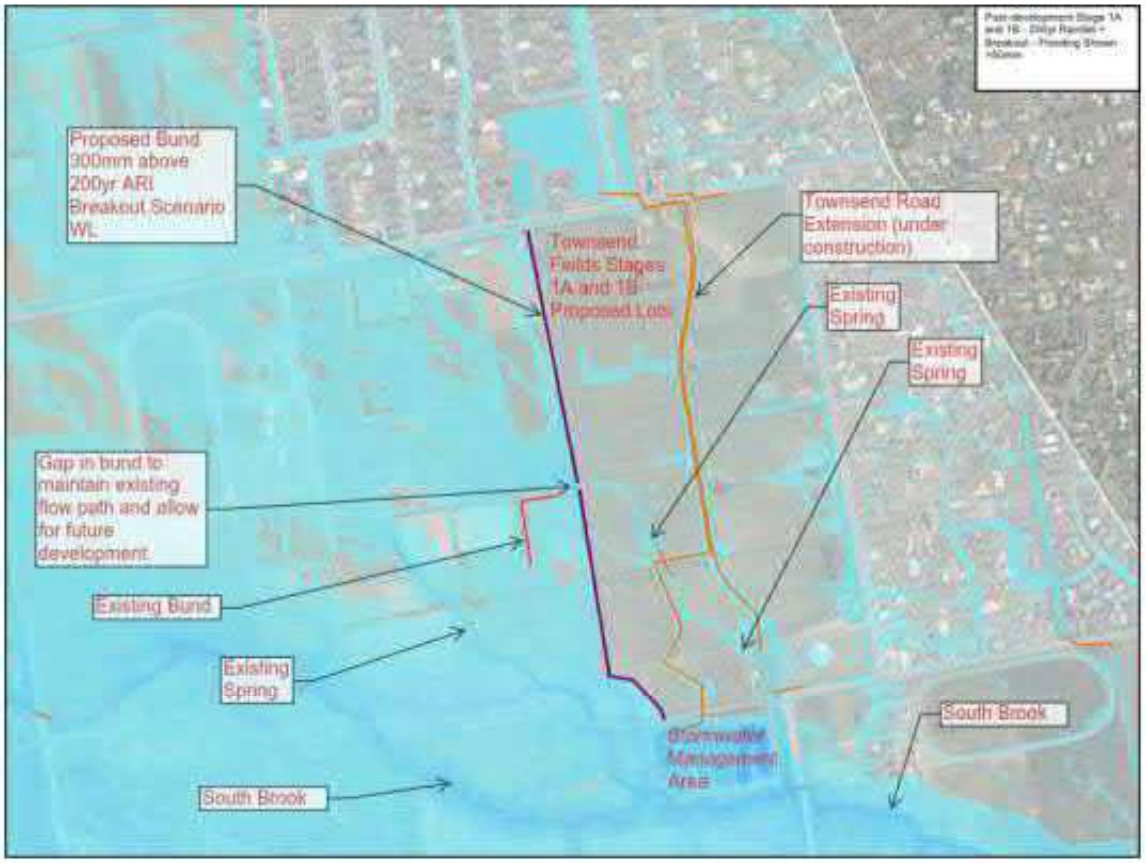
Retrieved from the Waimakariri District Flood Hazard Management Strategy on 23 May 2019

7 GNS Near Faults Database

Retrieved from GNS Science on 23 May 2019

8 Fluent Flood Modelling

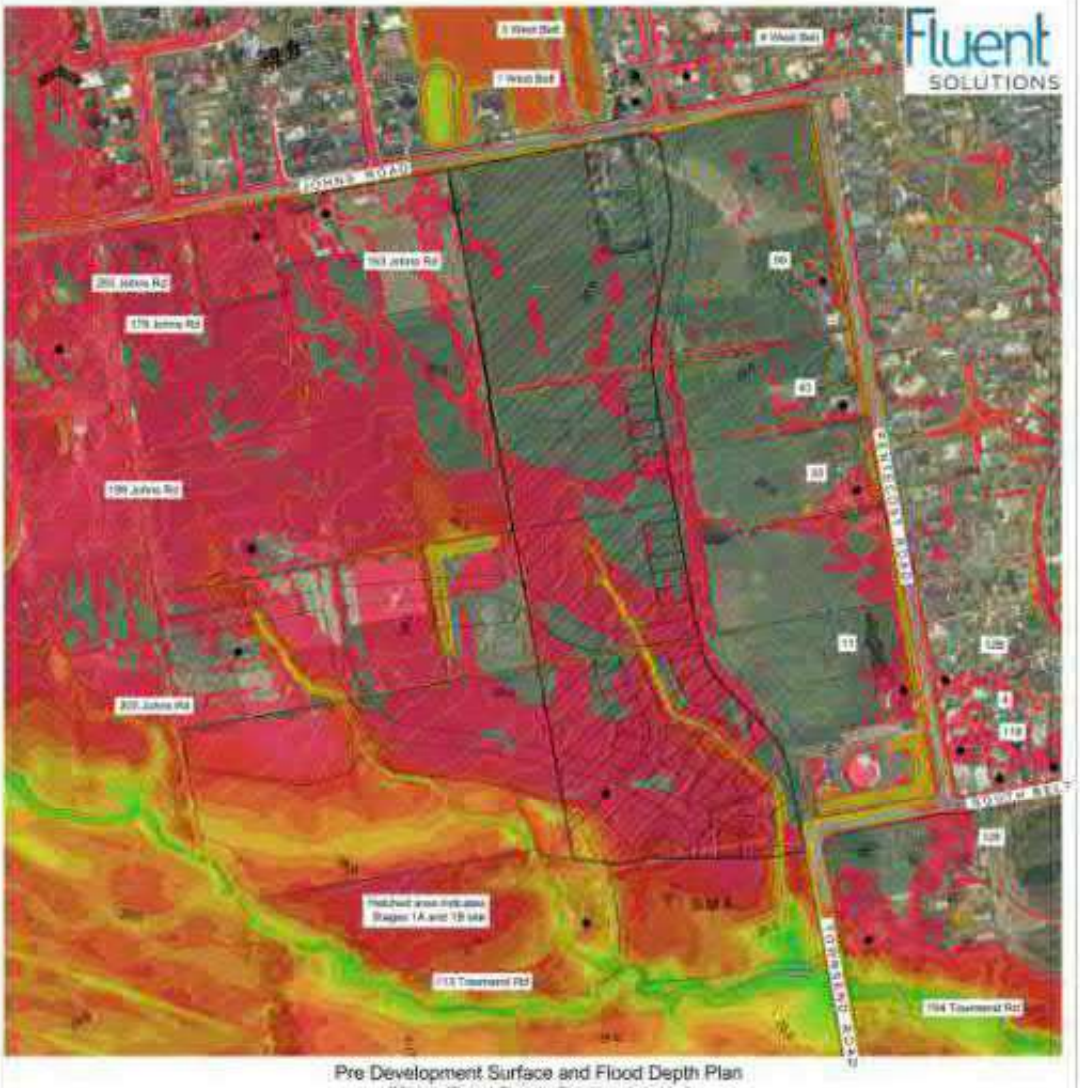
Flood modelling performed by Fluent for Eliot Sinclair & Partners



Original bund location flood modelling

Table 1: Effects Assessment Results – Neighbouring Properties 200yr ARI Rainfall + Breakout Flood Level Estimations

Location	Pre-Development 200yr ARI Rainfall + Breakout Flood Level (m)	Post-Development 200yr ARI Rainfall + Breakout Flood Level (m)	Flood Level Difference (Pre- minus Post-) (m)
205 Johns Road	32.31	32.30	+0.01
179 Johns Road	31.61	31.62	-0.01
163 Johns Road	31.41	31.41	0
199 Johns Road	30.24	30.24	0
203 Johns Road	29.52	29.52	0
1 West Belt	31.25	31.25	0
3 West Belt	31.31	31.30	+0.01
4 West Belt	31.09	31.09	0
59 Pentecost Road	29.04	29.01	+0.03
43 Pentecost Road	27.97	27.92	+0.05
33 Pentecost Road	27.57	27.56	+0.01
128 Pentecost Road	26.69	26.65	+0.04
11 Pentecost Road	26.97	26.96	+0.01
WDC Land – Water Reservoir	26.73	26.73	0
4 Pentecost Road	26.49	26.47	+0.02
Flow Over South Belt	26.48	26.48	0
126 South Belt	26.10	26.09	+0.01
118 South Belt	25.69	25.69	0
104 Townsend Road	26.61	25.56	+0.05
113 Townsend Road	27.02	27.04	-0.02



Pre Development Surface and Flood Depth Plan
50mm Flood Depth Contour Interval

Scale: 1:1000 in A4

Base Surface = Pre Development Ground Surface
Comparison Surface = Pre Development Flood Depth

Flood Depth		Flood Depth		Flood Depth		Flood Depth		Flood Depth	
Colour	Depth Range (m)	Colour	Depth Range (m)	Colour	Depth Range (m)	Colour	Depth Range (m)	Colour	Depth Range (m)
	0.05 to 0.10		0.55 to 0.60		1.05 to 1.10		1.55 to 1.60		2.05 to 2.10
	0.10 to 0.15		0.60 to 0.65		1.10 to 1.15		1.60 to 1.65		2.10 to 2.15
	0.15 to 0.20		0.65 to 0.70		1.15 to 1.20		1.65 to 1.70		2.15 to 2.20
	0.20 to 0.25		0.70 to 0.75		1.20 to 1.25		1.70 to 1.75		2.20 to 2.25
	0.25 to 0.30		0.75 to 0.80		1.25 to 1.30		1.75 to 1.80		2.25 to 2.30
	0.30 to 0.35		0.80 to 0.85		1.30 to 1.35		1.80 to 1.85		2.30 to 2.35
	0.35 to 0.40		0.85 to 0.90		1.35 to 1.40		1.85 to 1.90		2.35 to 2.40
	0.40 to 0.45		0.90 to 0.95		1.40 to 1.45		1.90 to 1.95		2.40 to 2.45
	0.45 to 0.50		0.95 to 1.00		1.45 to 1.50		1.95 to 2.00		2.45 to 2.50
	0.50 to 0.55		1.00 to 1.05		1.50 to 1.55		2.00 to 2.05		2.50 to 2.55

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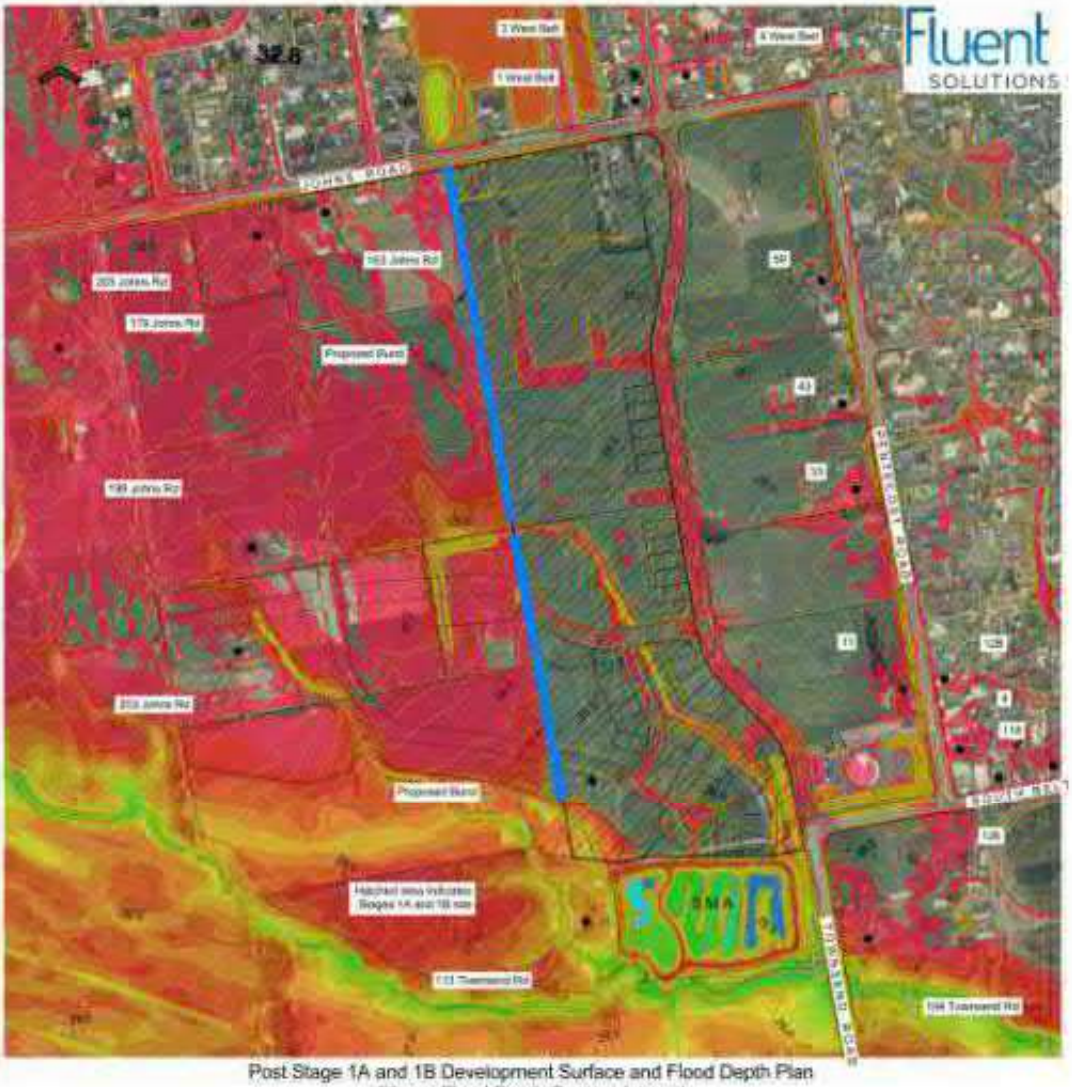

Post Stage 1A and 1B Development Surface and Flood Depth Plan
50 mm Flood Depth Contour Interval

Scale: 1:6000 on A4
Base Surface: Post Development Ground Surface
Comparison Surface: Post Development Flood Depth

Flood Depth		Flood Depth		Flood Depth		Flood Depth		Flood Depth	
Colour	Depth Range (m)	Colour	Depth Range (m)	Colour	Depth Range (m)	Colour	Depth Range (m)	Colour	Depth Range (m)
	0.05 to 0.10		0.55 to 0.60		1.05 to 1.10		1.55 to 1.60		2.05 to 2.10
	0.10 to 0.15		0.60 to 0.65		1.10 to 1.15		1.60 to 1.65		2.10 to 2.15
	0.15 to 0.20		0.65 to 0.70		1.15 to 1.20		1.65 to 1.70		2.15 to 2.20
	0.20 to 0.25		0.70 to 0.75		1.20 to 1.25		1.70 to 1.75		2.20 to 2.25
	0.25 to 0.30		0.75 to 0.80		1.25 to 1.30		1.75 to 1.80		2.25 to 2.30
	0.30 to 0.35		0.80 to 0.85		1.30 to 1.35		1.80 to 1.85		2.30 to 2.35
	0.35 to 0.40		0.85 to 0.90		1.35 to 1.40		1.85 to 1.90		2.35 to 2.40
	0.40 to 0.45		0.90 to 0.95		1.40 to 1.45		1.90 to 1.95		2.40 to 2.45
	0.45 to 0.50		0.95 to 1.00		1.45 to 1.50		1.95 to 2.00		2.45 to 2.50
	0.50 to 0.55		1.00 to 1.05		1.50 to 1.55		2.00 to 2.05		2.50 and above

7 June 2019 Our Ref: 500204

Carolina Homes Ltd
c/ 5 Skara Brae
Christchurch, 7604

Attention: Justin Busbridge

Dear Justin

Pre-Purchase Contamination Assessment: Preliminary Site Investigation (PSI) for 199 Johns Road, Fernside, Rangiora

1 Introduction

Eliot Sinclair & Partners Ltd were engaged by Carolina Homes Ltd to undertake a pre-purchase preliminary site investigation of 199 Johns Road, Rangiora (the 'site') in relation to the risk of soil contamination.

2 Scope of Work

The scope of this report is to prepare a Preliminary Site Investigation (PSI) report in accordance with MfE's *Contaminated Land Management Guidelines* (CLMG) No. 1 and 5[1], and included;

- Reviewing Environment Canterbury's Listed Land Use Register (LLUR) and resource consent database.
- Reviewing historical and recent aerial images of the area taken between 1940 and 2018.
- Reviewing information from the Waimakariri District Council property file.
- Conducting a site inspection/walkover.
- Compilation of the findings in accordance with the NESCS[2] and MfE's Contaminated Land Management Guidelines 1 and 5.

[1] Ministry for the Environment (MfE) 2011. Contaminated Land Management Guidelines No. 1. Reporting on Contaminated Sites in New Zealand. No. 5: Site Investigation and Analysis of Soils (Revised 2011).
[2] Ministry for the Environment (MfE) 2011. Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

3 Site Description

Access to the site is via a right of way from Johns Road to the northwest corner of the property. The site is generally flat with very minor natural undulations. At the time of the investigation in May 2019, there was one existing dwelling and associated outbuildings located near the mid-south parts of the site. Refer to Figure 1. The legal description and environmental setting are summarised in Table 1.

Figure 1: Layout of 199 Johns Road, Rangiora at the time of the investigation. Base aerial sourced from www.canterburymaps.govt.nz.

Table 1: Site identification, legal description and environmental setting

Street address	199 Johns Road, Fernside, Rangiora
Legal description	Lot 2 DP 333694, 4.5320 ha
Owner/occupiers	Jennifer Ann Todd
Local authority	Waimakariri District Council
District Plan Zoning	Rural Zone (Waimakariri District Plan)
Current land-use/adopted NESCS land-use scenario	Rural residential 'lifestyle block', 25% produce consumption
Neighbouring land-use	N: rural E: rural S: rural W: rural
Topsoil	GLEY Regional (Source ECan GIS)
Geology	The site is underlain by river deposits. Refer to ESP Geotechnical Report for 199 Johns Road. Ref. 500204.
Surface water	There is no natural surface water on the site. Two unnamed surface drains are on neighbouring land to the south and east.
Groundwater	The bore log of Well M36/9869 (on site, used for domestic supply) states an initial water level of 1.74 m below MP. The aquifer is unconfined or semi-confined. The general flow direction is towards the southeast. Source: ECan GIS.

4 Site History (Council Records)

4.1 Waimakariri District Property File

Information from the property file was reviewed on 4 June 2019. The records include a LIM report, subdivision and building consent matters. The computer freehold register indicates that the current lot was formed in 2004, the building compliance approval of the residential dwelling is dated 2006.

The reviewed property file holds no information on potential HAIL activities occurring on the site, or having occurred on the site in the past.

4.2 Environment Canterbury Listed Land Use Register (LLUR)

A search of Environment Canterbury's Listed Land Use Register (LLUR) was undertaken on 4 June 2019. The LLUR is a database containing records of contaminated, potentially contaminated and remediated (previously contaminated) sites in Canterbury. It is not an exhaustive database, i.e. an unregistered site does not confirm that there have been no HAIL activities undertaken on the site in the past.

The site is not recorded on Environment Canterbury's LLUR. Refer to Appendix A.

4.3 Environment Canterbury Resource Consent Database

Environment Canterbury's Resource Consent Database was reviewed on 4 June 2019. A land-use consent (CRC040906) and discharge permit (CRC061070) have been issued to establish the residential dwelling and to discharge domestic wastewater from an Oasis system, respectively.

Residential land-use and the discharge of treated domestic wastewater are not considered a HAIL activity. Consents on neighbouring land (e.g. for water abstraction or discharge of residential stormwater) are unlikely to have caused ground contamination on the site.

4.4 Aerial Images

Historical and recent aerial images from Environment Canterbury's GIS and Google Earth Pro were reviewed to assess previous land-uses and to identify any obvious HAIL activities. The reviewed images are attached in Appendix B. The findings are summarised in Table 2 (below).

Table 2: General land-use and identified potential HAIL activities on aerial images.

Aerial Image[3]	Comments	HAIL activities
Refer to the enclosed aerial images. Note that the images were reviewed at a higher resolution than reproduced in this report.		
1940-1944	The land is cleared; the land-use is cropping/grazing. No structures.	None
1960-1964	No significant change in land-use identified. No structures.	None
1965-1969	No significant change in land-use identified. No structures.	None
1970-1974	No significant change in land-use identified. No structures.	None
1980-1984	No significant change in land-use identified. No structures.	None
1985-1989	No significant change in land-use identified. No structures. Poor image quality.	None
1990-1994	No significant change in land-use identified. No structures.	None

[3] Source: Environment Canterbury GIS, unless specified otherwise.

Aerial Image[3]	Comments	HAIL activities
2000-2004	The land-use is cropping. No structures.	None
2004-2010	The site appears unused or is being grazed. No structures.	None
2006	An area near the central southern boundary is cleared for the house and shed foundations. Possible construction of the cattle yard. Earthworks are visible on the neighbouring land to the southeast. Image source: Google Earth Pro.	None
2008	A shed and the foundations for the residential dwelling are constructed; an ornamental pond is excavated. Image source: Google Earth Pro.	None
2010-2015	The residential dwelling and associated structures are established. The land-use is similar to the current layout at the time of the investigation.	None

In summary, no HAIL activities have been identified on the reviewed aerial images. Earthworks on the neighbouring land to the south east are unlikely to affect the site.

4.5 Site Walkover

A site walkover by an Eliot Sinclair environmental scientist was undertaken on 21 May 2019. Field notes with observations are summarised in Figure 2. Two residential-size glasshouses were established post year 2000 and are not considered a HAIL activity. The organic stockpile to the north of the chicken coop did not show signs of burning activities. No further HAIL activities have been identified during the walkover. Photographs from the site inspection are attached in Appendix C.

Figure 2: Land-uses identified during the site inspection.

5 Risk Assessment/Site Characterisation

This PSI report is based on a review of Council records including historical aerial images and Eliot Sinclair's site inspection on 21 May 2019.

In accordance with NESCS Regulation 6 (3) no activity or industry described in the HAIL:

- is being undertaken on the site,
- has been undertaken in the past, or
- is more likely than not to have been undertaken on the site.

There is no information that indicates that the site has been used for a HAIL activity or may have been affected by HAIL activities on neighbouring land. Within the limitations of the accidental discovery protocol, it is considered that the likelihood of any activity or industry described in the HAIL having being undertaken is low. As such, it is highly unlikely that contaminant concentrations on the site pose a risk to human health.

6 Conclusion

Soil disturbance and subdivision are assessed to be a permitted activity with regards to contamination in accordance with Regulation 8(4) of the NESCS. No further investigation or assessment under the NESCS is required for the site at this point in time.

7 Recommendation

In case soil is removed from the site, it shall be disposed at a facility authorised to accept the material. This is likely to require soil tests to inform disposal options.

8 Accidental Discovery Protocol

This ground contamination assessment is based on a review of Council records, comments by the current owner Mr Sixtus, and Eliot Sinclair's site inspection on 21 May 2019. It is possible that unidentified contamination may be present on the site that is not currently known, or was not encountered by the investigations outlined in this report. Therefore, if any of the following materials are encountered during future earthworks the actions provided below must be followed.

Potential contamination:

- Stained or odorous soil
- Slag, ash, charcoal
- Refuse comprising putrescible waste, metal or plastics
- Obvious fill material or buried topsoil that is not natural
- Asbestos (bonded) in asbestos cement material (ACM) or friable (e.g. in insulation material).

Actions:

- Works must stop immediately in the area of the discovery, and the site must be secured to stop people entering the area where potential contamination was encountered.
- Contact a contaminated land specialist. **Eliot Sinclair (03 379 4014)** can assist, assess the risk, and can determine a practicable course of action.

9 Limitations

The comments made in this report are based on Council records and Eliot Sinclair's site inspection on 21 May 2019. It is possible these may not provide a complete or accurate assessment of the entire site. As a result, Eliot Sinclair provides this information on the basis that it does not guarantee that the information is complete or without error and accepts no liability for any inaccuracy in, or omission from, this information.

All reasonable effort has been made to ensure that the conclusions drawn in this report are correct at the time of reporting. However, the activities described on the HAIL may change in the future as knowledge about potentially hazardous activities develops over time.

It is possible there may be unidentified subsoil conditions that are not obvious from the information obtained by our site inspection, and that differ from the conclusions of this report. Should unusual geotechnical conditions be encountered during future earthworks such as historical uncontrolled fill materials, then Eliot Sinclair should be advised so that they can review any new information and to advise if the recommendations of this report are still valid.

This report has been prepared for the benefit of Carolina Homes Ltd. No liability is accepted by this company or any employee of this company with respect to the use of this report by any other party or for any other purpose other than what is stated in our scope of work.

This report does not relieve contractors of their responsibilities under the Health and Safety at Work Act 2015. Site conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes, at their own expense.

Yours sincerely
ELIOT SINCLAIR & PARTNERS LTD

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Principal

Appendix A: LLUR Register (accessed on 4 June 2019)

Listed Land Use Register (LLUR)

Search

199 Johns Road, Rangiora, Waimakariri District

(Having trouble finding your address?)

OVERVIEW | FINDING YOUR ADDRESS | SEARCH SUMMARY

Thank you for your enquiry.

The Listed Land Use Register does not currently have any information about a Hazardous Activities and Industries List site on this land parcel.

If you would like a property statement, please fill in your details below.

Records Found

No records found.

Property Search Results

	Legal Description	Titles	Valuation No	
199 Johns Road				
1	Lot 2 DP 333694	138041	2159133900	

Appendix B: Aerial Images (1940 – 2018)

Eliot Sinclair
surveyors | engineers | planners

1940-1944 Aerial Image

Carolina Homes Ltd

Scale:
NTS

Date: 7 June 2019
Author: JMZ

Source:
Environment Canterbury GIS

ESP reference:
500204

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149 Phone 03-379 4014 info@eliotsinclair.co.nz www.eliotsinclair.com

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1960-1964 Aerial Image

Carolina Homes Ltd

Scale: NTS

Date: 7 June 2019
Author: JMZ

Source: Environment Canterbury GIS

ESP reference: 500204

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1965-1969 Aerial Image

Carolina Homes Ltd

Scale: NTS	Date: 7 June 2019 Author: JMZ
Source: Environment Canterbury GIS	ESP reference: 500204

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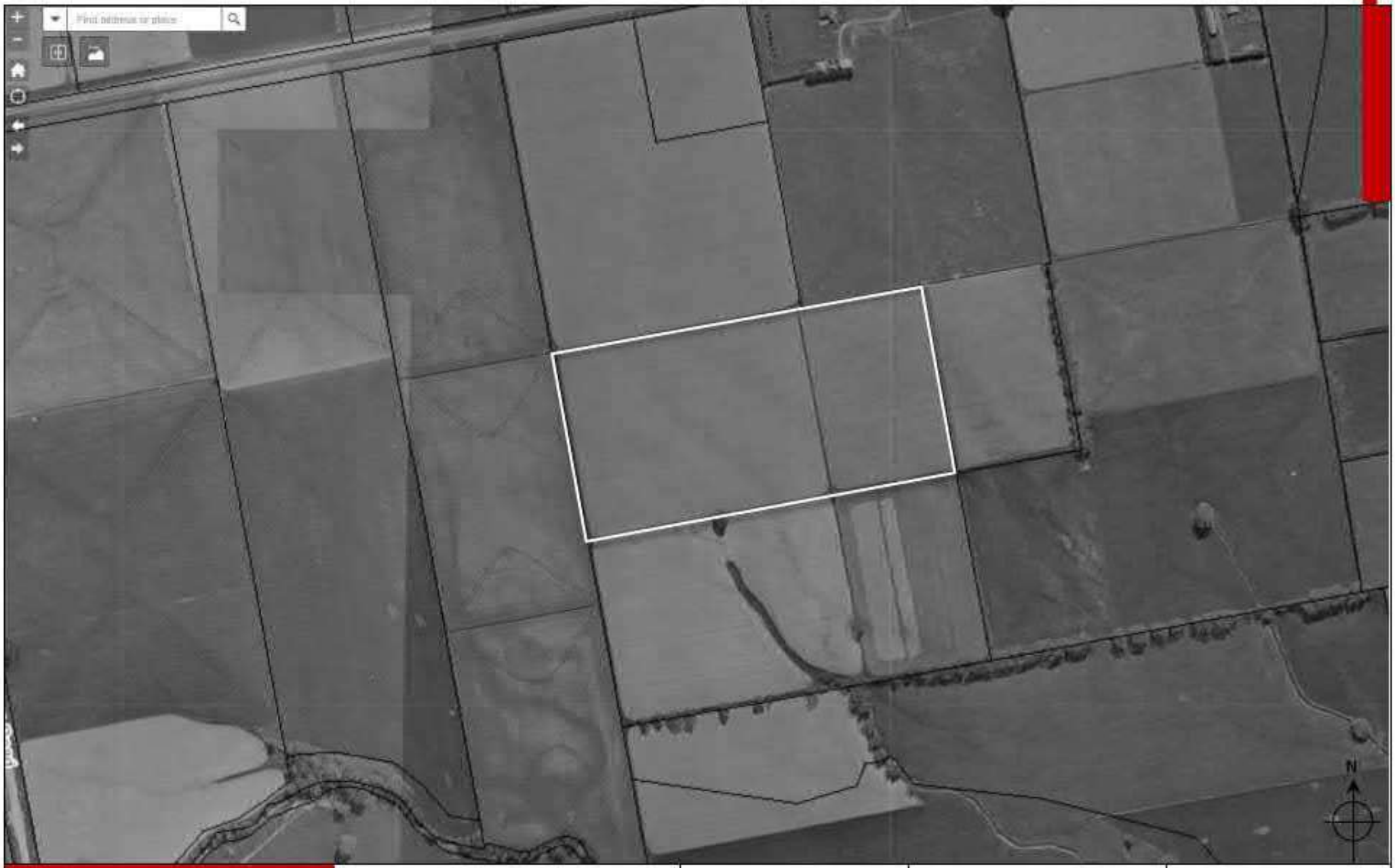

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1970-1974 Aerial Image

Carolina Homes Ltd

Scale:
NTS

Date: 7 June 2019
Author: JMZ

Source:
Environment Canterbury GIS

ESP reference:
500204

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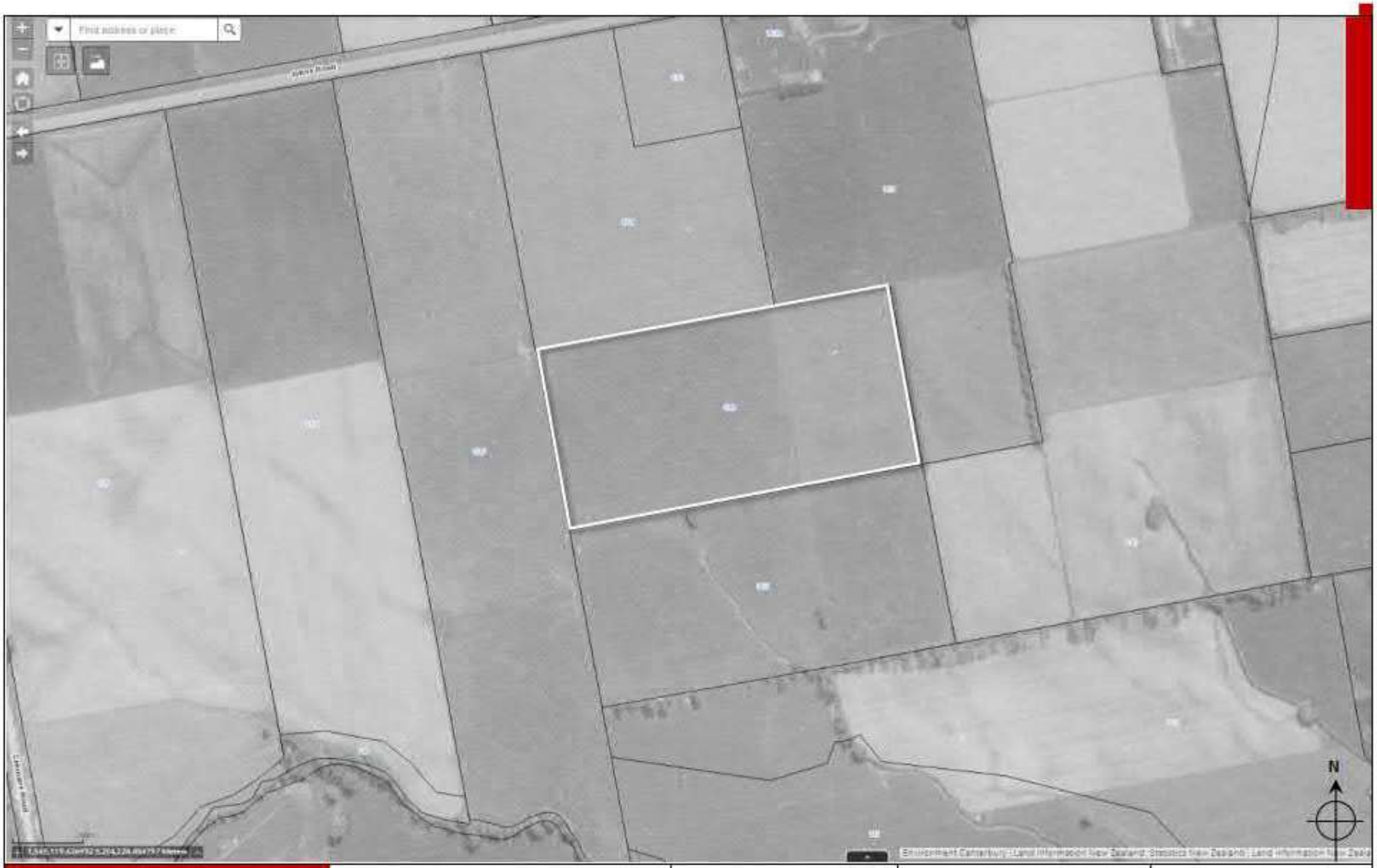

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1975-1979 Aerial Image

Carolina Homes Ltd

Scale:
NTS

Date: 7 June 2019
Author: JMZ

Source:
Environment Canterbury GIS

ESP reference:
500204

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1980-1984 Aerial Image

Carolina Homes Ltd

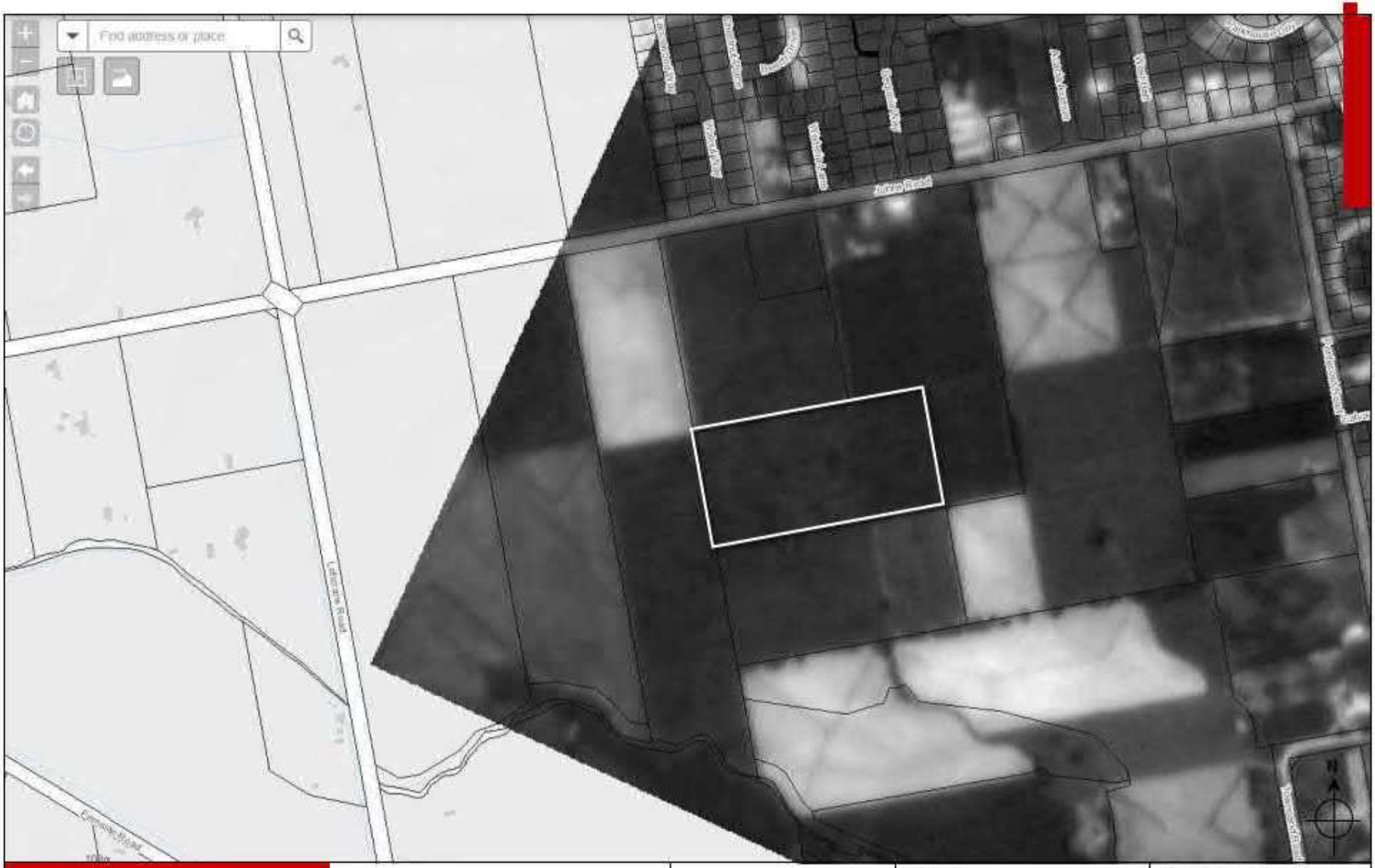
Scale: NTS

Date: 7 June 2019
Author: JMZ

Source: Environment Canterbury GIS

ESP reference: 500204

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149. Phone 03-379 4014. info@eliotsinclair.co.nz www.eliotsinclair.com



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1985-1989 Aerial Image

Carolina Homes Ltd

Scale: NTS

Date: 7 June 2019
Author: JMZ

Source: Environment Canterbury GIS

ESP reference: 500204

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1990-1994 Aerial Image

Carolina Homes Ltd

Scale: NTS

Date: 7 June 2019
Author: JMZ

Source: Environment Canterbury GIS

ESP reference: 500204

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1995-1999 Aerial Image

Carolina Homes Ltd

Scale: NTS

Date: 7 June 2019
Author: JMZ

Source: Environment Canterbury GIS

ESP reference: 500204

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2000-2004 Aerial Image

Carolina Homes Ltd

Scale:
NTS

Date: 7 June 2019
Author: JMZ

Source:
Environment Canterbury GIS

ESP reference:
500204

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2004-2010 Aerial Image

Carolina Homes Ltd

Scale: NTS	Date: 7 June 2019 Author: JMZ
Source: Environment Canterbury GIS	ESP reference: 500204

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16/01/2006 Aerial Image

Carolina Homes Ltd

Scale: NTS	Date: 7 June 2019 Author: JMZ
Source: Google Earth Pro	ESP reference: 500204

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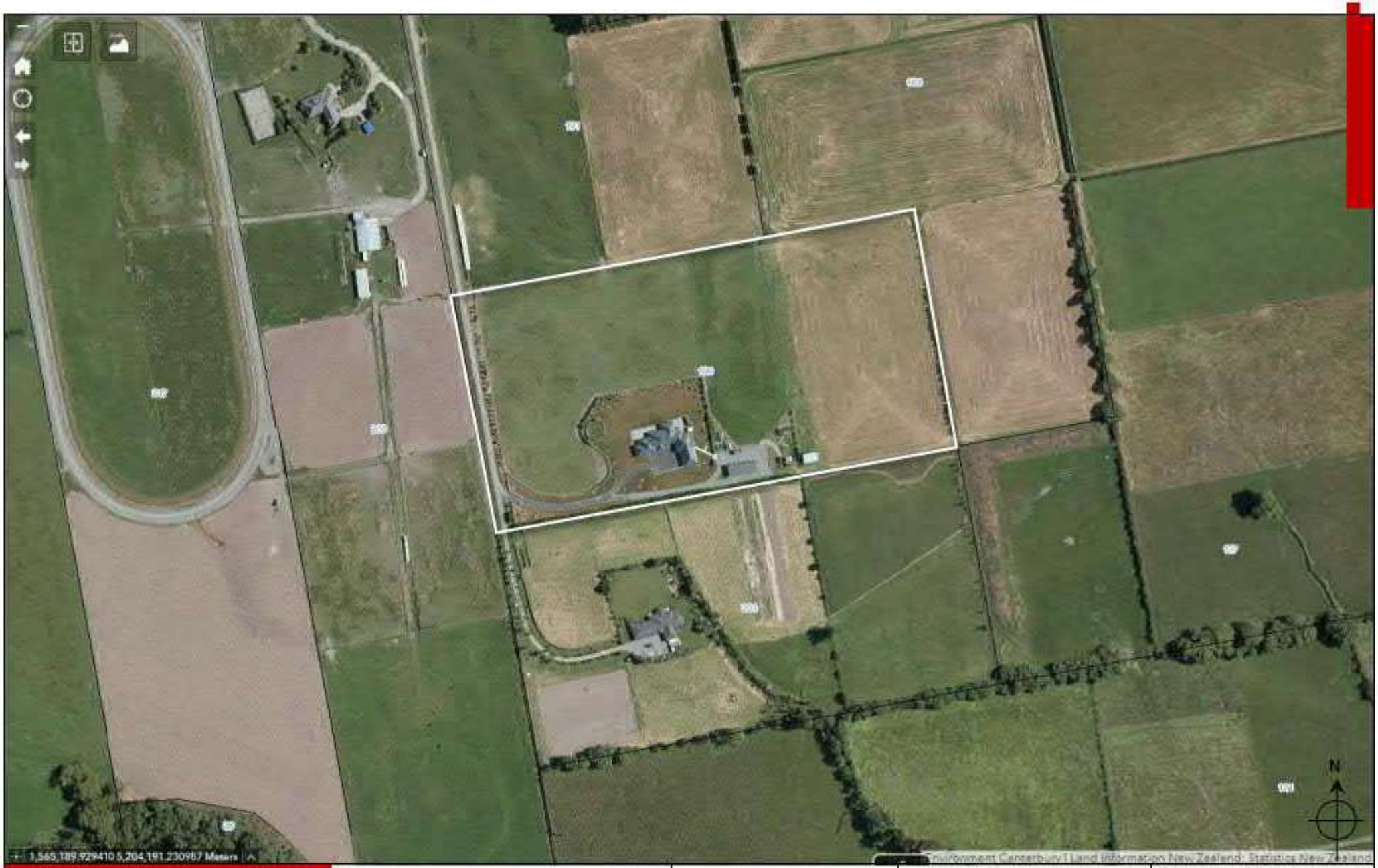
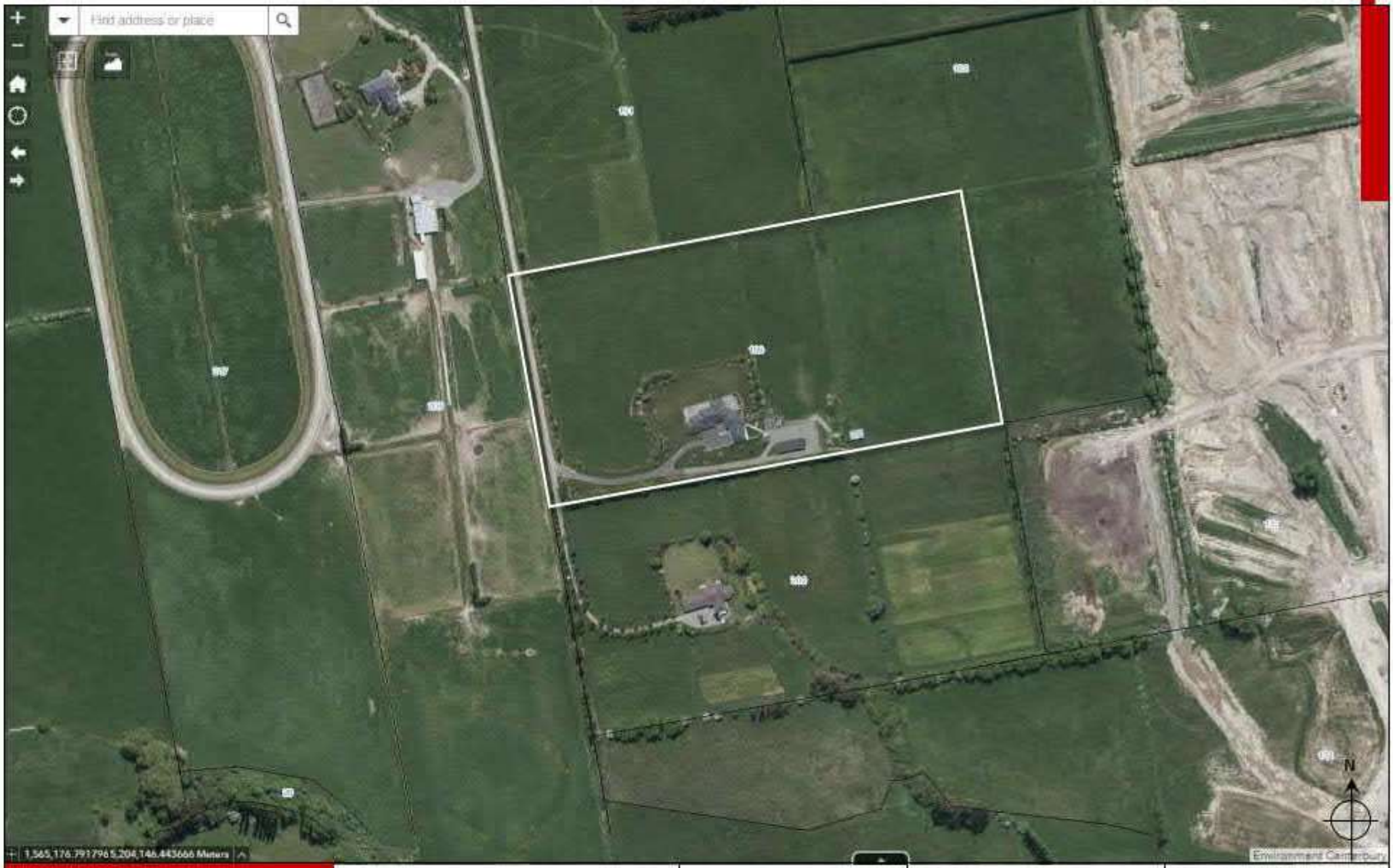


Eliot Sinclair surveyors | engineers | planners	2010-2015 Aerial Image	Carolina Homes Ltd	Scale: NTS	Date: 7 June 2019 Author: JMZ
			Source: Google Earth Pro	ESP reference: 500204

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149 Phone 03 379 4014 info@eliotsinclair.co.nz www.eliotsinclair.com



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2/11/2018 Aerial Image

Carolina Homes Ltd

Scale: NTS

Date: 7 June 2019
Author: JMZ

Source: Google Earth Pro, Environment Canterbury GIS

ESP reference: 500204

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Appendix C: Site Photographs (taken on 21/5/2019)

Photo 1. View of the residential dwelling at 199 Johns Road

Photo 2. View of the garage and shed located to the southeast of the residential dwelling

Photo 3. Raised gardens and disused domestic glasshouse

Photo 4. Cattle yards and garden shed

Photo 5. Compost (no signs of burning activities)

Photo 6. Disused domestic glasshouse

Appendix C. Waimakariri District Natural Hazards Mapping (Nov 2021)

Liquefaction hazard

Fault Rupture

Tsunami

Coastal Erosion

Flooding