20 December 2017

HUAPAI TRIANGLE SUB PRECINCT D, STAGES 1-5

GEOTECHNICAL COMPLETION REPORT

Cabra Developments Limited

Ref: AKL2016_0331AE Rev: 0

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Appendices

1. INTRODUCTION

In accordance with our instructions, this Geotechnical Completion Report has been prepared for Cabra Developments Limited as part of the documentation to be submitted to Auckland Council following earthworks to form stages 1-5 of the Huapai Triangle Sub Precinct D development. Construction of this residential subdivision has been undertaken in accordance with the Auckland Council Resource Consent number SLC-67410 and Engineering Approval letter dated 17 November 2016. Specific structures constructed during the civil works to create the subdivision include timber pole retaining walls, segmental block retaining walls and two timber boardwalks across the stormwater utility reserve.

This report contains our Suitability Statement, specific comments related to items raised in the Resource Consent, relevant test data and the Cato Bolam Limited as-built plan set as provided in Appendix B.

This report covers the construction period October 2016 to December 2017 and is intended to be used for certification purposes for new lots (listed below) created from Lot 120 DP 508664 as follows:

- 62 new residential lots numbered 119 to 180;
- 3 new residential superlots numbered 206 to 208;
- 2 new roads named Vinistra Road and Lumbarda Drive, and extension to Nobilo Road and Schoolside Road; and,
- 1 new recreation reserve 503.

These stages of the Huapai Triangle Sub Precinct D Development are located off Nobilo Road, Huapai. As can be seen from the as-built plans, 50 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 5.5 metres.

2. PROJECT BACKGROUND

The geotechnical investigations and design were undertaken by CMW Geosciences as presented in the following reports:

- Geotechnical Investigation Report for Residential Subdivision at 57 Nobilo Road, Kumeu prepared by CMW Geosciences, referenced AKL2016_0331AB Rev. 0, dated 11 March 2016
- Retaining Wall Design Report prepared by CMW Geosciences, referenced AKL2016_0331 AC Rev. 0, dated 12 October 2016

3. DESCRIPTION OF EARTHWORKS

Earthworks operations for the development began in mid-October 2016 with the installation of silt fences and other environmental controls. Cut/Fill for this development was conducted in conjunction with neighbouring developments, all of which were under the observation of CMW Geosciences. The majority of engineered fill was placed in a large gully which ran through the southern and eastern portions of the site. As part of these works, organic and alluvial soils were removed before filling commenced. Two underfill drains were installed in the base of the gully. Fill conditioning using lime drying was conducted as required throughout the earthworks operations to meet fill specifications.

Civil works including the installation of stormwater lines commenced in early December 2016.

By early January 2017 the bulk earthworks for the development were mostly complete, and lot subgrade preparation, topsoil respreading and road subgrade construction began.

Construction of the timber pole retaining walls commenced in late January 2017 and were complete by mid-February 2017. Keystone retaining wall construction was completed in July 2017.

4. GEOTECHNICAL QUALITY CONTROL

4.1. Site Observations

During the earthworks site visits were typically undertaken several times each week to assess compliance with NZS 4431 and specific design recommendations and specifications.

Site visits were carried out to observe and confirm compliance relating to:

- Adequate topsoil stripping;
- Fill areas prior to the placement of fill materials to ascertain that all mullock and soft inorganic subsoils had been removed;
- Installation of subsoil drains including underfill drains but excluding road under-channel drains;
- Excavation and backfilling of sewer and stormwater trenches;
- Retaining wall pile excavations;
- Construction of cantilever pole retaining walls including ground conditions, pile size, spacing and depth; and
- Construction of keystone walls including ground conditions, block placement, geogrid placement and hardfill backill; and
- Placement and compaction of engineered fills.

4.2. Compaction Control

Compaction of engineered earth fills was controlled by undrained shear strength measured by hand held shear vane calibrated using the NZGS 2001 method and by air voids as defined by NZS4402.

The criteria for undrained shear strength were a minimum single value of 110 kPa and minimum average of any 10 consecutive tests of 140 kPa.

The criteria for air voids were a maximum single value of 12% and maximum average of any 10 consecutive tests of 10%.

Vane shear strength, water content and in situ density tests were carried out on all areas of the engineered filling to at least the frequency recommended by NZS 4431.

These tests showed on multiple occasions that the required compaction standards were not being achieved and to the best of our knowledge the failing areas of fill were re-worked as necessary. Subsequent testing confirmed compliance with the specification.

5. EVALUATION OF COMPLETED EARTHWORKS

5.1. Natural Hazards

The appended as-built drawings depict the extents of zones that contain limitations intended to ensure that future building and/ or earthworks on the lots is undertaken in a manner that does not lead to buildings being subject to any of the natural hazards described in section 106 of the Resource Management Act, i.e. erosion, falling debris, subsidence, slippage, and inundation. Consideration of the inundation hazard was outside the scope of CMW's brief and has been assessed by others. The applied zones include:

- **Specific Design Zone (slope) –** intended to protect building development from long term creep effects on or adjacent to steep slopes and to protect the slopes from inappropriate loading or undermining.

- **Specific Design Zones (retaining)** - intended to protect the retaining walls from overloading at the crest or undermining at the toe that could lead to instability;

Full descriptions of the restrictions associated with these zones are presented in the Suitability Statement (Appendix A). Additional information is also provided in some of the following sections.

5.2. Natural Soils Geotechnical Assessment

Portions of lots within these stages of the subdivision are formed partially within natural soils, which are predominantly of alluvial origin.

During construction and earthworks, lenses of firm to stiff organically stained clay soils were observed and were undercut and replaced with engineered fill.

Hand auger boreholes conducted in the centre of each lot as part of the post earthworks investigation did encounter lenses of organically stained soils. We do not consider that liquefaction and/or settlement due to discrete lenses of organically stained clay soils are a significant geotechnical risk for development or future residential dwellings built in general accordance with NZS3604.

5.3. Land Stability and Erosion Control

The north-western corner of lot 206 lies at the crest of a filled batter formed in the adjacent stormwater utility reserve. For the protection of future foundations, a Specific Design Zone (slope) has been applied in the corner of lot 206. The extents are depicted on the appended Cato Bolam Limited As-built plans and details of the restrictions are described in the appended Suitability Statement.

Building and landscape designers must ensure that all runoff from solid surfaces is directed into the stormwater system. It is also important that care is paid to the disposal of stormwater during construction so that concentrated discharges (e.g. from unconnected spouting) are not directed towards steep ground.

Depths of mulch and topsoil applied to sloping areas should be limited to less than 150mm to minimise the risks of saturation leading to localised slumping on batter face. Wherever practical on such land, and particularly on steep batters, existing vegetation and grass cover should be well maintained. Any vegetation cleared beyond the immediate area of building platforms for temporary construction purposes should be replanted or replaced as soon as possible. The roots of an established vegetation cover can serve to bind the surface soils while the foliage can reduce rain infiltration and soil saturation, resulting in better resistance to erosion and shallow slumping.

5.4. Retaining Walls

Cantilever pole retaining walls and segmental block walls have been constructed in the locations shown on the appended Cato Bolam Limited As-built Plan. These walls reach a maximum height of approximately 1.5 metres and were designed by CMW Geosciences and the construction was observed by this consultancy. Copies of the Producer Statements - Construction Review are provided in Appendix E.

Descriptions of the building and earthworks restrictions within the vicinity of these walls (Specific Design Zones – retaining) are contained in the Suitability Statement in Appendix A. Lots containing these zones include 119 to 121, 129 to 130, 137 to 148, 164 to 169 inclusive.

5.5. Fill Induced Settlement

On the basis of the relatively minor magnitude of fill depths on this site, together with the elapsed time since it was placed, we consider that remaining post-construction settlements will be within code limits.

5.6. Service Line Trenches

As part of the civil works, sanitary sewer and stormwater services were trenched throughout the development as shown on the appended Cato Bolam Limited Stormwater and Sanitary Sewer As-built Plans.

As is normal on all subdivisions, building developments involving foundations within a 45-degree zone of influence from pipe inverts will require engineering input. The Auckland Council drawing referenced SW22 provided in Appendix B extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision depicts their requirements for stormwater pipes. Details for water and wastewater pipes are available in the Watercare Code of Practice for Land Development and Subdivision, with drawings referenced WW 53, WW54 and WW60 applicable to bridging wastewater pipes. The majority of lots are known to have service trenches within the lot boundary as shown on the appended stormwater and wastewater as-built plans. The resulting restrictions are presented in the Suitability Statement below, together with a table of the affected lots.

5.7. Subsoil Drains

The appended Cato Bolam Limited as-built plan shows the positions of underfill drains which were constructed in the natural ground during the earthworks operations. The drains were installed to help control groundwater levels. The ongoing operation of these drains is important to the overall stability conditions of the site.

Typical subsoil drain locations are beneath 4.0m of fill. Accordingly they are predominantly beyond the depths of anticipated foundations.

Description of the restrictions are contained in the appended Suitability Statement.

5.8. Road Subgrades

Penetration resistance testing was carried out on the road subgrades during construction and the results of this testing were forwarded to Cato Bolam Limited for pavement remedial design. Where soft ground with low equivalent CBR values was identified it was generally undercut replaced with engineered clay fill or hardfill. All road subgrade areas were subsequently lime stabilised to achieve appropriate CBR values.

Benkelman Beam testing of the base course was carried out by Road Test Limited on each road and those results were also forwarded to Cato Bolam Limited.

5.9. Design of Shallow Foundations

5.9.1. Bearing Capacity

Once bulk earthworks and top-soiling of the building platforms had been completed, our staff drilled hand auger boreholes on platforms in natural ground to determine representative finished ground conditions and hence evaluate likely foundation options for future building development. Our assessments of bearing capacity for the design of shallow foundations on each building platform are contained in the appended Suitability Statement.

At current subgrade levels all the residential lots including the superlots have been assessed as having a geotechnical ultimate bearing capacity of 300 kPa within the influence of conventional shallow residential building foundation loads.

If higher geotechnical ultimate bearing capacities are required, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

5.9.2. Foundation Settlements

At the bearing pressures specified above and subject to the design requirements for soil expansiveness provided below, differential settlement of shallow foundations for buildings designed in accordance with NZS 3604 (including the 600mm subfloor fill depth limit) should be within code limits.

5.9.3. Soil Expansiveness Classification

Four sets of soil tests were carried out on samples taken from likely foundation level on lots within this development.

Testing was carried out in accordance with NZS 4402, "Methods of Testing Soils for Civil Engineering Purposes" test 2.2 and 2.6 and were used in conjunction with visual-tactile assessment of the site soils to determine expansive site Classes as defined in AS 2870, "Residential Slabs and Footings – Construction". All test results are appended.

On this basis we have assessed the AS 2870 Site Class for all lots these stages of the development to be M (moderate). Details of foundation options for this Class are contained in the appended Suitability Statement.

In recent years in Auckland, there have been examples of concrete floors and/ or foundations that have been poured on dry, desiccated subgrades in summer months on expansive soils and have undergone heaving and cracking once the soil moisture contents have returned to higher levels. Foundation contractors need to be made aware of this issue and the need to maintain appropriate moisture contents in the footings and building platform subgrade between the time of excavation and the pouring of concrete.

Remedial actions that may be appropriate include platform protection with a hard fill layer, pouring of a blinding layer of concrete in footing bases and soaking of the building platform with sprinklers for an extended period.

Home owners need to be aware that the planting of high water demand plants where their roots may extend close to footings can also cause settlement damage.

5.10. Minimum Floor Levels

As depicted on the appended Final Contour and Retaining Wall Plan (sheet E603), a minimum floor level of 27.56m applies on lots 206, 207 and 208.

5.11. Topsoil Depths

Topsoil depths have been checked on most of the lots by the drilling of a borehole in the approximate centre of the building platform. The results are considered indicative for each lot, but may be subject to variations. Topsoil depths are between 100 and 300mm on this development.

Site specific findings are contained in the appended Suitability Statement Summary (Appendix A). However, it is possible that further levelling works have been undertaken since our investigations and accordingly, we strongly recommend that lot purchasers complete their own checks of topsoil depths.

6. CLOSURE

The appended Statement of Professional Opinion is provided to the Auckland Council and Cabra Developments Limited for their purposes alone on the express condition that it will not be relied upon by any other person. It is important that prospective purchasers satisfy themselves as to any specific conditions pertaining to their particular land interest.

Although regular site visits have been undertaken for observation, for providing guidance and instruction and for testing purposes, the geotechnical services scope did not include full time site presence. To this end, our appended Suitability Statement also relies on the Contractors' work practices and assumes that when we have not been present to observe the work, it has been completed to high standards and in accordance with the drawings, instructions and consent conditions provided to them.

Similarly it assumes that all as-built information and other details provided to the Client and/or CMW by other members of the project team are accurate and correct in all respects.

For and on behalf of CMW Geosciences

Prepared by:

Jack Mynett - Johnson

Engineering Geologist

Reviewed by:

Greg Snook

Senior Engineering Geologist

Approved by:

Richard Knowles

Principal Geotechnical Engineer, CPEng

Appendix A

Statement of Professional Opinion as to the Suitability of Land for Building Development

STATEMENT OF PROFESSIONAL OPINION AS TO THE SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

I, Richard Knowles, of CMW Geosciences (NZ) Limited Partnership, Auckland, hereby confirm that:

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on Stages 1-5 of the Huapai Triangle Sub Precinct D development.

2. The extent of preliminary investigations carried out to date are described in the CMW Geosciences Geotechnical Investigation Report referenced AKL2016_0331AB Rev. 0, dated 11 March 2016. The conclusions and recommendations of those documents have been re-evaluated in the preparation of this report. The results of all tests carried out are also appended.

3. In my professional opinion, not to be construed as a guarantee, I consider that:

   (a) The earth fills shown on the appended Cato Bolam Limited As-built Plans have been placed in compliance with NZS 4431, the Legacy Rodney District Council Plans and related documents.

   (b) The completed earthworks give due regard to land slope and foundation stability considerations on the building platform areas, but as required as **Specific Design Zones (Slope)** has been applied as depicted on Lot 206. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated Specific Design Zone (Slope) area unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the implications of the proposals on both global stability conditions and soil creep on the building buildings.

   (c) **Specific Design Zone (Retaining) areas** have been applied on Lots 119 to 121, 129 to 130, 137 to 148, 164 to 169 inclusive for the protection of the function of the retaining walls. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Retaining)** areas unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the stability implications of the earthworks and building proposals on the retaining walls. Accordingly, restrictions incorporating Specific Design Zones (Retaining) have been applied as depicted on the as-built plans.

   (d) The function of the subsoil drains installed beneath Lots 119 to 123, 132 to 137, 141 to 142, and 166 to 173 inclusive (typically ≥ 4m deep) must not be impaired by any building development or landscaping works. Any bored or driven piles must be positioned to avoid damaging the draincoils. Where any subsoil drain is intercepted by building works, it must be reinstated under the direction of a Chartered Professional Engineer to ensure the integrity of the subsoil drainage system.

   (e) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on the building platforms of Lots 119 to 180 and 206 to 208 inclusive. On lots 206 to 208 a minimum floor level of 27.56m applies.

   If for any reason higher geotechnical bearing capacities are required, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

(f) The expansive site Class for all lots has been assessed as AS2870 Class M (moderate). We recommend that building designers note on the Building Consent drawings the need to maintain appropriate moisture levels across building subgrades and in footing excavations (as described in Section 5.9.3 of the Geotechnical Completion Report) for reference by foundation contractors.

(g) The backfilling and compaction of the storm water and sanitary sewer trenches on this subdivision has been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.

However, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific design and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and trench backfill. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision this document is provided in Appendix B for clarification. Details for water and wastewater pipes are available in the Watercare Code of Practice for Land Development and Subdivision, with drawings referenced WW 53, WW54 and WW60 applicable to bridging wastewater pipes.

(h) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(b), 3(c), 3(d), 3(e), 3(f) and 3(g) above:

(i) The filled and natural ground is generally suitable for residential buildings constructed in accordance with NZS 3604 and the requirements of AS2870 for the appropriate expansive soil class.

(ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 (Class M) or alternately, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.

4. Road subgrades have been formed with appropriate regard for slope stability and settlement risks.

The following table summarises the conditions on each of the residential lots.

For and on behalf of CMW Geosciences

Richard Knowles

Principal Geotechnical, CPEng

GCR Summary Table

Condition	Specific Design Zone (slope)	Specific Design Zone (retaining)	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	Minimum Floor Level (m)	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
GCR SOPO Clause	**3(b)**	**3(c)**	**3(d)**	**3(e)**	**3(e)**	**3(f)**	**3(g)**	
Lot number								
119		●	●	300		M	●	200
120		●	●	300		M		300
121		●	●	300		M		300
122			●	300		M		
123			●	300		M		300
124				300		M		
125				300		M		300
126				300		M		300
127				300		M		300
128				300		M	●	300
129		●		300		M	●	
130		●		300		M	●	300
131				300		M	●	300
132			●	300		M	●	100
133			●	300		M	●	100
134			●	300		M		100
135			●	300		M	●	
136			●	300		M	●	300
137		●	●	300		M	●	

Condition	Specific Design Zone (slope)	Specific Design Zone (retaining)	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	Minimum Floor Level (m)	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
138		●		300		M	●	300
139		●		300		M	●	300
140		●		300		M	●	300
141		●	●	300		M	●	300
142		●	●	300		M	●	
143		●		300		M		300
144		●		300		M	●	100
145		●		300		M	●	300
146		●		300		M	●	
147		●		300		M	●	300
148		●		300		M	●	
149				300		M	●	300
150				300		M	●	300
151				300		M	●	300
152				300		M	●	100
153				300		M	●	300
154				300		M	●	300
155				300		M	●	
156				300		M	●	
157				300		M	●	
158				300		M	●	300
159				300		M	●	100
160				300		M	●	200

Condition	Specific Design Zone (slope)	Specific Design Zone (retaining)	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	Minimum Floor Level (m)	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
161				300		M	●	150
162				300		M	●	150
163				300		M	●	150
164		●		300		M	●	150
165		●		300		M	●	300
166		●	●	300		M	●	300
167		●	●	300		M	●	300
168		●	●	300		M	●	300
169		●	●	300		M	●	300
170			●	300		M	●	
171			●	300		M	●	150
172			●	300		M	●	300
173			●	300		M	●	300
174				300		M	●	250
175				300		M	●	300
176				300		M	●	300
177				300		M	●	
178				300		M	●	250
179				300		M	●	300
180				300		M	●	
206	●			300	27.56	M	●	250
207				300	27.56	M	●	
208				300	27.56	M	●	

Appendix B

Drawings

Title	Reference No.	Date	Revision
Cato Bolam Limited Final Contours and Retaining Wall As Built Plans	33659 E600-604	Dec 2017	R1
Cato Bolam Limited Cut Fill As Built Plans	33659 E605-609	Dec 2017	
Cato Bolam Limited Roading As Built Plans	33659 E610-614	Dec 2017	
Cato Bolam Limited Wastewater Reticulation As Built Plans	33659 E615-619	Dec 2017	
Cato Bolam Limited Stormwater Reticulation As Built Plans	33659 E620-624	Dec 2017	
Cato Bolam Limited Water Reticulation As Built Plans	33659 E625-629	Dec 2017	
Cato Bolam Limited Stormwater Drainage Zone of Influence As Built Plans	33659 E630-633	Dec 2017	
Cato Bolam Limited Specific Design As Built Plans	33659 E634-636	Dec 2017	R1
Cato Bolam Limited Reverse Landscape As Built Plans	33659 E637	Dec 2017	
Cato Bolam Limited Telecommunications As Built Plans	33659 E638-639	Dec 2017	
Auckland Council Stormwater Pipe and Manhole Construction Clearance Requirements	ACSD SW22	Sept 2013	1

Appendix C

Laboratory Test Data

ROADTEST LTD

Revision: 1

Report No: 17 0255 00
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DETERMINATION OF THE LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2 & 2.6

Job:	**57 Nobilo Road** (AKL2016-0331)		
Date of order:	3.10.17	Sample origin:	-
Sample method:	HA	Sample Description:	-
Sample By:	TG	Date:	3.10.17

Test Details :

Test performed on : Whole Sample
History : Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
548F	Lot 147	-	92	22	44.1
549F	Lot 134	-	99	23	41.7
550F	Lot 175	0.3m-0.6m	55	16	23.7
551F	Lot 208	0.4m-1.0m	66	18	33.3

Comments :

Tested By:	EC	Date :	12.10.17
Calculated By :	EC	Date :	16.10.17
Checked By :	EC	Date :	17.10.17

Appendix D

Field Test Data

LF11 Rev 4 Soil Field Density NDM Direct Transmission with VSS Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	57 Nobilo Road, Huapai
Project No:	AKL2016_0331
Location:	Huapai
Report No:	AKl2016_0331LAA Rev.0
Report Date:	14/11/2016
Client:	Cabra Developments Limited
Client Address:	PO Box 197 Orewa 0946
Client Reference:	-

Test Methods:
NZS 4402.2.1:1986
NZS 4407.4.2.2:2015
NZGS:August 2001

Notes:
Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff

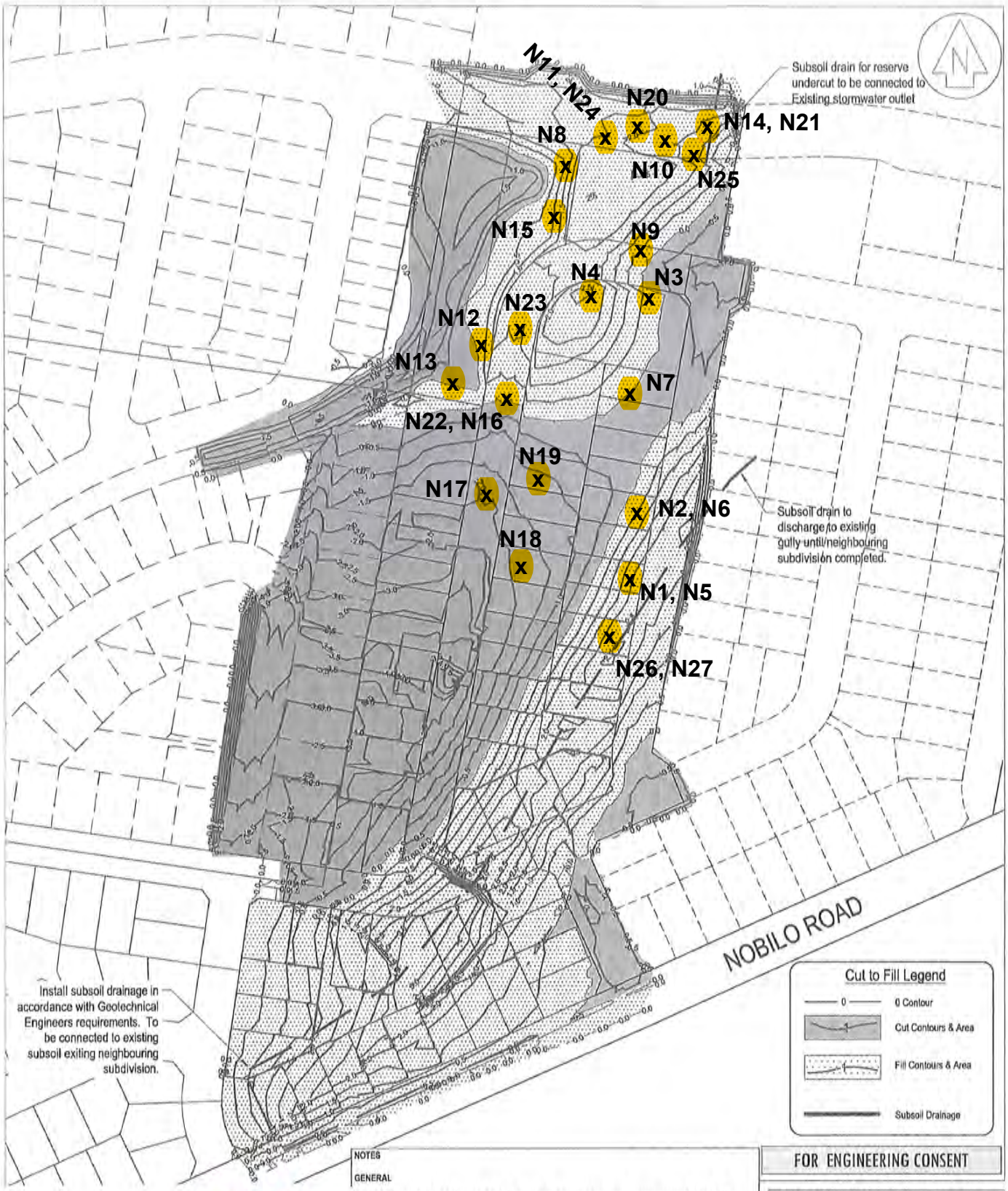
IANZ ACCREDITED LABORATORY

Tests indicated as not accredited are outside the scope of the laboratory's accreditation

Measurements marked * are not accredited and are outside the scope of the laboratories accreditation

Date Sampled	Sample No.	Test Location: Easting	Northing	RL/Details	Soil Description	In-situ Vane Shear Strengths: Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Field and Laboratory Testing Data: Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³) *	Oven Dry Density (t/m³)	Calculated Air Voids (%) *	Comments
19/10/2016	N1	Lot 174			CLAY	157	154	173	178	166	1.7458	1.2578	38.8	4.51	250	37.5	2.7	1.26	5.3	
	N2	Lot 176			CLAY	143	165	140	140	147	1.7172	1.2368	38.8	6.05	250	44.1	2.7	1.20	3.3	Failed
	N3	Lot 208 E			CLAY	97	94	111	105	102	1.7985	1.3658	31.7	6.05	300	26.3	2.7	1.42	9.8	
	N4	Lot 208 W			CLAY	127	132	140	135	134	1.6465	1.2844	28.2	8.14	300	28.4	2.7	1.28	16.0	Failed
20/10/2016	N5	Lot 174			CLAY	167	175	167	146	164	1.8165	1.3426	35.3	2.78	250	29.8	2.7	1.40	6.5	
	N6	Lot 176			CLAY	154	157	165	178	164	1.8369	1.3678	34.3	2.33	300	33.7	2.7	1.38	2.8	Re-test of N2
	N7	Lot 180			CLAY	146	170	167	159	161	1.8010	1.2988	38.7	1.57	300	29.2	2.7	1.38	7.2	
26/10/2016	N8	Refer to site plan			Lime Stabilised CLAY	146	151	159	165	155	1.8099	1.3154	37.6	1.72	300	36.7	2.7	1.32	2.4	
	N9	Refer to site plan			Lime Stabilised CLAY	154	178	154	170	164	1.8351	1.3449	36.4	1.06	300	32.1	2.7	1.38	4.0	
27/10/2016	N10	Road 5			CLAY	116	127	121	132	124										Failed
	N11	Road 5			Lime Stabilised CLAY	>189	>189	>189	>189	>189	1.8044	1.3249	36.2	2.87	300	30.7	2.7	1.38	6.5	
	N12	Lot 502			Lime Stabilised CLAY	178	183	140	154	164	1.8272	1.4117	29.4	6.07	300	35.1	2.7	1.36	2.4	
	N13	Lot 502			Lime Stabilised CLAY	178	186	>189	>189	>186	1.7107	1.2550	36.3	7.85	300	27.5	2.7	1.34	13.0	Failed
28/10/2016	N14	Road 5			Lime Stabilised CLAY	>189	>189	>189	>189	>189	1.8184	1.3674	33.0	4.15	300	31.2	2.7	1.38	5.4	
	N15	Refer to site plan			Lime Stabilised CLAY	>189	>189	>189	>189	>189	1.8395	1.4009	31.3	4.16	250	31.0	2.7	1.40	4.4	Re-test of N10
	N16	Road 2			Lime Stabilised CLAY	162	178	189	189	180	1.8168	1.3201	37.6	1.33	300	37.2	2.7	1.32	1.7	
	N17	Road 2			Lime Stabilised CLAY	167	>189	>189	189	>184	1.8632	1.4351	29.8	3.95	300	28.1	2.7	1.46	5.3	
31/10/2016	N18	Lot 155			Lime Stabilised CLAY	167	189	189	>189	>184	1.8697	1.4177	31.9	2.20	250	31.2	2.7	1.42	2.7	
	N19	Lot 158			Lime Stabilised CLAY	167	>189	>189	>189	>184	1.8243	1.3199	38.2	0.56	300	37.2	2.7	1.34	1.3	
	N20	Road 5			Lime Stabilised CLAY	165	154	189	189	174	1.8132	1.3073	38.7	0.88	300	40.7	2.7	1.28	-0.2	Failed
	N21	Road 5			Lime Stabilised CLAY	173	189	189	189	185	1.8116	1.3088	38.4	1.13	250	39.3	2.7	1.30	0.74	
3/11/2016	N22	Road 4			Lime Stabilised CLAY	>189	>189	UTP	UTP	>189	1.8719	1.4088	32.9	1.41	300	28.8	2.7	1.46	4.3	
	N23	Road 4			Lime Stabilised CLAY	151	167	178	189	171	1.8352	1.3625	34.7	2.17	300	32.7	2.7	1.38	3.5	
	N24	Road 5			Lime Stabilised CLAY	162	170	178	186	174	1.8750	1.4380	30.4	2.94	300	32.4	2.7	1.42	1.7	Re-test of N20
	N25	Road 5			Lime Stabilised CLAY	>189	>189	UTP	UTP	>189	1.8881	1.4223	32.8	0.64	300	28.7	2.7	1.46	3.6	
11/11/2016	N26	Lot 172			CLAY	167	143	151	165	157	1.8388	1.3379	37.4	0.25	300	36.5	2.7	1.34	0.91	Re-test of S2
	N27	Lot 172			CLAY	148	178	189	189	176	1.8003	1.3341	34.9	3.87	300	36.8	2.7	1.32	2.8	

Created By: TG Date: 14/11/2016
Checked By: TG Date: 17/11/2016
Authorised Signatory: Date: 17/11/2016



NOTES

GENERAL

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3. All works are to be installed as per
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   - Auckland Council Code of Practice for Land Development and Subdivision - Chapter 4 Stormwater
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5. If discrepancies are found between the standards, confirmation shall be sort from the Engineer and supervising council field officer.

FOR ENGINEERING CONSENT

CMW Geosciences

R1 CUT/FILL AMENDED	SL	08/2016
REVISION/DESCRIPTIONS	NAME	DATE
	NAME	DATE
SURVEYED		
DESIGNED	KM	04/2016
DRAWN	KM	04/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
57 NOBILO ROAD,
HUAPAI

DRAWING TITLE

CUT AND FILL CONTOURS
SHEET 1 OF 5

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09 426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
DATE 27/01/2016	CAD REFERENCE 33659 E107 Cut fill p.dwg	SHEET NO E107
DIRECTORY T:/33659/ACAD		JOB NO 33659

LF21 Rev 2 Vane Shear Strength Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	57 Nobilo Road, Huapai
Project No:	AKL2016_0331
Location:	Huapai
Report No:	AKL2016_0331LAB Rev.0
Report Date:	13/10/2017
Client:	Cabra Developments Limited
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

Test Methods: NZGS 2001: Guideline for Handheld Shear Vane Test

Notes:

Testing Locations Selected By: CMW Field Staff

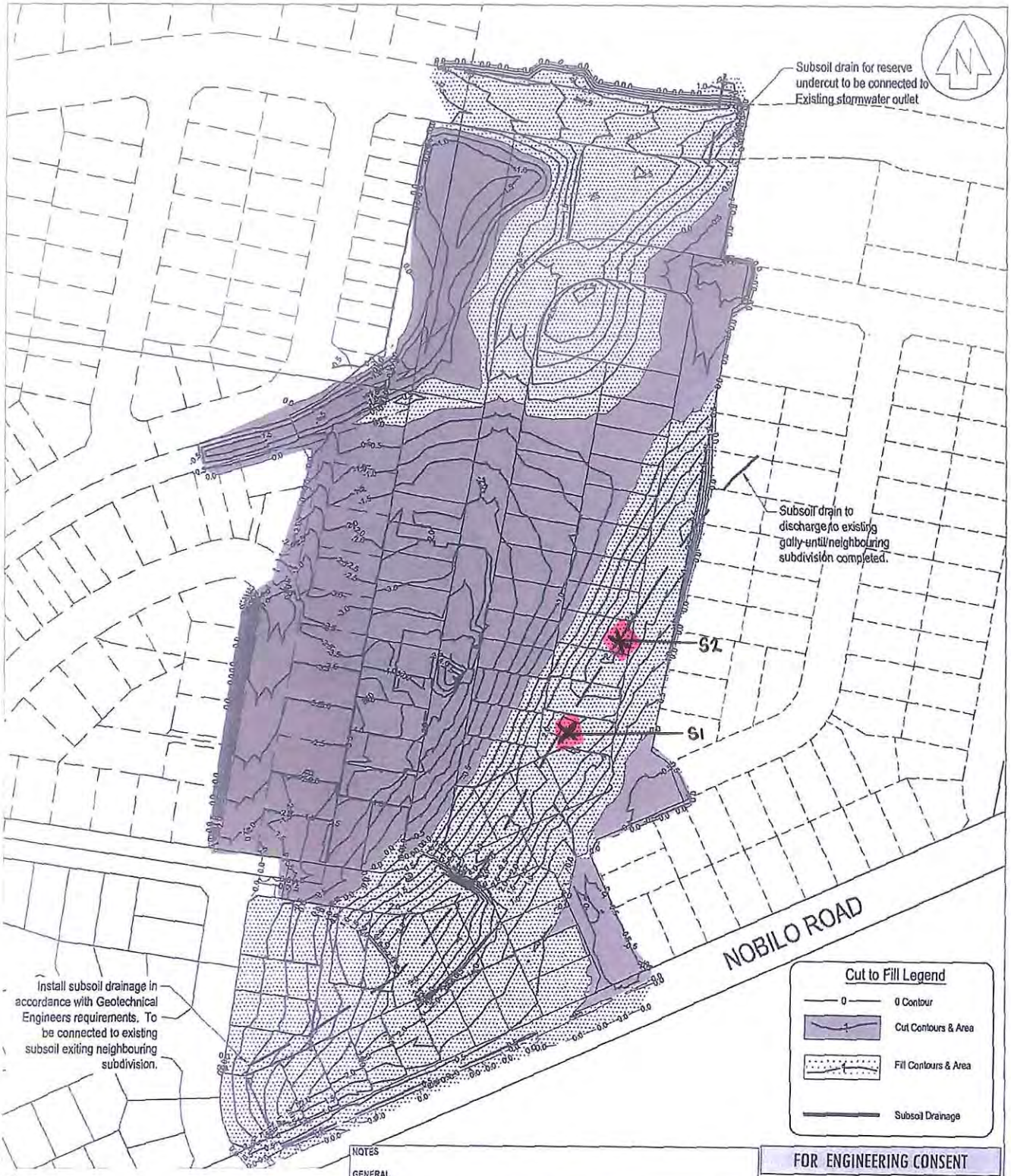
IANZ ACCREDITED LABORATORY

Date Sampled	Sample No.	Test Location			Soil Description	In-situ Vane Shear Strengths					Comments
		Easting	Northing	RL/Details		Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	
9/11/2016	S1	Lot 169			CLAY	116	94	97	113	105	Failed (Re-tested as N28)
	S2	Lot 172			CLAY	124	111	108	105	112	Failed (Re-tested as N26)

Created By: TG Date: 11/11/2016

Checked By: TS Date: 13/10/2017

Authorised Signatory: Joeli Myrtle-Jones Date: 17/10/2017



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5. If discrepancies are found between the standards, confirmation shall be sort from the Engineer and supervising council field officer.

FOR ENGINEERING CONSENT

CMW Geosciences

CATO BOLAM CONSULTANTS
SURVEYORS PLANNERS ENGINEERS
CATO BOLAM CONSULTANTS LTD
19 Tomorehi Avenue
PO Box 137
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

R1 CUT/FILL AMENDED	SL	08/2016
REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED		
DESIGNED	KM	04/2016
DRAWN	KM	04/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
57 NOBILO ROAD,
HUAPAI

DRAWING TITLE

CUT AND FILL CONTOURS
SHEET 1 OF 5

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
DATE 27/01/2016	CAD REFERENCE 33659 E107 Cut fill p.dwg	SHEET NO E107
DIRECTORY Z:\33659\CAD		JOB NO 33659

LF11 Rev 4 Soil Field Density NDM Direct Transmission with VSS Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	57 Nobilo Road, Huapai
Project No:	AKL2016_0331
Location:	Huapai
Report No:	AKL2016_0331LAC Rev. 0
Report Date:	7/12/2016
Client:	Cabra Developments Limited
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

Test Methods: NZS 4402.2.1:1986; NZS 4407.4.2.2:2015; NZGS:August 2001

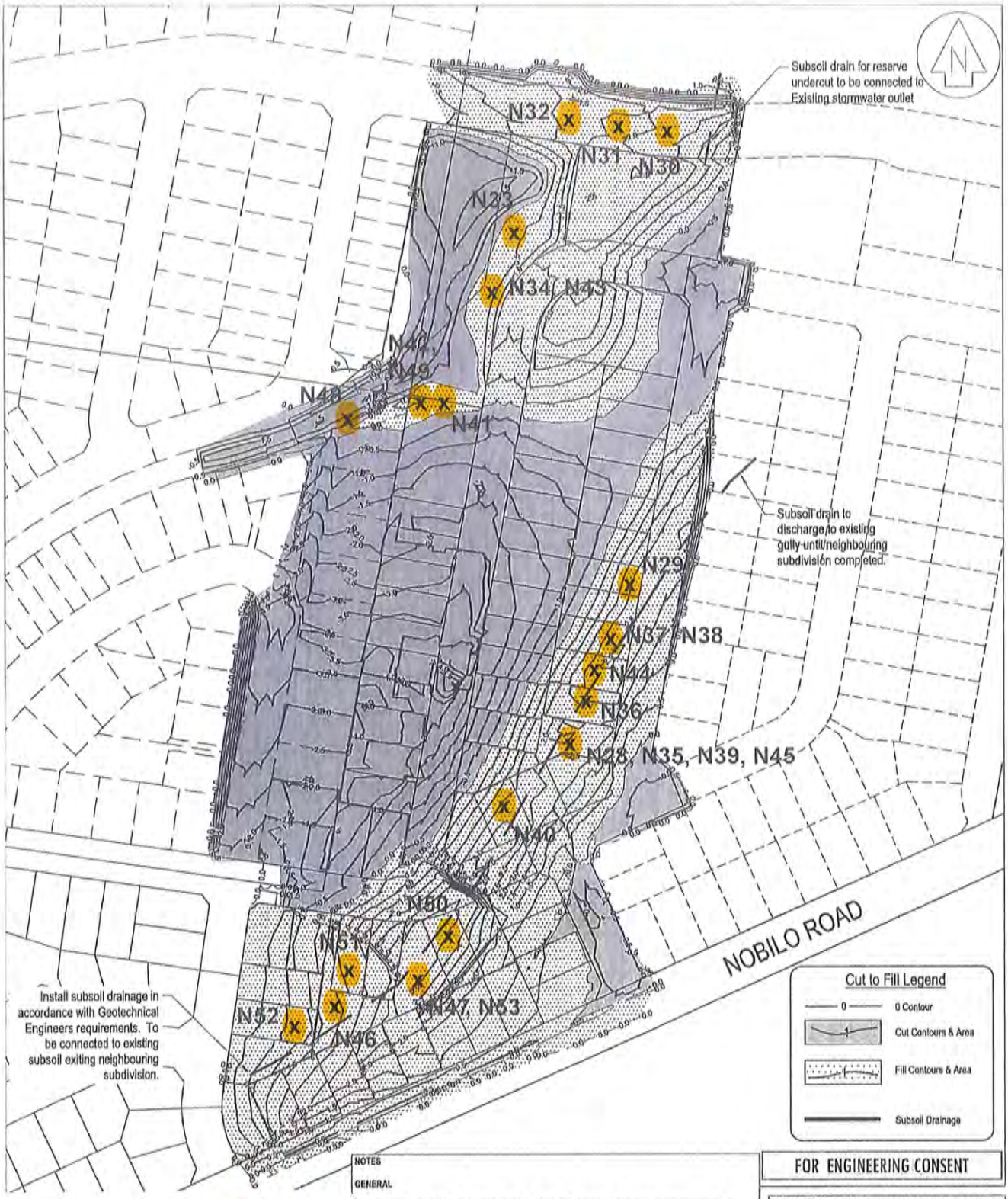
Notes: Solid Density: Assumed; Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY — Tests indicated as not accredited are outside the scope of the laboratory's accreditation

Measurements marked * are not accredited and are outside the scope of the laboratories accreditation

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³) *	Oven Dry Density (t/m³)	Calculated Air Voids (%) *	
11/11/2016	N28	Lot 169	CLAY	151	173	189	189	176	1.8094	1.3174	37.3	1.90	300	36.4	2.7	1.32	2.6	Re-test of S1
	N29	Lot 174	CLAY	173	189	UTP	UTP	181	1.8519	1.3608	36.1	0.38	300	34.5	2.7	1.38	1.5	
	N30	Road 5 East	CLAY	189	189	>189	>189	>189	1.8965	1.4417	31.5	1.02	300	27.4	2.7	1.48	4.0	
	N31	Road 5 Centre	CLAY	159	165	189	>189	>176	1.9002	1.4619	30.0	1.93	250	30.1	2.7	1.46	2.0	
	N32	Road 5 West	CLAY	>189	>189	189	189	>189	1.8711	1.3476	38.8	-2.38	250	40.9	2.7	1.32	-3.5	
	N33	Lot 502 North	CLAY	173	173	>189	189	>181	1.7549	1.2517	40.2	3.21	250	42.4	2.7	1.24	2.1	Re-test of N13
	N34	Lot 502 South	CLAY	178	154	189	189	178	1.8868	1.3336	41.5	-4.84	300	42.7	2.7	1.32	-5.4	
21/11/2016	N35	Lot 169	CLAY with blended unsuitables	UTP	UTP	UTP	UTP	UTP	1.8067	1.3784	31.1	6.02	300	28.3	2.7	1.40	8.0	
	N36	Lot 170	CLAY with blended unsuitables	UTP	UTP	UTP	UTP	UTP	1.8228	1.3593	34.1	3.20	300	30.3	2.7	1.40	5.8	
	N37	Lot 172	CLAY	UTP	UTP	UTP	UTP	UTP	1.8288	1.3563	34.8	2.41	300	29.9	2.7	1.40	5.8	
23/11/2016	N38	Lot 171	CLAY	>189	>189	>189	>189	>189	1.8287	1.2916	41.6	-1.66	300	43.2	2.7	1.28	-2.5	
	N39	Lot 169	CLAY	151	178	189	>189	>177	1.8155	1.3087	38.7	0.74	300	37.6	2.7	1.32	1.5	
	N40	Lot 166	CLAY	175	189	189	189	186	1.7872	1.2814	39.5	1.85	300	35.9	2.7	1.32	4.1	
24/11/2016	N41	Lot 206 East	Lime Stabilised CLAY	UTP	UTP	UTP	UTP	UTP	1.7887	1.3642	31.1	6.93	300	25.4	2.7	1.42	11.0	Failed
	N42	Lot 206 West	Lime Stabilised CLAY	UTP	UTP	UTP	UTP	UTP	1.7831	1.3289	34.2	5.26	300	25.8	2.7	1.42	11.0	Failed
	N43	Lot 502	Lime Stabilised CLAY	181	189	189	189	187	1.8566	1.4009	32.5	2.44	300	27.7	2.7	1.46	5.8	
	N44	Lot 171	CLAY	189	189	189	189	189	1.7808	1.2500	42.5	0.51	300	40.7	2.7	1.26	1.6	
	N45	Lot 169	CLAY	189	>189	>189	>189	>189	1.8060	1.3145	37.4	2.05	300	38.1	2.7	1.30	1.7	
29/11/2016	N46	Lot 137	Lime Stabilised CLAY	>189	>189	>189	>189	>189	1.8941	1.4047	34.8	-1.08	300	32.9	2.7	1.42	0.35	
	N47	Lot 134	Lime Stabilised CLAY	157	175	183	173	172	1.7747	1.2747	39.2	2.68	300	38.3	2.7	1.28	3.3	
	N48	Refer to site plan	CLAY	186	189	UTP	>189	>188	1.8502	1.3872	33.4	2.22	300	30.1	2.7	1.42	4.5	
	N49	Refer to site plan	CLAY	181	>189	>189	>189	>187	1.8520	1.4121	31.2	3.61	300	30.9	2.7	1.42	3.9	Re-test of N41/N42
1/12/2016	N50	Lot 133	CLAY	151	165	189	>189	>174	1.8644	1.3583	37.3	-1.03	300	29.3	2.7	1.44	4.4	
	N51	Lot 136	CLAY	UTP	UTP	UTP	UTP	UTP	1.8404	1.3107	40.4	-1.63	300	39.4	2.7	1.32	-0.91	
5/12/2016	N52	Lot 141	CLAY	UTP	UTP	UTP	UTP	UTP	1.8070	1.3190	37.0	2.24	300	26.0	2.7	1.44	9.6	
	N53	Lot 134	CLAY	UTP	UTP	UTP	UTP	UTP	1.7872	1.3174	35.7	4.13	300	34.1	2.7	1.34	5.2	

Created By: TG Date: 12/11/2016
Checked By: TG Date: 7/12/2016
Authorised Signatory: Date: 8/12/16



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FOR ENGINEERING CONSENT

CMW Geosciences

R1 CUT/FILL AMENDED	SL	08/2016
REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED		
DESIGNED	KM	04/2016
DRAWN	KM	04/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
57 NOBILO ROAD,
HUAPAI

DRAWING TITLE

CUT AND FILL CONTOURS
SHEET 1 OF 5

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 137
Orewa 0946
phone 09 427 0672
fax 09 426 2231
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
DATE 27/01/2016	CAD REFERENCE 33659 E107 Cut Fill p4.dwg	SHEET NO E107
DIRECTORY J:/33659/ACAD		JOB NO 33659

LF11 Rev 4 Soil Field Density NDM Direct Transmission with VSS Report

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Project:	57 Nobilo Road, Huapai
Project No:	AKL2016_0331
Location:	Huapai
Report No:	AKL2016_0331LAD Rev. 0
Report Date:	26/10/2017
Client:	Cabra Developments Limited
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

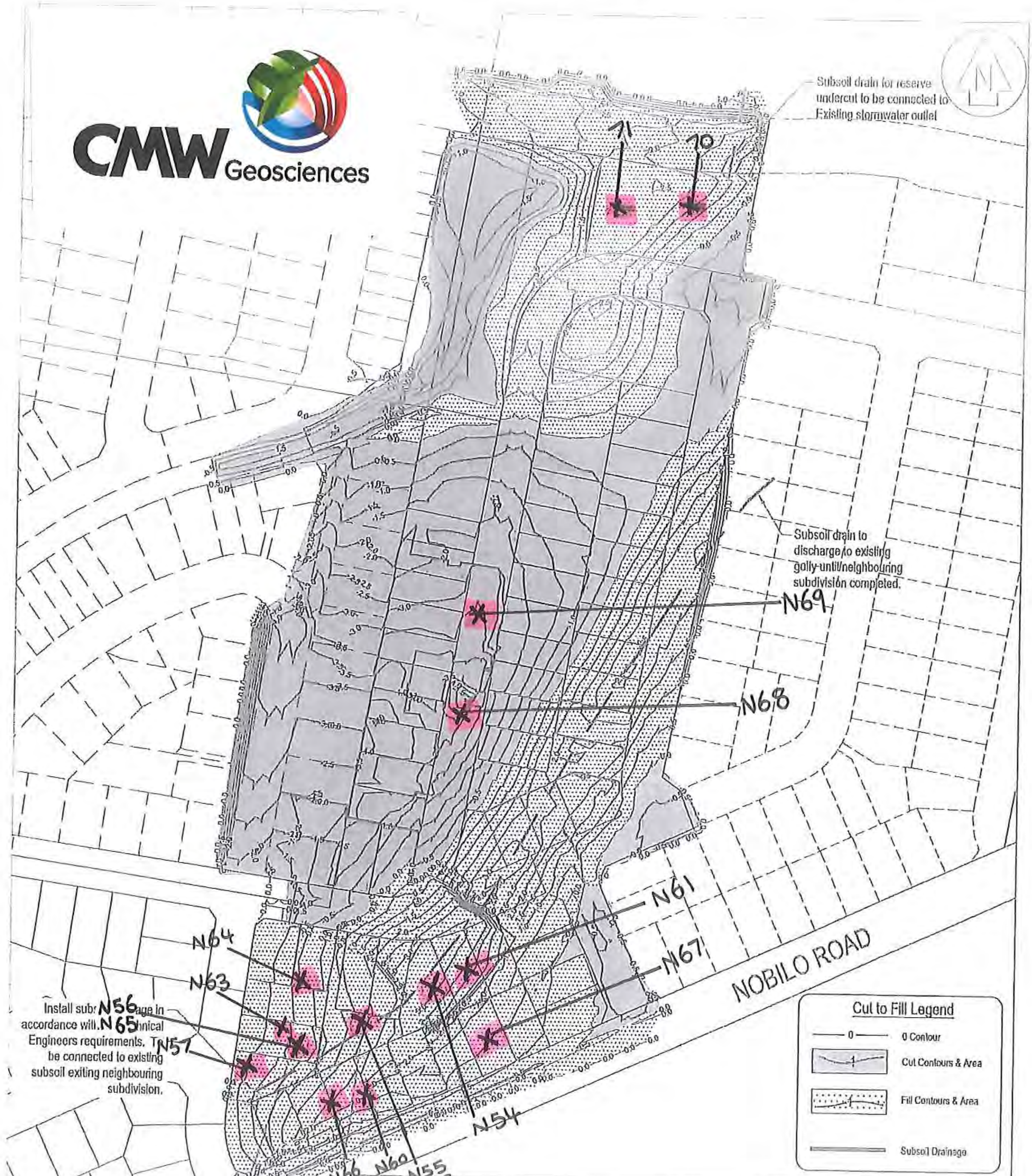
Test Methods:
NZS 4402.2.1:1986
NZS 4407.4.2.2:2015
NZGS:August 2001

Notes:
Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff

Measurements marked * are not accredited and are outside the scope of the laboratories accreditation

Date Sampled	Sample No.	Test Location			Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
		Easting	Northing	RL/Details		Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m^3)	Gauge Dry Density (t/m^3)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m^3) *	Oven Dry Density (t/m^3)	Calculated Air Voids (%) *	
7/12/2016	N54	Lot 134			CLAY	>189	>189	UTP	UTP	>189	1.7868	1.2992	37.5	3.02	300	38.8	2.7	1.28	2.4	
	N55	Lot 137			CLAY	UTP	UTP	UTP	UTP	UTP	1.7573	1.3208	33.1	7.33	300	32.5	2.7	1.32	7.8	
	N56	Lot 141			CLAY	151	162	189	189	173	1.8560	1.3946	33.1	2.11	300	31.4	2.7	1.42	3.3	
13/12/2016	N57	Lot 142			CLAY	UTP	UTP	UTP	UTP	UTP	1.9053	1.4887	28.0	3.12	300	30.7	2.7	1.46	1.2	
	N58	Lot 137			CLAY	173	178	>189	>189	>182	1.8900	1.4197	33.1	0.28	300	25.0	2.7	1.52	6.2	
16/12/2016	N59	Lot 137			CLAY	UTP	UTP	UTP	UTP	UTP	1.8525	1.3569	36.5	0.07	300	33.7	2.7	1.38	2.0	
	N60	Lot 122			CLAY	159	173	189	189	178	1.8257	1.4085	29.6	6.02	300	32.8	2.7	1.38	4.0	
20/12/2016	N61	Lot 133			CLAY	UTP	UTP	UTP	UTP	UTP	1.8822	1.4071	33.8	0.27	300	33.4	2.7	1.42	0.6	
	N62	Lot 137			CLAY	UTP	UTP	UTP	UTP	UTP	1.8978	1.4779	28.4	3.18	300	26.4	2.7	1.50	4.8	
	N63	Lot 141			CLAY	>189	>189	UTP	UTP	>189	1.8424	1.3836	33.2	2.78	300	31.8	2.7	1.40	3.8	
30/12/2016	N64	SW Corner			Clayey SILT	UTP	UTP	UTP	UTP	UTP	1.7665	1.2838	37.6	4.08	200	40.8	2.7	1.26	2.3	
	N65	SW Corner			Clayey SILT	UTP	UTP	UTP	UTP	UTP	1.7076	1.1989	42.4	4.61	200	47.5	2.7	1.16	2.1	
	N66	SW Corner			Clayey SILT	UTP	UTP	UTP	UTP	UTP										VSS only
	N67	SW Corner			Clayey SILT	UTP	UTP	UTP	UTP	UTP										VSS only
25/01/2017	N68	Road 2 CH80			CLAY	>189	>189	UTP	UTP	>189	1.8306	1.4305	28.1	6.92	300	26.4	2.7	1.44	8.1	
	N69	Road 2 CH110			CLAY	UTP	UTP	UTP	UTP	UTP	1.8623	1.4306	30.2	3.74	300	27.5	2.7	1.46	5.7	
27/04/2017	N70	Refer to site plan			CLAY	119	132	135	140	132	1.8045	1.2571	43.5	1.42	300	50.6	2.7	1.20	-5.0	Reserve Fill
	N71	Refer to site plan			CLAY	145	129	135	108	129	1.8195	1.3473	35.0	2.78	300	32.0	2.7	1.38	4.8	Reserve Fill

Created By: TG Date: 8/12/2016
Checked By: TS Date: 26/10/2017
Authorised Signatory: Date: 27/10/2017



NOTES

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   - Auckland Transport's Code of Practice 'ATCOP'.
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FOR ENGINEERING CONSENT

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

R1 CUT/FILL AMENDED	SL	08/2016
REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED		
DESIGNED	KJK	04/2016
DRAWN	KJK	04/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
57 NOBILO ROAD,
HUAPAI

DRAWING TITLE

CUT AND FILL CONTOURS
SHEET 1 OF 5

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
DATE 27/01/2016	CAD REFERENCE	SHEET NO E107
DIRECTORY		JOB NO 33659

LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0331LAF Rev.0
Project Name:	57 Nobilo Road
Project Location:	Huapai
Project Number:	AKL2016_0331
Test Date:	11/01/2017
Tested By:	RHD/KP
Client:	Cabra Development Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation

Test No.	1		2		3		4		5	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH60 Left		CH70 Right		CH80 Left		CH90 Right		CH100 Left	
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	6	13	5	10	10	20+	4	8
100 - 200	5	10	6	13	4	8	9	20	3	6
200 - 300	5	10	5	10	5	10	5	10	2	4
300 - 400	6	13	6	13	5	10	5	10	5	10
400 - 500	4	8	5	10	4	8	3	6	4	8
500 - 600	4	8	6	13	5	10	4	8	6	13
600 - 700	5	10	7	15	4	8	4	8	8	18
700 - 800	5	10	8	18	4	8	4	8	12	20+
800 - 900	5	10	8	18	4	8	4	8	9	20
900 - 1000										

Test No.	6		7		8					
Test Location	Road 1		Road 1		Road 1					
Chainage & Offset	CH110 Right		CH120 Left		CH130 Right					
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	6	13	9	20				
100 - 200	6	13	5	10	6	13				
200 - 300	2	4	2	4	2	4				
300 - 400	3	6	1	2	3	6				
400 - 500	4	8	2	4	3	6				
500 - 600	3	6	2	4	5	10				
600 - 700	4	8	2	4	2	4				
700 - 800	5	10	3	6	4	8				
800 - 900	6	13	4	8	4	8				
900 - 1000										

Prepared by: CS Date: 12/01/2017

Checked by: TG Date: 12/01/2017

Authorised Signatory: Date: 12/01/2017

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.

LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0331LAF Rev.0
Project Name:	57 Nobilo Road
Project Location:	Huapai
Project Number:	AKL2016_0331
Test Date:	11/01/2017
Tested By:	RHO/KP
Client:	Cabra Development Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation

Test No.	9		10		11		12		13	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH0 Centre		CH10 Centre		CH18 Left		CH30 Right		CH41 Left	
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	5	10	4	8	7	15	2	4
100 - 200	3	6	3	6	3	6	3	6	3	6
200 - 300	2	4	4	8	2	4	4	8	1	2
300 - 400	2	4	5	10	2	4	4	8	2	4
400 - 500	2	4	7	15	4	8	3	6	2	4
500 - 600	3	6	4	8	4	8	4	8	1	2
600 - 700	3	6	8	18	3	6	3	6	2	4
700 - 800	3	6	13	20+	4	8	4	8	2	4
800 - 900	4	8	8	18	4	8	3	6	2	4
900 - 1000										

Test No.	14		15		16		17		18	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH53 Right		CH66 Left		CH79 Right		CH91 Left		CH103 Right	
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	2	4	3	6	2	4	2	4
100 - 200	2	4	2	4	2	4	1	2	2	4
200 - 300	3	6	1	2	3	6	1	2	1	2
300 - 400	2	4	2	4	2	4	1	2	1	2
400 - 500	2	4	2	4	2	4	1	2	1	2
500 - 600	3	6	3	6	4	8	2	4	2	4
600 - 700	2	4	4	8	3	6	3	6	3	6
700 - 800	4	8	5	10	6	13	3	6	2	4
800 - 900	3	6	7	15	7	15	4	8	3	6
900 - 1000										

Prepared by: CS Date: 12/01/2017

Checked by: TG Date: 12/01/2017

Authorised Signatory: Date: 12/01/2017

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LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0331LAF Rev.0
Project Name:	57 Nobilo Road
Project Location:	Huapai
Project Number:	AKL2016_0331
Test Date:	11/01/2017
Tested By:	RHD/KP
Client:	Cabra Development Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
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PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation

Test No.	19		20		21		22		23	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH116 Left		CH128 Right		CH141 Left		CH153 Right		CH164 Left	
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	1	2	3	6	2	4	3	6
100 - 200	1	2	1	2	1	2	1	2	1	2
200 - 300	1	2	0	0	1	2	1	2	1	2
300 - 400	1	2	0	0	2	4	1	2	1	2
400 - 500	0	0	1	2	1	2	1	2	2	4
500 - 600	2	4	2	4	1	2	1	2	2	4
600 - 700	2	4	3	6	1	2	1	2	3	6
700 - 800	2	4	4	8	1	2	2	4	4	8
800 - 900	2	4	4	8	2	4	2	4	4	8
900 - 1000										

Test No.	24		25		26		27		28	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH176 Right		CH186 Left		CH198 Right		CH210 Left		CH220 Right	
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	3	6	6	13	7	15	8	18
100 - 200	2	4	3	6	4	8	9	20	6	13
200 - 300	2	4	4	8	3	6	5	10	5	10
300 - 400	1	2	3	6	3	6	4	8	4	8
400 - 500	1	2	2	4	2	4	4	8	9	20
500 - 600	1	2	2	4	3	6	4	8	3	6
600 - 700	1	2	2	4	3	6	3	6	2	4
700 - 800	1	2	3	6	3	6	2	4	3	6
800 - 900	2	4	2	4	3	6	3	6	4	8
900 - 1000										

Prepared by: CS Date: 12/01/2017

Checked by: TG Date: 12/01/2017

Authorised Signatory: Date: 12/01/2017

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.

LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0331LAF Rev.0
Project Name:	57 Nobilo Road
Project Location:	Huapai
Project Number:	AKL2016_0331
Test Date:	11/01/2017
Tested By:	RHD/KP
Client:	Cabra Development Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation

Test No.	29		30		31		32		33	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH230 Left		CH240 Right		CH250 Left		CH260 Right		CH270 Left	
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	7	15	9	20	5	10	6	13
100 - 200	7	15	3	6	7	15	6	13	8	18
200 - 300	5	10	2	4	5	10	4	8	6	13
300 - 400	4	8	6	13	6	13	5	10	5	10
400 - 500	3	6	4	8	7	15	7	15	7	15
500 - 600	2	4	4	8	6	13	6	13	3	6
600 - 700	3	6	5	10	3	6	3	6	4	8
700 - 800	3	6	5	10	3	6	4	8	5	10
800 - 900	6	13	6	13	4	8	4	8	5	10
900 - 1000										

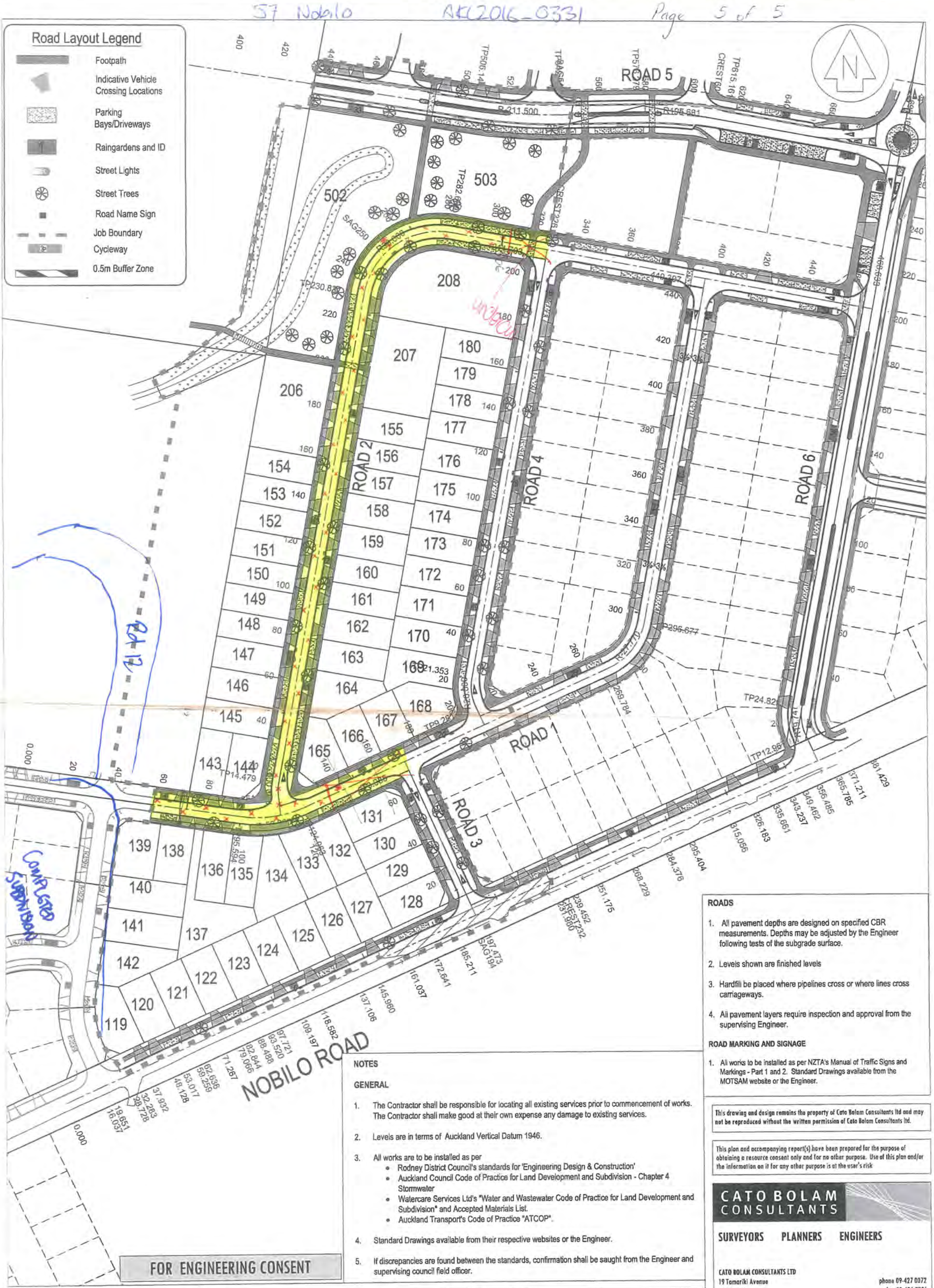
Test No.	34		35		36		37			
Test Location	Road 2		Road 2		Road 2		Road 2			
Chainage & Offset	CH280 Right		CH290 Left		CH300 Right		CH306 Left			
Material & Layer:	Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm		Clay/Subgrade +150mm			
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	8	18	4	8	7	15	6	13		
100 - 200	7	15	6	13	5	10	5	10		
200 - 300	6	13	5	10	2	4	4	8		
300 - 400	8	18	3	6	3	6	2	4		
400 - 500	5	10	3	6	1	2	2	4		
500 - 600	4	8	3	6	2	4	3	6		
600 - 700	4	8	3	6	3	6	2	4		
700 - 800	6	13	4	8	2	4	2	4		
800 - 900	6	13	3	6	2	4	2	4		
900 - 1000										

Prepared by: CS Date: 12/01/2017

Checked by: TG Date: 12/01/2017

Authorised Signatory: Date: 12/01/2017

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.



ROADS

1. All pavement depths are designed on specified CBR measurements. Depths may be adjusted by the Engineer following tests of the subgrade surface.
2. Levels shown are finished levels
3. Hardfill be placed where pipelines cross or where lines cross carriageways.
4. All pavement layers require inspection and approval from the supervising Engineer.

ROAD MARKING AND SIGNAGE

1. All works to be installed as per NZTA's Manual of Traffic Signs and Markings - Part 1 and 2. Standard Drawings available from the MOTSAM website or the Engineer.

NOTES

GENERAL

1. The Contractor shall be responsible for locating all existing services prior to commencement of works. The Contractor shall make good at their own expense any damage to existing services.
2. Levels are in terms of Auckland Vertical Datum 1946.
3. All works are to be installed as per
   - Rodney District Council's standards for 'Engineering Design & Construction'
   - Auckland Council Code of Practice for Land Development and Subdivision - Chapter 4 Stormwater
   - Watercare Services Ltd's "Water and Wastewater Code of Practice for Land Development and Subdivision" and Accepted Materials List.
   - Auckland Transport's Code of Practice "ATCOP".
4. Standard Drawings available from their respective websites or the Engineer.
5. If discrepancies are found between the standards, confirmation shall be saught from the Engineer and supervising council field officer.

R5 ENGINEERING APPROVAL	SL	08/16
R4 TENDER REVISIONS	SL	08/16
R3 SECTION 28 AMENDMENTS	SL	06/16
REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED		
DESIGNED	KM	01/2016
DRAWN	KM	01/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
57 NOBILO ROAD
HUAPAI

DRAWING TITLE

ROAD LAYOUT
SHEET 1 OF 4

CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R5
DATE 28/01/2016	CAD REFERENCE 33659 E200 Road Layout p	SHEET NO E200
DIRECTORY Z:/33659/ACAD		JOB NO 33659

LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0331LAG Rev.0
Project Name:	57 Nobilo Road
Project Location:	Huapai
Project Number:	AKL2016_0331
Test Date:	15/03/2017
Tested By:	KP
Client:	Cabra Development Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

Tests indicated as not accredited are outside the scope of the laboratory's accreditation

Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation

Test No.	1		2		3		4		5	
Test Location	Road 5		Road 5		Road 5		Road 5		Road 5	
Chainage & Offset	CH540 Right		CH530 Left		CH520 Right		CH510 Left		CH500 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	2	4	2	4	2	4	3	6	2	4
100 - 200	2	4	2	4	2	4	2	4	3	6
200 - 300	3	6	3	6	4	8	2	4	3	6
300 - 400	3	6	2	4	4	8	4	8	4	8
400 - 500	3	6	2	4	5	10	2	4	6	13
500 - 600	3	6	3	6	4	8	4	8	5	10
600 - 700	2	4	2	4	4	8	4	8	5	10
700 - 800	3	6	3	6	4	8	6	13	5	10
800 - 900	4	8	4	8	4	8	6	13	5	10
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Road 5		Road 5		Road 5		Road 5		Road 5	
Chainage & Offset	CH490 Left		CH480 Right		CH470 Left		CH460 Right		CH450 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	2	4	2	4	4	8	2	4	2	4
100 - 200	3	6	3	6	3	6	4	8	3	6
200 - 300	3	6	3	6	2	4	3	6	2	4
300 - 400	2	4	2	4	4	8	4	8	4	8
400 - 500	3	6	3	6	3	6	5	10	4	8
500 - 600	3	6	4	8	4	8	4	8	4	8
600 - 700	2	4	3	6	4	8	4	8	5	10
700 - 800	3	6	5	10	4	8	4	8	5	10
800 - 900	3	6	5	10	4	8	4	8	5	10
900 - 1000										

Prepared by: TG Date: 17/03/2017

Checked by: CS Date: 17/03/2017

Authorised Signatory: Date: 22/3/2017

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.

LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0331LAG Rev.0
Project Name:	57 Nobilo Road
Project Location:	Huapai
Project Number:	AKL2016_0331
Test Date:	15/03/2017
Tested By:	KP
Client:	Cabra Development Limited
Client Address:	
Client Reference:	

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CMW Geosciences (NZ) Limited
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PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY — Tests indicated as not accredited are outside the scope of the laboratory's accreditation

Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation

Test No.	11									
Test Location	Road 5									
Chainage & Offset	CH440 Right									
Material & Layer:	CLAY / Subgrade									
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	2	4								
100 - 200	3	6								
200 - 300	3	6								
300 - 400	4	8								
400 - 500	5	10								
500 - 600	5	10								
600 - 700	6	13								
700 - 800	6	13								
800 - 900	6	13								
900 - 1000										

Test No.										
Test Location										
Chainage & Offset										
Material & Layer:										
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100										
100 - 200										
200 - 300										
300 - 400										
400 - 500										
500 - 600										
600 - 700										
700 - 800										
800 - 900										
900 - 1000										

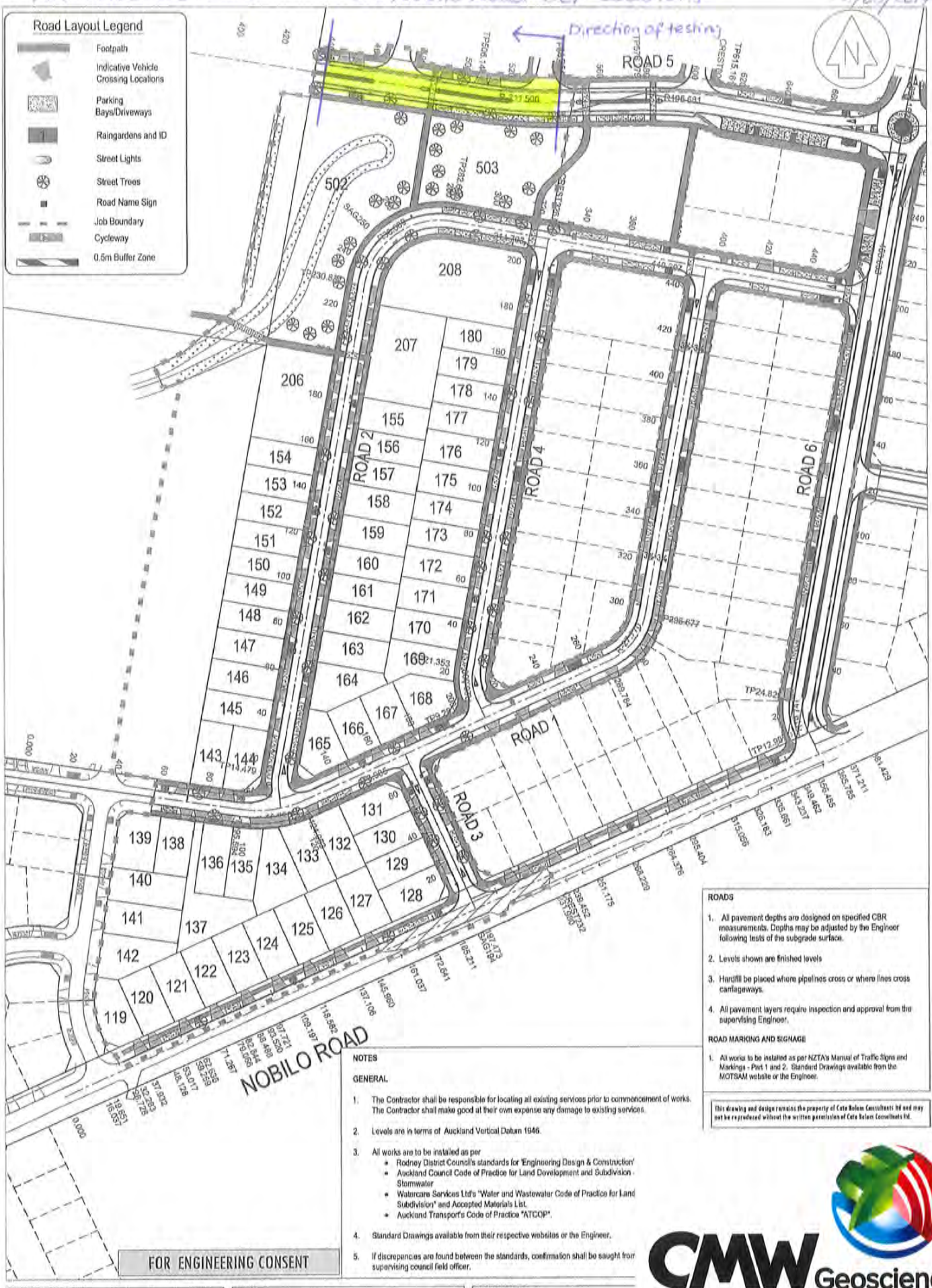
Prepared by: TG Date: 17/03/2017

Checked by: CS Date: 17/03/2017

Authorised Signatory: Date: 22/3/2017

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.

AKL2016_0331 LAG — 57 Nobilo Road DCP Locations — 15/03/2017



ROADS

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4. All pavement layers require inspection and approval from the supervising Engineer.

ROAD MARKING AND SIGNAGE

1. All works to be installed as per NZTA's Manual of Traffic Signs and Markings - Part 1 and 2. Standard Drawings available from the MOTSAM website or the Engineer.

NOTES

GENERAL

1. The Contractor shall be responsible for locating all existing services prior to commencement of works. The Contractor shall make good at their own expense any damage to existing services.
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   - Auckland Council Code of Practice for Land Development and Subdivision - Stormwater
   - Watercare Services Ltd's "Water and Wastewater Code of Practice for Land Subdivision" and Accepted Materials List.
   - Auckland Transport's Code of Practice "ATCOP".
4. Standard Drawings available from their respective websites or the Engineer.
5. If discrepencies are found between the standards, confirmation shall be sought from supervising council field officer.

FOR ENGINEERING CONSENT

REVISION (DESCRIPTIONS)	NAME	DATE
R5 ENGINEERING APPROVAL	SL	08/16
R4 TENDER REVISIONS	SL	08/16
R3 SECTION 28 AMENDMENTS	SL	06/16
	NAME	DATE
SURVEYED		
DESIGNED	KM	01/2016
DRAWN	KM	01/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
57 NOBILO ROAD
HUAPAI

DRAWING TITLE

ROAD LAYOUT
SHEET 1 OF 4

CMW Geosciences

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO	R5
DATE 28/01/2016	CAD REFERENCE 33659 E200 Road Layout.j	SHEET NO	E200
DIRECTORY I:/33659/ACAD		JOB NO	33659

Appendix E

Producer Statements

26 October 2017 Ref: AKL2016-0331AD Rev. 0

Cabra Developments Limited
PO Box 197, Orewa 0946

Attention: Duncan Unsworth

RE: CERTIFICATION OF THE CONSTRUCTION OF A KEYSTONE RETAINING WALL AND TIM BER POLE RETAINING WALLS AT 57 NOBILO ROAD, HUAPAI -BCO10057679

CMW Geosciences (CMW) have visited the site at 57 Nobilo Road, Huapai, legally described as Lot 4 DP 116044 on several occasions during January and February 2017 to observe the construction of timber pole retaining walls. Several inspections for the keystone retaining wall took place during July 2017.

Our work has included review of the following documents and drawings:

- Conditions of Auckland Council Building Consent referenced BCO10057679 issued 15 December 2016;
- Consented construction drawings, prepared by CMW Geosciences, referenced TP01, TP02 and KS01 dated 14 October 2016;
- Geotechnical report for 57 Nobilo Road prepared by CMW Geosciences, referenced AKL2016-0331AC REV.0, dated 12 October 2016.

The works observed and/or tested by CMW staff incorporated:

- Timber pole retaining walls;
    - Assessment of soil strengths in the exposed pile foundation excavations;
    - Pile size, depth, spacing and diameter;
    - Timber pole size, treatment and placement;
    - Lagging dimensions and placement;
    - Drainage material and installation.
- Keystone retaining wall;
    - Assessment of soil strengths in the exposed foundations excavations;
    - Foundation dimensions;
    - Geogrid reinforcement placement (type, length, vertical spacing);
    - Hardfill compaction;
    - Drainage material and installation.

Construction aspects of the timber pole and keystone retaining walls are checked for the aforementioned hold points over several visits.

Hardfill compaction of the reinforced hardfill was checked using an impact hammer.

Ground conditions were tested using a hand held shear vane at the base and sides of the pile excavation. The retained soil was also tested as part of the observations.

On the basis of our observations and testing, we consider that the site works have been undertaken in accordance with the approved Building Consent and related approved documentation described above and are in accordance with the requirements and/or recommendations of the geotechnical report.

Our observations and assessment of works did not include an assessment of appropriate soil moisture conditions immediately prior to pouring of the building platform with respect to the soils expansiveness, as soil moisture within the surface layers vary significantly with weather conditions if left exposed.

For and on behalf of CMW Geosciences

Richard Knowles

Principal Geotechnical Engineer, CPEng

Attachments: Producer Statement - Construction Review

13 September 2017 Ref: AKL2016_0634AG Rev. 0

Cabra Developments Limited
PO Box 197, Orewa 0946
Auckland

Attention: Duncan Unsworth

Dear Duncan

RE: CERTIFICATION OF SITEWORKS FOR THE CONSTRUCTION OF TWO TIMBER BOARDWALKS AT 53 STATION ROAD – BCO10091660

CMW Geosciences (CMW) have visited the site at 53 Station Road, Huapai legally described as Lot 1 DP 502602 on several occasions during August 2017 to observe the site works for the construction of two timber boardwalks.

Our work has included review of the following documents and drawings:

- Conditions of Auckland Council Building Consent referenced BCO10091660, issued 18 April 2017;
- Consented construction drawings, prepared by Hutchinson Consulting Engineers Limited, referenced 19870 S01-S08, dated Feb 2017;
- Geotechnical report for Huapai Development Stage 1 prepared by CMW Geosciences, referenced 2015_1029AB Rev. 0, dated 24 November 2014.

The site works observed and/or tested by CMW staff incorporated:

- assessment of soil strengths in the exposed foundation excavations;
- pile size, depth and diameter.

Our testing demonstrated vane shear strengths in excess of the 50kPa design specification for alluvial soils, in excess of the 100kPa design specification for engineered fill and in excess of the 200kPa design specifications for rock. Pile holes were observed as having been imbedded a minimum of 300mm into the rock.

On the basis of our observations and testing, we consider that the site works have been undertaken in accordance with the approved Building Consent and related approved documentation described above and are in accordance with the requirements and/or recommendations of the geotechnical report.

For and on behalf of CMW Geosciences

Richard Knowles

Principal Geotechnical Engineer, CPEng

Attachments: Producer Statement - Construction Review

Building Code Clause(s).....B1.....

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY: ...CMW GEOSCIENCES.....
(Construction Review Firm)

TO: ...CABRA DEVELOPMENTS LIMITED.....
(Owner/Developer)

TO BE SUPPLIED TO: ...AUCKLAND COUNCIL.....
(Building Consent Authority)

IN RESPECT OF: ...SITEWORKS FOR THE CONSTRUCTION OF TWO TIMBER BOARDWALKS.....
(Description of Building Work)

AT: ...53 STATION ROAD, HUAPAI.....
(Address)
..... **LOT**.....1..... **DP** ...502602... **SO** .....

...CMW GEOSCIENCES.....has been engaged by...CABRA DEVELOPMENTS LIMITED.....
(Construction Review Firm)
To provide☐CM1☐CM2☐CM3☐CM4☐CM5*(Engineering Categories)* or ☐ observation as per agreement with owner/developer

or ☒other ...REFER TO ATTACHED DOCUMENT AKL2016_0634AG REV. 0 DATED 13 SEPTEMBER 2017..services
(Extent of Engagement)
in respect of clause(s) .....B1..... of the Building Code for the building work described in documents relating to Building Consent No. ...BCO10091660..... and those relating to Building Consent Amendment(s) Nos. .....issued during the course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variations(s) No. ..... (copies attached) or by the attached Schedule ☐ have been issued during the course of the works.

On by the basis of ☒this ☐these review(s) and information supplied by the contractor during the course of the works and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that ☐All ☒Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) .....B1.....of the Building Code.
I also believe on reasonable grounds that the persons who have undertaken this construction review have the necessary competency to do so.

I, ...RICHARD J KNOWLES (AC AUTHOR #2342).....am: ☒CPEng No. ...160049.....
(Name of Construction Review Professional)
☐Reg Arch No. .....

I am a Member of : ☒IPENZ ☐NZIA and hold the following qualifications: ...BE(CIVIL), CPEng.....

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Construction Review Firm is a member of ACENZ : ☐

SIGNED BY ...RICHARD J KNOWLES..... **ON BEHALF OF** ...CMW GEOSCIENCES.....

Date:... 18/9/17 ..... Signature:.....

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000.*

This form is to accompany **Forms 6 or 8 of the Building (Form) Regulations 2004** for the issue of a Code Compliance Certificate.

Building Code Clause(s)..... B1

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY: ...CMW GEOSCIENCES.....
(Construction Review Firm)

TO: ...CABRA DEVELOPMEMNTS LIMITED.....
(Owner/Developer)

TO BE SUPPLIED TO: ...AUCKLAND COUNCIL.....
(Building Consent Authority)

IN RESPECT OF: ...CONSTRUCTION OF TIMBER POLE RETAINING WALLS AND KEYSTONE WALLS .....
(Description of Building Work)

AT: ...57 NOBILO ROAD, HUAPAI.....
(Address)
..... **LOT**.....4..... **DP** ...116044... **SO** .....

...CMW GEOSCIENCES.....has been engaged by... CABRA DEVELOPMEMNTS LIMITED .....
(Construction Review Firm)
To provide☐CM1☐CM2☐CM3☐CM4☐CM5*(Engineering Categories)* or ☐ observation as per agreement with owner/developer

or ☒other ...REFER TO DOCUMENT AKL2016_0331AD REV 0 DATED 26 OCTOBER 2017.....services
(Extent of Engagement)
in respect of clause(s) .....B1..... of the Building Code for the building work described in documents relating to Building Consent No. ...BCO10057679..... and those relating to Building Consent Amendment(s) Nos. .....issued during the course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variations(s) No. ..... (copies attached) or by the attached Schedule ☐ have been issued during the course of the works.

On by the basis of ☐this ☒these review(s) and information supplied by the contractor during the course of the works and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that ☒All ☐Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) .....B1.....of the Building Code.
I also believe on reasonable grounds that the persons who have undertaken this construction review have the necessary competency to do so.

I, ...RICHARD J KNOWLES (AC AUTHOR 2342).....am: ☒CPEng No. ...160049.....
(Name of Construction Review Professional)
☐Reg Arch No. .....

I am a Member of : ☒IPENZ ☐NZIA and hold the following qualifications: ...BE(CIVIL), CPEng.....

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Construction Review Firm is a member of ACENZ : ☐

SIGNED BY ...RICHARD J KNOWLES..... **ON BEHALF OF** ...CMW GEOSCIENCES.....

Date:... 26/10/17 Signature:.....

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000.*

This form is to accompany **Forms 6 or 8 of the Building (Form) Regulations 2004** for the issue of a Code Compliance Certificate.