Prestons Park Subdivision

Geotechnical Report for Lot 4 Cameo Grove

CDL Land New Zealand Ltd

Reference: 235361

Revision: 1

2026-03-04

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Document control record

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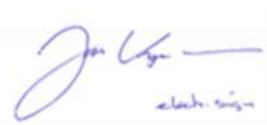
Author signature		Approver signature	
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1 Executive Summary

CDL Land NZ Ltd has commissioned Aurecon New Zealand Ltd (Aurecon) to undertake a site specific geotechnical investigation and assessment for individual residential lots for building consent purposes for the Prestons Park Subdivision Cameo Grove. This report documents the results of the geotechnical assessment and presents geotechnical comments together with foundation recommendations for the residential building on Lot 4 Cameo Grove at the Prestons Park Subdivision.

As part of the subdivision development extensive geotechnical testing, including cone penetration tests (CPTs), were carried out to define the liquefaction potential at the overall subdivision and to monitor the site works that have occurred. **Based on our information the property is likely to perform to a level equivalent to Technical Category 2 (TC2 - Yellow) set by the Ministry of Business, Innovation and Employment (MBIE) in their guidelines issued in December 2012.**

The site development has included extensive bulk earthworks. All earthworks and compliance testing have been undertaken in accordance with the earthworks specification. The engineering sign off and bulk earthworks are documented in the Aurecon report *Prestons Park, 12 Cameo Grove Subdivision Extension - Geotechnical Completion Report*, Rev 0, dated 22 October 2025. The earthfill at the subdivision construction stage was placed and signed off in accordance NZS 4431:1989 *Code of Practice for Earthfill for Residential Development* (since superseded by the NZS 4431:2022 *Engineered fill construction for lightweight structures*).

The geotechnical site specific assessment comprised a review of previous geotechnical investigations undertaken for the subdivision development and a site specific geotechnical investigation. A single hand auger borehole was undertaken to assess the upper soil profile and groundwater level. Two dynamic cone penetrometers (DCPs) were carried out on the lot, one of the DCPs was located immediately adjacent to the hand auger borehole with the second DCP located on the opposite half of the lot.

Based on our knowledge of the site setting and our past work it is recommended that any residential structure constructed on Lot 4 be founded on a TC2 type 'enhanced foundation slab' as per Option 3 or 4 from the MBIE Guidelines (2012) Section 5.3.1.

These foundations require a minimum geotechnical ultimate bearing capacity of at least 200kPa. Based on our understanding of the site works and the investigation results, we recommend that MBIE Guidelines (2012) Section 5.3.1 compliant foundations on Lot 4 are embedded a minimum depth of 0.4m below current ground level. The site investigation results indicate that approximately 0.25m of topsoil was present, which will need to be removed, and the clean subgrade exposed for foundation construction.

This report shall be read as a whole. Our limitations are presented in Section 7.

2 Introduction

CDL Land New Zealand Ltd is currently undertaking a large residential subdivision with associated commercial lots. Previously Aurecon New Zealand Ltd has undertaken detailed geotechnical investigations and assessments for the purpose of the plan change, subdivision resource consent application, liquefaction assessment, technical classification of the entire subdivision, and observation of bulk earthworks construction.

Aurecon New Zealand Ltd has since been commissioned to undertake site specific geotechnical investigations and assessment of individual lots for building consent application purposes. The site which this report is focused on comprises a single lot, designated Lot 4 Cameo Grove at the Prestons Park Subdivision to the south of Prestons Road in Marshland, Christchurch. This report documents the results of the geotechnical assessment and presents geotechnical comments together with foundation recommendations for the proposed residential building on the lot. We note that at the time of writing this report the location and structural form of the dwelling were unknown, but is expected to comprise a timber or steel framed building with lightweight cladding.

This report shall be read as a whole. Our limitations are presented in Section 7.

3 Site Conditions

3.1 Site Description

The Prestons Subdivision is located on the northern fringes of Christchurch City. The site is made up of a series of adjacent properties forming an irregular and elongated rectangle shape, orientated approximately north to south. The total area of the overall Prestons Subdivision site is approximately 190ha. The site can be separated into two distinct blocks, Prestons North which runs from the Lower Styx Road in the north through to Prestons Road in the south and the Prestons Park development which continues from Prestons Road through to Mairehau Road to the south.

This building consent report is for Lot 4 which is located in the Cameo Grove extension of the Prestons Park Subdivision development (refer Figure 1 in Appendix A). The lot is bordered by residential lots to the north, east and west, and Cameo Grove roadway to the south.

3.2 Surface Water

The only drainage feature near the site is a storm water channel to the west of the Cameo Grove extension, which is approximately 1.2m deep.

3.3 Regional Geology

The geology of the site is described in the 1:250,000 scale geological map – '*Geology of the Christchurch Area*', published in 2008 by the Institute of Geological and Nuclear Sciences. Note this map has been referenced as it is at an appropriate scale and covers the entire site. The map indicates the underlying geology comprises '*Dominantly sand of fixed and semi-fixed dunes and beach deposits'* and '*drained peat swamp*'. The subdivision geotechnical investigation identified that this area was predominantly underlain by aeolian (dune) and beach sand deposits.

Geonet indicates that the site is located approximately:

- 27km north east of the eastern end of the Greendale Fault System. Movement on the Greendale Fault System was responsible for the Magnitude 7.1 Darfield (Canterbury) Earthquake on 4 September 2010.
- 14km north of the epicentre of the Magnitude 6.2 Christchurch Earthquake on 22 February 2011.
- 12km north west of the Magnitude 6.0 earthquake on 13 June 2011 (GNS, 2012b).
- 8km north west of the Magnitude 5.9 earthquake on 23 December 2012.

3.4 Site Earthworks

Site earthworks have been undertaken to prepare the site for residential building purposes. As part of the earthworks, the original topsoil was stripped (up to 350mm), and variable thickness of engineered site-won fill has been placed (up to a maximum of 1.5m in height).

All earthworks and compliance testing have been undertaken in accordance with the earthworks specification. Details of the site bulk earthworks are provided in the Aurecon report *Prestons Park, 12 Cameo Grove Subdivision Extension - Geotechnical Completion Report*, Rev 0, dated 22 October 2025. The Geotechnical Completion Report has been completed as part of the requirements of NZS4404:2010 *Land development and subdivision infrastructure* and Christchurch City Council *Infrastructure Design Standards - Part 4: Geotechnical Requirements*. The compacted fill was placed and signed off in accordance with NZS 4431:1989 *Code of Practice for Earthfill for Residential Development* (since superseded by the NZS 4431:2022 *Engineered fill construction for lightweight structures*).

3.5 Technical Category

A liquefaction assessment was carried out as part of the *Prestons Park, 12 Cameo Grove Subdivision Extension,* Rev 1, dated 1 March 2024, which indicates, based on the available data, that the site is consistent with MBIE (2012) Guidelines Technical Category 2 (TC2). Confirmation of the Technical Category is provided in the *Prestons Park, 12 Cameo Grove Subdivision Extension - Geotechnical Completion Report*, Rev 0, dated 22 October 2025.

4 Geotechnical Assessment

4.1 General

The geotechnical assessment comprised a review of relevant previous geotechnical investigations and construction data and an in-situ geotechnical investigation. The geotechnical investigation comprised hand held testing on the individual lot. A single hand auger borehole was undertaken to assess the upper soil profile and the groundwater level. Two dynamic cone penetrometers (DCPs) were carried out on the lot. The hand held testing was undertaken on the lot following the site earthworks. The testing density is considered reasonable as the geotechnical engineers were involved in the observation of the civil engineering works.

4.2 Previous Investigations

The previous geotechnical testing and investigations undertaken by Aurecon across the entire subdivision site comprised of a combination of cone penetrometer tests (CPT) and machine excavated test pits. Further details regarding these investigations are provided in the Aurecon report *Prestons Park, 12 Cameo Grove Subdivision Extension,* Rev 1, dated 1 March 2024.

4.3 Hand Auger Borehole

One hand auger borehole was undertaken on the lot as part of the geotechnical investigation to assess the upper soil profile and the groundwater level.

The logging of recovered hand auger samples was undertaken by an Aurecon engineering geologist in accordance with the New Zealand Geotechnical Society's *Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes: 2005*. The test location and log are both shown in Appendix A and Appendix B, respectively.

The hand auger borehole indicates that the upper soil profile consists of topsoil, but the hand auger borehole was terminated when soil samples became too dense to auger (refused on inferred gravel layer).

4.4 Dynamic Cone Penetrometers

Two DCPs were conducted around the lot as part of the geotechnical investigation to assess the upper soil profile. One of the DCPs was located adjacent to the hand auger borehole, with the second DCP located on the opposite half of the lot. The test locations and logs are all shown in Appendices A and B, respectively.

DCP logs indicate two blows per 100mm penetration was consistently encountered from a shallow depth.

4.5 Groundwater Levels

Groundwater levels were measured within the hand auger borehole at the time of the investigation and correlated to our site specific knowledge. An indicative groundwater level was noted where holes collapsed due to saturated soil.

Groundwater was not encountered due to shallow auger refusal. Nearby investigations indicate that groundwater is typically encountered at approximately 1m to 2m depth. We note that the groundwater level could vary depending on the time of year.

A review of the NZGD indicates that regional groundwater levels are likely to be in the order of 1m to 2m below ground level. These groundwater levels are reasonably consistent with those measured during the investigation, when taking into account the subdivision earthworks filling and cutting.

4.6 Topsoil Depth

The depth of topsoil has been determined from the single hand auger and two DCPs undertaken on site. We note that the topsoil depths may vary by +/- 100mm between the testing locations and hence it is recommended that at least a 100mm tolerance should be allowed for building foundation excavations.

If greater certainty of topsoil depths across the whole site is required for construction costing, then further testing would be necessary across the footprint of the proposed structure (unknown at the time of writing this report). **The responsibility and liability for any additional testing shall be met by the section purchaser.**

5 Foundation Recommendations

5.1 Foundation Types

It is recommended that residential structures constructed on Lot 4 Cameo Grove are founded on shallow foundations. Due to the potential for liquefaction induced ground damage at Lot 4 we recommend that the residential building is founded on a TC2 type 'enhanced foundation slab' as per Option 3 or 4 from the MBIE Guidelines (2012) Section 5.3.1. These foundations require a minimum geotechnical ultimate bearing capacity of at least 200kPa.

Based on our understanding of the site works and the investigation results, we recommend that MBIE Guidelines (2012) Section 5.3.1 compliant foundations are embedded a minimum depth of 0.4m below current ground level.

The site investigation results indicate that approximately 0.25m of topsoil was present, which will need to be removed, and the clean subgrade exposed for foundation construction.

5.2 Foundation Construction Recommendations

Topsoil should be removed from beneath the floor slab and compacted hardfill placed to bring the foundation to the required level. In addition, the following recommendations should be considered:

1. To ensure that excavated footings are adequately founded we recommend that excavations should be undertaken by a digger fitted with a smooth edge bucket. The base should be tidily trimmed by hand, lightly compacted with a plate compactor and immediately covered with a concrete tidy slab or 100mm of compacted granular hardfill. A suitable qualified engineer with foundation experience or territorial authority building inspector should be retained to verify the adequate founding has been achieved and all loose and soft or compressible material was removed.
2. If there are significant soft layers beneath a sub-excavation, the softer material will have to be excavated and backfilled with 10MPa concrete or compacted hardfill underneath all load bearing foundation elements. For the hardfill, the sub-excavation will have to have plan dimensions of B+2D where B is the footing width and D is the depth of undercut. For 10MPa concrete the sub-excavation can have the same dimensions as the footing.
3. Depending on the soil encountered, the time of year, and fluctuations of the groundwater level, it is possible that excavations may encounter groundwater. The building contractor is to take appropriate measures to deal with any groundwater ingress into the foundation excavations and keep the excavations and backfill free of groundwater intrusions until the footings are cast.
4. The footing excavations are likely to expose layers of granular soils, which can be adversely affected by rainfall or stormwater. Foundation excavations should not be left open for more than three days. In addition, rainfall and stormwater should not be allowed to pond within the footing excavations as this may affect the bearing capacity of the subsoils.

6 References

Forsyth, P. J., Barrell, D. J. A., & Jongens, R. (compilers), 2008. *Geology of the Christchurch area.* Institute of Geological & Nuclear Sciences (GNS Science), 1:25,000 geological map 1. 1 sheet + 104p. Lower Hutt, New Zealand: GNS Science.

Geonet, 2025. ftp://ftp.geonet.org.nz/strong/processed/Proc (24/10/25)

Ministry of Business, Innovation and Employment, 2012. *Repairing and rebuilding houses affected by the Canterbury earthquakes.* Version 3, Revised Issue

NZGS, 2005. *Guidelines for the Classification and Field Description of Soils and Rocks in Engineering.* NZ Geotechnical Society Inc., Wellington, New Zealand.

NZS 3604:2011. *Timber Framed Buildings.* Standards New Zealand, Wellington, New Zealand.

NZS 4431:1989. *Code of practice for earth fill for residential development*. Standards New Zealand, Wellington, New Zealand.

NZS 4431:2022 *Engineered Fill Construction for Lightweight Structures*. Standards New Zealand, Wellington, New Zealand.

7 Explanatory Statement

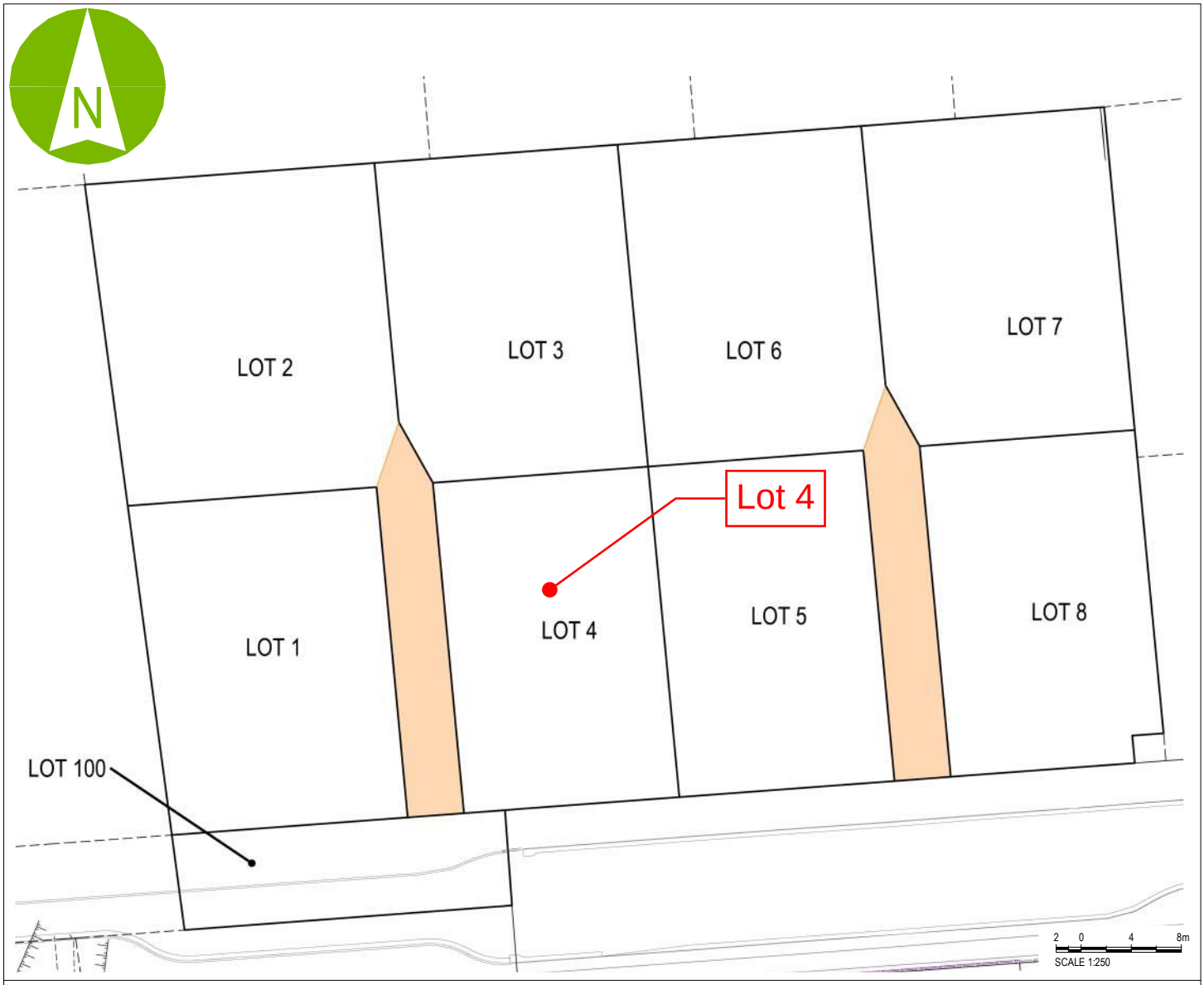
We have prepared this report in accordance with the brief as provided. The contents of the report are for the sole use of the Client for the purpose of building consent application only, and no responsibility or liability will be accepted to any other third party. Data or opinions contained within the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

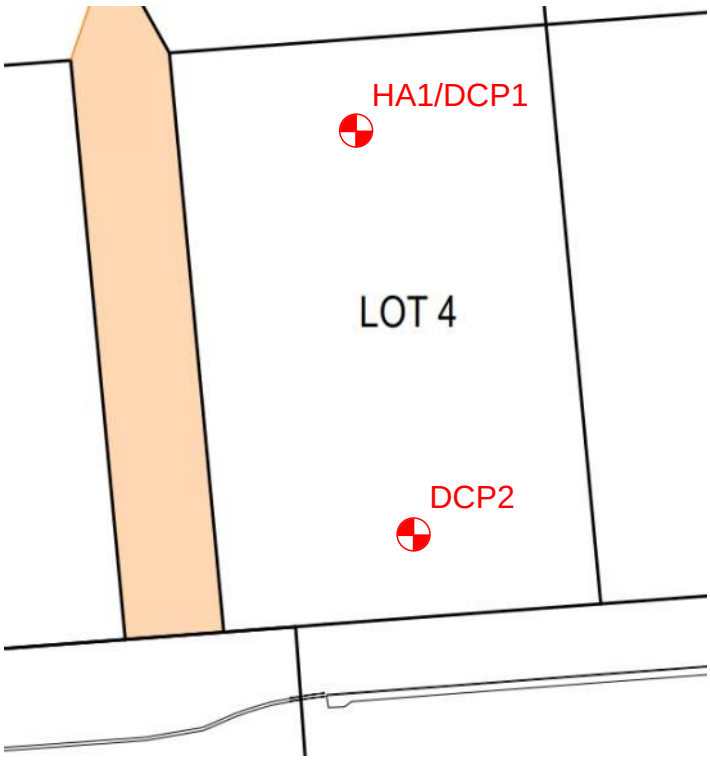
The recommendations in this report are based on data collected at specific locations and by using suitable investigation techniques with limited site coverage. Only a finite amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground and groundwater 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.

Appendix A
Figures





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CLIENT

CDL LAND NEW ZEALAND LIMITED

REV	DATE	REVISION DETAILS	APPROVED
A	26/11/25	ISSUE FOR INFORMATION	J.TRIST

SCALE	SIZE
1 : 250	A4

DRAWN: O. HALL
DESIGNED: A.PAYNE
CHECKED: J.MUIRSON

INFORMATION

APPROVED
DATE 26/11/25
K.ASHBY

PROJECT: CAMEO GROVE - PRESTONS

TITLE: LOT 4
SITE LOCATION PLAN
FIGURE 1

DRAWING No.: PROJECT No. 235361 – AREA 0000 – TYPE SKT – DISC GG – NUMBER Lot 4 – REV A

Appendix B
Investigation Logs

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christchurch@aurecongroup.com
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Client: **CDL Land New Zealand Limited**
Project: **Prestons Park Subdivision**
Location: **Christchurch, New Zealand**
Project Reference: **235361**

Lot 04 HA1/ DCP1

AUGER INFORMATION		CO-ORDINATES:	NZTM2000		
Date completed:	19/11/2025	Easting:	1573942.00	Logged:	A Payne
Excavated by:		Northing:	5185940.00	Input:	O Hall
Equipment:	Dynamic Cone Penetrometer	Ground level:	13.9m (NZVD2016)	Reviewed:	A Payne
				Verified:	J Muirson

RL (m) / DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLES & FIELD TESTS	Dynamic Probe Blows	STRATIGRAPHY DEFECT DESCRIPTION ADDITIONAL NOTES
13 / 1		0.00m: Sandy SILT with trace of organic matter, with trace of gravel; brown. Dry. Sand is fine. Organic matter is rootlets. [TOPSOIL].		10	
				9	
				6	
		Terminated at 0.25 m. Refusal.		20	
12 / 2					
11					

Dynamic Probe Blows: 2 4 6 8 10 12 14 16 18

Remarks:
[1] Logged in general accordance with NZGS (2005). Soil strengths in "parenthesis" are inferred from field observation.
[2] Soil strength/consistency descriptions are derived from Scala Penetrometer or hand held shear vane (where available).
[3] Horizontal coordinates recorded in field using hand held GPS. Accurate to +/- 5m.
[4] Ground level is approximate based on design contours. Accurate to +/- 0.5m.

Water Level Readings:

DateTime	Hole Depth	Water Level
		Dry

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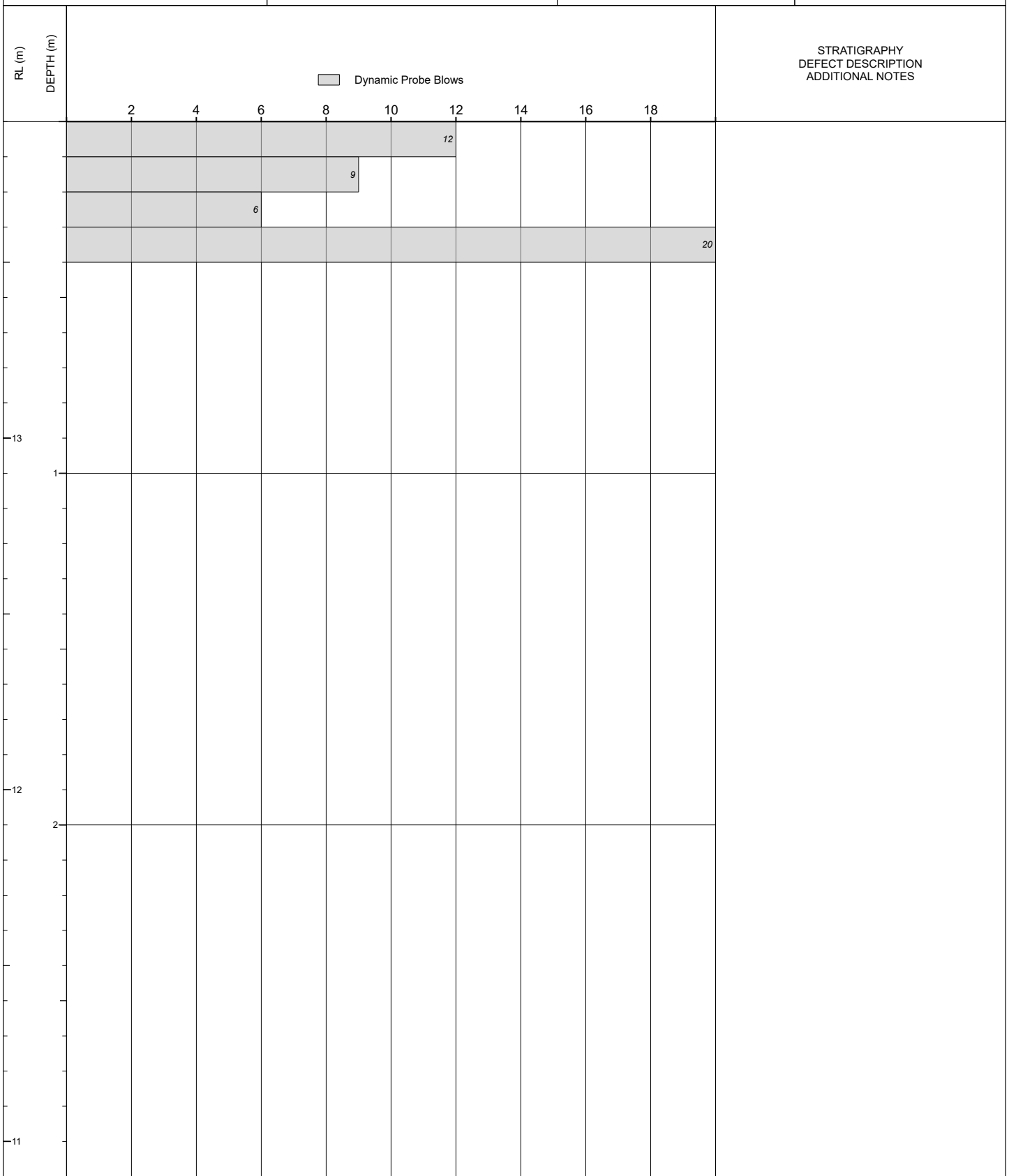
Client: **CDL Land New Zealand Limited**
Project: **Prestons Park Subdivision**
Location: **Christchurch, New Zealand**
Project Reference: **235361**

Lot 04 DCP2

TEST INFORMATION		**CO-ORDINATES:**	NZTM2000		
Date completed:	19/11/2025	Easting:	1573940.00	Logged:	A Payne
Tested by:		Northing:	5185924.00	Input:	O Hall
Probe Type:		Ground level:	13.9m (NZVD2016)	Reviewed:	A Payne
				Verified:	J Muirson



STRATIGRAPHY
DEFECT DESCRIPTION
ADDITIONAL NOTES

Remarks:
[1] Horizontal coordinates recorded in field using hand held GPS. Accurate to +/- 5m.
[2] Ground level is approximate based on design contours. Accurate to +/- 0.5m.
[3] Effective DCP refusal at 20+ blows per 100mm.

Water Level Readings:

DateTime	Hole Depth	Water Level

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