GEOTECHNICAL REPORT FOR PLAN CHANGE

Corner of Annanvale & Pocock Roads, Springfield

For **Ballymena Holdings Limited**

23 August 2013

Eliot Sinclair

surveyors | engineers | planners

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Corner of Annanvale & Pocock Roads, Springfield

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surveyors | engineers | planners

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Limitations: This report has been prepared according to the instructions from Ballymena Holdings Limited, for the particular objectives described in the scope of work. The information contained in the report should not be used by anyone else or for any other purposes.

Executive Summary

Estimated liquefaction-induced settlement in SLS event	**TC1**		**0-15mm**	☒
	TC2	Minor	0-50mm	☐
	TC3	Moderate	< 100mm	☐
		Potentially Significant	> 100mm	☐
Estimated liquefaction-induced settlement in ULS event	**TC1**		**0-25mm**	☒
	TC2		0-100mm	☐
	TC3		> 100mm	☐
Nearest watercourse	Shallow water race crossing mid of the site			
Estimated lateral stretch in ULS event	**TC1**		**NIL**	☒
	TC2	Minor	< 100mm	☐
	TC3	Minor to Moderate	< 200mm	☐
		Major	200-500mm	☐
		Severe	> 500mm	☐
Global lateral movement at ULS event	**TC1**		**NIL**	☒
	TC2	Minor	< 100mm	☐
	TC3	Minor to Moderate	< 300mm	☐
		Major	300-500mm	☐
		Severe	> 500mm	☐
MBIE residential Foundation Technical Category as per the site specific assessment			**TC1**	☒
			TC2	☐
			TC3	☐
			TC2/TC3 Hybrid	☐
			N/A	☐
NZS 1170.5 site subsoil class	A☐ B☐ **C☒** D☐ E☐			
Flood Hazard ?	Site requires minimum floor level?			Yes☐
				No☒
				N/A☐

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1. INTRODUCTION

Eliot Sinclair were engaged by Ballymena Holdings Limited to prepare a geotechnical investigation and interpretive report for the proposed plan change application for the site located on the Corner of Annanvale & Pocock Roads, Springfield.

2. SCOPE OF WORK

The scope of work for this interpretive report was;

- Review available data from Canterbury Geotechnical database (CGD), and Environment Canterbury's GIS database, and
- Investigate the upper soil conditions across the site with a series of 15 machine excavated test pits, to 2.2-3.2m depth. Each test pit reinstated with uncompacted backfill, and
- Undertake 15 shallow Scala penetrometer tests adjacent to each test pits to determine inferred ultimate static bearing strengths, and
- Prepare a Geotechnical Report for Plan Change to comment on the general geotechnical conditions encountered across the site, the risk of any of the hazards as per Section 106 of the Resource Management Act 1991, and the suitability of the site for low density residential land use (living 2 zone).

3. DISCLAIMER

Comments made in this geotechnical report for the proposed plan change are based on information shown on the Canterbury Geotechnical Database, Environment Canterbury's GIS, geotechnical investigations undertaken by Eliot Sinclair, inspection of the general area, and the Ministry for Business, Innovation & Employment's December 2012 guidelines.

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 a review of our recommendations. 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 Ballymena Holdings Limited and the Selwyn District Council, in accordance with the scope of work.

This report should not be relied upon without the professional advice of a geotechnical engineer, and should not be used for foundation design, unless supported by further site-specific geotechnical investigation and reporting once the nature and location of a future building proposal is known.

No liability is accepted by Eliot Sinclair or any employee of Eliot Sinclair with respect to the use of this report by any other party, for any other purpose other than outlined in the Scope of Work.

4. PLAN CHANGE PROPOSAL

It is proposed to rezone the site to low density residential land use (living 2 zone). A concept scheme plan for subdivision of the site, provided by Planning Solutions Ltd, proposes a 13-lot fee simple subdivision with one dwelling over a minimum average of 2 hectares. Refer to Appendix A.

5. SITE DESCRIPTION

5.1. Location

The site is legally described as Lot 2 DP 400509, and is located northeast of Annanvale Road, northwest of Pocock Road, and south of the rail track. The site is located just northwest of Springfield. Refer to Figures 1 and 2.

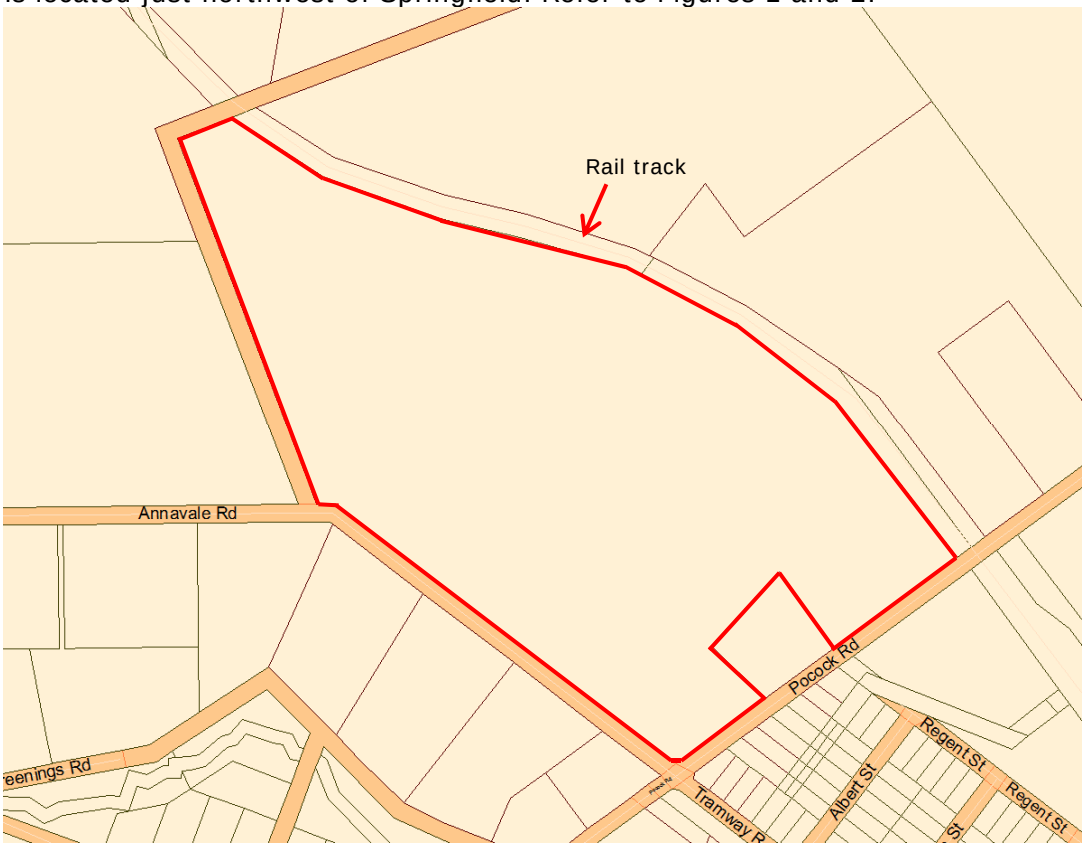


Figure 1: Site area (red outline), (source: QuickMap, July 2013)

5.2. Topography

The site generally comprises flat topography, with a slight fall down to the north.

The site was vegetated with exotic grass and used for grazing. A shelterbelt is located at the mid northwest part of the site. Refer to Figures 2 and 3.

5.3. Existing buildings

The site is generally vacant, except for a number of farm sheds located at the east corner of the site. Refer to Figure 2.

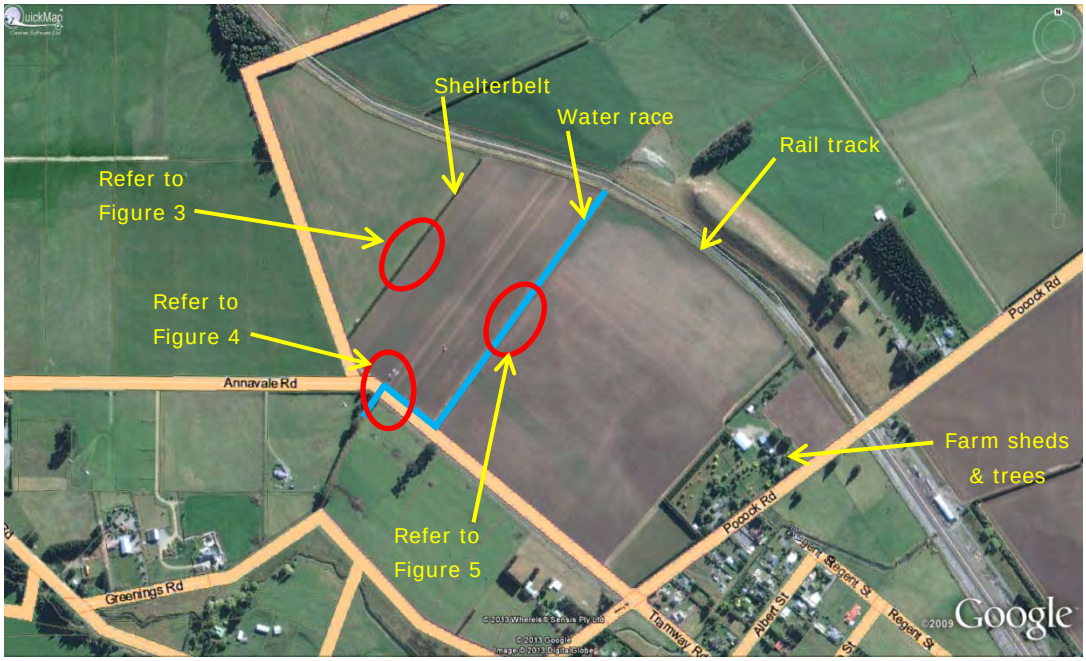


Figure 2: Aerial photo (source: CGD, July 2013)

Figure 3: Shelterbelt (photo taken 1 July 2013)

5.4. Roads

Pocock Road appeared to be in reasonable condition for its age and did not have any obvious unusual cracking, slumping or heaving which may have indicated earthquake damage.

Annanval Road is unpaved.

5.5. Watercourses

A shallow water race runs across the site and is approximately 0.5m deep by 1m wide. Refer to Figures 2, 4 and 5. In addition, Kowai River is located approximately 600m north of the site.

Figure 4: The water race at the western part of the site, adjacent to Annanvale Road (photo taken 1 July 2013).

Figure 5: The water race at the mid part of the site (photo taken 1 July 2013).

6. DESKTOP INVESTIGATION

6.1. Canterbury Geotechnical Database

The Canterbury Geotechnical Database (CGD) contains a large range of photographic, topographic, geological, geotechnical, land classification, survey records and field observations that relate to the Canterbury earthquake sequence. The database is coordinated by the Canterbury Earthquake Recovery Authority (CERA). The following comments are associated with information from the CGD.

6.2. CERA land classification

The Ministry of Business, Innovation and Employment (MBIE) defines three technical categories for residential foundation design described in its guidance for repairing and rebuilding earthquake damaged homes in Canterbury. These categories apply to liquefaction prone flat land in the green zone in the greater Christchurch urban area and surrounding communities.

This site has been classified by CERA as 'Green Zone, Technical Category Not Applicable, Rural & Unmapped', that indicates that '*Properties in rural areas or beyond the extent of land damage mapping, and properties in parts of the Port Hills and Banks Peninsula have not been given a Technical Category'*.

6.3. Geological maps

The geological map of Selwyn indicates the site is underlain by 'unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (loess) cap'[1]. Refer to Figure 6.

[1] GNS Geological Map of Selwyn, showing the surficial soil geology and surrounding area (source: GNS, July 2013).

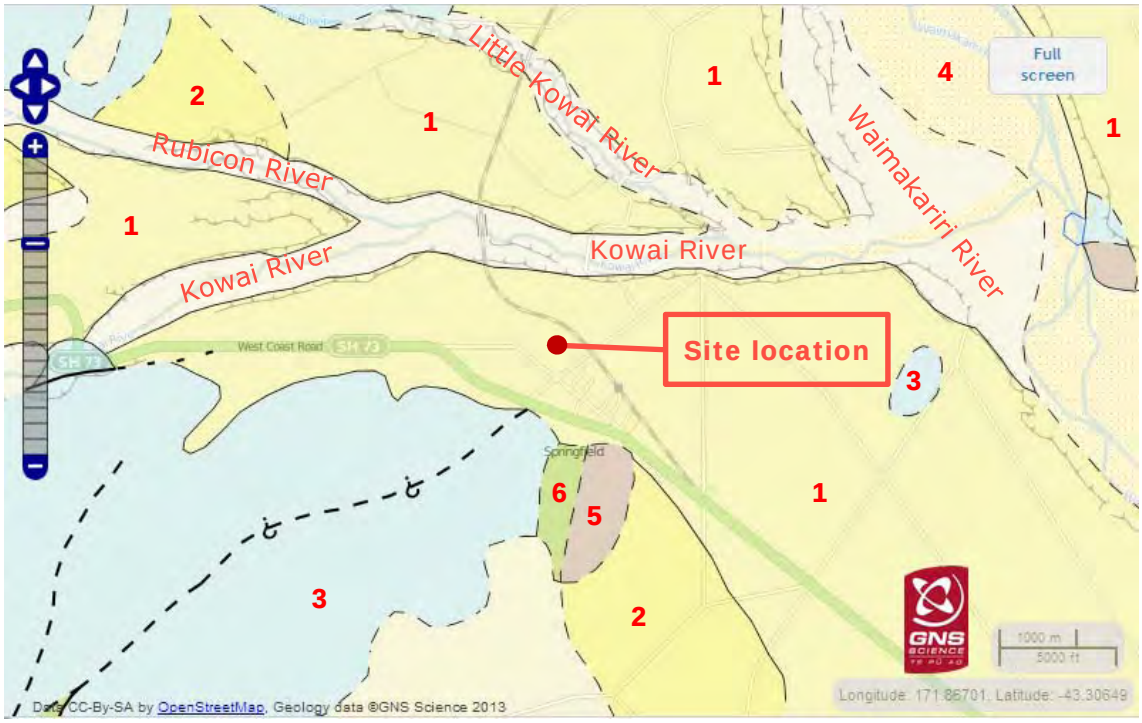


Figure 6: Geological map of Selwyn[1]

1	***Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (?loess) cap.***
2	*Grey-brown, slightly to moderately weathered mixtures of gravel/sand/silt/clay alluvium forming scattered river terrace remnants.*
3	*Well indurated, massive or bedded, greywacke sandstone & argillitic mudstone/siltstone; minor conglomerate/chert/volcanics; TZ1*
4	*Active flood plain. Unweathered; rounded-subangular; variably sorted loose gravel/sand/silt. Assoc with surfaces <2 deg. slope.*
5	*Interbedded basalt lava flows; pillow lavas; marine tuff; mudstone; sandstone; limestone; rare volcanogenic breccia*
6	*Non-marine qtz sst; carb mst & claystone; minor congl. and thin coal seams, mainly near base. Marine influence (glau) near top*

6.4. Active faults

Geological & Nuclear Science's (GNS) Active Faults Database notes a number of active faults nearby. These include;

- High Peak Fault, located approximately 6km south of the site,
- Springfield Fault, located approximately 7km southwest of the site,
- Benmore Fault, located approximately 9km northwest of the site,
- Ashley Gorge Fault, located approximately 10km east of the site,
- Porters Pass Fault, located approximately 8km north of the site,
- Joyces Stream Fault, located approximately 5km north of the site,
- Coopers Creek Fault, located approximately 12km northeast of the site,
- Townshend Fault, located approximately 12km northeast of the site.

Refer to Figure 7.

Based on the Ministry for Environment recommendation[2], the site is well outside of the minimum 20m fault avoidance zone.

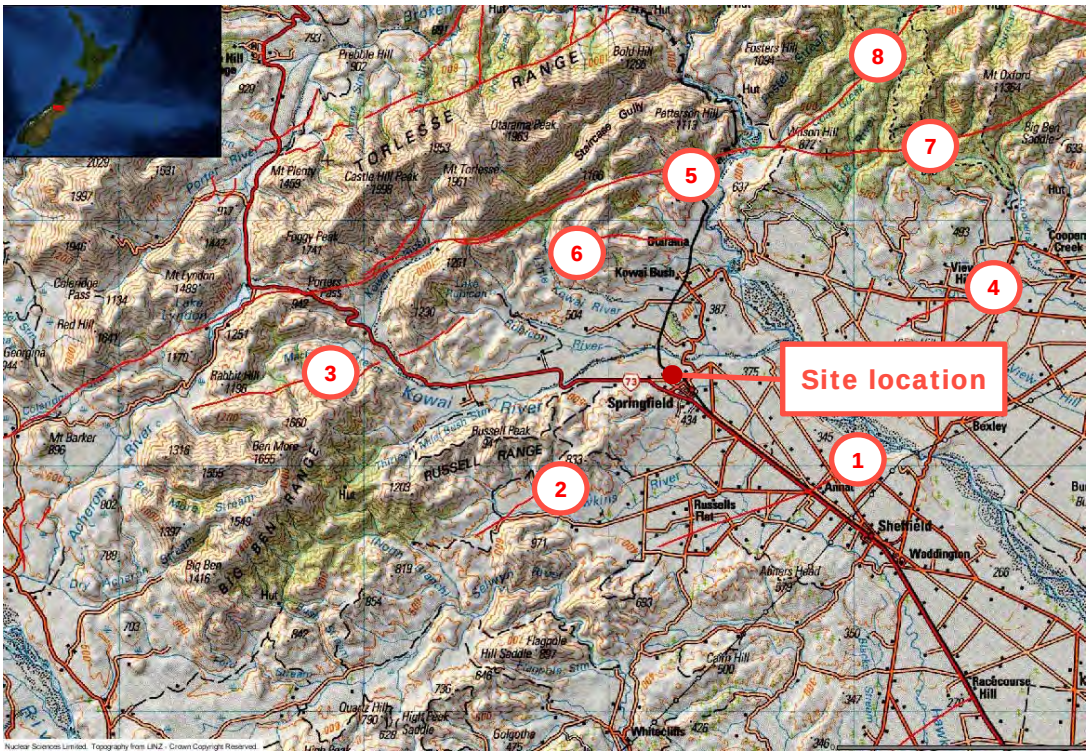


Figure 7: Active faults (Source: GNS, July 2013)

1	*High Peak Fault*	*5*	*Porters Pass Fault*
2	*Springfield Fault*	*6*	*Joyces Stream Fault*
3	*Benmore Fault*	*7*	*Coopers Creek Fault*
4	*Ashley Gorge Fault*	*8*	*Townshend Fault*

6.5. Conditional PGA for liquefaction assessment

The Ministry for Business, Innovation and Employment's (MBIE) '*Guidance for repairing and rebuilding houses affected by the Canterbury earthquakes*' (December 2012) specifies, for residential land, the peak ground acceleration ($PGA_{M7.5}$) to be adopted for liquefaction assessment in a serviceability limit state (SLS) event as $PGA_{M7.5}$ = 0.13g, and $PGA_{M7.5}$= 0.35g in an ultimate limit state (ULS) event.

Table 1: Comparison of peak horizontal ground accelerations close to site

PGA (horizontal)	SLS (1/25, M7.5)	ULS (1/500, M7.5)	Sept 2010 (M7.1)	Feb 2011 (M6.2)
Design (as of April 2012)	0.13g	0.35g		
Conditional Median PGA at Springfield Fire Station			0.22g	0.09g
Magnitude Scaling Factor (MSF)			**1.11**	**1.41**
Equivalent to $PGA_{M7.5}$			**0.20g**	**0.06g**

[2] Planning for Development of Land on or Close to Active Faults: A Guideline to Assist Resource Management Planners in New Zealand (Published July 2003)

The conditional median peak horizontal ground accelerations recorded at the Springfield Fire Station (around 600m south of the site) in the September 2010 event exceeded the Serviceability Limit State (SLS, $PGA_{M7.5}$=0.13g), but were less than the Ultimate Limit State (ULS, $PGA_{M7.5}$=0.35g). Refer to Table 1.

6.6. Liquefaction hazard mapping

Environment Canterbury's review of the liquefaction hazard information[3] in eastern Canterbury and does not extend to Springfield.

6.7. Flood hazard

The site is located outside of the flood areas monitored by Environment Canterbury (ECan). Refer to Appendix B.

6.8. Existing well-logs

Nearby well logs L35/1161, L35/1159, L35/1160, L35/0719, L35/0287, and L35/0674 typically encountered deep clayey/silty gravels to at least 15m below ground level, with some minor lenses of clay or silt between 2 to 4m depth. Refer to Appendix C.

7. SITE INVESTIGATION

7.1. Shallow testing

15 machine excavated test pits were undertaken across the site. Each test pit was excavated to 2.2m to 3.2m depth in order to confirm the nature of the shallow subsoil materials.

In addition, 15 Scala penetrometer tests were undertaken across the site, with one penetrometer test adjacent to each test pits to confirm the inferred ultimate bearing strengths of the shallow subsoil materials.

Refer to Appendix D for the geotechnical test location plan, and Appendix E for the site investigation records.

7.1.1. Test pit results

Test pit 1 encountered silty topsoil to 0.2m depth, over sand to 0.5m and sandy gravel to 2.6m below ground level where the test pit terminated.

Test pits 2 and 15 encountered silty topsoil to 0.25m depth, over silt to 0.7m to 2.4m and sandy gravel to 2.2m to 3.2m below ground level where the test pits terminated.

The clayey silt was typically deepest in the central part of the site.

The underlying sandy gravels contain cobbles, and occasional boulders, and give the appearance of being highly permeable.

[3] Brackley, H.I. (2012): Review of liquefaction hazard information in eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts – Environment Canterbury, Report No. R12/83

Groundwater was generally encountered between 2.1m to 2.7m below ground level.

Refer to Appendix E.

7.1.2. Scala penetrometer testing

Shallow Scala penetrometer test results typically exceeded 3 blows per 75mm at 400mm to 800mm depth, which meets or exceeds the minimum penetration resistance required to be termed as "*Good Ground*" in accordance with the compliance document for New Zealand Building Code, Clause B1 Structure. Refer to Appendix E.

8. LIQUEFACTION ASSESSMENT

Due to the presence of deep highly permeable gravels cobbles and boulders, and the depth to groundwater, the site is not likely to be at high risk of liquefaction.

8.1. Provisional land classification

Based on the nature of the subsoil materials and depth to groundwater, we conservatively assess the underlying soils across the site to be consistent with the **TC1** land classification (*i.e. <15mm settlement in a SLS event, and <25mm in a ULS event*).

8.2. Geotechnical inspections required

Section 16.2 of MBIE guidelines[4] advise appropriate geotechnical investigations be carried out to enable the ground forming materials to at least 15m depth to be characterised, unless the ground is known to be of acceptable quality from lesser depths, for example in areas known to be underlain by competent gravels or deep groundwater profiles.

At this site, the underlying geology comprises shallow topsoil to around 0.2-0.3m depth, overlying silts and clays to 0.6 to 2.4m depth, over gravels. Nearby well logs indicate these gravels extend to considerable depth in excess of 60m. With groundwater around 2.1m to 2.7m below ground level in winter conditions.

The results of the test pits and penetrometer testing, along with the evidence of the deeper geology indicated by existing well logs, provides satisfactory evidence of the nature of the ground forming materials to at least 15m depth.

Additional deep geotechnical investigation is not warranted for this Plan Change.

[4] Guidance for Repairing and rebuilding houses affected by the Canterbury earthquakes, version 3, Ministry of Business, Innovation and Employment (MBIE), December 2012

9. RMA (1991) SECTION 106

9.1. Performance philosophy

In determining the requirement for future ground performance it is useful to outline the requirements of the New Zealand Building Code, Clause B1-Structure which advises that buildings, building elements and site work must;

(B.1.3.1) have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives. (Generally referred to as the Ultimate Limit State, ULS).

(B.1.3.2) have a low probability of causing loss of amenity through undue deformations, vibratory response, degradation or other physical characteristics throughout their lives, or during construction or alteration when the building is in use (generally referred to as the Serviceability Limit State , SLS).

9.2. Erosion, falling debris, landsliding

Due to the location, geology and topography of the site and surrounding land, the site is not likely to be subject to material damage due to erosion, falling debris or landsliding.

9.3. Inundation

We note that subdivision of the site will not increase the risk of inundation to the surrounding area, and the site will not be at any greater risk than that which existed previously.

The are no significant topographical features that form concentrations of surface stormwater across the site, however, there may well be shallow topographical features that could not be easily observed at time of our inspection that may tend to form small concentrations in larger storm events. In general, there is no obvious risk of inundation. We note that building floor levels constructed in accordance with the relevant requirements of the NZBC would be adequate to mitigate the floor level requirements.

The Selwyn District Council and Environmental Canterbury (ECan) do not hold any specific record for the risk of inundation at the site, and ECan comments on the presence of river terrace to the north which effectively prevents flow from Kowai River reaching the site.

9.4. Subsidence

'The Ministry for Business, Innovation and Employment's'[4] guidance document specified the values to be adopted for liquefaction assessment. The peak ground accelerations to be used for liquefaction assessment are 0.13g for a Serviceability Limit State (SLS) event, and 0.35g for an Ultimate Limit State (ULS) event.

The site was subjected to peak ground accelerations of 0.22g ($PGA_{7.5}$=0.20g) in the September 2010, and 0.09g ($PGA_{7.5}$=0.06g) in the February 2011 earthquakes. The September 2010 earthquake had the largest shaking intensity and exceeded the serviceability limit state event with no record of ground damage at the site or the general area.

Based on actual ground performance, and the nature of the underlying geology and depth to groundwater, we consider that subsidence due to liquefaction is not likely.

9.4.1. Provisional land classification

With reference to the MBIE's guidelines[4] and based on our assessment, we consider future land performance likely to be within the parameters Technical Category 1 (TC1).

9.5. Vehicle access

There are no specific geotechnical requirements for formation of private vehicle access to each lot.

9.6. Stormwater

In terms of capacity, the underlying sandy gravels will provide a suitable media for receiving discharges of roof and driveway stormwater runoff into ground. We have not verified the status of any future stormwater discharge into land in terms of the relevant Regional Plan/s.

9.7. Disposal of treated effluent

The underlying sandy gravels provides adequate capacity for receiving discharges of treated effluent into ground, providing all discharges comply with the requirements of the relevant Regional Plans. We have not verified the status of any future discharge of treated effluent into land in terms of the relevant Regional Plan/s.

10.CONCLUSION

The site is not likely to be subject to material damage due to subsidence, inundation, falling debris, erosion, or land slippage as set out by RMA (1991) Section 106 (1a, b).

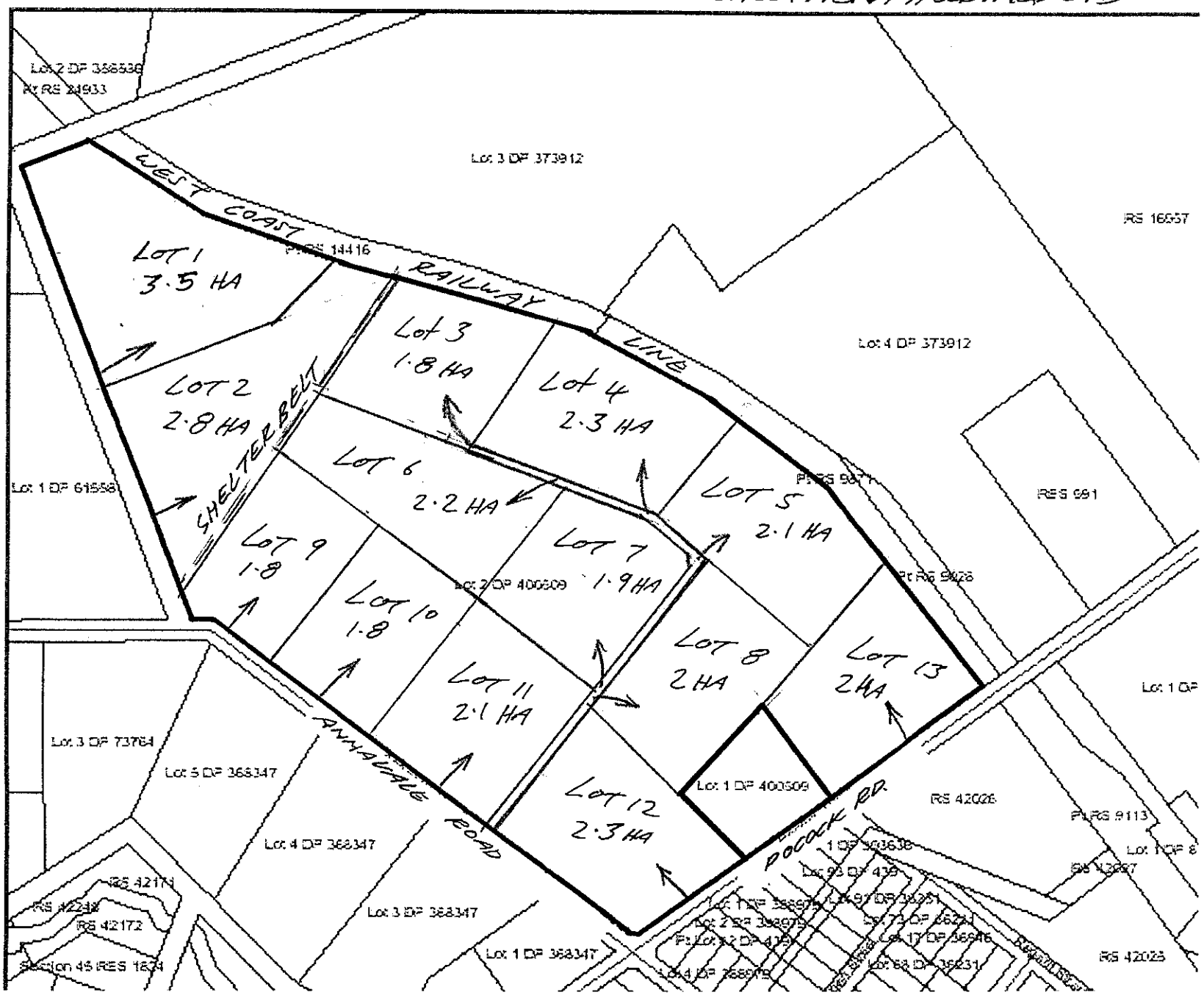
On this basis, we are satisfied that from a geotechnical perspective, the site is suitable for the proposed plan change and to be used for Low Density Residential (Living 2 Zone).

Appendix A : PROPOSED SUBDIVISION SCHEME PLAN

SCALE:
1:5,000

Print Page

SPRINGFIELD "BALLYMENA HOLDINGS LTD"



PLAN DRAWN
BY JOHN COOK (26/10/12)

Appendix B : FLOOD HAZARD

Firas Salman

From: Nick Griffiths <nick.griffiths@ecan.govt.nz>
Sent: Tuesday, 22 January 2013 10:55 a.m.
To: Firas Salman
Subject: RE: [#369527] Inundation and flood hazard assessment
Attachments: image001.png

Hi Firas

The Kowai River is located to the north, however it is bounded by a significant natural terrace in this location and therefore does not pose a flood risk to the property.

The property is outside of areas that have been monitored for flooding by Environment Canterbury following local rainfall events. We also have insufficient information to comment on whether or not there is any risk of localised flooding by runoff from adjoining land or water-races, drains or streams.

The Selwyn District Council or neighbouring property owners may have some information that could be of use.

For future reference there is a form on our website that you can send through to our customer services team to request flood hazard information.

http://ecan.govt.nz/services/environmental-planning/Pages/flood-assessments.aspx

There is normally a charge for this service.

Cheers

Nick Griffiths

Hazard Analyst

Tel: (03) 365-3828 | Mobile: 027 668-8494 | Fax: (03) 365-3194

Environment Canterbury
PO Box 345
Christchurch
New Zealand
www.ecan.govt.nz

From: Firas Salman [mailto:Firas.Salman@eliotsinclair.co.nz]
Sent: Monday, 21 January 2013 12:48 p.m.
To: Nick Griffiths
Subject: [#369527] Inundation and flood hazard assessment

Hi Nick

I'm working on a report for plan change to be submitted to the Selwyn District Council. It is required to incorporate the hazards outlined by Section 106 of the Resource Management Act (1991).
One of these hazards is the inundation and flood hazard. So, kindly help and provide the available information in this regard (including flood mapping, if available).

The subject property is currently rural land (zoned Outer Plains in the Selwyn District Plan) adjoining the north western edge of the Springfield township, in Selwyn District. It is bounded by Annavale Road, Pocock Road and the Midland Railway Line. Site plan is attached for your reference.

Kind regards

Firas A. Salman
Civil/Geotechnical Engineer

firas.salman@eliotsinclair.co.nz

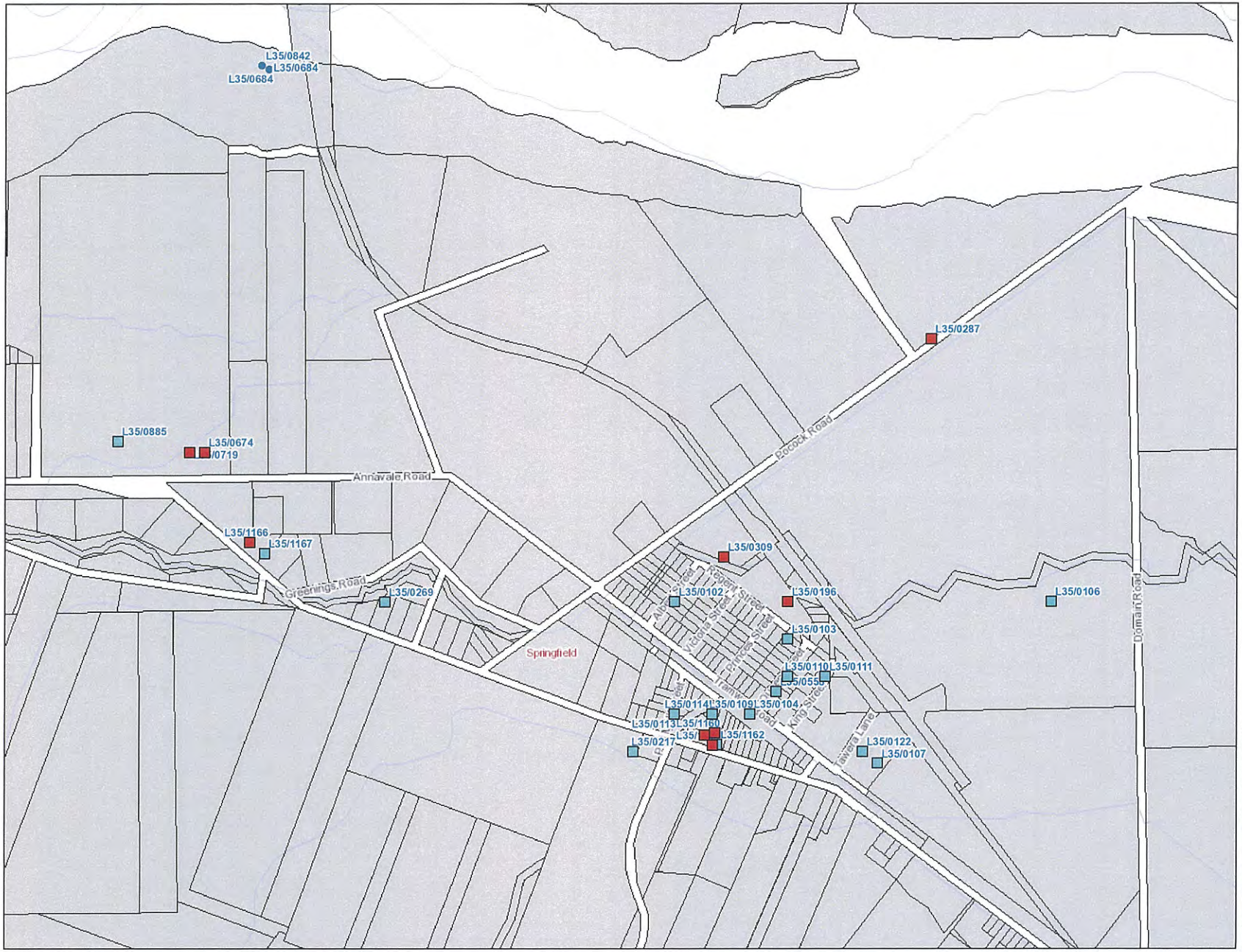
Eliot Sinclair
surveyors | engineers | planners

Eliot Sinclair & Partners Ltd. Unit 4, 502 Wairakei Road, PO Box 4597, Christchurch 8140, New Zealand
phone 03 379 4014, fax 03 365 2449

www.eliotsinclair.co.nz

Appendix C : WELL LOGS

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha



Cadastral & Region Boundaries

- Regional Boundaries
- Territorial Authority Boundaries
- State highways (>1:1,000,000)
- State highways (<1:1,000,000)
- State highways (<1:250,000)
- Roads (250,000 - 50,000)
- Land Parcel Boundary
- State highways outside Canterbury

Cadastral, Road & Placename Labels

- Population center and locality labels
- Hydrographic feature labels
- Parks, forests, and reserves labels
- Address point labels
- Road labels
- Regional authority labels
- Territorial authority labels

Groundwater

- Wells

N

0 62.5 125 250 375 500

Metres

1:10,000

Date Created: Monday, 21 January 2013
Disclaimer:
Copyright and disclaimers apply. See www.ecan.govt.nz for details

Bore or Well No: L35/1161
Well Name:
Owner: Chevron NZ Ltd

Environment Canterbury
Your regional council

Street of Well: 28 West Coast Road
Locality: Springfield
NZGM Grid Reference: L35:23001-62817 QAR 2
NZGM X-Y: 2423001 - 5762817
Location Description:
ECan Monitoring:
Well Status: Active (exist, present)

File No: CO6C/13247
Allocation Zone: Selwyn-Waimakariri
Uses: Foundation/Investigation Bore

Drill Date: 21 Oct 2010
Well Depth: 8.00m -GL
Initial Water Depth:
Diameter: 50mm

Water Level Count: 0
Strata Layers: 4
Aquifer Tests: 0
Isotope Data: 0
Yield/Drawdown Tests: 0

Measuring Point Ait:
GL Around Well: 0.00m -MP
MP Description:

Highest GW Level:
Lowest GW Level:
First Reading:
Last Reading:

Driller: C W Drilling and Investigations Ltd
Drilling Method: Rotary/Percussion
Casing Material: PVC
Pump Type:
Yield:
Drawdown:
Specific Capacity:

Aquifer Type:
Aquifer Name:

Calc. Min. GWL:
Last Updated: 29 May 2012
Last Field Check:

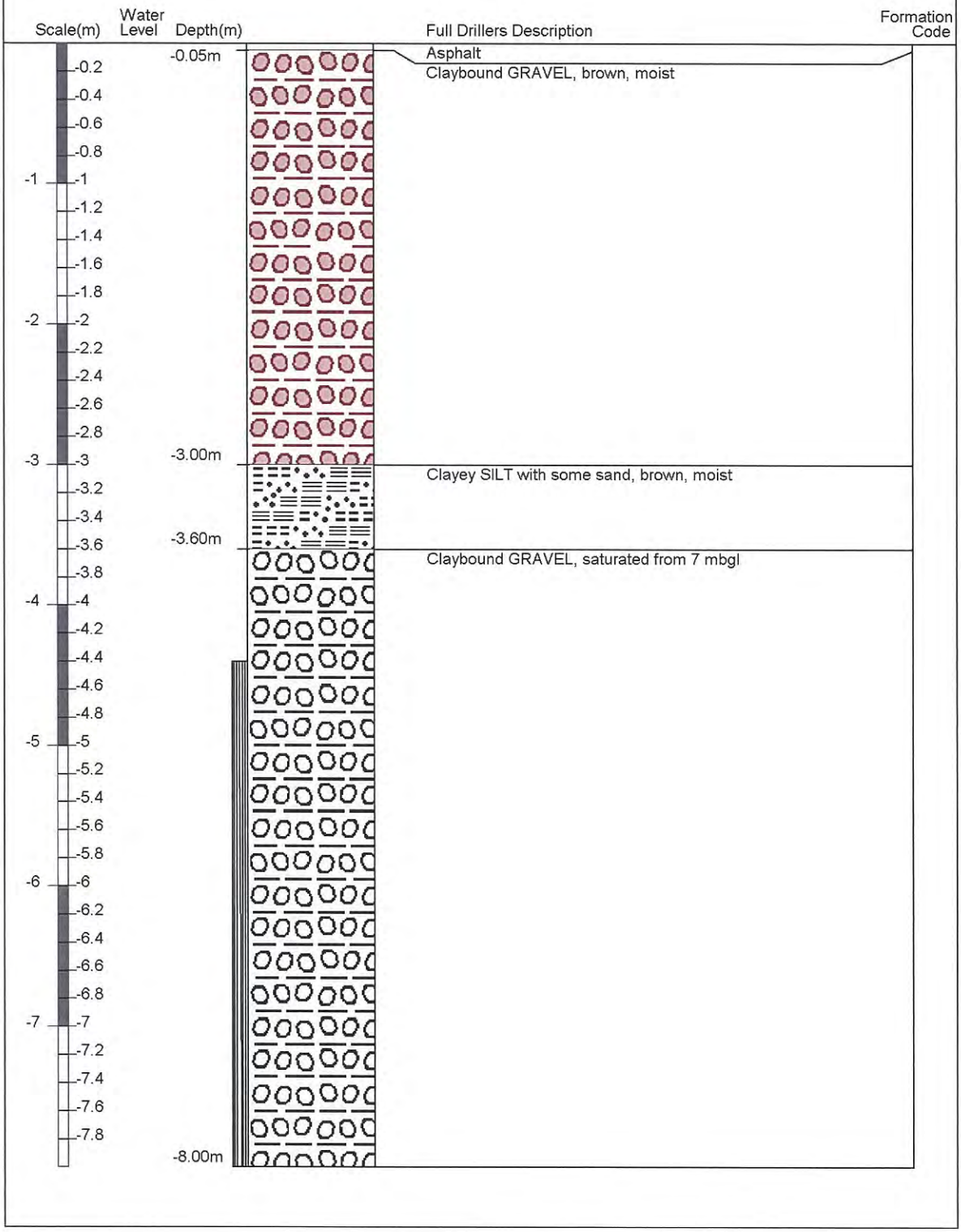
Screens:
Screen Type: Slotted PVC
Top GL: 4.40m
Bottom GL: 8.00m

Date	Comments
12 Mar 2012	NZMG Map Reference updated from: L35:2297-6284 shifted 38.6005m

Borelog for well L35/1161

Gridref: L35:23001-62817 Accuracy : 2 (1=high, 5=low)
Driller : C W Drilling and Investigations Ltd
Drill Method : Rotary/Percussion
Drill Depth : -8m Drill Date : 21/10/2010

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No:	L35/1159
Well Name:	
Owner:	Chevron NZ Ltd

Environment Canterbury
Your regional council

Street of Well:	28 West Coast Road	**File No:**	CO6C/13247
Locality:	Springfield	**Allocation Zone:**	Selwyn-Waimakariri
NZGM Grid Reference:	L35:22980-62844 QAR 2		
NZGM X-Y:	2422980 - 5762844		
Location Description:		**Uses:**	Foundation/Investigation Bore
ECan Monitoring:			
Well Status:	Active (exist, present)		

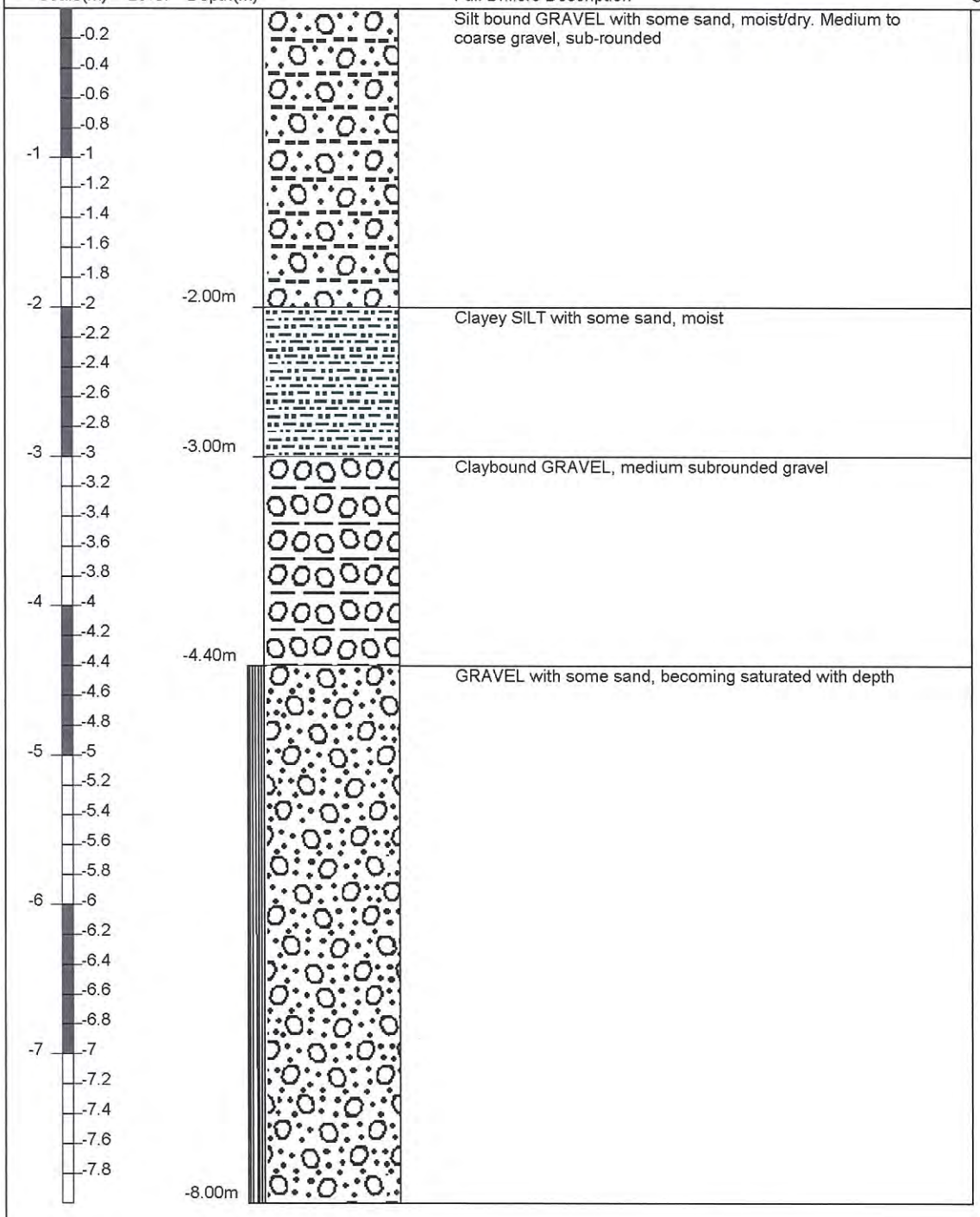
Drill Date:	21 Oct 2010	**Water Level Count:**	0
Well Depth:	8.00m -GL	**Strata Layers:**	4
Initial Water Depth:		**Aquifer Tests:**	0
Diameter:	50mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:		**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:		**First Reading:**	
		Last Reading:	
Driller:	CW Drilling and Investigation	**Calc. Min. GWL:**	
Drilling Method:		**Last Updated:**	29 May 2012
Casing Material:	PVC	**Last Field Check:**	
Pump Type:			
Yield:		**Screens:**	
Drawdown:		**Screen Type:**	Slotted PVC
Specific Capacity:		**Top GL:**	4.40m
		Bottom GL:	8.00m
Aquifer Type:			
Aquifer Name:			

Date	Comments
12 Mar 2012	NZMG Map Reference updated from: L35:2297-6284 shifted 10.7703m

Borelog for well L35/1159

Gridref: L35:22980-62844 Accuracy : 2 (1=high, 5=low)
Driller : CW Drilling and Investigation
Drill Method : Not Recorded
Drill Depth : -8m Drill Date : 21/10/2010

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No: L35/1160
Well Name:
Owner: Chevron NZ Ltd

Environment Canterbury
Your regional council

Street of Well: 28 West Coast Road
Locality: Springfield
NZGM Grid Reference: L35:23007-62850 QAR 2
NZGM X-Y: 2423007 - 5762850
Location Description:
ECan Monitoring:
Well Status: Active (exist, present)

File No: CO6C/13247
Allocation Zone: Selwyn-Waimakariri
Uses: Foundation/Investigation Bore

Drill Date: 20 Oct 2010
Well Depth: 9.00m -GL
Initial Water Depth:
Diameter: 50mm

Water Level Count: 0
Strata Layers: 5
Aquifer Tests: 0
Isotope Data: 0
Yield/Drawdown Tests: 0

Measuring Point Ait:
GL Around Well: 0.00m -MP
MP Description:

Highest GW Level:
Lowest GW Level:
First Reading:
Last Reading:

Driller: C W Drilling and Investigations Ltd
Drilling Method: Rotary/Percussion
Casing Material: PVC
Pump Type:
Yield:
Drawdown:
Specific Capacity:

Aquifer Type:
Aquifer Name:

Calc. Min. GWL:
Last Updated: 29 May 2012
Last Field Check:

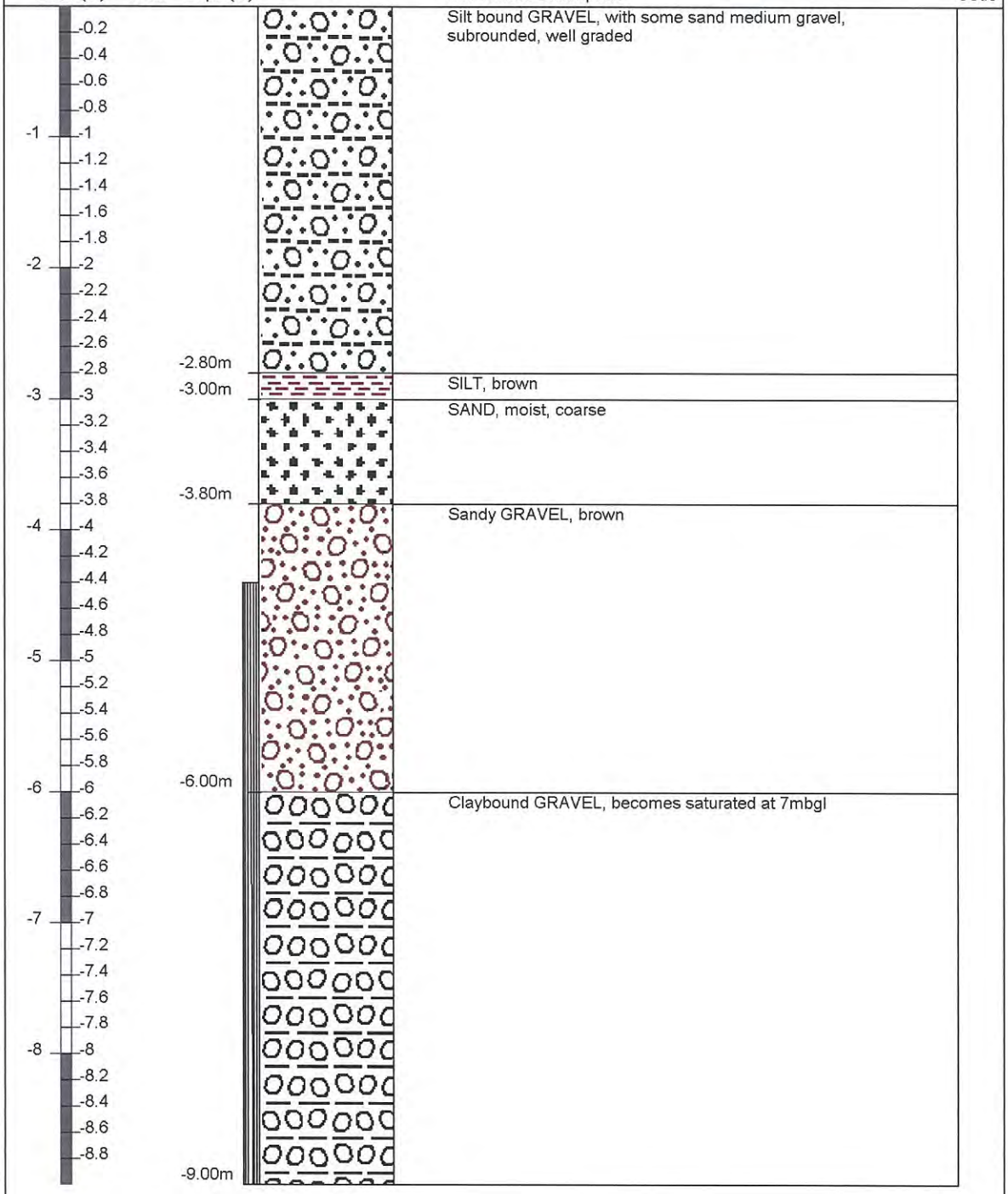
Screens:
Screen Type: Slotted PVC
Top GL: 4.40m
Bottom GL: 9.00m

Date	Comments
12 Mar 2012	NZMG Map Reference updated from: L35:2297-6284 shifted 38.3275m

Borelog for well L35/1160

Gridref: L35:23007-62850 Accuracy : 2 (1=high, 5=low)
Driller : C W Drilling and Investigations Ltd
Drill Method : Rotary/Percussion
Drill Depth : -9m Drill Date : 20/10/2010

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Bore or Well No: L35/0719
Well Name:
Owner: Buckley, D G & M M

Environment Canterbury
Your regional council

Street of Well: Annavale Road
Locality: Springfield
NZGM Grid Reference: L35:2161-6360 QAR 4
NZGM X-Y: 2421610 - 5763600
Location Description:
ECan Monitoring:
Well Status: Active (exist, present)

File No: CO6C/18035
Allocation Zone: Selwyn-Waimakariri
Uses: Domestic and Stockwater
Dairy Use

Drill Date: 04 Jul 2001
Well Depth: 29.82m -GL
Initial Water Depth: -10.40m -MP
Diameter: 150mm

Water Level Count: 0
Strata Layers: 16
Aquifer Tests: 0
Isotope Data: 0
Yield/Drawdown Tests: 1

Measuring Point Alt: 408.52m MSD QAR 4
GL Around Well: -0.30m -MP
MP Description: ToC

Highest GW Level:
Lowest GW Level:
First Reading:
Last Reading:

Driller: McMillan Water Wells Ltd
Drilling Method: Rotary Rig
Casing Material: STEEL
Pump Type:
Yield: 2 l/s
Drawdown: 2 m
Specific Capacity: 0.99 l/s/m

Calc. Min. GWL:
Last Updated: 01 Feb 2002
Last Field Check:

Screens:
Screen Type: Slotted Casing
Top GL: 13.00m
Bottom GL: 15.80m
Screen Type: Slotted Casing
Top GL: 19.50m
Bottom GL: 21.00m

Aquifer Type:
Aquifer Name:

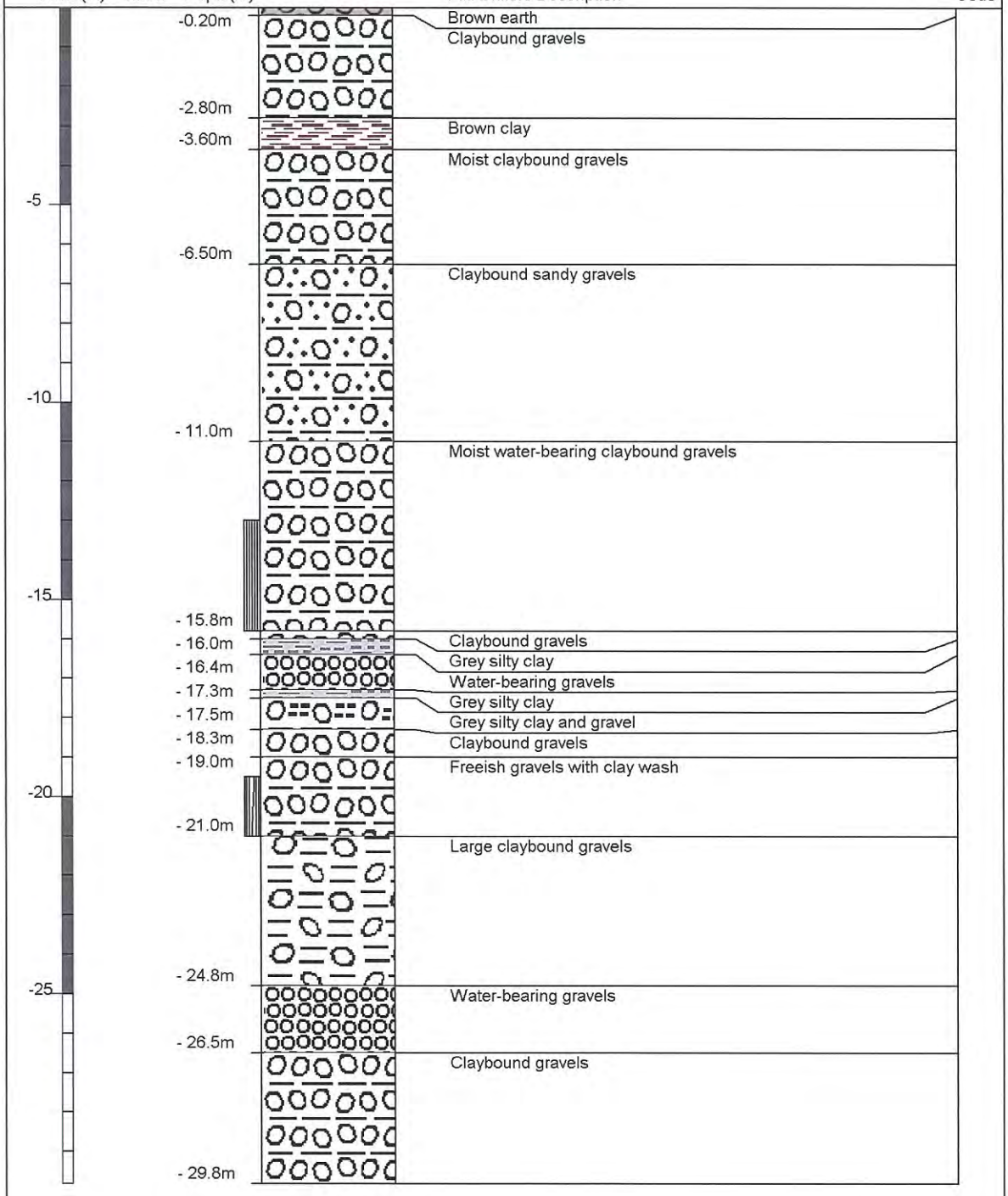
Date	Comments
01 Feb 2002	3rd Screen Perforated set from 24.80m to 26.50m
17 Mar 2008	StepTestDate Step Yield DrawDown StepDuration 04-Jul-01 1 2.05 3.55 2.25 04-Jul-01 2 2.27 2.3 3.5

L35/0719
32
+33
+34
6
1
7
5
14
2
18
15
8
17
4
19
13
9
1 Km
New Well
Railway
10
3
16
A
16
12
11
21
20A
20
Yards
Hse
Annsvale Rd
Main West Rd
250m
Well House

Borelog for well L35/0719

Gridref: L35:2161-6360 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 408.22 +MSD
Driller : McMillan Water Wells Ltd
Drill Method : Rotary Rig
Drill Depth : -29.82m Drill Date : 4/07/2001

Environment Canterbury Regional Council



Bore or Well No:	L35/0287
Well Name:	SPRINGFIELD 2
Owner:	SELWYN DISTRICT COUNCIL

Environment Canterbury
Your regional council

Street of Well:	POCOCKS RD	**File No:**	
Locality:	SPRINGFIELD	**Allocation Zone:**	Selwyn-Waimakariri
NZGM Grid Reference:	L35:2358-6390 QAR 4		
NZGM X-Y:	2423580 - 5763900		
Location Description:		**Uses:**	
ECan Monitoring:			
Well Status:	Casing Retrieved / Abandoned		

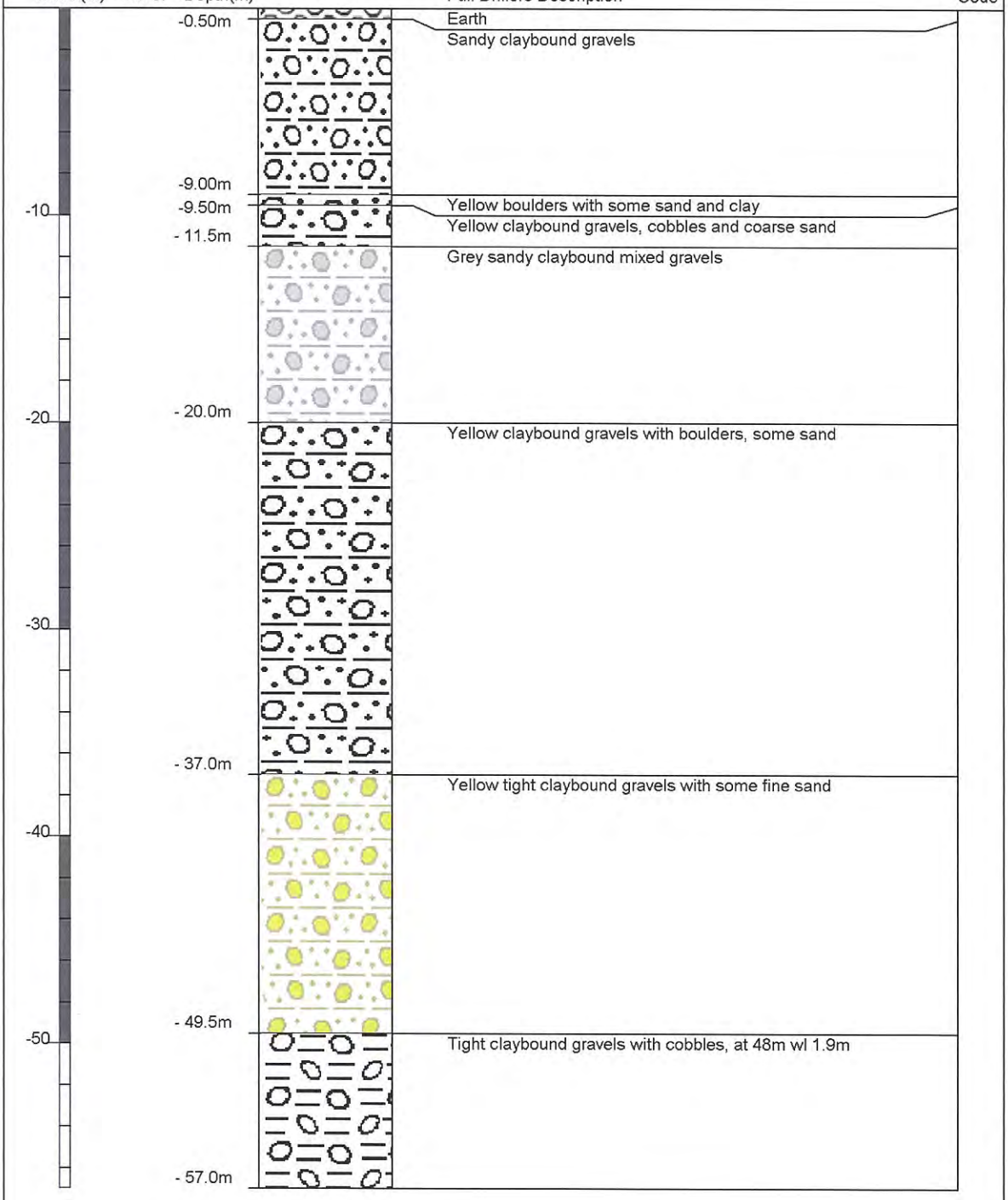
Drill Date:	20 Dec 1985	**Water Level Count:**	0
Well Depth:	112.80m -GL	**Strata Layers:**	20
Initial Water Depth:	-25.00m -MP	**Aquifer Tests:**	0
Diameter:	300mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	389.22m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	-1.22m -MP	**Lowest GW Level:**	
MP Description:	Top of pipe	**First Reading:**	
		Last Reading:	
Driller:	McMillan Water Wells Ltd	**Calc. Min. GWL:**	
Drilling Method:	Rotary/Percussion	**Last Updated:**	22 Mar 2006
Casing Material:		**Last Field Check:**	24 Jan 1986
Pump Type:	Unknown		
Yield:	0 l/s	**Screens:**	
Drawdown:	0 m	**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:	Unknown		
Aquifer Name:			

Date	Comments
11 Oct 2001	Frist well sunk for Malvern CC, pump test done by airlifted from compressor

Borelog for well L35/0287 page 1 of 2

Gridref: L35:2358-6390 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 388 +MSD
Driller : McMillan Water Wells Ltd
Drill Method : Rotary/Percussion
Drill Depth : -114m Drill Date : 20/12/1985

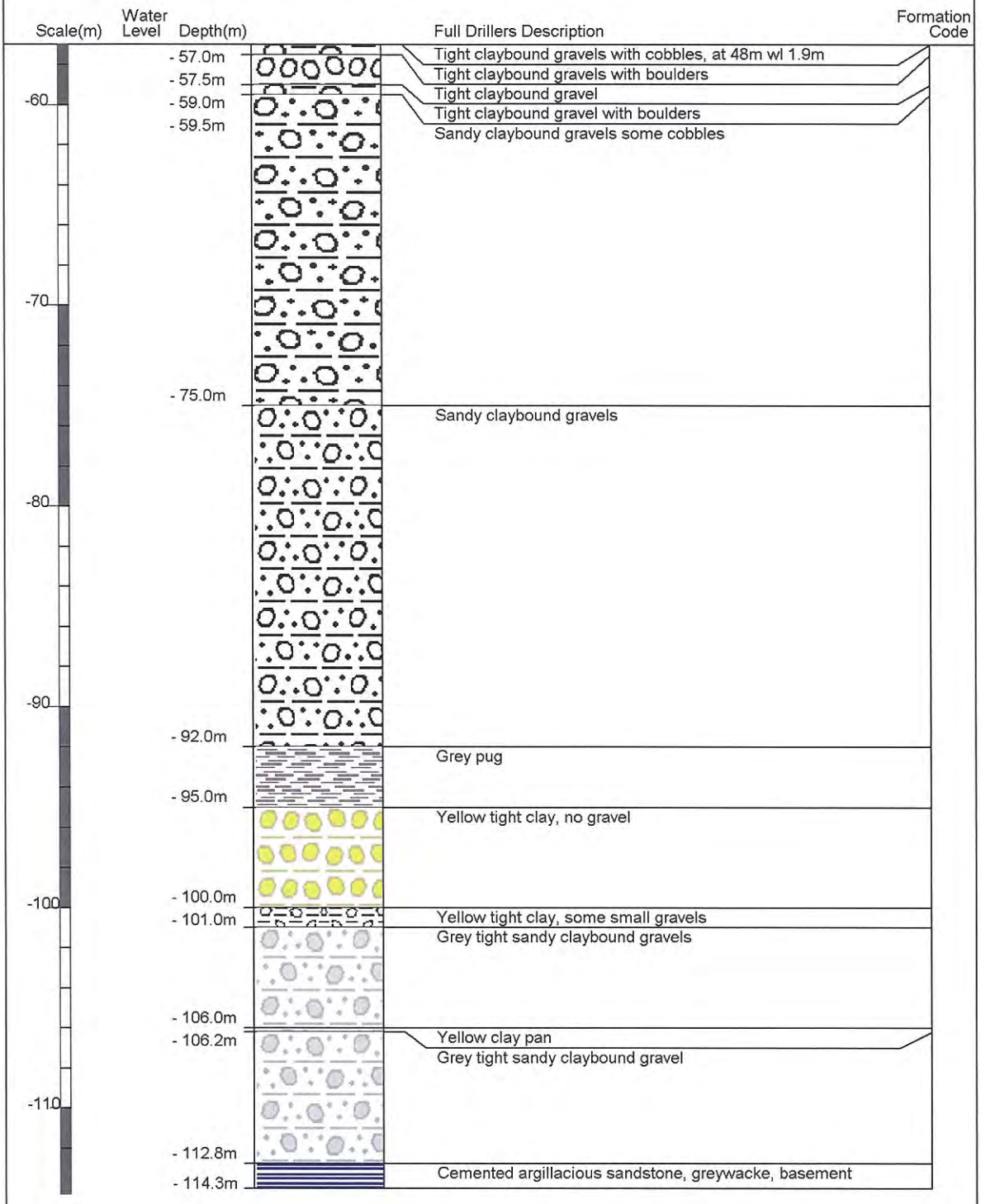
Environment Canterbury Regional Council



Borelog for well L35/0287 page 2 of 2

Gridref: L35:2358-6390 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 388 +MSD
Driller : McMillan Water Wells Ltd
Drill Method : Rotary/Percussion
Drill Depth : -114m Drill Date : 20/12/1985

Environment Canterbury Regional Council



Bore or Well No:	L35/0674
Well Name:	
Owner:	Voice, DR

Environment Canterbury
Your regional council

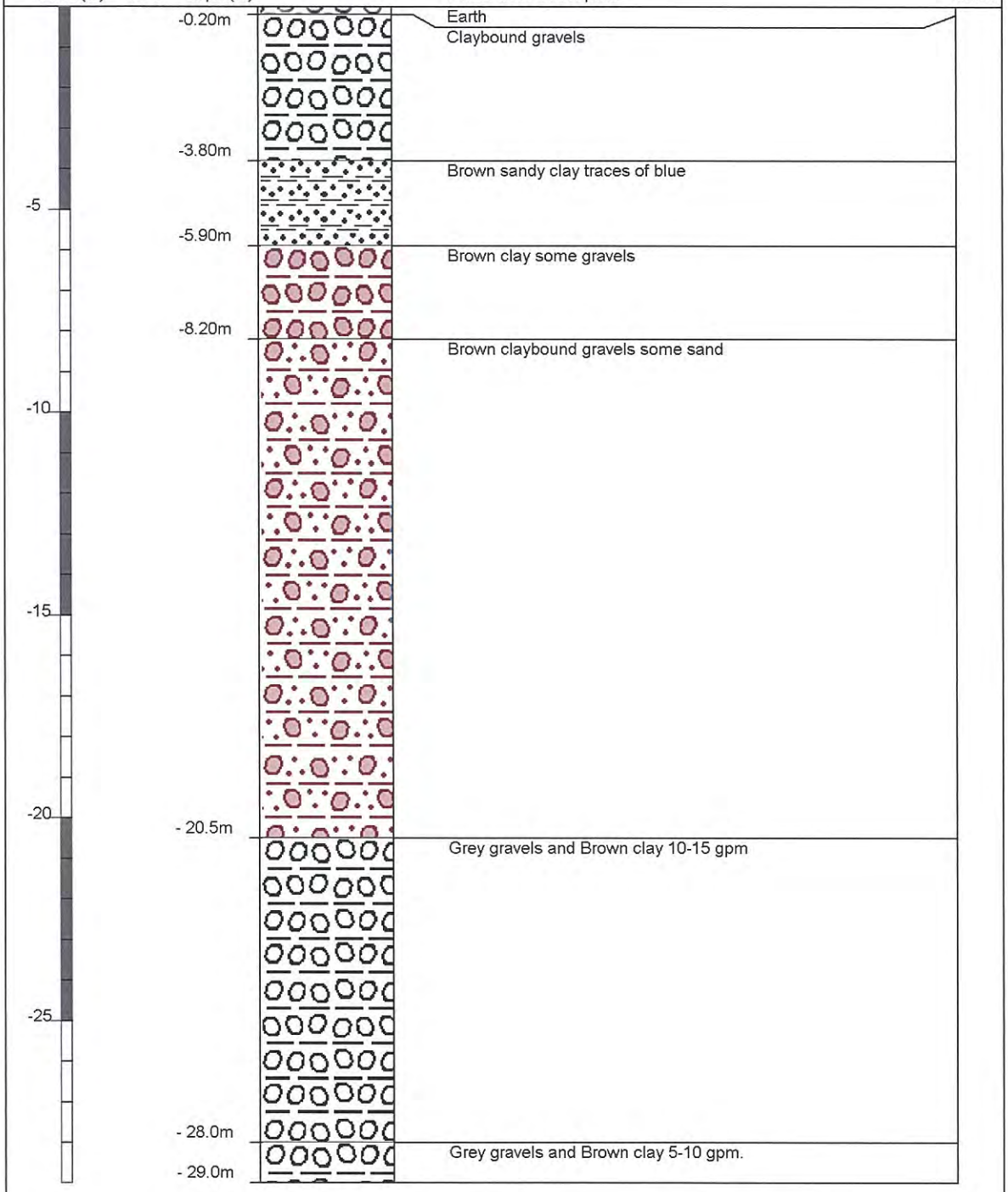
Street of Well:	West Coast Road	**File No:**	CO6C/17145
Locality:	Springfield	**Allocation Zone:**	Selwyn-Waimakariri
NZGM Grid Reference:	L35:2165-6360 QAR 3		
NZGM X-Y:	2421650 - 5763600		
Location Description:		**Uses:**	
ECan Monitoring:			
Well Status:	Casing Retrieved / Abandoned		

Drill Date:	11 Oct 2000	**Water Level Count:**	0
Well Depth:	29.00m -GL	**Strata Layers:**	7
Initial Water Depth:		**Aquifer Tests:**	0
Diameter:	150mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	408.36m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:		**First Reading:**	
		Last Reading:	
Driller:	McMillan Water Wells Ltd	**Calc. Min. GWL:**	
Drilling Method:	Rotary/Percussion	**Last Updated:**	26 Jan 2001
Casing Material:	STEEL	**Last Field Check:**	
Pump Type:			
Yield:		**Screens:**	
Drawdown:		**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:			
Aquifer Name:			

Borelog for well L35/0674

Gridref: L35:2165-6360 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 408.36 +MSD
Driller : McMillan Water Wells Ltd
Drill Method : Rotary/Percussion
Drill Depth : -29m Drill Date : 11/10/2000

Environment Canterbury Regional Council



Bore or Well No: L35/0309
Well Name: SPRINGFIELD 3
Owner: SELWYN DISTRICT COUNCIL

Environment Canterbury
Your regional council

Street of Well:	CNR POCOCKS ROAD & TRAMWAY ROAD	**File No:**	
Locality:	SPRINGFIELD	**Allocation Zone:**	Selwyn-Waimakariri
NZGM Grid Reference:	L35:2303-6332 QAR 4		
NZGM X-Y:	2423030 - 5763320		
Location Description:		**Uses:**	
ECan Monitoring:			
Well Status:	Not Used		

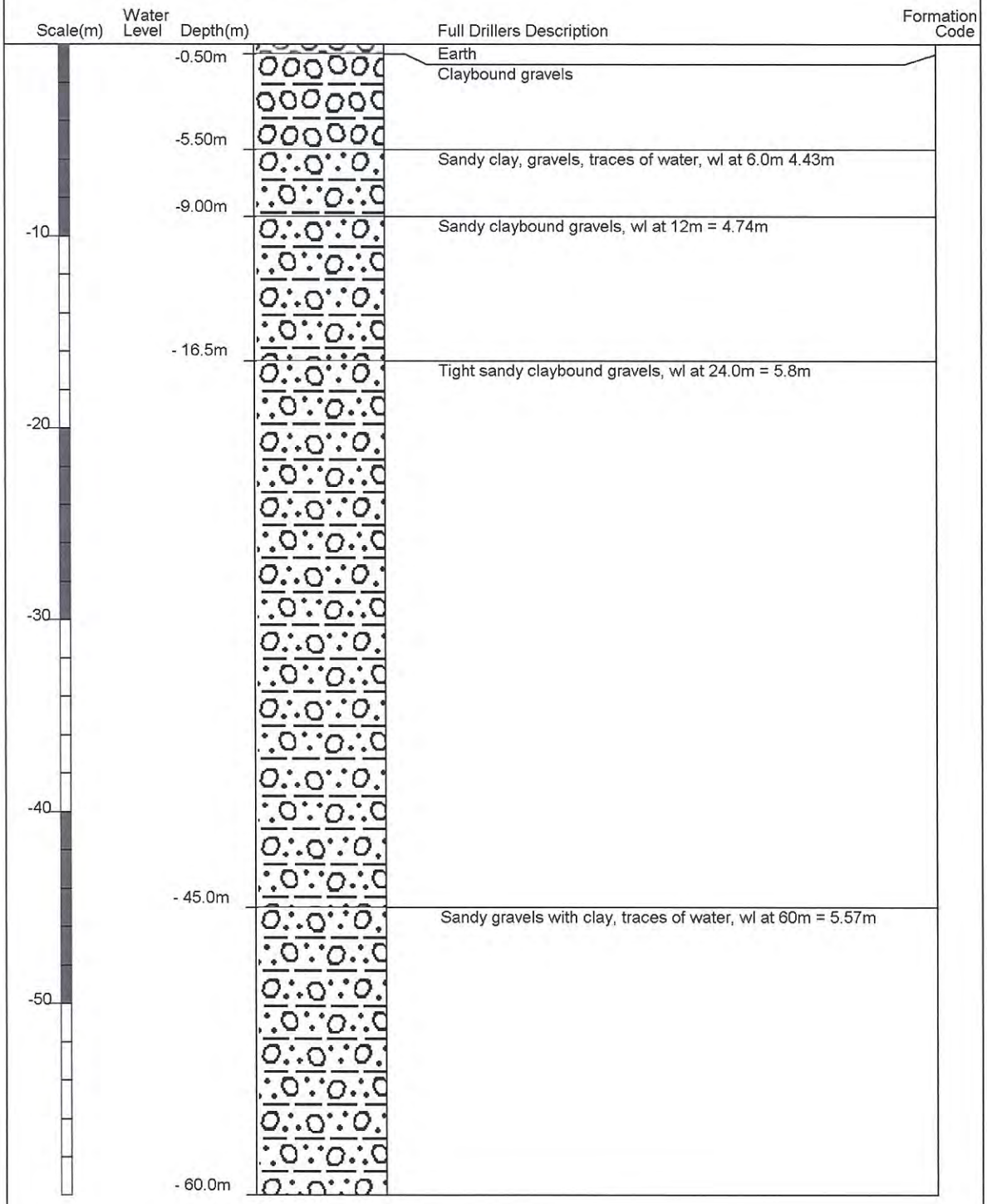
Drill Date:	13 Jan 1986	**Water Level Count:**	0
Well Depth:	60.00m -GL	**Strata Layers:**	6
Initial Water Depth:	-5.57m -MP	**Aquifer Tests:**	0
Diameter:	300mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	394.89m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	-0.75m -MP	**Lowest GW Level:**	
MP Description:	ToC	**First Reading:**	
		Last Reading:	
Driller:	McMillan Water Wells Ltd	**Calc. Min. GWL:**	
Drilling Method:	Rotary/Percussion	**Last Updated:**	22 Mar 2006
Casing Material:		**Last Field Check:**	
Pump Type:	Unknown		
Yield:	0 l/s	**Screens:**	
Drawdown:	0 m	**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:	Unknown		
Aquifer Name:			

Date	Comments
04 Dec 2000	2nd well sunk for malvern C.C. Distance form old railway well approx 300meters pump test done by airlift from compressor.

Borelog for well L35/0309

Gridref: L35:2303-6332 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 394.14 +MSD
Driller : McMillan Water Wells Ltd
Drill Method : Rotary/Percussion
Drill Depth : -60m Drill Date : 13/01/1986

Environment Canterbury Regional Council



Bore or Well No: L35/0196
Well Name:
Owner: N.Z. RAILWAYS

Environment Canterbury
Your regional council

Street of Well:	Regent Street	**File No:**	
Locality:	SPRINGFIELD	**Allocation Zone:**	Selwyn-Waimakariri
NZGM Grid Reference:	L35:232-632 QAR 4		
NZGM X-Y:	2423200 - 5763200		
Location Description:		**Uses:**	Domestic Supply
ECan Monitoring:			
Well Status:	Active (exist, present)		

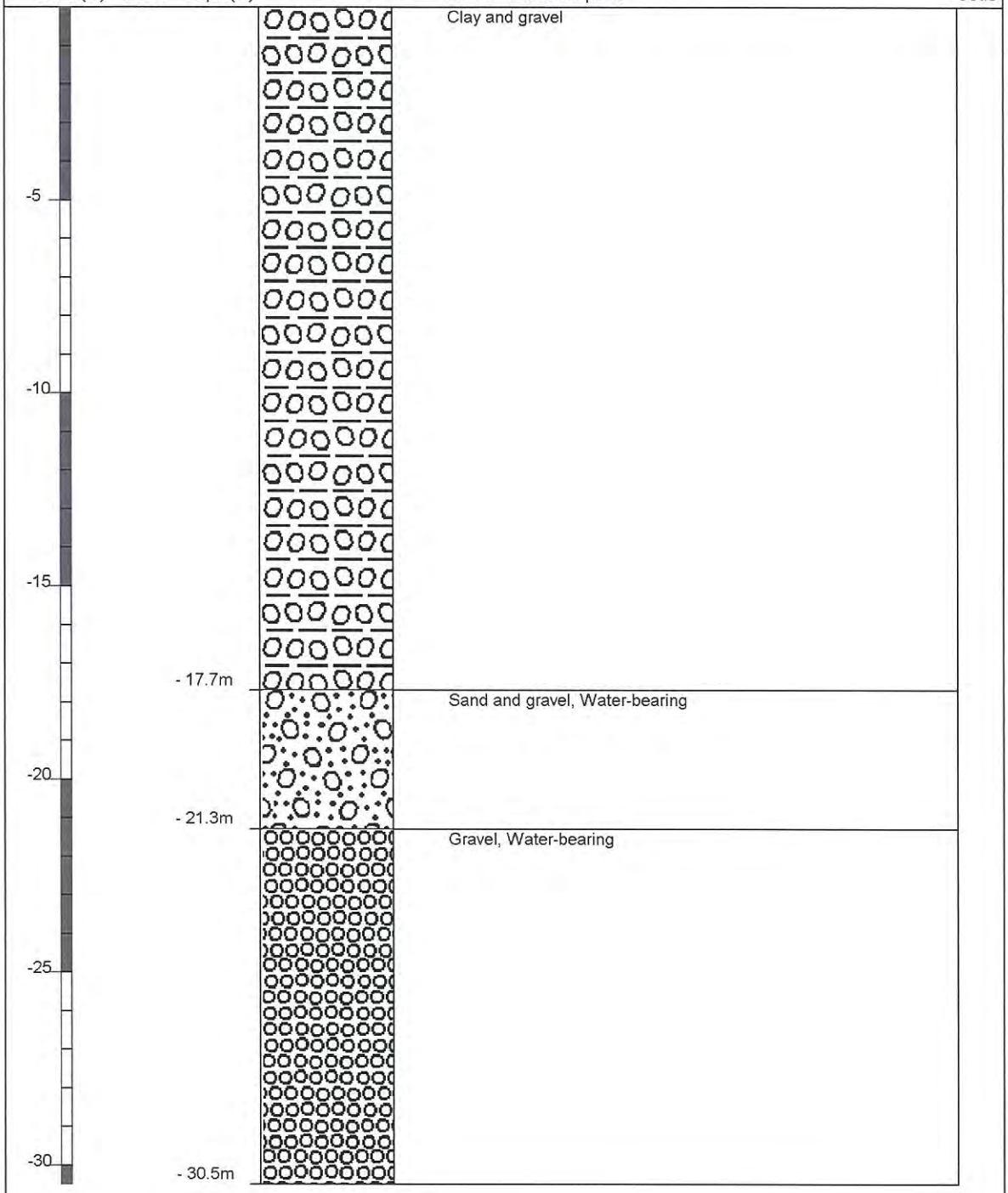
Drill Date:	01 Jul 1955	**Water Level Count:**	0
Well Depth:	30.50m -GL	**Strata Layers:**	3
Initial Water Depth:		**Aquifer Tests:**	0
Diameter:	150mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	391.42m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:		**First Reading:**	
		Last Reading:	
Driller:	Shennan, W D & Co	**Calc. Min. GWL:**	
Drilling Method:	Cable Tool	**Last Updated:**	13 Nov 2000
Casing Material:		**Last Field Check:**	
Pump Type:	Submersible		
Yield:	0 l/s	**Screens:**	
Drawdown:	0 m	**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:	Unknown		
Aquifer Name:			

Date	Comments
13 Nov 2000	Supplies several railway houses. NCCB 3130. At 16.9m - 118m3/day, 25.1m - 236m3/day, 29.2m - 295m3/day. Pump 100mm.

Borelog for well L35/0196

Gridref: L35:232-632 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 391.42 +MSD
Driller : Shennan, W D & Co
Drill Method : Cable Tool
Drill Depth : -30.5m Drill Date : 1/07/1955

Environment Canterbury Regional Council



Bore or Well No: L35/1166
Well Name:
Owner: MR C SEDDON

Environment Canterbury
Your regional council

Street of Well: WEST COAST ROAD
File No: CO6C/31913
Locality: Springfield
Allocation Zone: Selwyn-Waimakariri
NZGM Grid Reference: L35:2177-6336 QAR 3
NZGM X-Y: 2421770 - 5763360
Location Description:
Uses: Domestic Supply
ECan Monitoring:
Well Status: Active (exist, present)

Drill Date: 09 Dec 2010
Water Level Count: 0
Well Depth: 18.00m -GL
Strata Layers: 7
Initial Water Depth:
Aquifer Tests: 0
Diameter: 150mm
Isotope Data: 0
Yield/Drawdown Tests: 0

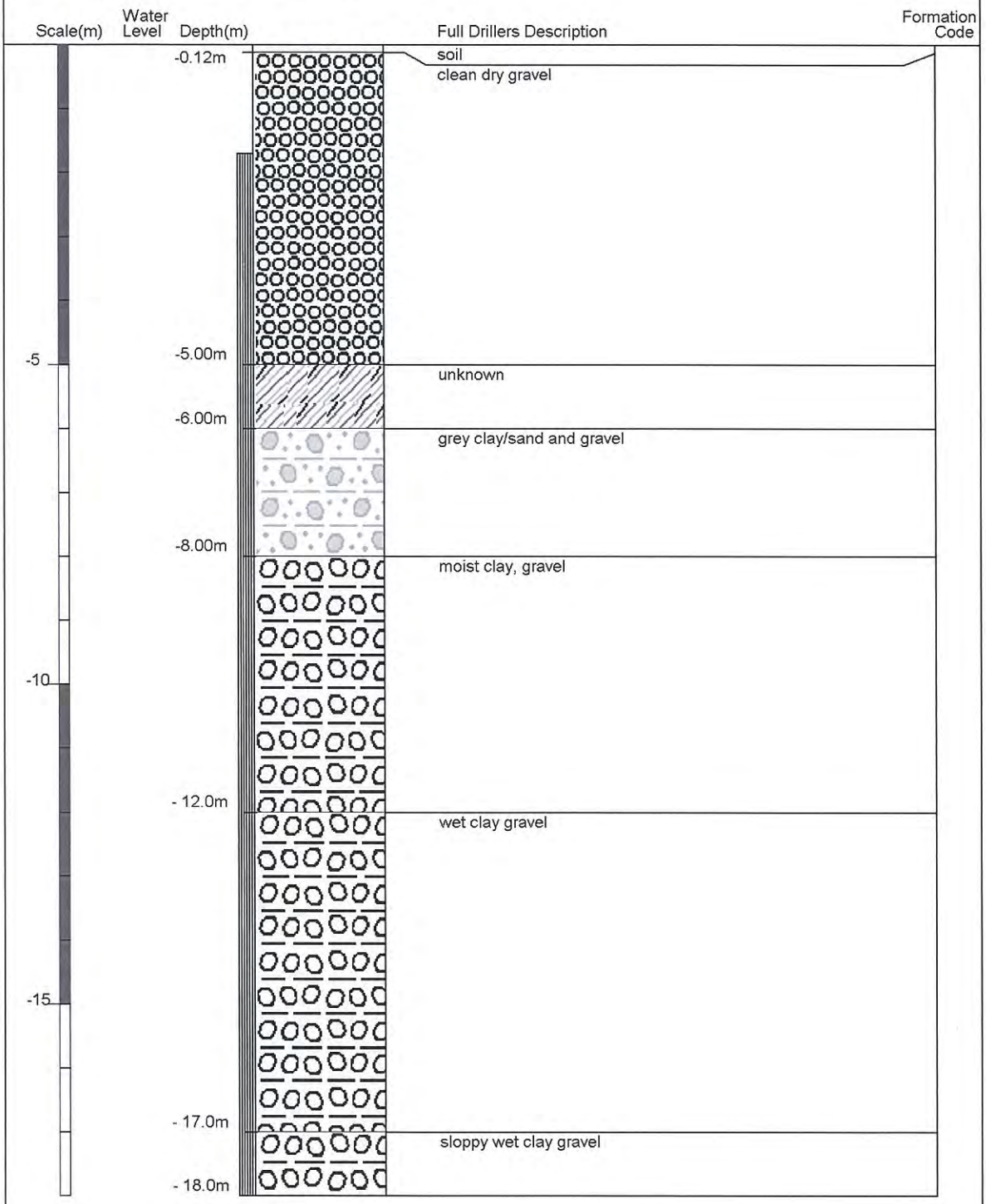
Measuring Point Ait: 410.00m MSD QAR 4
Highest GW Level:
GL Around Well: -0.40m -MP
Lowest GW Level:
MP Description: ToC
First Reading:
Last Reading:
Driller: Well Drilling Direct
Calc. Min. GWL:
Drilling Method: Rotary/Percussion
Last Updated: 05 Dec 2011
Casing Material: STEEL
Last Field Check:
Pump Type:
Yield:
Screens:
Drawdown:
Screen Type: Stainless steel
Specific Capacity:
Top GL: 1.70m
Bottom GL: 18.00m
Aquifer Type:
Aquifer Name:

Date	Comments
18 Jan 2011	Gridref changed from: L35:2181-6333 to L35:2177-6336 BCR confirms

Borelog for well L35/1166

Gridref: L35:2177-6336 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 409.6 +MSD
Driller : Well Drilling Direct
Drill Method : Rotary/Percussion
Drill Depth : -18m Drill Date : 9/12/2010

Environment Canterbury Regional Council



Appendix D : SHALLOW TESTS LOCATION PLAN

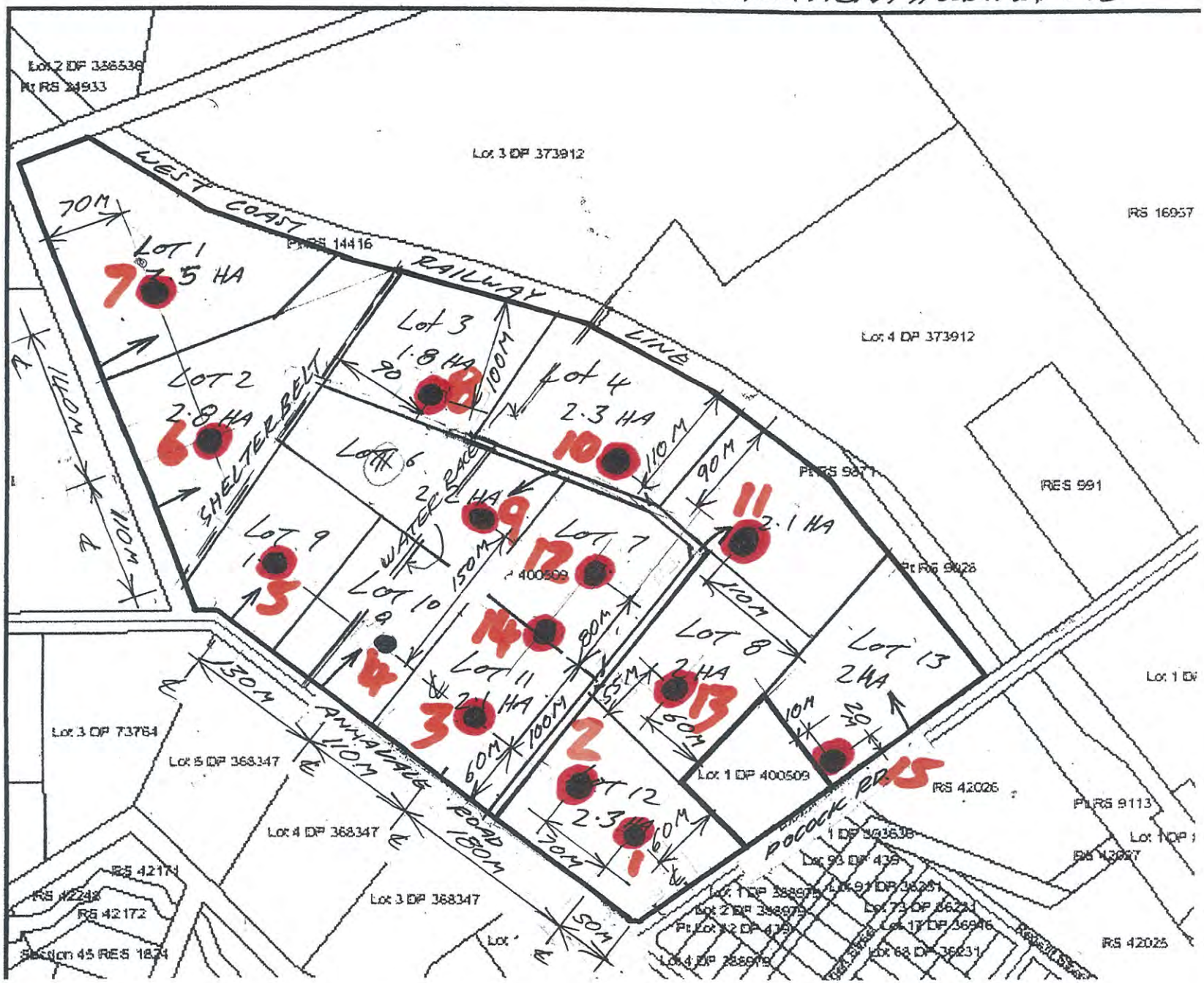
369527 – Shallow test locations plan

SCALE: 1:5,000

Print Page

SPRINGFIELD "BALLYMENA HOLDINGS LTD"

● - TEST PIT LOCATIONS



PLAN DRAWN BY JOHN COOK (26/10/12)

Appendix E : SHALLOW SITE INVESTIGATION RESULTS

TEST PIT & SCALA PENETROMETER RESULTS

Eliot Sinclair
surveyors | engineers | planners

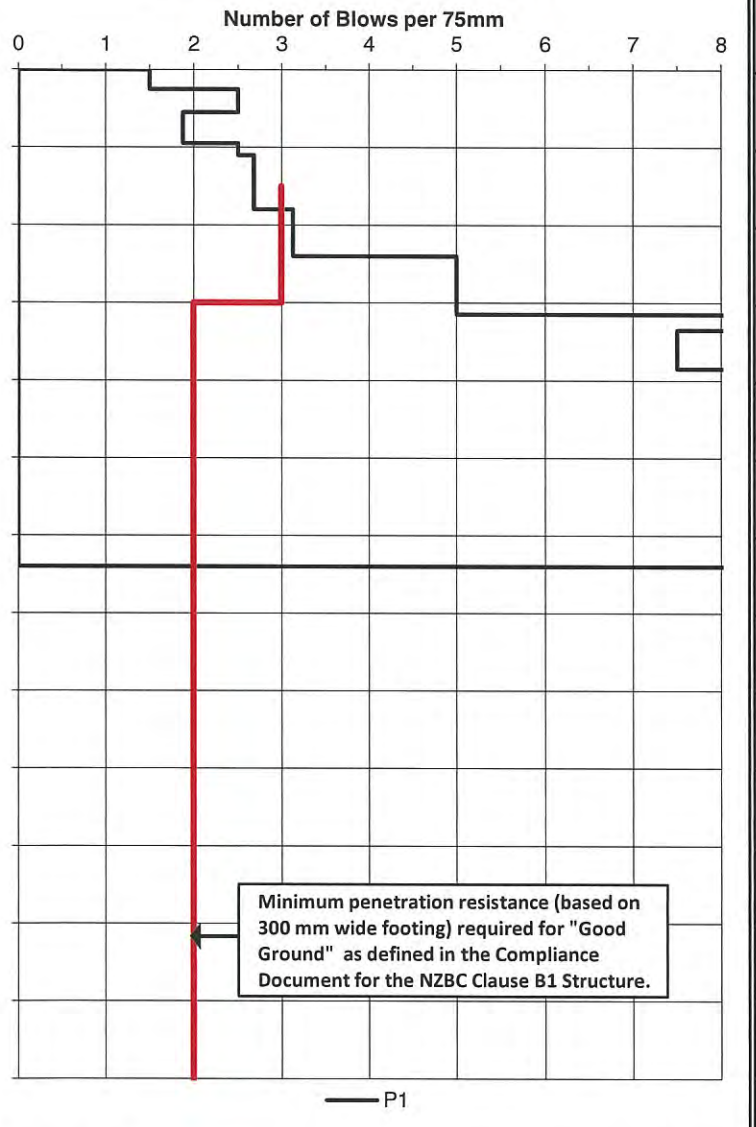
20 Troup Drive, Tower Junction
PO Box 9339, Christchurch 8149
Ph. (03) 379-4014 Fax. (03) 365-2449

Job Number	369527
Date Tested	1-Jul-2013
Page	1 of 15
D.P	400509
Lot	2

SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ✔

(Test Pit @ 1)

DEPTH [m]	
GL	Dark brown silty TOPSOIL
0.2	
0.4	Grey SAND, some gravel
0.6	Grey sandy GRAVEL
0.8	
1.0	
1.2	
1.4	
1.6	Brown sandy GRAVEL, some cobbles and occasional boulders
1.8	
2.0	
2.2	
2.4	
2.6	STOP
2.8	
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North ↑

See attached site plan

COMMENTS

Civil Engineer J. Cranmer Date: 23/8/13

Eliot Sinclair
surveyors | engineers | planners

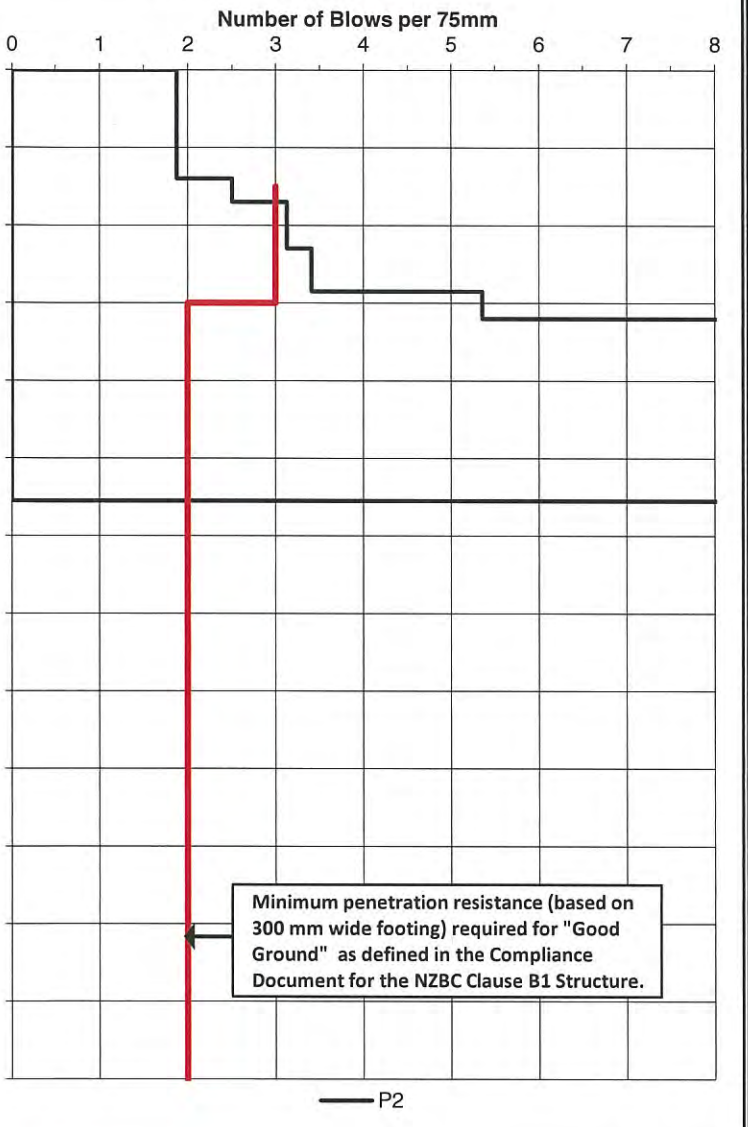
20 Troup Drive, Tower Junction
PO Box 9339, Christchurch 8149
Ph. (03) 379-4014 Fax. (03) 365-2449

Job Number	369527
Date Tested	1-Jul-2013
Page	2 of 15
D.P	400509
Lot	2

SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 2)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown SILT, low plasticity
0.6	
0.8	
1.0	
1.2	
1.4	Brown sandy GRAVEL, some cobbles and occasional boulders
1.6	
1.8	
2.0	
2.2	STOP
2.4	
2.6	
2.8	
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

Civil Engineer J. Armstrong Date: 23/8/13

Eliot Sinclair
surveyors | engineers | planners

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

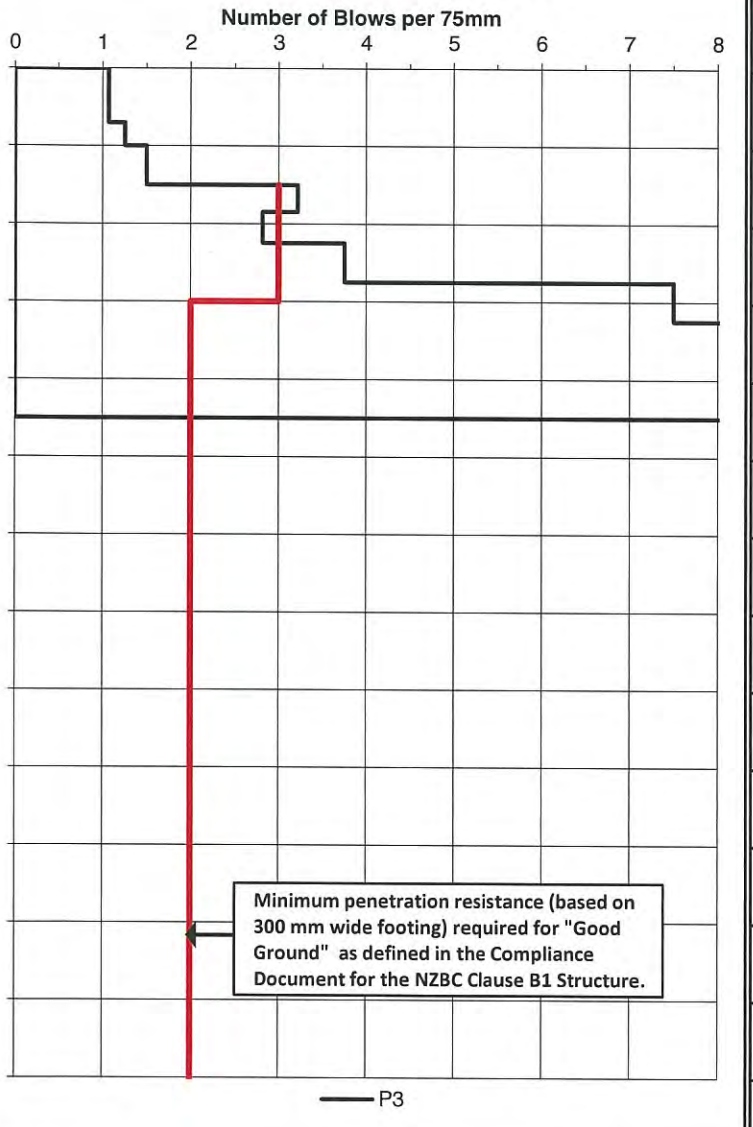
Job Number	369527
Date Tested	1-Jul-2013
Page	3 of 15
D.P	400509
Lot	2
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ✔

(Test Pit @ 3)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown SILT
0.6	
0.8	
1.0	
1.2	
1.4	Brown sandy GRAVEL, some cobbles and occasional boulders, moist
1.6	
1.8	
2.0	
2.2	STOP
2.4	
2.6	
2.8	
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North ↑

See attached site plan

COMMENTS

Civil Engineer J. Armstrong Date: 23/8/13

Eliot Sinclair
surveyors | engineers | planners

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

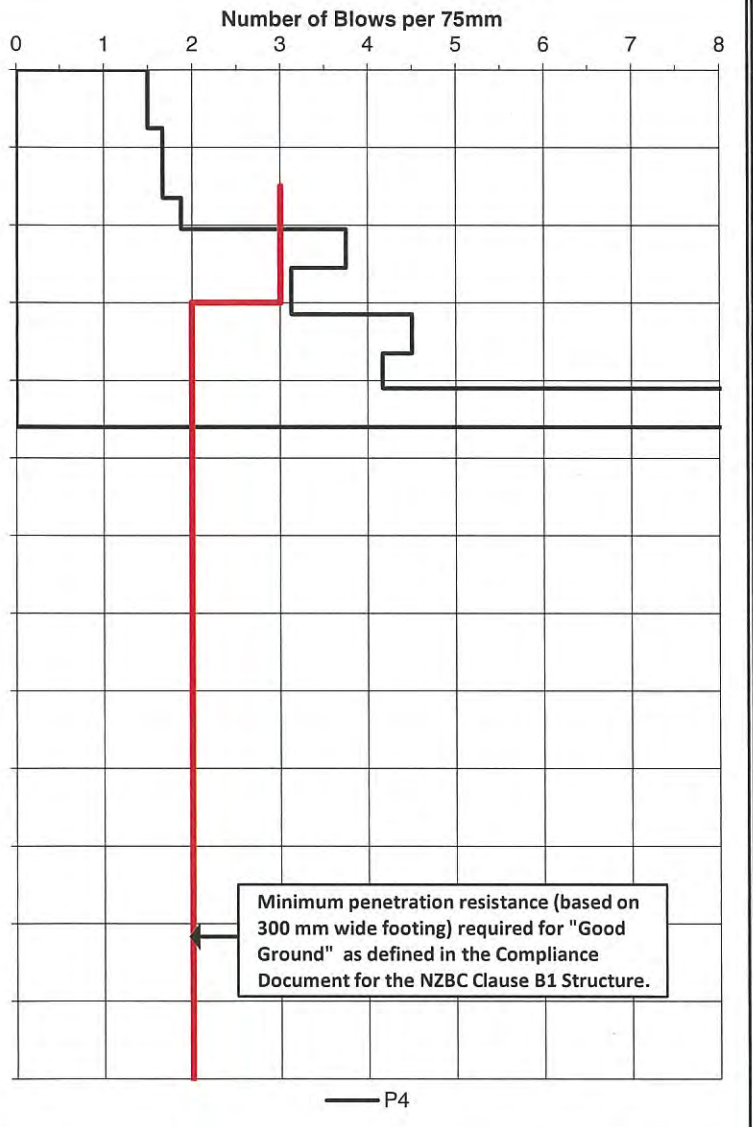
Job Number	369527
Date Tested	1-Jul-2013
Page	4 of 15
D.P	400509
Lot	2
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ✔

(Test Pit @ 4)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	
0.6	Brown clayey SILT, firm
0.8	
1.0	
1.2	
1.4	
1.6	
1.8	Brown GRAVEL, minor clay, some cobbles and occasional boulders
2.0	
2.2	
2.4	STOP
2.6	
2.8	
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

J. Armstrong

Civil Engineer **Date:** 23/8/13

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	369527
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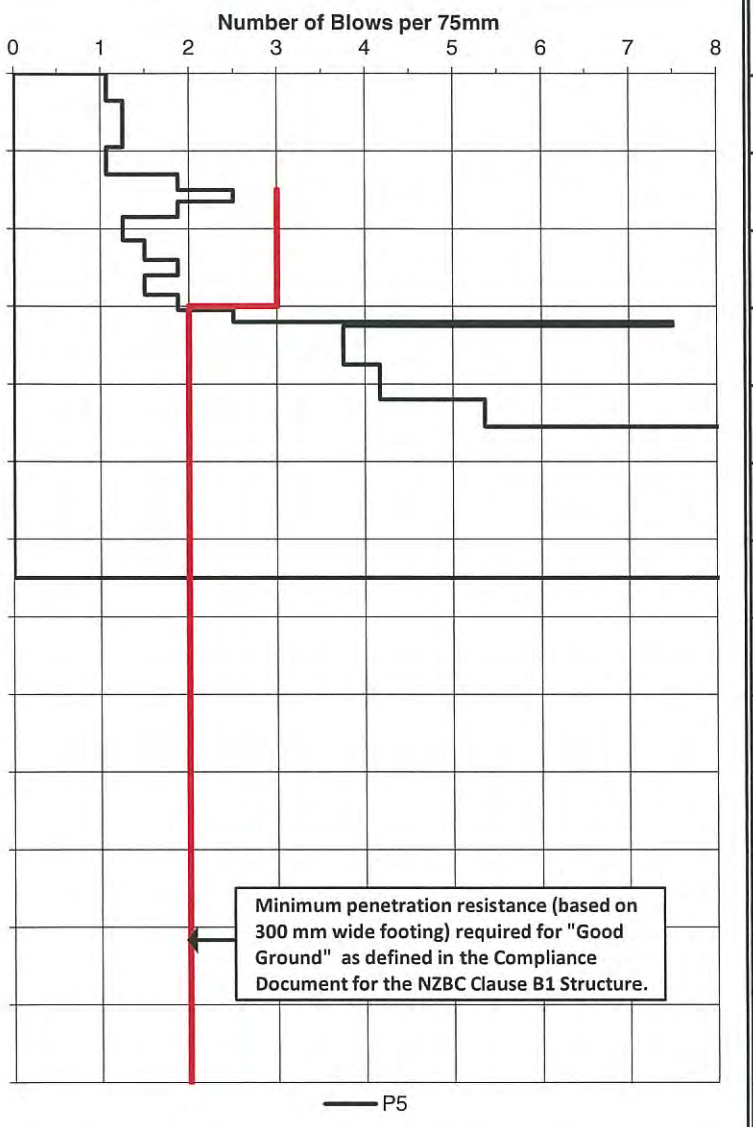
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 5)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	
0.6	Brown clayey SILT, firm, low plasticity
0.8	
1.0	
1.2	
1.4	
1.6	Brown sandy GRAVEL, some cobbles and occasional boulders
1.8	
2.0	
2.2	
2.4	STOP
2.6	
2.8	
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

Civil Engineer J. Armstrong Date: 23/8/13

Eliot Sinclair
surveyors | engineers | planners

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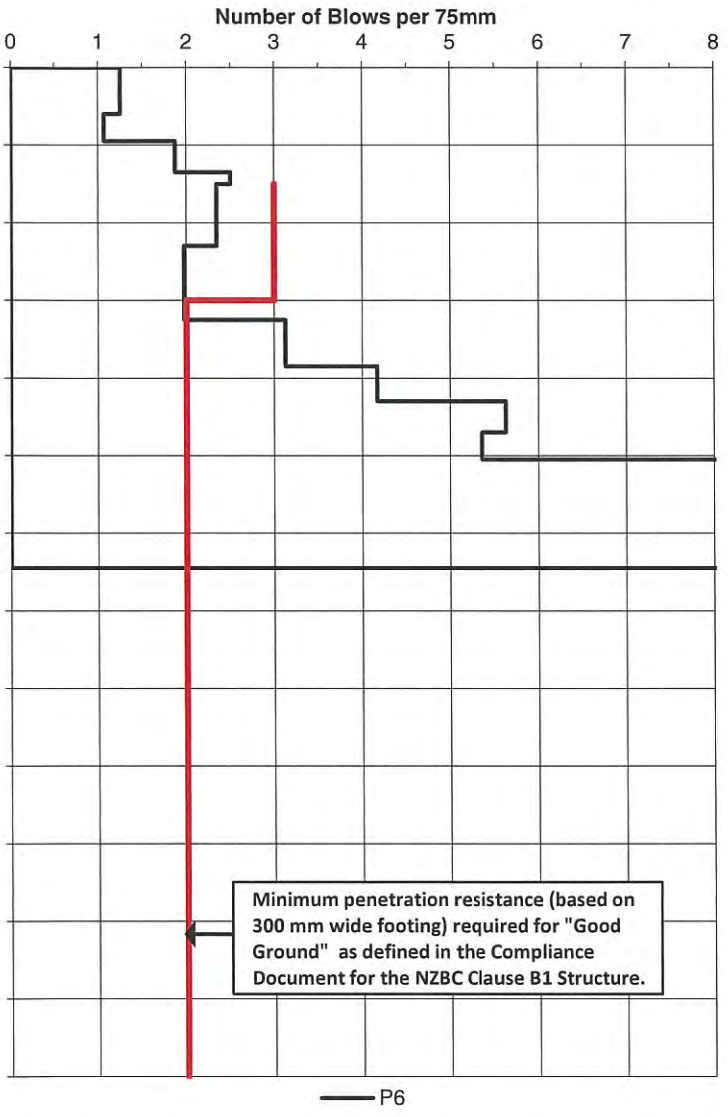
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 6)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	
0.6	Brown clayey SILT, low plasticity
0.8	
1.0	
1.2	
1.4	
1.6	
1.8	Brown GRAVEL, trace of clay, some cobbles and occasional boulders
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

Civil Engineer J. Aramowicz Date: 23/8/13

Eliot Sinclair
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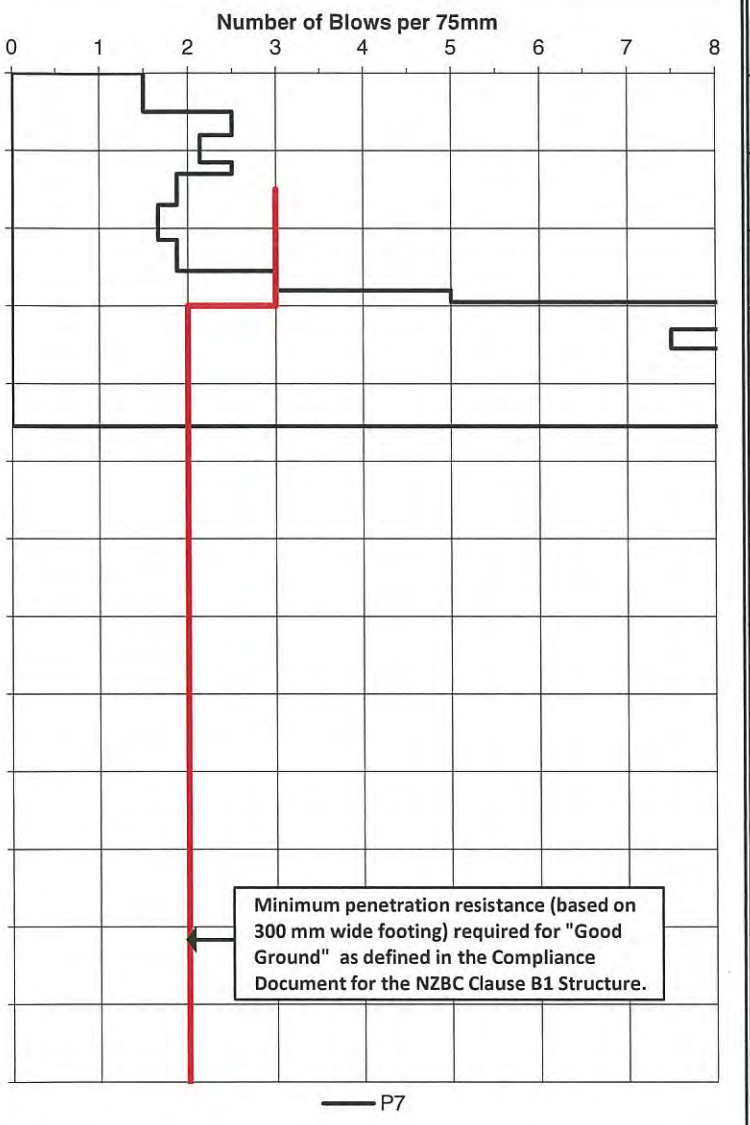
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



SITE PLAN (Not to Scale)

North

See attached site plan

BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 7)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT, trace of gravel
0.6	
0.8	
1.0	
1.2	
1.4	
1.6	Brown GRAVEL, trace of clay, some cobbles and occasional boulders
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

COMMENTS

Civil Engineer J. Cranmer Date: 23/8/13

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Job Number	369527
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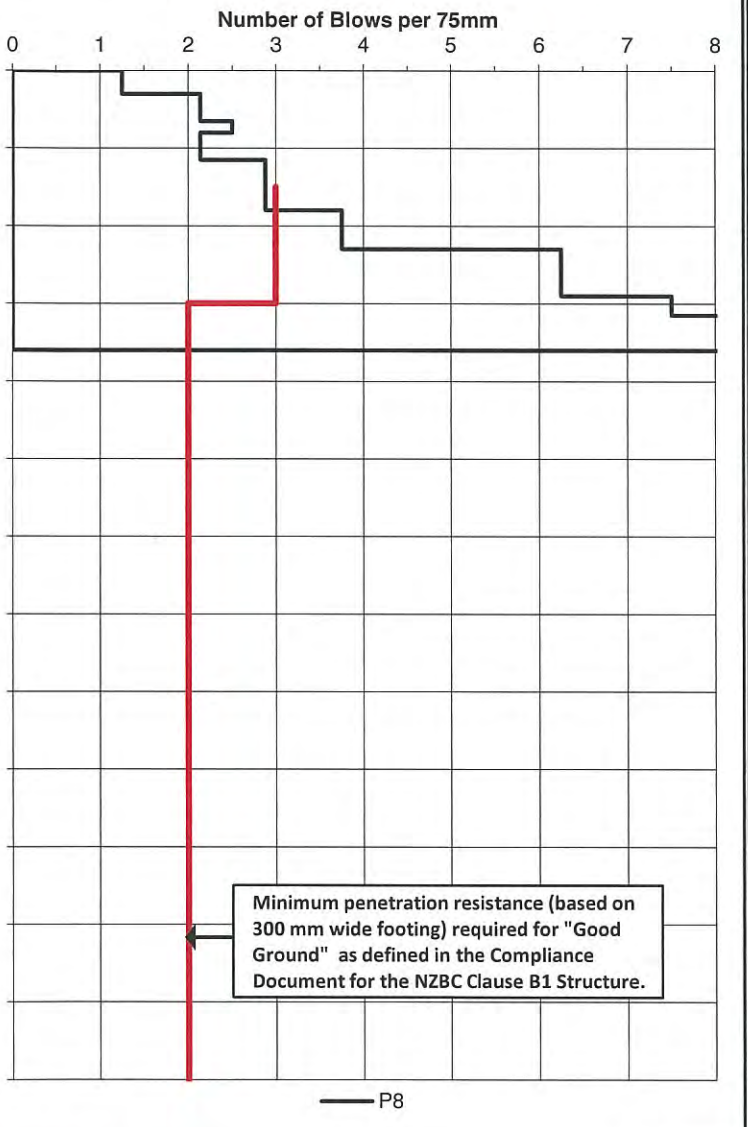
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 8)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT
0.6	
0.8	
1.0	
1.2	
1.4	
1.6	Brown sandy GRAVEL, some cobbles and occasional boulders
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North ↑

See attached site plan

COMMENTS

Civil Engineer J. Armstrong Date: 23/8/13

Eliot Sinclair
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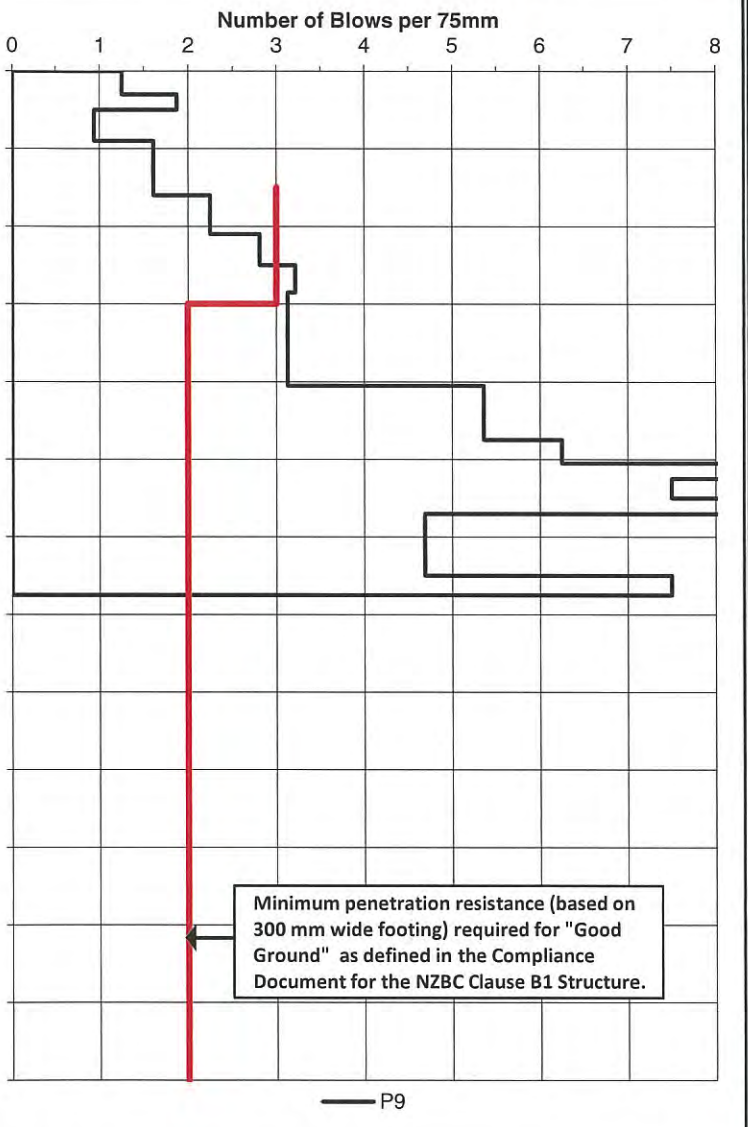
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



SITE PLAN (Not to Scale)

North

See attached site plan

BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 9)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	
0.6	
0.8	
1.0	
1.2	Brown clayey SILT, firm, low plasticity
1.4	
1.6	
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	Brown GRAVEL, minor clay, some cobbles and occasional boulders
3.0	
3.2	STOP
3.4	

COMMENTS

Civil Engineer J. Cranmer Date: 23/8/13

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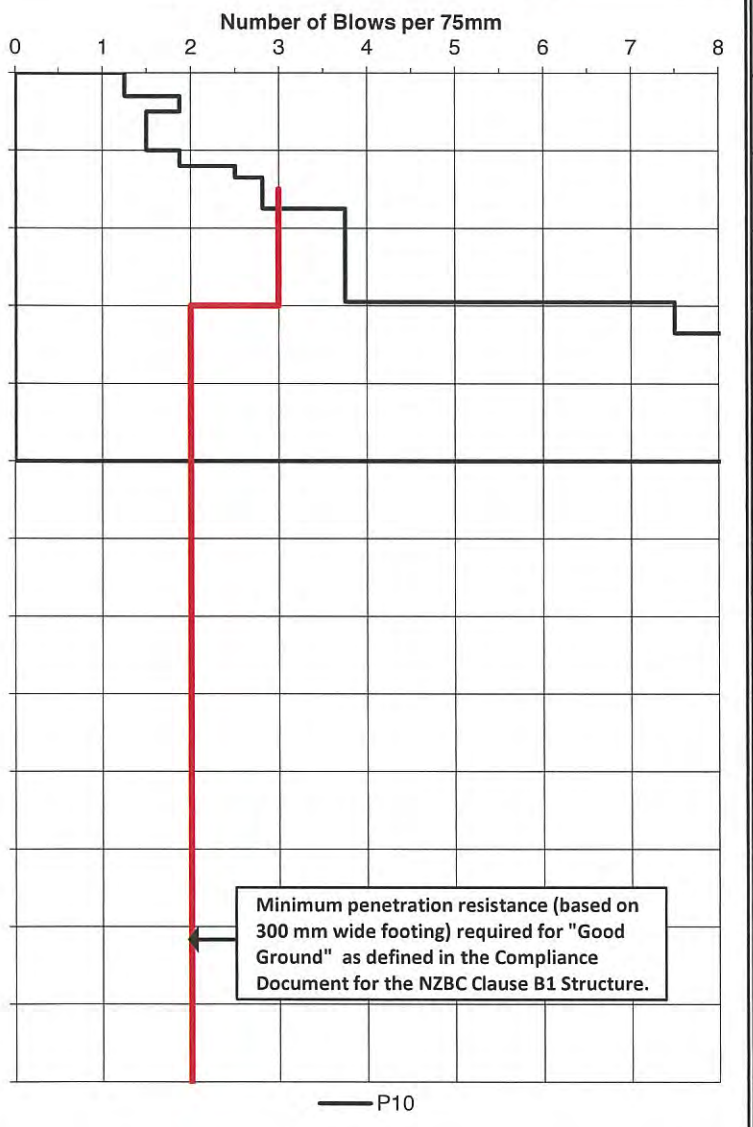
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☐

(Test Pit @ 10)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT
0.6	
0.8	
1.0	
1.2	
1.4	
1.6	Brown GRAVEL, minor clay, some cobbles and occasional boulders, moist
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

Civil Engineer J. Channing **Date:** 23/8/13

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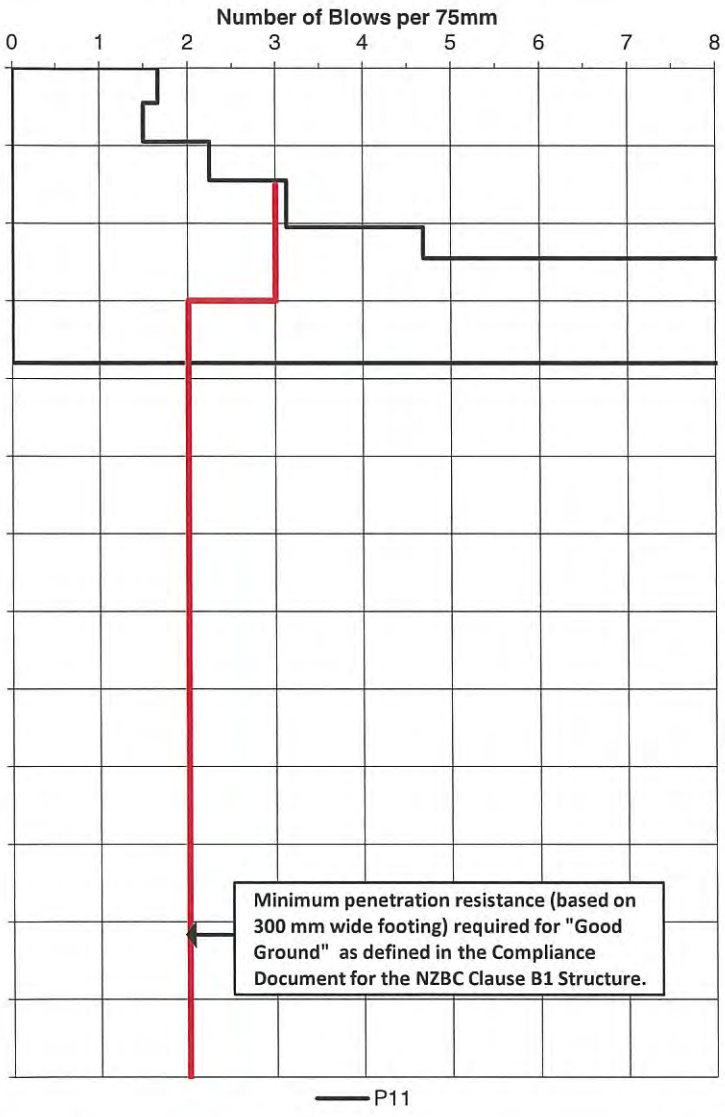
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



SITE PLAN (Not to Scale)

North

See attached site plan

BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ✔

(Test Pit @ 11)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT
0.6	
0.8	
1.0	
1.2	
1.4	Grey sandy GRAVEL, some cobbles and occasional boulders
1.6	
1.8	
2.0	
2.2	
2.4	STOP
2.6	
2.8	
3.0	
3.2	
3.4	

COMMENTS

J. Armstrong

Civil Engineer Date: 23/8/13

Eliot Sinclair
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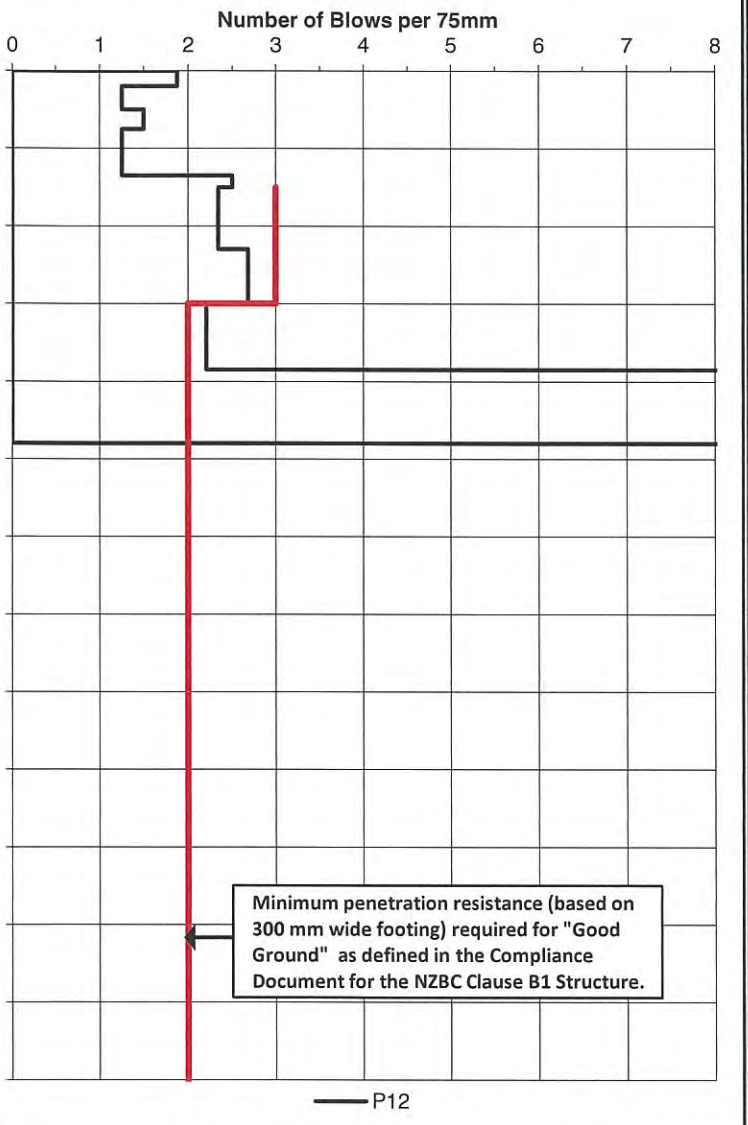
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 12)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT, firm
0.6	
0.8	
1.0	
1.2	
1.4	
1.6	Grey GRAVEL, minor clay, some cobbles and occasional boulders
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

J. Cranmer 23/8/13

Civil Engineer Date:

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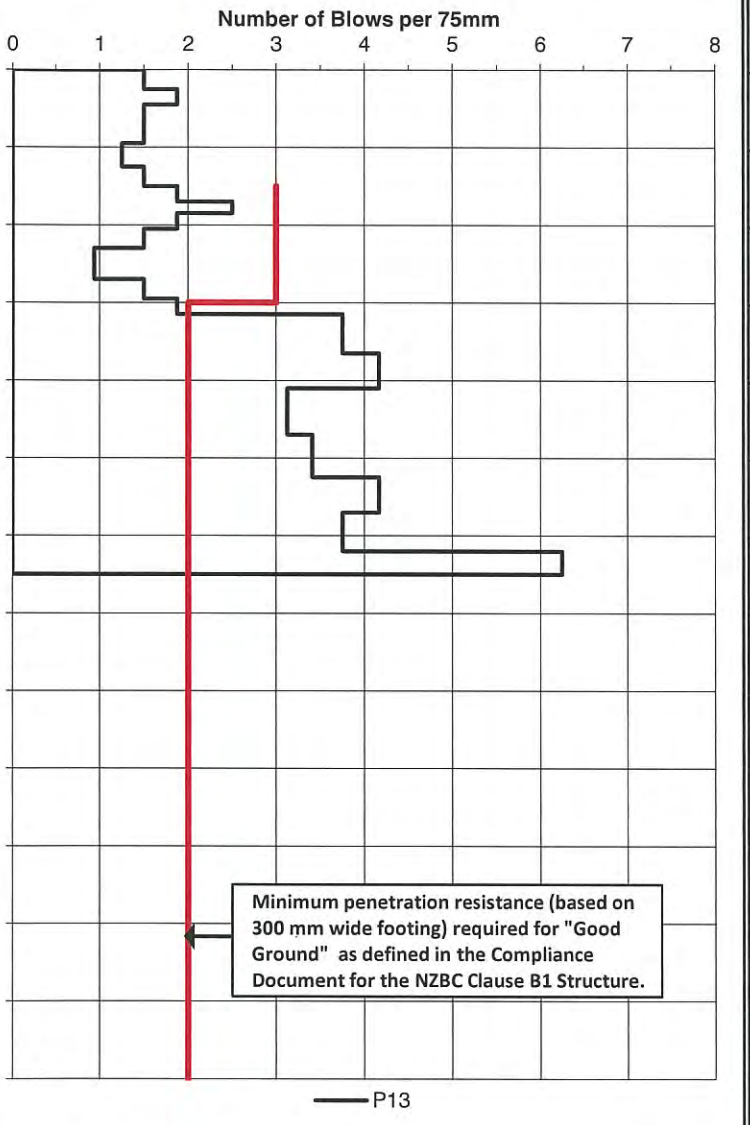
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ☑

(Test Pit @ 13)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	
0.6	
0.8	Brown clayey SILT, firm
1.0	
1.2	
1.4	
1.6	
1.8	Brown GRAVEL, minor clay, some cobbles and occasional boulders
2.0	
2.2	
2.4	
2.6	Brown GRAVEL, minor clay, some cobbles and occasional boulders, wet
2.8	STOP
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North

See attached site plan

COMMENTS

J. Arannouing

Civil Engineer **Date:** 23/8/13

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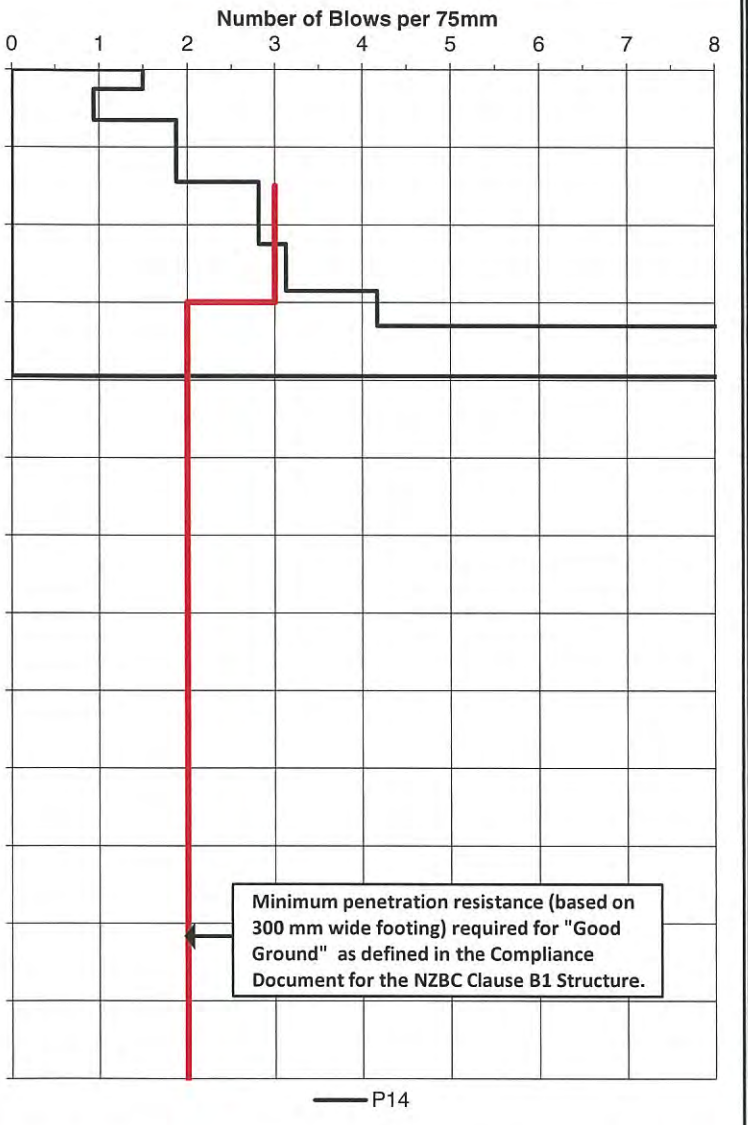
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ✔

(Test Pit @ 14)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT, low plasticity
0.6	
0.8	
1.0	
1.2	
1.4	
1.6	
1.8	Brown GRAVEL, trace of clay, some cobbles and occasional boulders
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

SITE PLAN (Not to Scale)

North ↑

See attached site plan

COMMENTS

Civil Engineer *A. Aramowicz* Date: 23/8/13

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Job Number	369527
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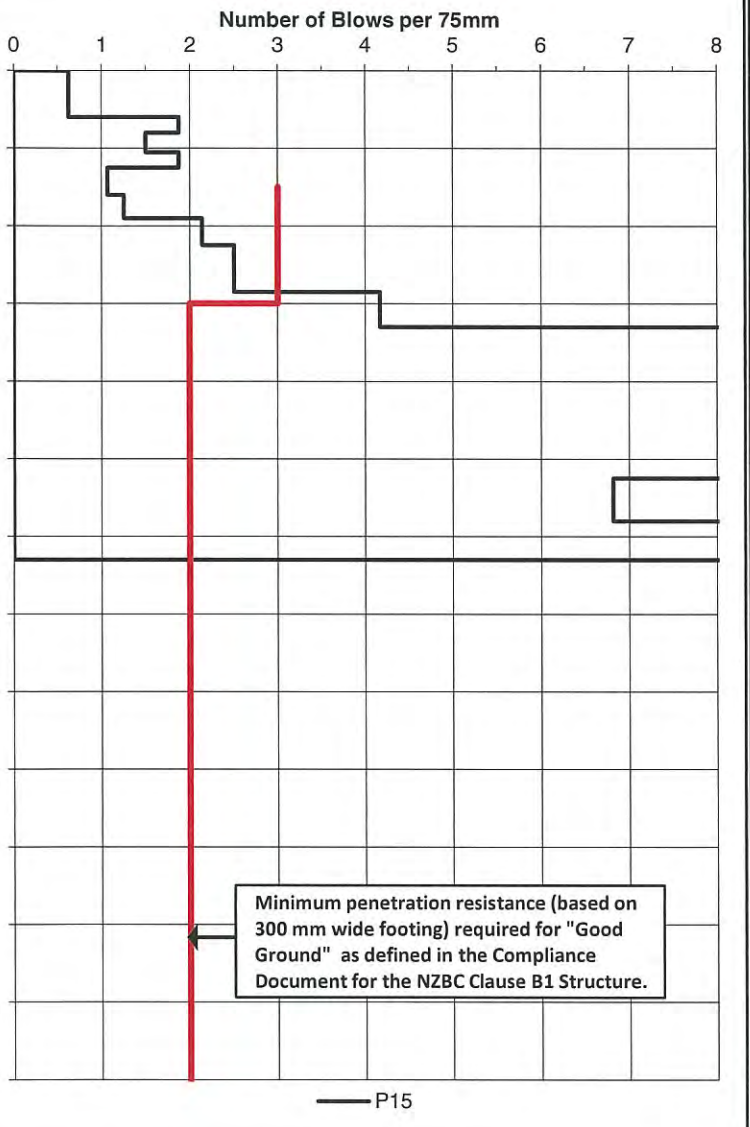
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



SITE PLAN (Not to Scale)

North

See attached site plan

BORE LOGS

Hand Auger ☐ Machine Auger ☐ Test Pit ✔

(Test Pit @ 15)

DEPTH [m]	
GL	Dark Brown silty TOPSOIL
0.2	
0.4	Brown clayey SILT
0.6	
0.8	
1.0	
1.2	
1.4	
1.6	Brown GRAVEL, trace of clay, some cobbles and occasional boulders
1.8	
2.0	
2.2	
2.4	
2.6	
2.8	STOP
3.0	
3.2	
3.4	

COMMENTS

Civil Engineer J. Asamoney Date: 23/8/13

ULTIMATE BEARING STRENGTH

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Job Number	**369527**
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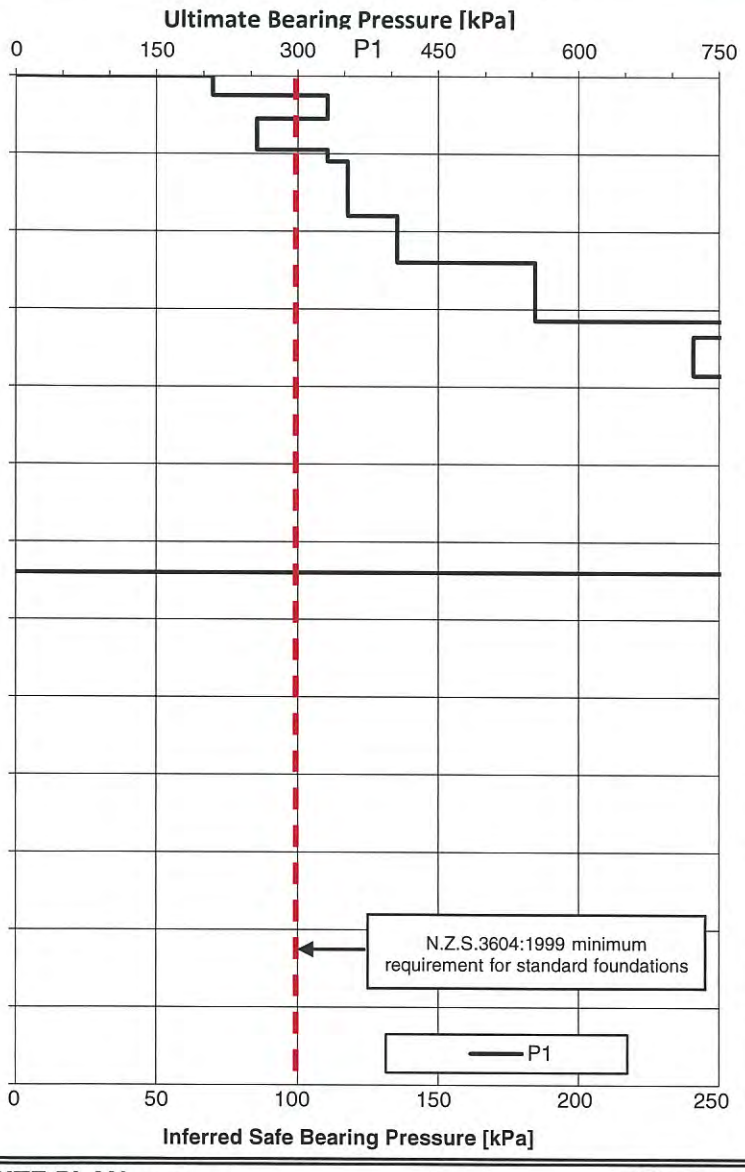
Technical Category	**N/A - Rural**

SITE INVESTIGATION RECORD

Client **Ballymena Holdings Limited**

Site **Corner of Annanval Road & Pocock Road, Springfield**

SCALA PENETROMETER TESTS



BORE LOGS

DEPTH [m]
GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

SITE PLAN *(Not to Scale)*

North

COMMENTS

Civil Engineer J. Armstrong ***Date:*** 23/8/13

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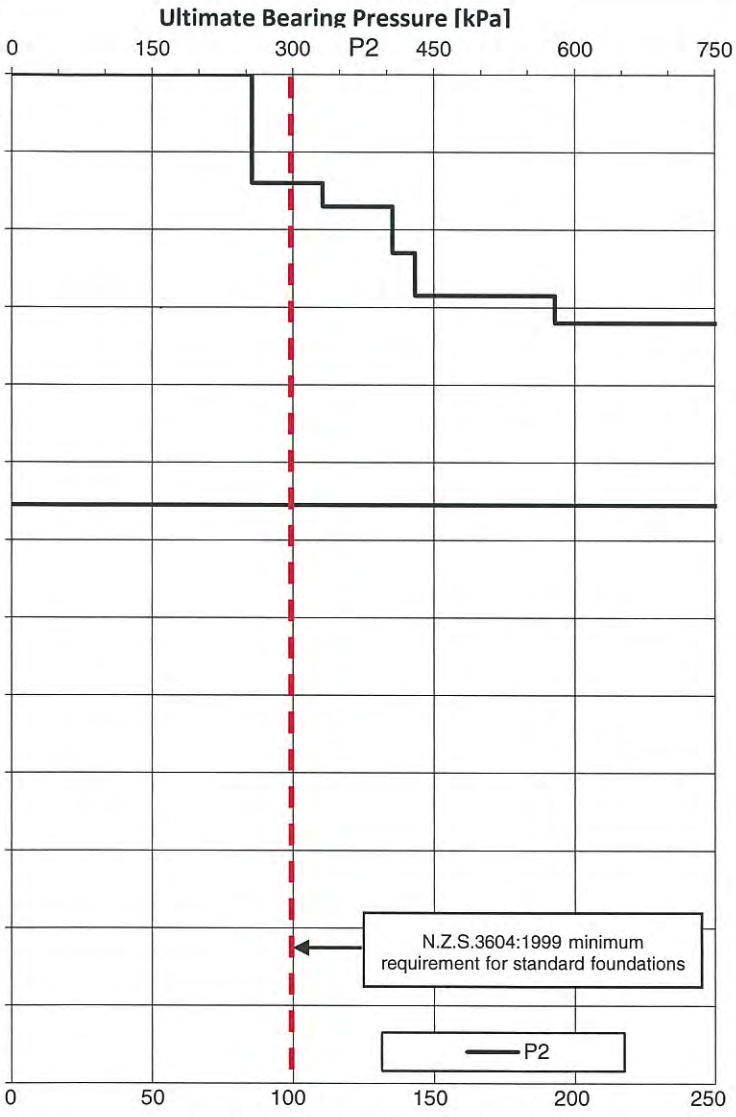
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



SITE PLAN (Not to Scale)

North

BORE LOGS

DEPTH [m]
GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

COMMENTS

Civil Engineer J. Aramowicz Date: 23/8/13

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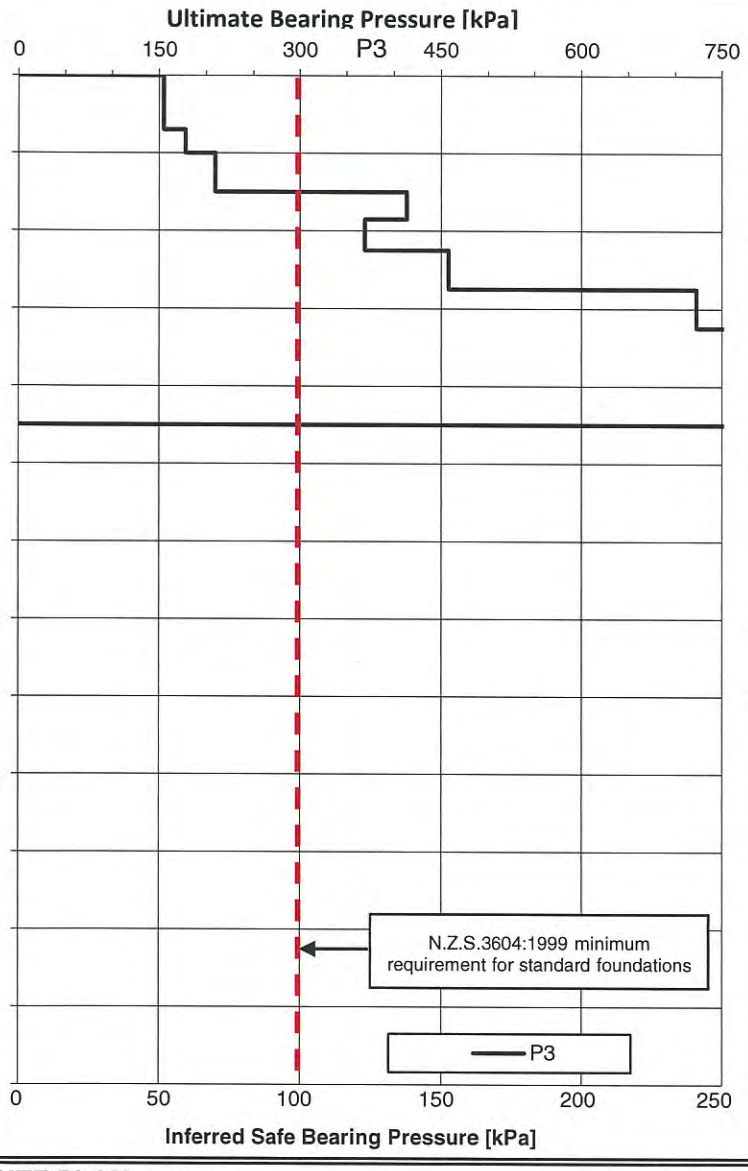
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

DEPTH [m]
GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

SITE PLAN *(Not to Scale)*

North

COMMENTS

Civil Engineer J. Aramowicz Date: 23/8/13

Eliot Sinclair
surveyors | engineers | planners

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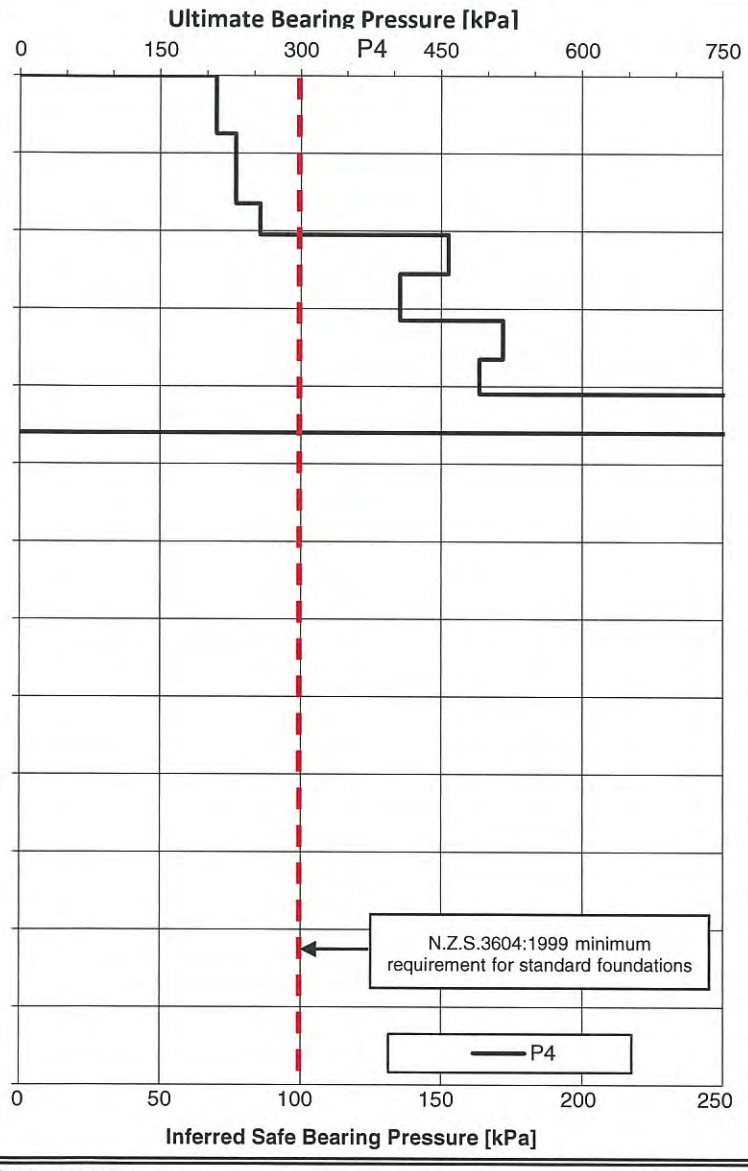
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS

DEPTH [m]
GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

SITE PLAN *(Not to Scale)*

North

COMMENTS

Civil Engineer J. Cranmore Date: 23/8/13

Eliot Sinclair
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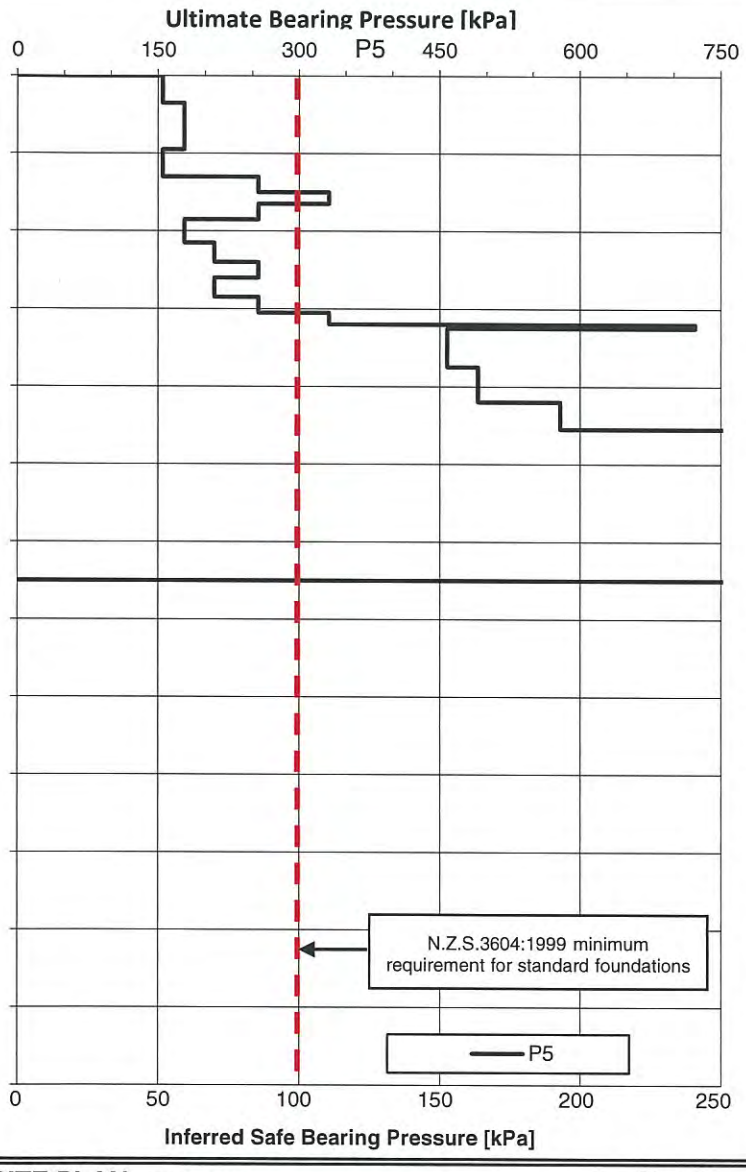
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

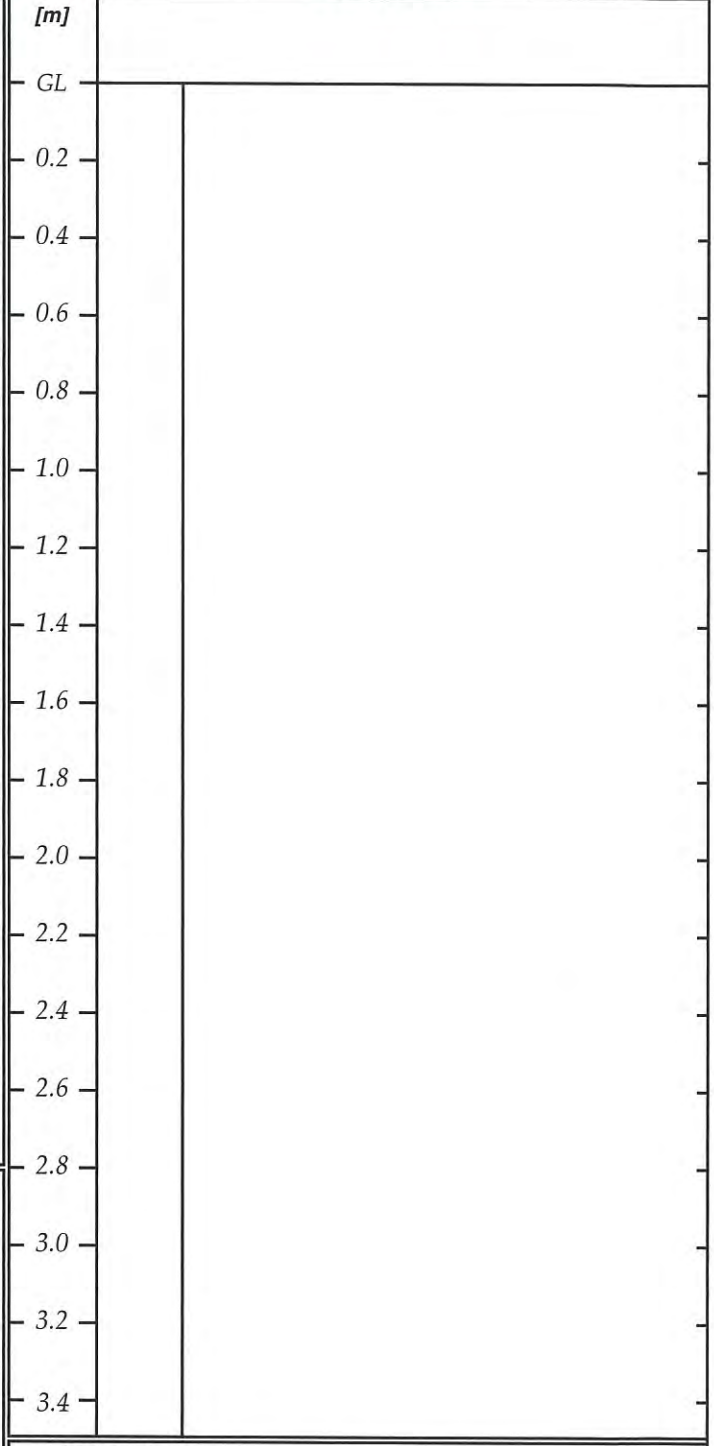
Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS



SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Aramowicz Date: 23/8/13

Eliot Sinclair
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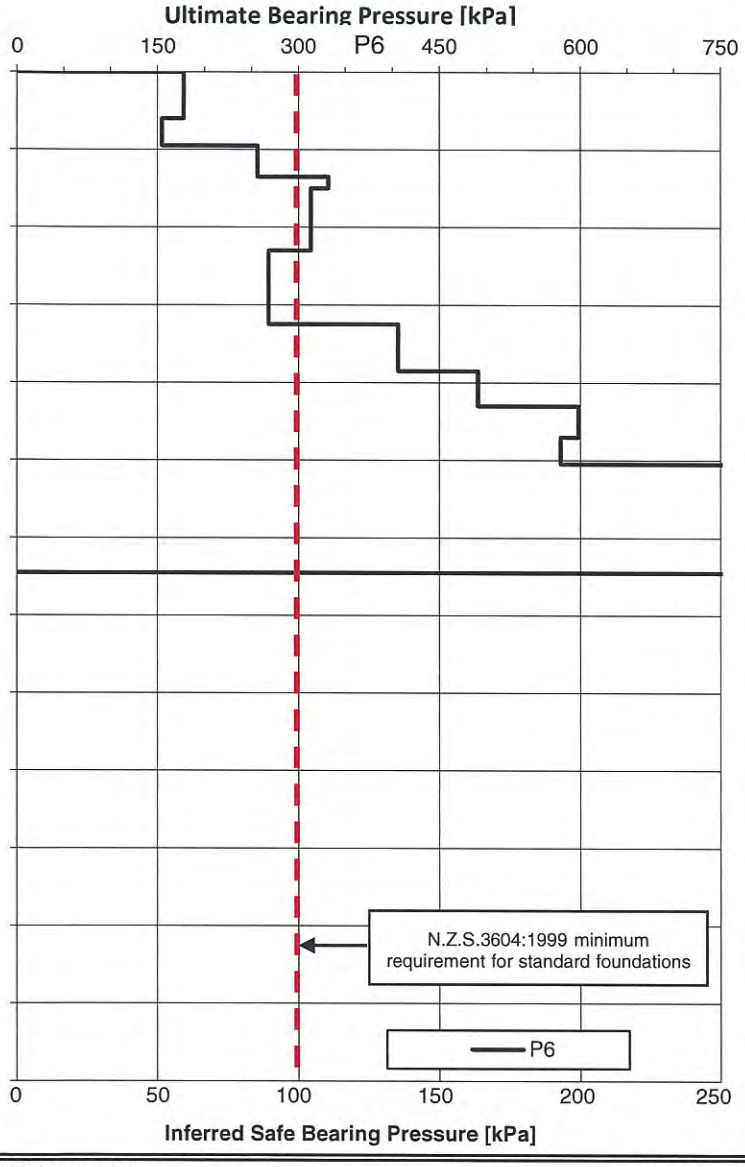
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

DEPTH [m]

GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Cranmore Date: 23/8/13

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	369527
Date Tested	1-Jul-2013
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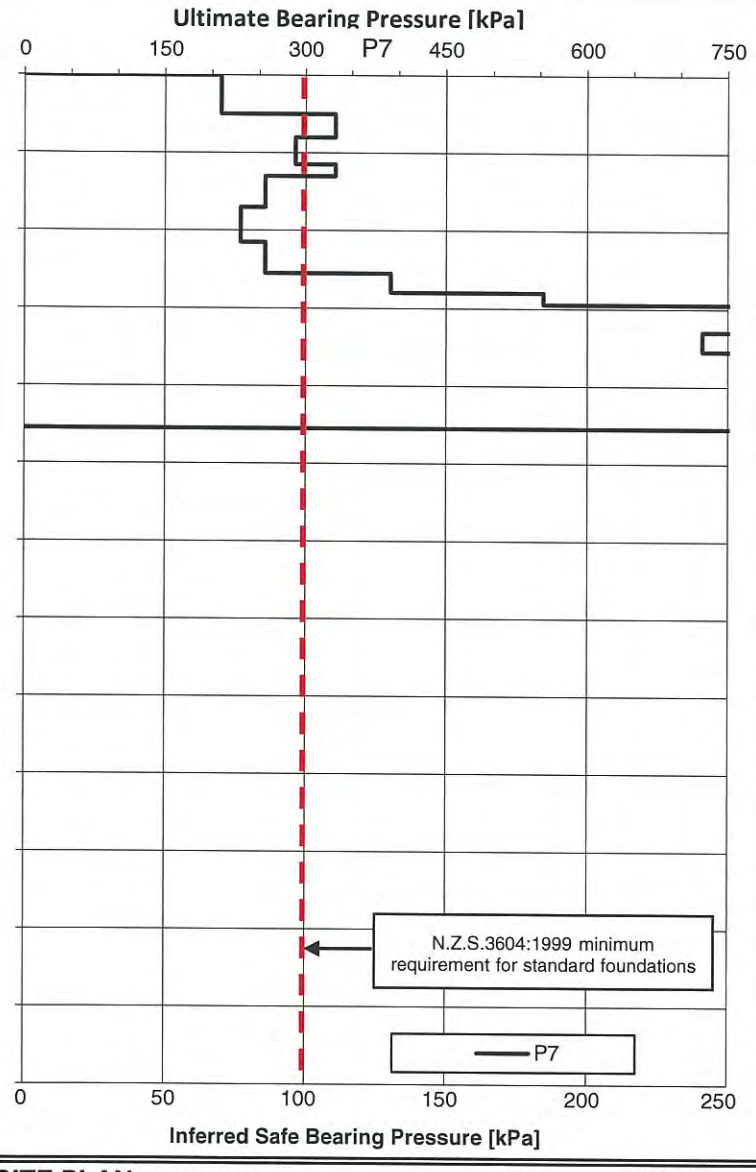
Lot	2
Technical Category	N/A - Rural

SITE INVESTIGATION RECORD

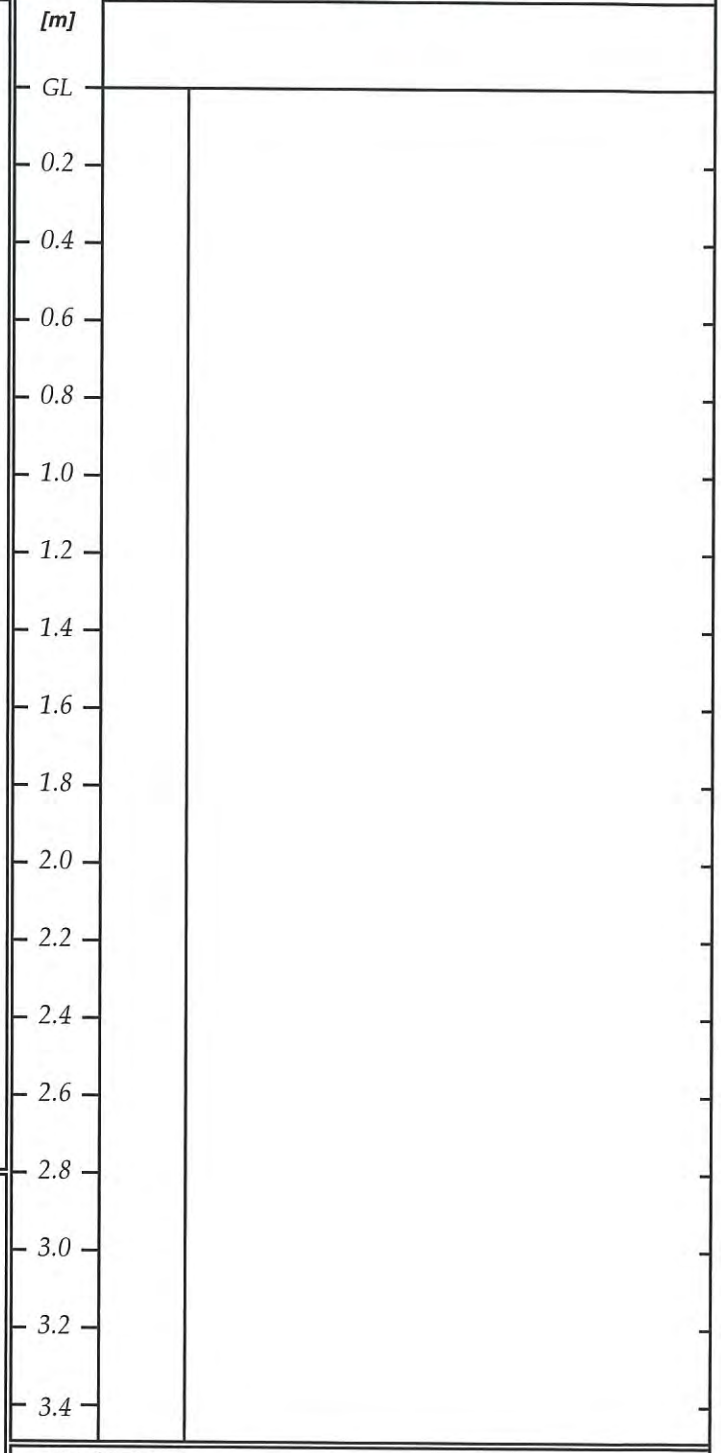
Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



BORE LOGS



SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Cranmore Date: 23/8/13

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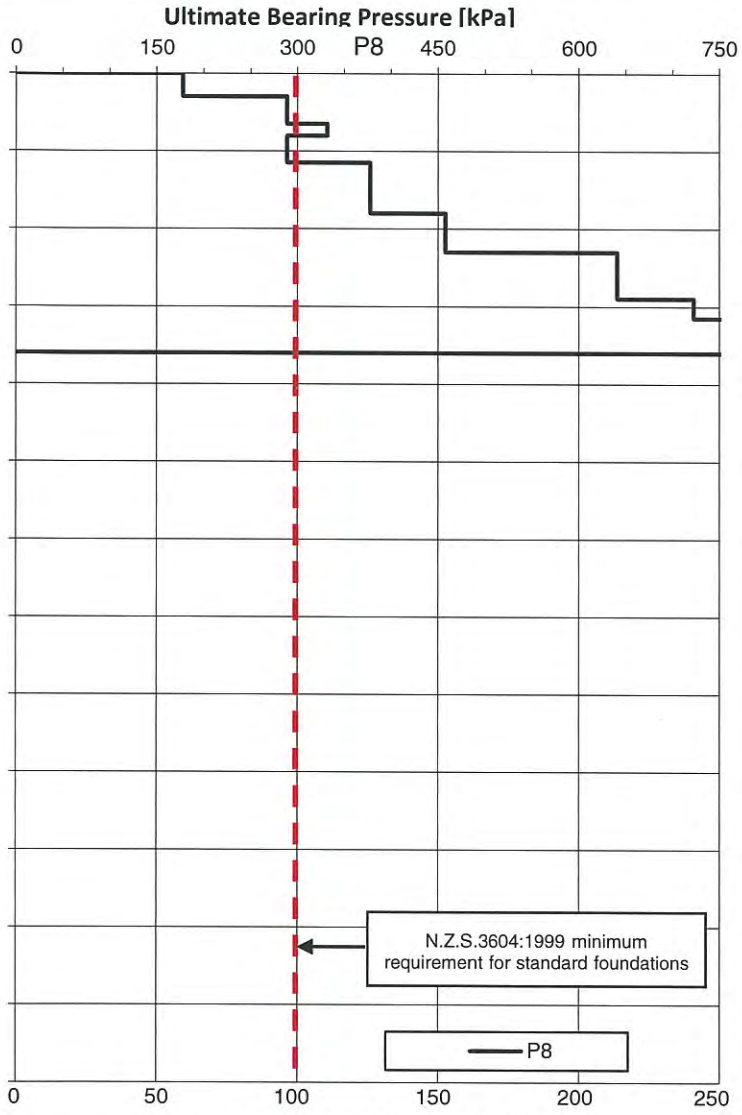
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



SITE PLAN (Not to Scale)

North

BORE LOGS

DEPTH [m]
GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

COMMENTS

Civil Engineer J. Cranwell Date: 23/8/13

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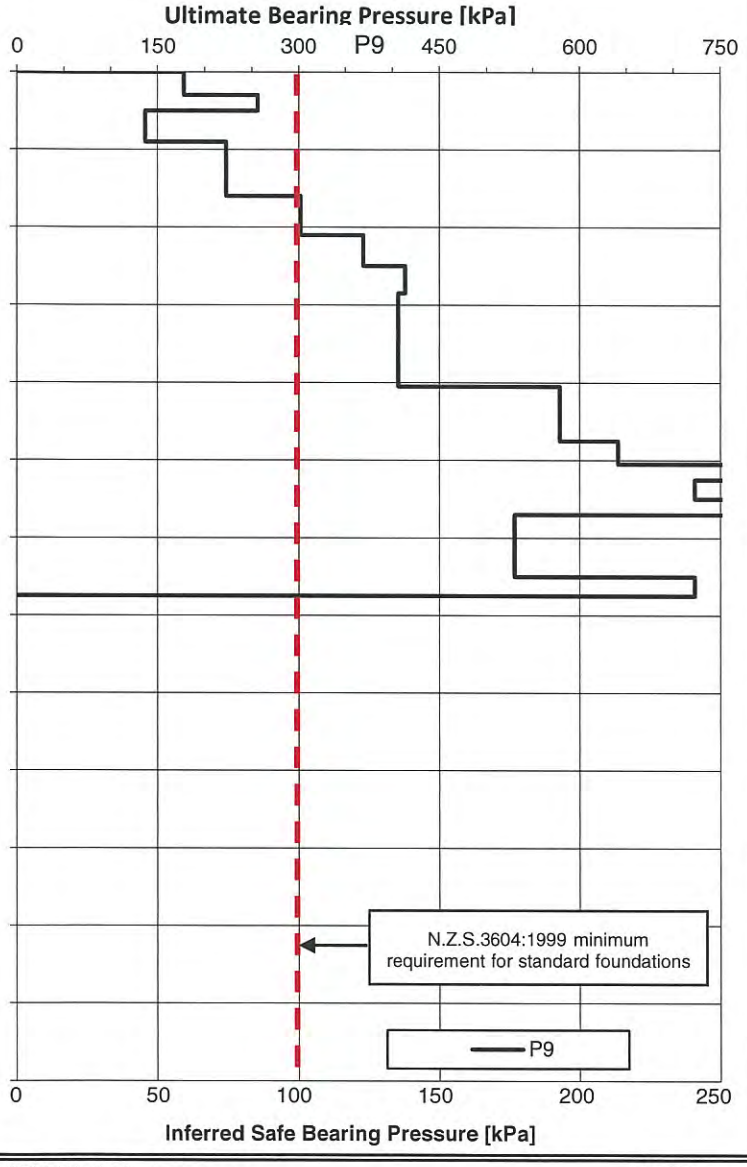
SITE INVESTIGATION RECORD

Client	Site	Technical Category
Ballymena Holdings Limited	Corner of Annanval Road & Pocock Road, Springfield	N/A - Rural

SCALA PENETROMETER TESTS



BORE LOGS

DEPTH [m]

GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Mannering Date: 23/8/13

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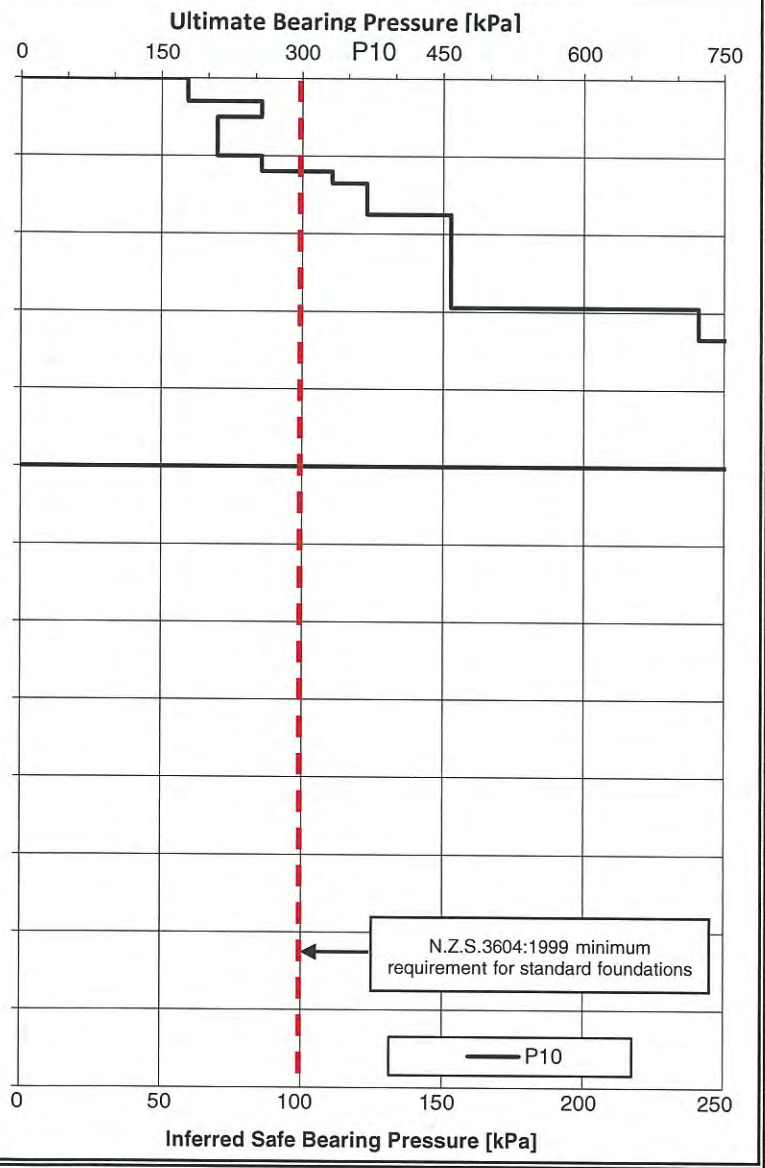
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



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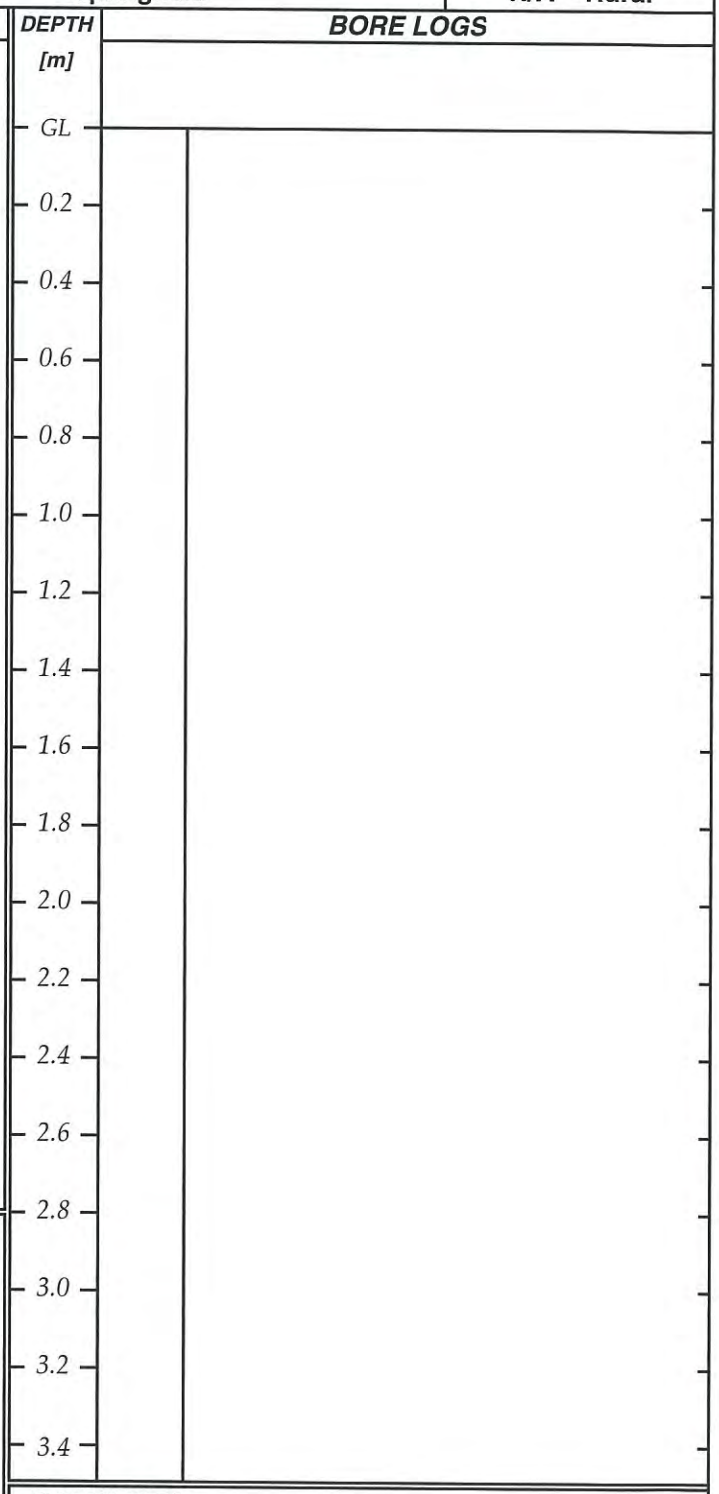

SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Cranwell Date: 23/8/13

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SITE INVESTIGATION RECORD

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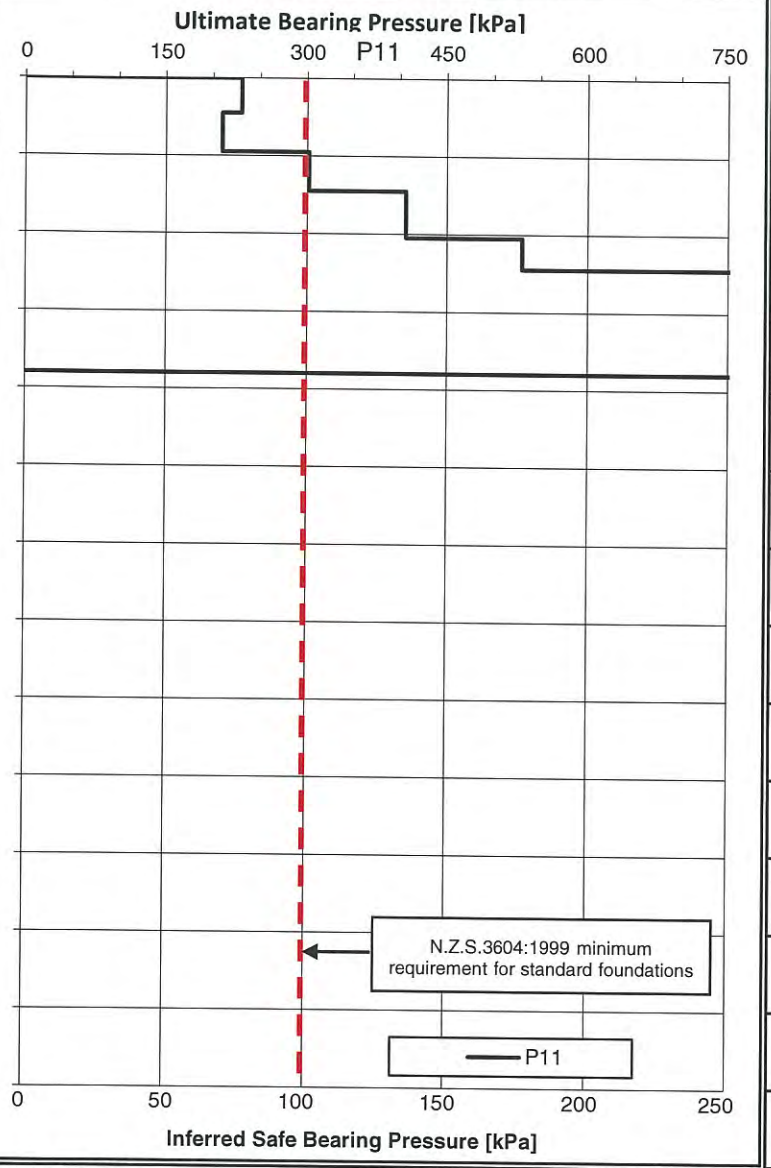
Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



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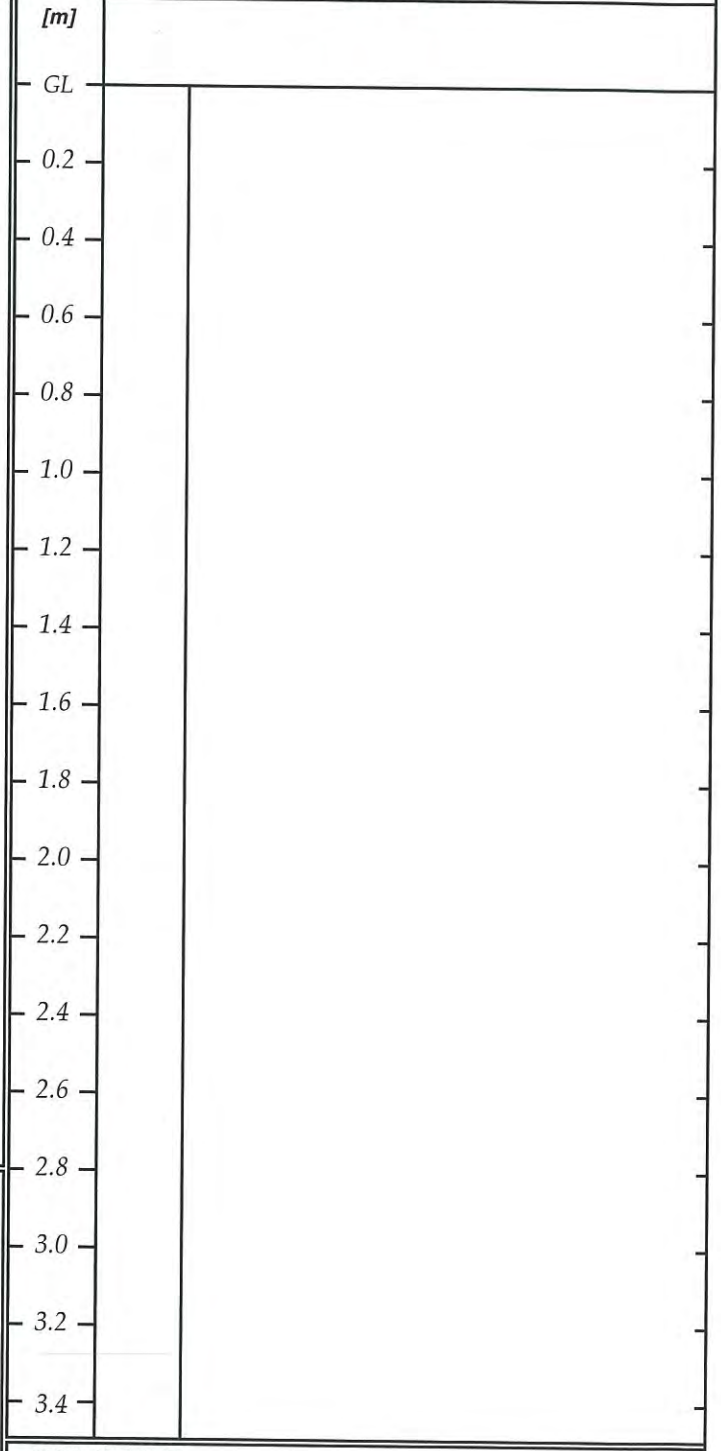

SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Cranmore Date: 23/8/13

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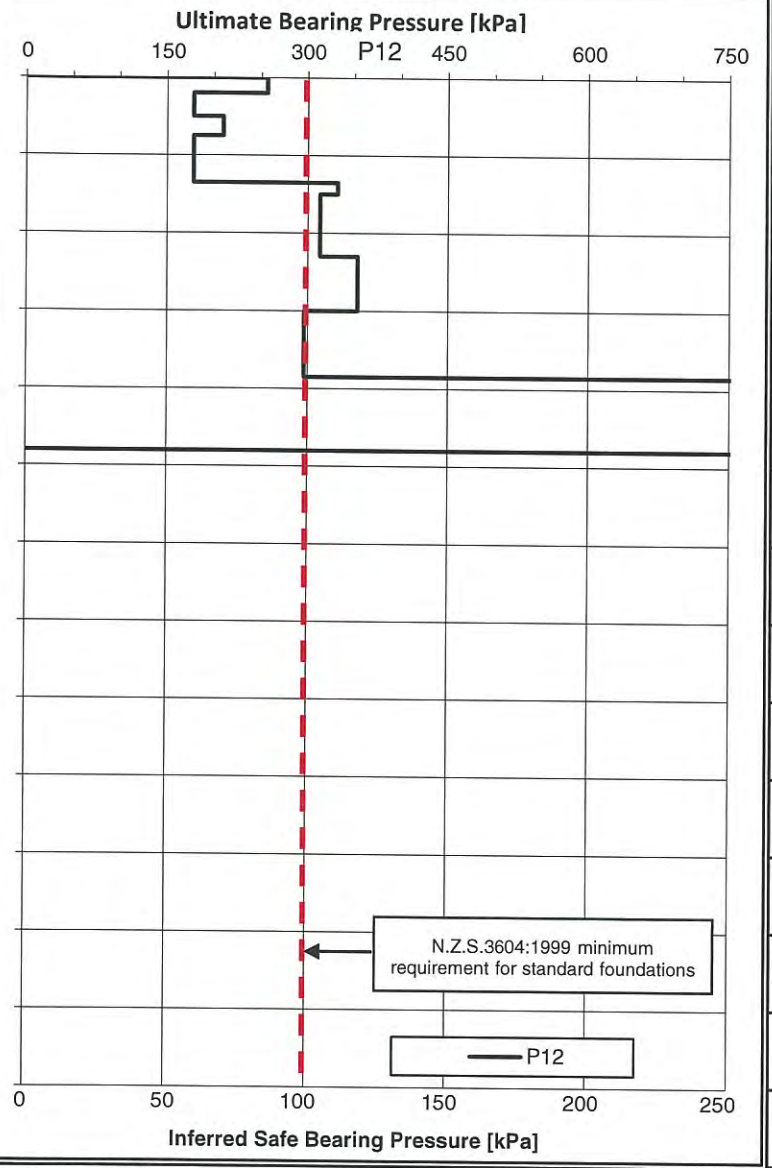
SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

SCALA PENETROMETER TESTS



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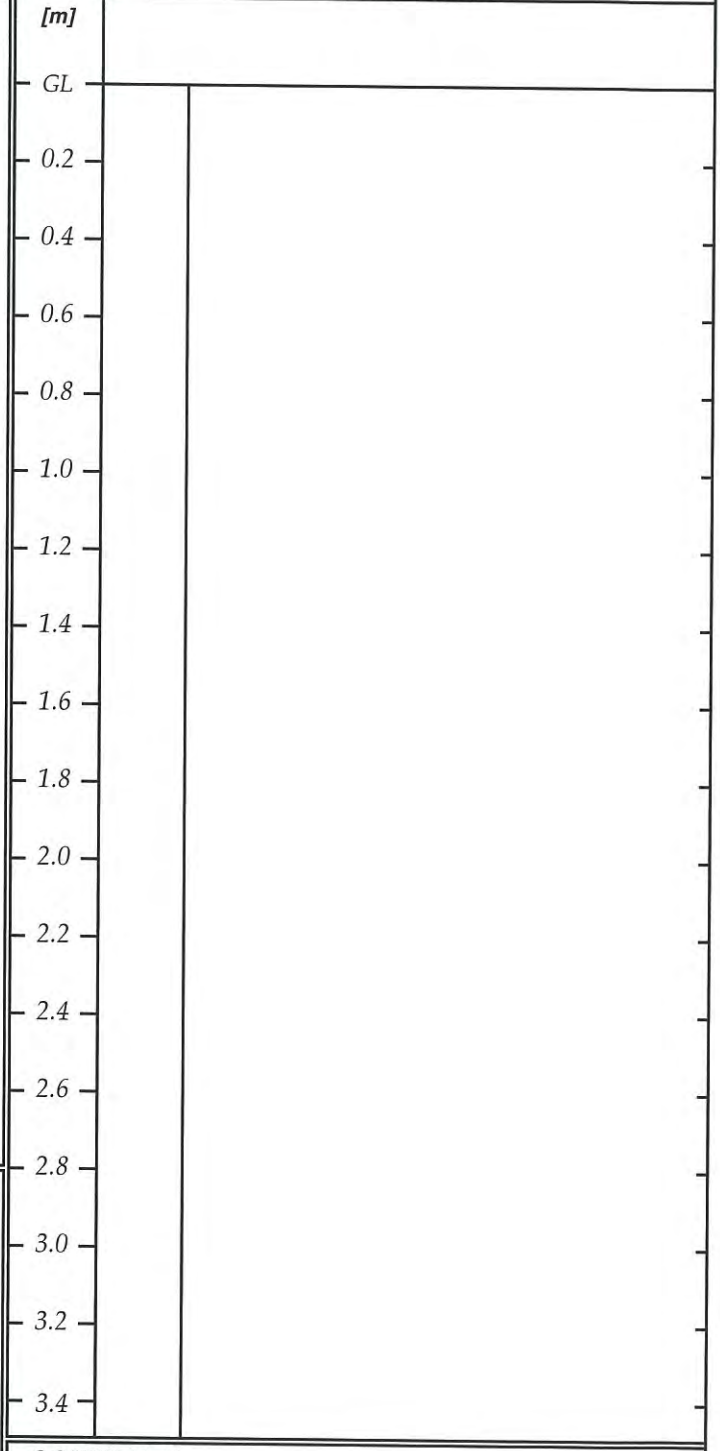

SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer

Date: 23/8/13

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SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

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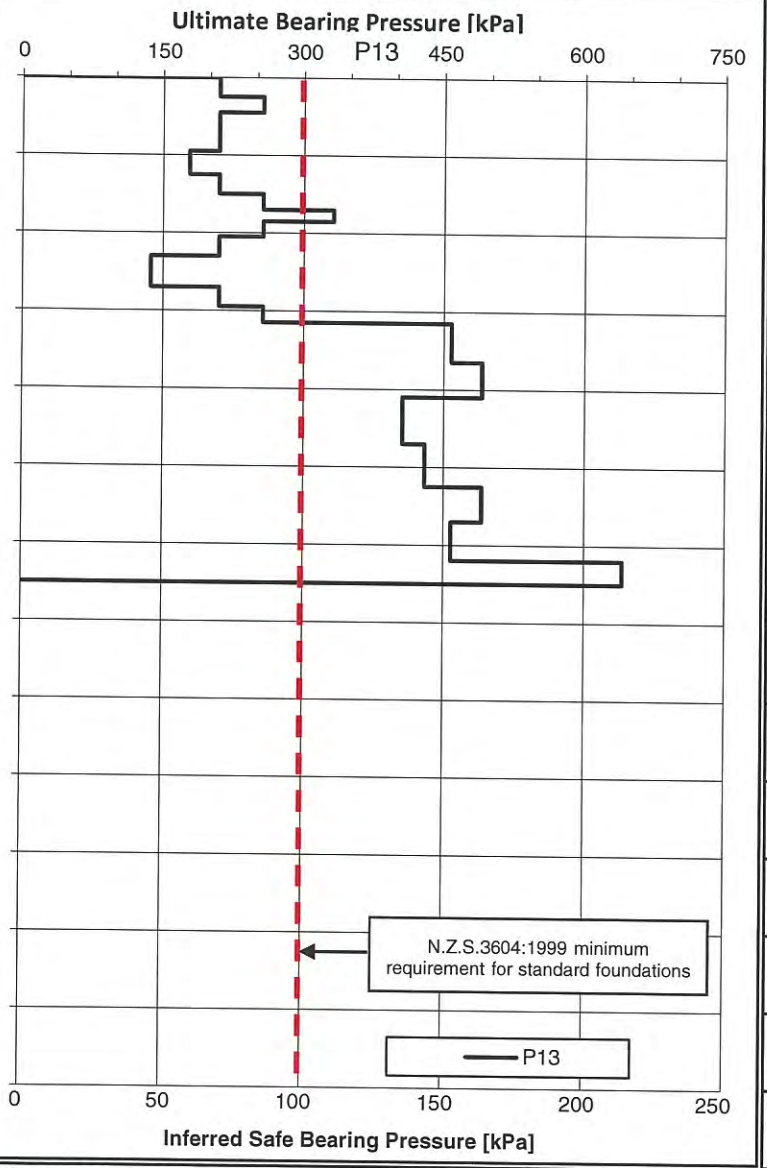

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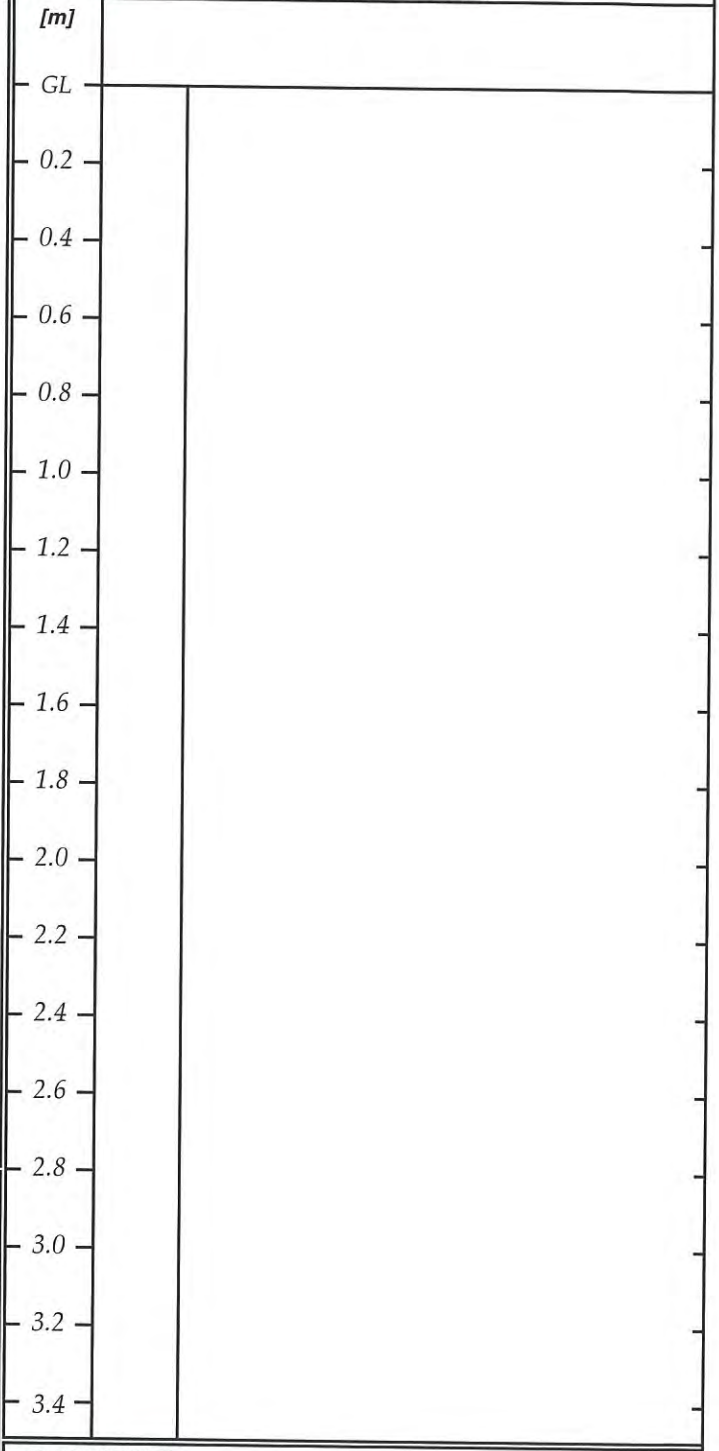

SITE PLAN (Not to Scale)

North

COMMENTS

Soft conditions within silts to 0.6m bgl.

Civil Engineer J. Arancibia Date: 23/8/13

Eliot Sinclair
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SITE INVESTIGATION RECORD

Client Ballymena Holdings Limited

Site Corner of Annanval Road & Pocock Road, Springfield

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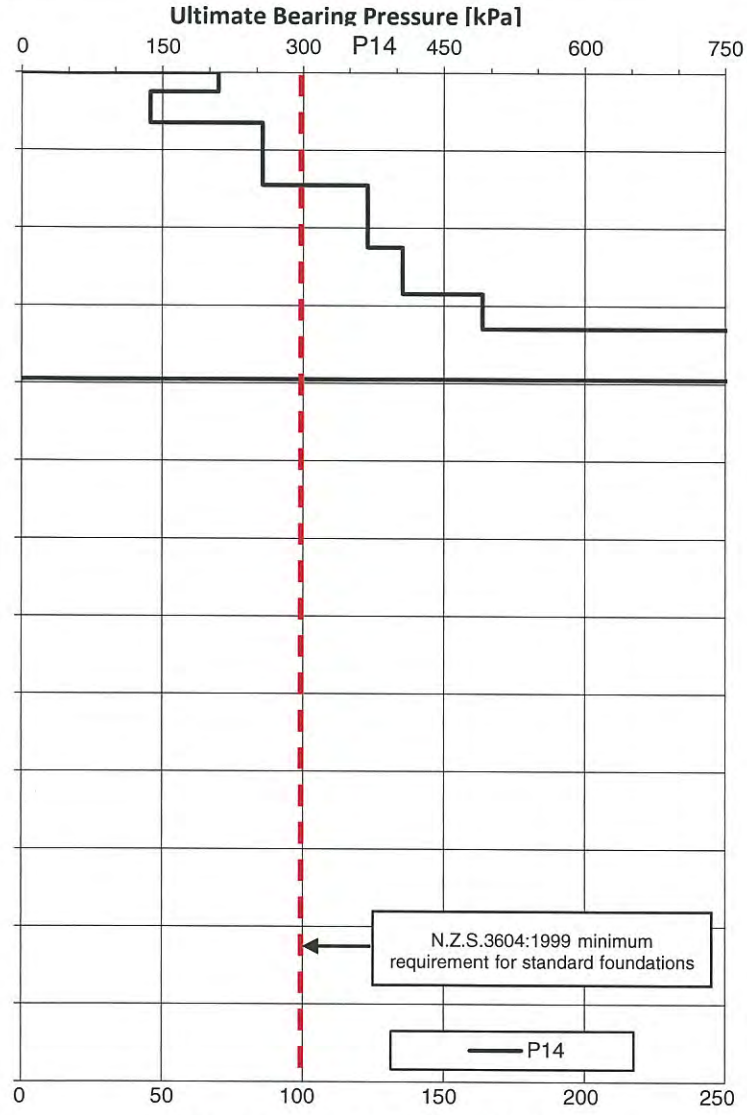

BORE LOGS

DEPTH [m]
GL
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

SITE PLAN (Not to Scale)

North

COMMENTS

Civil Engineer J. Armstrong Date: 23/8/13

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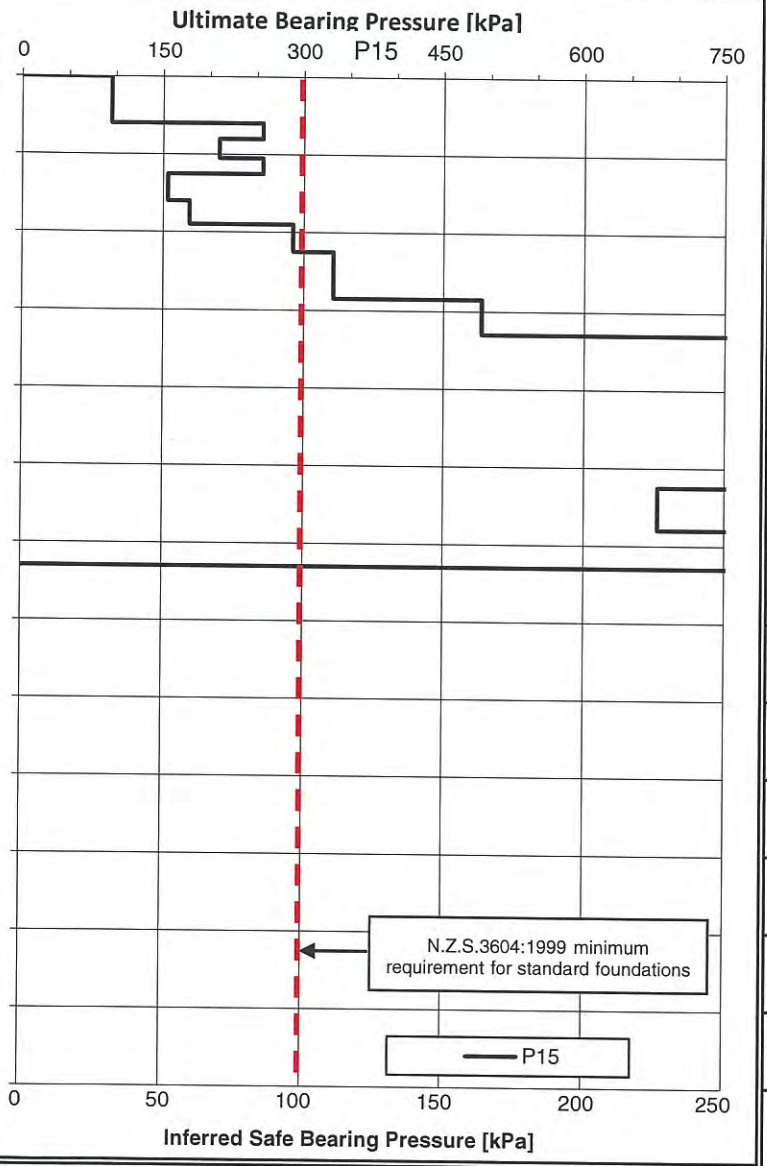
SCALA PENETROMETER TESTS



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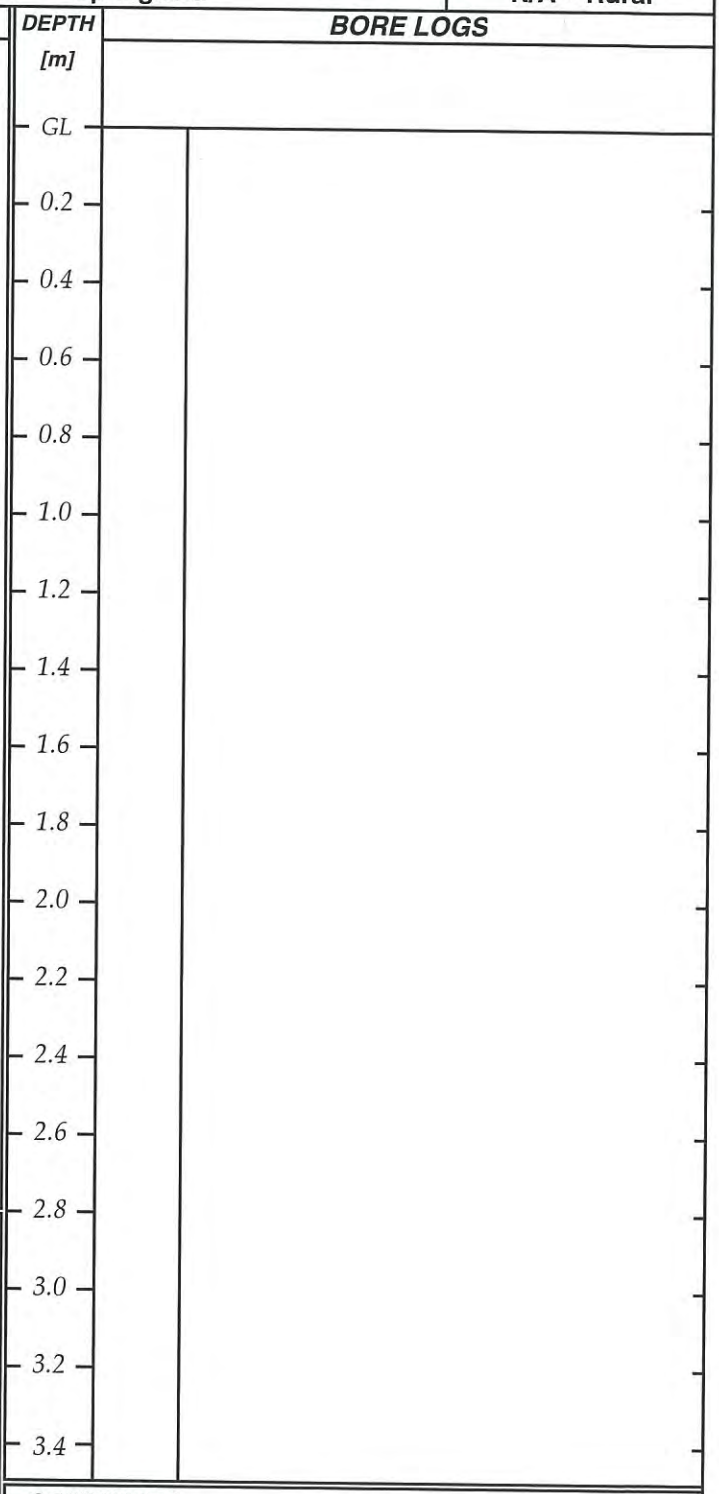

SITE PLAN (Not to Scale)

North

COMMENTS

J. Aramowicz

Civil Engineer

Date: 23/8/13