IN THE MATTER OF the Local Government Act 2002

AND

IN THE MATTER OF G V Maginness

LOCAL GOVERNMENT ACT 2002

SUBMITTER:	Gavin Vaughan Maginness
PROPOSAL:	To include additional land within those areas as identified in the Draft Rural Residential Strategy as being locations for Rural Residential Development
ADDRESS:	354 Perymans Road, Lincoln
LEGAL DESCRIPTION:	Lot 2 DP 459061
ZONING:	Inner Plains
HEARING DATE:	11 April 2014

1 Proposal

1.1 Mr Maginness has made a submission on the Consultation Draft Rural Residential Strategy for the inclusion of his property as one of the areas for Rural Residential development. The rationale for the inclusion of his property was that the inclusion of land into the Rural Residential zone on the eastern side of Ellesmere Road, would not would not impede the residential growth of the previously zoned residential land to the west, nor restrict any extension to future residential growth areas.

1.2 It is acknowledged that the Land Use Recovery Plan was designed to provide for property owners who were displaced by the Canterbury earthquakes to be provided with choice as to the form of the living environments within which they might choose to relocate. On this basis, the intention was that land be immediately available for development. However when the criteria that land nominated for Rural Residential development be located in positions that are unlikely to restrict residential growth direction, and preferably be located on the fringes of townships, there is the dilemma that services are not yet available as the township growth has not developed to the outer boundaries.

1.3 The above consideration may influence whether land should be included within the Rural Residential zones as being resolved for the present consideration as required by the Land Use Recovery Plan, or whether land considered appropriate for inclusion but not able to immediately serviced should be identified at this stage, but accepting that the development nay occur over a slightly extended period when those services are available for extension. From a land owners' perspective, there is a preference that future land use as a consequence of re-zoning become known at an early stage, to ensure that capital expenditure is appropriately directed towards the ultimate land use.

2 Site and Locality

2.1 The property subject to this submission described as being Lot 2 DP 459061 comprised in Computer Freehold Register CT 599503 and containing an area of 11.1875 hectares. The property abuts a 0.50 hectare property at the intersection of Ellesmere Road and Lincoln Tai Tapu Road, and has frontage onto Ellesmere Road, Lincoln Tai Tapu Road and Perymans Road. A new dwelling accessed off Perymans Road has been established on the property. Other buildings on the property include stables and sheds.

2.2 The property is located on the eastern side of Ellesmere Road adjacent to the Living Z zone of Lincoln, and is 1.8 kilometres from the existing Business zone of Lincoln. The property is zoned Rural Inner Plains and is not included within the Lower Flood Plain area. It is acknowledged that land to the south of both Perymans Road and Lincoln Tai Tapu Road are within the flood area, and have been evidenced to have been subject to ponding in flood events

2.3 The recently erected dwelling on the Maginness property is located 70 metres setback from Perymans Road and as yet, has not been planted with amenity planting adjacent to the dwelling or along the Perymans Road frontage. Mr Maginness has experienced poor heath over the past two years other priorities have been given preference. The site has established amenity planting along Lincoln Tai Tapu Road, but limited planting along Ellesmere Road.

3 Guiding Principles

3.1 It is accepted that the guiding principles which should influence the preparation of the Consultation Draft of the Rural Residential Strategy are:

1. Rural residential development typologies
2. Landscape values
3. Rural residential character
4. Development constraints
5. Infrastructure servicing
6. Market demand assessment
7. Cultural values
8. Other considerations

3.2 The peri-urban environment is acknowledged as being the preferred location for rural residential development. The location of the Maginness property for Rural Residential development is considered to be peri-urban, being adjacent to the Living Z zone on the western side of Ellesmere Road. Existing amenity planting on the northern and eastern side of the property, will screen Rural Residential development.

3.3 Development constraints for the immediate development of the property include the absence of control over the timing of the development on the western side of Ellesmere Road. However the owner of the adjacent land is progressing at a reasonably rapid rate to develop the residential sites, perhaps stimulated by the competition between development companies to meet the present demand for vacant residential sections.

3.4 The development of the adjacent residentially zoned land will ensure that sewage and water reticulation provided to that land, will be able to be extended to the Maginness land. Mr Maginness has previously been in contact with Fulton Hogan Land Development Ltd to gain an indication of whether that company would allow for the extension of services through the sections or roading linkages to allow for the connection to his land. There has not been any rejection to this request.

3.5 The Maginness site does not contain any known springs or sites of historical significance which may impact on the potential for development of the property. As applies to all development sites, should there become evidence during construction of cultural sites, all construction would be required to cease until appropriate investigations of the historical occupation of the site had been undertaken.

3.6 A constraint on the development of the property for more intensive residential use, is the identification in the District Plan Roading Hierarchy of both Ellesmere Road and Lincoln Tai Tapu Road as being arterial roads. The Christchurch Rolleston and Environs Transportation Study indicates via Diagram E17 that Lincoln Tai Tapu Road will have priority at this intersection. The development plans for the residential development on the western side of Ellesmere Road, indicate that an intersection is proposed off Ellesmere Road to the north of the Lincoln Tai Tapu Road intersection. This would reasonably imply that the intension is to control traffic speeds from the 100 kph limit for rural roads, to closer to 50kpk with the restriction being placed north of the intersection to the residential development. Even in the absence of this intersection being placed to the north, traffic speeds will be controlled by the intersection of Ellesmere Road with Lincoln Tai Tapu Road.

3.7 It is noted that the Officers Hearing Report on the Rural Residential Strategy, does not support the inclusion of the Maginness property into the Rural Residential sites, on the grounds that the land is susceptible to flooding and additional stormwater discharges may have a negative impact on the local drainage network. This statement includes reference to both the Barker and Maginness sites.

3.8 It is evident from observation of flood ponding events that the land to the north of Lincoln Tai Tapu Road and Perymans Road is more elevated than the land on the southern sides of these roads, and that ponding within the Maginness site is not as significant as the statement might imply. What is acknowledged is that land within the Lincoln locality displays poor ability for soakage, whether residential or rural sites. The matter to be considered is to what extent does a potential rural residential development of the site, increase the run-off from the property. A general "rule of thumb", is that for residential use of land the run-off co-efficient is 0.4 of the rainfall intensity. The co-efficient for Rural Residential development where there is a lesser amount of hard-surface coverage, might be considered to be 0.25 of rainfall intensity. Where the land becomes saturated, regardless of the land use, the run-off might be 0.8.

3.9 The issue to be addressed is how the additional run-off as a consequence of intensified use, is to be addressed. It is considered that the erection of dwellings on the sites for Rural Residential land use, would not tip the balance with the consequence of run-off. The issue relates more significantly to the hard-stand areas. Within the sites this can be controlled by providing rules that driveway areas are to be metalled but not sealed. The matter then relates solely to the additional run-off from the roadway. Swales can be constructed on the sides of the roadway, which provide for the retention of the first 25mm of any rainfall event to be with-held and released following the peak of the event. Additional storage can be provided by formation of stormwater swales within the sites. The roadside and property swales will allow for suspended solids to settle, prior to release to drainage outfalls.

4 Development Plan

4.1 The Maginness property has the potential to be subdivided to create some fourteen allotments containing areas ranging from 0.54 hectares to 1.14 hectares, with an average allotment area of 0.73 hectares. The layout as attached of a possible subdivision, provides for all sites to be accessed off a roadway to be constructed off Perymans Road, with a pedestrian and cycle linkage to Ellesmere Road. A stormwater retention basin is proposed adjacent to Perymans Road frontage. While the layout shows the stormwater treatment area as being on the western side of the new road entranceway, the area can be significantly extended to include the southern side of the existing dwelling site on the eastern side of the new road.

4.2 The existing Maginness dwelling is presently accessed off Perymans Road. The intention would be that the dwelling be accessed off the new road. The provision of the pedestrian access will provide linkage to the residential zone, albeit that vehicles would exit the development onto Lincoln Tai Tapu Road. The intersection of this road with Perymans Road has been upgraded in recent times, and there will be safe sight distances available in both directions along Lincoln Tai Tapu Road.

5 Other Matters

5.1 Within the past two years, a subdivision to create a 1 hectare site was undertaken. At that time a geotechnical report was prepared following a CPT machine borehole being sunk to a depth of 15.5 metres, and penetrometer drilling. The conclusions within the attached report indicate that the site was considered to be TC2, and that site improvement works would be required before the site could be classified as TC1. In respect of dwellings the report states:

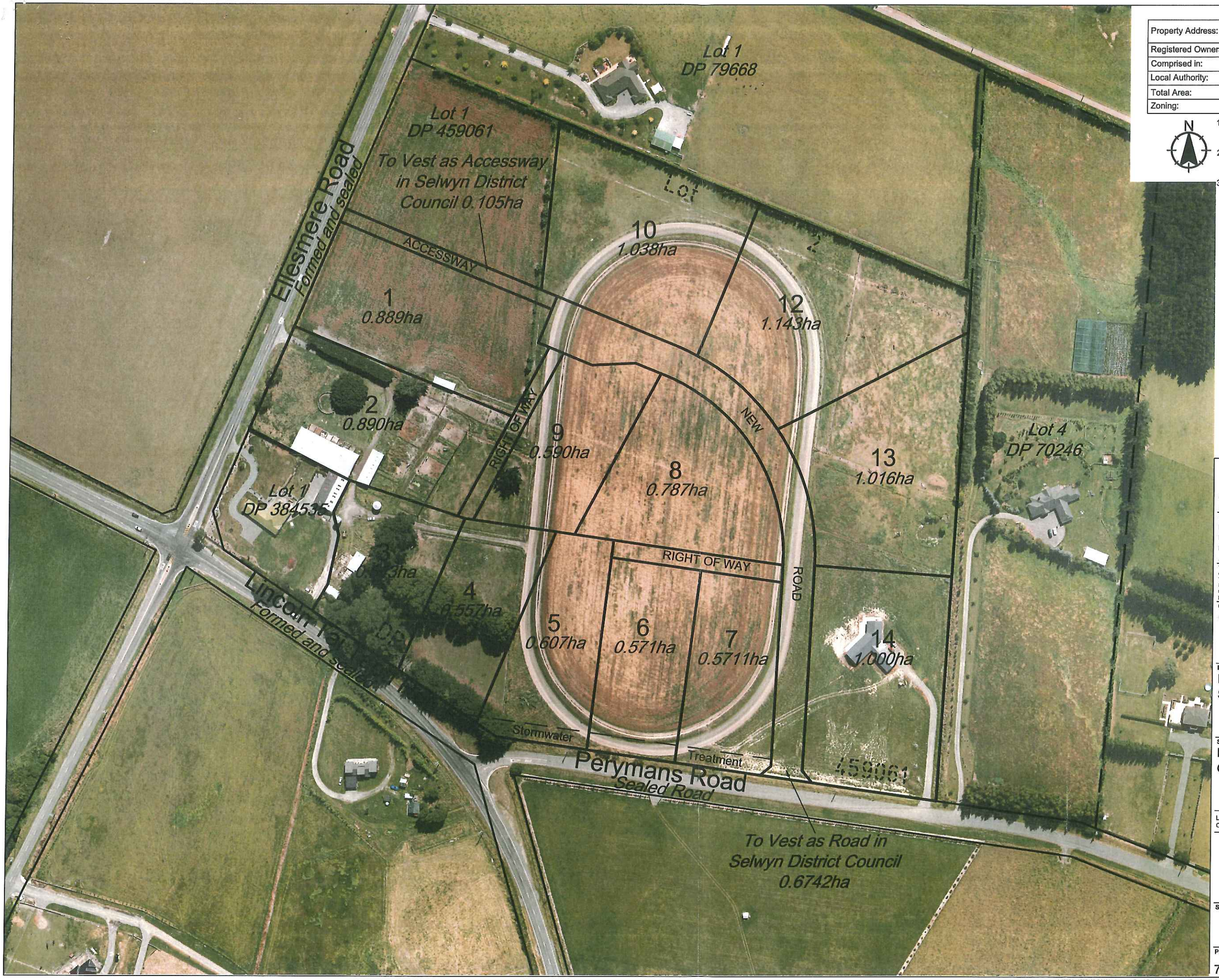
> *The type of foundations required will be dependent on the floor type adopted for the future dwelling. If slab-on-grade concrete floors are desired then Options1 to 4 of the DBH November 2011 should be used, provided all topsoil is removed to expose clean natural soils. It suspended timber flooring is desired then NZS3604 pile foundations can be used that are embedded the deeper of 500mm below finished ground level or 200mm below any localised deep topsoil.*

The geotechnical tests were undertaken in May 2012, and the water levels were noted to be not less than 1.5 metres below ground level.

6 Conclusion

6.1 The applicant respectfully asks that his property be considered for inclusion within the preferred area for Rural Residential growth.

Graham Fowler
11 April 2014



GENERAL NOTES

Property Address:	354 Perymans Road, Lincoln-Taitapu
Registered Owners:	G.V. Maginness
Comprised in:	CFR 599503
Local Authority:	Selwyn District Council
Total Area:	11.1875ha
Zoning:	Inner Plains

N

1. Horizontal Datum: NZGD 2000 Mount Pleasant Circuit
2. Areas and dimensions are approximate only and subject to Council approval and final survey.
3. Post earthquake aerial BX233242, BX233243 & BX233244 sourced from:

Toitu te Land whenua Information New Zealand

Revision	App	Date
0 INITIAL ISSUE	GF	09.04.14

Surveyed	–	–
Designed	GF	09.04.14
Drawn	JK	09.04.14
Reviewed	GF	09.04.14
Approved	GRAHAM FOWLER	09.04.14

Client
G.V. MAGINNESS

Project Title
RURAL RESIDENTIAL STRATEGY

Sheet Title
POSSIBLE SUBDIVISION OF LOT 2 DP 459061

Level 1, 323 Madras Street
Christchurch 8013
spiire.co.nz
+64 3 374 6515

spiire
Innovation in infrastructure

Scale (A3 Original) 1:2000

20 10 0 20 40 60 m

Project No	Sheet	Revision
707469	V60	0

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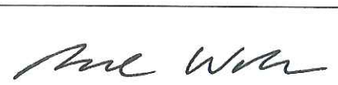
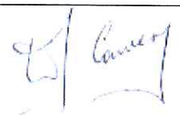
GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RURAL SUBDIVISION
354 PERYMANS ROAD, LINCOLN

Job Number:	C12066
Name of Project:	Proposed Rural Subdivision
Client:	Gavin Maginness
Author:	Dwayne Wilson, Senior Geotechnical Engineer
Reviewer:	Dave Convery, Director, MIPENZ, CPEng (36976)
Document Version:	A
Printed:	12 July 2012
Author Signature:	
Review Signature:	

Distribution List

Revision	Quantity	Issued to	Date
A	4	Gavin Maginness	12 July 2012
A	1	Soil & Rock Consultants (file copy)	12 July 2012

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RURAL SUBDIVISION
354 PERYMANS ROAD, LINCOLN

Table of Contents

Attachments:

Appendix A: Test Location Plan

Appendix B: Machine Borehole Logs & Core Photographs

Appendix C: Hand Augerhole Logs

1.0 Introduction

1.1 Project Brief and Scope

Soil & Rock Consultants were engaged by Gavin Maginness to undertake a geotechnical site investigation for a proposed subdivision at 354 Perymans Road, Lincoln, Canterbury. The scope of our investigation was to determine subsurface conditions, provide comment as to the suitability of the land to subdivide, and also give foundations recommendations for future dwelling construction. This report summarises our findings and recommendations and may be used to support both a Subdivision Consent and Building Consent application to Selwyn District Council.

1.2 Limitations

This report has been prepared for the sole benefit of our Client, Gavin Maginness, with respect to the particular brief given to us. This report is to be used by our Client's appointed Consultants and may be relied upon by Selwyn District Council when considering any proposed application in association with the presently proposed development. The data and/or opinions contained in this report may not be used in other contexts, by any other persons or for any other purpose without our prior review and agreement.

The recommendations given in this report are based on site data from discrete locations. Inferences about the subsoil conditions away from the test locations have been made, but cannot be guaranteed. We have inferred an appropriate geotechnical model that can be applied for our analyses. However, variations in ground conditions from those described in this report could exist across the site. Should conditions encountered differ to those outlined in this report we ask that we be given the opportunity to review the continued applicability of our recommendations.

Some of the engineering data provided in this report is based on recently published amendments to the Building Code compliance documents (August 2011). New information about the effects of the recent "Christchurch Earthquakes" is becoming available as a result of on-going investigations by statutory authorities and may result in further modifications to the Building Code and Council by-law requirements for building work. This report may need to be modified to take account of those future changes before the development works are implemented. It is recommended that the findings of this report be reviewed if there is any delay in the implementation of the work beyond the immediate future.

Our investigation and assessments have not taken into account possible fault rupture that may cause deformations and displacements of the ground directly below the site. This is outside of the scope of our engagement and beyond the realms of geotechnical investigation and assessment, and from recent accounts near impossible to predict.

The investigation was confined to geotechnical aspects of the site and did not involve assessment or testing for environmental contaminants or flood risk.

2.0 Site Description & Proposed Subdivision

The property 354 Perymans Road in Lincoln is legally described as Lot 2, DP384535 and has a total area of approximately 12.18 hectares. The area of our investigation encompassed a near level grassed paddock at the northwest corner of the property, which fronts to Ellesmere Road.

We understand it is proposed to subdivide the site to accommodate a new 1 hectare Lot at the northwestern corner of the property. We understand a new residential dwelling will be constructed within the lot sometime in the future, however development plans are not available at this stage.

3.0 Engineering Geology

The *Geology of the Christchurch Area*, published by IGNS in 1992 (mapped at a scale of 1:25,000) shows the site is underlain by grey river alluvium deposits beneath plains or low-level terraces. These materials are derived principally from deposits from the Halswell River (1km south to the site).

4.0 Field Investigation

Our field investigation comprised the following components:

- A detailed walkover inspection of the site
- Drilling of 1 machine borehole to depth of 15.5m on 20 May 2012 – Appendix B
- Drilling of 4 hand augerholes (AH1 – AH4) to depths of 3m on 24 May 2012 – Appendix C
- Scala Penetrometer testing through the locations of the augerholes – Appendix C

The locations of all field tests were measured in by tape from existing site features and inferred boundaries and with hand held GPS without survey control and are therefore approximate only. Test locations are shown on the attached Drawing C12066/1, *Test Location Plan,* Appendix A.

The machine borehole was drilled by equipment owned and operated by DCN Drilling Ltd. One of our geotechnical engineers was present on site during the duration of drilling to log the recovered soils, record field test results and direct the drilling contractors. Standard Penetration Tests were carried out at intervals of depth within the borehole, the recorded blow counts are shown on the attached borehole log.

Scala Penetrometer (Dynamic Cone) testing was carried out from the base of all augerholes and from the present ground surface at three locations to assess soil penetration resistance. The testing was carried out in accordance with

NZS 4402:1988, Test 6.5.2, Dynamic Cone Penetrometer and the blows per 100mm penetration are shown on the hand augerhole logs.

A visual-tactile field classification of the subsoils encountered during drilling was carried out in accordance with "Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes", issued by the New Zealand Geotechnical Society Inc. (2005).

Measurements of the groundwater table were carried out on the days of drilling and are shown on the attached logs.

5.0 Subsurface Conditions

Subsurface conditions encountered at the test locations are summarised below and a detailed description of the soils encountered during the drilling is given on the attached augerhole logs and machine borehole logs.

- **Topsoil.** Topsoil was encountered at the tops of all tests to depths between 0.3m to 0.6m below present ground level (bpgl).

- **Springston Formation Alluvial Deposits.** Alluvial deposits of the Springston Formation were encountered beneath the topsoil to the termination depths of all tests (ie 3.0m within augerholes and 15.5m within the borehole). The alluvial soils comprised loose to medium dense silts and sands within the augerholes, which extended to 7.0m bpgl within the borehole, under which dense gravelly sands and sandy gravels were encountered to the base of the borehole. Scala Penetrometer testing carried out through the augerhole locations recorded blow counts per 100mm penetration between 1 and 10, which generally ranged from 2 to 4 blows per 100mm. Three SPT's were conducted within the upper silts and sands that recorded blow counts per 300mm penetration of 7, 7 & 21. SPT's within the lower dense gravelly soils ranged from 33 to in excess of 50 blows per 300mm penetration.

- **Groundwater Table.** Groundwater was encountered at all test locations on the days of drilling at levels between 1.8m and 2.1m bpgl.

6.0 Site Seismicity

Based on the presence of the high SPT-N value at depths within 10m of the ground level, the site is considered Site Subsoil Class D in accordance with NZS1170.5:2004.

7.0 Liquefaction Analysis

An assessment of liquefaction potential has been carried out to determine possible ground subsidence under the site during future seismic events. Liquefaction analyses have been carried out for both Ultimate Limit State (ULS) and Serviceability Limit State (SLS) future seismic events using peak horizontal ground accelerations of 0.35g and 0.13g, respectively.

These acceleration values are given within the Department of Building and Housing (DBH) document, titled *"Interim Guidance for Repairing and Rebuilding Foundations in Technical Category 3"* dated 27 April 2012. Although the document is prepared for the assessment for residential areas designated as TC3 by CERA, the analysis methods and ground accelerations within the document are also to be adopted for all residential properties and subdivisions that liquefaction analysis are to be carried out for.

Liquefaction analyses have been carried out using the below methodology:

- Idriss & Boulanger (2008) for liquefaction triggering & ground subsidence

The calculated liquefaction induced ground subsidence values are shown in Table 1 below.

Table 1 – Liquefaction Analysis Results

Seismic Event	Peak Ground Acceleration (g)	Earthquake Magnitude (Mw)	Depth Range of Liquefied Layers (m)	Liquefaction Induced Ground Subsidence (mm)
ULS	0.35	7.5	2.2 – 7.0	67
SLS	0.13	7.5	2.2 – 3.2 & 6.0 – 7.0	36

The results indicate that 67mm and 36mm of ground subsidence could occur as a result of future liquefaction for ULS & SLS seismic events, respectively. The Technical Land Category of the subdivision site should therefore be classified as TC2, in accordance with DBH requirements.

With respect to lateral spreading the site is well clear of any incised rivers or changes in overall ground topography so it is highly unlikely of lateral spreading will occur as a result of on-going or future seismic activity.

8.0 Subdivision Requirements

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent if the land is likely to be subject to erosion, falling debris, subsidence, slippage or inundation.

We consider it unlikely that the site will be subject to erosion due to the site not being located within close proximity to any significant watercourses and the level nature of the area.

Falling debris from upslope land slippage or rock fall is not possible at this site in the absence of any elevated land in proximity to the site.

Due to the near level nature of the site slope instability and earthquake induced lateral spreading will not adversely affect the property.

Subsidence and inundation by ejected matter (ie sand, silt and water) could occur from future liquefaction of the site soils from a future large (ULS level) earthquake. Subsidence is expected to be within tolerable limits of Technical Category 2 in accordance with the DBH guidelines, titled *"Guidelines for the Geotechnical Investigation and Assessment of Subdivisions in the Canterbury Region"* dated 14 November 2011.

It is not considered practical or economic to carry out such ground improvement works to increase the land category of the site from TC2 to TC1. Therefore future dwelling construction should follow the DBH guidelines, titled *"Revised Guidance on Repairing and Rebuilding Houses affected by the Canterbury Earthquake Sequence"*, dated November 2011.

9.0 Future Development Recommendations

9.1 Dwelling Foundations

The type of foundations required will be dependent on the floor type adopted for the future dwelling. If slab-on-grade concrete floors are desired then Options 1 to 4 of the DBH November 2011 guidelines should be used, provided all topsoil is removed to expose clean natural soils. If suspended timber flooring is desired then NZS3604 pile foundations can be used that are embedded the deeper of 500mm below finished ground level or 200mm below any localised deep topsoil.

An Ultimate Bearing Capacity of 200kPa is available for Ultimate Limit State design of foundations in accordance with AS/NZS1170:2002. A Strength Reduction Factor of Ø = 0.5 should be applied to the ultimate bearing capacity to determine the dependable bearing capacity value, which should equal or exceed the factored bearing pressures.

Any fill placed at the site to form the building platform should be placed on clean natural ground cleared of any vegetation, topsoil and weak or organic soils. Fill placement should be limited to no more than 600mm above present ground level, with side batters formed no steeper than 1V: 5H. Fill should be placed and compacted in layers to achieve no less than 95% of maximum dry density. Fill may comprise either clean site soils won from excavations that are suitably moisture conditioned to achieve sufficient compaction or imported granular fill comprising well graded sandy gravel. The gravel particles must include at least two broken faces to provide better interlocking characteristics.

9.2 Pavement Areas

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement.

Based on our observations during drilling we consider the natural ground at the site should provide an adequate subgrade for any proposed concrete paved access, parking and turning areas. We recommend for preliminary design a CBR value of 3% or a modulus of subgrade reaction of 15kPa/mm, for flexible or rigid pavements respectively.

The subgrade should be proof-rolled to detect any significant deflection or soft spots which should be excavated and backfilled with compacted granular fill. Following preparation of the subgrade a basecourse comprising free-draining aggregate should be placed and compacted. The thickness of the basecourse would depend on the final CBR/modulus of subgrade reaction used for the subgrade and the traffic loads anticipated. The compaction of the basecourse should be carried out with a vibratory roller of appropriate static weight and energy.

9.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Stormwater flows must not be allowed to saturate the ground so as to adversely affect foundation conditions.

10.0 Review of Development Drawings

A Geotechnical Engineer familiar with the findings of this report should review development drawings once they have been prepared and prior to submission to Council for a Building Consent application to ensure the recommendations of this report are adhered to.

11.0 Observation of Construction

A Geotechnical Engineer familiar with the findings of this report should be engaged to carry out inspections during earthworks and foundation excavations, to confirm soil and foundation conditions are consistent with those presented within this report.

The recommendations given in this report are based on limited site data from discrete locations. Variations in ground conditions could exist across the site. It is in the interests of all parties that we be retained to inspect excavations and foundation conditions exposed during construction, so that ground conditions can be compared with those assumed in formulating this report. In any event, we should be notified of any variations in ground conditions from those described or assumed to exist.

12.0 Conclusions

Based on the results of our investigation and assessment we consider the proposed rural subdivision is generally suitable for construction at the subject site from a geotechnical perspective and that for classification purposes the Technical Land Category of the new lot is TC2. Recommendations regarding earthworks, foundation design, and geotechnical observation have been given for the proposed project, which should be followed.

End of Report

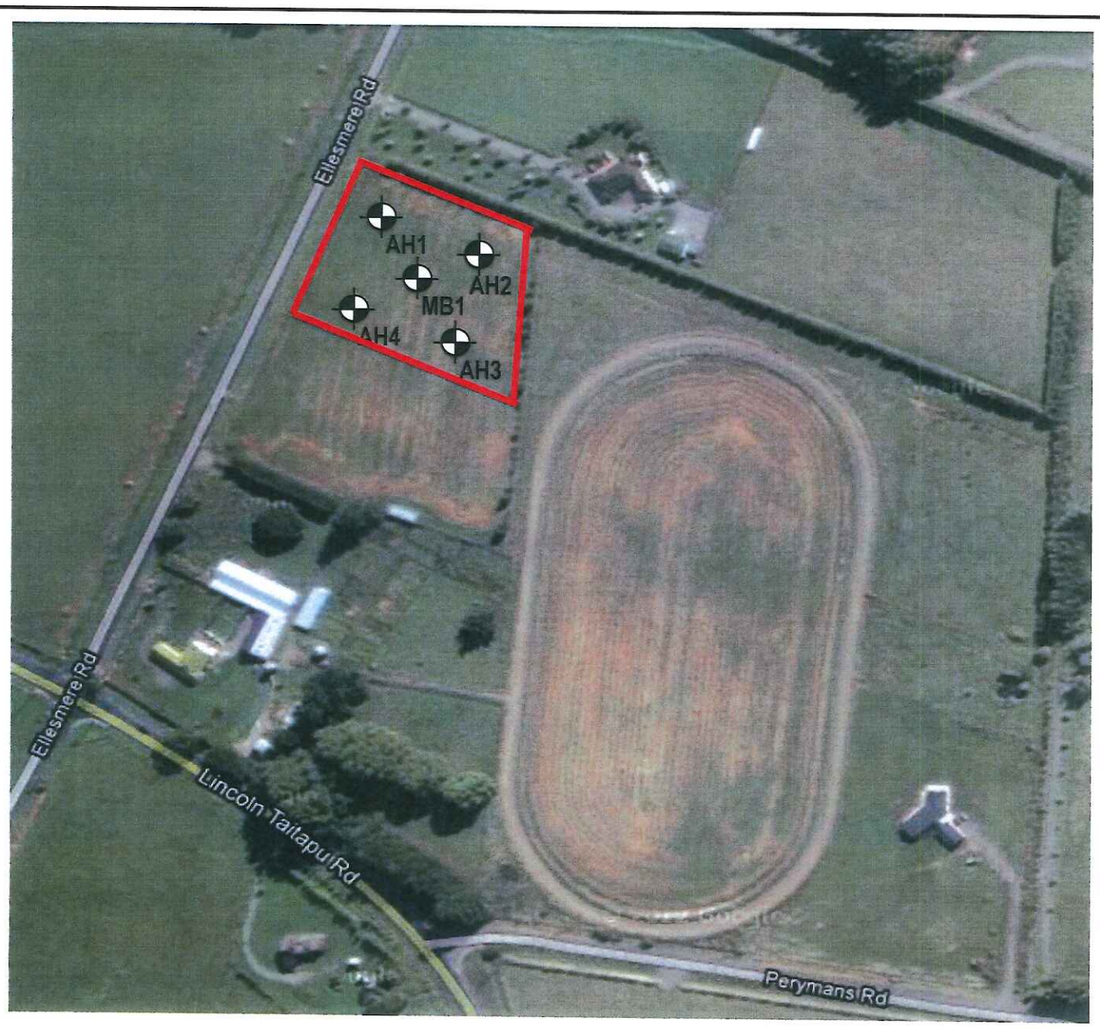
Soil&Rock Consultants
CONSULTING GEOTECHNICAL ENGINEERS

Appendix A

Test Location Plan

Ref. No. C12066

July 2012



Legend:

North — Approximate True North Direction

AH — Approximate Hand Augerhole Locations
Soil & Rock Consultants 24 May 2012

MB — Approximate Machine Borehole Location
DCN Drilling Ltd 20 May 2012

Approximate Extent of New Lot

Notes:

1. Soil & Rock Consultants Test Location Plan adapted from aerial photography from Google Maps
2. Locations of features are approximate only
3. Original sheet size A4
4. Buried services to be located prior to construction

Soil&Rock Consultants
CONSULTING GEOTECHNICAL ENGINEERS

DATE:	June 2012
DRAWN:	DW
SCALE:	NTS
CAD REF:	C12066-1.XLS

TEST LOCATION PLAN
PROPOSED RURAL SUBDIVISION
354 PERYMANS ROAD, LINCOLN

DRAWING NO:
C12066/1

SHEET 1 OF 1

Soil&Rock Consultants
CONSULTING GEOTECHNICAL ENGINEERS

Appendix B

Machine Borehole Logs and Core Photographs

Ref. No. C12066

July 2012

Soil & Rock Consultants
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CLIENT: Gavin Maginness

PROJECT: 354 Permans Road, Lincoln, Christchurch

Machine Borehole No: MB1

Sheet 1 of 2

Drill Type:	Sonic Drill	Project No:	C12066	Logged By:	DW
Drilled By:	DCN Drilling Ltd	Coordinates:		Shear Vane No - Calibration Date:	
Date Started:	20/5/12	Ground Elevation:		Surface Conditions:	Near level. grass paddock
Date Finished:	20/5/12	Water Level:	2.0m 20/05/2012		

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	C_u / SPT (blows/200mm) (kPa)	DRILLING METHOD	RECOVERY (%)	TCR SCR RQD	If	WATER CONTENT	OTHER
Topsoil		Top soil		0								
		Brownish grey, orange bands, SILT, minor clay and sand, very stiff, moist, moderately plastic	20/05/2012	1			Sonic					
		Brown and grey silty fine to medium SAND, loose to medium dense, wet Saturated		2		6 4 3 N=7	SPT					
		Bluish grey, fine sandy SILT, trace clay and rootlets, firm, saturated, slightly plastic, highly dilatant		3			Sonic					
		Bluish grey, silty fine SAND, medium dense, saturated		4								
Springston Formation		Brown, fine to coarse SAND, trace silt, medium dense, saturated Bluish grey, fine to medium SAND, some silt Silty fine SAND Fine to medium SAND, minor silt		5		7 9 12 N=21	SPT					
		Bluish grey, fine sandy SILT, trace clay, firm, saturated, slightly plastic, highly dilatant		6		1 3 4 N=7	Sonic SPT					
		Yellowish brown, fine to coarse SAND, trace silt, medium dense, saturated		7			Sonic					
		Brown and grey, fine to coarse subrounded GRAVEL, minor sand, dense, saturated										
		Brown, fine to coarse SAND, minor subrounded gravel, trace silt, very dense, saturated		8		13 32 18 for 80mm 50+	SPT Sonic					
		Brown and grey sandy fine to coarse subrounded GRAVEL, minor cobbles, very dense, saturated		9		25 50 for 140mm 50+	SPT					
		Brown, fine to coarse SAND, trace silt, very dense, saturated		10			Sonic					

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Soil & Rock Consultants
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CLIENT: Gavin Maginness

PROJECT: 354 Permans Road, Lincoln, Christchurch

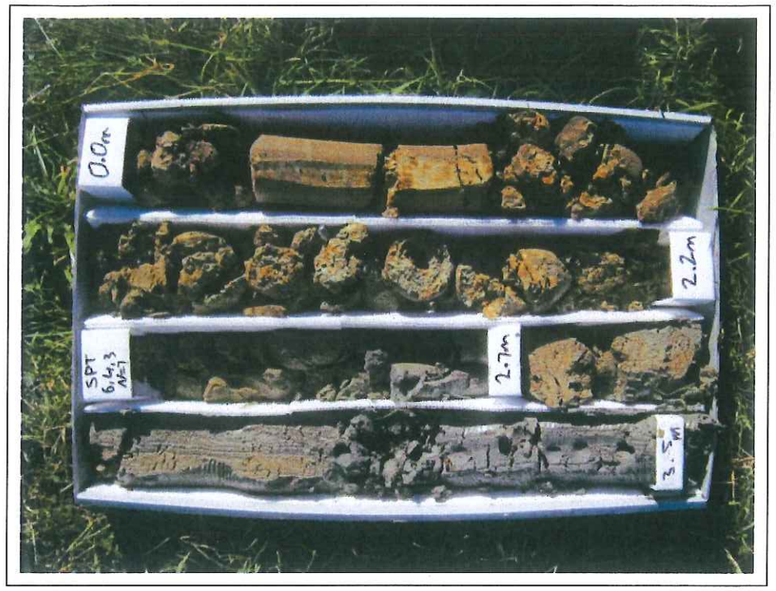
Machine Borehole No: MB1

Sheet 2 of 2

Drill Type:	Sonic Drill	Project No:	C12066	Logged By:	DW
Drilled By:	DCN Drilling Ltd	Coordinates:		Shear Vane No - Calibration Date:	
Date Started:	20/5/12	Ground Elevation:		Surface Conditions:	Near level, grass paddock
Date Finished:	20/5/12	Water Level:	2.0m 20/05/2012		

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT (blows/300mm) / C_u (kPa)	DRILLING METHOD	RECOVERY (%)	TCR SCR RQD	If	WATER CONTENT	OTHER
Springston Formation		Bluish grey, cobbly fine to coarse subrounded GRAVEL, very dense, saturated		10			Sonic					
		Yellowish brown, fine to coarse SAND, minor gravel, dense, saturated				39 50 for 125mm 50+	SPT					
		Brown and grey sandy fine GRAVEL, trace silt, dense, saturated		11			Sonic					
		Bluish grey, cobbly fine to coarse subrounded GRAVEL, very dense, saturated										
		Brownish yellow, sandy SILT, trace clay, stiff, saturated, slightly plastic		12								
		Brown fine to coarse SAND, medium dense, saturated				11 14 19 N=33	SPT					
		Brown and grey, sandy fine to coarse subrounded GRAVEL, some cobbles, very dense, saturated		13			Sonic					
		Yellowish brown, fine to coarse SAND, trace clay, medium dense, saturated				10 30 20 for 105mm 50+	SPT					
		Grey and brown, sandy fine to coarse subrounded GRAVEL, some silt, trace cobbles, very dense, saturated		14			Sonic					
		Dark brown, fine to coarse SAND, minor gravel, trace silt, very dense, saturated		15		8 16 38 N=54	SPT					
		END OF BORE. 15.45 METRES. [Target Depth]		16								
				17								
				18								
				19								
				20								

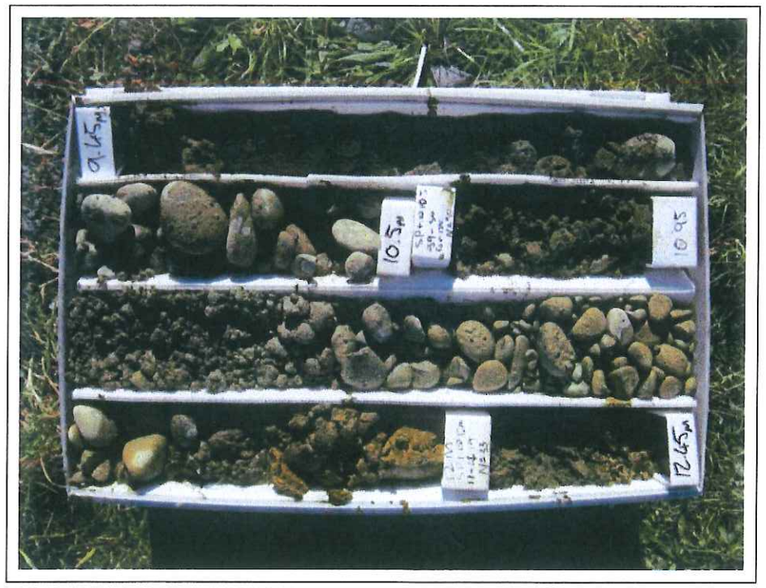
MACHINE LOG C12066 21-05-2012 MB1.GPJ S&R_2010.GDT 23/5/12



MB 1 from 0.00m to 3.5m
Box 1 of 5

MB 1 from 3.5 m to 6.45m
Box 2 of 5

MB 1 from 6.45m to 9.45m
Box 3 of 5



MB 1 from 9.45m to 12.45m
Box 4 of 5

MB 1 from 12.45m to 15.45m
Box 5 of 5

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Appendix C

Hand Augerhole Logs

Soil & Rock Consultants
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CLIENT: Gavin Maginness

PROJECT: 354 Perymans Road, Lincoln, Christchurch

Auger Hole No: AH1

Sheet 1 of 1

Drill Type:	Hand Auger	Project No:	C12066	Logged By:	LC/EH
Drilled By:	LC/EH	Coordinates:	2470281 E, 5729123 N		
Date Started:	24/5/12	Ground Elevation:		Surface Conditions:	Near level, grass
Date Finished:	24/5/12	Water Level:	2.0m 24/05/2012		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"
Topsoil	0.0		Dark brown, SILT, some sand, stiff, dry, non plastic
Springston Formation	0.5		Brown orange SILT, some fine sand, stiff, dry, non plastic
			fine to medium sandy SILT
			mottled orange
	1.0		Dark red, SAND, with minor silt, medium dense to dense, moist
			Brown yellow, SILT, minor sand, very loose to loose, moist
	1.5		grey, trace sand, very loose to loose, wet
			some fine to medium sand, hole suction
	2.0		Blue grey SAND, minor silt, medium dense, saturated
	2.5		poor sample recovery
			reddish purple mottling
	3.0		END OF BORE. 3.00 METRES. [Target Depth]
	3.5		
	4.0		
	4.5		
	5.0		

WATER LEVEL (m): 24/05/2012

SCALA PENETROMETER
TEST METHOD
NZS4402: 1986 test 6.5.2

(Blows per 100mm Increment)

DEPTH (m)	5	10	15	20
0.0	6			
	5			
	5			
0.5	4			
	3			
	4			
	4			
	5			
1.0	5			
	6			
		10		
	6			
1.5	2			
	1.5			
	1.5			
	2			
	4			
	1			
2.0	2			
	2			
	2			
	5			
	6			
2.5	4			
	6			
	2			
	2			
	3			
3.0	2			
3.5				
4.0				
4.5				
5.0				

LABORATORY TESTS

HAND AUGER WITH SCALA CHCH LOG C12066 AH1-4 24052012.GPJ CHCH S&R_MAY 2012.GDT 24/5/12

Soil & Rock Consultants
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CLIENT: Gavin Maginness

PROJECT: 354 Perymans Road, Lincoln, Christchurch

Auger Hole No: AH2

Sheet 1 of 1

Drill Type:	Hand Auger	Project No:	C12066	Logged By:	LC/EH
Drilled By:	LC/EH	Coordinates:	2470317 E, 5729109 N		
Date Started:	24/5/12	Ground Elevation:		Surface Conditions:	Near level, grass
Date Finished:	24/5/12	Water Level:	2.1m 24/05/2012		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SCALA PENETROMETER TEST METHOD NZS4402: 1986 test 6.5.2 (Blows per 100mm Increment)	LABORATORY TESTS
Topsoil	0.0		Dark brown, SILT, stiff, dry, non plastic [TOPSOIL]		0.0		
Springston Formation	0.5		Brown yellow, SILT, trace sand, stiff, dry, non plastic mottled brown orange minor sand, moist		0.5		
	1.0		Brown orange, fine to medium SAND, trace silt, loose to medium dense, moist		1.0		
	1.5		Brown grey, SILT, minor fine sand, stiff, wet, non plastic trace clay, slightly plastic grey fine sandy SILT, wet	24/05/2012	1.5		
	2.0		brown red mottling, saturated		2.0		
	2.5		some sand soft		2.5		
	3.0		END OF BORE. 3.00 METRES. [Target Depth]		3.0		
	3.5				3.5		
	4.0				4.0		
	4.5				4.5		
	5.0				5.0		

HAND AUGER WITH SCALA CHCH LOG C12066 AH1-4 24052012.GPJ CHCH S&R_MAY 2012.GDT 24/5/12

Soil & Rock Consultants
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CLIENT: Gavin Maginness

PROJECT: 354 Perymans Road, Lincoln, Christchurch

Auger Hole No: AH3

Sheet 1 of 1

Drill Type:	Hand Auger	Project No:	C12066	Logged By:	LC/EH
Drilled By:	LC/EH	Coordinates:	2470303 E, 5729067 N		
Date Started:	24/5/12	Ground Elevation:		Surface Conditions:	Near level, grass
Date Finished:	24/5/12	Water Level:	1.8m 24/05/2012		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"
Topsoil	0.0		Dark brown, SILT, some fine sand, loose, dry, non plastic [TOPSOIL]
Springston Formation	0.5		Brownish yellow, fine to medium SAND, minor silt, medium dense, dry
			mottled grey and orange
			fine to coarse SAND
			grey, minor silt
	1.0		trace rootlets
			orange bands
			Reddish brown, fine sandy SILT, stiff, moist, non plastic
			wet
	1.5		Grey, SILT, trace fine sand, trace clay, firm to stiff, wet, slightly plastic
			trace rootlets
	2.0		saturated
	2.5		grey, silty fine to medium SAND, medium dense, saturated, hole suction
	3.0		Grey, SILT, some fine sand, medium dense, saturated
			END OF BORE. 3.00 METRES. [Target Depth]
	3.5		
	4.0		
	4.5		
	5.0		

WATER LEVEL (m): 24/05/2012

SCALA PENETROMETER TEST METHOD NZS4402: 1986 test 6.5.2

(Blows per 100mm Increment)

DEPTH (m)	5	10	15	20
0.0	3			
	4			
0.5	3			
	4			
	3			
	2			
1.0	2			
	3			
	3			
	4			
	4			
1.5	5			
	5			
	4			
	3			
	4			
2.0	4			
	5			
	5			
	4			
2.5	4			
	4			
	6			
	4			
	2			
3.0	4			
3.5				
4.0				
4.5				
5.0				

LABORATORY TESTS

HAND AUGER WITH SCALA.CHCH LOG C12066 AH1-4 24052012.GPJ CHCH S&R_MAY 2012.GDT 24/5/12

Soil & Rock Consultants
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

CLIENT: Gavin Maginness

PROJECT: 354 Perymans Road, Lincoln, Christchurch

Auger Hole No: AH4

Sheet 1 of 1

Drill Type:	Hand Auger	Project No:	C12066	Logged By:	LC/EH
Drilled By:	LC/EH	Coordinates:	2470262 E, 5729087 N		
Date Started:	24/5/12	Ground Elevation:		Surface Conditions:	Near level, grass
Date Finished:	24/5/12	Water Level:	1.8m 24/05/2012		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"
Topsoil	0.0		Dark brown, SILT, some fine sand, medium dense, dry, non plastic [TOPSOIL]
Springston Formation	0.5		Brownish orange, fine sandy SILT, firm to stiff, dry, non plastic
			mottled orange, fine to coarse sandy SILT, moist
	1.0		some fine to coarse sand
			minor sand
	1.5		Reddish brown with grey bands, SILT, trace fine sand, stiff, moist, non plastic
			wet
	2.0		grey, minor fine sand
			saturated
			trace to minor fine sand
	2.5		Grey, silty fine to medium SAND, loose to medium dense, saturated
	3.0		END OF BORE. 3.00 METRES. [Target Depth]
	3.5		
	4.0		
	4.5		
	5.0		

WATER LEVEL (m): 24/05/2012

SCALA PENETROMETER TEST METHOD NZS4402: 1986 test 6.5.2

(Blows per 100mm Increment)

DEPTH (m)	Blows per 100mm Increment
0.0	3
	4
0.5	5
	3
	5
	5
	6
1.0	4
	3
	4
	2
	2
1.5	2
	3
	3
	2
	3
2.0	3
	4
	5
	3
	5
	6
2.5	5
	1
	2
	3
	4
3.0	4
	2
3.5	
4.0	
4.5	
5.0	

LABORATORY TESTS

HAND AUGER WITH SCALA CHCH LOG C12066 AH1-4 24052012.GPJ CHCH S&R_MAY 2012.GDT 24/5/12