

23 February 2018

STAGE 4 OF KAURI GROVE SUBDIVISION

GEOTECHNICAL COMPLETION REPORT

Cabra Developments Limited

Ref: AKL2016_0046AF Rev: 0

Table of Contents

1. INTRODUCTION	1
2. PROJECT BACKGROUND	1
3. DESCRIPTION OF EARTHWORKS	1
4. GEOTECHNICAL QUALITY CONTROL	1
4.1. Site Observations	1
4.2. Compaction Control	2
5. EVALUATION OF COMPLETED EARTHWORKS	2
5.1. Natural Hazards	2
5.1.1. Flood Plain Consent Notice Zone	2
5.1.2. Specific Design Zone Consent Notice Zone – Uncontrolled Filling	2
5.1.3. Drainage Consent Notice Zone	3
5.2. Fill Induced Settlement	3
5.3. Service Line Trenches	3
5.4. Road Subgrades	3
5.5. Design of Shallow Foundations	3
5.5.1. Bearing Capacity	3
5.5.2. Foundation Settlements	4
5.5.3. Soil Expansiveness Classification	4
5.6. Topsoil Depths	4
6. CLOSURE	4

Appendices

Appendix A – Statement of Professional Opinion as to the Suitability of Land For Building Development

Appendix B – Drawings

Appendix C – Laboratory Test Data

Appendix D – Field Test Data

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 stage 4 of the Kauri Grove Subdivision development. Construction of this residential subdivision has been undertaken in accordance with the Auckland Council Resource Consent number SLC65429 and REG65430 and Engineering Approval letter dated 12 January 2016.

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

This report covers the construction period December 2015 to February 2018 and is intended to be used for certification purposes for new lots (listed below) created from Lot 88 DP 502754 as follows:

- 44 new residential lots numbered 1 to 7, 9 to 39 and 50 to 55 inclusive;
- 1 new road named Vogwill Road
- Extension of 2 existing roads, named Len Ireland Drive and Fruitlands Road

This stage of the Kauri Grove Development is located off Len Ireland Drive and Fruitlands Road, Huapai. As can be seen from the as-built plans, 31 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 3.6 metres.

2. PROJECT BACKGROUND

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

- Geotechnical Investigation Report for the Proposed Residential Subdivision at 202, 218 and 224 Matua Road, Huapai. Referenced AKL2016_0046AA Rev. 1, dated 29 July 2015;
- Section 92 Response, 202, 218, and 224 Matua Road, Huapai. Referenced AKL2016_0046AB Rev. 0, dated 28 October 2015.

3. DESCRIPTION OF EARTHWORKS

The majority of earthworks occurred as part of the bulk earthworks undertaken across Kauri Grove subdivision during the 2015-2016 earthworks season. This includes site stripping, gully muck-outs and subsoil drainage installation, soft soil undercuts and general cut to fill earthworks across the subdivision.

Some minor civil works also occurred within this stage during the 2015-2016 season, including road undercuts and stabilisation of subgrade areas. The majority of lots were also stabilised and retopsoiled following the end of the season.

Civil works including service line drainage, roading and footpath construction and respread of topsoil across all works was undertaken during 2017 and early 2018. In addition, minor earthworks to extend the building platform areas on Lots 50 to 52 were undertaken during late 2017 which included stripping of topsoil, conditioning and placement of engineered fills and respread of topsoil within these lots.

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;
- Excavation and backfilling of sewer and stormwater trenches; 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 some 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 Aspire Consulting Engineers As-built Consent Notice Plans referenced 1285-AB(STG-2)-PG103 and PG104 depict the extents of a series 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:

5.1.1. Flood Plain Consent Notice Zone

Lots 50, 51, 52, and 55 are situated partially within flood plains from the adjacent Kumeu River. We understand that the flood plain zone with these lots is at an RL of 16.7 metres (including allowance for climate change). No building development and/or future earthworks should be taken within these areas.

5.1.2. Specific Design Zone Consent Notice Zone – Uncontrolled Filling

Lots 50 to 55 contain areas outside of the building platforms that include uncontrolled/uncertified filling. The filling within this area comprises topsoil and some organic soils placed as part of the landscaping works within the northern portions of these lots where marked on the appended **As-built Consent Notice Plan 2, referenced 1285-AB(STG-2)-PG104 as Specific Investigation and Design Consent Notice Zone.**

5.1.3. Drainage Consent Notice Zone

The zone has been placed on lots where service lines have been constructed within or in close proximity to the lot. It is intended to protect the public services from inappropriate loading from future development. Further recommendations for service trenches are provided in Section 5.3 below.

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

5.2. 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.

5.3. Service Line Trenches

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

Stormwater and sanitary sewer trenches in key locations contain a punched draincoil to facilitate draining of any groundwater seepages within the trench bedding. These draincoils are connected to the downstream stormwater manhole to outlet and water. This drainage has been installed as a precautionary measure that is not considered to be necessary for private connections.

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 COP1 - General Requirements and Procedures. The majority of lots are known to have service trenches within the lots as shown on the appended stormwater as-built plans. The resulting restrictions are presented in the Suitability Statement below.

5.4. Road Subgrades

Penetration resistance testing was carried out on the road subgrades during construction and the results of this testing were forwarded to Aspire Consulting Engineers Limited for pavement remedial design. Where soft ground with low equivalent CBR values was identified it was generally undercut and backfilled with stabilised fill and/or increased metal depths. All road subgrade areas were subsequently lime/ cement 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 Aspire Consulting Engineers Limited.

5.5. Design of Shallow Foundations

5.5.1. 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 lots 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.

5.5.2. 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.

5.5.3. Soil Expansiveness Classification

8 sets of soil tests were carried out on samples taken from likely foundation level on lots within this stage of the 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 within this stage of the development to be either M (moderate) or H1 (high). Details of foundation options for these Classes 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.

5.6. Topsoil Depths

Topsoil depths have been checked by the drilling of a borehole in the approximate centre of the building platform on each lot. The results are considered indicative for each lot, but may be subject to variations. Topsoil depths are between 50 and 300mm on this stage of the 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:



Greg Snook

Senior Engineering Geologist

Reviewed and 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, R.J 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 Stage 4 of the Kauri Grove Residential Development.
2. The extent of preliminary investigations carried out to date are described in the CMW Geotechnical Investigation Report referenced AKL2016_0046AA Rev. 1, dated 29 July 2015. 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) Apart from the area of uncertified filling on Lot 50 to 55, the earth fills shown on the appended As-built Cut to Fill Depth Contour Plan and As-built Undercut Depth Contour Plan have been placed in compliance with NZS 4431, the legacy Rodney District Council Plans, Auckland Council Code of Practice for Land Development and Subdivision and related documents.

Specific Design Consent Notice Zone – Uncontrolled Filling areas on lots 50 to 55 inclusive are depicted on the appended As-built Consent Notice Plan 2, referenced 1285-AB(STG-2)-PG104. The uncontrolled/uncertified filling was not placed or compacted to engineering standards. Any building development within this area will require specific investigation and foundation design prior to building Consent application.

- (b) **Flood Plain Consent Notice Zone** areas, determined as areas at finished levels lower than RL16.7m on lots 50, 51, 52, and 55 are designated no-build zones due to flooding risk. No building construction and no earthworks may take place in these areas.
 - (c) **Drainage Consent Notice Zone** areas on lots 1, 2, 1 to 16, 25 to 39, 50, 51, 53 and 54 inclusive are depicted on the appended As-built Consent Notice Plan 1 referenced 1285-AB(STG-2)-PG103 based on a 45 degree zone of influence from service lines. 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 COP1 - General Requirements and Procedures.

- (d) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on the building platforms for all lots.

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.

- (e) The expansive site Class for lots 1 to 7, 9 to 18, 31 to 39 and 52 to 55 inclusive have been assessed as AS2870 Class H1 (High). The expansive site Class for lots 19 to 30 and 50 to 51 inclusive have 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 5.5.3 of the Geotechnical Completion Report) for reference by foundation contractors.
- (f) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(a), 3(b), 3(c), 3(d), and 3(e) 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 for the appropriate expansive soil class 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 each residential lots.

For and on behalf of CMW Geosciences



Richard Knowles

Principal Geotechnical Engineer, CPEng

GCR Summary Table

Condition	Specific Design Consent Notice Zone - Uncontrolled Filling	Flood Plain Consent Notice Zone	Drainage Consent Notice Zone	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Indicative Topsoil Depth (mm)
GCR SOPO Clause	3(a)	3(b)	3(c)	3(d)	3(e)	
Lot number						
1			●	300	H1	200
2			●	300	H1	200
3				300	H1	300
4				300	H1	300
5				300	H1	300
6				300	H1	100
7				300	H1	100
9				300	H1	100
10				300	H1	250
11				300	H1	200
12				300	H1	300
13				300	H1	300
14			●	300	H1	200
15			●	300	H1	300
16			●	300	H1	300
17				300	H1	200
18				300	H1	300
19				300	M	200
20				300	M	300

21				300	M	200
22				300	M	300
23				300	M	300
24				300	M	200
25			●	300	M	200
26			●	300	M	200
27			●	300	M	200
28			●	300	M	200
29			●	300	M	200
30			●	300	M	200
31			●	300	H1	300
32			●	300	H1	200
33			●	300	H1	200
34			●	300	H1	200
35			●	300	H1	200
36			●	300	H1	200
37			●	300	H1	300
38			●	300	H1	250
39			●	300	H1	200
50	●	●	●	300	M	200
51	●	●	●	300	M	150
52	●	●		300	H1	100
53	●		●	300	H1	200
54	●		●	300	H1	200
55	●	●		300	H1	250

Appendix B

Drawings

Title	Reference No.	Date	Revision
Cover Sheet and Contents Page	1285 - PG101	FEB 2018	-
Existing Contours Plan	1285 - PG102	FEB 2018	-
As Built Consent Notice Plans	1285 - PG103 and PG104	FEB 2018	-
As Built Coordinate Tables	1285 - PG105	FEB 2018	-
As Built Contour Plan	1285 – EW201	FEB 2018	-
As Built Cut to Fill Depth Contour Plan	1285 – EW202	FEB 2018	-
As Built Undercut Depth Contour Plan	1285 – EW203	FEB 2018	-
As Built Road Index Plan	1285 – RD301	FEB 2018	-
As Built Roding Plan 1	1285 – RD302	FEB 2018	-
As Built Roding Plan 2	1285 – RD303	FEB 2018	-
As Built Road Cross Sections	1285 – RD304	FEB 2018	-
As Built Subgrade Undercuts Plan	1285 – RD305	FEB 2018	-
As Built Stormwater Plan 1	1285 – SW401	FEB 2018	-
As Built Stormwater Manhole Plan 1	1285 – SW402	FEB 2018	-
As Built Stormwater Plan 2	1285 – SW403	FEB 2018	-
As Built Stormwater Manhole Plan 2	1285 – SW404	FEB 2018	-
As Built Stormwater Plan 3	1285 – SW405	FEB 2018	-
As Built Wastewater Plan 1	1285 – WW501	FEB 2018	-

As Built Wastewater Plan 2	1285 – WW502	FEB 2018	-
As Built Water Supply Plan 1	1285 – WS601	FEB 2018	-
As Built Water Supply Plan 2	1285 – WS602	FEB 2018	-
Auckland Council SW22 Plan			
Watercare Drainage Extracts			

CABRA DEVELOPMENTS LIMITED
AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION
(STAGE 2) LEN IRELAND DRIVE, HUAPAI
SUB 60067200 ENG60069259



PRELIMINARY & GENERAL

PG101	COVER SHEET & CONTENTS PAGE
PG102	EXISTING CONTOUR PLAN
PG103-104	AS BUILT CONSENT NOTICE PLANS
PG105	AS BUILT COORDINATE TABLES

EARTHWORKS

EW201	AS BUILT CONTOUR PLAN
EW202	AS BUILT CUT TO FILL DEPTH CONTOUR PLAN
EW203	AS BUILT UNDERCUT DEPTH CONTOUR PLAN

ROADING

RD301	AS BUILT ROAD INDEX PLAN
RD302	AS BUILT ROADING PLAN 1
RD303	AS BUILT ROADING PLAN 2
RD304	AS BUILT ROAD CROSS SECTIONS
RD305	AS BUILT SUBGRADE UNDERCUT PLAN

STORMWATER

SW401	AS BUILT STORMWATER PLAN 1
SW402	AS BUILT STORMWATER MANHOLE PLAN 1
SW403	AS BUILT STORMWATER PLAN 2
SW404	AS BUILT STORMWATER MANHOLE PLAN 2
SW405	AS BUILT STORMWATER PLAN 3

COVER SHEET PG101

WASTEWATER

WW501	AS BUILT WASTEWATER PLAN 1
WW502	AS BUILT WASTEWATER PLAN 2

WATER SUPPLY

WS601	AS BUILT WATER SUPPLY PLAN 1
WS602	AS BUILT WATER SUPPLY PLAN 2



JOB NUMBER: 1285



NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM:
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

REV.		DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:1500 AT A3			CLIENT CABRA DEVELOPMENTS LIMITED Conditions of Use: <i>These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.</i>	SITE ADDRESS AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259		DRAWING NUMBER 1285-AB(STG-2)-PG102		 Ph: 09 426 6552 Web: www.aspeng.co.nz
						NAME	DATE	DRAWING TITLE EXISTING CONTOUR PLAN		DATE	REVISION			
						DESIGN	KC			02.18				
						DRAWN	KC			02.18				
						DRAWING CHECK	MJ			02.18				
						DESIGN CHECK	MJ	02.18						
						APPROVED	PF	02.18						



NOTE:
DRAINAGE CONSENT NOTICE ZONE ONLY
SHOWN OUTSIDE OF YARD BOUNDARIES:
3m FRONT YARD, 1m SIDE & REAR YARDS

LEGEND

-  DRAINAGE CONSENT
NOTICE ZONE
-  FLOOD PLAIN (RL 16.7m)
CONSENT NOTICE ZONE

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 

Chartered Professional Engineer

Date: 16 February 2018

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1500 AT A3
					NAME	DATE
					DESIGN	KC 02.18
					DRAWN	KC 02.18
					DRAWING CHECK	MJ 02.18
					DESIGN CHECK	MJ 02.18
					APPROVED	PF 02.18

CLIENT
CABRA DEVELOPMENTS LIMITED
Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259
DRAWING TITLE
AS BUILT CONSENT NOTICE PLAN 1

DRAWING NUMBER
1285-AB(STG-2)-PG103
DATE
FEB 2018
REVISION
-

ASPIRE CONSULTING ENGINEERS
Ph: 09 426 6552 Web: www.aspeng.co.nz



 DRAINAGE CONSENT NOTICE ZONE

 FLOOD PLAIN (RL 16.7m) CONSENT NOTICE ZONE

 SPECIFIC GEOTECHNICAL INVESTIGATION AND DESIGN CONSENT NOTICE ZONE

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 
Chartered Professional Engineer
Date: 16 February 2018
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1500 AT A3	
						NAME	DATE
					DESIGN	KC	02.18
					DRAWN	KC	02.18
					DRAWING CHECK	MJ	02.18
					DESIGN CHECK	MJ	02.18
					APPROVED	PF	02.18

CLIENT CABRA DEVELOPMENTS LIMITED	SITE ADDRESS AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259
Conditions of Use: <i>These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.</i>	DRAWING TITLE AS BUILT CONSENT NOTICE PLAN 2

DRAWING NUMBER 1285-AB(STG-2)-PG104	
DATE FEB 2018	REVISION -



Ph: 09 426 6552
Web: www.aspenq.co.nz

AS BUILT CO-ORDINATE TABLES

STORMWATER CESSPIT

COORDINATES		
POINTS	EASTING	NORTHING
AB-SWCP01	1736598.484	5930576.567
AB-SWCP02	1736584.605	5930589.535
AB-SWCP03	1736526.352	5930596.036
AB-SWCP04	1736605.100	5930568.827
AB-SWCP05	1736528.759	5930589.879
AB-SWCP06	1736595.204	5930512.487
AB-SWCP07	1736588.602	5930513.157
AB-SWCP08	1736505.042	5930520.194
AB-SWCP09	1736498.389	5930521.236
AB-SWCP10	1736571.794	5930447.607
AB-SWCP11	1736566.596	5930455.537
AB-SWCP12	1736581.616	5930434.507

STORMWATER MANHOLE

COORDINATES		
POINTS	EASTING	NORTHING
AB-SWMH-A01	1736535.772	5930447.171
AB-SWMH-A02	1736495.616	5930454.211
AB-SWMH-B03	1736589.157	5930596.562
AB-SWMH-B04	1736527.272	5930604.906
AB-SWMH-B05	1736503.405	5930589.850
AB-SWMH-B06	1736492.066	5930524.930
AB-SWMH-B07	1736484.289	5930479.820
AB-SWMH-B08	1736471.491	5930458.094
AB-SWMH-C03	1736618.370	5930569.513
AB-SWMH-C04	1736611.748	5930564.991
AB-SWMH-C05	1736582.078	5930518.842
AB-SWMH-C06	1736572.833	5930464.401
AB-SWMH-C07	1736569.677	5930446.822
AB-SWMH-C08	1736567.842	5930436.100
AB-SWMH-D01	1736565.714	5930423.205
AB-SWMH-D02	1736574.177	5930398.082
AB-SWMH-E01	1736591.258	5930568.913
AB-SWMH-E02	1736587.581	5930575.537
AB-SWMH-E03	1736558.107	5930580.767
AB-SWMH-E04	1736540.912	5930481.585

WASTEWATER FLUSHING PIT

COORDINATES		
POINTS	EASTING	NORTHING
AB-WWFP01	1736596.710	5930592.192
AB-WWFP02	1736592.204	5930560.596
AB-WWFP03	1736460.210	5930463.690

WATER SUPPLY FIRE HYDRANT

COORDINATES		
POINTS	EASTING	NORTHING
AB-WSFH01	1736587.782	5930594.714
AB-WSFH02	1736499.664	5930556.241
AB-WSFH03	1736479.365	5930476.056
AB-WSFH04	1736561.512	5930445.060
AB-WSFH05	1736585.025	5930522.026

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	N.T.S	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	 Ph: 09 426 6552 Web: www.aspeng.co.nz
									CABRA DEVELOPMENTS LIMITED	AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	1285-AB(STG-2)-PG105			
							DESIGN	KC 02.18						
							DRAWN	KC 02.18						
							DRAWING CHECK	MJ 02.18						
							DESIGN CHECK	MJ 02.18						
							APPROVED	PF 02.18				FEB 2018	-	
									Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE				
										AS BUILT COORDINATE TABLES				

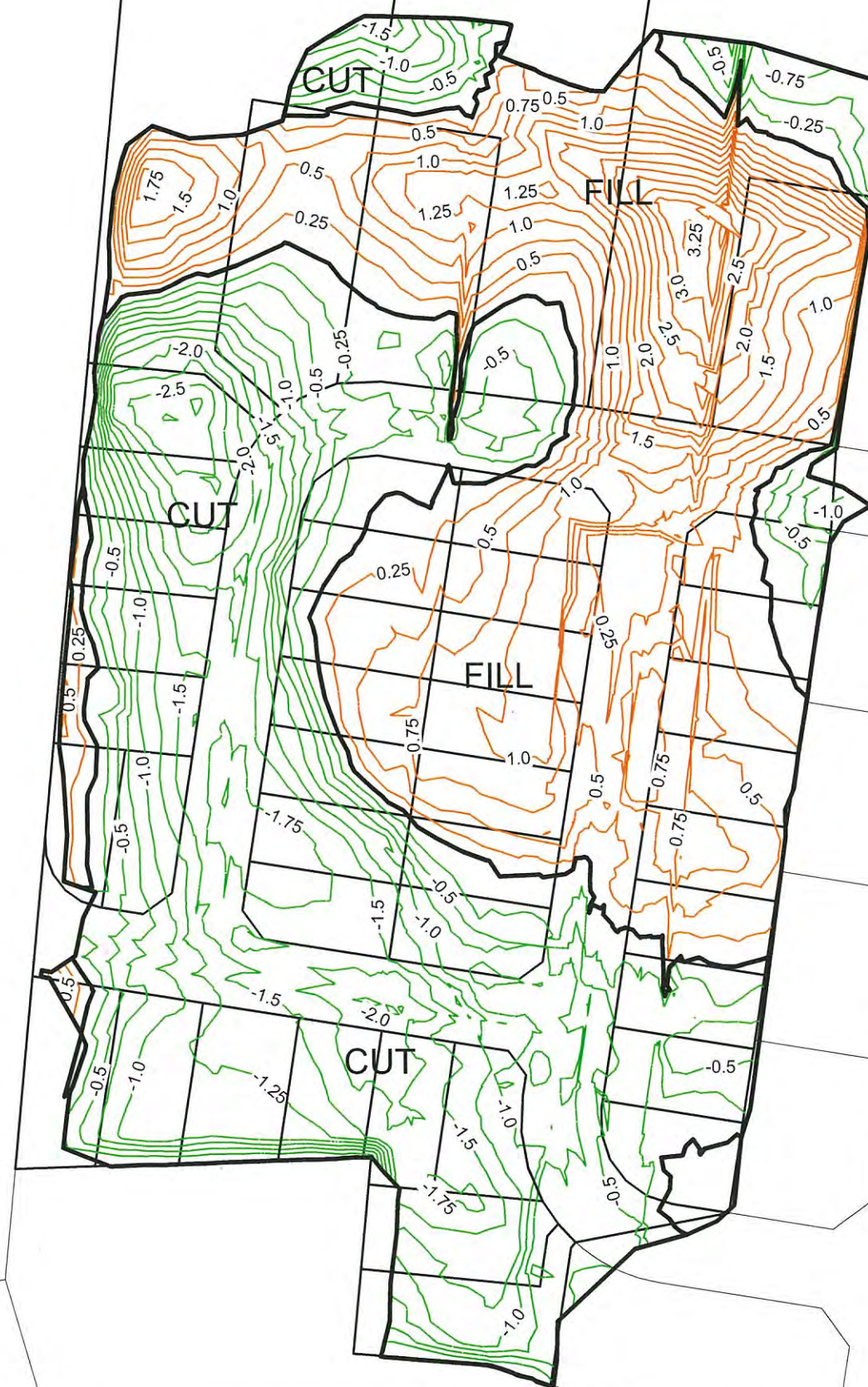


Signed: 
Chartered Professional Engineer
Date: 16 February 2018
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1500 AT A3		CLIENT CABRA DEVELOPMENTS LIMITED Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	SITE ADDRESS AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	DRAWING TITLE AS BUILT CONTOUR PLAN	DRAWING NUMBER 1285-AB(STG-2)-EW201	
						NAME	DATE				DATE	REVISION
					DESIGN	KC	02.18					
					DRAWN	KC	02.18					
					DRAWING CHECK	MJ	02.18					
					DESIGN CHECK	MJ	02.18					
					APPROVED	PF	02.18					



Ph: 09 426 6552
Web: www.aspeng.co.nz

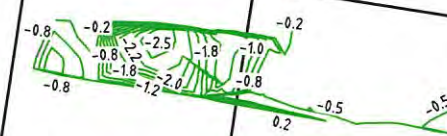


FILL VOLUME: 17,440m³
FILL AREA: 21,410m²
MAX FILL DEPTH: 3.6m

Email: evan@aspeng.co.nz

ASPIRE
CONSULTING ENGINEERS

Ph: 09 426 6552
Web: www.aspeng.co.nz



Three hand-drawn triangles are shown, each with its angles labeled:

- Isosceles Triangle:** The two base angles are labeled -0.4 and -0.4 . The top angle is labeled -0.4 .
- Equilateral Triangle:** All three angles are labeled -0.4 .
- Right-Angled Triangle:** One angle is labeled -0.4 , another is labeled -0.3 , and the third is labeled -0.3 .

A hand-drawn sketch of a roof profile. The profile is a continuous line with several peaks and valleys. The highest point on the left is labeled -0.4. There are two other points labeled -0.4, one in a valley and one on a lower slope. The highest point on the right is labeled -0.3. The lowest point on the right is labeled -0.4.

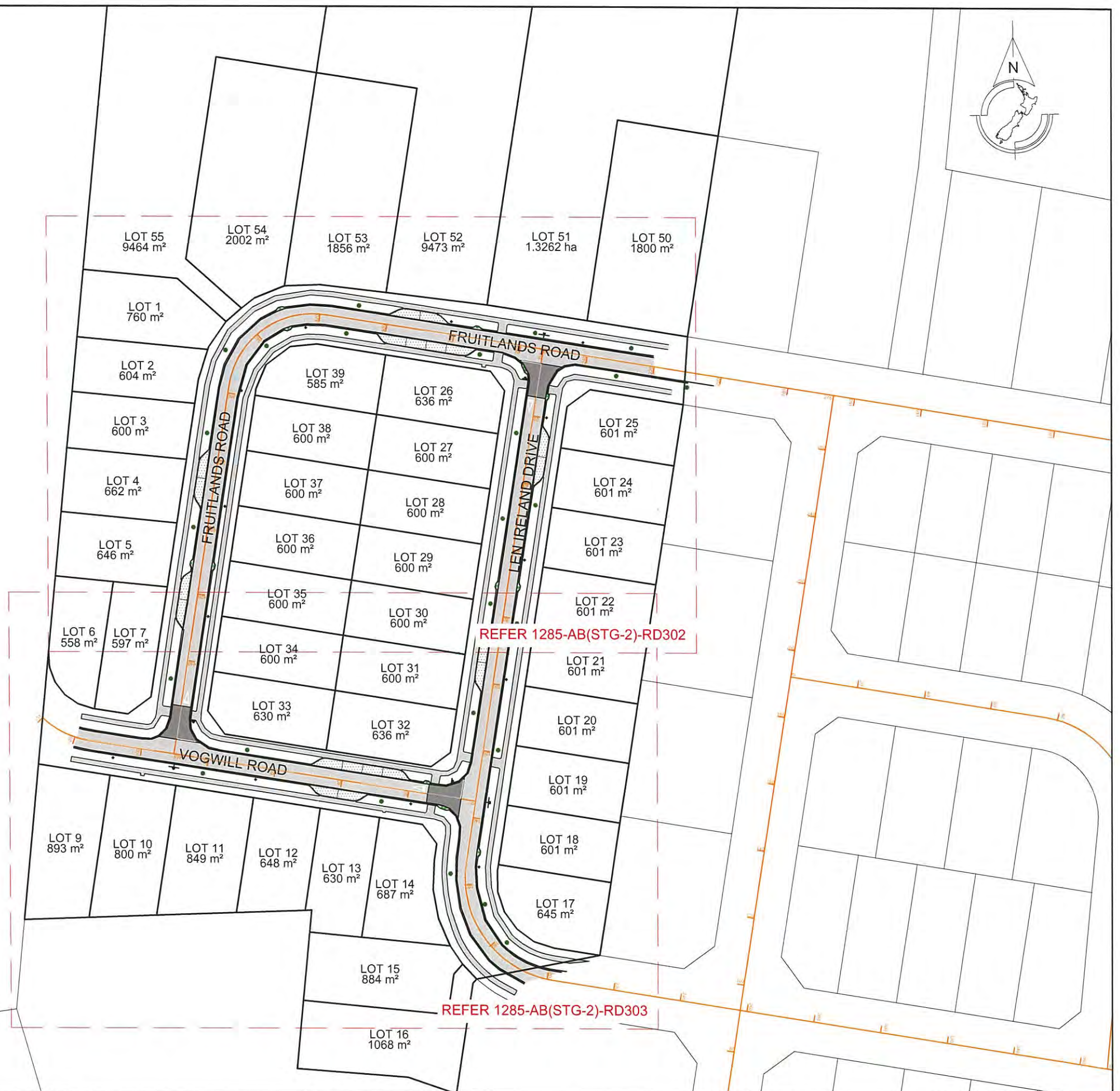


REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE 1:1000 AT A3		CLIENT CABRA DEVELOPMENTS LIMITED	SITE ADDRESS AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	DRAWING NUMBER 1285-AB(STG-2)-EW203	
					NAME	DATE				
					DESIGN	KC 02.18				
					DRAWN	KC 02.18				
					DRAWING CHECK	MJ 02.18				
					DESIGN CHECK	MJ 02.18	Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE AS BUILT UNDERCUT DEPTH CONTOUR PLAN	DATE FEB 2018	REVISION -
					APPROVED	PF 02.18				

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 
Chartered Professional Engineer
Date: 16 February 2018
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1250 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS
					DESIGN		KC	02.18	CABRA DEVELOPMENTS LIMITED	AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	1285-AB(STG-2)-RD301	FEB 2018	-	Ph: 09 426 6552 Web: www.aspeng.co.nz
					DRAWN		KC	02.18						
					DRAWING CHECK		MJ	02.18						
					DESIGN CHECK		MJ	02.18						
					APPROVED		PF	02.18						

Conditions of Use:
These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: _____

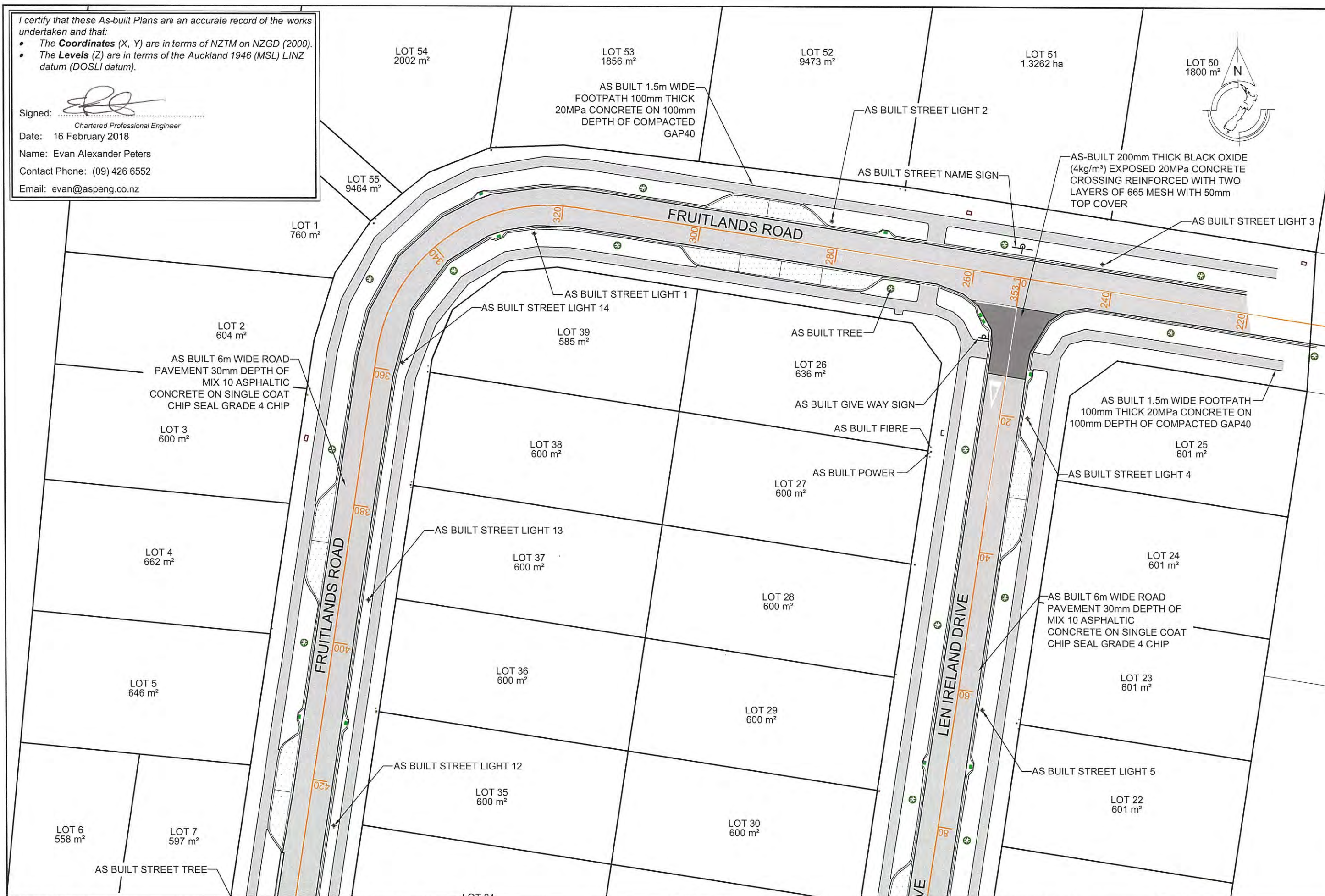
Chartered Professional Engineer

Date: 16 February 2018

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

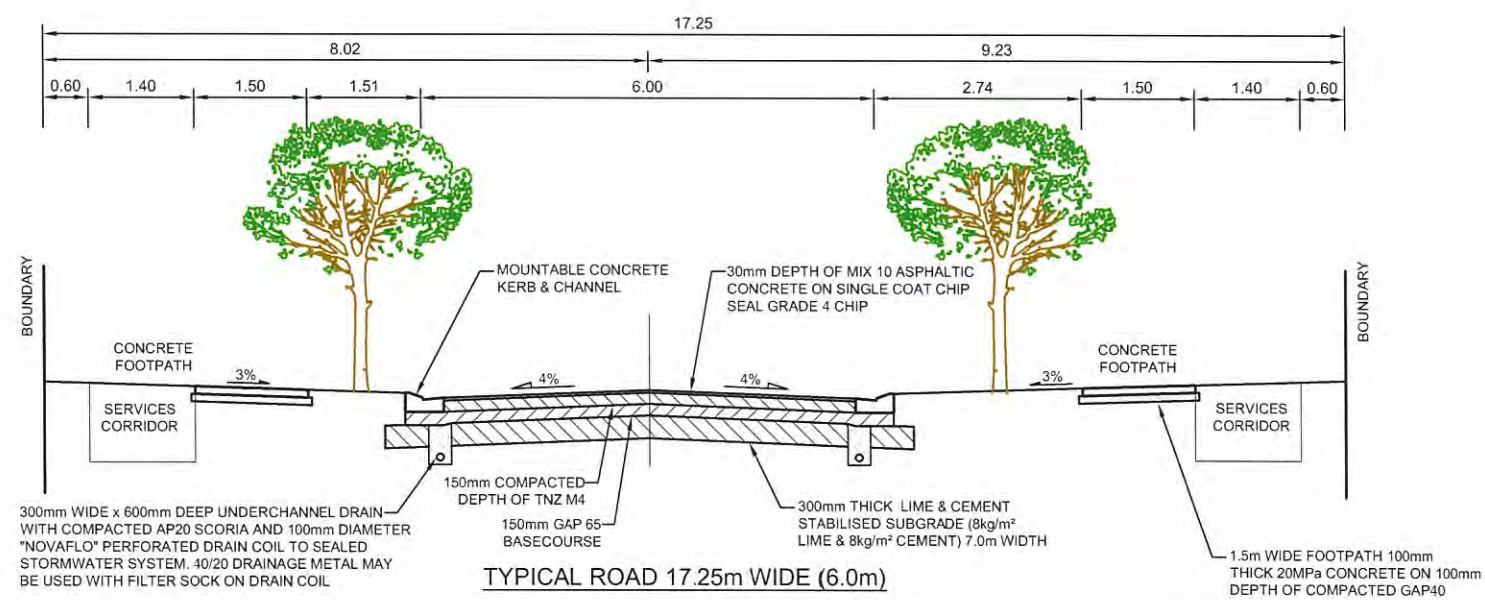
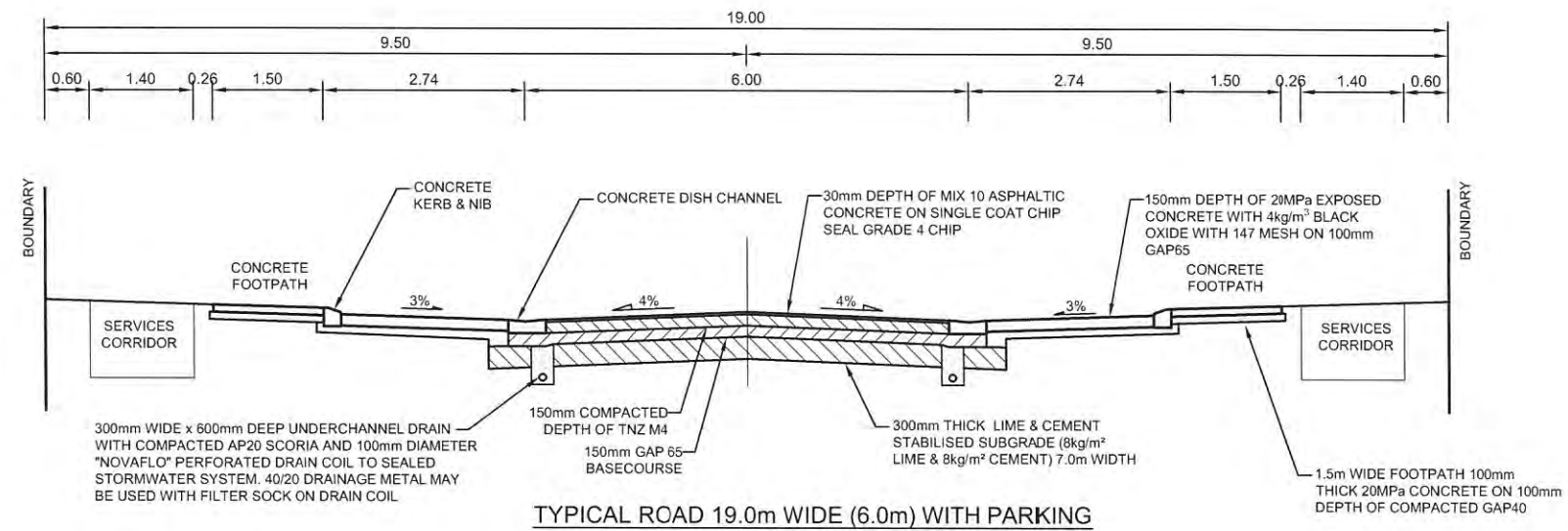
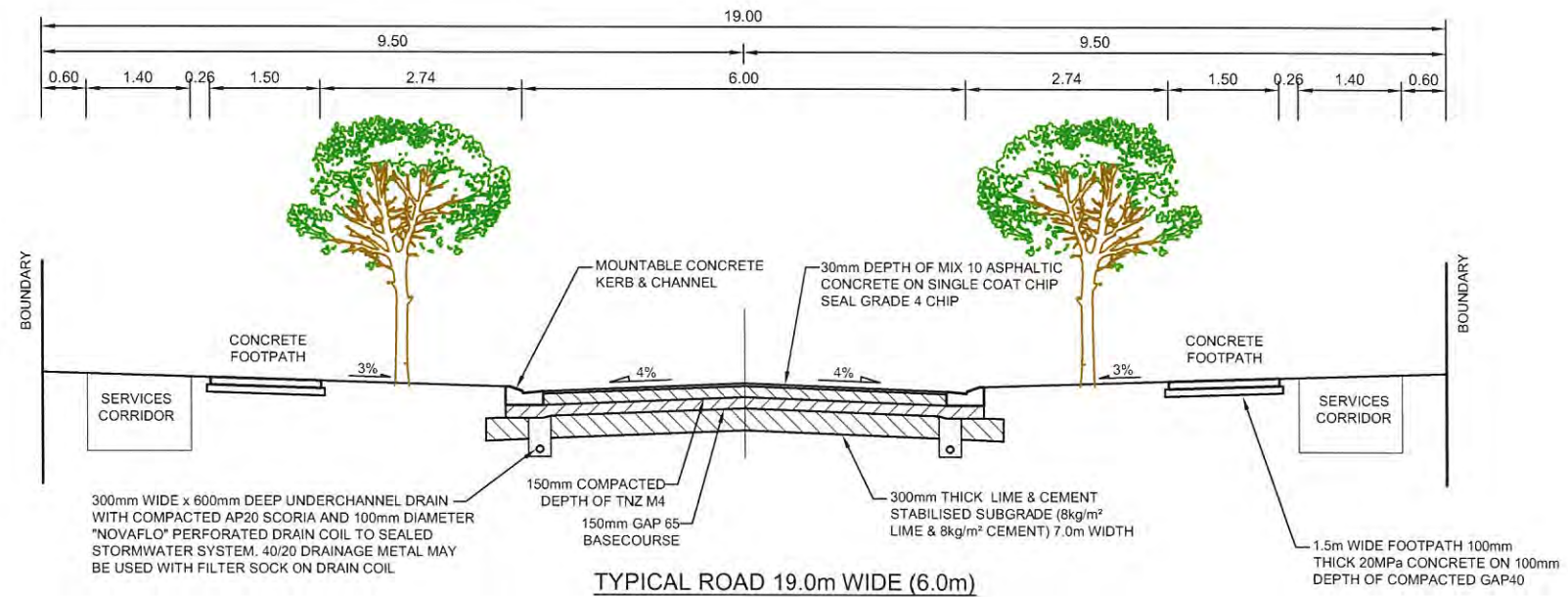


REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3
					NAME	DATE
					DESIGN	KC 02.18
					DRAWN	KC 02.18
					DRAWING CHECK	MJ 02.18
					DESIGN CHECK	MJ 02.18
					APPROVED	PF 02.18

CLIENT	CABRA DEVELOPMENTS LIMITED
SITE ADDRESS	AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259
DRAWING TITLE	AS BUILT ROADING PLAN 1

DRAWING NUMBER	1285-AB(STG-2)-RD302
DATE	FEB 2018
REVISION	-

ASPIRE
CONSULTING ENGINEERS
Ph: 09 426 6552
Web: www.aspeng.co.nz



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:100 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS
							CABRA DEVELOPMENTS LIMITED	AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	1285-AB(STG-2)-RD304	FEB 2018	-	Ph: 09 426 6552 Web: www.aspeng.co.nz
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	AS BUILT ROAD CROSS SECTIONS				

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 

Chartered Professional Engineer

Date: 16 February 2018

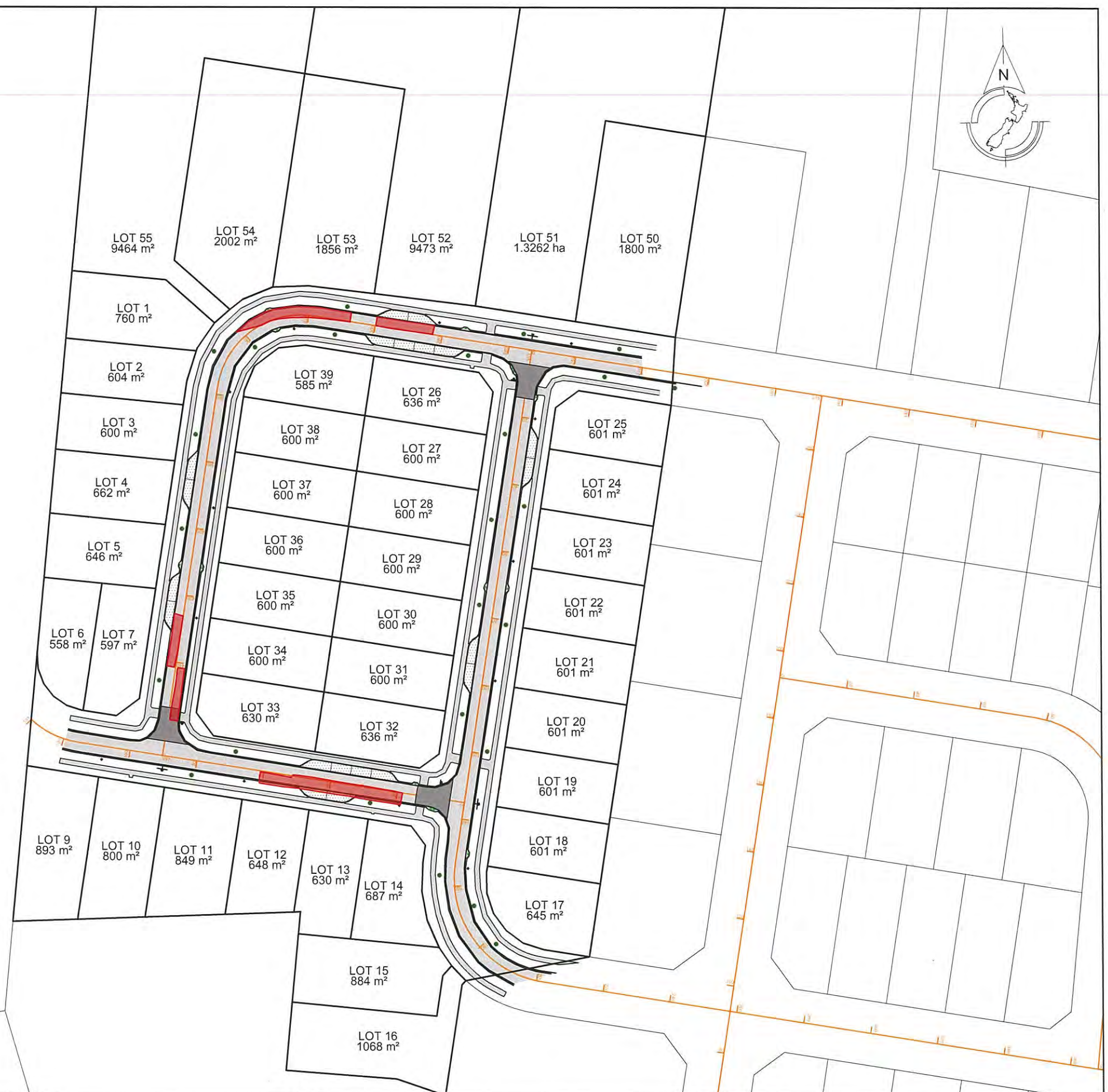
Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

LEGEND

 100mm-200mm DEEP
UNDERCUT BACKFILLED
WITH COMPACTED GAP 65
BASECOURSE



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1250 AT A3
					DESIGN	KC 02.18
					DRAWN	KC 02.18
					DRAWING CHECK	MJ 02.18
					DESIGN CHECK	MJ 02.18
					APPROVED	PF 02.18

CLIENT
CABRA DEVELOPMENTS LIMITED

Conditions of Use:
These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION
(STAGE 2) LEN IRELAND DRIVE, HUAPAI
ENG60069259

DRAWING TITLE
AS BUILT SUBGRADE UNDERCUT PLAN

DRAWING NUMBER
1285-AB(STG-2)-RD305

DATE	REVISION
FEB 2018	-

ASPIRE
CONSULTING ENGINEERS

Ph: 09 426 6552
Web: www.aspeng.co.nz

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: _____

Chartered Professional Engineer

Date: 16 February 2018

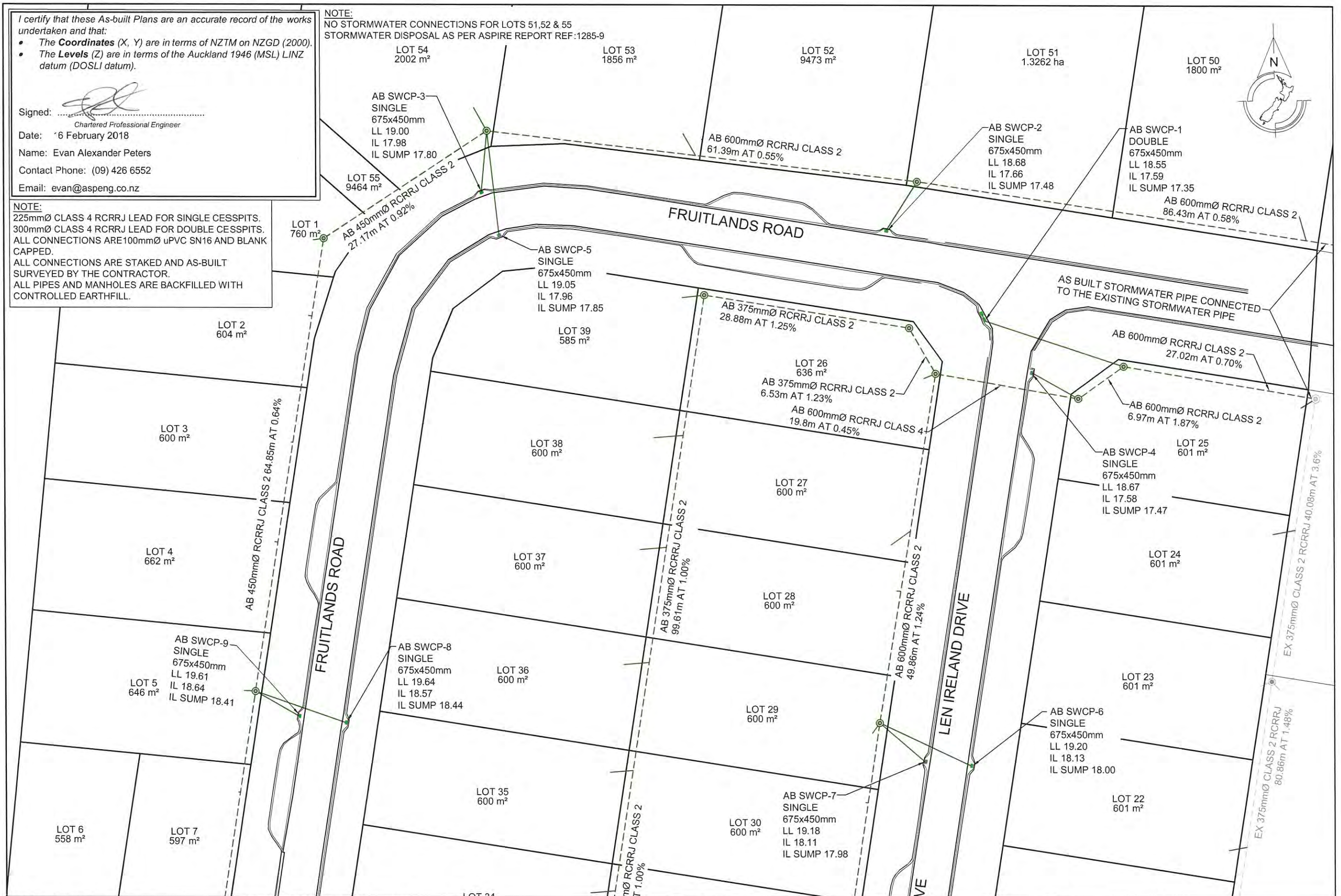
Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

NOTE:
225mmØ CLASS 4 RCRRJ LEAD FOR SINGLE CESSPITS.
300mmØ CLASS 4 RCRRJ LEAD FOR DOUBLE CESSPITS.
ALL CONNECTIONS ARE 100mmØ uPVC SN16 AND BLANK CAPPED.
ALL CONNECTIONS ARE STAKED AND AS-BUILT SURVEYED BY THE CONTRACTOR.
ALL PIPES AND MANHOLES ARE BACKFILLED WITH CONTROLLED EARTH FILL.

NOTE:
NO STORMWATER CONNECTIONS FOR LOTS 51, 52 & 55
STORMWATER DISPOSAL AS PER ASPIRE REPORT REF: 1285-9



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3
					NAME	DATE
					DESIGN	KC 02.18
					DRAWN	KC 02.18
					DRAWING CHECK	MJ 02.18
					DESIGN CHECK	MJ 02.18
					APPROVED	PF 02.18

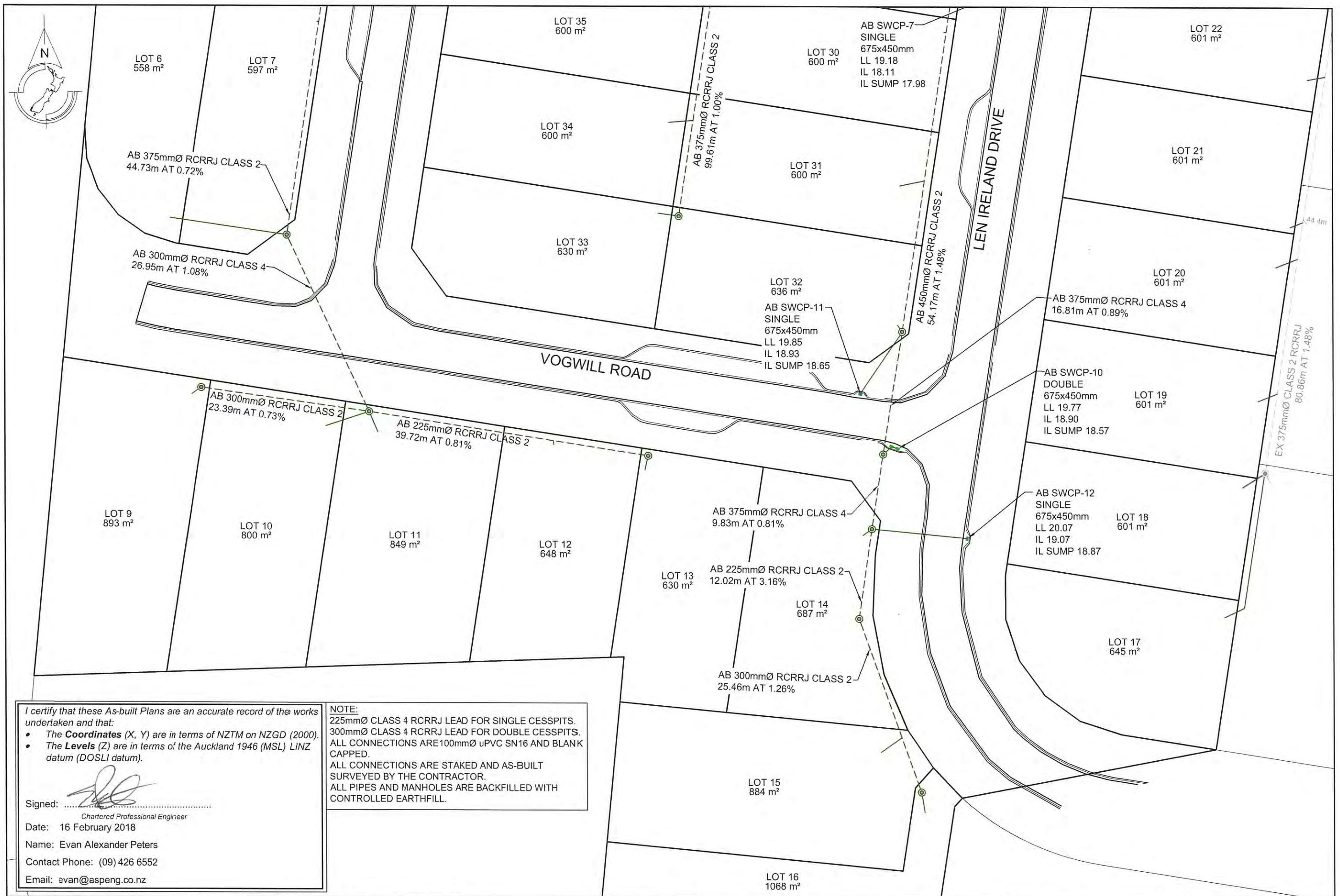
CLIENT
CABRA DEVELOPMENTS LIMITED
Conditions of Use.
These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259
DRAWING TITLE
AS BUILT STORMWATER PLAN 1

DRAWING NUMBER
1285-AB(STG-2)-SW401
DATE
FEB 2018
REVISION
-

ASPIRE
CONSULTING ENGINEERS

Ph: 09 426 6552
Web: www.aspeng.co.nz



I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 
Chartered Professional Engineer
Date: 16 February 2018
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

NOTE:
225mmØ CLASS 4 RCRRJ LEAD FOR SINGLE CESSPITS.
300mmØ CLASS 4 RCRRJ LEAD FOR DOUBLE CESSPITS.
ALL CONNECTIONS ARE 100mmØ uPVC SN16 AND BLANK CAPPED.
ALL CONNECTIONS ARE STAKED AND AS-BUILT SURVEYED BY THE CONTRACTOR.
ALL PIPES AND MANHOLES ARE BACKFILLED WITH CONTROLLED EARTHFILL.

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER
					DESIGN	KC	CABRA DEVELOPMENTS LIMITED	AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	1285-AB(STG-2)-SW403
					DRAWN	KC			
					DRAWING CHECK	MJ			
					DESIGN CHECK	MJ			
					APPROVED	PF			
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	DATE
								AS BUILT STORMWATER PLAN 2	FEB 2018
									REVISION
									-



Ph: 09 426 6552
Web: www.aspeng.co.nz



NOTE:
225mmØ CLASS 4 RCRRJ LEAD FOR SINGLE CESSPITS.
300mmØ CLASS 4 RCRRJ LEAD FOR DOUBLE CESSPITS.
ALL CONNECTIONS ARE 100mmØ uPVC SN16 AND BLANK CAPPED.
ALL CONNECTIONS ARE STAKED AND AS-BUILT SURVEYED BY THE CONTRACTOR.
ALL PIPES AND MANHOLES ARE BACKFILLED WITH CONTROLLED EARTHFILL.
NO STORMWATER CONNECTIONS FOR LOTS 51, 52 & 55
STORMWATER DISPOSAL AS PER ASPIRE REPORT REF:1285-9

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 
Chartered Professional Engineer
Date: 16 February 2018
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3
					NAME	DATE
					DESIGN	KC 02.18
					DRAWN	KC 02.18
					DRAWING CHECK	MJ 02.18
					DESIGN CHECK	MJ 02.18
					APPROVED	PF 02.18

CLIENT
CABRA DEVELOPMENTS LIMITED

Conditions of Use:
These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
**AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION
(STAGE 2) LEN IRELAND DRIVE, HUAPAI
ENG60069259**

DRAWING TITLE
AS BUILT STORMWATER MANHOLE PLAN 3

DRAWING NUMBER
1285-AB(STG-2)-SW405

DATE
FEB 2018

REVISION
-



Ph: 09 426 6552
Web: www.aspeng.co.nz

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Chartered Professional Engineer

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3	
						NAME	DATE
					DESIGN	KC	02.18
					DRAWN	KC	02.18
					DRAWING CHECK	MJ	02.18
					DESIGN CHECK	MJ	02.18
					APPROVED	PF	02.18

CLIENT

CABRA DEVELOPMENTS LIMITED

Conditions of Use,
These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION
(STAGE 2) LEN IRELAND DRIVE, HUAPAI
ENG60069259

DRAWING TITLE AS BUILT WASTEWATER PLAN 1

DRAWING NUMBER

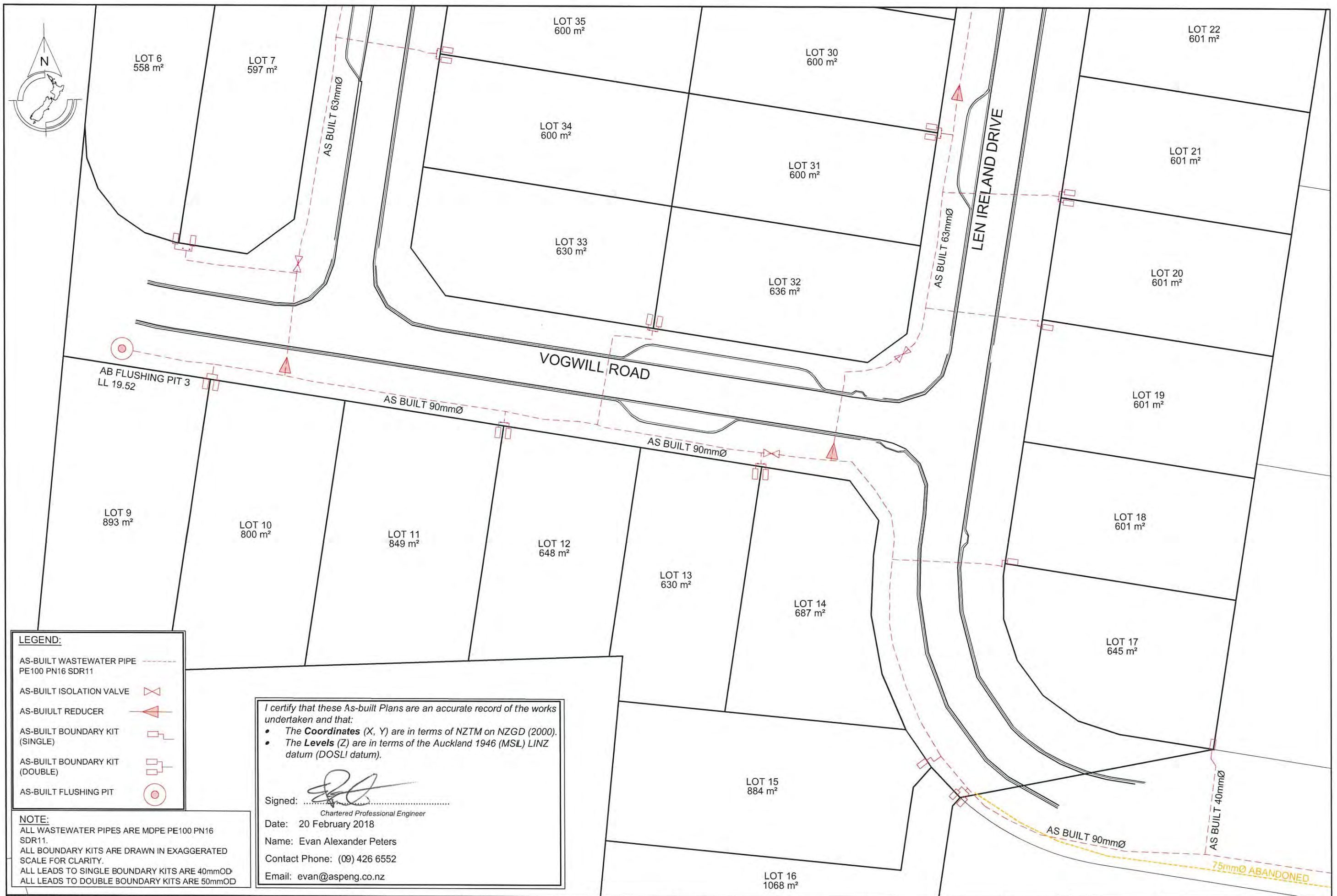
1285-AB(STG-2)-WW501

DATE
FEB 2018

REVISION



Ph: 09 426 6552
Web: www.aspeng.co.nz



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER
A	ABANDONED 75mmØ WASTEWATER PIPE ADDED	MJ	PF	20.02.18			CABRA DEVELOPMENTS LIMITED	AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	1285-AB(STG-2)-WW502
					DESIGN	KC 02.18			
					DRAWN	KC 02.18			
					DRAWING CHECK	MJ 02.18			
					DESIGN CHECK	MJ 02.18			
					APPROVED	PF 02.18			
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	DATE
								AS BUILT WASTEWATER PLAN 2	FEB 2018
									REVISION
									A

Ph: 09 426 6552
Web: www.aspeng.co.nz

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

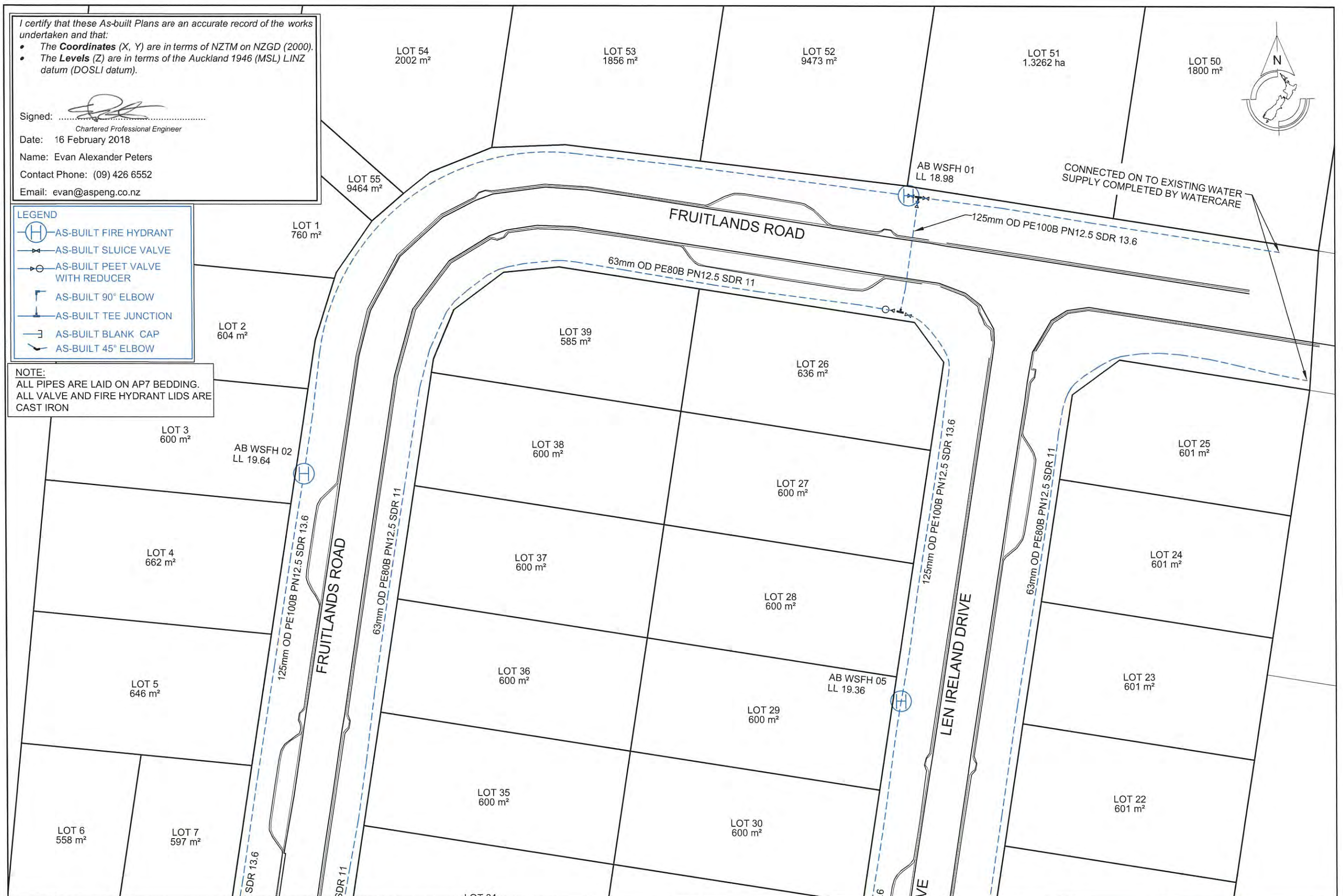
Chartered Professional Engineer

Name: Evan Alexander Peters

Email: evan@aspeng.co.nz

- AS-BUILT FIRE HYDRANT
- AS-BUILT SLUICE VALVE
- AS-BUILT PEET VALVE WITH REDUCER
- AS-BUILT 90° ELBOW
- AS-BUILT TEE JUNCTION
- AS-BUILT BLANK CAP
- AS-BUILT 45° ELBOW

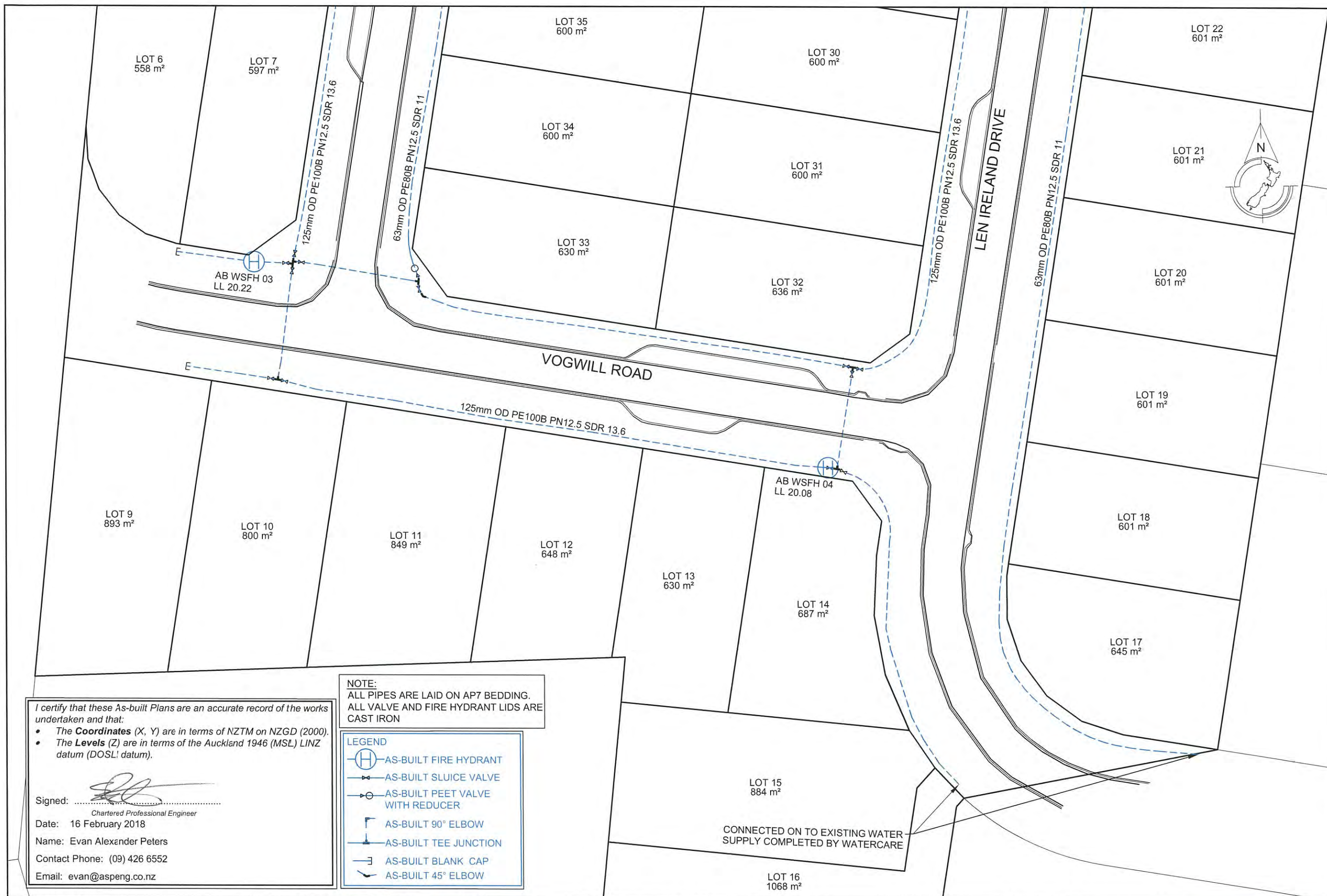
NOTE:
ALL PIPES ARE LAID ON AP7 BEDDING.
ALL VALVE AND FIRE HYDRANT LIDS ARE
CAST IRON



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3		CLIENT CABRA DEVELOPMENTS LIMITED	SITE ADDRESS AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259	DRAWING NUMBER 1285-AB(STG-2)-WS601		
						NAME	DATE			DRAWING TITLE AS BUILT WATER SUPPLY PLAN 1	DATE FEB 2018	REVISION -
					DESIGN	KC	02.18					
					DRAWN	KC	02.18					
					DRAWING CHECK	MJ	02.18	Conditions of Use: <i>These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.</i>				
					DESIGN CHECK	MJ	02.18					
					APPROVED	PF	02.18					

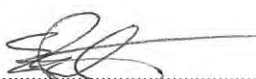


Ph: 09 426 6552
Web: www.aspenq.co.nz



I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000).
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSL datum).

Signed: 
Chartered Professional Engineer
Date: 16 February 2018
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

NOTE:
ALL PIPES ARE LAID ON AP7 BEDDING.
ALL VALVE AND FIRE HYDRANT LIDS ARE CAST IRON

- LEGEND
-  AS-BUILT FIRE HYDRANT
 -  AS-BUILT SLUICE VALVE
 -  AS-BUILT PEET VALVE WITH REDUCER
 -  AS-BUILT 90° ELBOW
 -  AS-BUILT TEE JUNCTION
 -  AS-BUILT BLANK CAP
 -  AS-BUILT 45° ELBOW

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3
					NAME	DATE
					DESIGN	KC 02.18
					DRAWN	KC 02.18
					DRAWING CHECK	MJ 02.18
					DESIGN CHECK	MJ 02.18
					APPROVED	PF 02.18

CLIENT
CABRA DEVELOPMENTS LIMITED
Conditions of Use:
These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
AS BUILT PLANS 44 LOT RESIDENTIAL SUBDIVISION (STAGE 2) LEN IRELAND DRIVE, HUAPAI ENG60069259
DRAWING TITLE
AS BUILT WATER SUPPLY PLAN 2

DRAWING NUMBER
1285-AB(STG-2)-WS602
DATE
FEB 2018
REVISION
-

ASPIRE
CONSULTING ENGINEERS

Ph: 09 426 6552
Web: www.aspeng.co.nz

Appendix C

Laboratory Test Data

Report No: 17 0286 00
Page: 1 of 1**DETERMINATION OF THE LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2 & 2.6**Job: **Matua Road**
Date of order: 3.11.17
Sample method: -
Sample By: ClientSample origin: -
Sample Description: -
Date: 31.10.17**Test Details :**Test performed on :
History :Whole Sample
Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
636F	Lots 5/6/7	-	107	25	43.6
637F	Lots 1/2	-	102	25	43.7
638F	Lots 10/11	-	112	29	48.1
639F	Lots 19/20	-	70	21	33.1
640F	Lots 23/24	-	64	18	27.3
641F	Lots 30/35	-	82	19	40.2
642F	Lots 27/38	-	75	18	38.5
643F	Lot 53	-	60	18	28.2

Comments :

Tested By:	EC	Date :	7.11.17
Calculated By :	EC	Date :	20.11.17
Checked By :	EC	Date :	21.11.17

Appendix D

Field Test Data

LF11 Rev 2 Field Density NDM Soil 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: 202, 218 & 224 Matua Road
Project No: AKI2016_0046
Location: Huapai
Report No: AKL2016_0046LAA Rev.0
Report Date: 20/05/2016
Client: Cabra Developments Limited
Client Address: PO Box 197 Orewa 0946
Client Reference:

Test Methods:
NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS4407.4.2.2:1991

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



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/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 (%)	
15/12/2015	N1	Gully fill			CLAY	UTP	>209	UTP	194	>205	1.8240	1.4240	28.1	7.13	300	28.7	2.7	1.42	6.8	
	N2	Gully fill			CLAY	164	172	187	>209	>183	1.8400	1.3726	34.1	2.27	300	34.6	2.7	1.36	2.1	
25/12/2015	N3	Gully fill			CLAY	>191	>191	>191	163	>184	1.8910	1.4400	31.3	1.40	300	31.2	2.7	1.44	1.7	
	N4	Gully fill			CLAY	>191	>191	>191	>191	>191	1.8950	1.4350	32.0	0.73	300	31.1	2.7	1.44	1.5	
30/12/2015	N5	Gully fill			CLAY	>191	>191	>191	>191	>191	1.8950	1.4150	33.9	-0.53	300	25.0	2.7	1.52	5.9	
	N6	Gully fill			CLAY	>191	>191	>191	>191	>191	1.9130	1.4960	27.9	2.76	300	26.7	2.7	1.50	3.7	
	N7	Gully fill			CLAY	177	>191	>191	156	>176	1.8270	1.3580	34.5	2.67	300	23.0	2.7	1.48	11.0	
	N8	Gully fill			CLAY	136	161	180	159	159	1.8600	1.4160	31.4	3.03	300	33.5	2.7	1.40	1.7	
	N9	Gully fill			CLAY	163	152	180	156	163	1.9050	1.4470	31.7	0.45	300	28.7	2.7	1.48	2.7	
	N10	Gully fill			CLAY	158	163	>191	>191	>176	1.8660	1.4110	32.3	2.09	300	29.0	2.7	1.44	4.5	
18/01/2016	N11	Southern Eastern gully			CLAY	82	97	116	119	104										
	N12	Southern Eastern gully			CLAY	105	140	100	146	123										
21/01/2016	N13	Eastern gully			CLAY	>209	164	157	140	>168	1.8752	1.4042	33.5	0.79	300	35.5	2.7	1.38	-0.4	
	N14	Eastern gully			CLAY	193	197	197	187	194	1.8857	1.4267	32.2	1.16	300	28.7	2.7	1.46	3.7	
22/01/2016	N15	North eastern gully			CLAY	146	>209	149	164	>167	1.7986	1.3128	37.0	2.69	300	33.9	2.7	1.34	4.7	
	N16	North eastern gully			CLAY	>209	>209	>209	>209	>209	1.7457	1.2624	38.3	4.80	300	39.0	2.7	1.26	4.5	
	N17	North eastern gully			CLAY	>209	>209	>209	>209	>209	1.7844	1.2967	37.6	3.09	300	36.2	2.7	1.32	4.1	
	N18	Eastern gully			CLAY	UTP	UTP	UTP	UTP	>209	1.8641	1.4128	31.9	2.44	300	30.2	2.7	1.44	3.7	
	N19	Eastern gully			CLAY	151	UTP	194	136	>173	1.9085	1.4474	31.9	0.18	300	27.6	2.7	1.50	3.3	
	N20	Eastern gully			CLAY	142	172	182	176	168	1.8106	1.3187	37.3	1.87	300	34.7	2.7	1.34	3.6	
26/01/2016	N21	Eastern gully			CLAY	UTP	UTP	UTP	UTP	>201	1.9148	1.4730	30.0	1.17	300	28.2	2.7	1.50	2.6	
	N22	North eastern gully			CLAY	UTP	UTP	UTP	UTP	>201	1.8730	1.4508	29.1	3.96	300	36.2	2.7	1.38	-0.7	
	N23	North eastern gully			CLAY	UTP	UTP	UTP	UTP	>201	1.8960	1.4502	30.7	1.61	300	25.6	2.7	1.50	5.4	
	N24	Southern Eastern gully			CLAY	UTP	179	194	>209	>198	1.8661	1.4202	31.4	2.71	300	31.5	2.7	1.42	2.8	
29/01/2016	N25	Southern Eastern gully			CLAY	UTP	>209	UTP	>209	>209	1.8658	1.4311	30.4	3.43	300	35.7	2.7	1.38	0.0	
	N26	Eastern gully			CLAY	>209	>209	>290	>209	>209	1.6733	1.1945	40.1	7.77	300	39.9	2.7	1.20	8.0	
	N27	Eastern gully			CLAY	151	>209	>209	146	>179	1.6188	1.0486	54.4	4.02	300	46.2	2.7	1.10	7.9	

This report should only be reproduced in full.

Created By: AP
Checked By: CS
Authorised Signatory: *John Myerett-Jones*
Date: 15/12/2015
Date: 20/05/2016
Date: 20/05/2016

AKL2016-0046

NDM test locations



NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM:
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND 1946

REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE 1:3000 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION
						DESIGN	PBF 05.2015	CABRA DEVELOPMENTS LIMITED	202, 218 & 224 MATUA ROAD HUAPAI	1138 - ENG - 03		
						DRAWN	PBF 05.2015					
						DRAWING CHECK	PBF 05.2015					
						DESIGN CHECK	NM 05.2015					
						APPROVED	NM 05.2015					
								Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS	MAY 2015		

ASPIRE
CONSULTING ENGINEERS

LF11 Rev 2 Field Density NDM Soil 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: 202, 218 & 224 Matua Road
Project No: AKI2016_0046
Location: Huapai
Report No: AKL2016_0046LAB Rev.0
Report Date: 20/05/2016
Client: Cabra Developments Limited
Client Address: PO Box 197 Orewa 0946
Client Reference:

Test Methods:
NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS4407.4.2.2:1991

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



Date Sampled	Sample No.	Test Location			Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
		Eastings	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 (%)	
29/01/2016	N28	North Eastern gully			CLAY	>209	>209	>209	>209	>209	1.8672	1.4611	27.8	5.18	300	29.3	2.7	1.44	4.2	
	N29	North Eastern gully			CLAY	>209	>209	>209	UTP	>209	1.9164	1.4903	28.6	2.10	300	28.1	2.7	1.50	2.5	
02/02/2016	N30	South Eastern gully			CLAY	UTP	UTP	UTP	UTP	>209	1.8026	1.3213	36.4	2.82	300	31.2	2.7	1.38	6.2	
	N31	South Eastern gully			CLAY	UTP	UTP	UTP	UTP	>209	1.8371	1.3606	35.0	1.82	300	36.2	2.7	1.34	1.2	
09/02/2016	N32	South Eastern gully			CLAY	>209	>209	179	166	>191	1.7941	1.3193	36.0	3.48	300	33.1	2.7	1.34	5.4	
	N33	South Eastern gully			CLAY	>209	164	184	131	>172	1.8324	1.2887	42.2	-2.22	300	36.3	2.7	1.34	1.4	
	N34	South Eastern gully			CLAY	>209	164	184	131	>172	1.8294	1.2965	41.1	-1.42	300	33.3	2.7	1.38	3.5	
12/02/2016	N35	Lot 14			CLAY	141	148	143	160	148	1.8429	1.3809	33.5	2.56	300	31.8	2.7	1.40	3.8	
15/02/2016	N36	Lot 14			CLAY	186	171	179	>198	>184	1.8089	1.3282	36.2	2.63	300	31.8	2.7	1.38	5.5	
	N37	North of Lot 14			CLAY	>198	184	UTP	191	>193	1.8575	1.3588	36.7	-0.30	300	33.8	2.7	1.38	1.7	
16/02/2016	N38	Lot 68			CLAY	>198	>198	UTP	UTP	>198										
	N39	Lot 75			CLAY	UTP	UTP	UTP	UTP	>198	1.8492	1.4002	32.1	3.14	300	27.3	2.7	1.46	6.5	
23/02/2016	N40	Lot 24			CLAY	134	142	120	155	138	1.8601	1.4169	31.3	3.10	300	31	2.7	1.42	3.4	
	N41	Lot 24			CLAY	92	123	124	130	117										Fail
	N42	Lot 14			CLAY	148	155	142	155	150	1.7747	1.2884	37.7	3.54	300	37.9	2.7	1.28	3.5	
03/03/2016	N43	Lot 14			CLAY	UTP	UTP	UTP	UTP	>198	1.9054	1.4270	33.5	-0.80	200	30.3	2.7	1.46	1.6	Below G.P. 1
	N44	Lot 14			CLAY	>209	>209	UTP	UTP	>198	1.8826	1.4362	31.1	2.07	300	28.9	2.7	1.46	3.7	
04/03/2016	N45	North Eastern Lot 24 and 54			CLAY						1.7874	1.2859	39.0	2.11	300	36.2	2.7	1.32	3.9	NOT IANZ ENGINEERED - 1.8 NOT CALIBRATED
	N46	Lot 57			CLAY						1.8979	1.4312	32.6	0.22	300	31.5	2.7	1.44	1.1	
10/03/2016	N47	Lot 52			Lime stabilised CLAY	167	167	>198	186	>180	1.8152	1.3913	30.5	5.99	300	33.2	2.7	1.36	4.3	
	N48	Lot 52			Lime stabilised CLAY	155	164	167	150	159	1.7922	1.3221	35.6	3.92	300	34.2	2.7	1.34	4.9	
11/03/2016	N49	Lot 52			Lime stabilised CLAY	>198	>198	>198	>198	>198	1.8079	1.3724	31.9	5.34	300	30.1	2.7	1.38	6.7	
	N50	Lot 52			Lime stabilised CLAY	>198	UTP	UTP	UTP	>198	1.8464	1.4534	27.2	6.78	300	28.9	2.7	1.44	5.6	
14/03/2016	N51	Lot 53			Lime stabilised CLAY	UTP	UTP	UTP	UTP	>198	1.8070	1.3448	34.4	3.87	300	35.1	2.7	1.34	3.5	
	N52	Lot 53			Lime stabilised CLAY	UTP	UTP	UTP	UTP	>198	1.8767	1.5507	21.0	9.90	300	28.2	2.7	1.46	4.5	
15/03/2016	N53	Lot 53			Lime stabilised CLAY	195	>198	>198	>198	>197	1.8109	1.3349	35.7	2.85	300	40.4	2.7	1.30	0.2	
	N54	Lot 53			Lime stabilised CLAY	UTP	UTP	UTP	UTP	UTP	1.8915	1.4729	28.4	3.50	300	23.4	2.7	1.54	7.4	

This report should only be reproduced in full.

Created By: AP
Checked By: CS
Authorised Signatory: *Jack Myerth-Johnson*

Date: 02/02/2016
Date: 20/05/2016
Date: 20/05/2016

NDM test locations



NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM:
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND 1946

REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE	13000 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	
							CABRA DEVELOPMENTS LIMITED	202, 218 & 224 MATUA ROAD HUAPAI	1138 - ENG - 03	
					DESIGN	NM 05.2015	Conditions of Use, These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS	DATE MAY 2015	
					DRAWN	PBF 05.2015				
					DRAWING CHECK	PBF 05.2015				
					DESIGN CHECK	NM 05.2015				
					APPROVED	NM 05.2015				
									REVISION	-

LF10 Rev 4 Soil Core Sample Density 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: 202, 218 & 224 Matua Road
Project No: AKI2016_0046
Location: Huapai
Report No: AKL2016_0046LAC Rev.0
Report Date: 20/05/2016
Client: Cabra Developments Limited
Client Address: PO Box 197 Orewa 0946
Client Reference:

Test Methods: NZS 4402:1986 5.1.3
NZS 4402:1986 2.1
Notes: Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff



Date Sampled	Sample No.	Test Location			Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data					Comments
		Easting	Northing	RI/Details		Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Bulk Density (t/m ³)	Dry Density (t/m ³)	Water Content (%)	Solid Density (t/m ³)	Calculated Air Voids (%)	
29/01/2016	C1	North Eastern gully			CLAY	151	>209	>209	146	>179	1.66	1.16	43.7	2.7	6.4	

This report should only be reproduced in full.

Created By: AP

Date: 29/01/2016

Checked By: CS

Date: 20/05/2016

Authorised Signatory: *Jack Myer-Johnson*

Date: 20/05/2016

Page: 1 of 1

AKL2016-0046

Core test locations



NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM.
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND 1946

REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE	1:3000 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION
									CABRA DEVELOPMENTS LIMITED	202, 218 & 224 MATUA ROAD HUAPAI	1138 - ENG - 03		
							DESIGN	PBF 05.2015	Conditions of Use, These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.				
							DRAWN	PBF 05.2015					
							DRAWING CHECK	PBF 05.2015					
							DESIGN CHECK	NM 05.2015					
							APPROVED	NM 05.2015					
									DRAWING TITLE		MAY 2015		
									CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS				



LF11 Rev 2 Field Density NDM Soil 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: 202, 218 & 224 Matua Road
Project No: AKI2016_0046
Location: Huapai
Report No: AKI2016_0046LAD Rev.0
Report Date: 20/05/2016
Client: Cabra Developments Limited
Client Address: PO Box 197 Orewa 0946
Client Reference:

Test Methods: NZS 4407.3.1:1991
NZS 4407.4.2.1:1991
NZS4407.4.2.2:1991

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



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 (%)	
15/03/2016	N55	Lot 55 south			Lime stabilised Sandy CLAY	155	158	>198	>198	>177	1.8782	1.4466	29.8	3.17	300	30.0	2.7	1.44	3.1	
	N56	Lot 55 south			Lime stabilised Sandy CLAY	153	155	158	164	158	1.8013	1.3793	30.6	6.63	300	28.1	2.7	1.40	8.4	
	N57	Lot 58			Lime stabilised CLAY	UTP	UTP	>198	>198	>198	1.8318	1.4177	29.2	5.99	300	25.8	2.7	1.46	8.5	
	N58	Lot 59 north			Lime stabilised Silty CLAY	195	169	198	198	190	1.7721	1.3313	33.1	6.51	300	32.5	2.7	1.34	7.0	
	N59	Lot 59 south			Lime stabilised Silty CLAY	150	169	184	198	175	1.8256	1.3672	33.5	3.42	300	30.1	2.7	1.40	5.8	
17/03/2016	N60	Lot 53 South			Lime stabilised Silty CLAY	UTP	UTP	UTP	UTP	>198	1.8664	1.4197	31.5	2.66	300	25.5	2.7	1.48	7.0	
	N61	Lot 53 North			Lime stabilised Silty CLAY	>198	>198	>198	>198	>198	1.8214	1.3773	32.2	4.48	300	26.7	2.7	1.44	8.4	
	N62	Lot 55 South			Lime stabilised Silty CLAY	UTP	UTP	UTP	UTP	>198	1.8472	1.4203	30.1	4.61	300	24.6	2.7	1.48	8.6	
	N63	Lot 55 North			Lime stabilised Silty CLAY	UTP	UTP	UTP	UTP	>198	1.8845	1.4477	30.2	2.60	300	32.2	2.7	1.42	1.3	
21/03/2016	N64	Lot 53 South			Lime stabilised Silty CLAY	UTP	UTP	UTP	UTP	>198	1.9145	1.5214	25.8	4.26	300	23.7	2.7	1.54	6.0	
22/03/2016	N65	Lot 53			Lime stabilised Silty CLAY	195	198	>198	>198	>197	1.8214	1.4250	27.8	7.49	300	27.0	2.7	1.44	8.2	
30/03/2016	N66	Lot 54			CLAY	UTP	UTP	UTP	UTP	>198	1.8990	1.4786	28.4	3.10	300	26.7	2.7	1.50	4.4	
31/03/2016	N67	Lot 53			CLAY	147	147	184	>198	>169	1.8701	1.3968	33.9	0.83	300	31.7	2.7	1.42	2.4	
	N68	Lot 54			CLAY	141	155	161	>198	>164	1.8307	1.3353	37.1	0.90	300	37.5	2.7	1.34	0.8	
5/04/2016	N69	Lot 53			Lime stabilised Silty CLAY	>198	>198	>198	>198	>198	1.8093	1.3649	32.6	4.91	300	33.5	2.7	1.36	4.4	
	N70	Road Undercut fill			Lime stabilised Silty CLAY	>198	>198	>198	>198	>198	1.7844	1.3514	32.0	6.55	300	31.4	2.7	1.36	7.1	
14/04/2016	N71	Lot 55			CLAY	>198	155	161	150	>166	1.8303	1.3561	35.0	2.25	300	38.0	2.7	1.32	0.5	
	N72	Lot 52			CLAY	178	186	>198	>198	>190	1.9197	1.4696	30.6	0.46	300	27.7	2.7	1.50	2.7	
26/04/2016	N73	North Eastern Gully			Sandy CLAY	178	155	161	147	160	1.8696	1.4267	31.0	2.77	300	21.8	2.7	1.54	9.7	
	N74	North Eastern Gully			Sandy CLAY	158	178	169	169	169	1.8656	1.4218	31.2	2.87	300	28.5	2.7	1.46	4.8	
	N75	North Eastern Gully			CLAY	>198	>198	UTP	UTP	>198	1.8312	1.4127	34.7	6.10	300	40.7	2.7	1.30	-1.2	

This report should only be reproduced in full.

Created By: AP
Checked By: CS
Authorised Signatory: *Jack Myrland-Johnson*

Date: 17/03/2016
Date: 20/05/2016
Date: *20/05/2016*

AKL 2016-0046

NDM test locations



NOTE:
ALL LEVELS
HORIZONTAL DATUM: AUCKLAND 1946
VERTICAL DATUM: AUCKLAND 1946

REV	DESCRIPTION	CHECK	APPD	DATE	SCALE	1:3000 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS
							CABRA DEVELOPMENTS LIMITED	202, 218 & 224 MATUA ROAD HUAPAI	1138 - ENG - 03			
							DESIGN PBF 05/2015					
							DRAWN PBF 05/2015					
							DRAWING CHECK PBF 05/2015					
							DESIGN CHECK NM 05/2015					
							APPROVED NM 05/2015					
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS	MAY 2015			

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No: AKL2016_0046LAF Rev 0
Project Name: 218 Matarua Road
Project Location: Huapai
Project Number: AKL2016_0046
Test Date: 16/09/2016
Client: Cabrita Developments Ltd
Client Address: PO Box 197 Onekaka 0946
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



Test No.	1		2		3		4		5	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	20/RHS		30/LHS		40/RHS		50/LHS		60/RHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	5	10	7	15	6	13	5	10	8	18
100 - 200	4	8	4	8	5	10	4	8	5	10
200 - 300	2	4	3	6	2	4	3	6	6	13
300 - 400	2	4	3	6	2	4	3	6	5	10
400 - 500	2	4	3	6	3	6	3	6	4	8
500 - 600	2	4	4	8	4	8	3	6	5	10
600 - 700	3	6	6	13	4	8	6	13	3	6
700 - 800	4	8	9	20	5	10	6	13	4	8
800 - 900	7	15	10	20+	7	15	8	18	4	8
900 - 1000										
Test No.	6		7		8		9		10	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	70/LHS		80/RHS		90/LHS		100/RHS		110/LHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	7	15	8	18	6	13	8	18	7	15
100 - 200	4	8	5	10	4	8	5	10	5	10
200 - 300	4	8	3	6	3	6	5	10	4	8
300 - 400	3	6	8	18	4	8	5	10	5	10
400 - 500	3	6	7	15	7	15	7	15	7	15
500 - 600	4	8	10	20+	10	20+	7	15	8	18
600 - 700	5	10	8	18	8	18	8	18	7	15
700 - 800	5	10	7	15	5	10	9	20	3	6
800 - 900	6	13	8	18	7	15	11	20+	3	6
900 - 1000										

Prepared by: AP

Date: 12/04/2016

Checked by: *JP*

Date: 13/04/2016

Authorised Signatory: *Just Nye-H*

Date: 19/04/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No: AKL2016_0016LAI Rev.0
Project Name: 218 Matarua Road
Project Location: Huapai
Project Number: AKL2016_0016
Test Date: 16/03/2016
Client: Cabira Developments Ltd
Client Address: PO Box 192 Orewa 0996
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



Test No.	11		12		13		14		15	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	120/RHS		130/LHS		140/RHS		150/LHS		160/RHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	6	13	6	13	7	15	8	18	9	20
100 - 200	5	10	6	13	9	20	8	18	7	15
200 - 300	3	6	5	10	3	6	7	15	4	8
300 - 400	6	13	5	10	5	10	7	15	4	8
400 - 500	7	15	9	20	6	13	5	10	4	8
500 - 600	7	15	12	20+	8	18	9	20	4	8
600 - 700	7	15	10	20+	8	18	8	18	7	15
700 - 800	8	18	6	13	8	18	3	6	4	8
800 - 900	7	15	9	20	9	20	4	8	4	8
900 - 1000										
Test No.	16		17		18		19		20	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	170/LHS		180/RHS		190/LHS		200/RHS		210/LHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	9	20	7	15	7	15	10	20+	7	15
100 - 200	5	10	8	18	6	13	5	10	8	18
200 - 300	6	13	5	10	5	10	3	6	3	6
300 - 400	3	6	3	6	2	4	3	6	3	6
400 - 500	4	8	2	4	1	2	3	6	3	6
500 - 600	4	8	2	4	3	6	3	6	3	6
600 - 700	4	8	1	2	3	6	3	6	4	8
700 - 800	3	6	2	4	3	6	3	6	2	4
800 - 900	3	6	2	4	5	10	4	8	3	6
900 - 1000										

Prepared by: AP

Checked by: JMS

Authorised Signatory: *Paul Myer*

Date: 12/04/2016

Date: 18/04/2016

Date: 19/04/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Page 2 of 4

LE34 Rev:5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1998

Report No:	AKI2016_0046LAF Rev.0	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 Name:	218 Matua Road	
Project Location:	Huonui	
Project Number:	AKI 2016_0046	
Test Date:	16/03/2016	
Client:	Cabra Developments Ltd	Testing Locations Selected By: CMW Field Staff
Client Address:	PO Box 197 Greys 0946	
Client Reference:		

Test No.	21		22		23		24		25	
Test Location	Road 2		Road 4		Road 4		Road 4		Road 4	
Chainage & Offset	220/RHS		10/RHS		20/LHS		30/RHS		40/LHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	7	15	6	13	11	20+	8	18	8	18
100 - 200	4	8	8	18	5	10	4	8	5	10
200 - 300	3	6	4	8	6	13	4	8	6	13
300 - 400	2	4	3	6	4	8	4	8	2	4
400 - 500	2	4	2	4	4	8	4	8	3	6
500 - 600	2	4	2	4	3	6	2	4	3	6
600 - 700	3	6	2	4	2	4	3	6	1	2
700 - 800	2	4	2	4	2	4	3	6	2	4
800 - 900	3	6	2	4	2	4	3	6	2	4
900 - 1000										

Test No.	26		27		28		29		30	
Test Location	Road 4		Road 4		Road 4		Road 4		Road 4	
Chainage & Offset	50/RHS		60/LHS		70/RHS		80/LHS		90/RHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	8	18	10	20+	6	13	9	20	7	15
100 - 200	4	8	5	10	6	13	8	18	4	8
200 - 300	3	6	5	10	3	6	4	8	2	4
300 - 400	7	15	5	10	5	10	7	15	3	6
400 - 500	3	6	4	8	4	8	5	10	5	10
500 - 600	4	8	3	6	5	10	4	8	4	8
600 - 700	2	4	2	4	3	6	4	8	4	8
700 - 800	3	6	3	6	4	8	4	8	5	10
800 - 900	2	4	3	6	4	8	6	13	3	6
900 - 1000										

Prepared by: AP

Checked by: *SMJ*

Authorised Signatory: *John Myer*

Date: 12/04/2016

Date: *13/04/2016*

Date: *17/04/2016*

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No: AK12016_0046LAE Rev.0
Project Name: 21R Matua Road
Project Location: Huapai
Project Number: AK12016_0046
Test Date: 16/04/2016
Client: Cairn Developments Ltd
Client Address: PO Box 197 Orongorangi 0946
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



Test No.	31		32		33		34		35	
Test Location	Road 4		Road 4		Road 4					
Chainage & Offset	100/LHS		110/RHS		120/LHS					
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	9	20	11	20+	12	20+				
100 - 200	6	13	8	18	7	15				
200 - 300	4	8	8	18	4	8				
300 - 400	5	10	4	8	4	8				
400 - 500	6	13	6	13	5	10				
500 - 600	5	10	6	13	4	8				
600 - 700	10	20+	5	10	5	10				
700 - 800	9	20	3	6	5	10				
800 - 900	6	13	7	15	9	20				
900 - 1000										
Test No.	36		37		38		39		40	
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: AP

Date: 12/04/2016

Checked by: JMS

Date: 18/04/2016

Authorised Signatory: *Paul Nybble*

Date: 19/04/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Page 4 of 4

Dynamic Cone Penetration (DCP) Test Report

NZS 4402.1:1996 6.5.2: 1988

Report No: AKL2016_0046LAF Rev.0
Project Name: 218 Mairua Road
Project Location: Huapai
Project Number: AKL2016_0046
Test Date: 17/09/2016
Client: Polysa Developments Ltd
Client Address: PO Box 197 Orewa 0946
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



Test No.	1		2		3		4		5	
Test Location	Road 4		Road 4		Road 4		Road 4		Road 4	
Chainage & Offset	130/RHS		140/LHS		150/RHS		160/LHS		170/RHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	8	18	11	20+	10	20+	9	20	15	20+
100 - 200	5	10	7	15	5	10	5	10	7	15
200 - 300	4	8	4	8	4	8	6	13	4	8
300 - 400	6	13	6	13	5	10	8	18	5	10
400 - 500	6	13	6	13	4	8	5	10	6	13
500 - 600	9	20	6	13	5	10	8	18	5	10
600 - 700	8	18	6	13	7	15	8	18	7	15
700 - 800	7	15	6	13	5	10	6	13	5	10
800 - 900	10	20+	9	20	5	10	5	10	6	13
900 - 1000										
Test No.	6		7		8		9		10	
Test Location	Road 4		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	180/LHS		220/RHS		230/LHS		240/RHS		250/LHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	7	15	8	18	11	20+	11	20+	10	20+
100 - 200	6	13	7	15	4	8	6	13	7	15
200 - 300	6	13	3	6	4	8	4	8	5	10
300 - 400	6	13	4	8	5	10	5	10	4	8
400 - 500	6	13	4	8	4	8	4	8	3	6
500 - 600	7	15	4	8	3	6	3	6	3	6
600 - 700	7	15	5	10	3	6	3	6	3	6
700 - 800	5	10	5	10	3	6	4	8	3	6
800 - 900	6	13	5	10	3	6	3	6	3	6
900 - 1000										

Prepared by: AP

Date: 12/04/2016

Checked by: Jms

Date: 18/4/2016

Authorised Signatory: John Mallett-Johnson

Date: 19/4/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Page 1 of 6

LF14 Rev.5 **Dynamic Cone Penetration (DCP) Test Report**
NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0046LAF Rev.0	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 Name:	218 Matarua Road	
Project Location:	Huapai	
Project Number:	AKL2016_0046	
Test Date:	17/01/2016	
Client:	Castle Developments Ltd	Testing Locations Selected By: CMW Field Staff
Client Address:	PO Box 197 Greyson 0946	
Client Reference:		

Test No.	11		12		13		14		15	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	260/RHS		280/LHS		290/RHS		300/LHS		310/RHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	10	20+	14	20+	7	15	13	20+	9	20
100 - 200	9	20	9	20	6	13	8	18	6	13
200 - 300	4	8	5	10	5	10	5	10	4	8
300 - 400	4	8	4	8	3	6	4	8	2	4
400 - 500	4	8	3	6	4	8	4	8	2	4
500 - 600	4	8	4	8	4	8	4	8	3	6
600 - 700	3	6	5	10	2	4	4	8	4	8
700 - 800	3	6	5	10	4	8	4	8	5	10
800 - 900	4	8	3	6	3	6	5	10	4	8
900 - 1000										

Test No.	16		17		18		19		20	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	320/LHS		330/RHS		340/LHS		350/RHS		360/LHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	8	18	10	20+	12	20+	11	20+	7	15
100 - 200	5	10	6	13	8	18	8	18	6	13
200 - 300	5	10	4	8	5	10	7	15	4	8
300 - 400	4	8	4	8	4	8	4	8	3	6
400 - 500	5	10	4	8	4	8	7	15	1	2
500 - 600	3	6	4	8	4	8	7	15	3	6
600 - 700	5	10	5	10	4	8	3	6	2	4
700 - 800	6	13	5	10	4	8	4	8	2	4
800 - 900	6	13	6	13	4	8	4	8	3	6
900 - 1000										

Prepared by: AP

Checked by: JN

Authorised Signatory: *Jack Myrland-John*

Date: 12/04/2016

Date: 18/4/2016

Date: 19/4/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTRROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2 1988

Report No:	AKL2016_0040LAF Rev.0	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 Name:	218 Motor Road	
Project Location:	Huapae	
Project Number:	AKL2016_0046	
Test Date:	17/04/2016	
Client:	Catara Development Ltd	Testing Locations Selected By: CMW Field Staff
Client Address:	PO Box 197 Oranui 0946	
Client Reference:		

Test No.	21			22			23			24			25		
Test Location	Road 3			Road 3			Road 3			Road 3			Road 3		
Chainage & Offset	370/RHS			380/LHS			390/RHS			400/LHS			410/RHS		
Material & Layer:	Lime stab CLAY/Subgrade			Lime stab CLAY/Subgrade			Lime stab CLAY/Subgrade			Lime stab CLAY/Subgrade			Lime stab 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	9	20		12	20+		8	18		8	18		7	15	
100 - 200	5	10		6	13		6	13		4	8		4	8	
200 - 300	5	10		5	10		4	8		4	8		3	6	
300 - 400	5	10		6	13		4	8		4	8		3	6	
400 - 500	7	15		4	8		3	6		2	4		4	8	
500 - 600	5	10		4	8		4	8		4	8		4	8	
600 - 700	2	4		4	8		4	8		4	8		4	8	
700 - 800	3	6		5	10		5	10		4	8		4	8	
800 - 900	3	6		5	10		7	15		6	13		6	13	
900 - 1000															
Test No.	26			27			28			29			30		
Test Location	Road 3			Road 1			Road 1			Road 1			Road 1		
Chainage & Offset	420/LHS			10/RHS			20/LHS			30/RHS			40/LHS		
Material & Layer:	Lime stab CLAY/Subgrade			Lime stab CLAY/Subgrade			Lime stab CLAY/Subgrade			Lime stab CLAY/Subgrade			Lime stab 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	7	15		8	18		7	15		6	13		11	20+	
100 - 200	4	8		7	15		5	10		5	10		5	10	
200 - 300	2	4		5	10		3	6		4	8		4	8	
300 - 400	2	4		6	13		4	8		6	13		7	15	
400 - 500	3	6		5	10		6	13		4	8		5	10	
500 - 600	2	4		3	6		4	8		7	15		5	10	
600 - 700	4	8		3	6		4	8		5	10		5	10	
700 - 800	4	8		3	6		2	4		5	10		3	6	
800 - 900	3	6		3	6		4	8		7	15		4	8	
900 - 1000															

Prepared by: AP

Checked by: *AMS*

Authorised Signatory: *John Myerell-fh*

Date: 12/04/2016

Date: 18/4/2016

Date: 19/4/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTRROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	APL2016_0046LAF Rev.0	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 Name:	718 Matua Road	
Project Location:	Huipai	Testing Locations Selected By: CMW Field Staff 
Project Number:	APL2016_0046	
Test Date:	17/03/2016	
Client:	Calbra Developments Ltd	
Client Address:	PO Box 197 Orewa 0946	
Client Reference:		

Test No.	31		32		33		34		35	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	50/RHS		60/LHS		70/RHS		80/CL		90/CL	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	13	20+	10	20+	15	20+	12	20+	10	20+
100 - 200	7	15	5	10	6	13	7	15	9	20
200 - 300	8	18	5	10	5	10	4	8	4	8
300 - 400	5	10	5	10	5	10	6	13	4	8
400 - 500	4	8	3	6	4	8	5	10	4	8
500 - 600	3	6	4	8	3	6	4	8	4	8
600 - 700	5	10	4	8	3	6	4	8	3	6
700 - 800	7	15	4	8	3	6	3	6	3	6
800 - 900	6	13	4	8	5	10	5	10	4	8
900 - 1000										

Test No.	36		37		38		39		40	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	100/CL		110/RHS		120/LHS		130/RHS		140/LHS	
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	12	20+	9	20	7	15	7	15	8	18
100 - 200	5	10	7	15	5	10	6	13	4	8
200 - 300	4	8	4	8	5	10	6	13	3	6
300 - 400	3	6	3	6	3	6	6	13	3	6
400 - 500	5	10	4	8	4	8	4	8	3	6
500 - 600	4	8	3	6	3	6	4	8	3	6
600 - 700	5	10	2	4	3	6	4	8	4	8
700 - 800	4	8	2	4	3	6	4	8	5	10
800 - 900	6	13	3	6	5	10	4	8	8	18
900 - 1000										

Prepared by: AP Checked by: Jms Authorised Signatory:	Date: 12/04/2016 Date: 13/04/2016 Date: 19/04/2016	This report should only be reproduced in full *Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils. Page 4 of 6
---	--	--

		(F14 Rev.3) Dynamic Cone Penetration (DCP) Test Report NZS 4402: test 6.5.2: 1988									
Report No: ARL 2016_0046/AF Rev.0 Project Name: 218 Mataua Road Project Location: Huapai Project Number: ARL 2016_0946 Test Date: 17/03/2016 Client: Cahra Developments Ltd Client Address: PO Box 197 Orewa 0946 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 									
Test No.	41		42		43		44		45		
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1		
Chainage & Offset	150/RHS		160/LHS		170/RHS		180/LHS		190/RHS		
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	7	15	12	20+	9	20	8	18	8	18	
100 - 200	5	10	7	15	7	15	6	13	8	18	
200 - 300	3	6	6	13	3	6	4	8	3	6	
300 - 400	3	6	6	13	4	8	4	8	5	10	
400 - 500	3	6	5	10	3	6	5	10	4	8	
500 - 600	3	6	4	8	5	10	6	13	6	13	
600 - 700	3	6	4	8	6	13	4	8	5	10	
700 - 800	4	8	4	8	6	13	5	10	3	6	
800 - 900	5	10	4	8	6	13	5	10	3	6	
900 - 1000											
Test No.	46		47		48		49		50		
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1		
Chainage & Offset	200/LHS		210/RHS		220/LHS		230/RHS		240/LHS		
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab CLAY/Subgrade		Lime stab 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	8	18	6	13	6	13	6	13	5	10	
100 - 200	6	13	6	13	3	6	3	6	4	8	
200 - 300	5	10	3	6	3	6	4	8	3	6	
300 - 400	4	8	2	4	2	4	2	4	2	4	
400 - 500	2	4	2	4	2	4	2	4	2	4	
500 - 600	3	6	1	2	2	4	2	4	2	4	
600 - 700	3	6	1	2	2	4	1	2	2	4	
700 - 800	3	6	2	4	2	4	1	2	3	6	
800 - 900	4	8	2	4	2	4	2	4	3	6	
900 - 1000											
Prepared by: AP Checked by: <i>JMS</i> Authorised Signatory: <i>Jack Myer</i>						Date: 12/04/2016 Date: 18/04/2016 Date: 19/04/2016					
						This report should only be reproduced in full *Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils. Page 5 of 6					

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0096LAF Rev 0
Project Name: 218 Marua Road
Project Location: Huapai
Project Number: AKL2016_0096
Test Date: 17/03/2016
Client: Colura Developments Ltd
Client Address: PO Box 197 Grewa 0946
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



Test No.	51		52		53		54		55	
Test Location	Road 1		Road 1							
Chainage & Offset	250/RHS		260/LHS							
Material & Layer:	Lime stab CLAY/Subgrade		Lime stab 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	7	15	7	15						
100 - 200	6	13	5	10						
200 - 300	3	6	3	6						
300 - 400	2	4	3	6						
400 - 500	2	4	3	6						
500 - 600	2	4	2	4						
600 - 700	2	4	2	4						
700 - 800	1	2	2	4						
800 - 900	1	2	3	6						
900 - 1000										
Test No.	56		57		58		59		60	
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: AP

Date: 12/04/2016

Checked by: JMS

Date: 18/04/2016

Authorised Signatory: JMS

Date: 19/04/2016

This report should only be reproduced in full

*Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils.

Page 6 of 6

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

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0046LAG Rev.0
Project Name: 218 Matua Road
Project Location: Huapai
Project Number: AKL2016_0046
Test Date: 6/06/2017
Tested By: KP / TG
Client: Cabra Developments Ltd
Client Address: PO Box 197 Orewa 0946
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



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 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH0 Centre		CH10 Left		CH20 Right		CH30 Left		CH40 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	5	10	5	10	3	6	2	4	3	6
100 - 200	4	8	5	10	4	8	3	6	2	4
200 - 300	3	6	2	4	2	4	4	8	3	6
300 - 400	2	4	1	2	3	6	4	8	2	4
400 - 500	2	4	2	4	3	6	5	10	3	6
500 - 600	2	4	2	4	3	6	6	13	4	8
600 - 700	2	4	2	4	5	10	8	18	4	8
700 - 800	3	6	3	6	5	10	7	15	7	15
800 - 900	2	4	3	6	6	13	7	15	8	18
900 - 1000										
Test No.	6		7		8		9		10	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH50 Left		CH60 Right		CH70 Left		CH80 Right		CH90 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	4	8	4	8	4	8	4	8	4	8
100 - 200	3	6	4	8	6	13	4	8	4	8
200 - 300	3	6	4	8	5	10	4	8	2	4
300 - 400	2	4	2	4	2	4	2	4	2	4
400 - 500	3	6	2	4	3	6	2	4	2	4
500 - 600	3	6	3	6	3	6	4	8	3	6
600 - 700	5	10	3	6	4	8	4	8	3	6
700 - 800	5	10	4	8	5	10	5	10	4	8
800 - 900	6	13	6	13	6	13	5	10	5	10
900 - 1000										

Prepared by: TG Date: 7/06/2017
Checked by: TG Date: 8/06/2017
Authorised Signatory: *Greg Snodgrass* Date: 8/06/2017

This report should only be reproduced in full

*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.

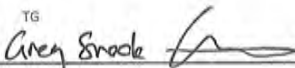
LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0046LAG Rev.0	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 Name:	218 Matua Road		
Project Location:	Huapai		
Project Number:	AKL2016_0046		
Test Date:	6/06/2017	Testing Locations Selected By: CMW Field Staff	
Tested By:	KP / TG	 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	
Client:	Cabra Developments Ltd		
Client Address:	PO Box 197 Orewa 0946		
Client Reference:			

Test No.	11		12		13		14		15	
Test Location	Road 1		Road 1		Road 1		Vogwill Crescent		Vogwill Crescent	
Chainage & Offset	CH100 Right		CH110 Left		CH120 Right		CH0 Left		CH10 Left	
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	3	6	4	8	3	6
100 - 200	3	6	3	6	4	8	4	8	4	8
200 - 300	3	6	4	8	3	6	2	4	4	8
300 - 400	2	4	2	4	2	4	2	4	2	4
400 - 500	3	6	2	4	2	4	2	4	2	4
500 - 600	2	4	2	4	2	4	3	6	2	4
600 - 700	3	6	3	6	2	4	3	6	4	8
700 - 800	2	4	3	6	3	6	4	8	4	8
800 - 900	3	6	2	4	2	4	5	10	4	8
900 - 1000										

Test No.	16		17		18		19		20	
Test Location	Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent	
Chainage & Offset	CH20 Right		CH30 Left		CH40 Right		CH50 Left		CH60 Right	
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	5	10	4	8
100 - 200	4	8	4	8	4	8	6	13	4	8
200 - 300	4	8	2	4	4	8	4	8	3	6
300 - 400	3	6	2	4	2	4	2	4	2	4
400 - 500	3	6	3	6	3	6	4	8	4	8
500 - 600	4	8	4	8	3	6	3	6	4	8
600 - 700	6	13	6	13	5	10	4	8	6	13
700 - 800	6	13	6	13	5	10	6	13	6	13
800 - 900	6	13	7	15	4	8	6	13	6	13
900 - 1000										

Prepared by: TG Checked by: TG Authorised Signatory: 		Date: 7/06/2017 Date: 8/06/2017 Date: 8/06/2017		This report should only be reproduced in full *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. Page 2 of 7
--	--	---	--	--

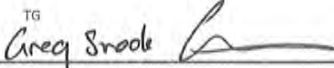
LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0046LAG Rev.D	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 Name:	218 Matua Road	Testing Locations Selected By: CMW Field Staff  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
Project Location:	Huapai	
Project Number:	AKL2016_0046	
Test Date:	6/06/2017	
Tested By:	KP / IG	
Client:	Cobra Developments Ltd	
Client Address:	PO Box 197 Orewa 0946	
Client Reference:		

Test No.	21		22		23		24		25	
Test Location	Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent	
Chainage & Offset	CH70 Left		CH80 Right		CH90 Left		CH100 Right		CH110 Left	
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	5	10	6	13	5	10	4	8	3	6
100 - 200	4	8	6	13	4	8	11	20+	5	10
200 - 300	4	8	3	6	3	6	10	20+	6	13
300 - 400	2	4	2	4	3	6	4	8	3	6
400 - 500	4	8	4	8	4	8	4	8	2	4
500 - 600	4	8	4	8	4	8	4	8	2	4
600 - 700	5	10	5	10	5	10	3	6	2	4
700 - 800	6	13	6	13	5	10	3	6	4	8
800 - 900	5	10	6	13	4	8	3	6	4	8
900 - 1000										

Test No.	26		27		28		29		30	
Test Location	Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent	
Chainage & Offset	CH120 Right		CH130 Left		CH140 Right		CH150 Left		CH160 Right	
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	4	8	4	8	4	8	4	8	4	8
100 - 200	4	8	4	8	4	8	4	8	2	4
200 - 300	3	6	3	6	4	8	2	4	2	4
300 - 400	3	6	2	4	2	4	2	4	4	8
400 - 500	3	6	3	6	2	4	2	4	3	6
500 - 600	3	6	4	8	2	4	4	8	2	4
600 - 700	3	6	4	8	3	6	4	8	3	6
700 - 800	3	6	4	8	2	4	4	8	4	8
800 - 900	4	8	4	8	3	6	4	8	4	8
900 - 1000										

Prepared by: TG Date: 7/06/2017
 Checked by: TG Date: 8/06/2017
 Authorised Signatory:  Date: 8/06/2017

This report should only be reproduced in full
 *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.
 Page 3 of 7

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0046 LAG Rev.0
Project Name: 218 Matua Road
Project Location: Huapai
Project Number: AKL2016_0046
Test Date: 6/06/2017
Tested By: KP / TG
Client: Cabra Developments Ltd
Client Address: PO Box 197 Orewa 0946
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



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.	31		32		33		34		35	
Test Location	Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent	
Chainage & Offset	CH170 Left		CH180 Centre		CH190 Right		CH200 Left		CH210 Left	
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	4	8	2	4	4	8	4	8	4	8
100 - 200	2	4	3	6	4	8	4	8	3	6
200 - 300	1	2	3	6	3	6	4	8	3	6
300 - 400	2	4	3	6	3	6	5	10	4	8
400 - 500	3	6	2	4	4	8	5	10	5	10
500 - 600	4	8	4	8	4	8	10+	20+	7	15
600 - 700	4	8	4	8	5	10			8	18
700 - 800	4	8	4	8	6	13			8	18
800 - 900	4	8	4	8	5	10			8	18
900 - 1000										
Test No.	36		37		38		39		40	
Test Location	Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Len Ireland Drive		Len Ireland Drive	
Chainage & Offset	CH220 Left		CH230 Right		CH240 Left		CH0 Left		CH10 Right	
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	4	8	4	8	4	8	6	13	5	10
100 - 200	3	6	4	8	7	15	5	10	10	20+
200 - 300	3	6	4	8	5	10	3	6	8	18
300 - 400	2	4	6	13	6	13	3	6	5	10
400 - 500	4	8	5	10	5	10	3	6	4	8
500 - 600	7	15	4	8	4	8	7	15	4	8
600 - 700	6	13	4	8	4	8	9	20	7	15
700 - 800	7	15	4	8	4	8	7	15	4	8
800 - 900	6	13	4	8	4	8	6	13	4	8
900 - 1000										

Prepared by: TG Date: 7/06/2017
Checked by: TG Date: 8/06/2017
Authorised Signatory: *Greg Snade* Date: 8/06/2017

This report should only be reproduced in full

*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.

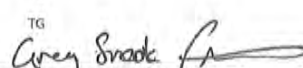
LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0046LAG Rev.0	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 Name:	218 Matua Road	Testing Locations Selected By: CMW Field Staff  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
Project Location:	Huapal	
Project Number:	AKL2016_0046	
Test Date:	6/06/2017	
Tested By:	KP / TG	
Client:	Cabra Developments Ltd	
Client Address:	PO Box 197 Orewa 0946	
Client Reference:		

Test No.	41		42		43		44		45	
Test Location	Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive	
Chainage & Offset	CH20 Left		CH30 Right		CH40 Right		CH50 Left		CH60 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	7	15	5	10	8	18	8	18	6	13
100 - 200	9	20	7	15	7	15	14	20+	6	13
200 - 300	6	13	5	10	6	13	7	15	5	10
300 - 400	6	13	10	20+	6	13	6	13	6	13
400 - 500	5	10	6	13	4	8	7	15	4	8
500 - 600	5	10	6	13	6	13	7	15	5	10
600 - 700	8	18	8	18	6	13	6	13	6	13
700 - 800	6	13	8	18	4	8	6	13	6	13
800 - 900	6	13	9	20	4	8	6	13	6	13
900 - 1000										

Test No.	46		47		48		49		50	
Test Location	Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive	
Chainage & Offset	CH70 Left		CH80 Left		CH90 Left		CH100 Left		CH110 Right	
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	5	10	6	13	9	20	5	10	4	8
100 - 200	7	15	6	13	6	13	6	13	5	10
200 - 300	6	13	6	13	5	10	6	13	3	6
300 - 400	6	13	4	8	2	4	3	6	3	6
400 - 500	9	20	6	13	2	4	4	8	3	6
500 - 600	7	15	8	18	4	8	4	8	3	6
600 - 700	8	18	5	10	2	4	4	8	2	4
700 - 800	8	18	7	15	4	8	4	8	2	4
800 - 900	8	18	8	18	4	8	4	8	2	4
900 - 1000										

Prepared by: TG Date: 7/06/2017
 Checked by: TG Date: 8/06/2017
 Authorised Signatory:  Date: 8/06/2017

This report should only be reproduced in full
 *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.
 Page 5 of 7

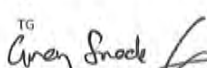
Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0046LAG Rev.0	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 Name:	218 Matua Road	Testing Locations Selected By: CMW Field Staff  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
Project Location:	Huapai	
Project Number:	AKL2016_0046	
Test Date:	6/06/2017	
Tested By:	KP / TG	
Client:	Cabra Developments Ltd	
Client Address:	PO Box 197 Orewa 0946	
Client Reference:		

Test No.	51		52		53		54		55	
Test Location	Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive	
Chainage & Offset	CH120 Left		CH130 Centre		CH140 Right		CH150 Left		CH160 Left	
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	5	10	5	10	8	18	4	8	8	18
100 - 200	8	18	4	8	4	8	3	6	8	18
200 - 300	3	6	3	6	4	8	3	6	8	18
300 - 400	3	6	2	4	3	6	1	2	5	10
400 - 500	3	6	2	4	4	8	1	2	1	2
500 - 600	2	4	2	4	2	4	2	4	2	4
600 - 700	1	2	2	4	3	6	2	4	3	6
700 - 800	1	2	3	6	3	6	3	6	2	4
800 - 900	2	4	2	4	4	8	4	8	2	4
900 - 1000										

Test No.	56		57							
Test Location	Len Ireland Drive		Len Ireland Drive							
Chainage & Offset	CH170 Right		CH180 Left							
Material & Layer:	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	10	20+	4	8						
100 - 200	7	15	6	13						
200 - 300	6	13	4	8						
300 - 400	3	6	2	4						
400 - 500	2	4	2	4						
500 - 600	3	6	1	2						
600 - 700	4	8	2	4						
700 - 800	4	8	2	4						
800 - 900	4	8	3	6						
900 - 1000										

Prepared by: TG Checked by: TG Authorised Signatory: 	Date: 7/06/2017 Date: 8/06/2017 Date: 8/06/2017	This report should only be reproduced in full *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. Page 6 of 7
--	---	--



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1000 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION
							CABRA DEVELOPMENTS LIMITED	LEN IRELAND DRIVE HUAPAI	1285 - ENG - RD301	MARCH 2017	
							NAME: DATE:				
							DESIGNER: P.F. 03.17				
							DRAWN: P.F. 03.17				
							DRAWING CHECK: P.F. 03.17				
							DESIGN CHECK: P.F. 03.17				
							APPR & B: P.F. 03.17				
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer	DRAWING TITLE			
								PROPOSED ROADING PLAN			

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

NZS 4402: Test 6.5.2; 1988

Report No: AKL2016_0046LAH Rev.0
Project Name: 218 Matua Road
Project Location: Huapai
Project Number: AKL2016_0046
Test Date: 22/06/2017
Tested By: KP
Client: Cabra Developments Ltd
Client Address: PO Box 197 Orewa 0946
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

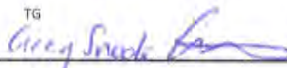


Tests indicated as
not accredited are outside
the scope of the
laboratory's accreditation

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 1		Road 1		Road 1		Road 1		Vogwill Crescent	
Chainage & Offset	CH0 Centre		CH10 Left		CH80 Right		CH100 Right		CH20 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	4	8	4	8	4	8	3	6	3	6
100 - 200	5	10	3	6	4	8	3	6	3	6
200 - 300	2	4	2	4	5	10	3	6	2	4
300 - 400	2	4	2	4	2	4	2	4	2	4
400 - 500	2	4	3	6	2	4	2	4	2	4
500 - 600	1	2	3	6	2	4	2	4	4	8
600 - 700	2	4	4	8	3	6	4	8	4	8
700 - 800	2	4	4	8	4	8	5	10	4	8
800 - 900	2	4	5	10	5	10	5	10	4	8
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Vogwill Crescent		Len Ireland Drive	
Chainage & Offset	CH120 Right		CH140 Right		CH180 Centre		CH220 Left		CH90 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	3	6	3	6	2	4	5	10	4	8
100 - 200	4	8	3	6	5	10	7	15	4	8
200 - 300	3	6	3	6	5	10	3	6	3	6
300 - 400	3	6	2	4	3	6	3	6	2	4
400 - 500	2	4	2	4	2	4	4	8	3	6
500 - 600	4	8	1	2	2	4	5	10	4	8
600 - 700	4	8	2	4	3	6	5	10	4	8
700 - 800	4	8	2	4	3	6	7	15	4	8
800 - 900	4	8	2	4	4	8	8	18	4	8
900 - 1000										

Prepared by: TG **Date:** 23/06/2017
Checked by: TG **Date:** 23/06/2017
Authorised Signatory:  **Date:** 26/06/2017

This report should only be reproduced in full

*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_0046LAH Rev.0
Project Name: 218 Matua Road
Project Location: Huapai
Project Number: AKL2016_0046
Test Date: 22/06/2017
Tested By: KP
Client: Cabra Developments Ltd
Client Address: PO Box 197 Orewa 0946
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



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

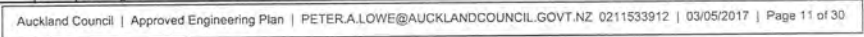
Test No.	11		12		13		14		15	
Test Location	Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive		Len Ireland Drive	
Chainage & Offset	CH110 Right		CH120 Left		CH140 Right		CH160 Left		CH180 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		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	4	8	4	8	5	10	4	8	5	10
100 - 200	3	6	4	8	4	8	4	8	4	8
200 - 300	3	6	3	6	3	6	4	8	3	6
300 - 400	3	6	3	6	2	4	2	4	2	4
400 - 500	2	4	2	4	2	4	2	4	2	4
500 - 600	4	8	2	4	2	4	2	4	2	4
600 - 700	2	4	2	4	2	4	2	4	2	4
700 - 800	3	6	2	4	2	4	4	8	2	4
800 - 900	4	8	3	6	4	8	4	8	2	4
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
Checked by: TG
Authorised Signatory: *Grey Strack*

Date: 23/06/2017
Date: 23/06/2017
Date: 25/06/2017

This report should only be reproduced in full

*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.



LF13 Rev 4 **IMPACT HAMMER TESTING REPORT**
TEST STANDARD: ASTM D5874:2016 FIELD PROCEDURE A.

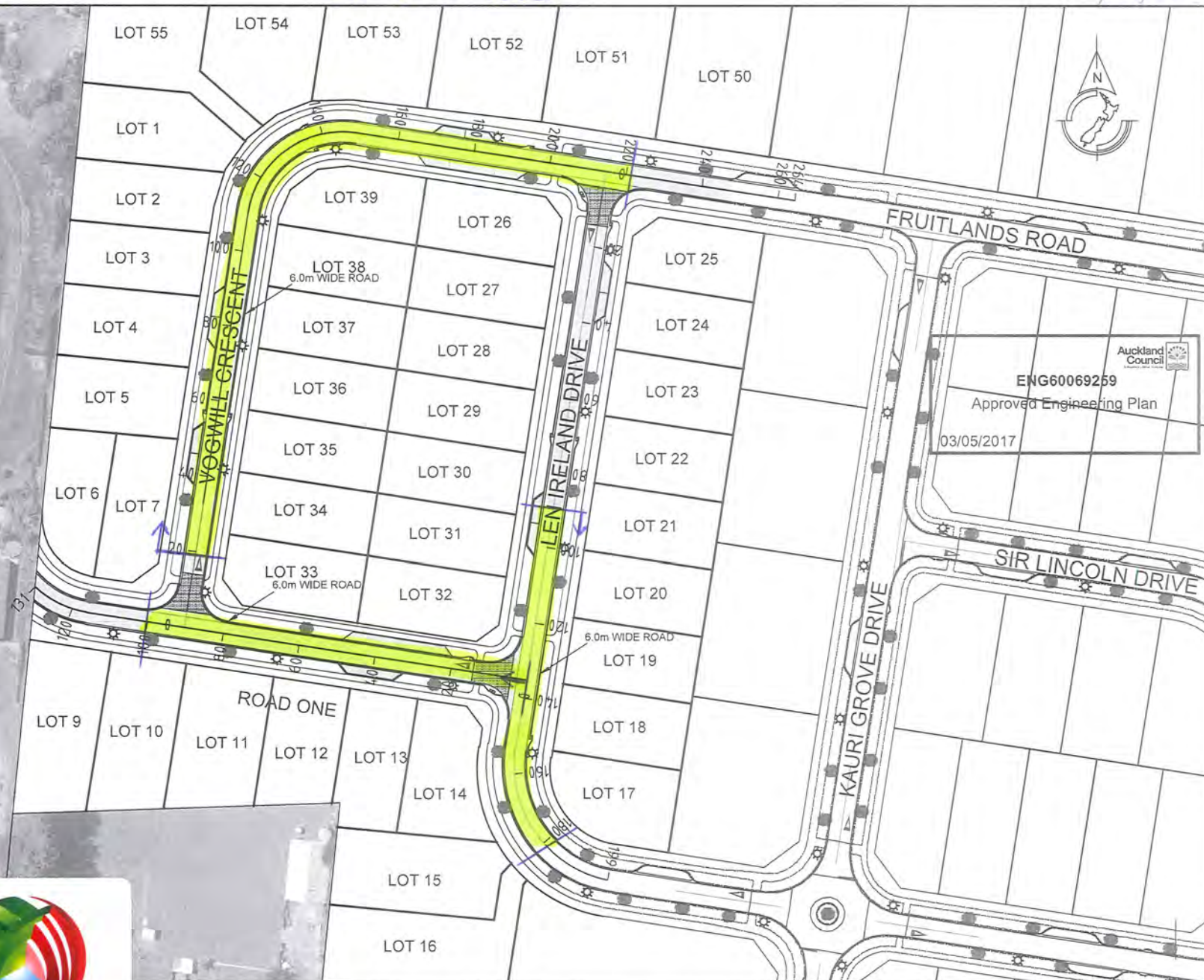
Project:	218 Matua Road	Auckland Laboratory
Project No:	AKL2016_0046	CMW Geosciences (NZ) Limited
Location:	Huapai	Building C, 9 Piermark Drive, Rosedale, NZ 0632
Report No:	AKL2016_0046LAI Rev 0	PO Box 300206, Albany, Auckland, NZ 0752
Report Date:	22/06/2017	Phone: +64 (09) 4144 632
Client:	Cabra Developments Ltd	Testing Locations Selected By: CMW Field Staff
Client Address:	PO Box 197 Orewa 0946	 All tests reported herein have been performed in accordance with the laboratory's scope of accreditation Measurements marked * are not accredited and are outside of the scope of the laboratory's accreditation
Client Reference:		

Test No.:	Date Tested:	Test Location	Material**	Impact Value**	Inferred * CBR %	Notes
CH0	22/06/2017	Road 1	Clay	6	3	
CH10	22/06/2017	Road 1	Clay	10	7	
CH80	22/06/2017	Road 1	Clay	10	7	
CH100	22/06/2017	Road 1	Clay	10	7	
CH20	22/06/2017	Vogwill Crescent	Clay	18	23	
CH120	22/06/2017	Vogwill Crescent	Clay	16	18	
CH140	22/06/2017	Vogwill Crescent	Clay	24	40	
CH180	22/06/2017	Vogwill Crescent	Clay	20	28	
CH220	22/06/2017	Vogwill Crescent	Clay	24	40	
CH90	22/06/2017	Len Ireland Drive	Clay	32	72	
CH110	22/06/2017	Len Ireland Drive	Clay	30	63	
CH120	22/06/2017	Len Ireland Drive	Clay	26	47	
CH140	22/06/2017	Len Ireland Drive	Clay	18	23	
CH160	22/06/2017	Len Ireland Drive	Clay	20	28	
CH180	22/06/2017	Len Ireland Drive	Clay	10	7	

** Measurements with a maximum particle size > 37.5mm are outside of the scope of ASTM D5874:2016 Field Procedure A. Impact Values on such materials are not accredited and are outside of the scope of the laboratory's accreditation.

Created By:	KP	Date: 26/06/2017	This report should only be reproduced in full * Inferred CBR Calculation: $CBR = IV^2 \times 0.07$ Page 1 of 2
Checked By:	JMJ	Date: 26/06/2017	
Authorised Signatory:	 Date: 26/06/2017		

NOTE:
FOOTPATHS TO BE 1.5m WIDE
UNLESS OTHERWISE NOTED.
REFER TO DRAWING 1285 - ENG -
RD310 FOR LINE MARKING.



NAME	DATE
PF	03.17
PF	03.17
PF	03.17
PF	03.17
PF	03.17
EP	03.17

CLIENT
CABRA DEVELOPMENTS LIMITED

Conditions of Use:
These drawings shall only be used for the purpose for which they were
submitted. Do not measure off this drawing. If doubt please contact Engineer

SITE ADDRESS
LEN IRELAND DRIVE
HUAPAI

DRAWING TITLE
PROPOSED ROADING PLAN

DRAWING NUMBER
1285 - ENG - RD301

DATE
MARCH 2017

REVISION

ASPIRE
CONSULTING ENGINEERS

Ph: 09 426 6552
Web: www.aspeng.co.nz



LF11 Rev 5 Soil Field Density NDM Direct Transmission with VSS Report

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

Project: 218 Matua Road
Project No: AKL2016_0046
Location: Huapai
Report No: AKL2016_0046LAJ Rev. 1
Report Date: 13/02/2018
Client: Cabra Developments Limited
Client Address:
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



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/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 (%) *	
23/11/2017	N76	Refer to site plan	CLAY	178	121	158	149	152	1.7718	1.3307	33.1	6.52	200	35.6	2.7	1.31	5.1	No sample taken
	N77	Refer to site plan	Lime Stabilized CLAY	191	158	192	153	174	1.6488	1.2679	30.1	14.85	300					
	N78	Refer to site plan	Lime Stabilized CLAY	153	132	158	162	151	1.8593	1.3748	35.2	0.53	300	38.7	2.7	1.34	-1.3	
24/11/2017	N79	Refer to site plan	Lime Stabilized CLAY	178	178	187	194	184	1.8100	1.4013	29.0	7.20	50	32.0	2.7	1.37	5.4	Retest of N77
	N80	Refer to site plan	Lime Stabilized CLAY	187	178	187	178	183	1.8508	1.4116	31.0	3.70	200	29.8	2.7	1.43	4.7	
	N81	Refer to site plan	CLAY	228+	194	220	228+	218+	1.8161	1.3501	34.5	3.30	300	34.2	2.7	1.35	3.6	
27/11/2017	N82	Refer to site plan	CLAY	129	226	145	162	166	1.7800	1.3318	33.7	5.70	300	32.9	2.7	1.34	6.3	
	N83	Refer to site plan	CLAY	226+	220	226	199	218+	1.7846	1.3036	36.9	3.80	300	35.6	2.7	1.32	4.4	
1/12/2018	N84	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.8761	1.4892	27.0	2.10	300	30.7	2.7	1.44	2.7	
4/12/2017	N85	Refer to site plan	CLAY	162	178	226	UTP	189+	1.8270	1.4270	29.0	5.43	300	26.6	2.7	1.44	8.2	
	N86	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.8700	1.4250	31.0	2.66	300	25.9	2.7	1.49	6.5	
5/12/2017	N87	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.8340	1.4067	30.4	5.07	300	26.3	2.7	1.45	8.1	
	N88	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.8728	1.4347	30.5	2.97	300	33.4	2.7	1.40	1.1	
6/12/2017	N89	Refer to site plan	CLAY	145	129	145	162	145	1.8228	1.3716	32.9	3.90	300	35.0	2.7	1.35	2.8	
11/12/2017	N90	Refer to site plan	CLAY	178	139	226	226	192	1.8100	1.3168	37.0	1.80	300	35.5	2.7	1.34	3.1	
12/12/2017	N91	Refer to site plan	CLAY	123	145	162	145	144	1.7910	1.3372	33.0	4.98	300	43.2	2.7	1.25	-0.3	
13/12/2017	N92	Refer to site plan	CLAY	UTP	UTP	220	UTP	220+	1.8020	1.3497	34.7	4.17	300	38.8	2.7	1.30	1.5	
18/12/2017	N93	Refer to site plan	CLAY	UTP	UTP	UTP	166	166+	1.9041	1.4961	27.0	3.60	300	21.9	2.7	1.56	8.0	
20/12/2017	N94	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.9620	1.4870	35.0	0.80	300	34.5	2.7	1.46	-4.4	
17/01/2018	N95	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.7060	1.3042	30.8	9.45	300	26.3	2.7	1.35	14.0	
30/01/2018	N96	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.8460	1.3911	32.0	2.60	300	19.7	2.7	1.54	13.0	Re test of N94
12/02/2018	N97	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.8460	1.3911	32.0	2.60	300	33.1	2.7	1.39	2.7	Re test of N95

This report should only be reproduced in full.

** Gauge Wet Densities outside of the calibrated range of 1.728 to 2.756 t/m³ are not accredited and are outside the laboratories scope of accreditation.

This report supersedes AKL2016_0046LAJ Rev.0

Created By: JLM

Date: 09/02/2018

Checked By: JMJ

Date: 13/02/2018

Authorised Signatory: 

Date: 19/02/2018



I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The Coordinates (X, Y) are in terms of NZTM on NZGD (2000).
- The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).

Signed: 

Chartered Professional Engineer

Date: 27 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE	1:2000 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER
A	CONTOUR ADDED			27/09/16			NAME	DATE	CABRA DEVELOPMENTS LIMITED	56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3) 202 & 218 MATUA ROAD, HUAPAI R65429A RDC21584	1138 - AB - EW201
							DESIGN	14/09/16			
							DRAWN	14/09/16			
							DRAWING CHECK	16/09/16			
							DESIGN CHECK	16/09/16			
							APPROVED	09/10/16			
									DRAWING TITLE	ASBUILT CONTOUR PLAN	DATE SEPT 2016
											REVISION A

Limitations of Use.
These drawings should only be used for the purpose for which they were
prepared. Do not measure off this drawing. If doubt please contact Engineer.

ASPIRE

Ph: 09 426 6552
Web: www.aspeng.co.nz