



Land Information Memorandum



Property address:

59 Newtown Street

LIM number: H09555033

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Christchurch City Council

53 Hereford Street, PO Box 73015
Christchurch 8154, New Zealand
Tel 64 3 941 8999
Fax 64 3 941 8984

www.ccc.govt.nz

Application details

Date issued 7 April 2026
Date received 26 March 2026

Property details

Property address 59 Newtown Street, Bromley, Christchurch
Valuation roll number 22471 37101
Valuation information Capital Value: \$610,000
Land Value: \$435,000
Improvements Value: \$175,000
Please note: these values are intended for Rating purposes
Legal description Lot 8 DP 42922
Existing owner Car Haulaways Limited
PO Box 22740
Otahuhu
Auckland 1640

Council references

Rate account ID 73108577
LIM number H09555033
Property ID 1138265

Document information

This Land Information Memorandum (LIM) has been prepared for the purpose of section 44A of the Local Government Official Information and Meetings Act 1987 (LGOIMA). It is a summary of the information that we hold on the property. Each heading or "clause" in this LIM corresponds to a part of section 44A.

Sections 1 to 10 contain all of the information known to the Christchurch City Council that must be included under section 44A(2) LGOIMA. Any other information concerning the land as the Council considers, at its discretion, to be relevant is included at section 11 of this LIM (section 44A(3) LGOIMA). If there are no comments or information provided in these sections this means that the Council does not hold information on the property that corresponds to that part of section 44A.

The information included in this LIM is based on a search of Council records only and there may be other information relating to the land which is unknown to the Council. Please note that other agencies may also hold information relevant to the property, or administer legislation relevant to the use of the land, for example, the Regional Council (Ecan), Heritage New Zealand Pouhere Taonga, and Land Information New Zealand.

Council records may not show illegal or unauthorised building or works on the property. The applicant is solely responsible for ensuring that the land is suitable for a particular purpose.

A LIM is only valid at the date of issue as information is based only upon information the Council held at the time of that LIM request being made. It is essential that the applicant undertakes their own due diligence to verify the suitability of the property for their intended use.

To enable the Council to measure the accuracy of this LIM document based on our current records, we would appreciate your response should you find any information contained therein which may be considered to be incorrect or omitted. Please telephone the Customer Call Centre on (03) 941 8999.

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A search of records held by the Council has revealed the following information:

1. Special features and characteristics of the land

Section 44(A)(2)(aa) LGOIMA. This is information known to the Council but is not apparent from a district plan under the Resource Management Act 1991. It identifies each (if any) special feature or characteristic of the land concerned, including but not limited to the likely presence of hazardous contaminants.

☎ For enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Natural Hazards

Section 44A(2)(a) LGOIMA. This is information known to the Council about natural hazards that is required by section 44B LGOIMA.

Council's information has primarily been obtained from external specialists with the technical expertise to carry out research, investigation or analysis. Under the Local Government (Natural Hazard Information in Land Information Memoranda) Regulations 2025, the Council isn't required to:

- prepare a risk assessment of the land concerned.
- undertake any further analysis relating to the land.
- conduct additional searches or inquiries about the existence of natural hazard information.

It is the LIM recipient's responsibility to seek qualified advice about any identified natural hazard and/or the suitability of the land for its intended purpose.

This section may also include natural hazard information provided by Environment Canterbury. Christchurch City Council is required to include such information in LIMs where Environment Canterbury considers it meets the criteria under section 44C of LGOIMA.

The following statement has been provided by Environment Canterbury:

This Land Information Memorandum includes natural hazard information deemed by Environment Canterbury to be the most up to date, useful, and relevant, and is provided in accordance with the Local Government (Natural Hazard Information in Land Information Memoranda) Regulations 2025. All due care has been taken to ensure current information required to be provided under the regulations is presented below.

Environment Canterbury may hold superseded or less reliable natural hazards information relating to the land that has not been included in this Land Information Memorandum. Please contact Environment Canterbury if you would like to enquire about this information.

(a) Coastal Hazards

- Regional Hazard Information: Shoreline Modelling

Future shoreline modelling has not been completed for this area, however given the distance of the property from the coast, it will not be susceptible to coastal erosion for at least the next 100 years.

(b) Earthquakes

- Liquefaction Assessment

Christchurch City Council holds indicative information about liquefaction hazards for Christchurch. Information, including an interactive web tool, can be found on the Council's website at ccc.govt.nz/liquefaction

Depending on the potential liquefaction hazard of an area that a property is in, the Council may require site-specific investigations before granting future subdivision or building consent for a property.

Title of report: Christchurch liquefaction vulnerability study

Purpose of report: To provide a district-wide liquefaction vulnerability assessment and to provide expected land performance for a range of potential future earthquake and groundwater scenarios. For use in land use planning, subdivision and building consenting

Scope of report: Christchurch urban area from the Waimakariri River mouth to Godley Head, and inland to the Selwyn District boundary

Where or how to access the report: <https://ccc.govt.nz/assets/Documents/Environment/Land/CCC-Liquefaction-ReportBody.pdf>

Date of report: July 2020

Name of person/entity that commissioned report: Christchurch City Council

Name of person/entity that prepared the report: Tonkin & Taylor Ltd

Title of Report: Geotechnical information on horizontal land movement due to the Canterbury earthquake sequence

Purpose of report: Background geotechnical information about shallow ground movements as a result of the earthquake sequence

Scope of Report: Christchurch City flat area, excluding Port Hills and Banks Peninsula

Where or how to access the report: <https://www.linz.govt.nz/resources/research/geotechnical-information-horizontal-land-movement-due-canterbury-earthquake-sequence>

Date of report: March 2015

Name of person/entity that commissioned report: Land Information New Zealand

The name of person/entity that prepared the report: Tonkin & Taylor Ltd

- Regional Liquefaction Information

Areas where there was evidence of liquefaction were mapped following the 2010/11 Canterbury earthquakes by Tonkin & Taylor for the Earthquake Commission (urban areas) and by a group of researchers for Environment Canterbury (rural, commercial and industrial areas). These are available in the Christchurch Liquefaction Viewer at <https://apps.canterburymaps.govt.nz/ChristchurchLiquefactionViewer/>.

Technical report information:

Title: Review of liquefaction hazard information in eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts.

Date: December 2012.

Author: H Brackley (compiler).

Commissioned by: Environment Canterbury.

Purpose of report: To collate liquefaction occurrence during the 2010/11 Canterbury earthquakes, and to determine liquefaction vulnerability. For use in land use planning, subdivision and building consenting.

Study area: Coastal Canterbury from the Waipara River mouth to the Rakaia River mouth, including Banks Peninsula, and inland to Rangiora, Aylesbury, Selwyn and Southbridge.

Accessible at: <https://www.ecan.govt.nz/document/download?uri=1702192>.

- Regional Hazard Information: Earthquake fault deformation

There are no known earthquake faults at the ground surface in Christchurch. However, it is possible there are some faults in Christchurch that are yet to be identified because they are not visible at the ground surface.

More information on fault deformation is available on Environment Canterbury's fault deformation map at <https://mapviewer.canterburymaps.govt.nz/?webmap=b5f859bd18ee4912828cb092b6f6c449>.

(c) Flooding

- Regional Hazard Information: Flood Photographs

Photographs showing the property during or following past flood events may be available. Flood photographs are available on Environment Canterbury's flood imagery register at <https://apps.canterburymaps.govt.nz/FIR>.

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- **Regional Hazard Information: Site Specific Flood Assessment**
A site specific flood hazard assessment may have been completed for the property by Environment Canterbury. The information contained in this assessment may now be outdated. Please contact Environment Canterbury if you would like to request a copy.
- **Regional Hazard Information: Flood Assessment Request**
You can request a new site-specific flood hazard assessment for the property from Environment Canterbury at: <https://www.ecan.govt.nz/do-it-online/property-information/flood-hazard-assessments>.

(d) Landslides

As at the date of this LIM, Council research found no information under this heading.

(e) Subsidence

- **Consultant Report Available**
Land Information New Zealand (LINZ) engaged Tonkin and Taylor to provide a Geotechnical Report on Ground Movements that occurred as a result of the Canterbury Earthquake Sequence. The report indicates this property may have been effected by a degree of earthquake induced subsidence. The report obtained by LINZ can be accessed on their website at <https://www.linz.govt.nz> and search Information for Canterbury Surveyors.

(f) Tsunamis

As at the date of this LIM, Council research found no information under this heading.

(g) Volcanic and Geothermal Hazards

As at the date of this LIM, Council research found no information under this heading.

(h) Wind

As at the date of this LIM, Council research found no information under this heading.

(i) Any Other Natural Hazards

As at the date of this LIM, Council research found no information under this heading.

(j) District Plan Natural Hazard Information

Please refer to *Section 8. Land use and conditions* of this report for District Plan related natural hazard information.

(k) Building Notices

Please refer to *Section 5. Consents, certificates, notices, orders, or requisitions affecting the land and buildings* of this report for Building Act notice information.

Other Special Features or Characteristics of the Land

- **Contains or contained a Tank**
Council Records indicate that this site contains or contained a Tank Details of Tank are as follows: Date Installed: NA Tank Function: Flammable Liquid Volume(l): NA Underground or Above Ground: Underground Tank Status: Tank Does Not Exist Date Removed: NA Condition when Removed: NA TankID: 2909
- **Contains or contained a Tank**
Council Records indicate that this site contains or contained a Tank Details of Tank are as follows: Date Installed: NA Tank Function: Flammable Liquid Volume(l): NA Underground or Above Ground: Underground Tank Status: Tank Does Not Exist Date Removed: NA Condition when Removed: NA TankID: 2910

Related Information

- The latest soil investigation report for this property is attached for your information
- Attached is a copy of the aerial view of the property showing the approximate location of the tank/s

2. Private and public stormwater and sewerage drains

Section 44A(2)(b) LGOIMA. This is information about private and public stormwater and sewerage drains as shown in the Council's records.

 For stormwater and sewerage enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Related Information

- Attached are all drainage plans that Council hold for details of private and public drainage. Not all plans provided are verified by Council, and therefore Council cannot be liable for inaccuracies. Site investigation will be required by owners to determine exact layouts.
- This property is shown to be served by Christchurch City Council Sewer and Stormwater.
- Council Trade Waste Bylaw regulates the use of the sewer system for sources other than domestic sewage. A trade waste consent must be obtained by the new owner or occupier before any wastewater from an industrial or commercial processes including but not limited to wash down grease traps and cooling systems may be discharged to Council sewer system.

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3. Drinking Water Supply

Section 44A(2)(ba) and (bb) LGOIMA. This is information notified to the Council about whether the land is supplied with drinking water, whether the supplier is the owner of the land or a networked supplier, any conditions that are applicable, and any information the Council has about the supply.

Please note the council does not guarantee a particular water quality to its customers. If you require information on current water quality at this property please contact the Three Waters & Waste Unit.

☎ For water supply queries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Water supply

Christchurch City Council is the networked supplier of water to this property. This property is connected to the Christchurch City Council Water Supply. The conditions of supply are set out in the Christchurch City Council Water Supply and Wastewater Bylaw (2022), refer to www.ccc.govt.nz.

Related Information

- All Commercial and industrial properties are required to have a Reduced Pressure Zone backflow prevention device at the boundary to protect the Christchurch water supply network. The installation of this device is a condition of supply and is the responsibility of the property owner in accordance with the Christchurch City Council Water Supply and Wastewater Bylaw 2022. For more information visit our website <https://ccc.govt.nz/backflow-prevention/> or contact the backflow installation team on 03 941 8999.

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4. Rates

Section 44A(2)(c) LGOIMA. This is information on any rates owing in relation to the land.

☎ For rates enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

(a) Annual rates

Annual rates to 30/06/2026: \$5,675.97

	Instalment Amount	Date Due
Instalment 1	\$1,418.94	15/09/2025
Instalment 2	\$1,418.94	15/12/2025
Instalment 3	\$1,418.94	15/03/2026
Instalment 4	\$1,419.15	15/06/2026

Rates owing as at 07/04/2026: \$1,419.15

(b) Excess Water Rates

For excess water charge enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz/contact-us.

(c) Final water meter reading required at settlement?

Property settlements must ensure all water usage and outstanding debts are accurately accounted for.

To advise of a property settlement, please complete the request for settlement information form at www.ccc.govt.nz/services/rates-and-valuations/solicitors-request.

A settlement statement of accounts will be provided on the expected settlement date advised.

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5. Consents, certificates, notices, orders, or requisitions affecting the land and buildings

Section 44A(2)(d) LGOIMA. This is information concerning any consent, certificate, notice, order, or requisition, affecting the land or any building on the land, previously issued by the Council.

The information in this section may also cover building consent and/or code compliance information issued by building certifiers under the Building Act 1991 and building consent authorities that are not the Council under the Building Act 2004.

You can check the property file to identify whether any consent or certificate was issued by a building certifier under the Building Act 1991.

The building consents recorded in this LIM are only those that the Council has issued or been notified of by a stand-alone BCA. There may be others if a stand-alone BCA has issued consents without notifying the Council.

Section 44A(2)(da) LGOIMA. The information required to be provided to a territorial authority under section 362T(2) of the Building Act 2004. There is currently no information required to be provided by a building contractor to a territorial authority under section 362T(2) of the Building Act 2004. The Building (Residential Consumer Rights and Remedies) Regulations 2014 only prescribed the information that must be given to the clients of a building contractor.

Sections 71 to 74 of the Building Act 2004 require the Building Consent Authority to consider natural hazards when it receives a building consent application for the construction or major alteration of a building on land that is subject to, or likely to be subject to, a natural hazard. A building consent for this property may have been issued subject to a section 72 or 73 notice. This means at the time of building consent the Building Consent Authority was not satisfied that adequate provision would be made to protect the building and land from the natural hazard and was subsequently required to notify the Registrar-General of Land to record the natural hazard on the Record of Title. The Building Act 2004 defines natural hazards as erosion (including coastal erosion, bank erosion, and sheet erosion), falling debris (including soil, rock, snow, and ice), subsidence, inundation (including flooding, overland flow, storm surge, tidal effects, and ponding), and slippage.

If your property contains a notice under s73 of the Building Act 2004, this will be identified on the building consent decision below (decision under s72 of the Building Act 2004) and on the properties' Record of Title. The Record of Title may also record this as a s36 notice under the Building Act 1991, or a s641A notice under the Local Government Act 1974.

☎ For building enquiries, please phone (03) 941 8999, email EPADutyBCO@ccc.govt.nz or visit www.ccc.govt.nz.

(a) Consents

- BCN/2002/8285 Applied: 16/10/2002 Status: Completed
59 Newtown Street Bromley
Accepted for processing 16/10/2002
Building consent granted 29/10/2002
PIM Granted 29/10/2002
Building consent issued 21/01/2003
PIM Issued 21/01/2003
Code Compliance Certificate Granted 08/07/2005
Code Compliance Certificate Issued 08/07/2005
STORE SHED- Historical Reference ABA10029068
- BCN/2009/7623 Applied: 11/12/2009 Status: Completed
59 Newtown Street Bromley
Accepted for processing 11/12/2009
PIM Granted 25/01/2010
PIM Issued 25/01/2010
Building consent granted 05/03/2010
Building consent issued 09/03/2010
Notice to fix Applied: 29/11/2017 Expiry: 16/01/2018

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EXTEND EXISTING WASH PAD AND CONNECT TO STORMWATER AND SEWER- Historical Reference
ABA10098432

(b) Certificates

Note: Code Compliance Certificates were only issued by the Christchurch City Council since January 1993.

(c) Notices

(d) Orders

(e) Requisitions

Related Information

- Council holds no record of building permit/consent for original construction at this address. No information is held by Council relating to the materials, construction or year the office was built.
- In the property file there is an electrical and/or gas fitters certificate relating to works that have been carried out on the current building at this address.
- The Council has previously issued other consents, certificates, notices, orders, and/ or requisitions for this property that have been resolved or are no longer current or relate to a building that is no longer on the land. Further information is available on the property file.

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6. Certificates issued by a building certifier

Section 44A(2)(e) LGOIMA. This is information notified to the Council concerning any certificate issued by a building certifier pursuant to the Building Act 1991 or the Building Act 2004.

☎ For building enquiries, please phone (03) 941 8999, email EPADutyBCO@ccc.govt.nz or visit www.ccc.govt.nz.

7. Weathertightness

Section 44A(2)(ea) LGOIMA. This is information notified to the Council under section 124 of the Weathertight Homes Resolution Services Act 2006.

 For weathertight homes enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

If there is no information below this means Council is unaware of any formal Weathertight Homes Resolution Services claim lodged against this property.

8. Land use and conditions

Section 44A(2)(f) LGOIMA. This is information relating to the use to which the land may be put and conditions attached to that use. The planning information provided below is not exhaustive and reference to the Christchurch District Plan and any notified proposed changes to that plan is recommended: <https://ccc.govt.nz/the-council/plans-strategies-policies-and-bylaws/plans/christchurch-district-plan/>.

There may be some provisions of the Christchurch City Plan or Banks Peninsula District Plan that affect this property that are still operative.

☎ For planning queries, please phone (03) 941 8999, email DutyPlanner@ccc.govt.nz or visit www.ccc.govt.nz.

- **Regional plan or bylaw**

There may be objectives, policies or rules in a regional plan or a regional bylaw that regulate land use and activities on this site. Please direct enquiries to Canterbury Regional Council (Environment Canterbury).

(a)(i) Christchurch City Plan & Banks Peninsula District Plan

(ii) Christchurch District Plan

- **Liquefaction Management Area (LMA)**

Property or part of property within the Liquefaction Management Area (LMA) Overlay, which is operative.

- **Specified Electricity Line**

Property or part of property affected by setback rules that apply to some activities near specified electricity lines.

- **District Plan Zone**

Property or part of property within the Industrial Heavy Zone, which is operative.

(b) Resource consents

If there are any land use resource consents issued for this property the Council recommends that you check those resource consents on the property file. There may be conditions attached to those resource consents for the property that are still required to be complied with.

- **RMA/1998/2063 - Resource consents**

55 Newtown Street Bromley

To increase the height of the existing fence to 3m along the road boundary. - Historical Reference RES982357

Status: Processing complete

Applied 31/08/1998

Granted 17/09/1998

Decision issued 17/09/1998

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9. Other land and building classifications

Section 44A(2)(g) LGOIMA. This is information notified to the Council by any statutory organisation having the power to classify land or buildings for any purpose.

 For land and building enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

Please refer to Section 1 for details

10. Network utility information

Section 44A(2)(h) LGOIMA. This is information notified to the Council by any network utility operator pursuant to the Building Act 1991 or the Building Act 2004.

 For network enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

- **Power Pylons**

This site is traversed by or is adjacent to high tension overhead power lines and pylons. Minimum clearance distances apply to buildings, structures and trees. It is recommended that Transpower be contacted for further information.

11. Other information

Section 44A(3) LGOIMA. This is information concerning the land that the Council has the discretion to include if it considers it to be relevant.

☎ For any enquiries, please phone (03) 941 8999 or visit www.ccc.govt.nz.

(a) Kerbside waste collection

- Your organics are collected Weekly on Tuesday. Please leave your organics at the Kerbside by 6:00 a.m.
- Your recycling is collected Fortnightly on the Week 1 collection cycle on a Tuesday. Please leave your recycling at the Kerbside by 6:00 a.m. Your nearest recycling depot is the Metro Place EcoDrop.
- Your refuse is collected Fortnightly on the Week 1 collection cycle on a Tuesday. Please leave your rubbish at the Kerbside by 6:00 a.m. Your nearest rubbish depot is the Metro Place EcoDrop.

(b) Other

• Floor Levels Information

Council holds a variety of information on requirements for building or property development. This includes:

- required minimum finished floor levels, which need to be set to meet the surface water requirements in clause E1.3.2 of the Building Code (where this applies); and
- the requirements of the Christchurch District Plan (where a property is in the Flood Management Area).

Where this information has been processed for your property, you can view it online at <https://ccc.govt.nz/flooding-and-floor-levels>.

Otherwise, if you are building or developing on this land, you can request a calculation on required finished floor levels for your proposed building by emailing us at floorlevels@ccc.govt.nz.

• Community Board

Property located in Coastal-Burwood-Linwood Community Board.

• Tsunami Evacuation Zone

This property is not in a tsunami evacuation zone. It is not necessary to evacuate in a long or strong earthquake or during an official Civil Defence tsunami warning. Residents may wish to offer to open their home to family or friends who need to evacuate from a tsunami zone, and should plan with potential guests to do so in advance. More information can be found at <https://ccc.govt.nz/services/civil-defence/hazards/tsunami-evacuation-zones-and-routes/>

• Electoral Ward

Property located in Linwood Electoral Ward

• Listed Land Use Register

Hazardous activities and industries involve the use, storage or disposal of hazardous substances. These substances can sometimes contaminate the soil. Environment Canterbury identifies land that is used or has been used for hazardous activities and industries. This information is held on a publically available database called the Listed Land Use Register (LLUR). The Christchurch City Council may not hold information that is held on the LLUR. Therefore, it is recommended that you check Environment Canterbury's online database at www.llur.ecan.govt.nz

• Spatial Query Report

A copy of the spatial query report is attached at the end of this LIM. The spatial query report lists land use resource consents that have been granted within 100 metres of this property.

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Related Information

- Please see attached a copy of the Detailed Engineering Evaluation (DEE) assessment report.
- Dangerous Goods Licences have been replaced with Location Test Certificates/ Location Compliance Certificates administered by Worksafe. You can contact a local Test Certifier to advise you or to issue the type of test certificate you need.

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ph: 03 941 8999 web: ccc.govt.nz

Accuracy not guaranteed. Onsite verification required.
Display of data scale dependant.
Client selected legend.

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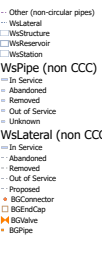


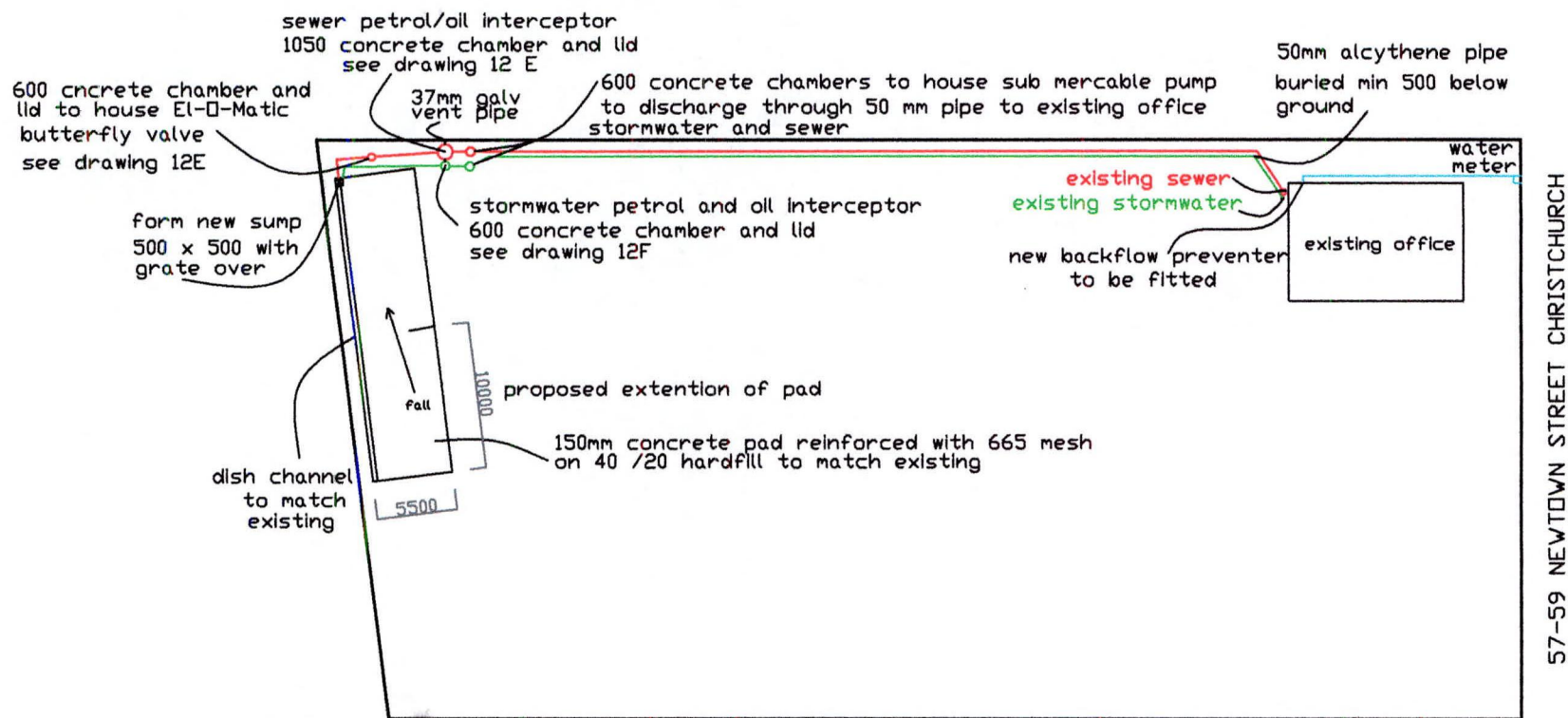
Date: 17/12/2025 11:09 AM
Scale: 1: 282 on A4

0 1.25 2.5 5 7.5 10

ArcGIS Web Map

-  Building
-  Tank
-  Rating Unit/Linked Property Report



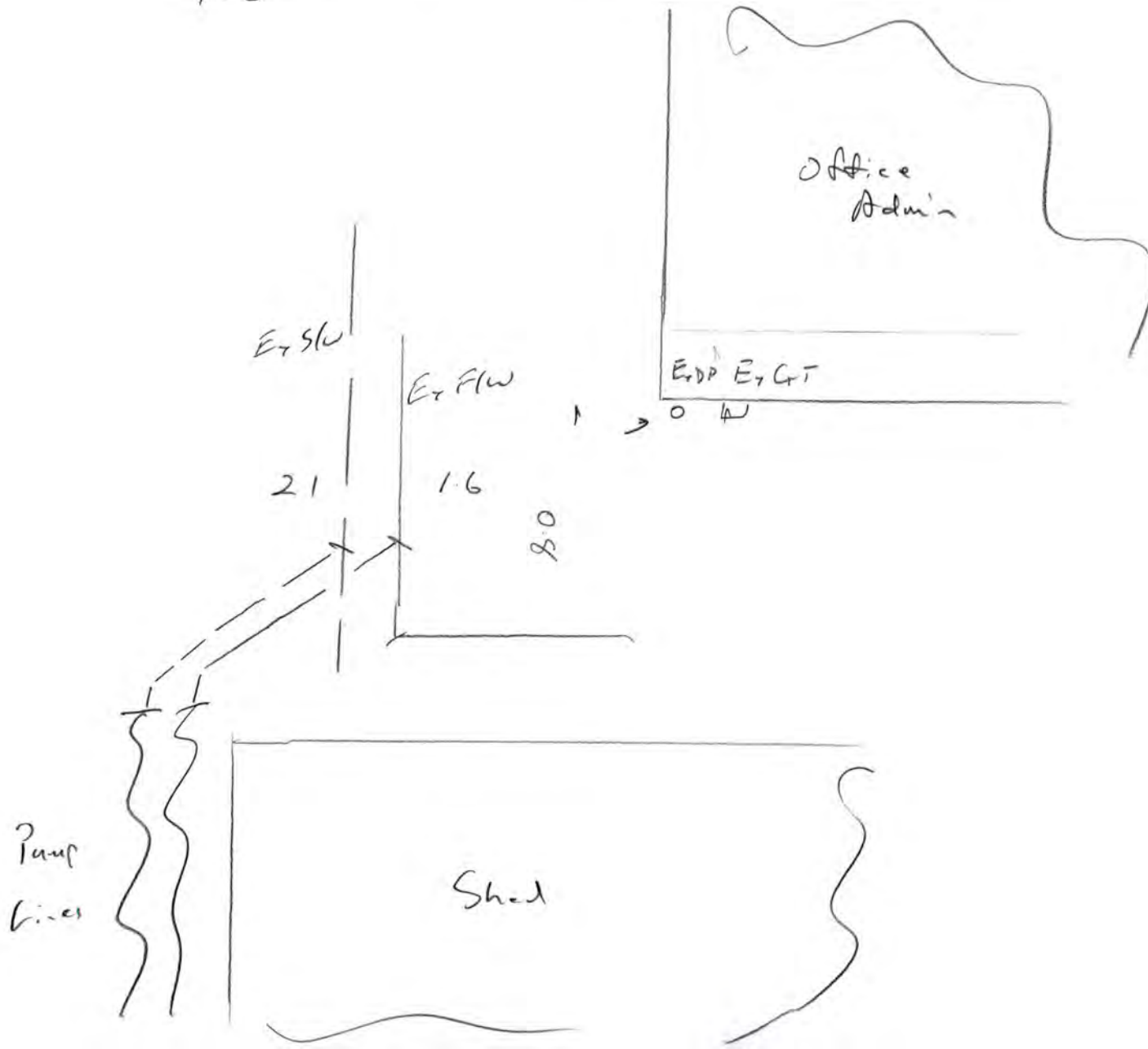


Proposed Plan

Scale 1:500

Christchurch City Council 	DRAINAGE PICKUP		CONSENT NUMBER
	Address: <u>59 Newtown St</u> Date: <u>11. 6. 10</u>	Drainlayer: <u>R Coe</u> Inspector: <u>Mor Hoch</u>	<u>10098432</u>

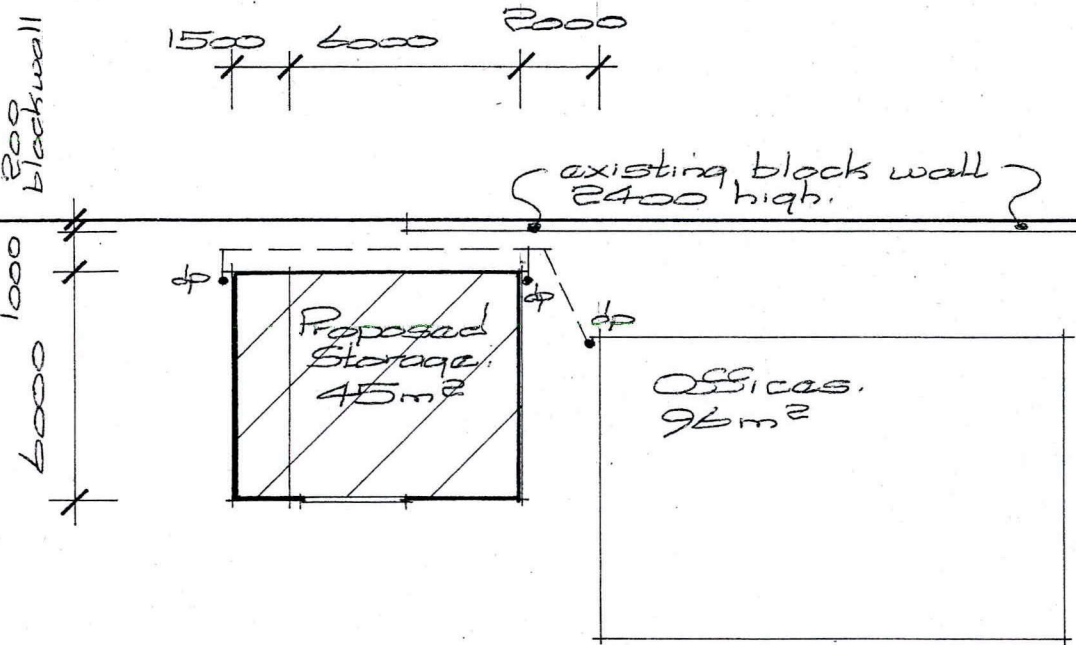
RD



Versatile Buildings - Peter Mc Dermid

Site Area- 1493m²
 Dwelling Area- 96m²
 Garage Area- 45m²
 Site Coverage - 9.44%

car storage and parking



Roof water must be connected to an approved piped stormwater system, complying with the New Zealand Building Code.

CHRISTCHURCH CITY COUNCIL
 P.L.M. APPLICATION
 Rec'd 16 OCT 2002
 Sockburn Service Centre
 Project No. 100 290 68

CHRISTCHURCH CITY COUNCIL
 Dave Barlow
 CONSENT DOCUMENT
 26 OCT 2002
 DAVE BARLOW
 All building work shall comply with the New Zealand Building Code notwithstanding any inconsistencies which may occur in the drawings and specifications.

FILE COPY

VERSATILE BUILDINGS
 HEAD OFFICE: 112 WATERLOO ROAD
 PH: (03) 348-8704
 FAX: (03) 348-9093

PROPOSED GARAGE FOR: Car Haulaways Ltd.	DRAWING TITLE : Versatile Buildings Ltd	Scale: 1:200 Date: 15/10/02.
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Newton Street

CHRISTCHURCH CITY COUNCIL - DRAINAGE PICK UP

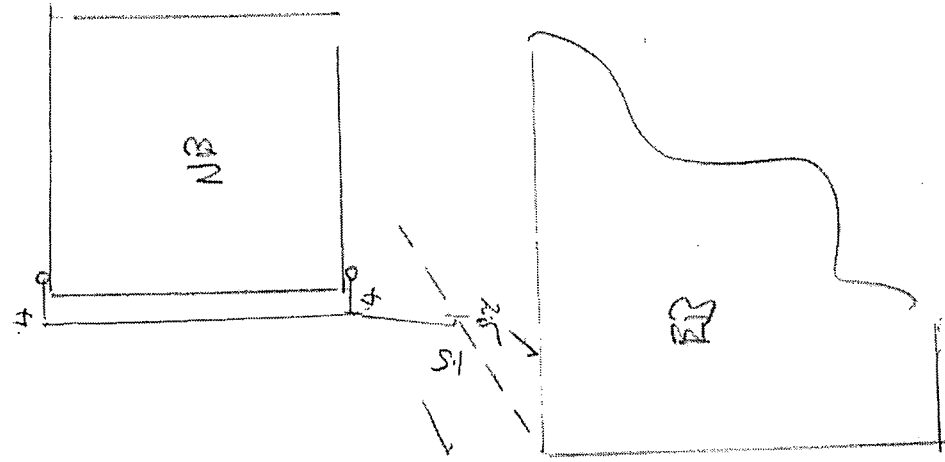


ADDRESS: 55 New Town St
 LEGAL DESCRIPTION:
 PROJECT No.: 10029068
 DATE:

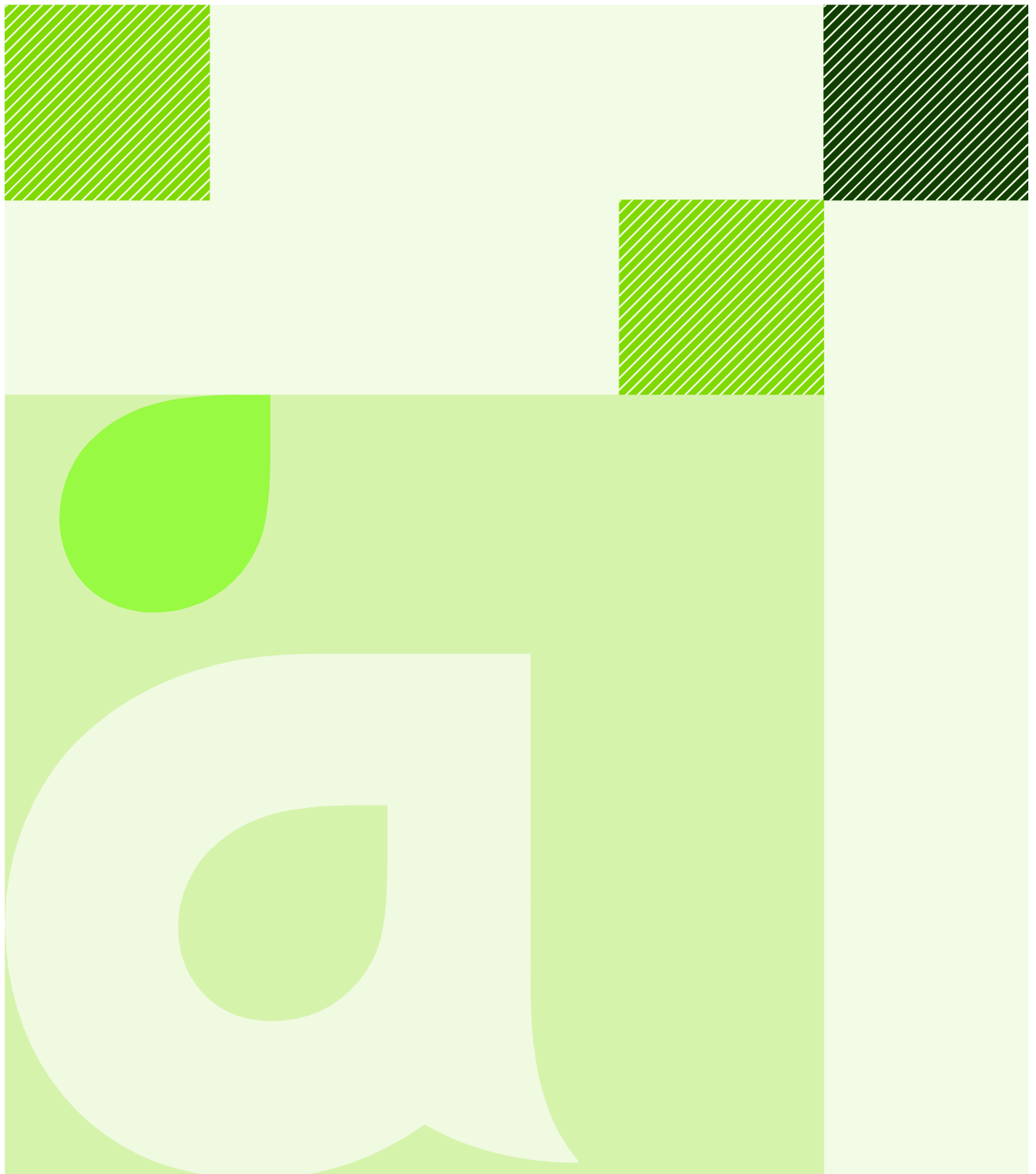
OWNER:
 DRAINLAYER: Andy Teapouru
 PLUMBER:
 FIELD OFFICER: RA

RECEIVED:
 BLOCK PLAN:
 PLOTTED: / /
 EYE BOOK:

CONNECTION
 NUMBER



15



Project: 59 Newtown Street
Detailed Engineering Evaluation
Quantitative Assessment

Reference: 228626
Prepared for: TPA
Godfreys Ltd
Revision: 1
22 June 2012

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Document prepared by:

Aurecon New Zealand Limited
Unit 1, 150 Cavendish Road
Casebrook
Christchurch, 8140
New Zealand

T +64 3 366 0821
F +64 3 379 6955
E Christchurch@ap.aurecongroup.com
W aurecongroup.com

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Author Signature		Approver Signature	
Name	H Burnett	Name	G K Wilby
Title	Structural Engineer	Title	Technical Director



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Appendices

Appendix A

Detailed Engineering Evaluation (DEE) Report

Appendix B

Photographs of Earthquake Damage

Appendix C

Geotechnical Report

1. Executive Summary

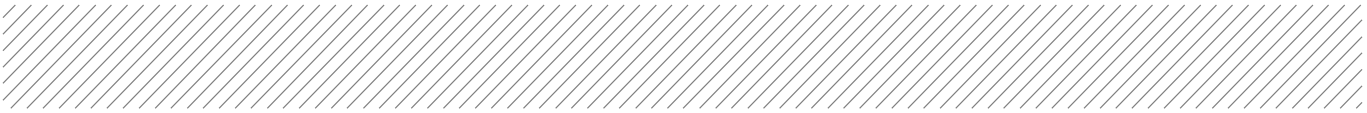
This is a summary of the evaluation completed for the building at 59 Newtown Street and is based on the Detailed Engineering Evaluation Procedure document issued by the Structural Advisory Group on 19 July 2011, visual inspections, available structural documentation and a strength assessment of the structure.

Building Details					
Building Address	59 Newtown Street, Christchurch				
Foot Print m ²	100	Stories above ground	2	Stories below ground	0
Approximate Year Built	1980	Building Age Yrs	32		
Building Current Use	Offices and lunchroom.				
Type of Construction	Concrete blockwork external walls, timber framed internal walls, light roof, timber first floor, slab on grade ground floor.				

Report Results Summary		
Building Occupied	Y	Offices and lunch room.
Suitable for Occupancy	Y	Strength above 33%NBS with minor cosmetic damage.
Critical Structural Weaknesses	N	None identified.
Lowest %NBS From Analysis	73%	Limited by the bracing capacity in the transverse direction.
General Building %NBS From Analysis	73%	Limited by the bracing capacity in the transverse direction.
Key Damage Summary	Y	Refer to summary of building damage in Section 3 of the report.

Report Recommendations		
Repair Required	Y	Minor cosmetic repairs required.
Strengthening Required	N	Strength exceeds 33% NBS.

Approval			
Name	Hugh Burnett	Name	Grant Wilby
Title	Structural Engineer	Title	Technical Director



2. Introduction

2.1 General

Aurecon have been engaged by TPA Godfreys Ltd to inspect the damage and to undertake a Detailed Engineering Evaluation of 59 Newtown Street.

Structural engineers from Aurecon inspected the building on 17 March 2012. The structure was mostly exposed at the time of inspection giving the opportunity to view the internal structure which assisted our reporting and findings.

We have checked the CERA website and the building does not have a Section 45 access prohibition.

2.2 Description of the Building

The building construction date is unknown however it was likely constructed circa 1980. It is a two storey commercial building currently tenanted by a car importer. The building footprint is approximately 100m².

The building is a rectangle with a length dimension of 12.4m and width of 8.2m. It has a lightweight profiled steel roof. The external walls consist of partially filled concrete blockwork reinforced with D12 reinforcing bars at 800 centres; there is a concrete bond beam at the level of the first floor. The internal walls are timber framed and lined with gib board, there is also a section of internal concrete blockwork wall on the ground floor. The first floor is a suspended timber floor while the ground floor is concrete slab on grade. The foundations are assumed to consist of strip footings.

Vertical loads from the lightweight roof and the first floor are supported on the internal and external load bearing walls.

The lateral loads are resisted by a mix of partially filled reinforced concrete blockwork walls and lined timber framed walls for both the longitudinal and transverse loading directions.

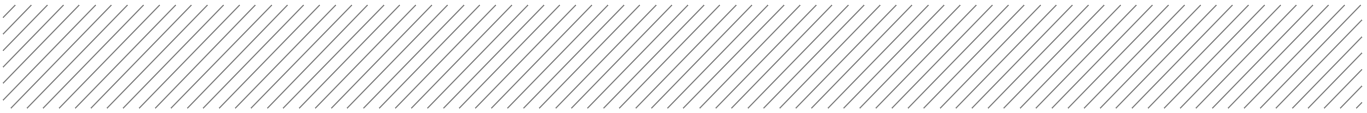
We were unable to obtain structural plans for the building. In order to determine the construction of the concrete blockwork walls for analysis an invasive investigation was carried out. The concrete blockwork walls were found to be partially filled and reinforced with D12 at 800 centres at both the first and ground floors. Voids containing no reinforcing were unfilled.

3. Damage to Structure

The building has sustained limited structural damage from the earthquakes over the past 18 months. The damage has primarily occurred due to the movements induced within the building during seismic events. Damage was also observed to the surrounding land as a result of liquefaction.

Damage includes:

- Minor cracking to the internal linings in many places.
- Minor movement between an interior block wall and the exterior block wall running perpendicular to it.
- Cracking in the concrete blockwork fence behind the building.
- Minor settlement and cracking of the asphalt around the building.



4. Strength Assessment

4.1 New building standard (NBS)

New building standard (NBS) is the term used with reference to the earthquake standard that would apply to a new building of similar type and use if the building was designed to meet the latest design Codes of Practice. If the strength of a building is less than this level, then its strength is expressed as a percentage of NBS.

4.2 Earthquake prone buildings

A building can be considered to be earthquake prone if its strength is less than one third of the strength to which an equivalent new building would be designed, that is, less than 33%NBS (as defined by the New Zealand Building Act). If the building strength exceeds 33%NBS but is less than 67%NBS the building is considered an earthquake risk.

4.3 Christchurch City Council Earthquake Prone Building Policy 2010

The Christchurch City Council (CCC) already had in place an Earthquake Prone Building Policy (EPB Policy) requiring all earthquake-prone buildings to be strengthened within a timeframe varying from 15 to 30 years. The level to which the buildings were required to be strengthened was 33%NBS.

As a result of the 4 September 2010 Canterbury earthquake the CCC raised the level that a building was required to be strengthened to from 33% to 67% NBS but qualified this as a target level and noted that the actual strengthening level for each building will be determined in conjunction with the owners on a building-by-building basis. Factors that will be taken into account by the Council in determining the strengthening level include the cost of strengthening, the use to which the building is put, the level of danger posed by the building, and the extent of damage and repair involved.

Irrespective of strengthening level, the threshold level that triggers a requirement to strengthen is 33%NBS.

As part of any building consent application fire and disabled access provisions will need to be assessed.

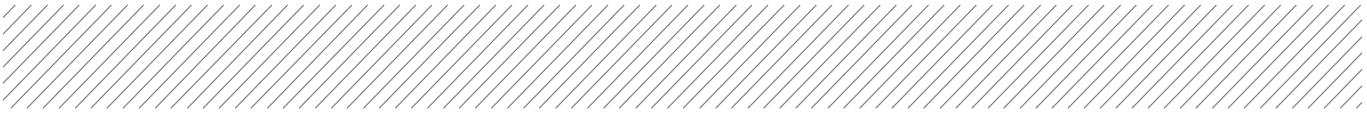
4.4 Christchurch Seismicity

The level of seismicity within the current New Zealand loading code (AS/NZS 1170) is related to the seismic zone factor. The zone factor varies depending on the location of the building within NZ. Prior to the 22nd February 2011 earthquake the zone factor for Christchurch was 0.22. Following the earthquake the seismic zone factor (level of seismicity) in the Christchurch and surrounding areas has been increased by 36% to 0.3.

5. Building Strength

The building strength discussed in the following section refers to the strength of the building prior to the earthquake damage. The damage that has occurred is relatively minor and it is not expected to have any impact on the global strength of the building.

The seismic demand placed on the building was assessed in the two major orthogonal directions based on the equivalent static method recommended in NZS1170:5, this was then compared with the capacity of the existing walls in the building calculated from assumed strengths of existing materials in order to express the capacity of the building as a percentage of NBS.



5.1 Strength of walls

Analysis shows that the walls are capable of achieving 100% NBS in the longitudinal direction while in the transverse direction the walls were found to be capable of achieving 73% NBS.

5.2 Strength of diaphragms

The strength of the timber diaphragms has not been directly assessed however the walls within the building are well distributed which results in low stress concentrations in the diaphragms. Consequently we consider that the diaphragms have adequate capacity to distribute earthquake loads to the in-plane walls. We were unable to inspect the connections between the diaphragm and the walls during our site visit and have assumed that these are adequate.

6. Conclusions and recommendations

The strength of the building is 73%NBS limited by the strength of walls in the transverse direction. Therefore, based on our detailed evaluation, the seismic capacity of the building is above 67%NBS and therefore classified as a low earthquake risk building. We also consider based on our investigation that the building is not a “dangerous” building as defined in the Building Act 2004 and therefore no strengthening work is required.

On this basis we consider that the following repairs to the building can proceed:

- Cracking to internal linings should be made good.
- The gap between the concrete block walls should be resealed.
- The section of the blockwork fence where the large crack occurs should be deconstructed and rebuilt.
- Cracks and damage to the asphalt should be patched.

We also recommend that all repair work should be undertaken by a Licenced Building Practitioner;

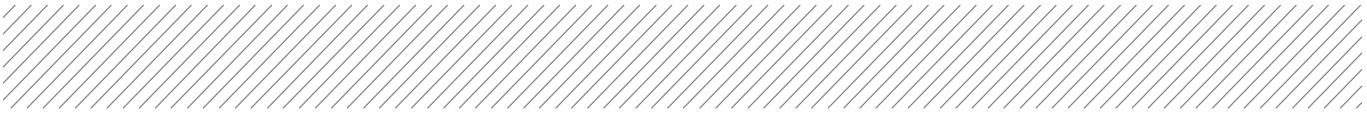
A building consent is not required from the Council to proceed with repairs to the building.

7. Explanatory Statement

There is no such thing as absolute safety, whether in relation to buildings or anything else. There is no legal definition as to what level of strength constitutes a safe building. Aurecon's assessment as to whether or not the building should continue to be occupied is subjective and is based on the exercise of reasonable engineering judgement. While this report may assist the Client in deciding whether the building is occupied, that decision is entirely the responsibility of the Client. Aurecon accepts no responsibility for losses arising from a decision to either vacate or stay in the building, whether from the Client or any third party.

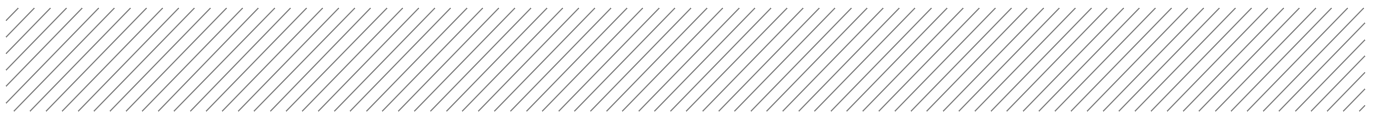
While this report may assist the client in assessing whether the building should be strengthened, that decision is the sole responsibility of the client.

This review has been prepared by Aurecon at the request of its client and is exclusively for its client's use. It is not possible to make a proper assessment of this review without a clear understanding of the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Aurecon. The report will not address issues which would need to be considered for another party if that party's particular circumstances, requirements



and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage whatsoever arising out of the use of or reliance on this report by any third party.

Without limiting any of the above, Aurecon's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.



Appendices



Appendix A

Building Information and References

Detailed Engineering Evaluation – Retail Block (as at 17th March 2012)

The following report format follows the report outline given by: *Guidance on Detailed Engineering Evaluation of Earthquake Affected Non-residential Buildings in Canterbury, Part 2, Evaluation Procedure, Draft Prepared by the Engineering Advisory Group Revision 5, 19 July 2011.*

Item	Content
Aerial photo of site.	
Building Address – noting that where more than one building is located on a particular site, this should be clearly noted.	59 Newtown Street, Christchurch

Item	Content
A full description of the building including plan dimensions, number of stories, total plan area, occupancy and importance classification.	Approx. Floor Area: 100m² Year Designed: 1980 Number of Storeys: 2 storey (at and above ground) Number of Basements: 0 Current use: Offices and lunch rooms Building Importance: IL2 Assumed The building construction date is unknown however it was likely constructed circa 1980. It is a two storey commercial building currently tenanted by a car importer. The building footprint is approximately 100m². The building is a rectangle with a length dimension of 12.4m and width of 8.2m. It has a lightweight profiled steel roof. The external walls consist of partially filled concrete blockwork reinforced with D12 at 800 centres and a concrete bond beam at the level of the first floor. The internal walls are timber framed and lined with gib board, there is also a section of internal concrete blockwork wall on the ground floor. The first floor is a suspended timber floor while the ground floor is concrete slab on grade. The foundations are assumed to be concrete strip footings.
A full description of the structural system - both lateral and gravity, including materials and noting proprietary systems where applicable. It is expected that this would be drawn from a review of existing plans, where available. If no plans are available, it will be necessary to complete more intensive investigation on site in order to verify the structure.	Gravity Load Resisting System Vertical loads from the lightweight roof and the first floor are supported on the internal and external load bearing walls. Lateral Load Resisting System The lateral loads are resisted by a mix of partially filled reinforced concrete blockwork walls and lined timber framed walls for both the longitudinal and transverse loading directions.
A full description of the foundation system and ground conditions, noting the extent of geotechnical investigation completed.	We were unable to obtain structural drawings for the building and as such some uncertainty surrounds the foundation system. We believe however that the foundation system is likely to be shallow foundations consisting of reinforced concrete slab and concrete strip footings. Geotechnical investigations were undertaken as part of this investigation. This consisted of 2 CPT tests around the perimeter of the building. The soil conditions comprised fine grained moderately dense sand. The soil is considered to be susceptible to liquefaction with a 17% probability of damaging liquefaction in the next 50 years. Settlement of 45mm can be expected with differential settlements of 25mm. A deep soil type D is assumed for the purpose of the seismic assessment.

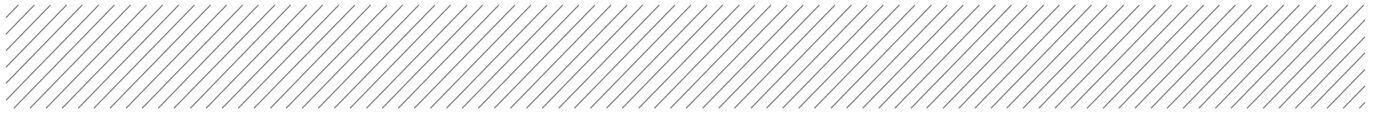
Item	Content
Whether drawings are available or not, a prediction of the likely 'hot-spots' should be made in order to prioritize the required inspections. This may be informed by a set of generic building types and behaviours that is included in Appendix A (of the DEE document)	No Architectural or Structural drawings were available for review for this building. Potential "hotspots" in this building include the following: • Inadequate bracing capacity provided by the timber framed walls and blockwork walls. • Inadequate diaphragm strength and stiffness
A summary of damage sustained (plans and elevations if necessary), both structural and non-structural damage as it relates to building movement. This will include an assessment of the severity of the damage, including noting whether the damage is substantial as defined in Section 5	• Minor cracking to the internal linings in many places. • There is some minor movement between an interior block wall and the exterior block wall running perpendicular to it. • Cracking in the partially filled concrete blockwork fence behind the building. • Minor settlement and cracking of the asphalt around the building. The damage that has occurred is relatively minor and it is not expected to have any impact on the overall strength of the building.
A record of intrusive investigation of key elements and connection details. Include foundations and secondary structural elements as well as primary structure. This should be fully documented, with the required inspections identified during the plan review in steps 1&2 of the qualitative assessment procedure	The damage assessment undertaken consisted of a walk-around visual inspection of the exterior and the interior of the building. The damage recorded is limited to what is visible to the naked eye. An intrusive investigation was also carried out in order to determine the reinforcing content of the concrete blockwork. The strength assessment is based on the comparison of the seismic demand obtained from the current code with the capacity of the existing structure. A few photographs were taken during the walk around of the building to confirm the main load carrying elements.
A consideration of the implications of and reasons for the damage. All failures must be addressed, with a conclusion drawn as to the reasons for the damage and the impact on both gravity and lateral structure	The observed damage to the wall linings is a common occurrence in this type of construction and occurs as plaster board is relatively brittle causing cracks to develop with a limited amount of displacement. The building has suffered only minor damage and this is not expected to have reduced the seismic or gravity capacity significantly.
Reference to generic building/ material/ configuration issues that are known to occur (from Appendix A); with verification of whether these have/have not occurred.	Ref DEE document Appendix 7A Partially Filled Concrete Masonry. Only minor damage was observed at the separation between perpendicular walls.
A statement must be made as to what elements have been specifically reviewed and what have been simply inferred. Mark areas of uncertainty on plans.	The strength assessment has been conducted by checking the bracing capacity of the walls.

Item	Content
An estimate of the original lateral load resistance as %NBS, and post damage capacity, if significantly damaged. This must include consideration of the failure mechanism, clearly identifying whether the failure is brittle or ductile.	The building was found to have a pre-damage capacity of 73% NBS in carrying current earthquake loading. The building has suffered only minor damage and this is not expected to have reduced the seismic capacity significantly.
A list of items that are to be repaired or further investigations required, with prioritization if this work is to be staged in any way.	Only minor cosmetic repairs are required.
A statement (Design Features Report) describing the new load paths and load levels used in design (if changes are to be made), or otherwise detailing the existing load path.	The existing lateral load path is through the lined timber framed walls and partially filled blockwork walls.
Sketch (at least) plans for any proposed retrofit.	Proposed Strengthening No strengthening is considered necessary.

Appendix B

Photographs of Earthquake Damage

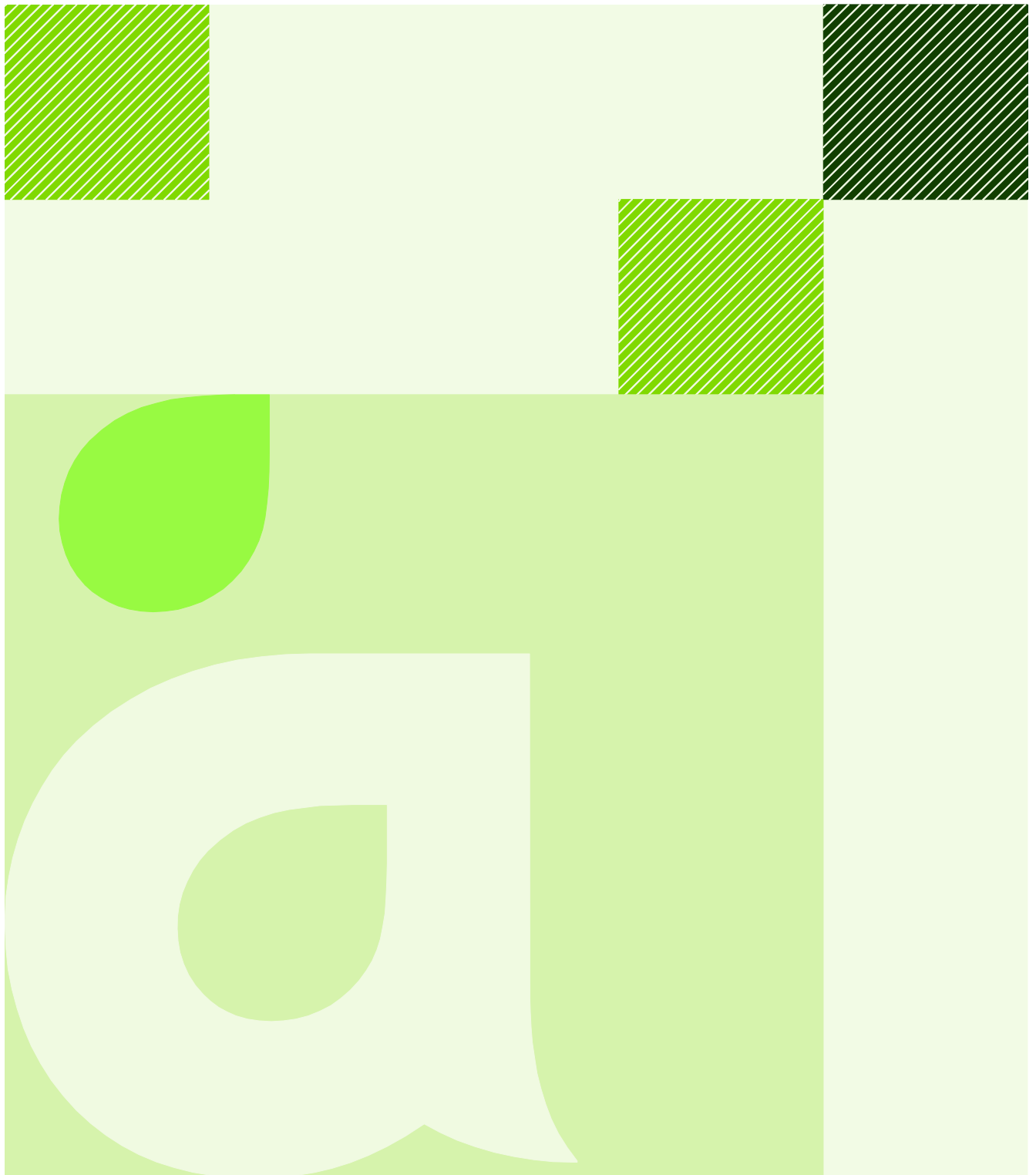
Ref	Description	Photograph
1	General southeast view of the building.	 A photograph showing the exterior of a two-story building with a grey tiled roof and light-colored walls. The building has several windows and a small entrance on the ground floor. A chain-link fence and a red and white striped pole are visible in the foreground.
2	General northeast view of the building.	 A photograph showing the exterior of the building from a different angle. The building has a grey tiled roof and light-colored walls. A large pile of black tires is visible in the foreground, and a red car is parked in the background.
3	Minor cracking to internal linings, typical.	 A photograph showing the interior of the building. The walls are white and have some minor cracking. A white door frame is visible in the foreground.



4	Minor movement between internal and external block walls.	
5	Evidence of liquefaction on site.	
6	Minor damage to asphalt.	

Appendix C

Geotechnical Report



aurecon

Project: Kailua Ltd

25 Wickham Road, 36,52,59 Newtown
Street and 235 Dyers Road –
Geotechnical Report

Prepared for: New
Zealand Insurance

Project: 226948

1 March 2012

Document Control Record

Document prepared by:

Aurecon New Zealand Limited
Unit 1, 150 Cavendish Road
Casebrook Christchurch 8140
PO Box 1061
Christchurch 8140
New Zealand

T +64 3 375 0761
F +64 3 379 6955
E christchurch@aurecongroup.com
W aurecongroup.com

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Approval			
Author Signature		Approver Signature	
Name		Name	
Title		Title	
Alan Wightman		Jan Kupec	
Senior Geotechnical Engineer		Technical Director	



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Appendix A

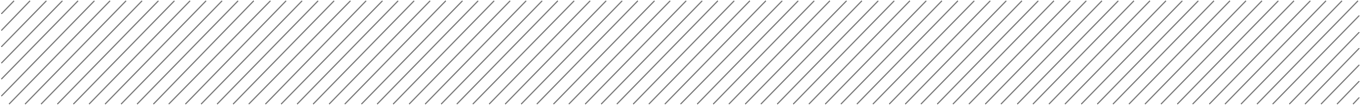
Figures

Appendix B

CPT Logs

Appendix C

Hand Auger Logs



Appendix D

Environment Canterbury borelogs

1. Executive Summary

Kailua Ltd's commercial buildings at 25 Wickham Street, 36 Newtown Street, 52 Newtown Street, 59 Newtown Street and 235 Dyers Road have suffered damage as a result of the major earthquakes in the past year. Aurecon have been engaged to carry out a geotechnical investigation of the properties.

An investigation was carried out in January 2012 which comprised 15 Cone Penetration Tests, two hand augers and a site walkover.

The investigation found that the soil conditions beneath the site comprise two distinct soils types - medium dense sand, and a loose silt/sand mixture. There is also a surface layer of fill (up to 1.2m thick) in some parts of the site.

The depth to ground water was measured at between 1.5m and 2.2m.

The soils are generally susceptible to liquefaction, with liquefaction occurring in the February 2011 and June 2011 earthquakes, although no surface evidence of liquefaction in the September 2010 has been found.

Future design will be based on two code levels of shaking – Serviceability Limit State (SLS) and Ultimate Limit State (ULS). In the SLS earthquake, which represents an approximately 80 year earthquake, no surface effect of liquefaction is expected. In the ULS earthquake, which represents an approximately 500 year earthquake, liquefaction is expected to occur with a maximum vertical settlement of 105mm and an average value across the five buildings of about 50mm (see Table 5).

The probability of damaging liquefaction occurring in the next 50 years varies between the five buildings, and is estimated to lie between 17% and 56% (see Table 6).

Several potential design options for rebuild or repair are available to the buildings' owners and insurers and these are listed below.

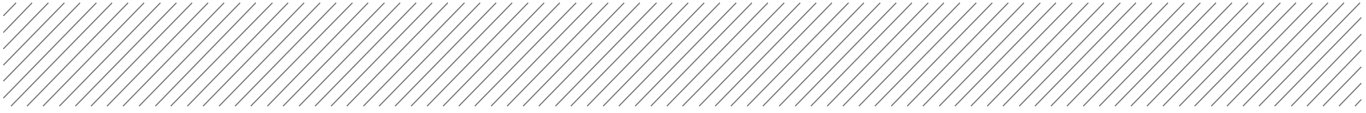
Repair Buildings

- Shallow grouting to re-level the building
- Compaction grouting columns to re-level the building
- Upgrade the building foundations by installing piles
- Do nothing and accept liquefaction risk
- Ground improvement under the existing buildings

Remove & Rebuild Buildings

- Construct new buildings after carrying out ground improvement, with the use of stone columns, driven piles, continuous flight auger (CFA) piles or impact compaction
- Construct new buildings on a combination of structural raft and geogrid reinforced gravel raft
- Construct new buildings on piles

These options are described in detail in Section 5.3.



2. Introduction

Kailua Ltd's commercial buildings at 25 Wickham Street, 36 Newtown Street, 52 Newtown Street¹, 59 Newtown Street and 235 Dyers Road in Bromley (see Figure 1) have suffered damage as a result of the major earthquakes in the past year. Aurecon have been engaged by TPA Godfreys, on behalf of New Zealand Insurance, to carry out a geotechnical investigation of the properties.

This report presents the results of the geotechnical investigations, and provides assessment of mitigation and foundation options for both building repair and rebuild.

The terms and conditions of Aurecon's engagement are set out in an email from James Muirson (Aurecon) to Nigel Greenhalgh (TPA Godfreys) on 24 November 2011. Approval to proceed was given by Nigel Greenhalgh by reply email on 6 December 2011.

Our limitations are attached as Section 7 of this report. This report shall be read as a whole.

¹ Google Maps shows the property as being on 48-60 Newtown Street. It is variously referred to in reports and correspondence as 48 and 52 Newtown Street. Powell Fenwick referred to it as 52 Newtown Street, and we have adopted 52 for consistency and (hopefully) clarity.

3. Geotechnical Investigations

3.1 General

The objective of the geotechnical site investigation was to investigate ground and groundwater conditions in order to assess the seismically induced liquefaction and lateral spreading risk to the site.

The investigation comprised the following:

- 15 Cone Penetrometer Tests (CPT) carried out by McMillan Drilling Services.
- Two hand augers carried out by an Aurecon geotechnical engineer.
- Site walk over by an Aurecon senior engineering geologist.
- Review of Environment Canterbury borehole logs in close proximity to the site.

The details of the investigations are presented below.

3.2 Cone Penetrometer Testing

15 CPTs were carried out by McMillan Drilling Services between 19 and 23 January 2012. Four were undertaken at 25 Wickham Street, four at 36 Newtown Street, two at 52 Newtown Street, two at 59 Newtown Street and three at 235 Dyers Road. The CPTs are numbered CPT1 to CPT16, with CPT5 unable to be carried out. The tests had a target depth of 15m and were extended until refusal was met (defined as sustained tip resistance of over 30MPa). All extended to at least 10m depth, with the exception of CPT10, which refused on hard ground at 1.2m depth. The test locations are shown on Figure 2, and the CPT logs are attached in Appendix B.

3.3 Hand Augers

To supplement the CPTs, four hand auger boreholes were attempted at the site on 24 January 2012. Two of these refused in gravelly soils at shallow depths so provided no information. Hand Auger HA1 penetrated to 1.7m depth and HA3 to 2.5m depth. The hand auger boreholes were logged by an engineer from Aurecon and the logs are provided in Appendix C. The locations of the hand augers are shown on Figure 2.

3.4 Environment Canterbury Borehole Logs

A review of the Environment Canterbury (2012) website was undertaken to identify existing borehole logs in the direct vicinity of the site. Three boreholes, M35/13270, M35/12148 and M35/9108 are relevant to the site and have been considered in this report. Their locations are shown on Figure 3 with the logs presented in Appendix D.



4. Site & Building Conditions

4.1 Site Description

The subject site comprises five commercial buildings, located at 25 Wickham Street, 36 Newtown Street, 52 Newtown Street, 59 Newtown Street and 235 Dyers Road (see Figure 1). The main features of the site are as follows:

- All the buildings are located either on or near Newtown Street within a rectangular area 220m long and 140m wide.
- The buildings are generally one storey warehouse style buildings. The exception is 59 Newtown Street, which is a small, two storey building.
- The site is essentially flat with less than 1.0m height difference across the site.
- The site is surrounded by commercial properties and gravel or asphalted car yards.

4.2 Site Access

All five buildings are directly accessed from the road of their street address. 235 Dyers Road and 36 Newtown Street can also be accessed from the entrance of 52 Newtown Street via a car yard.

4.3 Vegetation

The site is largely covered by buildings and gravel or asphalted car yards. There are few trees and little grass in the vicinity.

4.4 Drainage

Drainage is inferred to be via the reticulated drainage system located on the site.

4.5 Earthquake Hazard Zoning

At the time of writing, the buildings are located within the Green Zone on the Canterbury Earthquake Recovery Authority's website (CERA, 2012a). According to CERA, this zoning indicates that the 'Repair / rebuild process can begin' at the building sites.

CERA (2012b) have also released maps showing technical categories, which refers to a site's susceptibility to liquefaction. The technical categories strictly only apply to residential properties, but are still useful in assessing the likely liquefaction hazard at non-residential sites. The nearest residential property, about 300m to the south west, is classified as Technical Category 2, indicating that 'minor to moderate land damage from liquefaction is possible in future significant earthquakes'.

The site lies 800m from the nearest Technical Category 3 house. Technical Category 3 indicates that "moderate to significant land damage from liquefaction is possible in future significant earthquakes".

4.6 Regional Geology & Seismicity

The geology of the site is described by Brown & Weeber (1992) as "*dominantly sand of fixed and semi-fixed dunes and beaches*" of the Holocene epoch (that is, deposited within the last 10 000 years).

The site is located in a zone of recent severe seismic activity. Three major earthquakes have occurred since September 2010, as indicated in Table 1. For the sake of simplicity, these earthquakes are referred to in this report as the September, February and June earthquakes, respectively.

Table 1 - Recent Severe Earthquakes					
Earthquake Date	Moment Magnitude ⁽¹⁾	Epicentral Distance	Focal Depth	Peak Horizontal Ground Acceleration at site ⁽³⁾	Peak Vertical Ground Acceleration at site ⁽³⁾
4 September 2010	7.1	42km to the west	10km ⁽²⁾	0.22g	0.16 – 0.31g
22 February 2011	6.2	3.5km to the south	5km ⁽⁴⁾	0.48 – 0.66g	Uncertain
13 June 2011	6.0	4.5km to the south east	9km ⁽⁵⁾	0.47g	0.78g

Notes – information obtained from the following sources – see References section for detail.

- (1) Cooper et al (2011)
- (2) GeoNet (2012a)
- (3) Estimated by inspection of seismograms at the nearby Pages Road Pumping Station and Catholic Cathedral College. Seismograms accessed at GeoNet (2012b)
- (4) From GeoNet (2012c)
- (5) From GeoNet (2012d)

4.7 Soil Conditions

The soil conditions beneath the site comprise layers of sands and silt/sand mixtures to the depth investigated (a maximum of 16m) with a fair degree of consistency over the site. Table 2 shows the distribution of the various soil layers.

Table 2 – Soil Stratigraphy																		
Depth (m) / CPT	1	HA1	2	3	4	5	6	7	HA3	8	9	10	11	12	13	14	15	16
0.5																		
1																		
1.5																		
2																		
2.5																		
3																		
3.5																		
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15.5																		
16																		

The soil layers are described as follows:

Blue – Fill, comprising topsoil, basecourse, silt, gravel and bark. The maximum inferred depth of fill is 1.2m (CPT7).

Yellow – Sand and Silt mixtures. The top sand/silt layer is generally very loose to loose, and extends to a maximum depth of 3.7m (CPT9). The lower sand/silt layer, lying generally between 4.5m and 6.5m depth, is predominantly loose to medium dense. Neither sand/silt layer is present in all investigations. In particular, the lower sand/silt layer is absent, or present only in very thin layers, at the southern end of the investigated area.

Red – Sand. The upper parts of the sand profile are generally moderately dense, and logged in the hand augers as fine grained. The density of the sand increases with depth, and is typically inferred to be moderately dense to dense below about 7m.

4.8 Groundwater

The depth to the ground water table was measured in two of the hand augers. In addition, Environment Canterbury's log of borehole M35/9108 includes a water table depth measurement. These values are presented in Table 3.

Table 3 – Depth to ground water		
Borehole	Ground water depth (m)	Date measured
HA 1	1.5	24 January 2012
HA 3	2.2	24 January 2012
M35 / 9108	1.4	31 July 2001

For the purposes of the calculations in this report, a depth to ground water of 1.5m has been assumed.

4.9 Building Damage

The extent of building damage in each of the five buildings has been described in brief structural reports prepared by Powell Fenwick (2011a to 2011e). The inspections were carried out on 25 March 2011 following the 22 February earthquake. The damage to each of the buildings is summarised below.

36 Newtown Street – minor damage

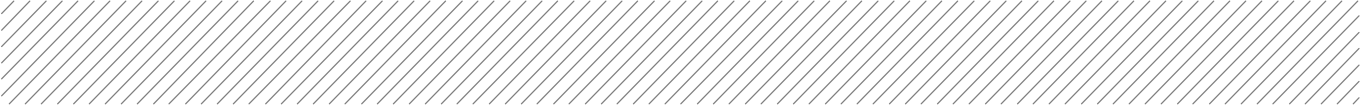
52 Newtown Street – minor damage

59 Newtown Street – minor damage

25 Wickham Street – extensive work required to repair the building. The foundations, the concrete slab and the asphalt path need re-levelling. Aurecon noted, in our site inspection during January 2012, liquefaction induced ground damage along the eastern side of the building.

235 Dyers Road – minor damage

All the structural reports noted ground movement, liquefaction or ground settlement in the vicinity of the buildings. More assessment on the liquefaction that occurred is presented in Section 5.2.2.



No reports regarding the extent, or lack, of building damage in any earthquake apart from the February event have been made available to Aurecon.

5. Engineering Considerations

5.1 General

The five Kailua Ltd commercial buildings at 25 Wickham Street, 36, 52, 59 Newtown Street and 235 Dyers Road have suffered damage as a result of the major earthquakes in the past year.

To assist with the structural assessments, the liquefaction potential of the ground and the bearing capacity of future foundations have been assessed.

5.2 Liquefaction Assessment

5.2.1 Introduction

Under cyclic loading during an earthquake, cohesionless soils (gravels, sands, silty sands) become excited by the sustained ground vibration produced by earthquakes. This allows the pore water to pressurise and when the pressure approaches 100% of the stress applied by the soils above, the unbound soils dilate. This causes a water spout activated by the developed water pressure which when it vents to atmosphere carries sands and silts to the surface. These vents are usually boils which quickly enlarge to become deep cavities. When the excess pore water pressure equalises to atmospheric pressure, water ceases to be expelled and liquefaction ceases. The suspended sands and silts repack usually to a greater density than before liquefaction. This densification and loss of soils expelled to the surface causes surface subsidence.

Building foundations, which rely on the soils which liquefy, lose bearing capacity and sink into the ground. This downward deformation generally stops when the state of liquefaction ceases and the soils regain shear strength. The loss of soil shear strength caused by the liquefied state can be significant and can be as much as 90% of the original soil strength. In many cases this reduction in available soil strength is sufficient to cause bearing capacity failure during the liquefied state.

The site has experienced seismically induced ground damage from the earthquakes over the past year. For the site redevelopment the main factors to be considered are:

- What layers have liquefied?
- What is the likelihood of further liquefaction in the future?
- What options are available to limit or prevent liquefaction?

Each of these is considered below.

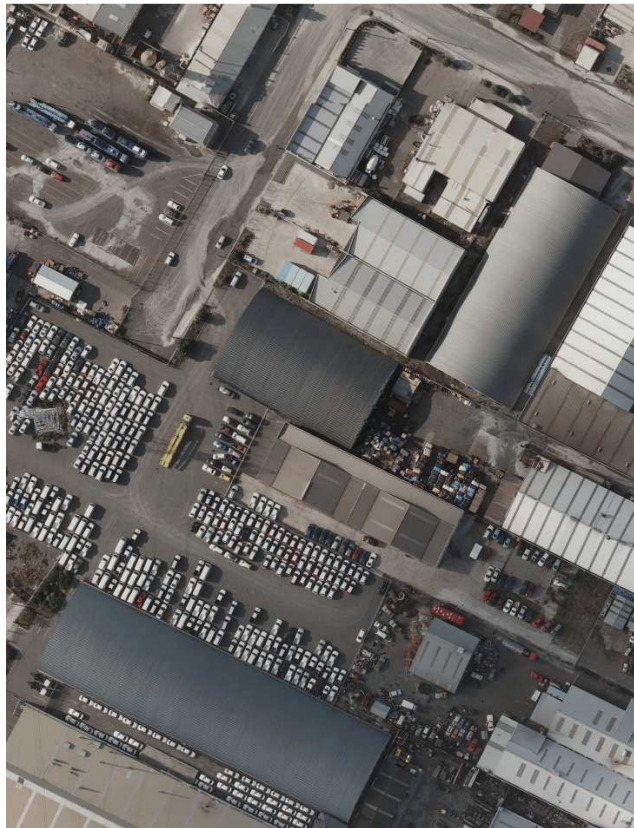
5.2.2 Evidence of Liquefaction at the Site

The following information is available regarding surface expression of liquefaction at the site:

- Aerial photography taken after the September earthquake shows no clear signs of subsoil liquefaction in the area.
- Tonkin & Taylor (2010) did not indicate that liquefaction occurred in the area in the September earthquake.
- Aerial photography taken after the February 2011 earthquake shows significant expelled soil deposits on surfaces which are the result of liquefaction. The soil deposits are most evident in

the northern parts of the site, around 25 Wickham Street and 52 & 59 Newtown Street (see Photograph 1).

- Powell Fenwick (2011a to 2011e) reported liquefaction, ground movement or settlement around all five of the subject buildings following the February earthquake.
- Aerial photography taken after the June earthquake shows significant expelled soil deposits, at least as severe as the February earthquake. This is unsurprising, considering the similar acceleration and magnitude of the February and June events (see Table 1).



Photograph 1. Aerial photograph of the site showing ejected sand in February 2011 earthquake (Koordinates, 2012).

Aurecon's site visit on 24 January 2012, eleven months after the February earthquake, recorded the following:

- Ejected sand around the southern end of 25 Wickham Street. Separation of the ground from the foundation along the eastern wall of the building. The southern wall of the building had been supported by temporary props.
- No evidence of ejected sand at 52 Newtown Street but the eastern wall was being supported by chains attached to the floor slab.
- Ground damage in the car park to the south of 59 Newtown Street, including depressions and uplifted asphalt.
- No ground damage was observed around 235 Dyers Road or 36 Newtown Street.



Our conclusion is that surface expression of liquefaction probably did not occur during the September earthquake. Surface expression of liquefaction occurred around the northern parts of the site (25 Wickham Street and 52 & 59 Newtown Street) in February and may have occurred around the southern parts of the site also.

5.2.3 Liquefaction Potential

The three primary factors that contribute to liquefaction potential are:

- Loose, uniformly graded soils.
- High groundwater table.
- Sufficiently high, earthquake induced ground acceleration and sustained shaking.

Each of these is considered below together with conclusions on the site liquefaction potential.

Soil Grading and Density

Liquefiable soils are generally loose to medium dense, cohesionless and comprise silts, sand or occasionally gravels. The soils at the site are wind blown sands with some silts of generally increasing density with depth. From a grading and density perspective, all of the soils (excluding the filling, where present) are considered to be potentially liquefiable in the top 7m. Below 7m depth, the density is generally too high for the soils to liquefy in all but the most severe earthquakes.

Groundwater

From a ground water perspective, all soils below 1.5m depth are considered to be potentially liquefiable.

Earthquake Shaking

For this study, we have back analysed the effect of the September and February earthquake events as a calibration of the observations at the site. In addition, two design code level earthquakes have been applied. These are summarised below:-

September 2010 Earthquake

Based on nearby seismographs, an estimated peak ground acceleration (PGA) of 0.22g has been adopted for the site, with an earthquake magnitude of 7.1 (see Table 1). This earthquake probably did not cause surface expression of liquefaction at the site, although liquefaction may have occurred at depth.

February 2011 Earthquake

Nearby seismographs give differing PGAs (see Table 1), but for the purposes of analysis we have assumed that the PGA was at least 0.50g, with a magnitude of 6.2. This level of shaking caused liquefaction at the site.

Code Level Earthquake - Ultimate Limit State (ULS)

A ULS ground acceleration associated with a 500 year return period earthquake has been adopted. This is based on the recommendations of NZS1170.0 Table 3.2 (Importance Level 2 building) and Table 3.3 (50 year design working life). We have adopted the method outlined by NZGS (2010) to obtain the design earthquake for the liquefaction assessment. A 1 in 500 year return period earthquake in Christchurch area for a Class D soil (Deep Soil Site) has a PGA of

0.34g, assuming the recent recommendations by SESOC (2011) are followed. In accordance with NZGS we have adopted a magnitude 7.5 earthquake event.

Buildings designed for the ULS event are expected to retain their structural integrity and form during an earthquake. Some plastic deformation of structural elements within the structure is expected to occur but ideally the damage can be repaired and the structure can be returned to service after the event, although repair may be uneconomical.

Code Level Earthquake - Serviceability Limit State (SLS)

NZS1170.0 Table 3.3 indicates that SLS level ground shaking should be based on a 1 in 25 year event. However, we consider this value to be too low to be applicable when assessing liquefaction because of the discrete nature of liquefaction. The site either liquefies or does not and when a site has liquefied there can be little difference in expected deformations for a 'small' earthquake that causes liquefaction relative to a 'large' earthquake that causes liquefaction. In addition, it has often been the case in recent Christchurch earthquakes that liquefaction causes more building damage than the ground shaking itself.

Based on recent discussions, we understand that the Department of Building and Housing is likely to recommend that the SLS ground acceleration be increased to 0.15g for Christchurch. We have therefore used a 0.15g acceleration, with a magnitude of 7.5 in accordance with NZGS (2010).

Buildings are expected to perform well for the SLS event and be returned to service after only nominal repair.

5.2.6 Liquefaction Induced Settlement

The ability of the subsoils to resist the effects of ground shaking associated with the four earthquakes above has been assessed from the subsoil information obtained from the CPTs. Factors of safety against liquefaction were assessed using the method of Youd *et al* (2001) with liquefaction induced settlement calculated using the method of Tokimatsu & Seed (1987) and the surface expression chart of Ishihara (1985). The results are presented in Table 4.

Table 4 - Calculated Liquefaction Settlements

Earthquake Event		Design Earthquakes		Actual Events	
		ULS	SLS	04/09/2010	22/02/2011
Earthquake Magnitude		7.5	7.5	7.1	6.2
Peak Ground Acceleration (PGA)		0.34g	0.15g	0.22g	0.50g
Total Vertical Settlement (mm)	CPT001	80	0	0	80
	CPT002	60	0	0	60
	CPT003	70	0	0	70
	CPT004	105	0	0	110
	CPT006	0	0	0	20
	CPT007	60	0	0	40

Table 4 - Calculated Liquefaction Settlements

Earthquake Event		Design Earthquakes		Actual Events	
		ULS	SLS	04/09/2010	22/02/2011
	CPT008	0	0	0	30
	CPT009	35	0	25	55
	CPT0011	45	0	0	35
	CPT0012	55	0	0	40
	CPT0013	40	0	0	50
	CPT0014	55	0	0	55
	CPT0015	45	0	0	45
	CPT0016	30	0	0	35
	Average	50	0	0	50

Note: CPT 5 and 10 refused at shallow depths and are thus excluded from this table.

The following broad conclusions are drawn from the data in Table 4:

- The model used calculated that surface settlement due to liquefaction would have occurred in only one of the locations in the September earthquake but in all of the locations during the February earthquake. This is consistent with the observed behaviour so the model can be used with some confidence to predict future behaviour.
- Liquefaction may occur at depth in the SLS event but is unlikely to have an effect on the foundations. Liquefaction therefore does not need to be taken account of in SLS design.
- Liquefaction is expected to occur in the ULS event with a maximum vertical settlement of 105mm and an average value across the five buildings of about 50mm (see Table 5). There may be some areas that do not experience liquefaction induced settlement. If no ground treatment is carried out, structural designers should ensure that current or future buildings are capable of withstanding, without collapse or endangering life, the liquefaction induced settlements indicated in Table 5:

Table 5 – Design Settlement Values - ULS

Building	Relevant CPTs	Design liquefaction induced vertical settlement (mm)	Design differential settlement across the length of the building (mm)
36 Newtown Street	13-16	55	25
52 Newtown Street	6, 12	55	55
59 Newtown Street	11	45	25
25 Wickham Street	1-4	105	35
235 Dyers Road	7-9	60	60

- As a general guide to structural designers, the liquefaction effects in the ULS event will be similar to those experienced by the site in the February event.

To further define the liquefaction risk at the site, the peak ground acceleration causing damage at foundation level (assumed to be around 0.5m depth) was calculated for each CPT in accordance with Ishihara (1985), and from this the expected return period for damaging liquefaction was calculated. These results are presented in Table 6.

Table 6 – Return period for damaging liquefaction

Building	Relevant CPTs	PGA for damaging liquefaction ⁽¹⁾	Return Period Factor (R) ⁽²⁾	Long Term Return Period for Damaging Liquefaction ⁽²⁾	Probability of damaging liquefaction in next 50 years ⁽³⁾
36 Newtown Street	13-16	0.27g	0.80	290 years	34%
52 Newtown Street	6, 12	0.29g	0.85	320 years	27%
59 Newtown Street	11	0.32g	0.95	430 years	17%
25 Wickham Street	1-4	0.24g	0.70	210 years	44%
235 Dyers Road	7-9	0.21g	0.62	160 years	56%

Notes:

- (1) Magnitude 7.5, as per NZGS (2010)
- (2) Based on NZS1170.5, Table 3.5, assuming $Z=0.3$ and $C=1.12$, hence $R=PGA/(0.3 \times 1.12)$
- (3) Based on GNS (2011)

There is some variation in liquefaction susceptibility across the sites and this is reflected in Tables 5 and 6. The average long-term return period for damaging liquefaction, based on the current codes varies between 160 and 430 years.

If no recent earthquakes had occurred, the probability of damaging liquefaction occurring in the next 50 years (the assumed design life of the buildings) would be between 11% and 27%. However, due to the tendency of earthquakes to cluster together, the recent earthquakes have increased these probabilities, as shown in Table 6, to between 17% (for 59 Newtown Street) and 56% (for 235 Dyers Road), based on research by GNS (2011).

5.2.7 Lateral Spreading

Lateral spreading toward any open channel or face can occur in mildly sloping liquefied ground and extend to large distances away from the open face. Commonly lateral spreading is towards a body of water such as a river. The nearest significant body of water is the Bromley oxidation ponds, around 600m to the east. At this distance, lateral spreading is not typically a hazard and there have been no reports of lateral spreading at the sites in the recent earthquakes. As the level of shaking in the February (and probably the June) events at least matched the ULS shaking, and no lateral spreading was reported following this event, we consider that lateral spreading does not need to be taken into account in building design.

5.3 Liquefaction Hazard Mitigation

It is considered that the site in its current state is susceptible to seismically induced liquefaction in a future earthquake. Several potential design options are available to the buildings' owners and insurers and these are outlined below.

Repair Buildings

The most suitable repair option will depend on the extent of the actual damage that has occurred across each building. Given that the level of potential settlements are relatively consistent across the site the following building repair options are presented below are likely to be suitable for all buildings. It must be noted that these options will need to be considered in conjunction with a structural assessment.

In all cases, regardless of the foundation options taken, repairs should be made to the buildings, where required, to ensure that they comply with the relevant building standards and that they can withstand ULS shaking and the liquefaction induced settlements noted in Table 5 without collapse or endangering life.

5.3.1 Option 1 – Shallow Grouting

This would involve installing shallow pads around the building to provide a resistance for the jacking forces required to re-level the building. Once the building has been re-levelled, a grout will be pumped below the building to fill the void between the building footings and the ground. Given the potential level of liquefaction induced settlements in a future seismic event this option could be cost effective. However it will need to be accepted that foundation settlement and deformation of the building may occur in a future seismic event (see risk estimates in Table 6). In addition, this option requires the use of shallow foundation pads which will require space to be constructed. Where part or all of the buildings are close to property boundaries, space may be limited for jacking pads, unless these are constructed inside the building once the floor slab has been removed.

Any jacking pads should be designed in accordance with Section 5.4.

5.3.2 Option 2 – Compaction Grouting

This option would require installation of low viscosity compaction grouting columns under the foundations to re-level the building. This option would allow re-levelling however this option does not remove the risk of liquefaction induced damage as the ground below the building will still be susceptible to liquefaction. Although this option would allow the building to be re-levelled to levels of that prior to the Canterbury earthquake sequence, it would need to be accepted that some damage to the buildings in future seismic events will occur (see risk estimates in Table 6).

5.3.3 Option 3 - Foundation Upgrade (Piling)

The building foundations could be upgraded to withstand the effects of liquefaction. For example this could be done by underpinning the buildings with piles. These would found the buildings into the non-liquefiable material at depth and designed in such a way as to withstand the effects of seismically induced liquefaction. The buildings could be re-levelled in the process of the pile installation in order to remediate the settlement associated with the recent seismic events.

Piling is problematic at this site because even the deep sands are potentially liquefiable. A piling solution would therefore require further investigations to identify non-liquefiable soils at greater than



15m depth, and pile depths selected carefully to avoid liquefiable soils. This would likely be a relatively expensive solution.

5.3.4 Option 4 – Do nothing and accept liquefaction risk

The building may be subject to settlement in a future seismic event. The likely level of settlement in the ULS event will be similar to that of the Christchurch Earthquake and depending on the structure such differential settlements may be tolerable. Therefore it may be acceptable to do nothing and acknowledge that the structure will require repairs after a future large earthquake. As discussed above, this option could only be undertaken once it had been established that the building currently poses no life-safety hazard.

5.3.5 Option 5 – Ground Improvement

Options are available to carry out ground improvement under the structure to minimise the potential for liquefaction. Such method may include compaction grouting or jet grouting. However, at this stage we consider that these options are likely to be uneconomic due to the large footprint that the buildings occupy, and the difficulty of improving ground under such large buildings.

Remove Buildings and Rebuild

If it is decided from a structural, financial and/or insurance perspective that an existing building needs to be demolished and a new building constructed, the following options are available. Given that the level of potential settlements are relatively consistent across the site the following building repair options are presented below are likely to be suitable for all building.

5.3.6 Ground Improvement

Improve the soil within the footprint of the new building and to a nominal width of 5m outside the new building, so that the soil is less susceptible to liquefaction and hence damage to the building is minimised. To strengthen all the liquefiable soils in the ULS event, ground improvements to a depth of at least 15m would have to be carried out. However, ground improvements to a depth of about 7m may be enough to significantly improve building performance.

This can be achieved with the use of stone columns, driven piles, continuous flight auger (CFA) piles or impact compaction. These can densify and stiffen the soil to form a non-liquefiable block, which the building can be founded on.

Ground densification is considered a feasible option and as the site is relatively large and within an industrial zoned area, therefore the area is likely to be less sensitive to noise and vibrations.

Typically ground improvement details are as follows:

- CFA piles within the building footprint and extending 5m out from the footprint, at 3m centres with 600mm to 750mm diameters.
- Driven piles of 300mm diameter within the building footprint and extending 5m out from the footprint at 3m centres.
- Stone columns within the building footprint and extending 5m out from the footprint at 3m centres with 800mm diameters.
- Use of an impact compaction roller to densify the upper 3m of soil and form a non-liquefiable crust.



These options will require detailed geotechnical design as well as input from a specialist contractor and given the size of the site and likely development may be uneconomical.

5.3.7 Upgraded Foundations

From a geotechnical perspective the following two foundation options are given:

- Found the new buildings on a raft foundation. This could take the form of a combination of a well reinforced and detailed structural floor system (i.e. a reinforced concrete rib-raft foundation) founded on top of a geogrid reinforced gravel raft. A raft foundation will not stop liquefaction induced settlement, but limit the differential settlement the structure experiences, and hence limit the structural damage to the building associated with liquefaction.
- Found the new building on pile foundations (i.e. have all load bearing areas founded on piles founded into the underlying non-liquefiable soil). Piled foundations could be designed to limit structural settlement to acceptable levels and thereby disconnect the structure from the effects of liquefaction. Ground settlement below the floor slab would need to be accounted for in the structural design.

The most appropriate ground improvement or foundation option will depend on such factors as the size of the building, building loads and its function. If a rebuild is to be considered, we recommend that a geotechnical engineer reviews any new building plans and advises on the required ground improvement or foundation requirements. Depending on the extent of the new building, additional investigations and site inspections may be required.

5.4 Foundation Bearing Capacity

New foundations may be required as part of the building repair or rebuild process and the following recommendations apply to shallow foundations on un-improved ground. The near-surface ground strength conditions vary significantly across the site. In the vicinity of CPTs 1, 2, 4, 6, 8, 11 and 15 the near-surface soils are the “red” soils from Table 2 and are generally medium dense sands with a recommended ultimate rupture bearing capacity of 300kPa, assuming a founding depth of 0.5m.

In other areas, the near-surface soils are the “yellow” soils from Table 2 and comprise loose or soft silt and sand mixtures. In these areas the designer may assume an ultimate rupture bearing capacity of 150kPa at 0.5m depth. Alternatively, the foundations can be deepened to reach more competent soils. To reach a material with an ultimate rupture bearing capacity of 300kPa, the foundation depth in these areas would have to be between 1.0m and 1.8m below ground surface.

The above capacities should be multiplied by the following reduction factors:

- | | |
|----------------------|------|
| • Earthquake Loading | 0.8 |
| • ULS | 0.5 |
| • SLS | 0.33 |

In all cases, we recommend that a geotechnical engineer is retained to inspect the foundation subgrade to confirm (or otherwise) that adequate bearing capacity is available.

5.5 Seismic Site Classification

Christchurch city is underlain by several kilometres of soil. We therefore consider that the seismic site classification, in the terms of NZS 1170.5, is Class D.

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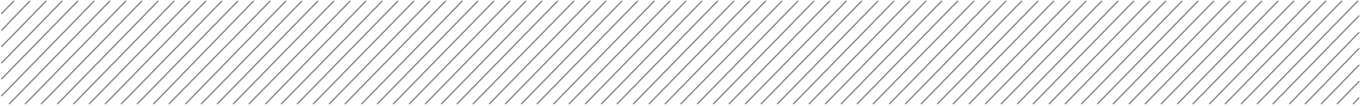
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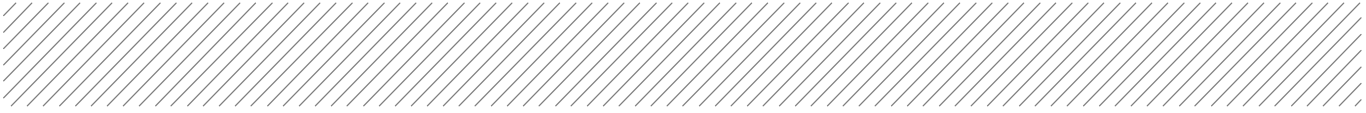
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7. Limitations

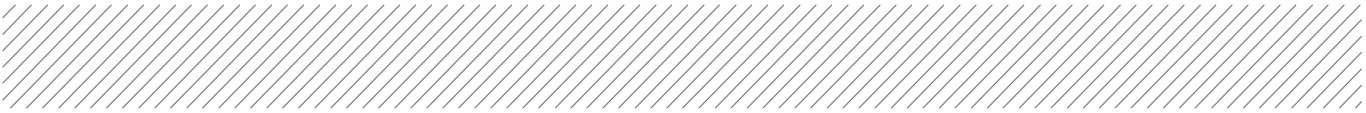
We have prepared this report in accordance with the brief as provided. The contents of the report are for the sole use of the Client and no responsibility or liability will be accepted to any third party. Data or opinions contained within the report may not be used in other contexts or for any other purposes without our prior review and agreement.

The recommendations in this report are based on data collected at specific locations and by using appropriate investigation methods with limited site coverage. Only a finite amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgment and it must be appreciated that actual conditions could vary from the assumed model.

Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

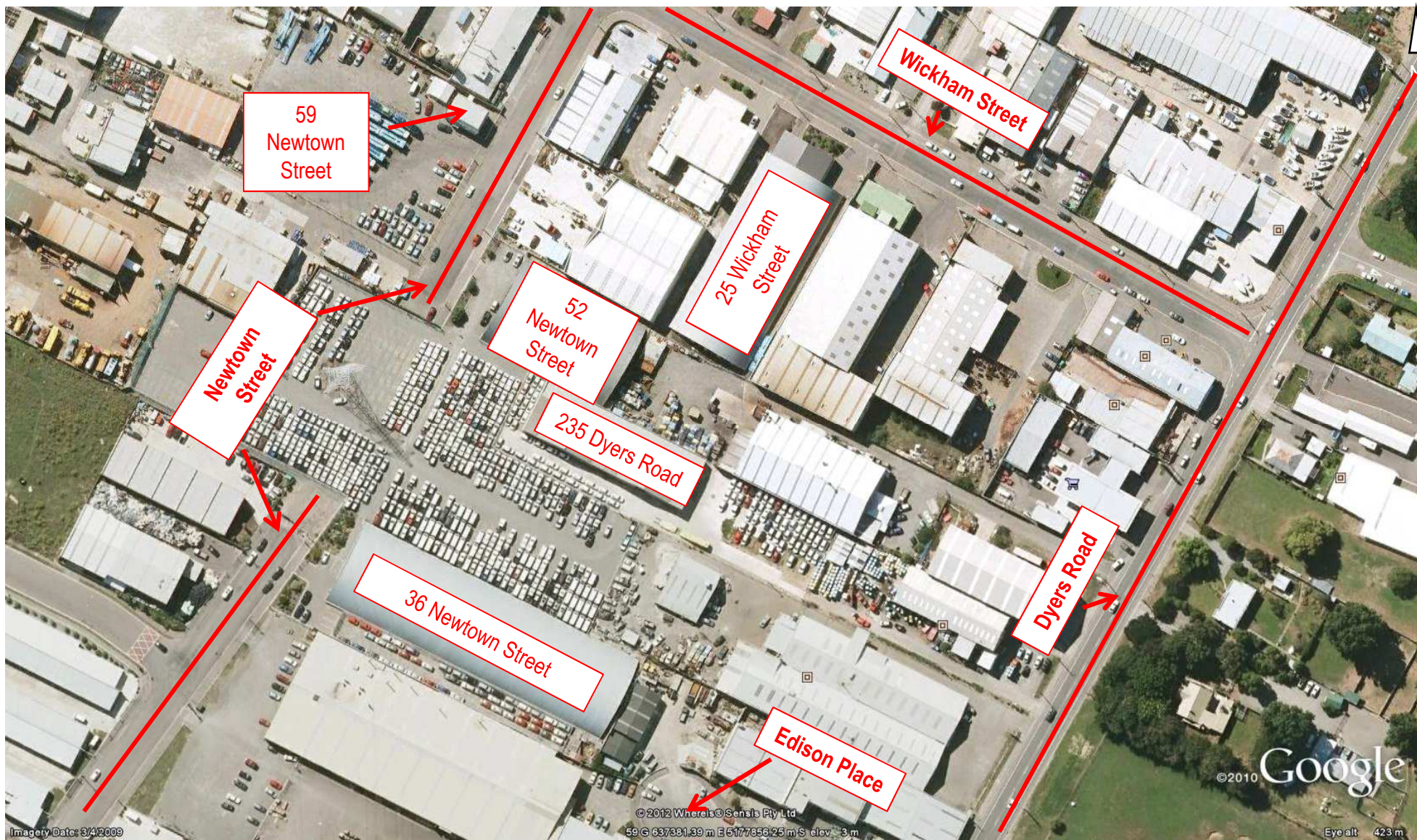
Subsurface conditions, such as groundwater levels, can change over time. This should be borne in mind, particularly if the report is used after a protracted delay.

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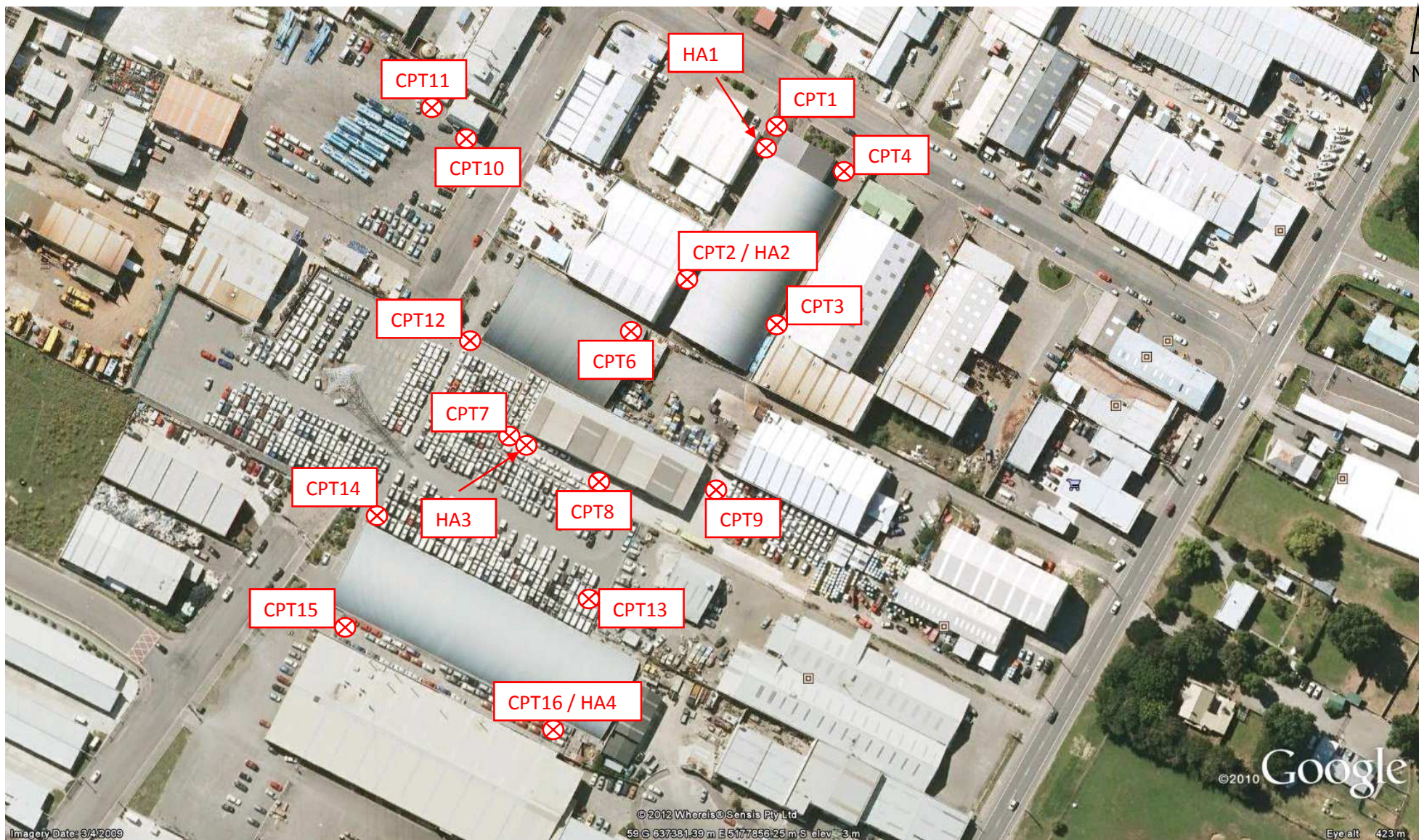
Appendix A

Figures



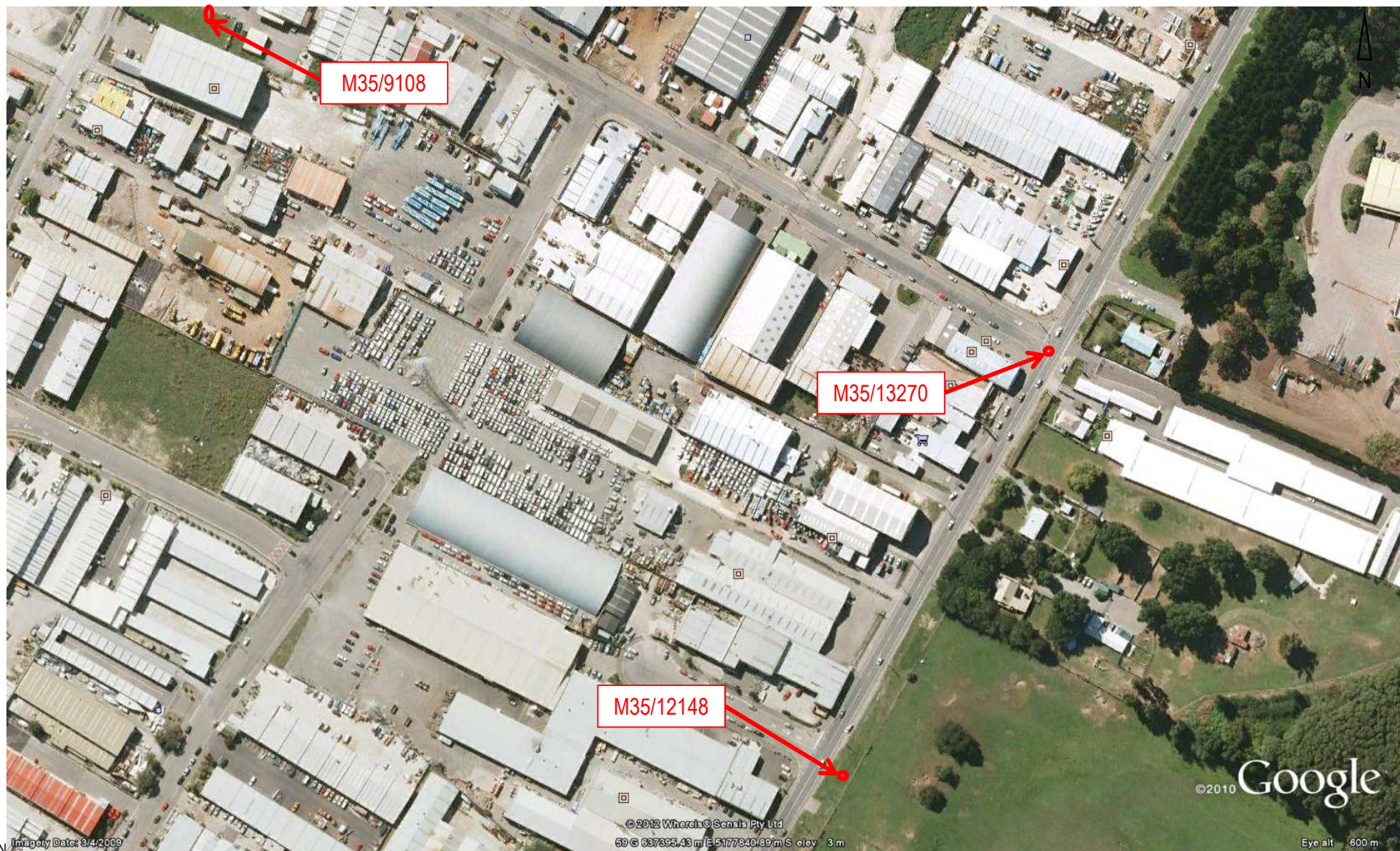
Note: Not to scale; boundaries and locations are approximate only

 Aurecon New Zealand Limited Unit 1, 150 Cavendish Road Casebrook PO Box 1061 Christchurch - New Zealand Telephone: +64 3 366 0821 Facsimile: +64 3 379 6955 Email: christchurch@ap.aurecongroup.com Website: www.aurecongroup.com	Client TPA Godfreys Ltd		Figure 1 Site Location		Paper Size A4
	Project 25 Wickham Street				Revision 1
	By MGL	Date 26 January 2012	Job Number 226948		



Note: Not to scale; boundaries and locations are approximate only

 Aurecon New Zealand Limited Unit 1, 150 Cavendish Road Casebrook PO Box 1061 Christchurch - New Zealand Telephone: +64 3 366 0821 Facsimile: +64 3 379 6955 Email: christchurch@ap.aurecongroup.com Website: www.aurecongroup.com	Client TPA Godfreys Ltd		Figure 2 Site Investigation Locations		Paper Size A4
	Project 25 Wickham Street				Revision 1
	By MGL	Date 26 January 2012	Job Number 226948		



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	Project 25 Wickham Street				Revision 1
	By MGL	Date 26 January 2012	Job Number 226948		



Appendix B

CPT Logs

CPT ANALYSIS NOTES

Soil Type

Interpretation using chart of Robertson & Campanella (1983). This is a simple but well proven interpretation using cone tip resistance (q_c) and friction ratio (f_R) only. No normalisation for overburden stress is applied. Cone tip resistance measured with the piezocone is corrected with measured pore pressure (u_c).

	sand (and gravel)
	silt-sand
	silt
	clay-silt
	clay
	peat

Liquefaction Screening

The purpose of the screening is to highlight susceptible soils, that is sand and silt-sand in a relatively loose condition. This is not a full liquefaction risk assessment which requires knowledge of the particular earthquake risk at a site and additional analysis. The screening is based on the chart of Shibata and Teparaksa (1988).

	high susceptibility
	medium susceptibility
	low susceptibility

High susceptibility is here defined as requiring a shear stress ratio of 0.2 to cause liquefaction with D_{50} for sands assumed to be 0.25 mm and for silty sands to be 0.05 mm.

Medium susceptibility is here defined as requiring a shear stress ratio of 0.4 to cause liquefaction with D_{50} for sands assumed to be 0.25 mm and for silty sands to be 0.05 mm.

Low susceptibility is all other cases.

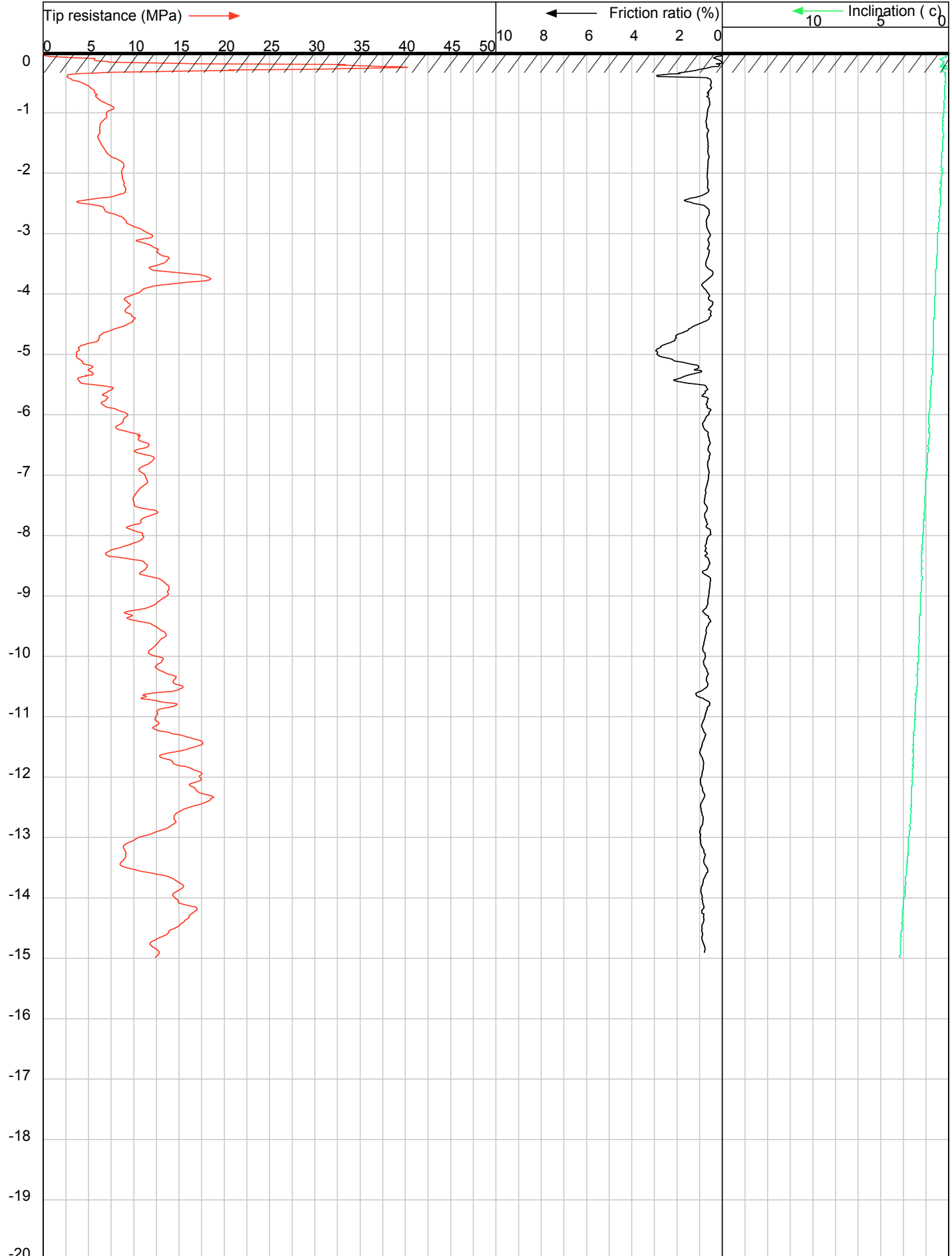
Relative Density (D_R)

Based on the method of Baldi et. al. (1986) from data on normally consolidated sand.

Undrained Shear Strength (S_u)

Derived from the bearing capacity equation using $S_u = (q_c - \sigma_{vo})/15$.

DEPTH IN METERS BELOW GROUND LEVEL

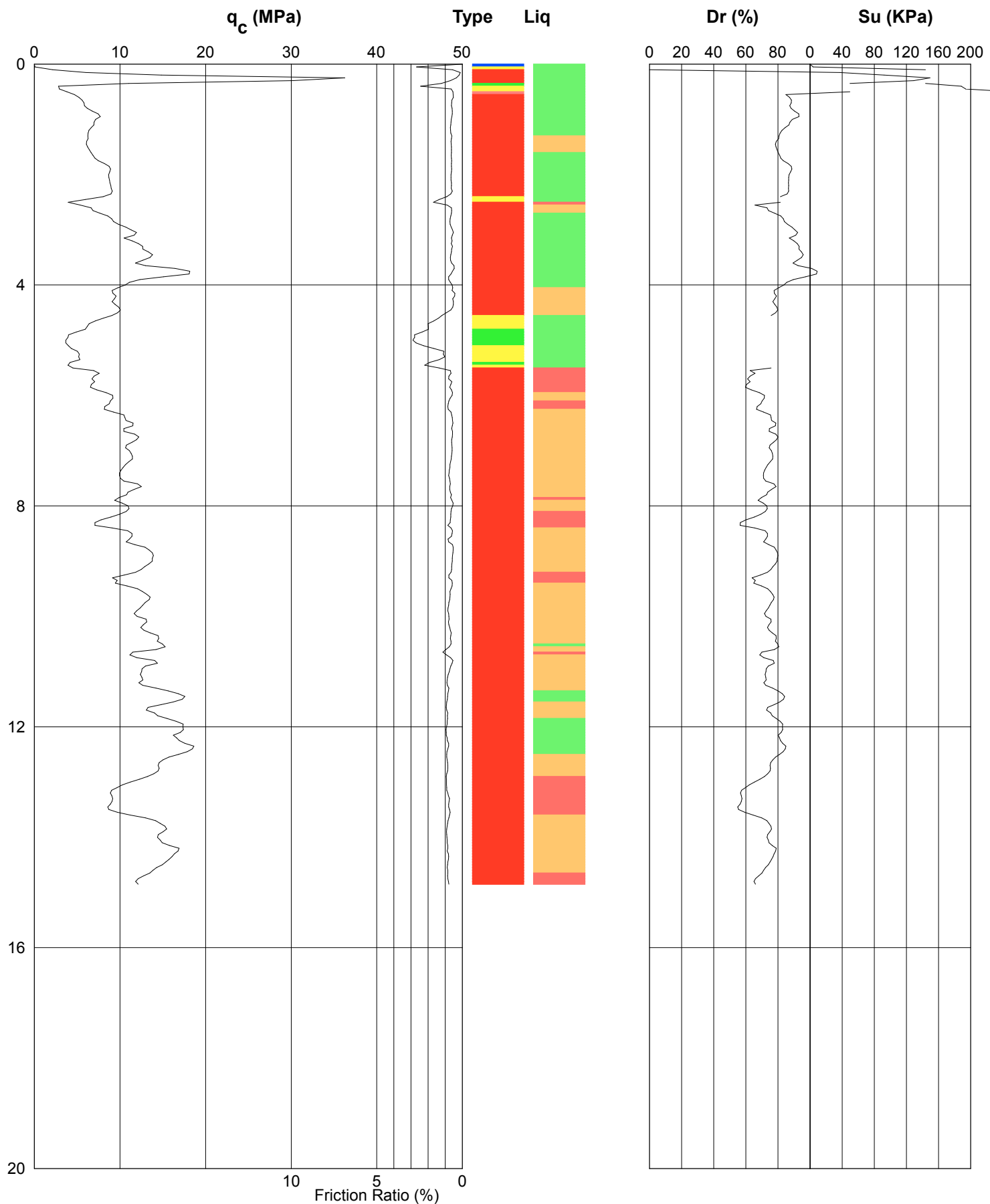


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT001
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT001

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT001

Project: Aurecon NZ Ltd

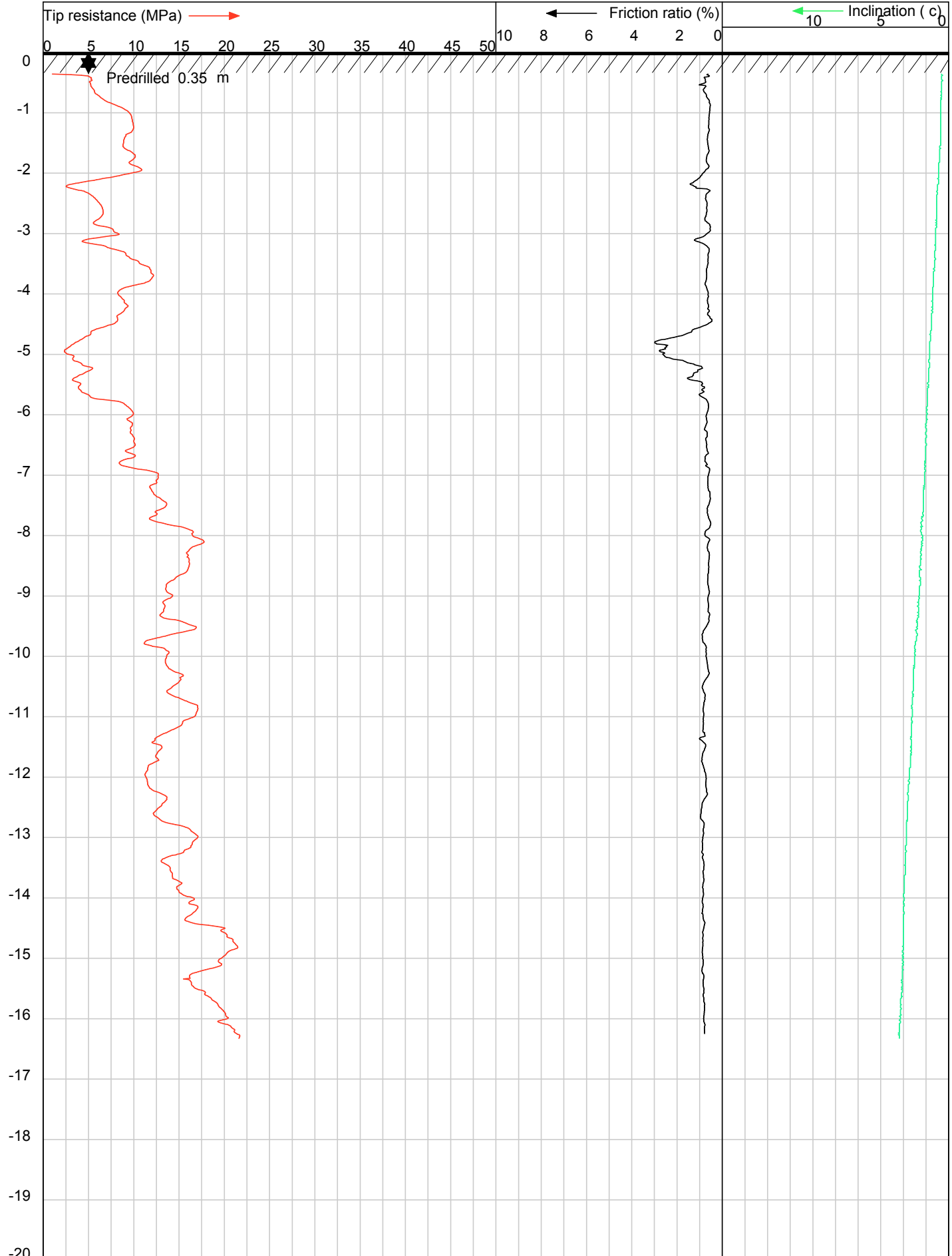
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Target Depth

DEPTH IN METERS BELOW GROUND LEVEL

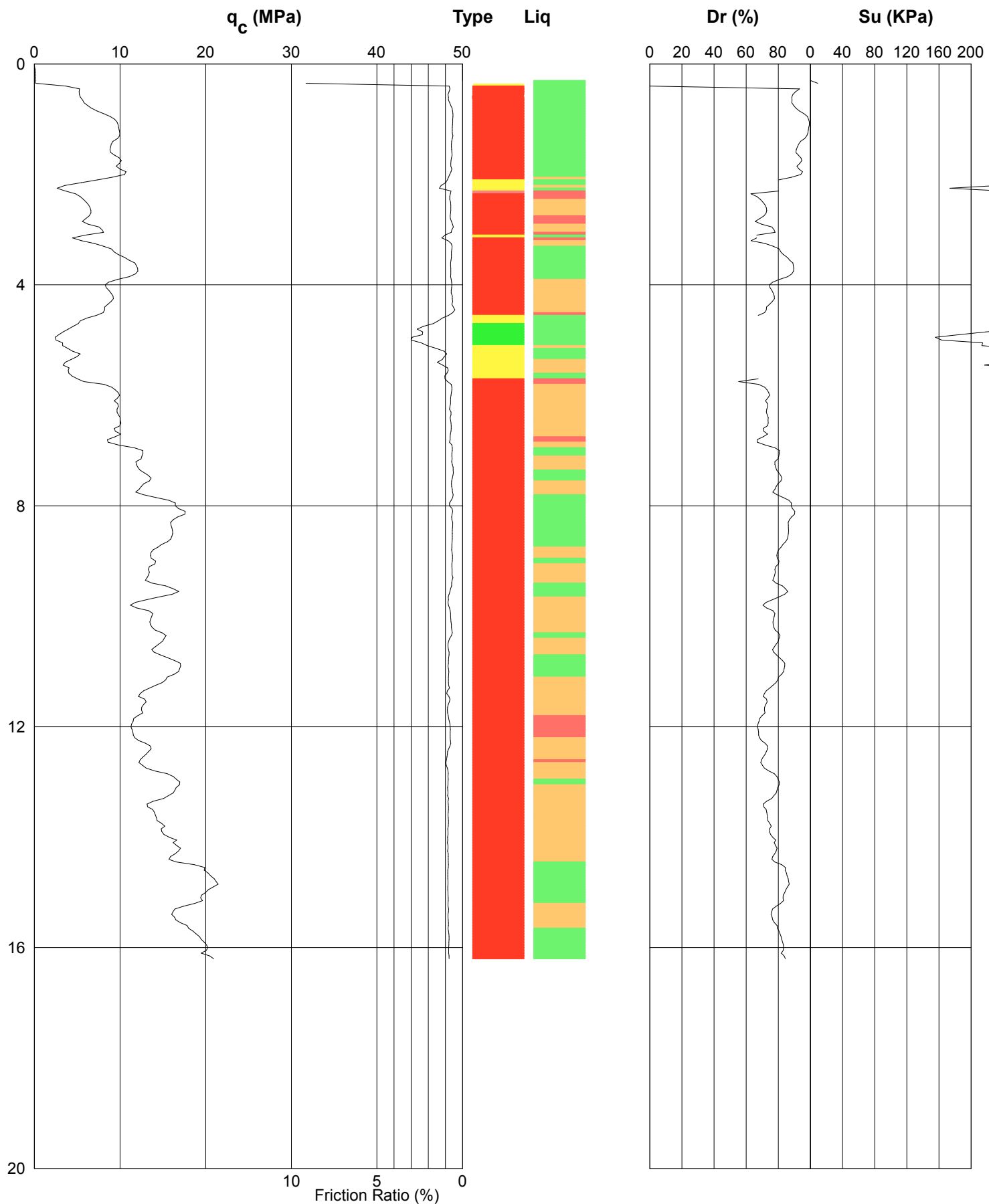


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT002
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT002

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT002

Project: Aurecon NZ Ltd

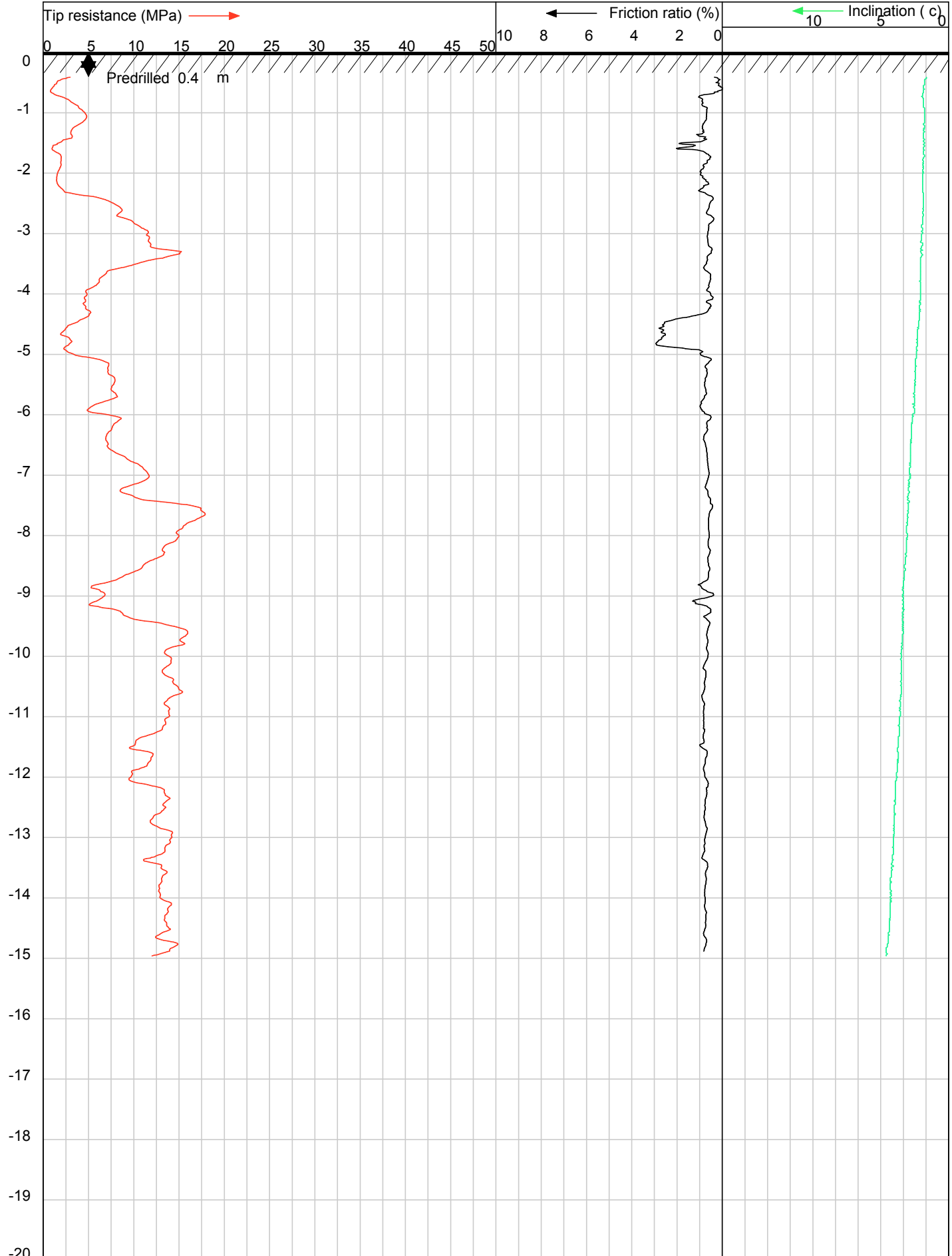
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

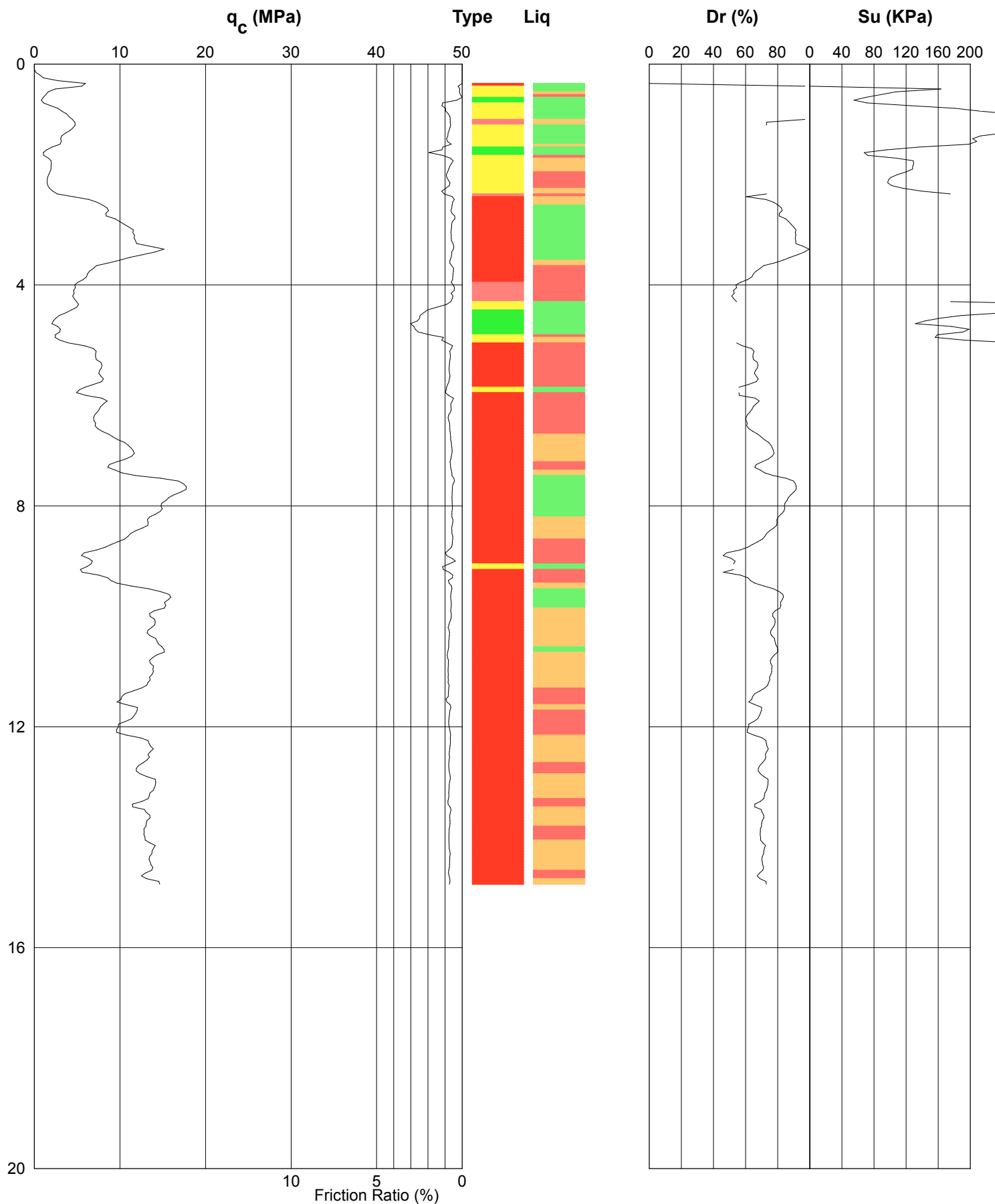


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT003
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT003

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Job No: 9998

CPT No: CPT003

Project: Aurecon NZ Ltd

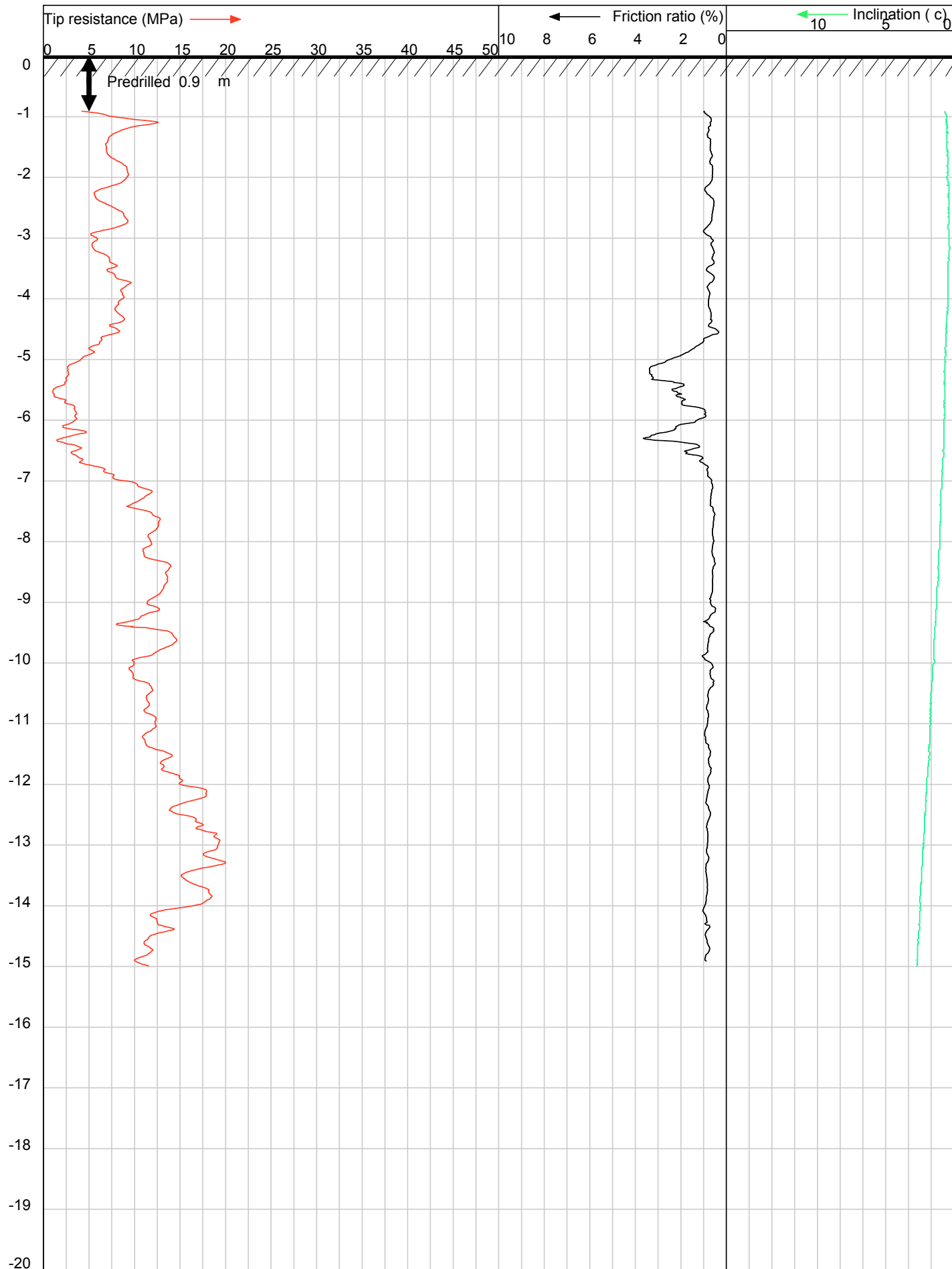
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Target Depth

DEPTH IN METERS BELOW GROUND LEVEL



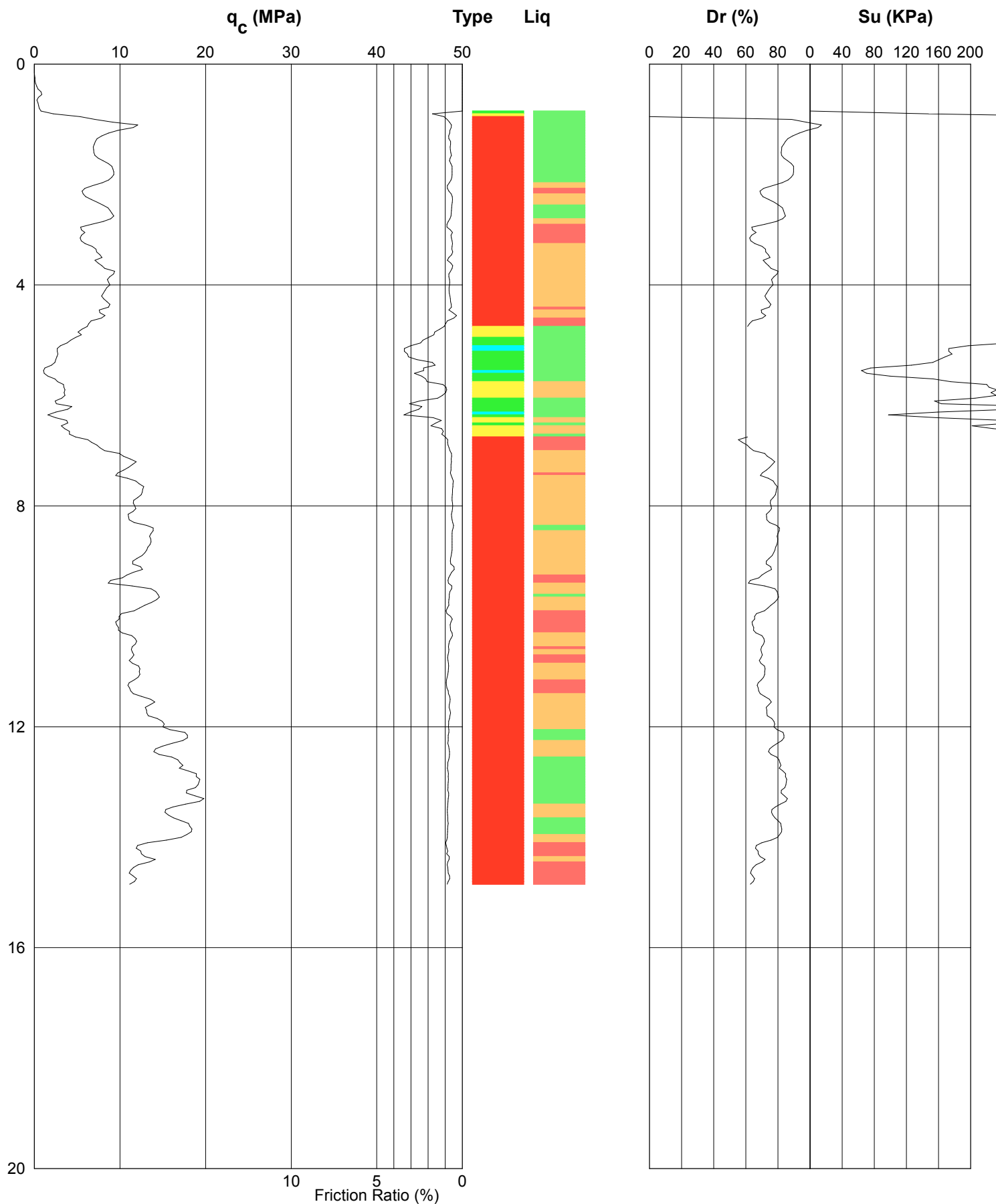
CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT004
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT004

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Job No: 9998

CPT No: CPT004

Project: Aurecon NZ Ltd

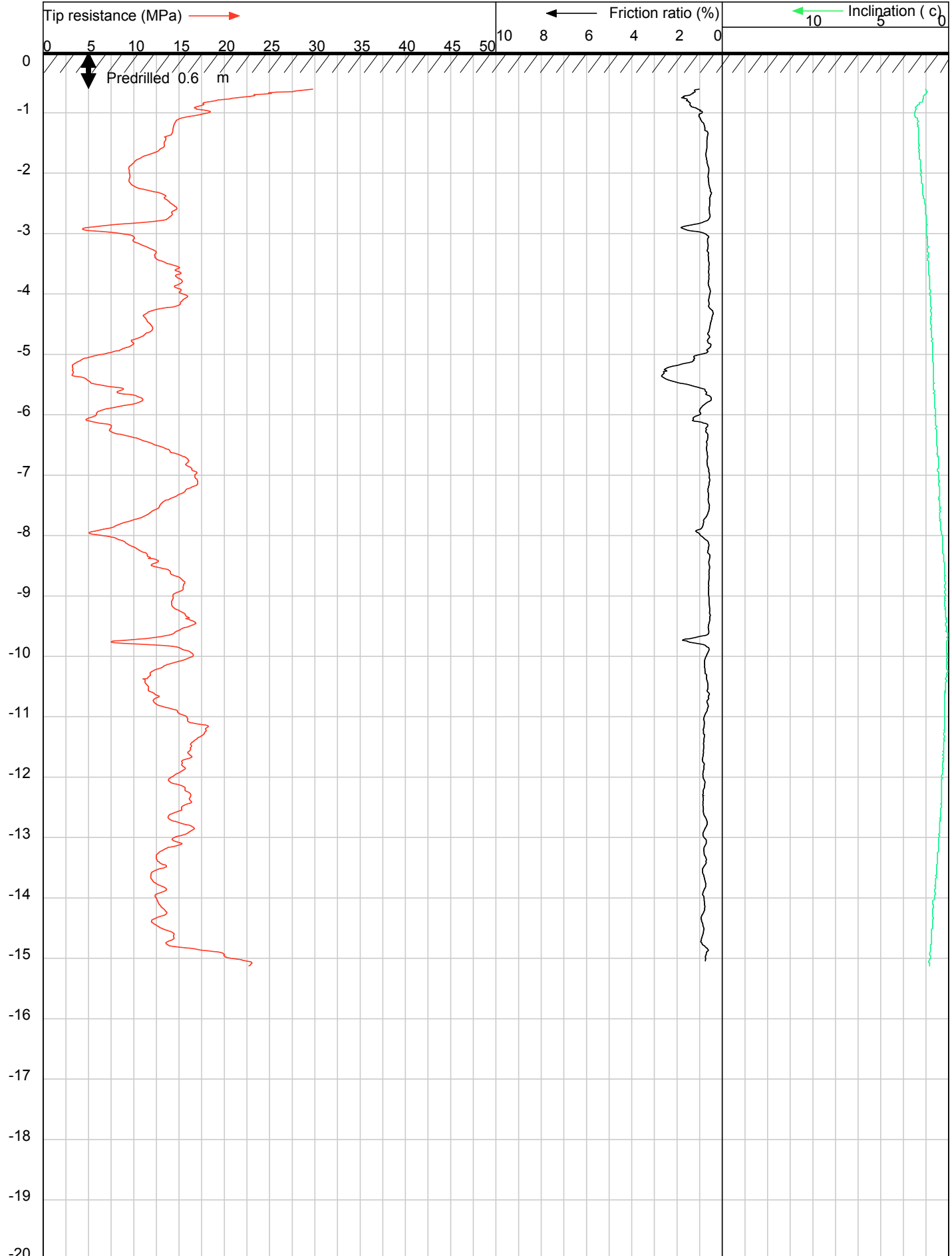
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Target Depth

DEPTH IN METERS BELOW GROUND LEVEL

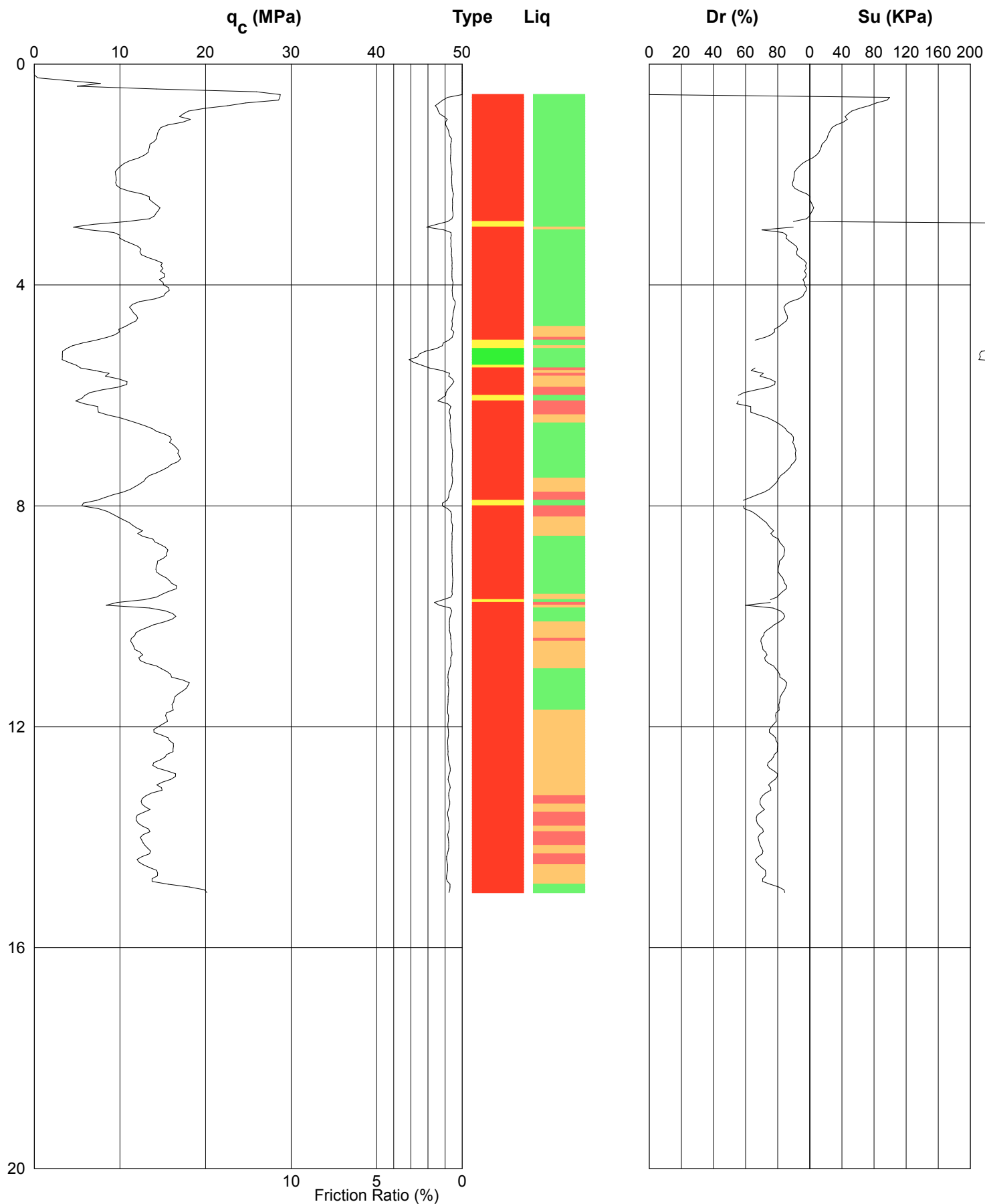


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT006
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT006

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Job No: 9998

CPT No: CPT006

Project: Aurecon NZ Ltd

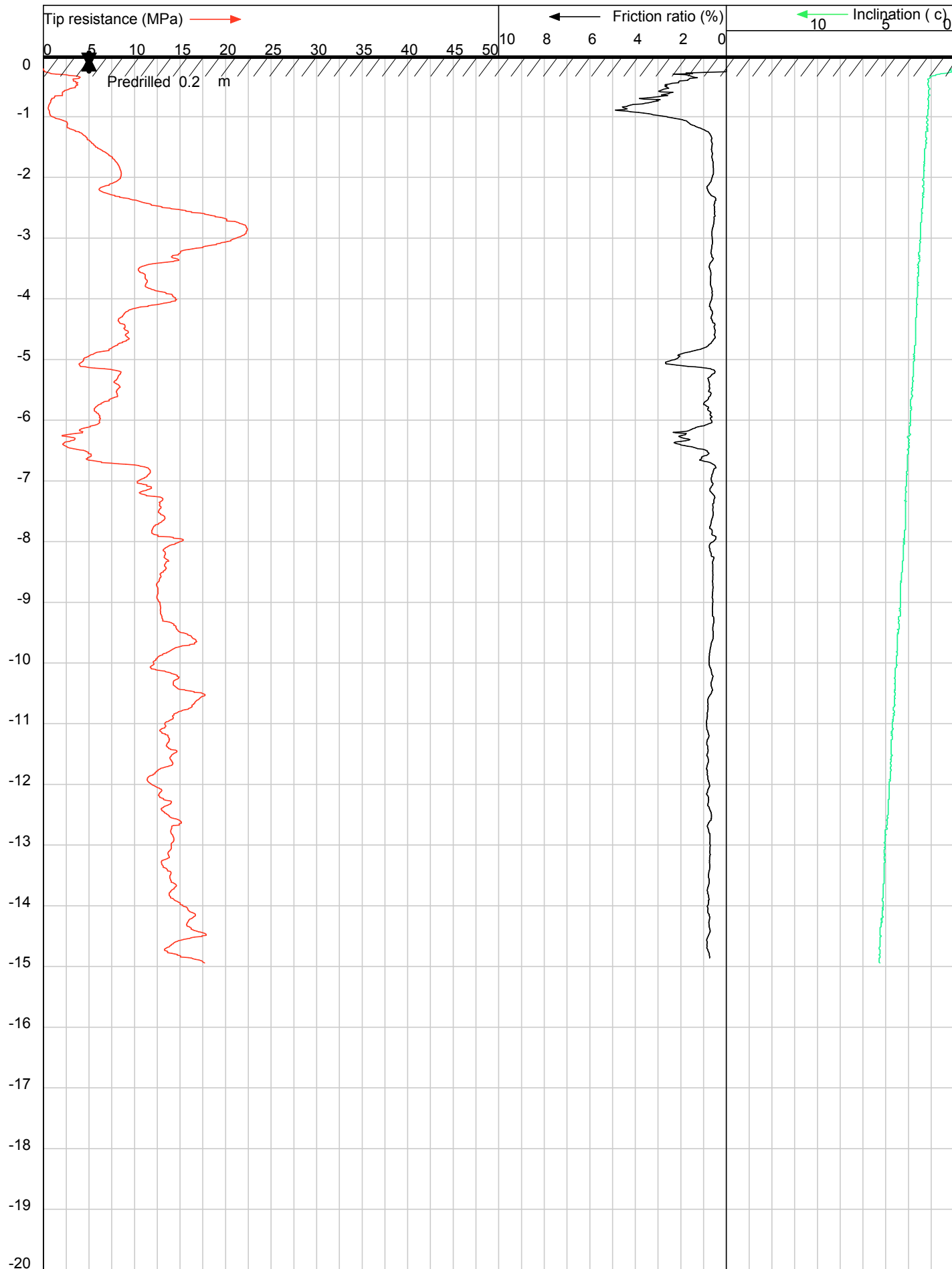
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

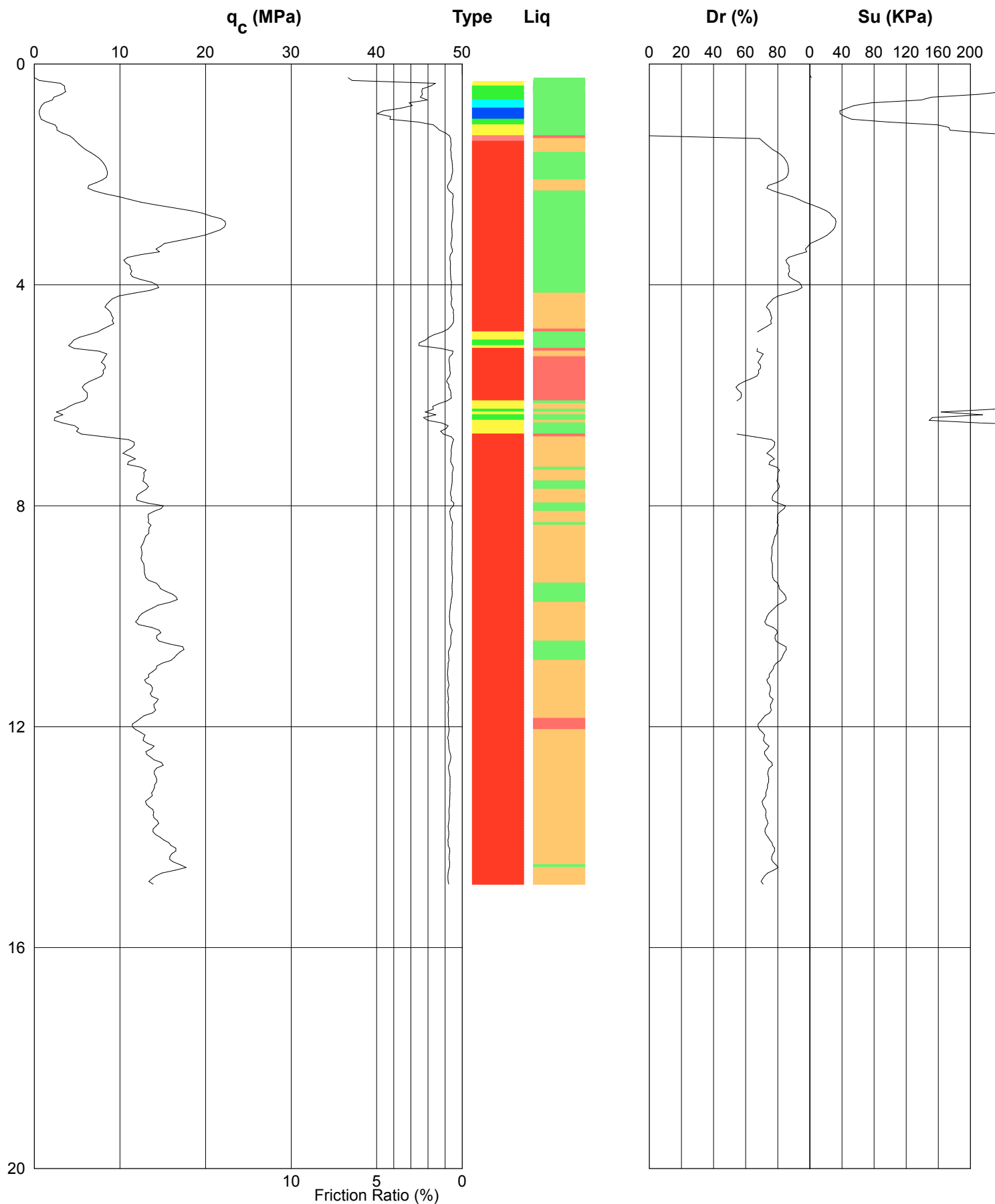


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT007
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT007

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Job No: 9998

CPT No: CPT007

Project: Aurecon NZ Ltd

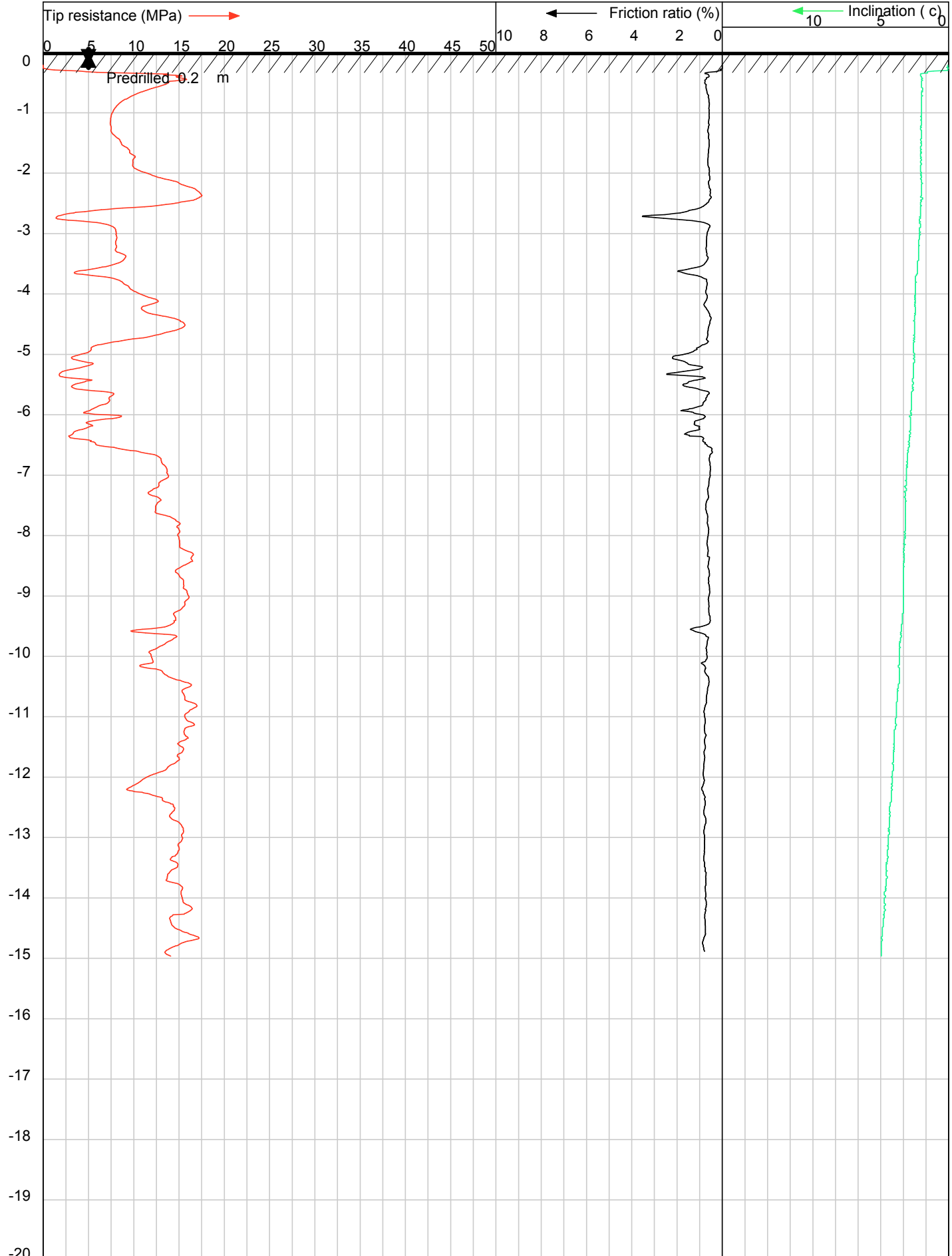
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Target Depth

DEPTH IN METERS BELOW GROUND LEVEL

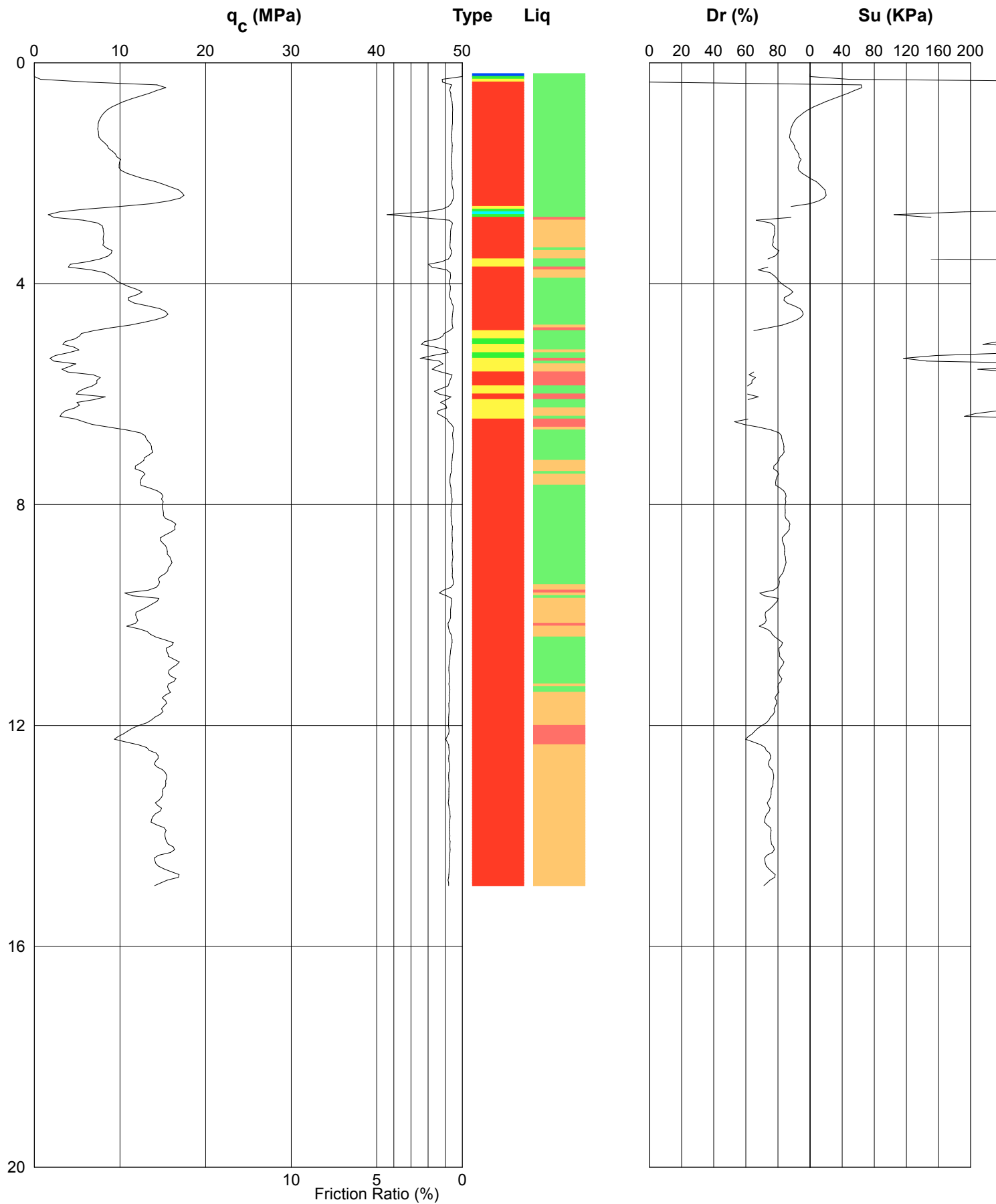


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 19-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT008
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT008

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Job No: 9998

CPT No: CPT008

Project: Aurecon NZ Ltd

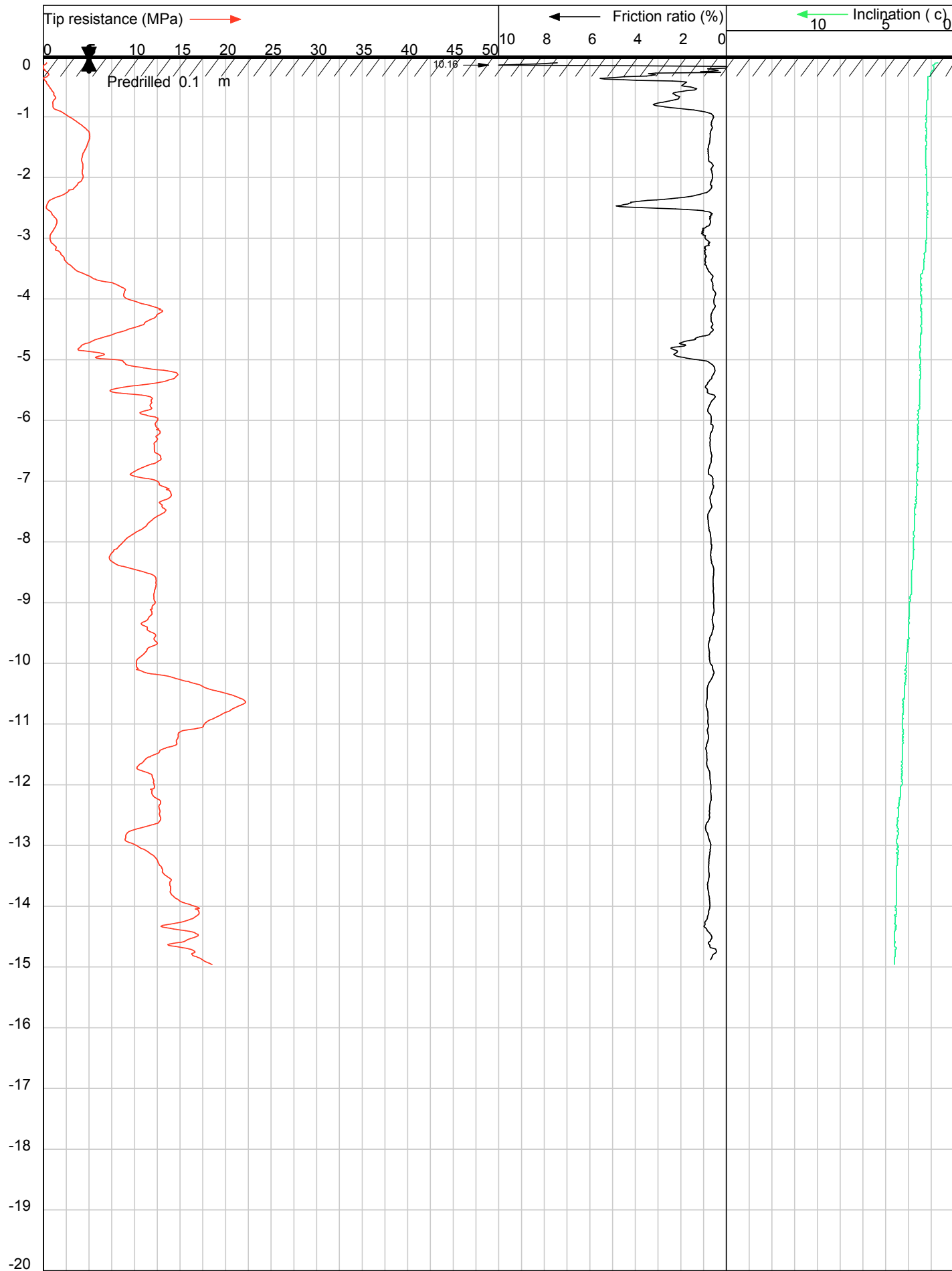
Location: Newton Street, Christchurch

Date: 19-1-2012

Operator: H Pardoe

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

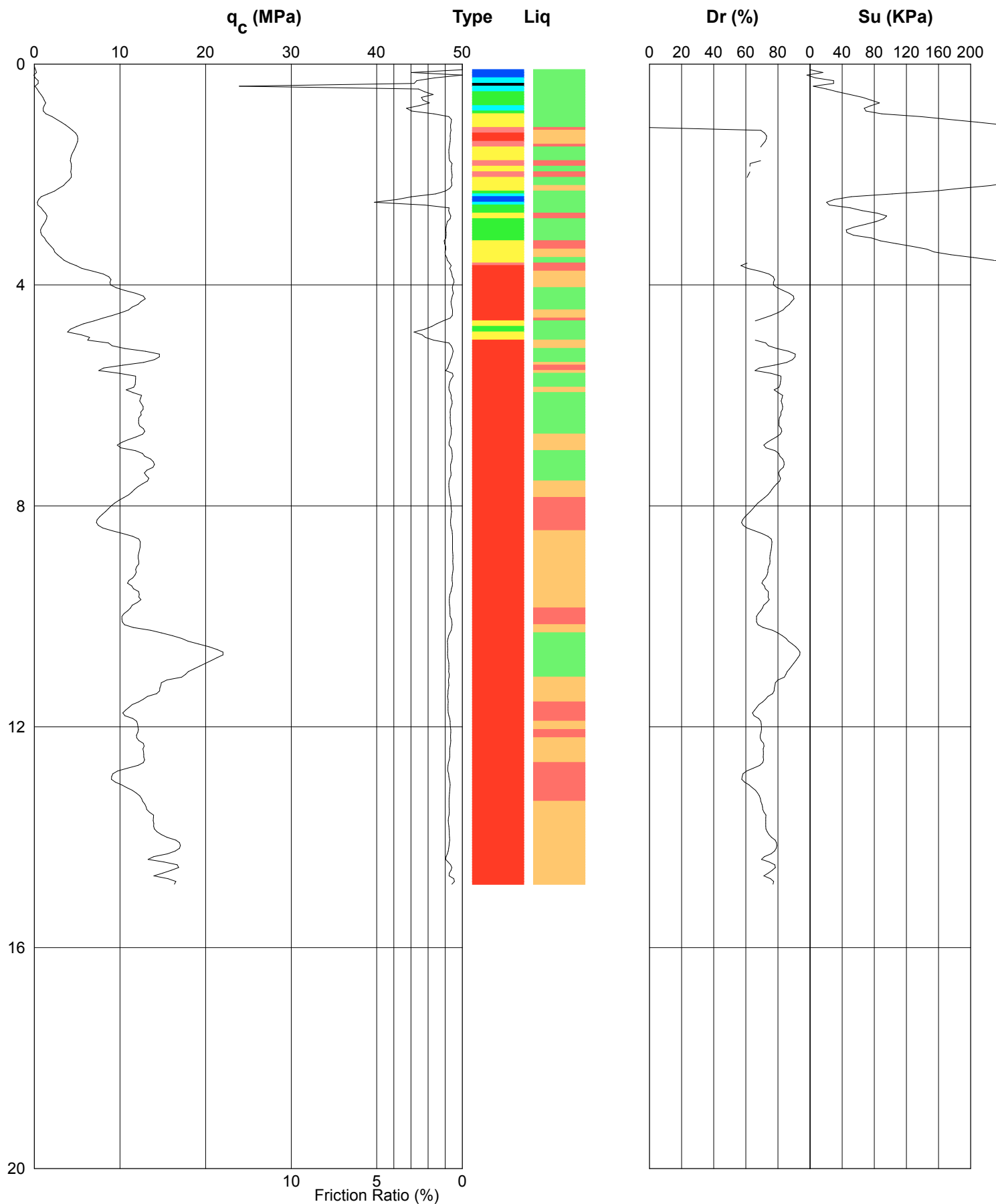


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 23-1-2012
OPERATOR : N.Barnes
REMARK 1 : CPT009
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT009

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT009

Project: Aurecon NZ Ltd

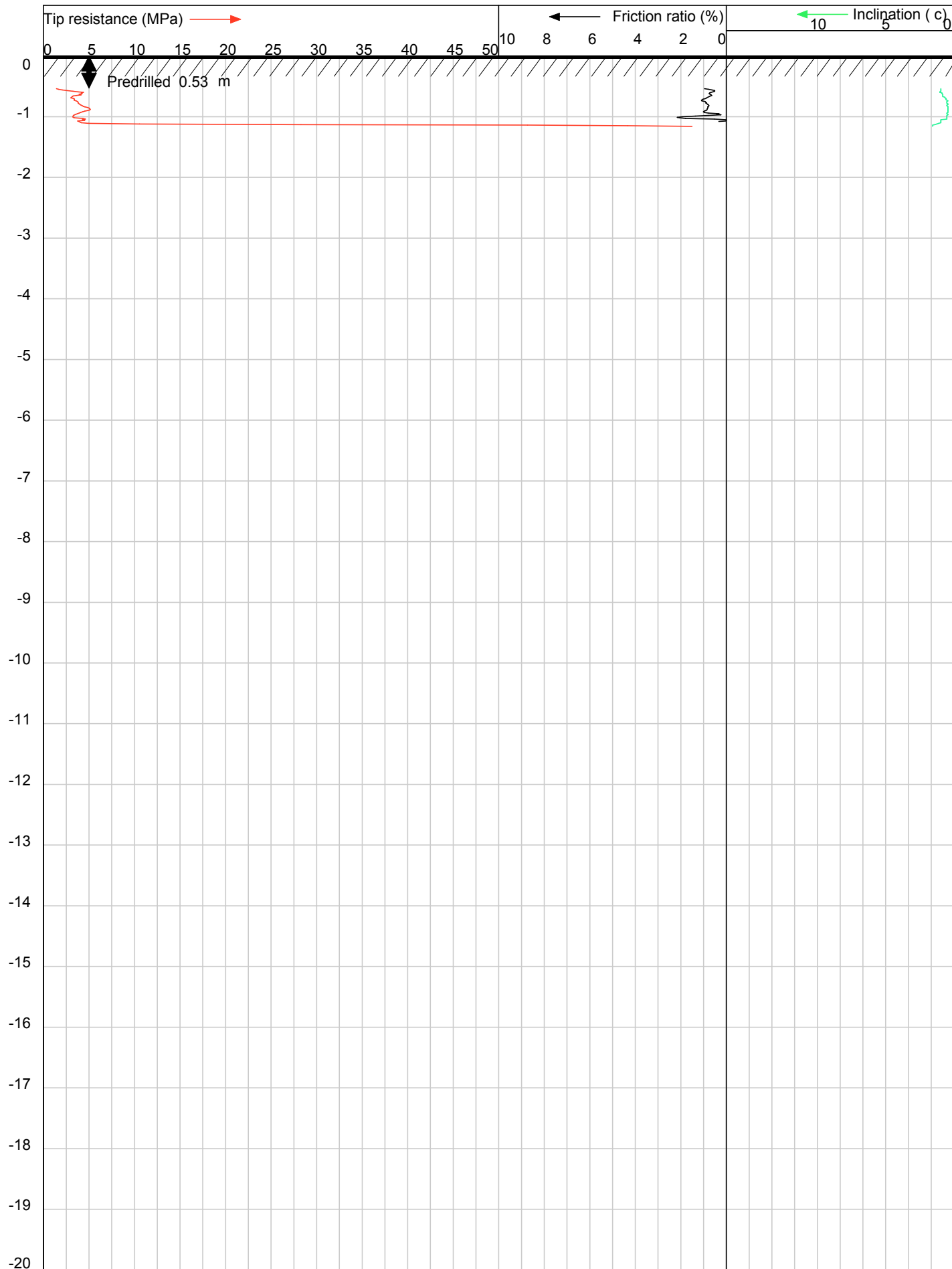
Location: Newton Street, Christchurch

Date: 23-1-2012

Operator: N Barnes

Remark: Target Depth

DEPTH IN METERS BELOW GROUND LEVEL

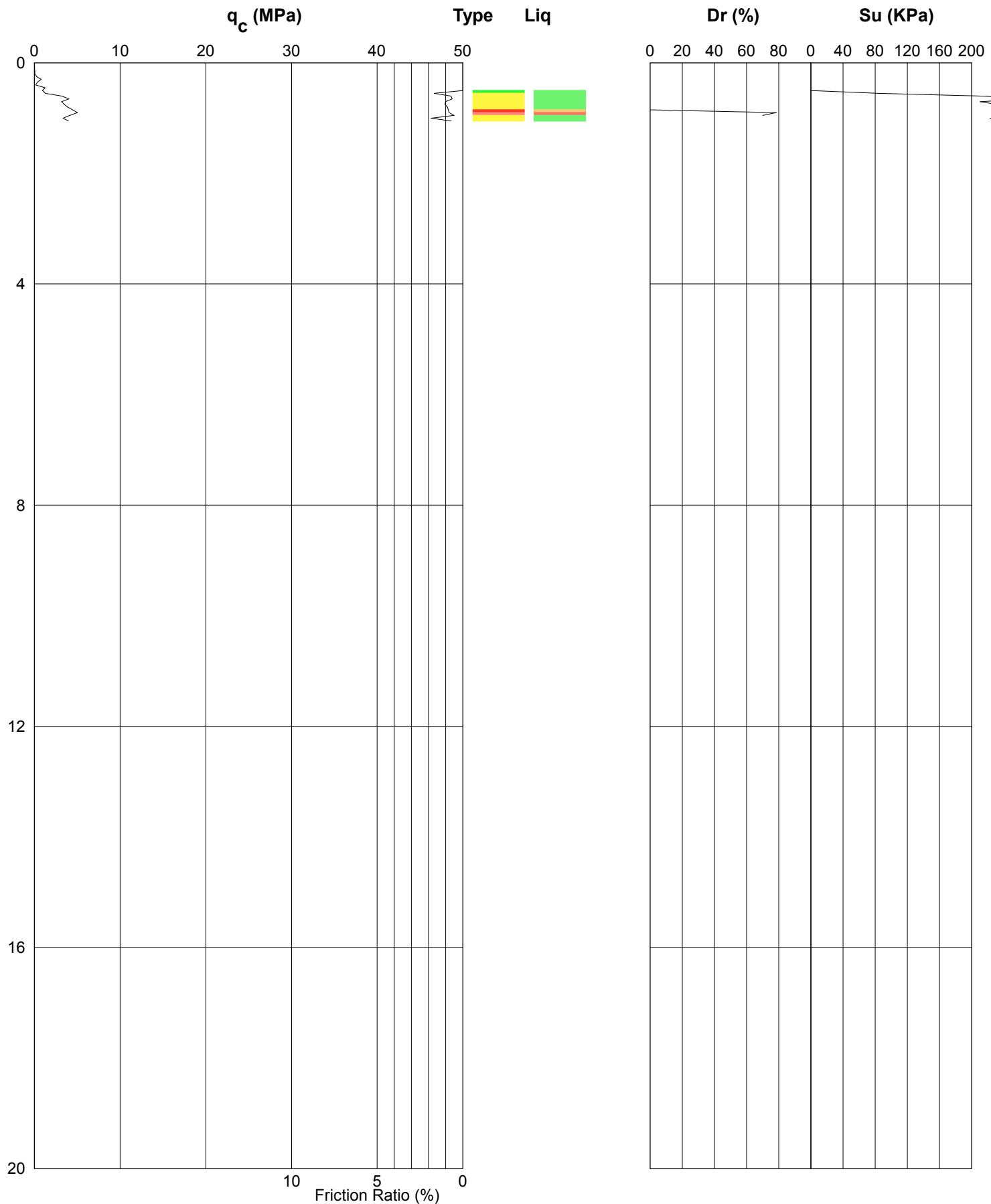


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 20-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT010
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT010

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT010

Project: Aurecon NZ Ltd

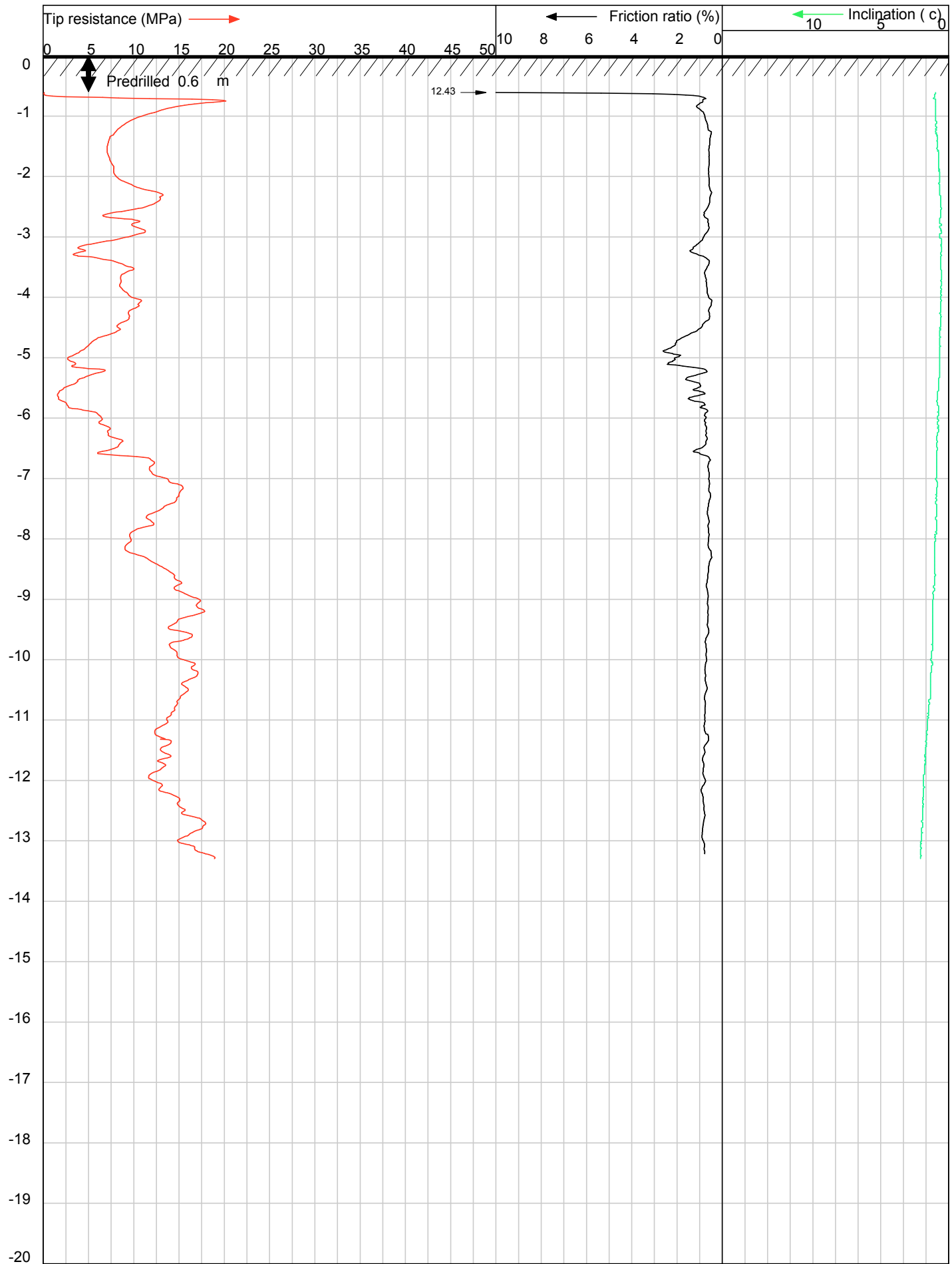
Location: Newton Street, Christchurch

Date: 20-1-2012

Operator: H Pardoe

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

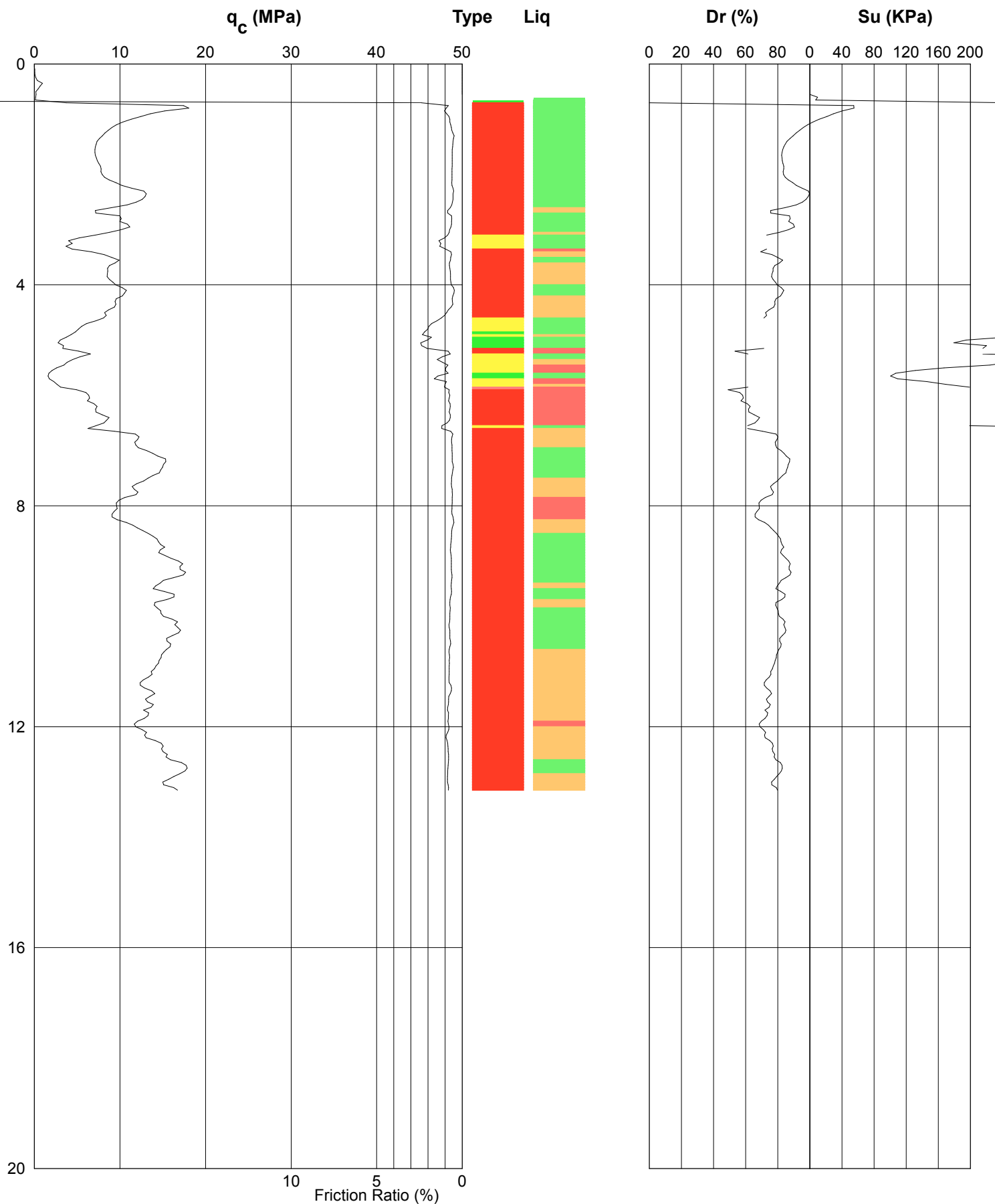


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 20-1-2012
OPERATOR : H Pardoe
REMARK 1 : CPT011
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT011

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT011

Project: Aurecon NZ Ltd

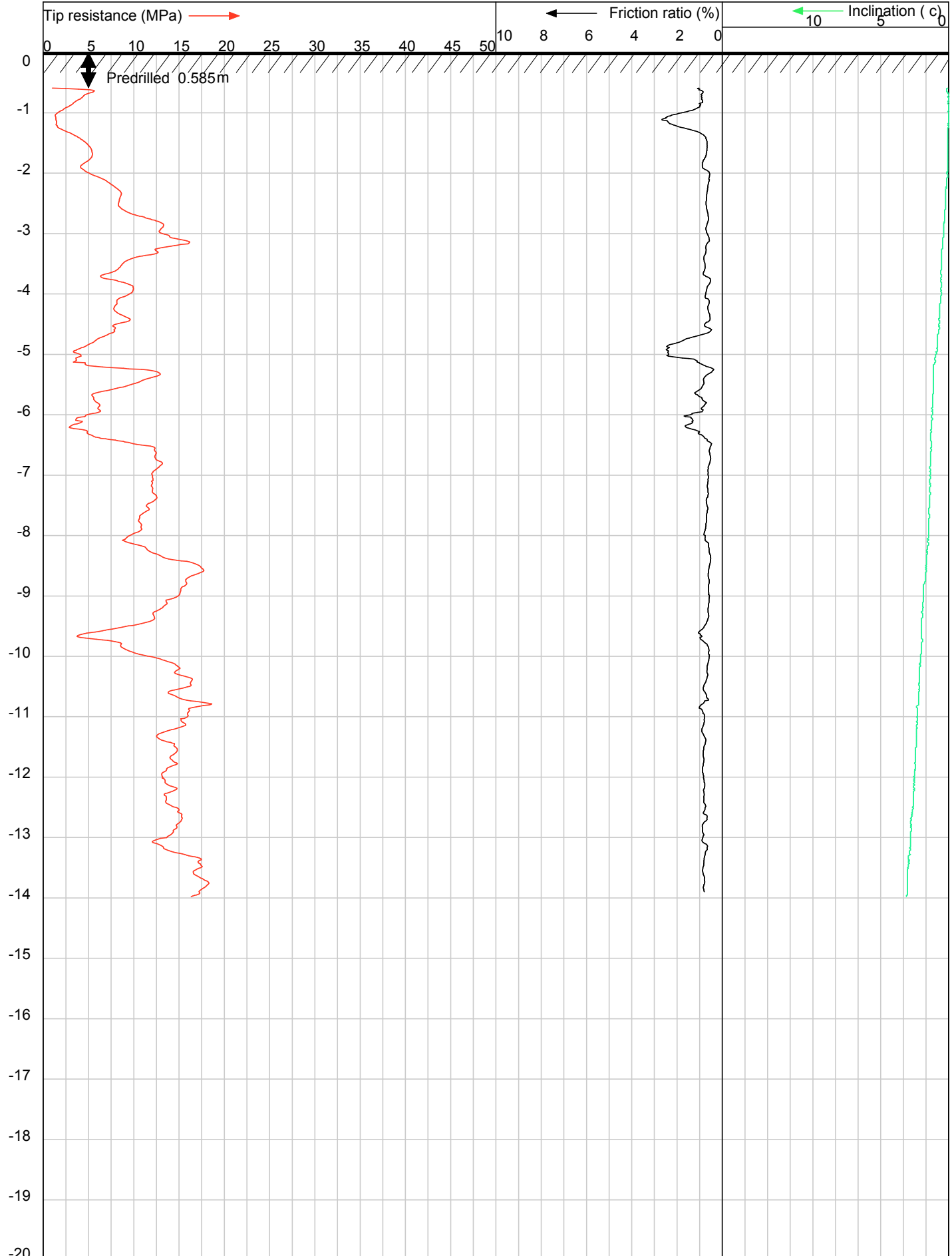
Location: Newton Street, Christchurch

Date: 20-1-2012

Operator: H Pardoe

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

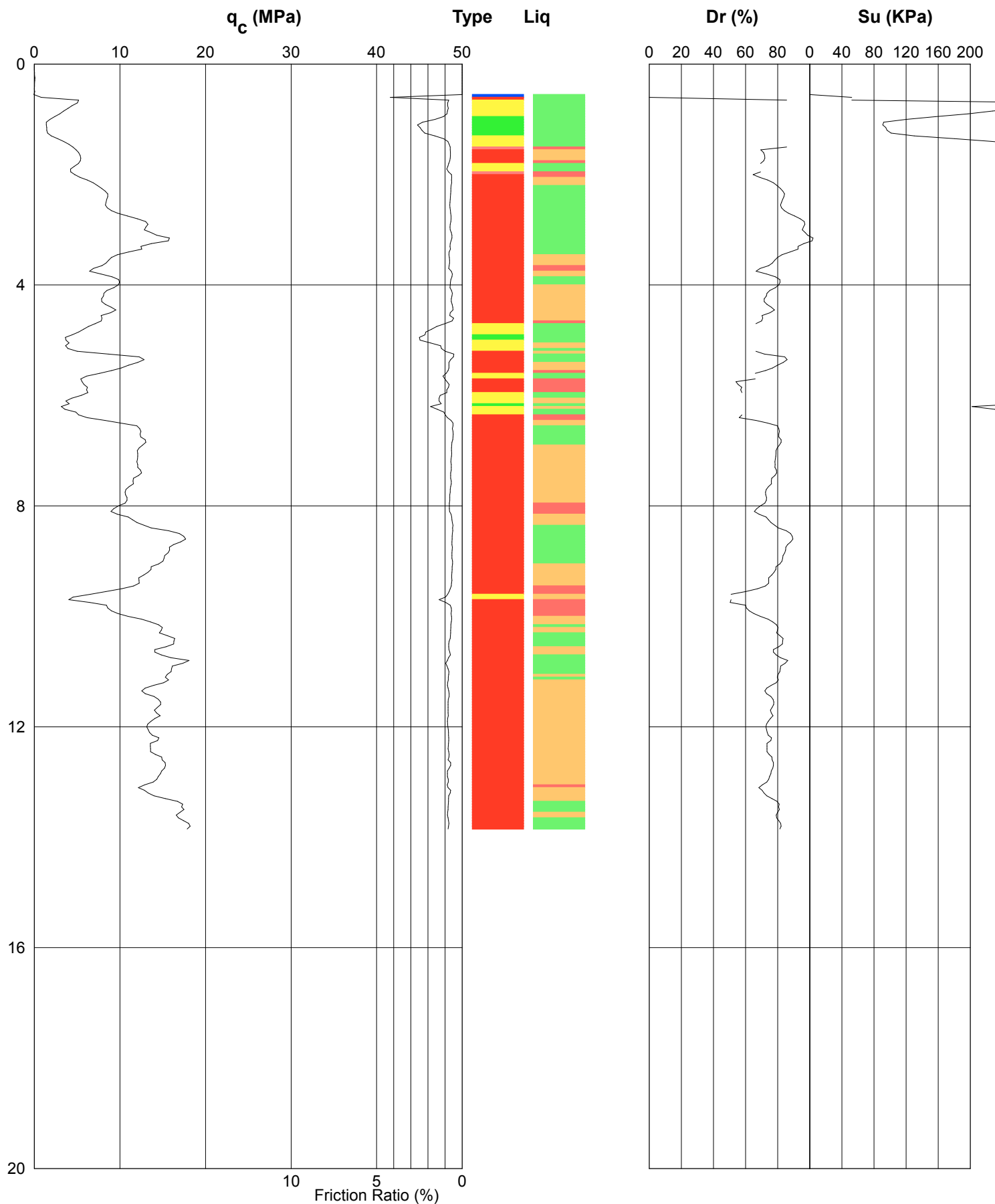


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 23-1-2012
OPERATOR : N.Barnes
REMARK 1 : CPT012
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT012

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT012

Project: Aurecon NZ Ltd

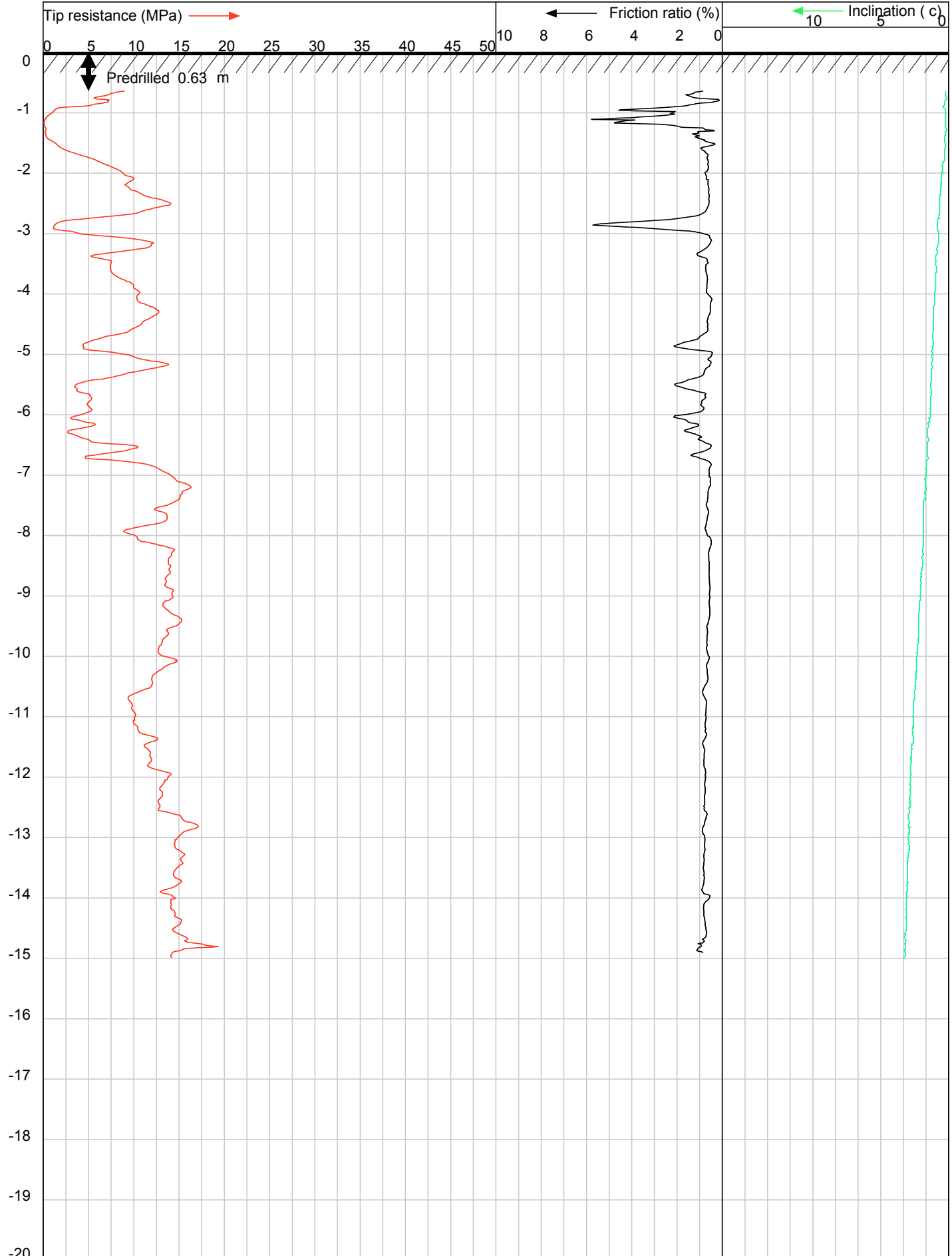
Location: Newton Street, Christchurch

Date: 23-1-2012

Operator: N Barnes

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

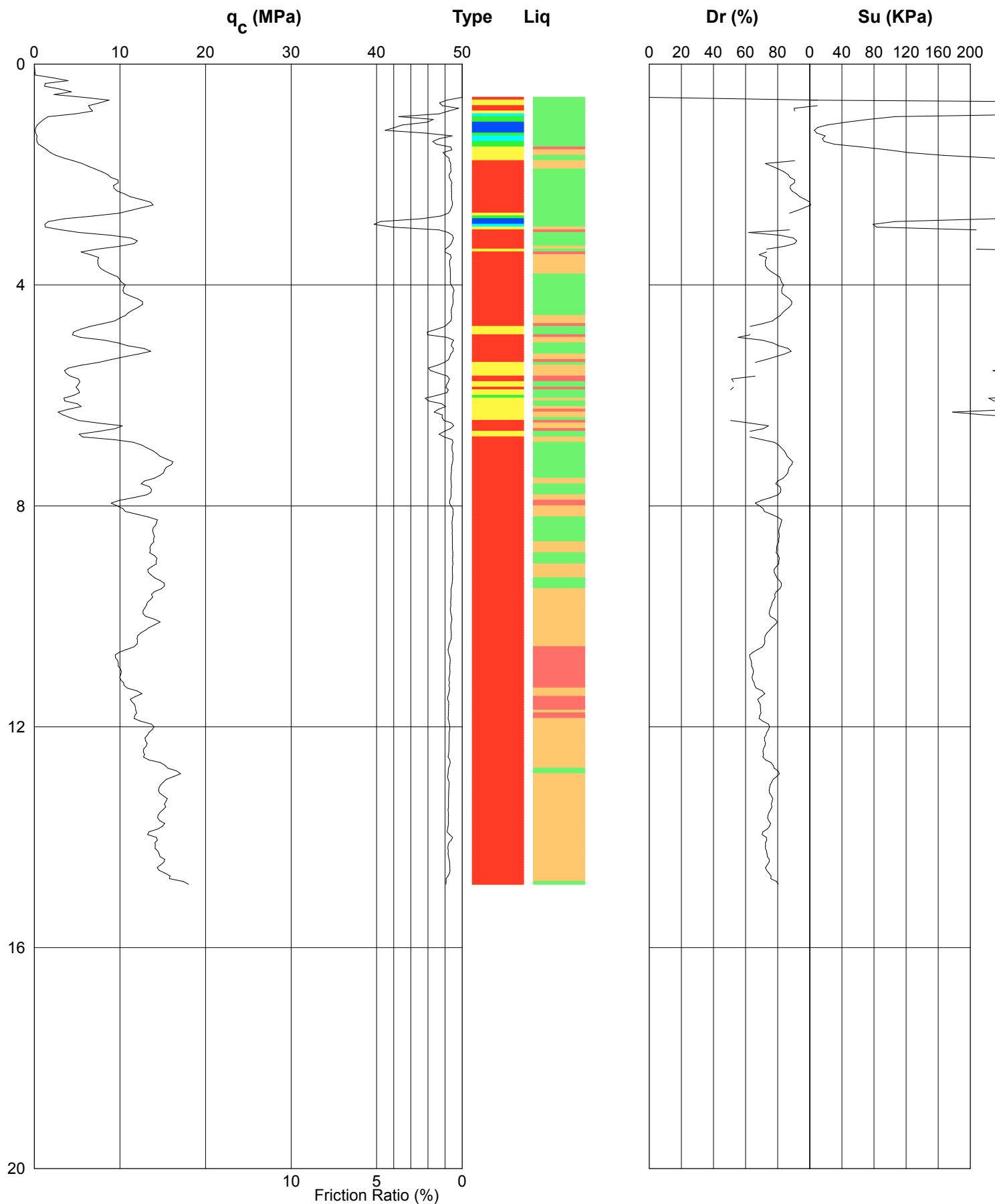


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 23-1-2012
OPERATOR : N.Barnes
REMARK 1 : CPT013
REMARK 2 : Target Depth

JOB # : 9998
TEST # : CPT013

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Job No: 9998

CPT No: CPT013

Project: Aurecon NZ Ltd

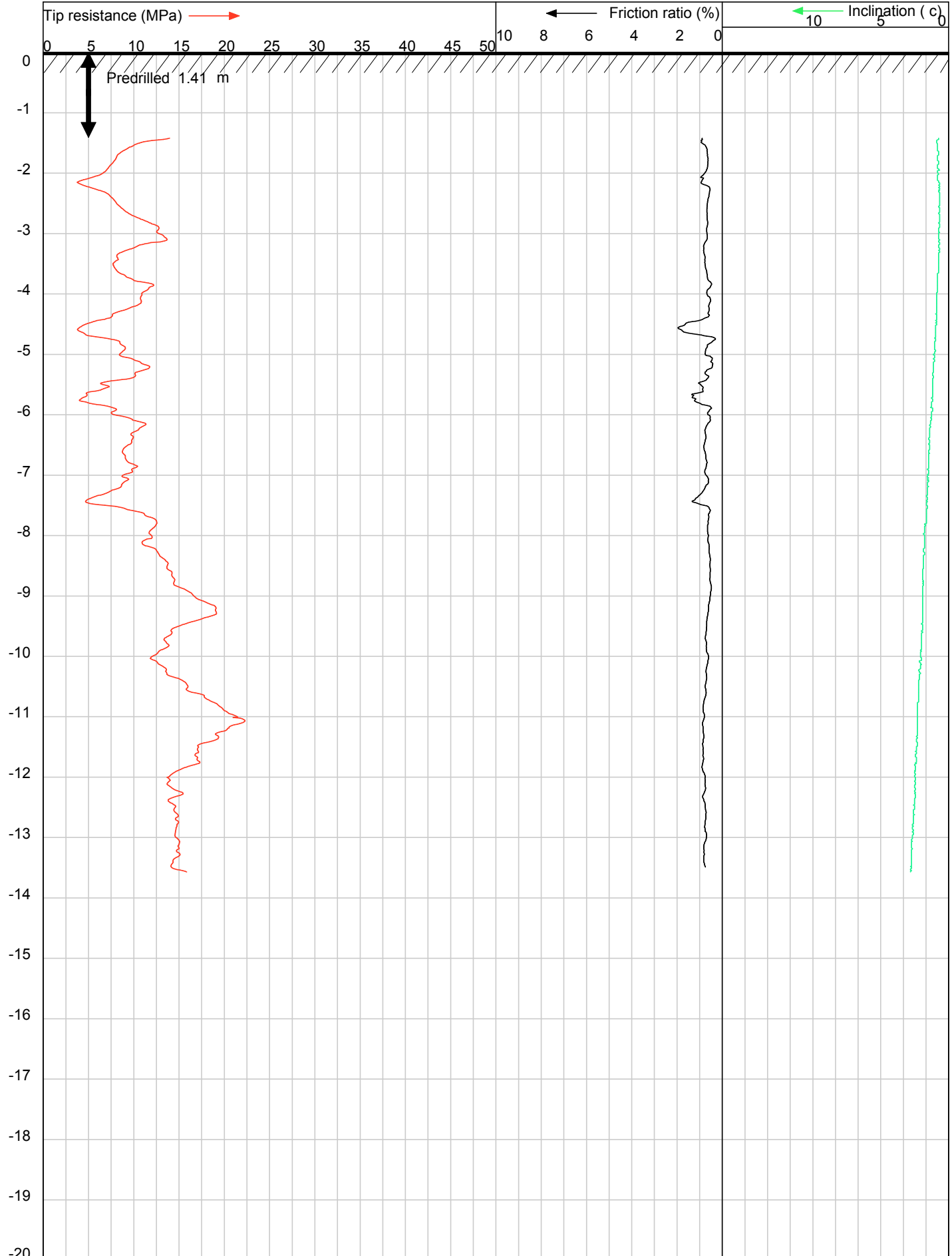
Location: Newton Street, Christchurch

Date: 23-1-2012

Operator: N Barnes

Remark: Target Depth

DEPTH IN METERS BELOW GROUND LEVEL

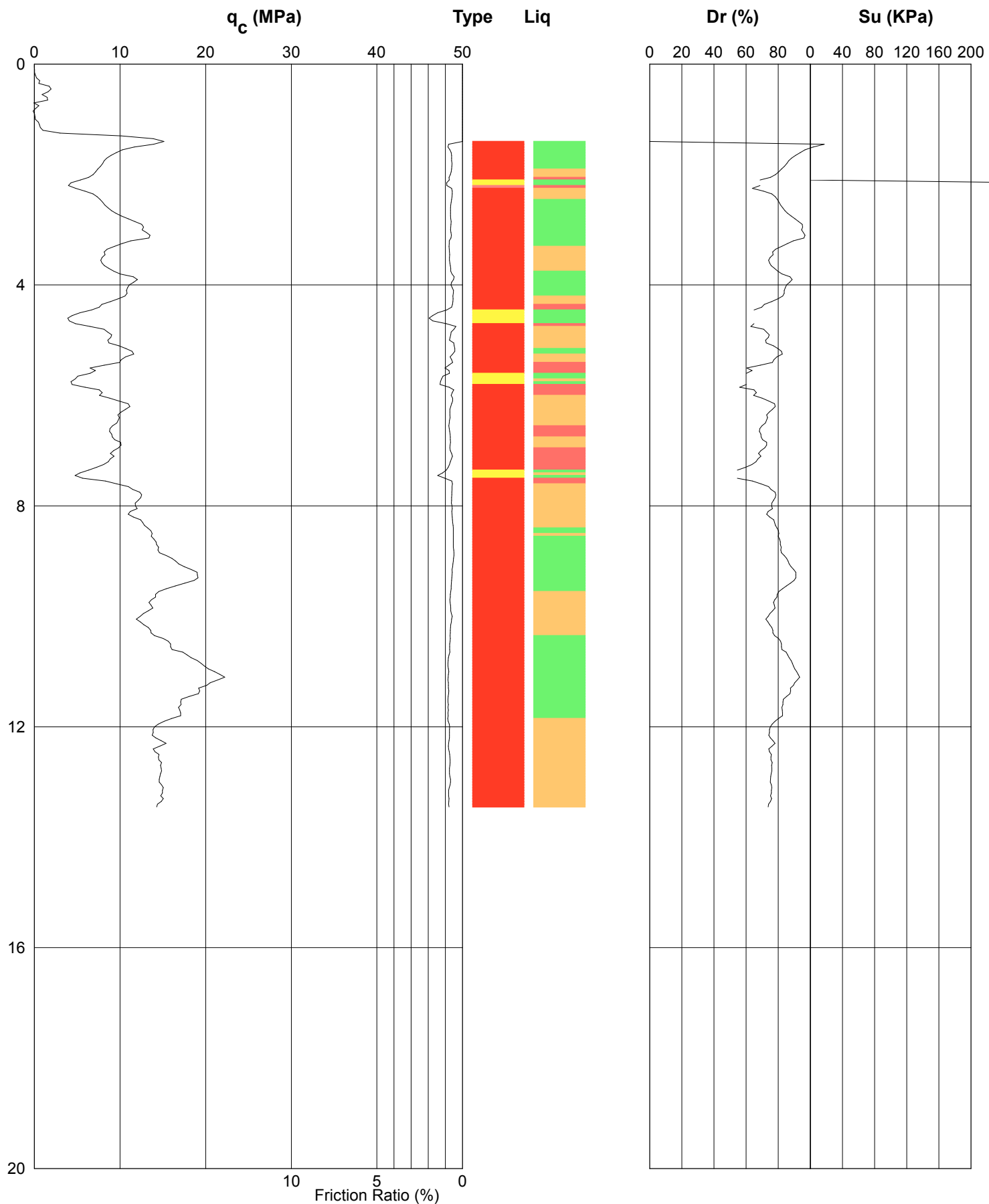


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 23-1-2012
OPERATOR : N.Barnes
REMARK 1 : CPT014
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT014

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Job No: 9998

CPT No: CPT014

Project: Aurecon NZ Ltd

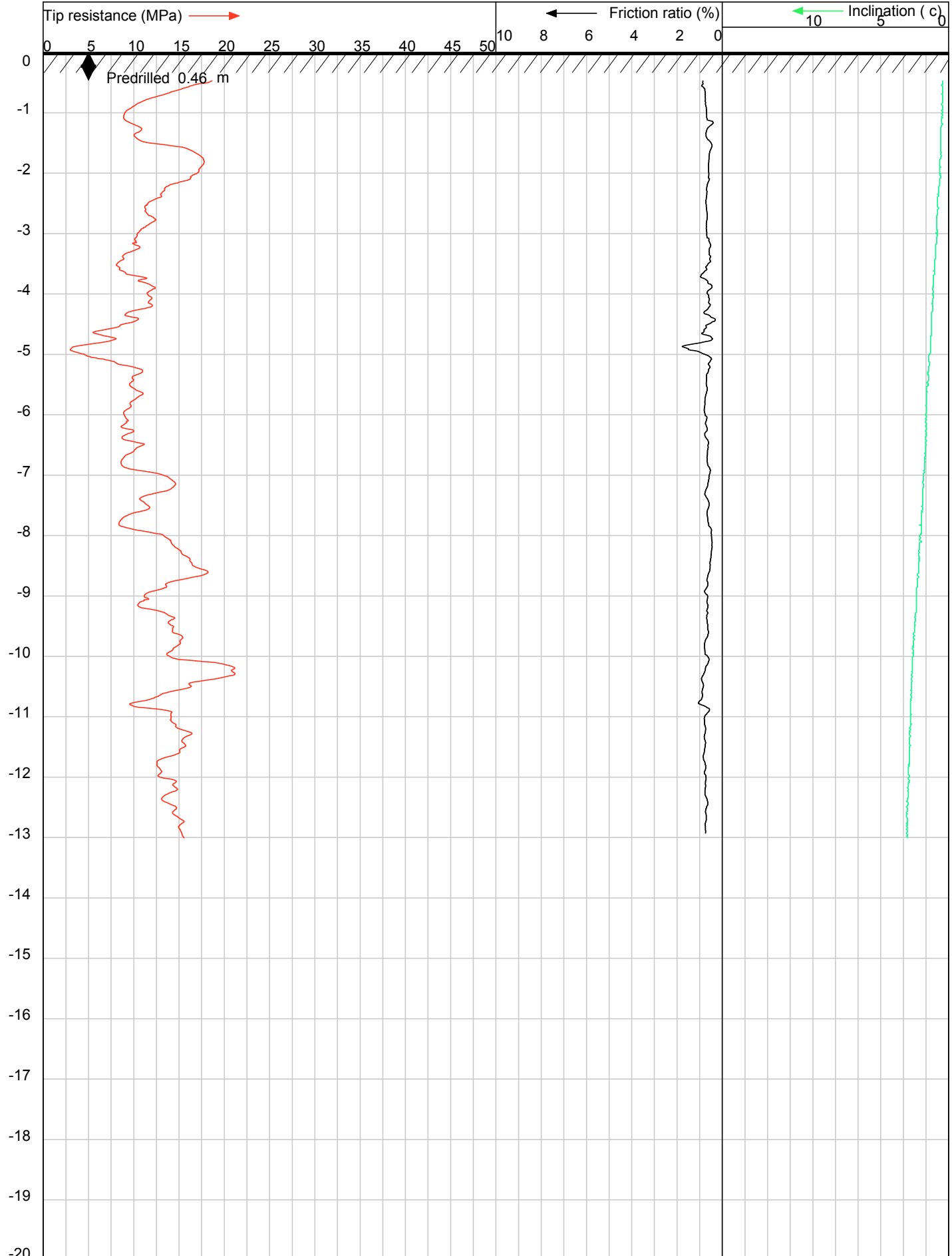
Location: Newton Street, Christchurch

Date: 23-1-2012

Operator: N Barnes

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

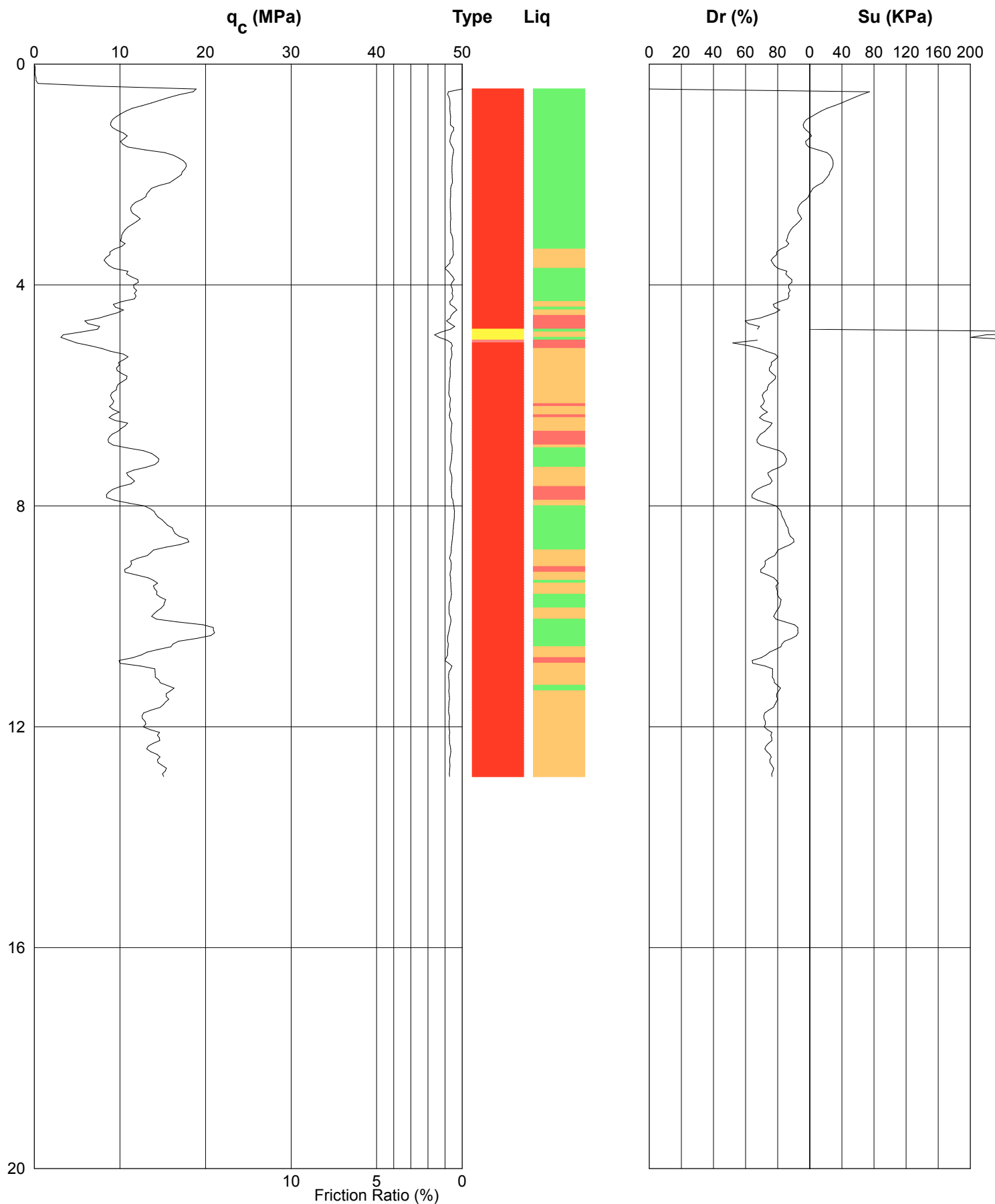


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 23-1-2012
OPERATOR : N.Barnes
REMARK 1 : CPT015
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT015

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT015

Project: Aurecon NZ Ltd

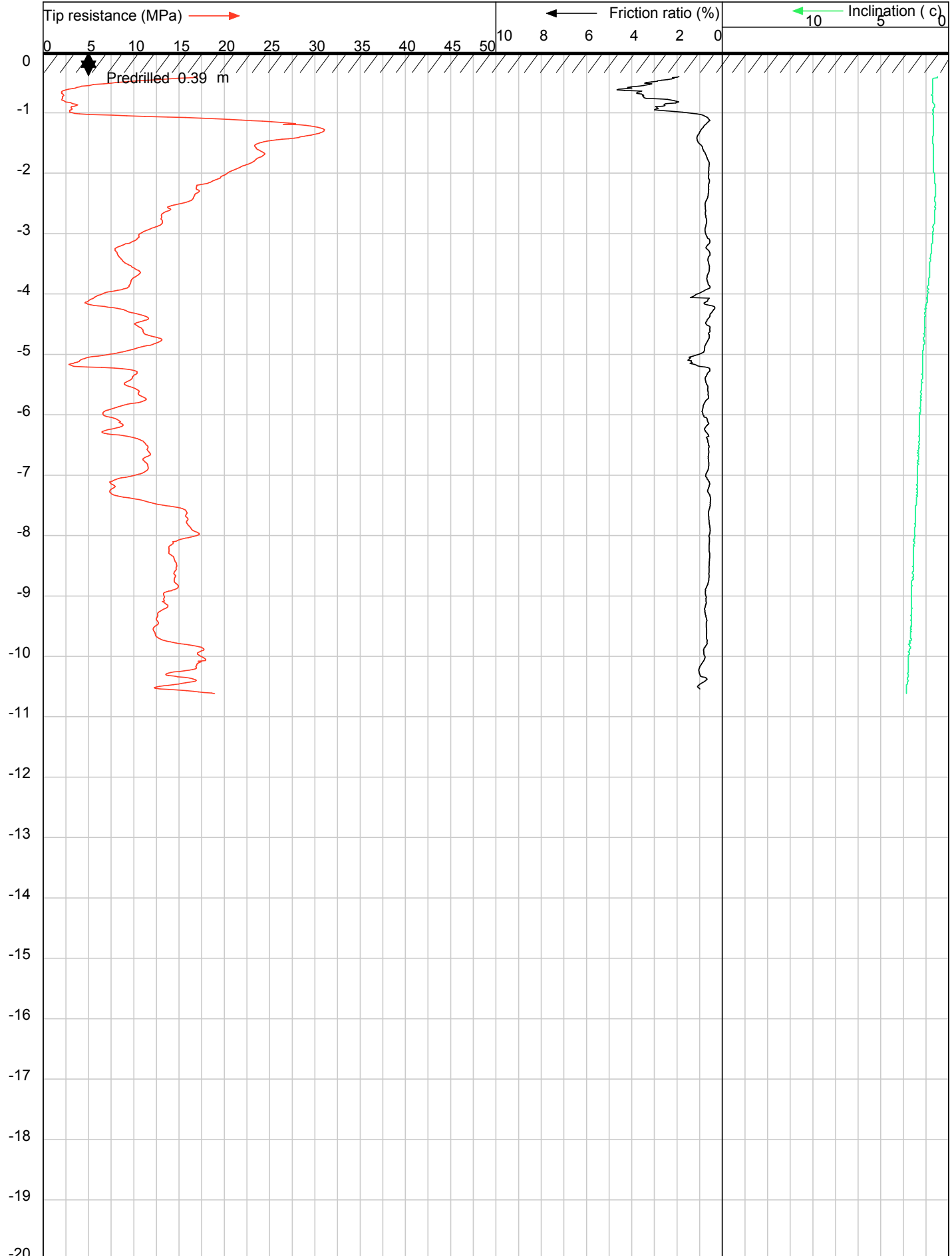
Location: Newton Street, Christchurch

Date: 23-1-2012

Operator: N Barnes

Remark: Effective Refusal

DEPTH IN METERS BELOW GROUND LEVEL

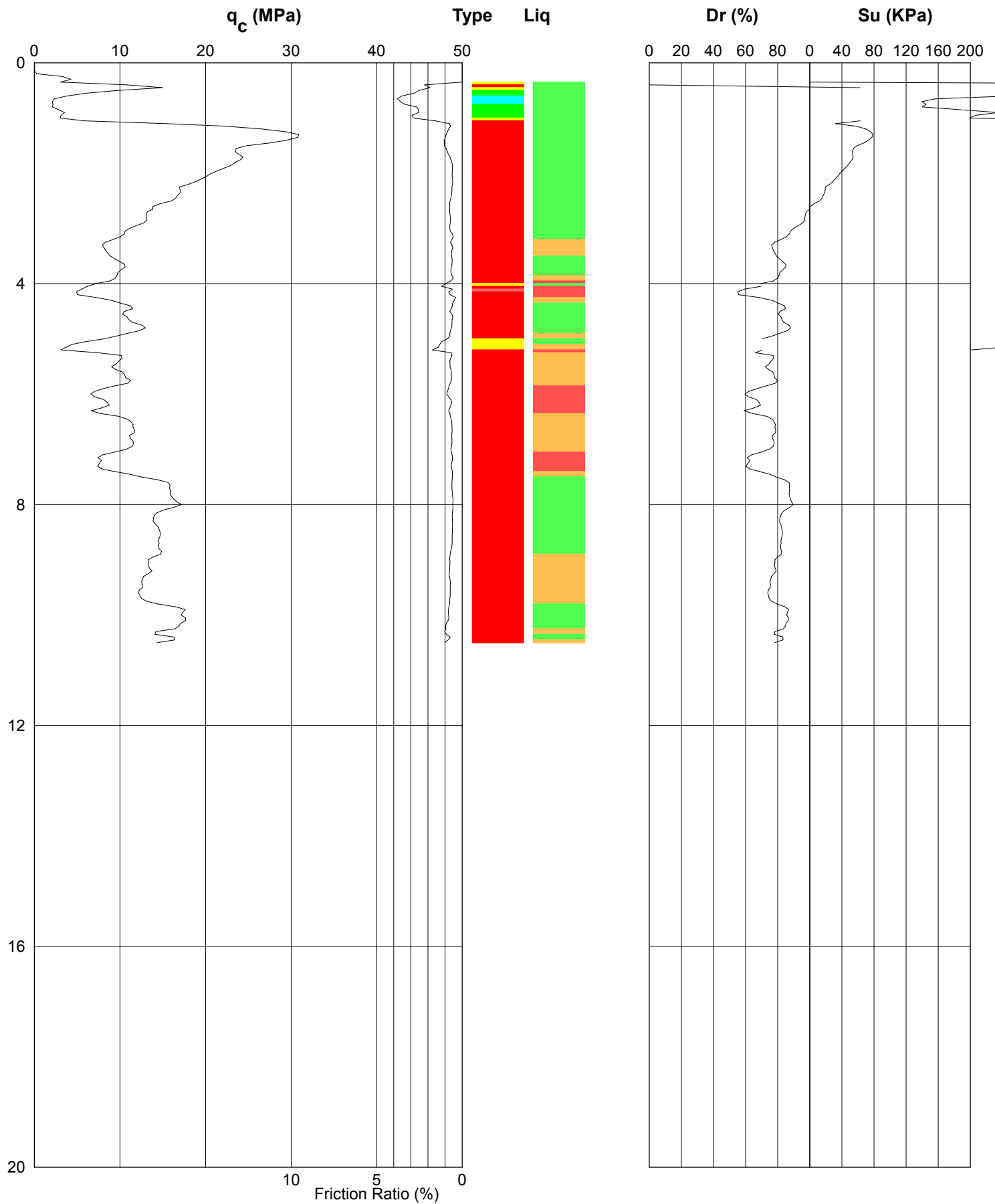


CLIENT : Aurecon NZ Ltd
LOCATION : Newtown Street, Christchurch
DATE : 23-1-2012
OPERATOR : N.Barnes
REMARK 1 : CPT016
REMARK 2 : Effective Refusal

JOB # : 9998
TEST # : CPT016

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PIEZOCONE PENETROMETER TEST (CPTU) INTERPRETIVE REPORT



Job No: 9998

CPT No: CPT016

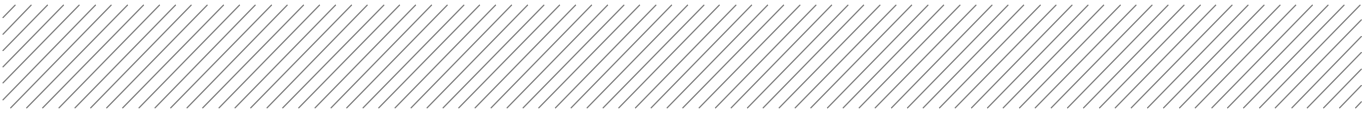
Project: Aurecon NZ Ltd

Location: Newton Street, Christchurch

Date: 23-1-2012

Operator: N Barnes

Remark: Effective Refusal



Appendix C

Hand Auger Logs

HAND AUGER INFORMATION

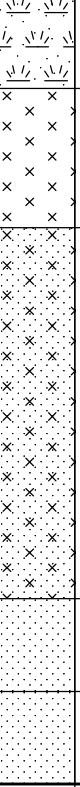
Drilling Method: Hand auger
Diameter Core: 50mm
Excavated By: MGL

CO-ORDINATES N/A

Easting: N/A
Northing: N/A
Ground Level: N/A

Date Started: 1/26/2012
Date Completed: 1/26/2012

Logged by: MGL
Input by: MGL
Checked by: ATS
Verified by: JSM

Drilling Method	Depth (m)	Sample	Water Level (m)	Graphic Log	Soil Description	Elevation (m)
					SILT with traces of bark and gravel; dark brown. Firm; dry; low plasticity. (Topsoil) 0.20 SILT with pockets of bark and gravel; brown. Firm; dry; low plasticity; friable. 0.50 Silty SAND; light brown. Loose; dry to moist; uniformly graded; sand is fine grained. 1.30 SAND; grey. Loose; wet; fine grained; uniformly graded. 1.50 SAND; dark grey. Loose; saturated; fine grained; uniformly graded. 1.70	
	0.5					
	1.0					
	1.5					
	2.0				End of Hand Auger at 1.7m (Required depth (WT))	
	2.5					
Remarks:						Logged by: MGL Input by: MGL Checked by: ATS Verified by: JSM Sheet 1 of 1

HAND AUGER INFORMATION

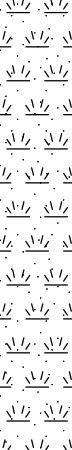
Drilling Method: Hand auger
Diameter Core: 50mm
Excavated By: MGL

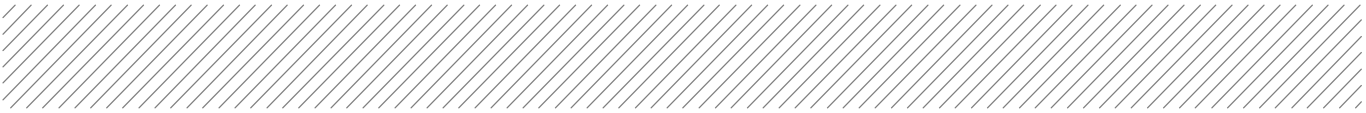
CO-ORDINATES N/A

Easting: N/A
Northing: N/A
Ground Level: N/A

Date Started: 1/26/2012
Date Completed: 1/26/2012

Logged by: MGL
Input by: MGL
Checked by: ATS
Verified by: JSM

Drilling Method	Depth (m)	Sample	Water Level (m)	Graphic Log	Soil Description	Elevation (m)
	0.5				SILT, traces of grass rootlets; dark brown. Firm, dry to moist. Friable	
	1.0				SILT; brown. Firm; moist; low plasticity. Friable	
	1.5				silty SAND; brownish grey. Loose; uniformly graded; moist. Sand is fine grained.	
	2.0				SAND; grey. Loose; uniformly graded; wet; fine grained.	
	2.5				SAND; dark grey. Loose, uniformly graded; saturated; fine grained.	
	2.5				End of Hand Auger at 2.5m (Required depth (WT))	
Remarks:						Logged by: MGL Input by: MGL Checked by: ATS Verified by: JSM Sheet 1 of 1



Appendix D

Environment Canterbury borelogs

Borelog for well M35/9108

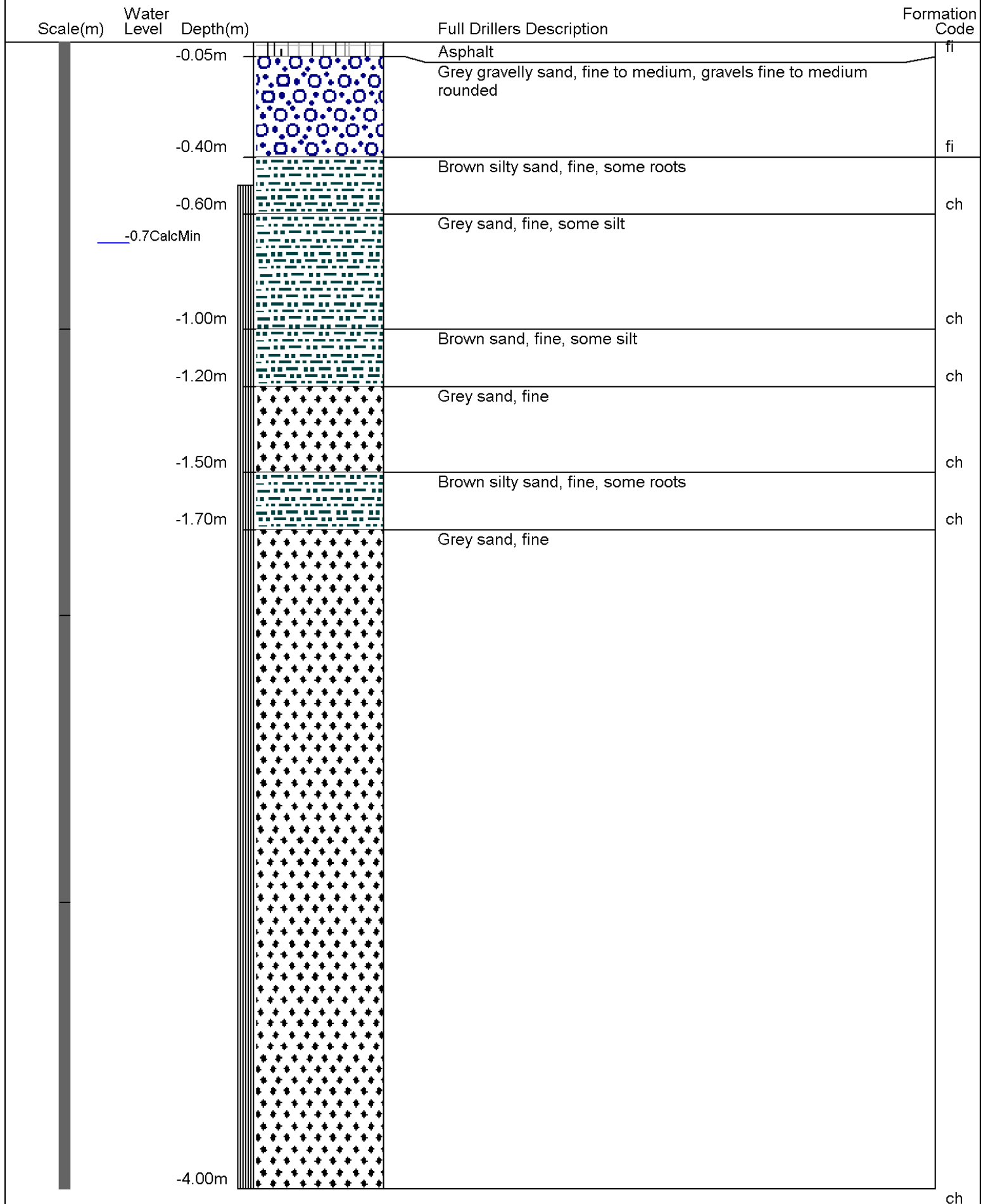
Gridref: M35:8557-4106 Accuracy : 3 (1=best, 4=worst)

Ground Level Altitude : 4 +MSD

Driller : Geotech Drilling

Drill Method : Auger Rig

Drill Depth : -4m Drill Date : 31/07/2001



Borelog for well M35/12148

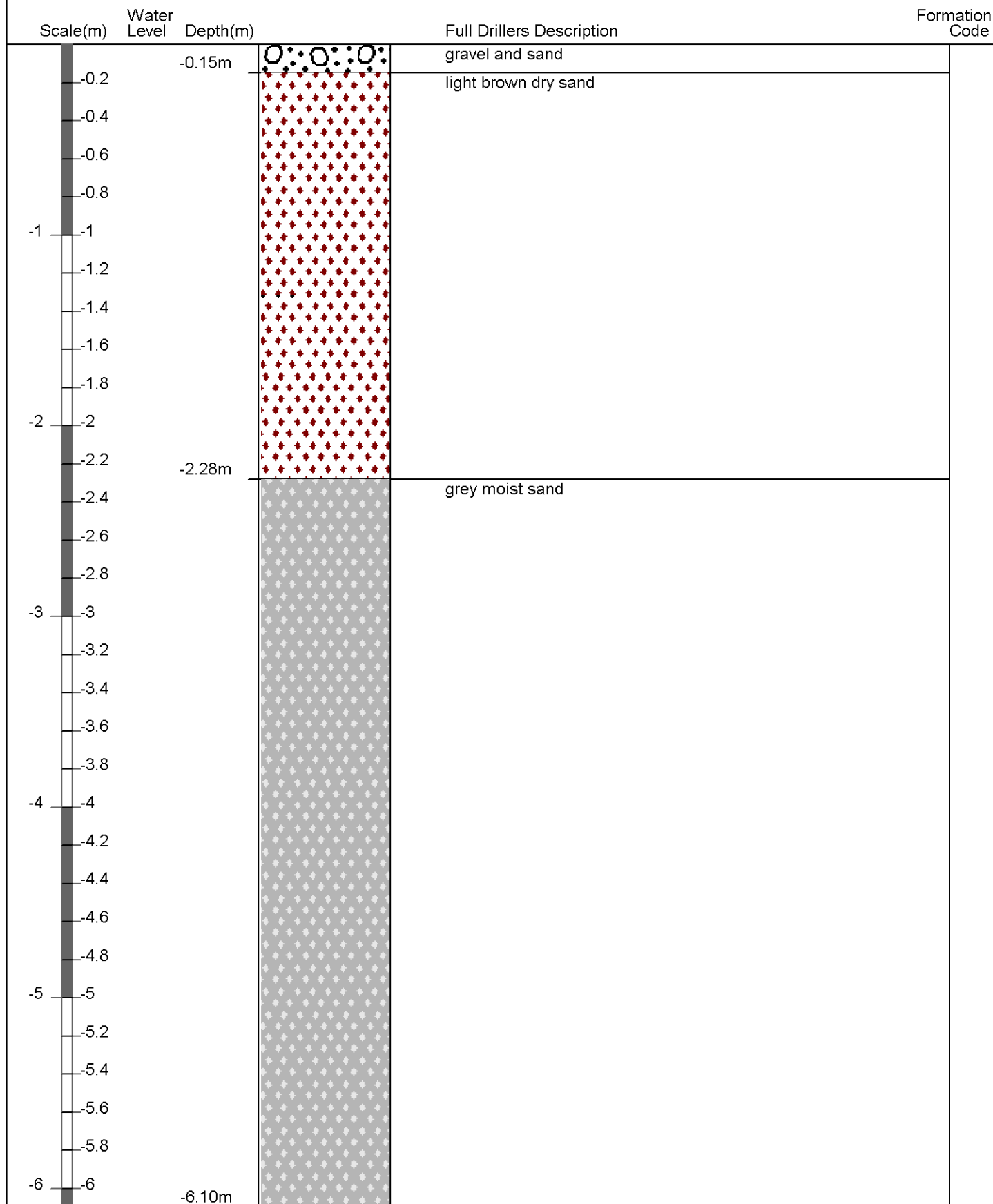
Gridref: M35:85878-40632 Accuracy : 3 (1=high, 5=low)

Ground Level Altitude : 1.1 +MSD

Well name : CCC BorelogID 146

Drill Method : Not Recorded

Drill Depth : -6.1m Drill Date :



Borelog for well M35/13270

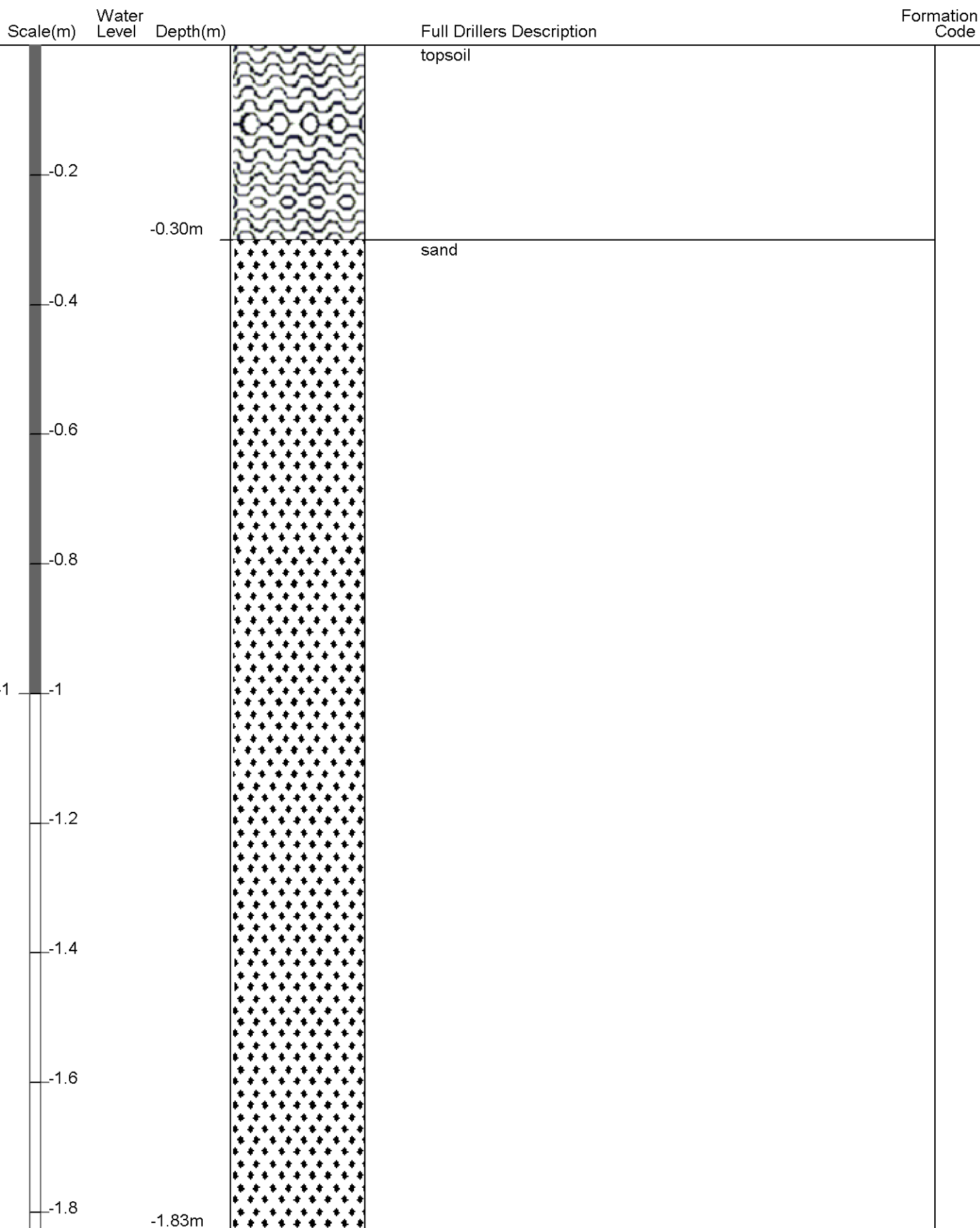
Gridref: M35:85985-40853 Accuracy : 3 (1=high, 5=low)

Ground Level Altitude : 4.1 +MSD

Well name : CCC BorelogID 1546

Drill Method : Not Recorded

Drill Depth : -1.83m Drill Date : 1/01/1968





Aurecon New Zealand Limited

Unit 1, 150 Cavendish Road

Casebrook

Christchurch, 8140

New Zealand

T +64 3 366 0821

F +64 3 379 6955

E Christchurch@ap.aurecongroup.com

W aurecongroup.com

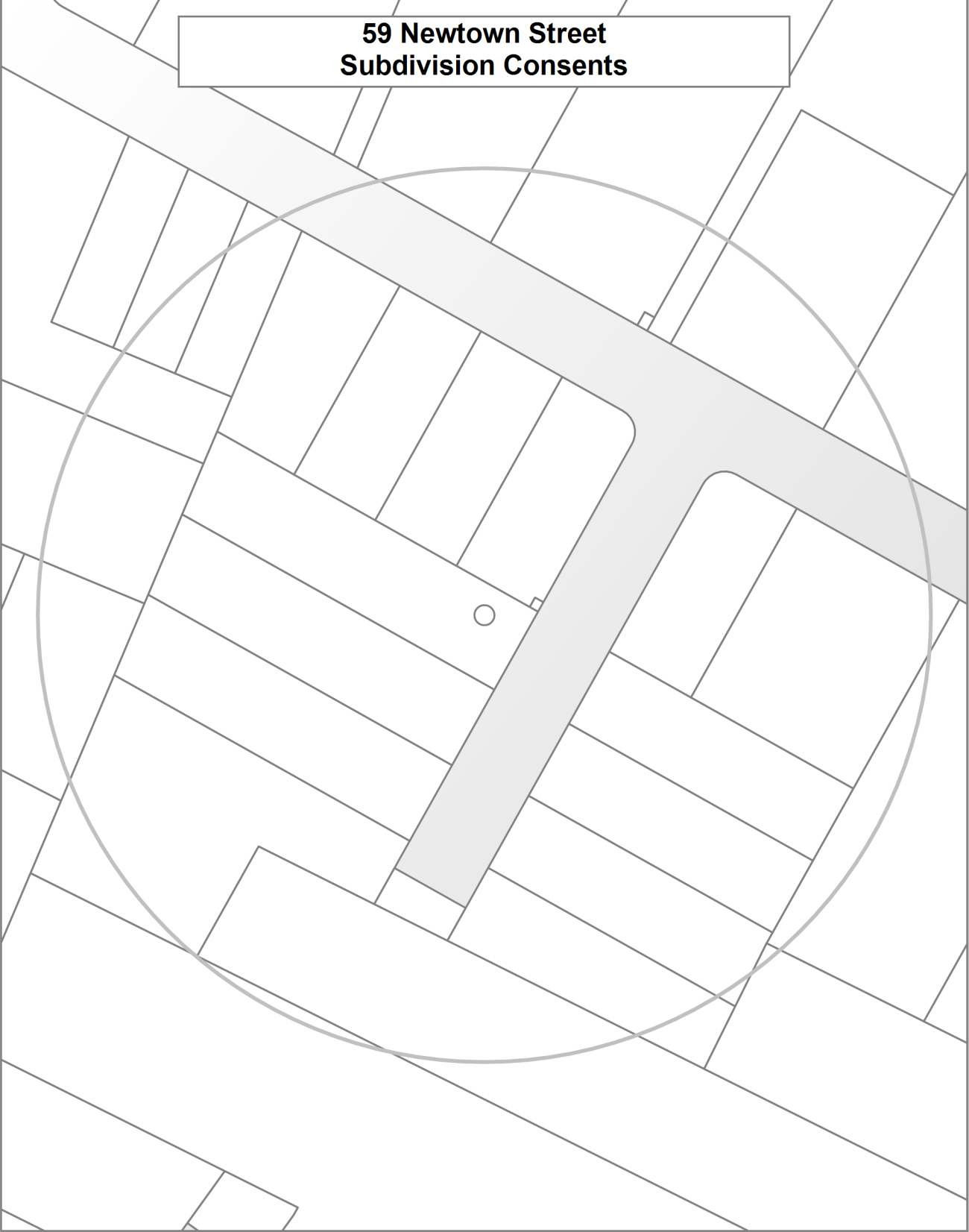
Aurecon offices are located in:

Angola, Australia, Botswana, China,
Ethiopia, Hong Kong, Indonesia,
Lesotho, Libya, Malawi, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam.

59 Newtown Street Land Use Consents



**59 Newtown Street
Subdivision Consents**



Land Use Resource Consents within 100 metres of 59 Newtown Street

Note: This list does not include subdivision Consents and Certificates of Compliance issued under the Resource Management Act.

235 Dyers Road

RMA/2007/2143

Earthworks - Historical Reference RMA92009449

Processing complete

Applied 02/08/2007

Decision issued 21/09/2007

Granted 21/09/2007

239A Dyers Road

RMA/1981/756

To erect a free standing sign exceeding 3m2. - Historical Reference RES9220614

Processing complete

Applied 06/04/1981

Decision issued 10/04/1981

Granted 10/04/1981

25 Wickham Street

RMA/1997/517

To erect a car storage building with reduced landscaping. - Historical Reference RES970496

Processing complete

Applied 03/03/1997

Decision issued 14/05/1997

Granted 14/05/1997

RMA/2002/2799

The proposal does not comply with landscaping requirements - Historical Reference RMA20011844

Processing complete

Applied 05/11/2002

Decision issued 23/12/2002

Granted 23/12/2002

31 Wickham Street

RMA/2006/735

Factory additions reducing the 1.5m road setback for a corner site, landscaping, parking space and on site manoeuvring non compliances - Historical Reference RMA92004763

Processing complete

Applied 06/04/2006

Decision issued 23/05/2006

Granted 23/05/2006

36 Newtown Street

RMA/2003/553

Long term, light vehicle storage facilities. - Historical Reference RMA20012818

Processing complete

Applied 28/02/2003

Decision issued 10/04/2003

Granted 09/04/2003

RMA/2006/1522

Retrospective consent for excavation and fill for a storage yard - Historical Reference RMA92005584

Processing complete

Applied 27/06/2006

Decision issued 01/10/2007

Granted 01/10/2007

38 Wickham Street

RMA/1986/1009

Reduction in required amount of carparks for warehouse. 70 req 47 sought. - Historical Reference RES9221062

Processing complete

Applied 13/08/1986

Decision issued 10/09/1986

Declined 10/09/1986

RMA/1995/3024

For the joint use of a portion of 48 Wickham Street with 38 Wickham Street - Historical Reference RES956111

Processing complete

Applied 01/12/1995

Decision issued 13/12/1995

Granted 13/12/1995

RMA/2015/749

s.348 Right of Way within an industrial parcel - Historical Reference RMA92028982

Processing complete

Applied 18/03/2015

Decision issued 22/04/2015

Granted 21/04/2015

43 Wickham Street

RMA/1979/541

Establish plant for washing and curing lamb skins. - Historical Reference RES9221063

Processing complete

Applied 25/05/1979

Decision issued 18/07/1979

Granted 18/07/1979

55 Newtown Street

RMA/1998/2063

To increase the height of the existing fence to 3m along the road boundary. - Historical Reference RES982357

Processing complete

Applied 31/08/1998

Decision issued 17/09/1998

Granted 17/09/1998

57 Newtown Street

RMA/1998/2063

To increase the height of the existing fence to 3m along the road boundary. - Historical Reference RES982357

Processing complete

Applied 31/08/1998

Decision issued 17/09/1998

Granted 17/09/1998

9D Tanya Street

RMA/2023/2972

Extension of ancillary office

Processing complete

Applied 14/11/2023

Decision issued 16/02/2024

Granted 15/02/2024

Data Quality Statement

Land Use Consents

All resource consents are shown for sites that have been labelled with an address. For sites that have been labelled with a cross (+) no resource consents have been found. Sites that have no label have not been checked for resource consents. This will be particularly noticeable on the margins of the search radius. If there are such sites and you would like them included in the check, please ask for the LIM spatial query to be rerun accordingly. This will be done free of charge although there may be a short delay. Resource consents which are on land occupied by roads, railways or rivers are not, and currently cannot be displayed, either on the map or in the list. Resource consents that relate to land that has since been subdivided, will be shown in the list, but not on the map. They will be under the address of the land as it was at the time the resource consent was applied for. Resource consents that are listed as Non-notified and are current, may in fact be notified resource consents that have not yet been through the notification process. If in doubt. Please phone (03)941 8999.

The term "resource consents" in this context means land use consents. Subdivision consents and certificates of compliance are excluded.

Subdivision Consents

All subdivision consents are shown for the sites that have been labelled with consent details. For Sites that have been labelled with a cross (+) no records have been found. Sites that have no label have not been checked for subdivision consents. This will be particularly noticeable on the margins of the search radius. If there are such sites and you would like them included in the check, please ask for the LIM spatial query to be rerun accordingly. This will be done free of charge although there may be a short delay.

The term "subdivision consents" in this context means a resource consent application to subdivide land. Non subdivision land use resource consents and certificates of compliance are excluded.

This report will only record those subdivision applications which have not been completed i.e once a subdivision has been given effect to and the new lots/properties have been established the application which created those lots will not be shown

All subdivision consent information is contained on the map and no separate list is supplied