28 September 2016

STAGES 1 TO 3 OF KAURI GROVE SUBDIVISION

GEOTECHNICAL COMPLETION REPORT

Cabra Developments Limited

Ref: AKL2016_0046AC Rev: 0

Building C, 9 Piermark Drive, Rosedale, Auckland 0632 www.cmwgeosciences.co.nz

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Appendices

1. INTRODUCTION

In accordance with our instructions, this Geotechnical Completion Report has been prepared for Cabra Developments Limited as part of the documentation to be submitted to Auckland Council following earthworks to form stages 1 and 2 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 August 2016 and is intended to be used for certification purposes for new lots (listed below) created from Lot 2 DP 491487, Lot 39 DP 477242, Lot 2 DP 14836 from 218 Matua Road, Lot 1 DP 491487 from 224 Matua Road and Lot 1 DP 317508 from 202 Matua Road as follows:

- 56 new residential lots numbered 1 to 42, 44 to 49 and 64 to 71; Lot 64 contains an existing dwelling and has not been fully assessed as part of our work.
- 4 new roads numbered Road One, Two Three and Four named Kauri Grove Drive, Fruitlands Road, Bellamont Street and Sir Lincoln Drive respectively;
- 1 jointly owned access lot (JOAL) providing access to Lots 29 and 30 within the eastern side of the site.

These stages of the Kauri Grove Subdivision Development are located off 218 Matua Road, Huapai. As can be seen from the as-built Cut to Fill Including Undercut Depth Contour Plan referenced 1138-AB-EW204, 41 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 4.75 metres.

Construction of the subdivision did not include formation of the existing stormwater retention pond located in the northern portion of Stage 3 which has been constructed and certified by others previously.

2. PROJECT BACKGROUND

The geotechnical investigations and design were undertaken by this consultancy 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

Works within the site began in early December 2015 with the removal of existing buildings, fences and vegetation from the earthworks area. Silt and erosion control measures were also constructed during this time by earthworks subcontractor Bob Hick Earthmoving Limited.

During mid-December 2015 a large temporary silt detention pond was constructed within Lot 48 which included muckout and topsoil stripping of the base and construction of temporary bunds with compacted fill.

Stripping operations across the majority of the site began in late December 2015 with topsoil stockpiled within lots on Stage 4 during the operations. Muckout and drainage of gully areas within the northern lots occurred during this time. Installation of underfill drainage incorporated geotextile wrapped scoria filled drainage trenches with single 160mm perforated draincoils which were inspected by CMW during the works. Unsuitable/organic soils from the muckout operations were stockpiled within stage 4 during this time.

Following installation of underfill/subsoil drainage in the gully areas, cut and fill operations began throughout the site and were regularly tested by CMW to placement and compaction was in accordance with our fill specifications.

During January 2016; progressive stripping, muckout, drainage and filling operations were undertaken within the southern lots of stages 2 and 3, with removal of farm sheds, fences and a large volume of buried tree stumps within this area of the site.

Civil operations also began in late January with trenching of stormwater completed by head contractor Opie Contractors Limited. CMW undertook periodic testing of the backfill of these lines during earthworks to confirm strengths and compaction of the backfill. On some occasions the backfill was reworked to achieve compaction standards.

During mid February 2016 excavation of natural soils from the borrow source within the northern lots of future Stage 4 (Lots 52 to 54; within floodplains zones) was undertaken to provide the additional fill needed to complete cut to fill operations. Unsuitable and/or highly organic soils were placed in the excavation area and compacted in layers. The road link between Road Three and Bellamont Street within the adjacent subdivision to the east was undercut and filled to subgrade levels during this time.

As subgrade levels reached final grades throughout the site in February/March 2016, topsoil from the stockpiles across the site were respread on the lots, with bunding of the topsoil around the perimeter of the lots to leave berm areas exposed for civil works construction. The subgrade for roads was levelled and prepared for initial stabilisation during this time. Wet conditions at the site forced lime drying operations to be used for cut and fill operations within Stage 4 earthworks at this time.

Civil works including combined services (power, gas, telephone, water and sewer) were undertaken within the berm areas across stages 1 to 3 between March and April 2016. Underchannel drainage was placed in the road reserves during this time. CMW also undertook scala tests of the stabilised subgrade for all roads within stages 1 to 3. Gully works, subsoil drainage and filling operations continued in Stage 4. The majority of earthworks were completed by the end of April 2016 throughout the site.

Throughout late April through to July civil works continued which included completion of combined services, kerb and channel formation, subbase and pavement formation, street lighting, footpaths and respread of topsoil throughout stages 1 to 3.

4. GEOTECHNICAL QUALITY CONTROL

4.1. Site Observations

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

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

- Adequate topsoil stripping;
- Fill areas prior to the placement of fill materials to ascertain that all mullock and soft inorganic subsoils had been removed;
- Installation of subsoil drains including underfill drains but excluding road under-channel drains;

- Backfilling of subsoil drains;
- Excavation and backfilling of stormwater and combined services trenches;
- 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 required by the project specification.

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 1138-AB-PG103 and PG104 depict the extents of a series of consent notice areas that contain limitations to ensure that future buildings and/or earthworks on the lots are undertaken in manner that does not lead to building 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. The applied consent notice areas include:

5.1.1. Flood Plain Consent Notice Zone

Lots 43 and 48 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 undertaken within these areas.

5.1.2. Specific Design Consent Notice Zone – Uncontrolled Filling

Lots 44 to 49 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 1, referenced 1138-AB-PG103 as Specific Design Consent Notice Zone**.

5.1.3. Specific Design Consent Notice Zone – Slope

A specific design consent notice zone has been placed on the eastern portion of Lot 1 due to slope gradients within that area. This zone is intended to protect building development from long term creep effects and to protect the slope from inappropriate loading. The extents of this zone are marked on the appended **As-built Consent Notice Plan 2, referenced 1138-AB-PG104 as Specific Design Consent Notice Zone**.

5.1.4. Drainage Consent Notice Zone

This 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 building development. Further recommendations for service trenches are provided in Section 5.3 below.

Full descriptions of the restrictions 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, combined services and stormwater services were trenched throughout the development as shown on the appended Aspire Stormwater As-built Plans referenced 1138-AB-SW401 to SW408.

Service 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 discharge any 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. Lots 2, 5 to 7, 13, 15 to 19, 27, 28, 30 to 49 and 64 to 71 inclusive 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. Subsoil Drains

The appended As-built Cut to Fill Including Undercut Depth Contour Plan referenced 1138-AB-EW204 shows the positions and depths of underfill drains which were constructed in the natural ground during the earthworks operations. The drains were installed to help control groundwater levels and are linked to the reticulated storm water system using specifications provided by CMW during the course of the earthworks operations. These drains are not critical to overall stability conditions of the site and do not require on-going maintenance.

Nevertheless, their function should be preserved as detailed in the Suitability Statement. Lots 30, 37 to 41 and 45 to 48 are known to contain subsoil drains.

5.5. 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 increase 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.

5.6. Design of Shallow Foundations

5.6.1. 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.

5.6.2. 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.

5.6.3. Soil Expansiveness Classification

Seven sets of soil tests were carried out on samples taken from likely foundation level on lots within these stages 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 these stages of the development to be either M (moderate) or H2 (high), with specific site class for each lot contained within the appended GCR Summary Table. 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.

5.7. 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 150 and 400mm on these stages 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 (NZ) Limited

Prepared by:	**Reviewed and Approved by:**
Greg Snook	**Richard Knowles**
Project Engineering Geologist	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, Auckland, hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering as defined in section 1.2.3 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on Stages 1 to 3 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 uncontrolled/uncertified filling on Lots 44 to 49, The earth fills shown on the appended As-built Cut to Fill Including 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 44 to 49 inclusive are depicted on the appended **As-build Consent Notice Plan 1, referenced 113-AB-PG103**. The uncontrolled/uncertified filling was not placed or compacted to engineering standards. Any future building development within these areas will require specific investigation and foundation design prior to Building Consent application.

   (b) The completed earthworks give due regard to land slope and foundation stability considerations on the building platform areas, however a **Specific Design Consent Notice Zone – Slope** has been placed on lot 1 as depicted on the appended **As-build Consent Notice Plan 2, referenced 113-AB-PG104**. No building construction and not earthworks (i.e. cuts or fills of any depth) should take place within this area unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the implications of the proposals on both global stability conditions and soil creep on the building platform and if necessary, comment of what aspects require engineering inspections and certification.

   (c) **Flood Plain Consent Notice Zone** areas, determined as areas at finished levels lower than RL16.7m on Lots 47, 48 and 49 inclusive are designated no-build zones due to flooding risk. No building construction and no earthworks may take place in these areas.

   (d) **Drainage Consent Notice Zone** areas on lots 2, 5 to 7, 13, 15 to 19, 27, 28, 30 to 49, and 64 to 71 inclusive are depicted on the appended **As-build Consent Notice Plans 1 and 2, referenced 113-AB-PG103 and PG104** based on a 45 degree zone of influence from service lines. No building development should take place within these areas unless endorsed by specific design and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure the lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and trench backfill.

   (e) The function of the subsoil drains installed beneath Lots 30, 37 to 41 and 45 to 48 inclusive must not be impaired by any building development or landscaping works. Any bored or driven piles must be positioned to avoid damaging the draincoils. Where any subsoil drain

is intercepted by building works, it must be reinstated under the direction of a Chartered Professional Engineer to ensure the integrity of the subsoil drainage system.

(f) 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.

(g) The expansive site Class for lots 1 to 23, 48, 49 and 64 to 71 have been assessed as AS2870 Class H2 (High). The expansive site Class for lots 24 to 47 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 5.6.3 of the Geotechnical Completion Report) for reference by foundation contractors.

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

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

(ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 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 (NZ) Limited

Richard Knowles

Principal Geotechnical Engineer, CPEng

GCR Summary Table

Condition	Flood Plain Consent Notice Zone	Specific Design Consent Notice Zone – Uncontrolled Filling	Specific Design Consent Notice Zone - Slope	Drainage Consent Notice Zone	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Indicative Topsoil Depth (mm)
GCR SOPO Clause	**3(c)**	**3(a)**	**3(b)**	**3(d)**	**3(e)**	**3(f)**	**3(g)**	
Lot number								
1			●			300	H2	350
2				●		300	H2	350
3						300	H2	200
4						300	H2	150
5				●		300	H2	200
6				●		300	H2	200
7				●		300	H2	250
8						300	H2	300
9						300	H2	300
10						300	H2	350
11						300	H2	300
12						300	H2	350
13				●		300	H2	400
14						300	H2	400
15				●		300	H2	100
16				●		300	H2	200
17				●		300	H2	200
18				●		300	H2	300
19				●		300	H2	100

Condition	Flood Plain Consent Notice Zone	Specific Design Consent Notice Zone – Uncontrolled Filling	Specific Design Consent Notice Zone - Slope	Drainage Consent Notice Zone	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Indicative Topsoil Depth (mm)
GCR SOPO Clause	**3(c)**	**3(a)**	**3(b)**	**3(d)**	**3(e)**	**3(f)**	**3(g)**	
Lot number								
20						300	H2	300
21						300	H2	200
22						300	H2	250
23						300	H2	300
24						300	M	350
25						300	M	300
26						300	M	350
27				●		300	M	350
28				●		300	M	350
29						300	M	300
30				●	●	300	M	400
31				●		300	M	400
32				●		300	M	350
33				●		300	M	400
34				●		300	M	250
35				●		300	M	200
36				●		300	M	200
37				●	●	300	M	350
38				●	●	300	M	350
39				●	●	300	M	350
40				●	●	300	M	300

Condition	Flood Plain Consent Notice Zone	Specific Design Consent Notice Zone – Uncontrolled Filling	Specific Design Consent Notice Zone - Slope	Drainage Consent Notice Zone	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Indicative Topsoil Depth (mm)
GCR SOPO Clause	**3(c)**	**3(a)**	**3(b)**	**3(d)**	**3(e)**	**3(f)**	**3(g)**	
Lot number								
41				●	●	300	M	250
42				●		300	M	200
44		●		●		300	M	200
45		●		●	●	300	M	150
46		●		●	●	300	M	250
47	●	●		●	●	300	M	200
48	●	●		●	●	300	H2	150
49	●	●		●		300	H2	200
64				●		Existing House		
65				●		300	H2	250
66				●		300	H2	300
67				●		300	H2	300
68				●		300	H2	250
69				●		300	H2	400
70				●		300	H2	400
71				●		300	H2	300

Appendix B

Drawings

Title	Reference No.	Date	Revision
Cover Sheet PG101	1138	September 2016	
Existing Contour Plan	1138-AB-PG102	September 2016	
Asbuilt Consent Notice Plan 1	1138-AB-PG103	September 2016	A
Asbuilt Consent Notice Plan 2	1138-AB-PG104	September 2016	A
Asbuilt Co-ordinates Tables	1138-AB-PG105	September 2016	
Asbuilt Contour Plan	1138-AB-EW201	September 2016	A
Asbuilt Cut to Fill Depth Contour Plan	1138-AB-EW202	September 2016	A
Asbuilt Undercut Depth Contour Plan	1138-AB-EW203	September 2016	
Asbuilt Cut to Fill Including Undercut Depth Contour Plan	1138-AB-EW204	September 2016	
Asbuilt Roading Plan 1	1138-AB-RD301	September 2016	
Asbuilt Roading Plan 1	1138-AB-RD302	September 2016	
Asbuilt Roading Cross Sections	1138-AB-RD303	September 2016	
Asbuilt Stormwater Plan 1	1138-AB-SW401	September 2016	
Asbuilt Stormwater Manhole Plan 1	1138-AB-SW402	September 2016	
Asbuilt Stormwater Plan 2	1138-AB-SW403	September 2016	
Asbuilt Stormwater Manhole Plan 2	1138-AB-SW404	September 2016	
Asbuilt Stormwater Plan 3	1138-AB-SW405	September 2016	
Asbuilt Stormwater Manhole Plan 3	1138-AB-SW406	September 2016	
Asbuilt Stormwater Plan 4	1138-AB-SW407	September 2016	
Asbuilt Stormwater Manhole Plan 4	1138-AB-SW408	September 2016	
Asbuilt Wastewater Plan 1	1138-AB-WW501	September 2016	
Asbuilt Wastewater Plan 2	1138-AB-WW502	September 2016	

Asbuilt Overall Water Supply Plan	1138-AB-WS601	September 2016	
Asbuilt Water Supply Plan 1	1138-AB-WS602	September 2016	
Asbuilt Water Supply Plan 2	1138-AB-WS603	September 2016	
Asbuilt Water Supply Plan 3	1138-AB-WS604	September 2016	
Asbuilt Water Supply Plan 4	1138-AB-WS605	September 2016	

CABRA DEVELOPMENTS LIMITED
AS-BUILT PLANS 56 LOT RESIDENTIAL SUBDIVISION (STAGES 1-3) 202 & 212 MATUA ROAD, HUAPAI
R65429A RDC21584 #44397

ASPIRE CONSULTING ENGINEERS
CABRA Land & Property Development

PRELIMINARY & GENERAL

PG101	COVER SHEET
PG102	EXISTING CONTOUR PLAN
PG103	ASBUILT CONSENT NOTICE PLAN 1
PG104	ASBUILT CONSENT NOTICE PLAN 2
PG105	ASBUILT COORDINATE TABLES

EARTHWORKS

EW201	ASBUILT CONTOUR PLAN
EW202	ASBUILT CUT TO FILL DEPTH CONTOUR PLAN
EW203	ASBUILT UNDERCUT DEPTH CONTOUR PLAN
EW204	ASBUILT CUT TO FILL INCLUDING UNDERCUT DEPTH CONTOUR PLAN

ROADING

RD301	ASBUILT ROADING PLAN 1
RD302	ASBUILT ROADING PLAN 2
RD303	ASBUILT ROAD CROSS SECTIONS

STORMWATER

SW401	ASBUILT STORMWATER PLAN 1
SW402	ASBUILT STORMWATER MANHOLE PLAN 1
SW403	ASBUILT STORMWATER PLAN 2
SW404	ASBUILT STORMWATER MANHOLE PLAN 2
SW405	ASBUILT STORMWATER PLAN 3
SW406	ASBUILT STORMWATER MANHOLE PLAN 3
SW407	ASBUILT STORMWATER PLAN 4
SW408	ASBUILT STORMWATER MANHOLE PLAN 4

WASTEWATER

WW501	ASBUILT WASTEWATER PLAN 1
WW502	ASBUILT WASTEWATER PLAN 2

WATER SUPPLY

WS601	ASBUILT OVERALL WATER SUPPLY PLAN
WS602	ASBUILT WATER SUPPLY PLAN 1
WS603	ASBUILT WATER SUPPLY PLAN 2
WS604	ASBUILT WATER SUPPLY PLAN 3
WS605	ASBUILT WATER SUPPLY PLAN 4

COVER SHEET PG101

JOB NUMBER: 1138

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:2000 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

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

56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE

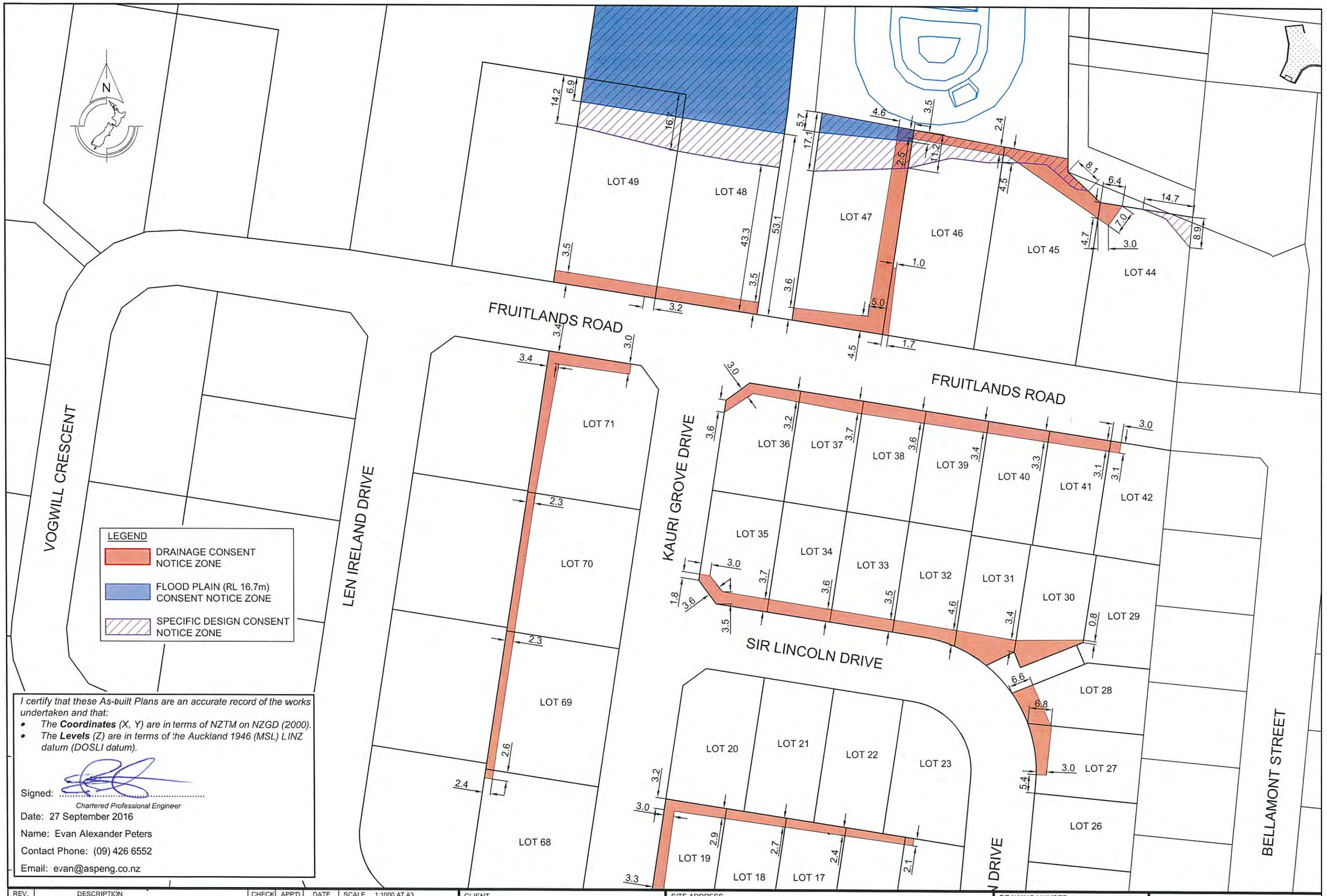
EXISTING CONTOUR PLAN

DRAWING NUMBER

1138 - AB - PG102

DATE	REVISION
SEPT 2016	-

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: 27 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE
A	FLOOD PLAIN AND SPECIFIC DESIGN CONSENT NOTICE ADDED			27/09/16

SCALE 1:1000 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

CLIENT

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE

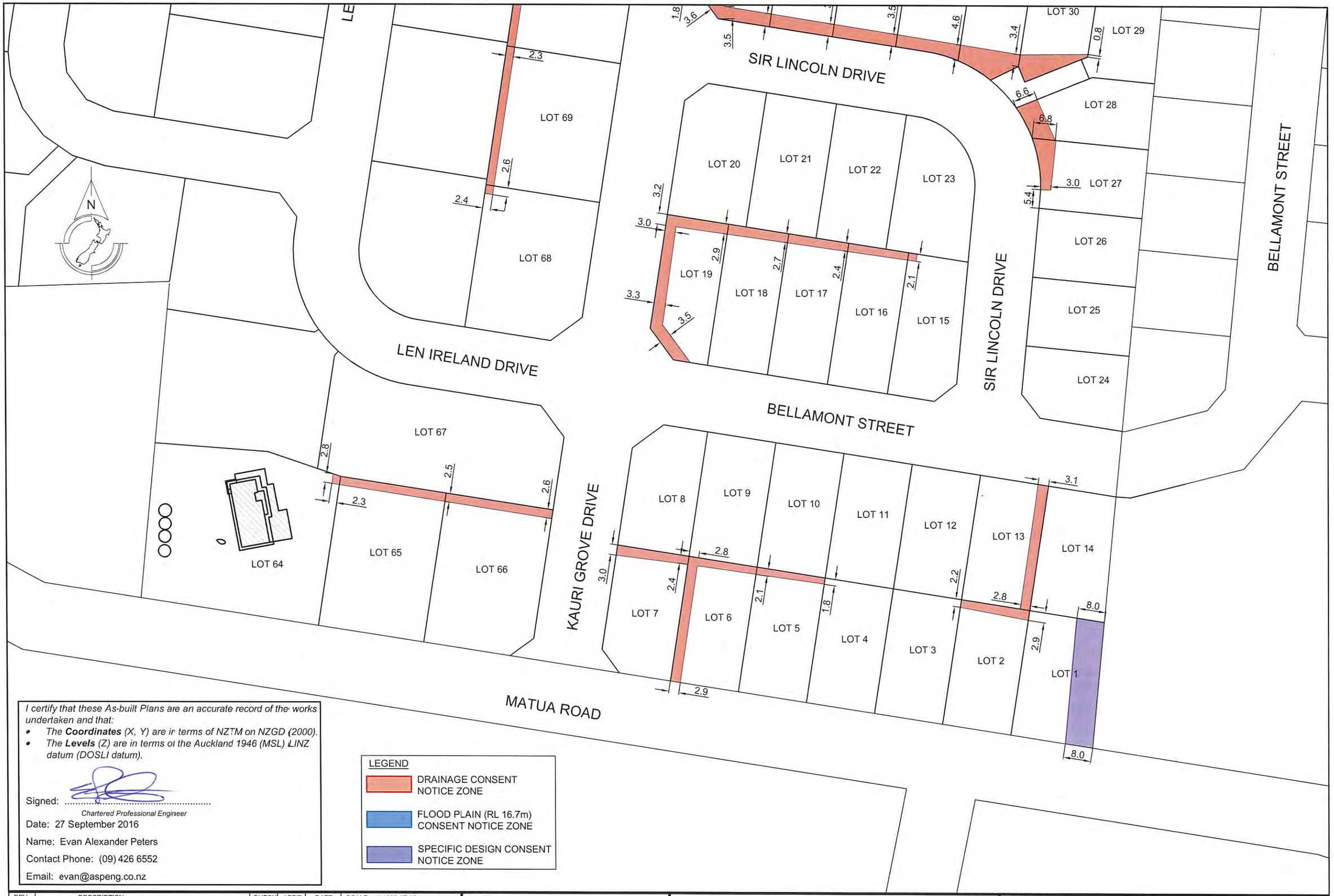
ASBUILT CONSENT NOTICE PLAN 1

DRAWING NUMBER

1138 - AB - PG103

DATE	REVISION
SEPT 2016	A

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: 27 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

LEGEND

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

REV.	DESCRIPTION	CHECK	APP'D	DATE
A	FLOOD PLAIN AND SPECIFIC DESIGN CONSENT NOTICE ADDED			27/09/16

SCALE 1:1000 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

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

56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE

ASBUILT CONSENT NOTICE PLAN 2

DRAWING NUMBER

1138 - AB - PG104

DATE	REVISION
SEPT 2016	A

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

ASBUILT CO-ORDINATE TABLES

STORMWATER MANHOLE

COORDINATES		
POINTS	EASTING	NORTHING
ABSW-WWA0	1736755.886	5930636.317
ABSWMHA01	1736750.063	5930628.556
ABSWMHA02	1736740.854	5930570.806
ABSWMHA03	1736735.803	5930549.454
ABSWMHA04	1736703.825	5930555.227
ABSWMHA05	1736697.089	5930550.613
ABSWMHA06	1736688.011	5930499.194
ABSWMHA07	1736692.969	5930492.916
ABSWMHA08	1736689.317	5930472.277
ABSWMHA09	1736682.973	5930467.772
ABSWMHA10	1736676.848	5930434.182
ABSWMHA11	1736671.764	5930402.727
ABSWMHA12	1736677.597	5930394.479
ABSWMHA13	1736673.881	5930373.616
ABSWMHA14	1736665.795	5930367.370
ABSWMHA15	1736660.603	5930338.701
ABSWMHA16	1736639.810	5930349.766
ABSWMHA17	1736578.744	5930360.038
ABSWMHB01	1736715.313	5930575.164
ABSWMHB02	1736675.513	5930582.160
ABSWMHC01	1736671.372	5930560.636
ABSWMHC02	1736646.049	5930564.462
ABSWMHE01	1736638.798	5930523.907
ABSWMHE02	1736624.805	5930443.215
ABSWMHF01	1736809.349	5930535.858

STORMWATER MANHOLE

COORDINATES		
POINTS	EASTING	NORTHING
ABSWMHG01	1736776.906	5930477.920
ABSWMHG02	1736787.179	5930454.312
ABSWMHG03	1736778.207	5930382.325
ABSWMHG04	1736783.908	5930354.497
ABSWMHG05	1736777.832	5930318.249
ABSWMHH01	1736744.953	5930360.932
ABSWMHI01	1736747.211	5930462.052
ABSWMHJ01	1736747.050	5930422.070
ABSWMHK01	1736707.262	5930367.662
ABSWMHL01	1736681.431	5930335.364
ABSWMHL02	1736718.767	5930328.807
ABSWMHM01	1736780.938	5930621.912
ABSWMHN01	1736675.574	5930301.056

STORMWATER CESSPIT

COORDINATES		
POINTS	EASTING	NORTHING
ABSWCP01	1736710.888	5930567.607
ABSWCP02	1736674.254	5930573.813
ABSWCP03	1736710.305	5930560.713
ABSWCP04	1736683.927	5930561.005
ABSWCP05	1736689.934	5930485.793
ABSWCP06	1736688.928	5930479.373
ABSWCP07	1736668.629	5930467.466
ABSWCP08	1736675.479	5930466.468
ABSWCP09	1736658.391	5930367.870
ABSWCP10	1736651.504	5930369.178
ABSWCP11	1736665.023	5930295.916
ABSWCP12	1736777.587	5930466.375
ABSWCP13	1736771.741	5930440.039
ABSWCP14	1736777.819	5930435.348
ABSWCP15	1736741.193	5930375.638
ABSWCP16	1736739.877	5930369.257
ABSWCP17	1736577.381	5930358.912

FIRE HYDRANT

COORDINATES		
POINTS	EASTING	NORTHING
ABWSFH01	1736709.566	5930573.898
ABWSFH02	1736664.124	5930475.336
ABWSFH03	1736762.957	5930453.597
ABWSFH04	1736746.210	5930380.329
ABWSFH05	1736620.719	5930384.739

WASTWATER FLUSHING PIT

COORDINATES		
POINTS	EASTING	NORTHING
ABWWFP01	1736811.598	5930555.729
ABWWFP02	1736645.301	5930584.527

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE N.T.S.		
						NAME	DATE
					DESIGN	MJ	09.16
					DRAWN	MJ	09.16
					DRAWING CHECK	PF	09.16
					DESIGN CHECK	PF	09.16
					APPROVED	EP	09.16

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SITE ADDRESS
56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE
ASBUILT CO-ORDINATE TABLES

DRAWING NUMBER
1138 - AB - PG105

DATE
SEPT 2016

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: 27 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE
A	CONTOUR ADDED			27/09/16

SCALE 1:2000 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

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202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE

ASBUILT CONTOUR PLAN

DRAWING NUMBER

1138 - AB - EW201

DATE	REVISION
SEPT 2016	A

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

LEGEND

TOTAL EARTHWORKS AREA: 75,470m²

CUT VOLUME: 19,330m³
MAX CUT DEPTH 2.7m

FILL VOLUME: 27,410m³
MAX FILL DEPTH 2.5m

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

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- *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	APP'D	DATE	SCALE 1:2000 AT A3	NAME	DATE
A	CUT TO FILL CONTOURS ADDED			27/09/16			
					DESIGN	MJ	09.16
					DRAWN	MJ	09.16
					DRAWING CHECK	PF	09.16
					DESIGN CHECK	PF	09.16
					APPROVED	EP	09.16

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE

ASBUILT CUT TO FILL DEPTH CONTOUR PLAN

DRAWING NUMBER

1138 - AB - EW202

DATE	REVISION
SEPT 2016	A

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

LEGEND

TOTAL UNDERCUT EARTHWORKS
AREA: 64,010m²

3.0 / 2.0 FILL VOLUME: 18,154m³
MAXIMUM FILL DEPTH: 4.2m

---------- AS-BUILT UNDERFILL DRAIN

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Signed: .....
Chartered Professional Engineer

Date: 27 September 2016

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Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:2000 AT A3		
						NAME	DATE
					DESIGN	MJ	09.16
					DRAWN	MJ	09.16
					DRAWING CHECK	PF	09.16
					DESIGN CHECK	PF	09.16
					APPROVED	EP	09.16

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202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE
ASBUILT UNDERCUT DEPTH CONTOUR PLAN

DRAWING NUMBER
1138 - AB - EW203

DATE
SEPT 2016

REVISION
-

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

LEGEND

TOTAL EARTHWORKS AREA: 75,470m²

CUT VOLUME: 19,290m³
MAX CUT DEPTH 2.7m

FILL VOLUME: 46,620m³
MAX FILL DEPTH 4.9m

---------- AS-BUILT UNDERFILL DRAIN

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

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					DESIGN	MJ	09.16
					DRAWN	MJ	09.16
					DRAWING CHECK	PF	09.16
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					APPROVED	EP	09.16

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429A RDC21584

DRAWING TITLE

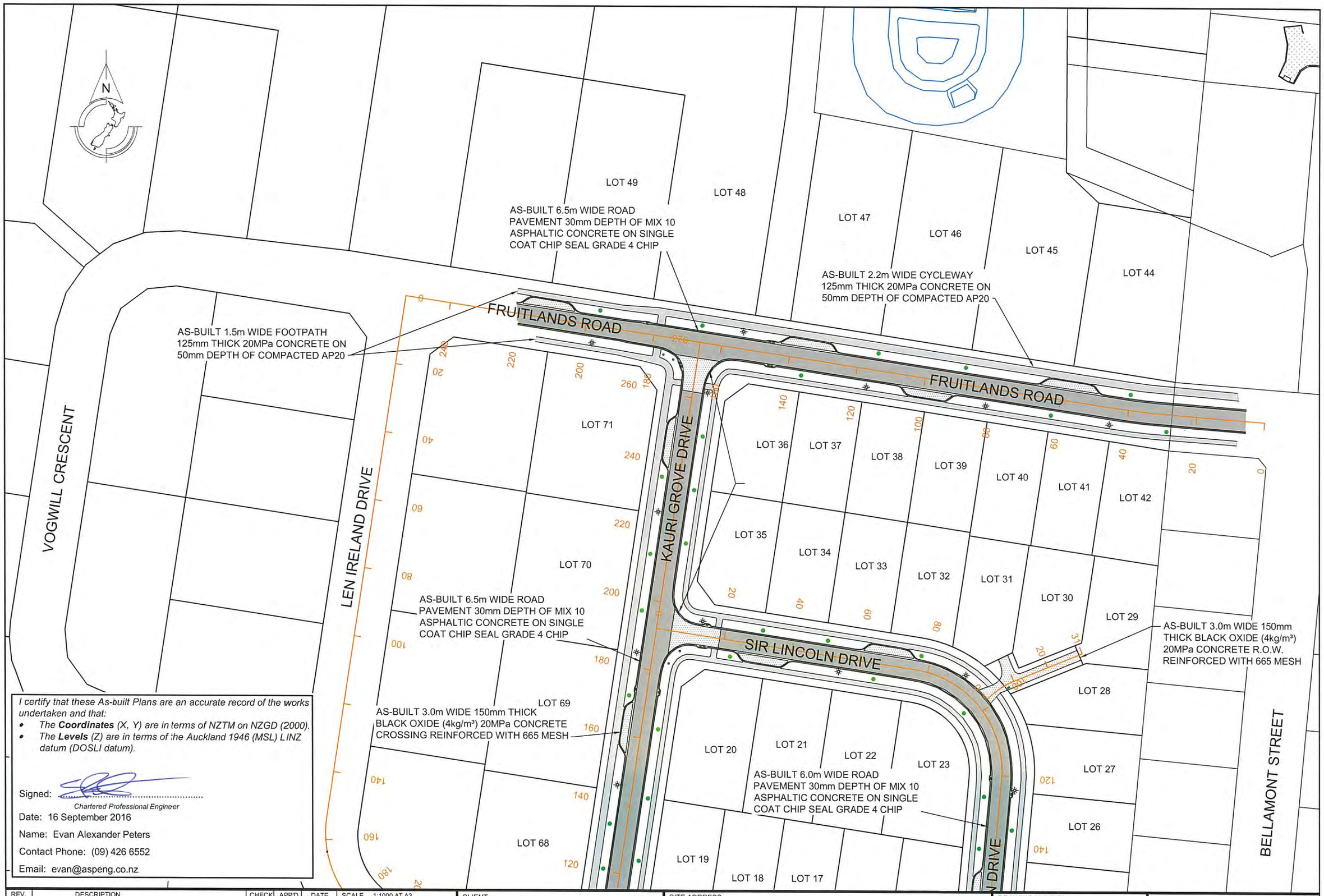
ASBUILT CUT TO FILL
INCLUDING UNDERCUT DEPTH CONTOUR PLAN

DRAWING NUMBER

1138 - AB - EW204

DATE	REVISION
SEPT 2016	-

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



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Email: evan@aspeng.co.nz

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE

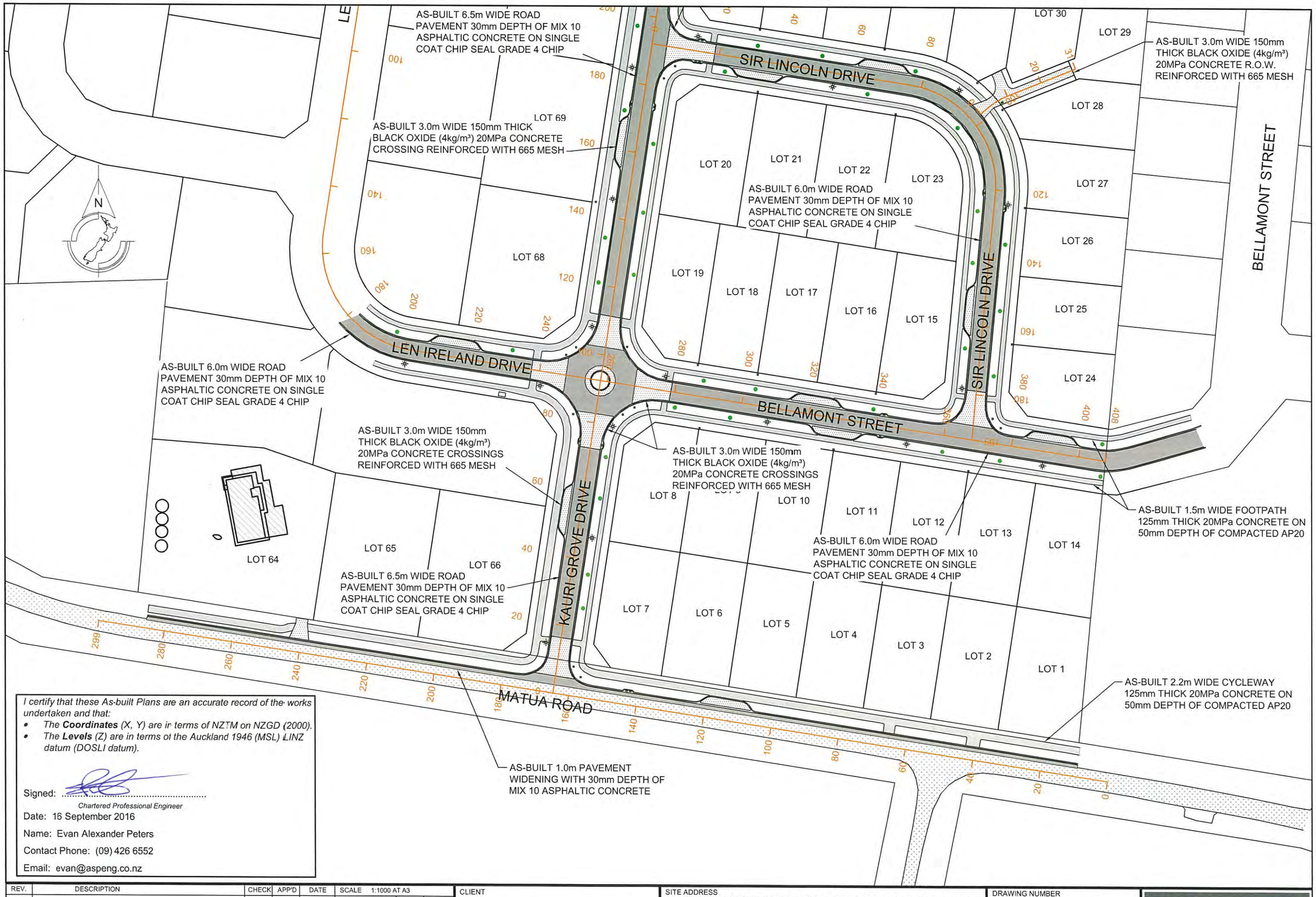
ASBUILT ROADING PLAN 1

DRAWING NUMBER

1138 - AB - RD301

DATE	REVISION
SEPT 2016	-

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



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Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:1000 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
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202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE

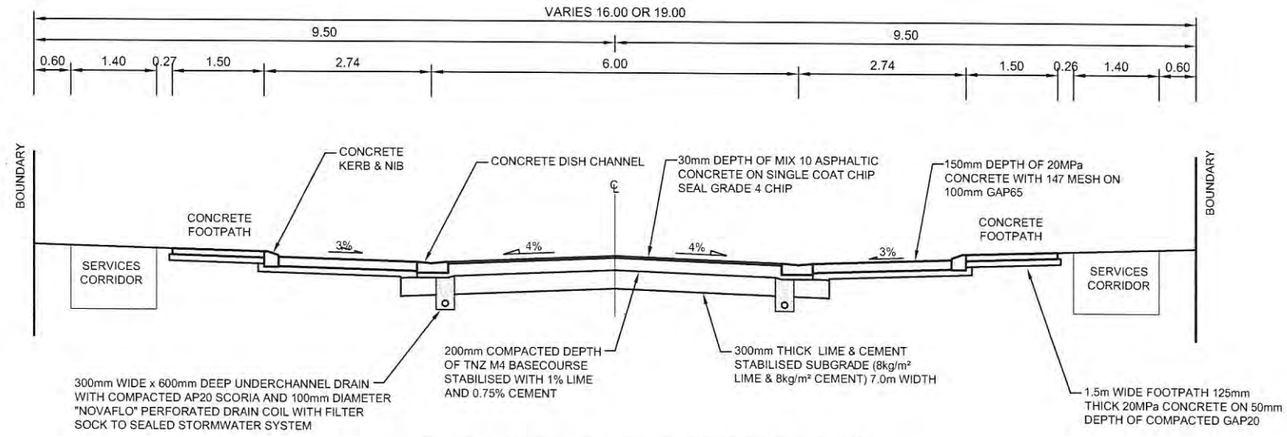
ASBUILT ROADING PLAN 2

DRAWING NUMBER

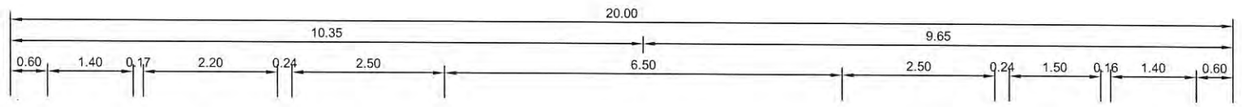
1138 - AB - RD302

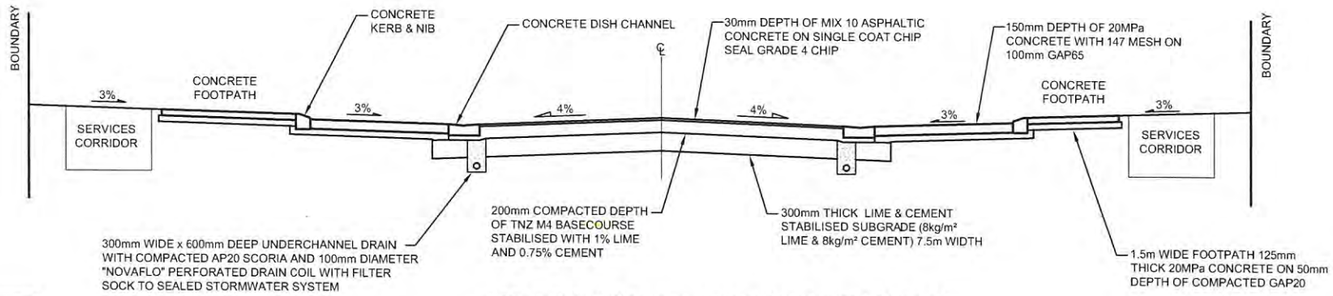
DATE	REVISION
SEPT 2016	-

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



ASBUILT TYPICAL 6.0m WIDE ROAD WITH PARKING





ASBUILT TYPICAL 6.5m WIDE ROAD WITH PARKING

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Signed: .....
Chartered Professional Engineer

Date: 16 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:100 AT A3	NAME	DATE
					DESIGN	MJ	09.16
					DRAWN	MJ	09.16
					DRAWING CHECK	PF	09.16
					DESIGN CHECK	PF	09.16
					APPROVED	EP	09.16

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE

ASBUILT ROADING CROSS SECTIONS

DRAWING NUMBER

1138 - AB - RD303

DATE	REVISION
SEPT 2016	-

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

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Signed: .....
Chartered Professional Engineer

Date: 16 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

NOTE:
ALL PIPES ARE LAID ON AP20 BEDDING. ALL CESSPIT LEADS ARE CLASS-4, 225mmØ FOR SINGLE CESSPITS AND 300mmØ FOR DOUBLE CESSPITS. ALL CROSSINGS ARE BACKFILLED WITH GAP 65 HARDFILL.

AB 1050mmØ CLASS 2
RCRRJ 9.0m AT %

AB 375mmØ CLASS 2
RCRRJ 30.16m AT 1.3%

AB 150mmØ uPVC SN16
33.64m CONNECTION

AB 1050mmØ CLASS 2 RCRRJ 56.70m AT 0.63%

AB SWCP-2
SINGLE 675x450mm
LL 18.19
IL 17.24
IL SUMP 16.99

AB SWCP-1
DOUBLE 675x450mm
LL 17.99
IL 17.02
IL SUMP 16.79

AB 600mmØ CLASS 2
RCRRJ 24.41m AT 2.4%

AB 600mmØ CLASS 2 RCRRJ 39.21m AT 0.54%

AB 900mmØ CLASS 4
RCRRJ 20.29m AT 1.1%

AB 675mmØ CLASS 2
RCRRJ 6.59m AT 4.8%

AB 675mmØ CLASS 2 RCRRJ 24.34m AT 0.78%

AB 750mmØ CLASS 4 RCRRJ 31.33m AT 0.4%

AB 900mmØ CLASS 2 RCRRJ 30.85m AT 1.2%

AB 300mmØ CLASS 2 RCRRJ 73.53m AT 3.0%

AB 375mmØ CLASS 2 RCRRJ 40.08m AT 3.6%

AB 675mmØ CLASS 2 RCRRJ 50.87m AT %

AB SWCP-4
DOUBLE 675x450mm
LL 18.08
IL 17.18
IL SUMP 16.88

AB SWCP-3
DOUBLE 675x450mm
LL 17.97
IL 16.97
IL SUMP 16.77

20.2m
25.7m
42.0m
59.6m
28.9m

LOT 48
LOT 47
LOT 46
LOT 45
LOT 44
LOT 71
LOT 36
LOT 37
LOT 38
LOT 39
LOT 40
LOT 41
LOT 42

FRUITLANDS ROAD
FRUITLANDS ROAD
KAURI GROVE DRIVE

N

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:500 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

CLIENT
CABRA DEVELOPMENTS LIMITED

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SITE ADDRESS
56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE
ASBUILT STORMWATER PLAN 1

DRAWING NUMBER
1138 - AB - SW401

DATE
SEPT 2016

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:

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- *The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).*

Signed: .....

Chartered Professional Engineer

Date: 16 September 2016

Name: Evan Alexander Peters

Contact Phone: (09) 426 6552

Email: evan@aspeng.co.nz

NOTE:
ALL PIPES ARE LAID ON AP20 BEDDING. ALL CESSPIT LEADS ARE CLASS-4, 225mmØ FOR SINGLE CESSPITS AND 300mmØ FOR DOUBLE CESSPITS. ALL CROSSINGS ARE BACKFILLED WITH GAP 65 HARDFILL.

AB SW-WW A0
IL 14.54

AB SWMH A1
1800mmØ
LL 16.77
IL IN 15.23/14.79
IL OUT 14.72
DTI 2.05

AB SWMH M1
1050mmØ
LL 17.25
IL IN 16.1
IL OUT 15.63
DTI 1.62

N

LOT 48

LOT 47

LOT 46

LOT 45

LOT 44

AB SWMH B2
1200mmØ
LL 18.38
IL IN 16.25
IL OUT 16.21
DTI 2.17

AB SWMH B1
1200mmØ
LL 18.30
IL IN 16.04
IL OUT 15.99
DTI 2.31

AB SWMH A2
1800mmØ
LL 18.51
IL IN 15.4/15.23
IL OUT 15.15
DTI 3.36

FRUITLANDS ROAD

AB SWMH C2
1200mmØ
LL 18.61
IL IN 16.46
IL OUT 16.38
DTI 2.23

AB SWMH C1
1350mmØ
LL 18.48
IL IN 16.19
IL OUT 16.12
DTI 2.36

AB SWMH A4
1800mmØ
LL 18.37
IL IN 16.0/15.94
IL OUT 15.87
DTI 2.5

AB SWMH A3
1500mmØ
LL 18.61
IL IN 15.89/15.51
IL OUT 15.45
DTI 3.15

AB SWMH F1
1050mmØ
LL 19.78
IL OUT 18.08
DTI 1.7

LOT 71

AB SWMH A5
1350mmØ
LL 18.43
IL OUT 16.26
DTI 2.17

LOT 36

LOT 37

LOT 38

LOT 39

LOT 40

LOT 41

LOT 42

AB SWMH E1
1050mmØ
LL 19.12
IL IN 17.92
IL OUT 17.89
DTI 1.23

KAURI GROVE DRIVE

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:500 AT A3

	NAME	DATE
DESIGN	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

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SITE ADDRESS
56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

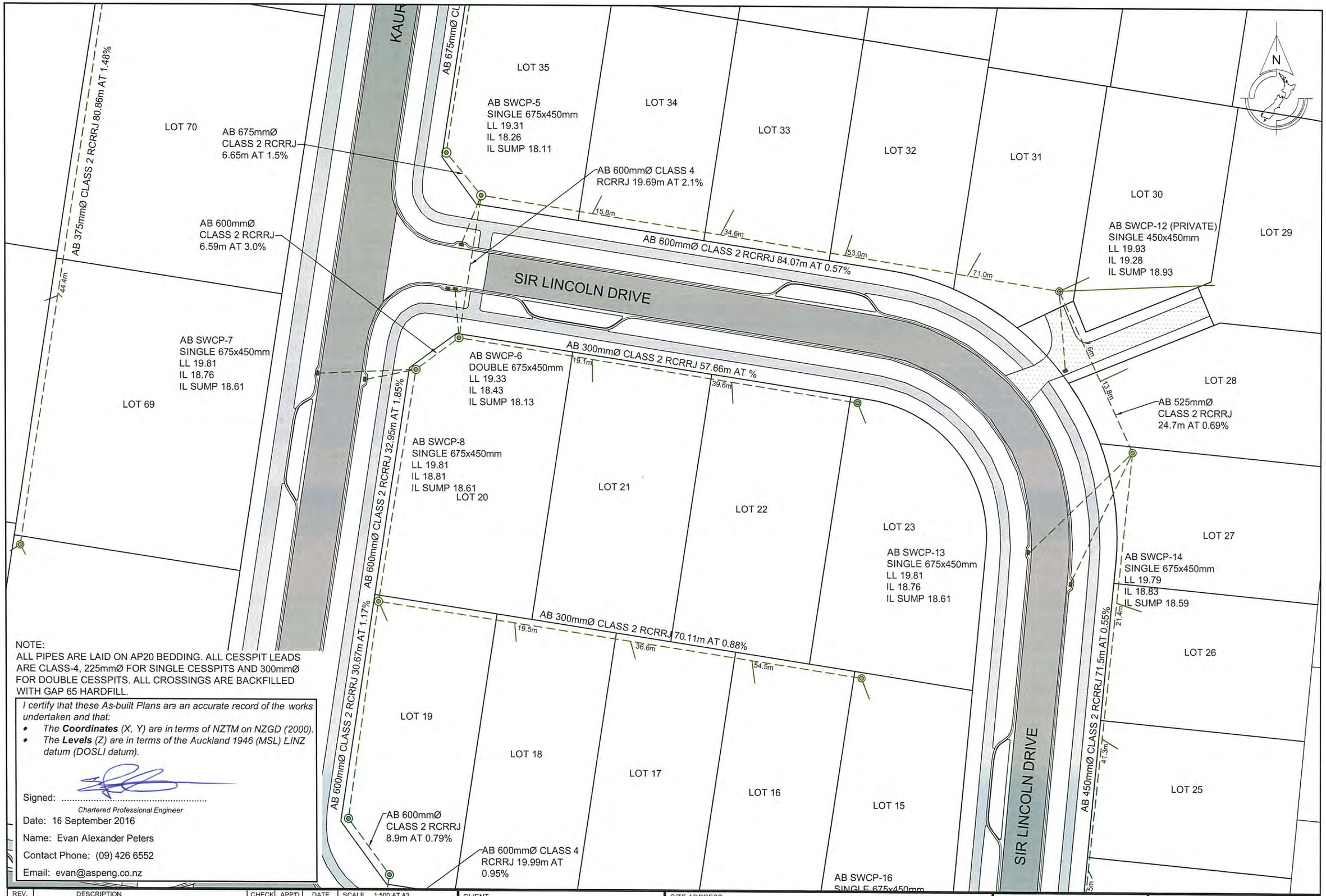
DRAWING TITLE
ASBUILT STORMWATER MANHOLE PLAN 1

DRAWING NUMBER
1138 - AB - SW402

DATE
SEPT 2016

REVISION
-

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



NOTE:
ALL PIPES ARE LAID ON AP20 BEDDING. ALL CESSPIT LEADS ARE CLASS-4, 225mmØ FOR SINGLE CESSPITS AND 300mmØ FOR DOUBLE CESSPITS. ALL CROSSINGS ARE BACKFILLED WITH GAP 65 HARDFILL.

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

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- *The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum).*

Signed: .....
Chartered Professional Engineer
Date: 16 September 2016
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	MJ	09.16
DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
DESIGN CHECK	PF	09.16
APPROVED	EP	09.16

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202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE
ASBUILT STORMWATER PLAN 2

DRAWING NUMBER
1138 - AB - SW403

DATE
SEPT 2016

REVISION
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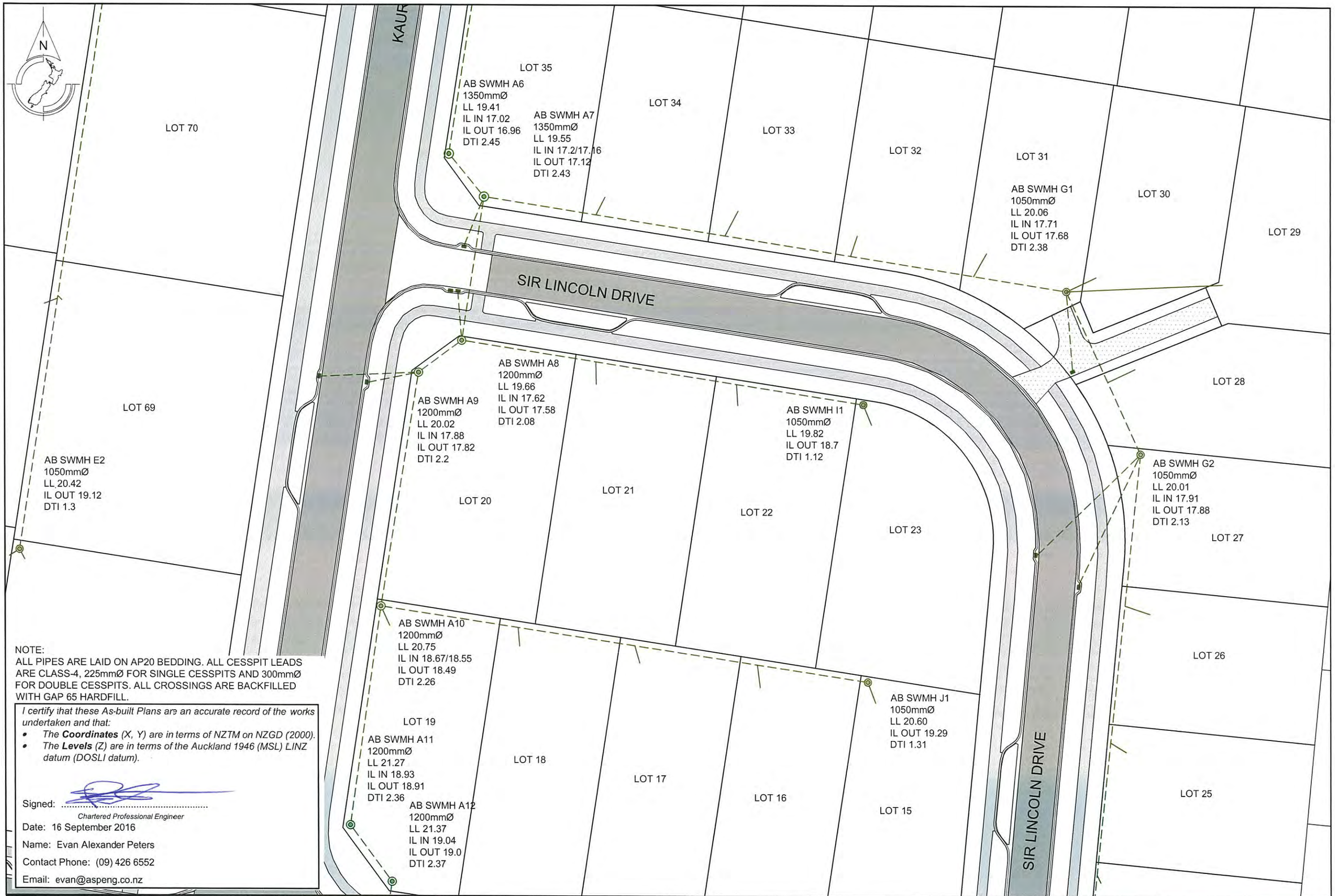

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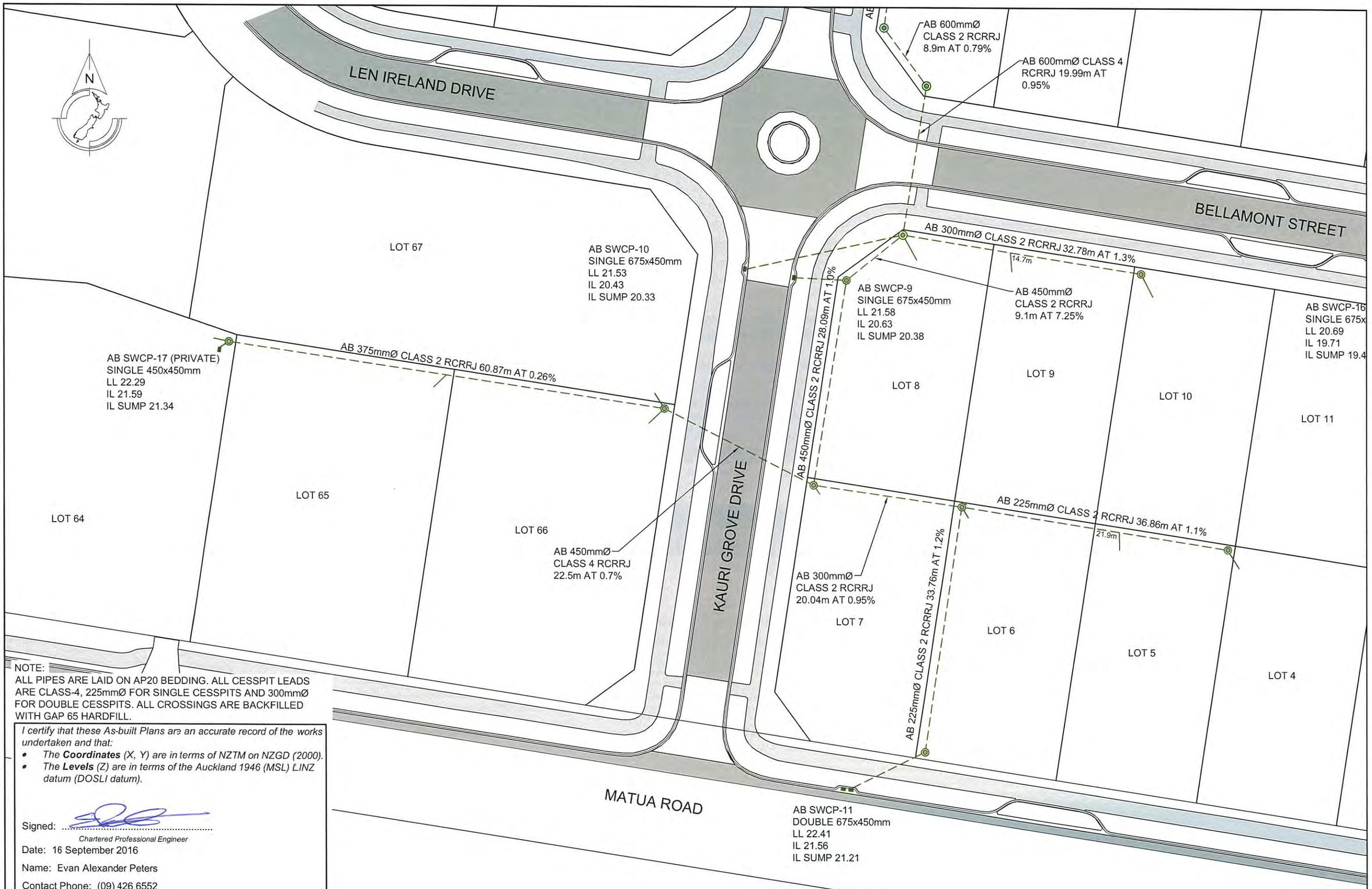

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DRAWING TITLE
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DRAWING NUMBER
1138 - AB - SW405

DATE
SEPT 2016

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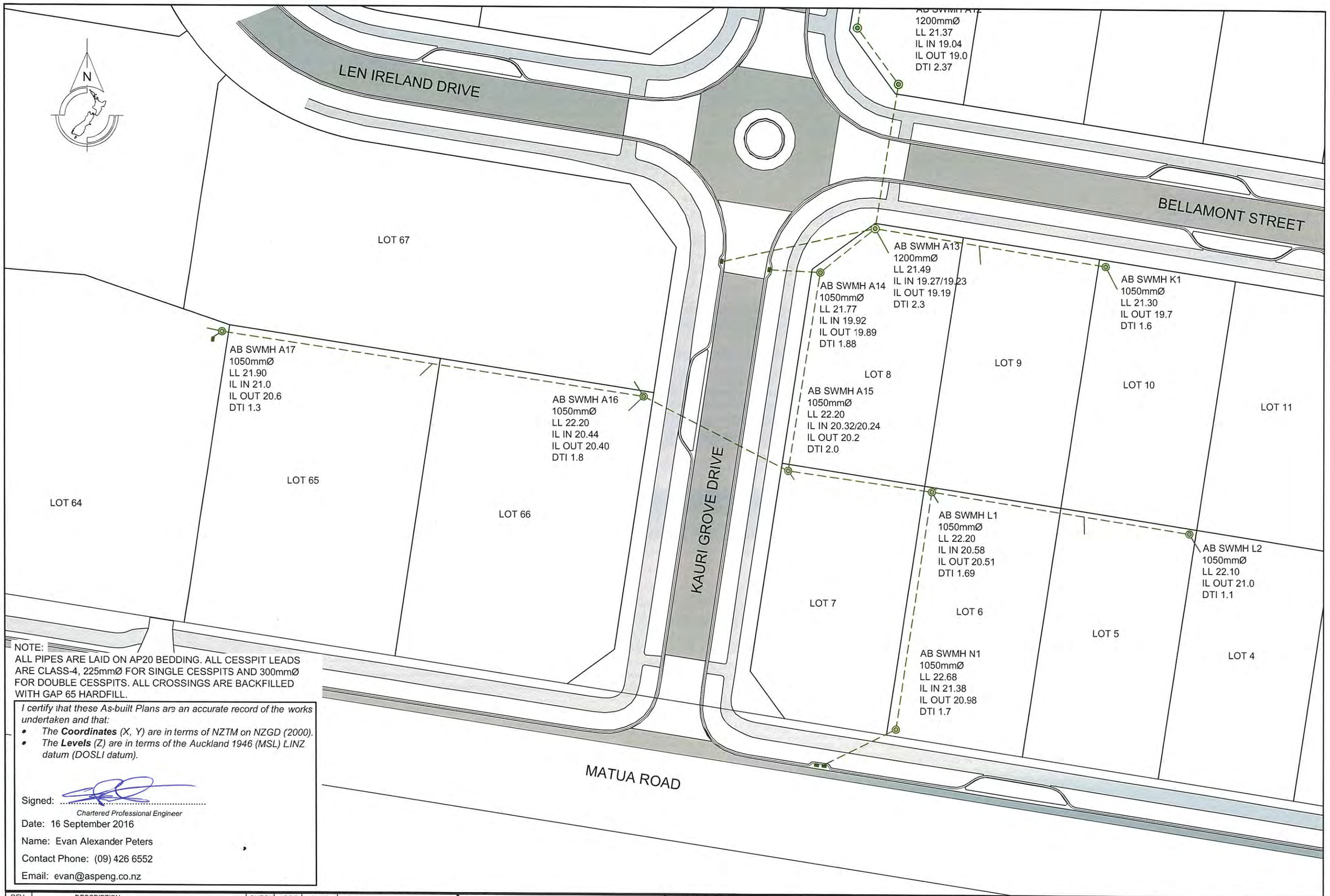

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R65429 RDC21584

DRAWING TITLE
ASBUILT STORMWATER MANHOLE PLAN 3

DRAWING NUMBER
1138 - AB - SW406

DATE	REVISION
SEPT 2016	-

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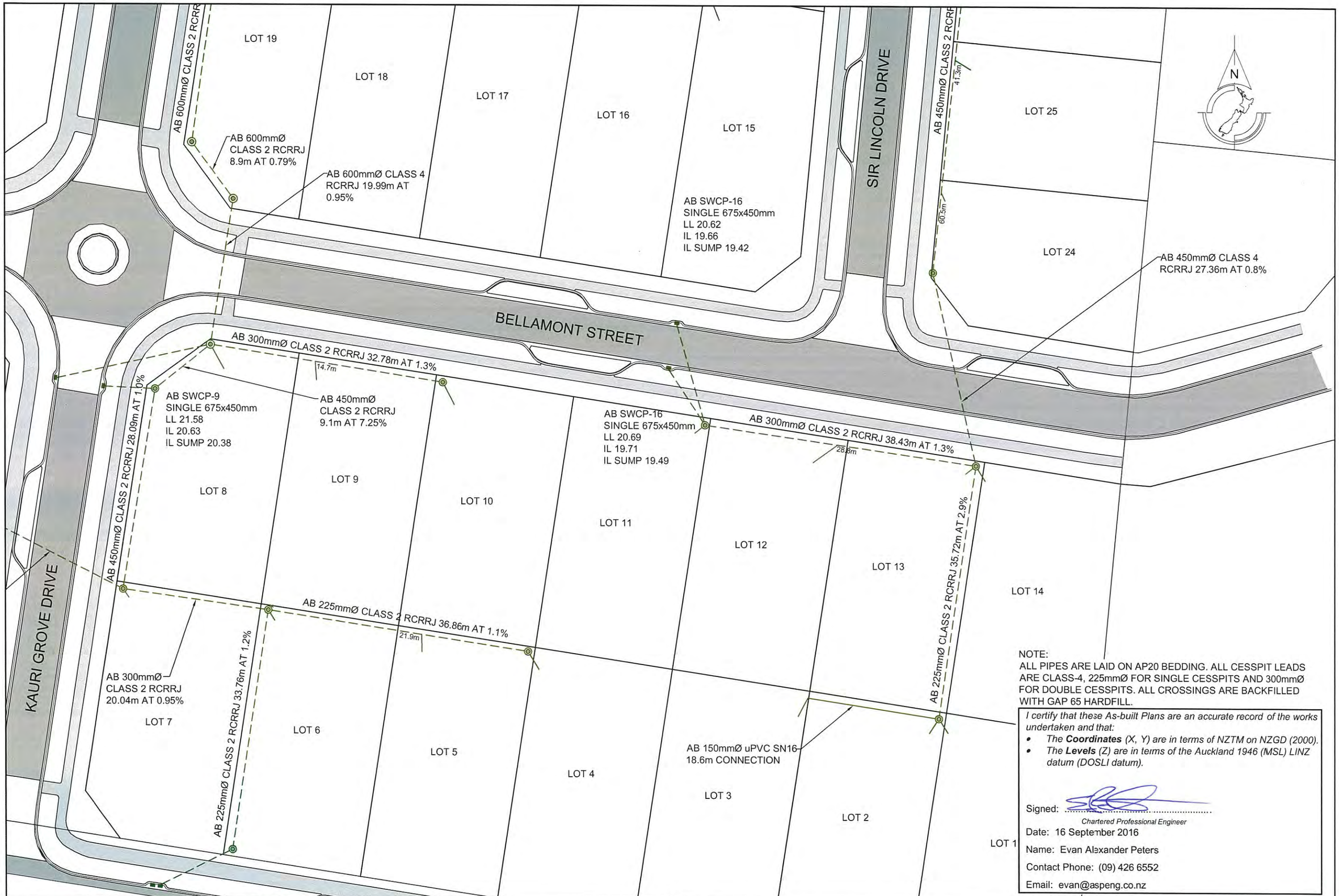

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE

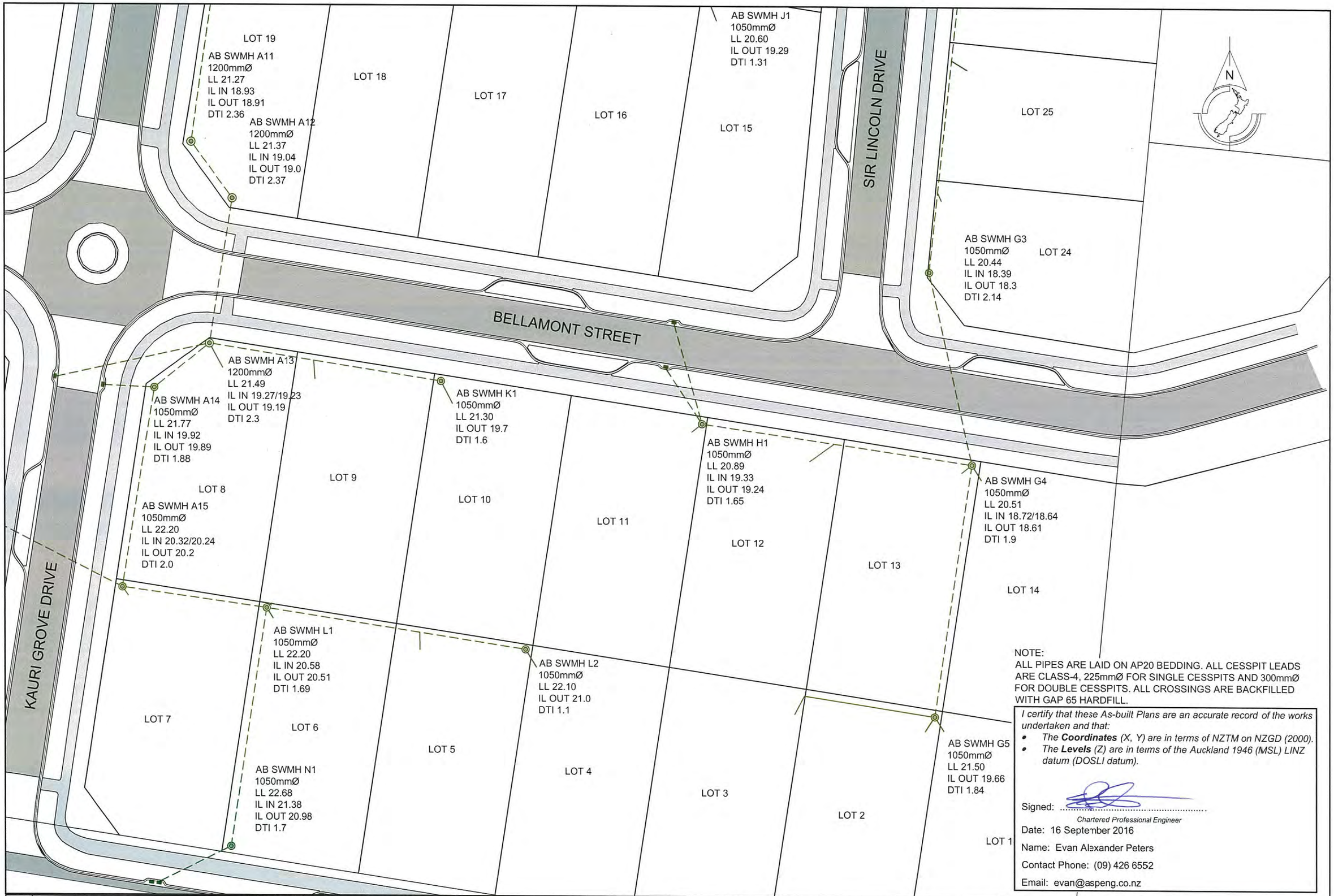
ASBUILT STORMWATER PLAN 4

DRAWING NUMBER

1138 - AB - SW407

DATE	REVISION
SEPT 2016	-

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



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SITE ADDRESS
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202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584

DRAWING TITLE
ASBUILT STORMWATER MANHOLE PLAN 4

DRAWING NUMBER
1138 - AB - SW408

DATE
SEPT 2016

REVISION
-

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

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

NOTE:
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REV.	DESCRIPTION	CHECK	APP'D	DATE

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DESIGN CHECK	PF	09.16
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SITE ADDRESS
56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584 #44397

DRAWING TITLE
ASBUILT OVERALL WATER SUPPLY PLAN

DRAWING NUMBER
1138 - AB - WS601

DATE
SEPT 2016

REVISION
-

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

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

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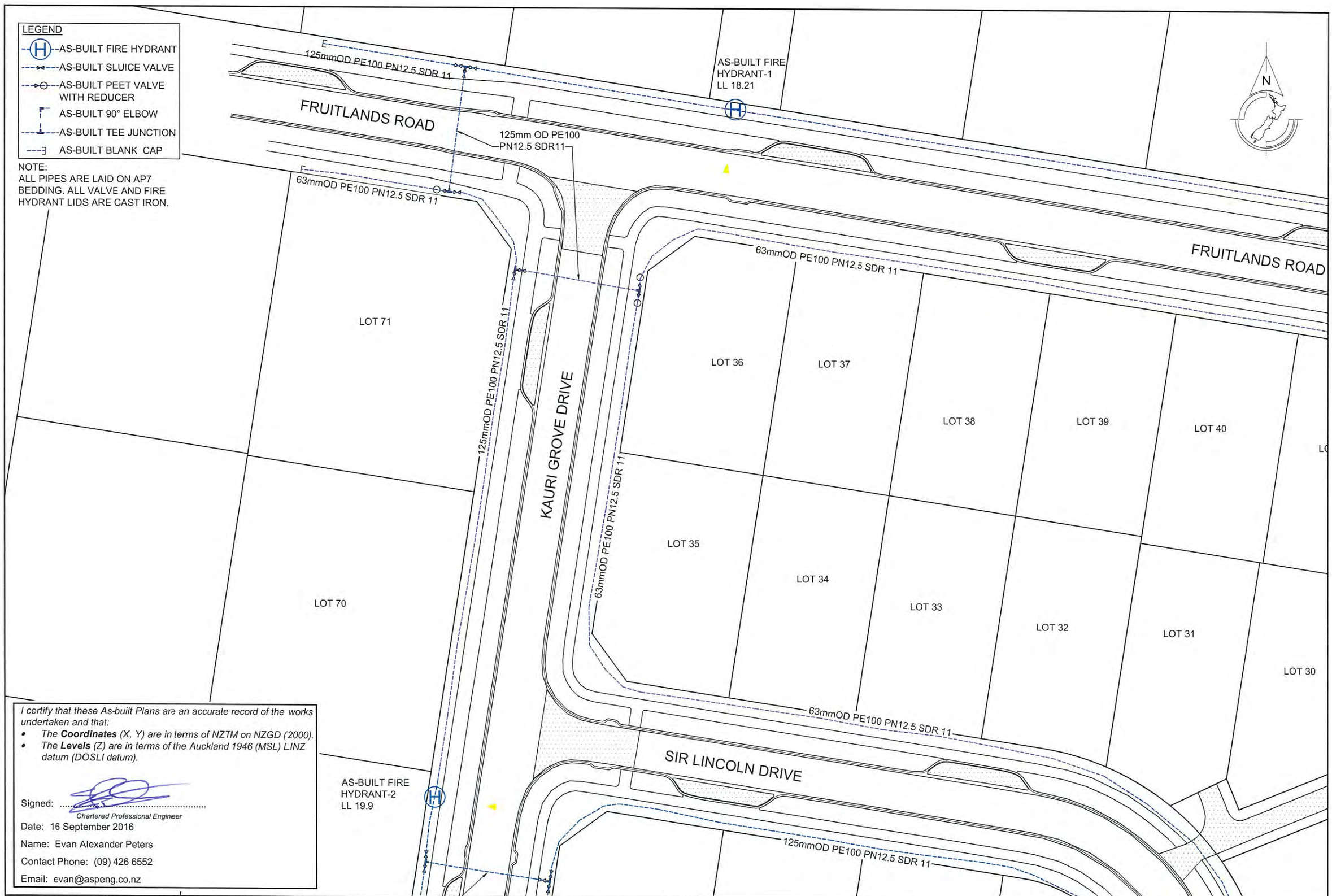

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DRAWN	MJ	09.16
DRAWING CHECK	PF	09.16
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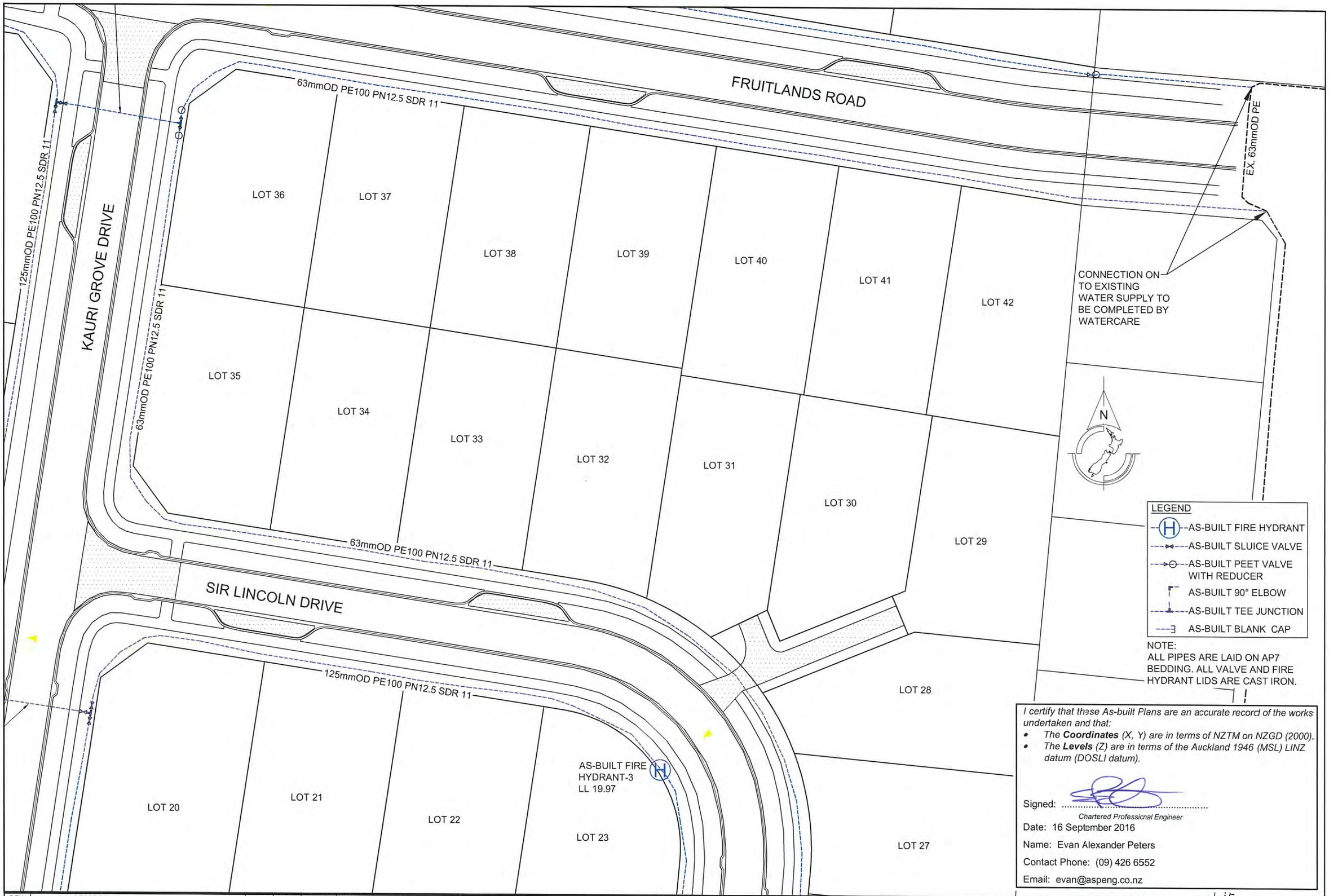
SITE ADDRESS
56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584 #44397

DRAWING TITLE
ASBUILT WATER SUPPLY PLAN 1

DRAWING NUMBER
1138 - AB - WS602

DATE	REVISION
SEPT 2016	-

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



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SCALE 1:500 AT A3

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584 #44397

DRAWING TITLE

ASBUILT WATER SUPPLY PLAN 2

DRAWING NUMBER

1138 - AB - WS603

DATE	REVISION
SEPT 2016	-

ASPIRE CONSULTING ENGINEERS
Ph: 09 426 6552
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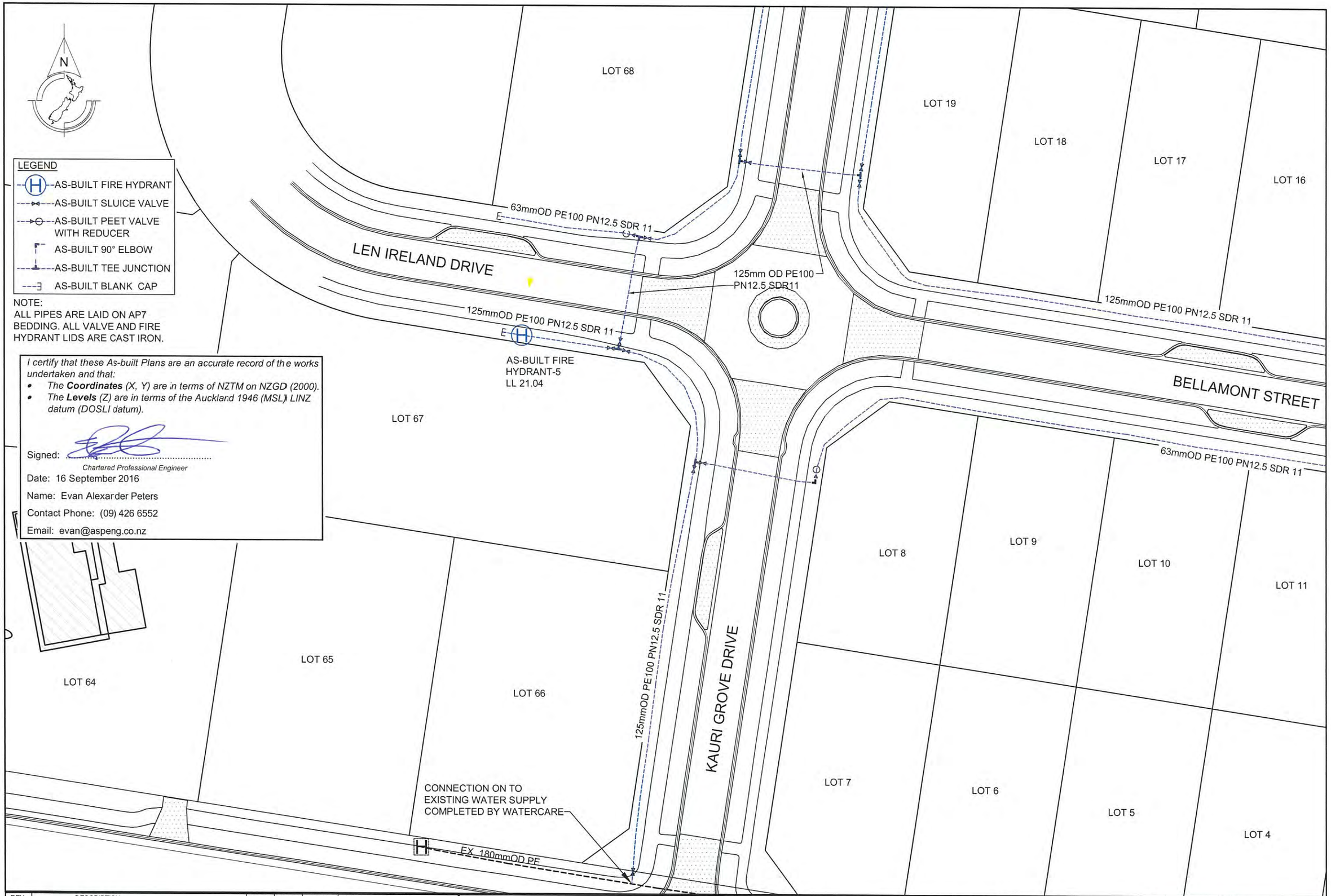

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584 #44397

DRAWING TITLE
ASBUILT WATER SUPPLY PLAN 3

DRAWING NUMBER
1138 - AB - WS604

DATE
SEPT 2016

REVISION
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LOT 19
LOT 18
LOT 17
LOT 16
LOT 15
LOT 27
LOT 26
LOT 25
LOT 24
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
LOT 13
LOT 14
LOT 7
LOT 6

125mmOD PE100 PN12.5 SDR 11
63mmOD PE100 PN12.5 SDR 11
125mm OD PE100 PN12.5 SDR11
63mmOD PE100 PN12.5 SDR 11
EX. 63mmOD PE
EX. 63mmOD PE

SIR LINCOLN DRIVE
BELLAMONT STREET
BELLAMONT STREET

AS-BUILT FIRE HYDRANT-4
LL 20.78

N

LEGEND
- AS-BUILT FIRE HYDRANT
- AS-BUILT SLUICE VALVE
- AS-BUILT PEET VALVE WITH REDUCER
- AS-BUILT 90° ELBOW
- AS-BUILT TEE JUNCTION
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DRAWING TITLE
ASBUILT WATER SUPPLY PLAN 4

DRAWING NUMBER
1138 - AB - WS605

DATE
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REVISION
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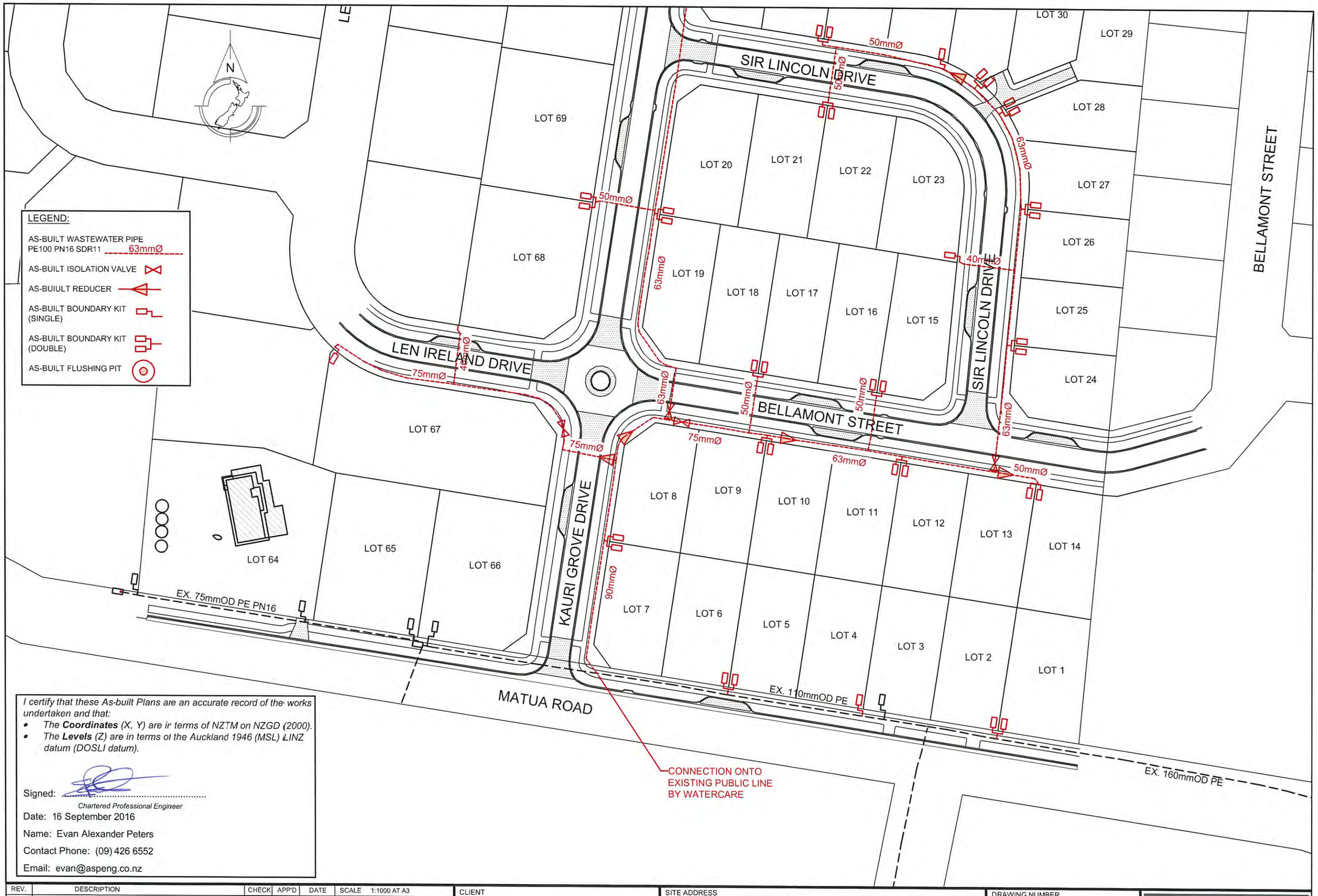

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56 LOT RESIDENTIAL SUBDIVISION (STAGES 1 TO 3)
202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584 #44397

DRAWING TITLE

ASBUILT WASTEWATER PLAN 1

DRAWING NUMBER

1138 - AB - WW501

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SEPT 2016	-

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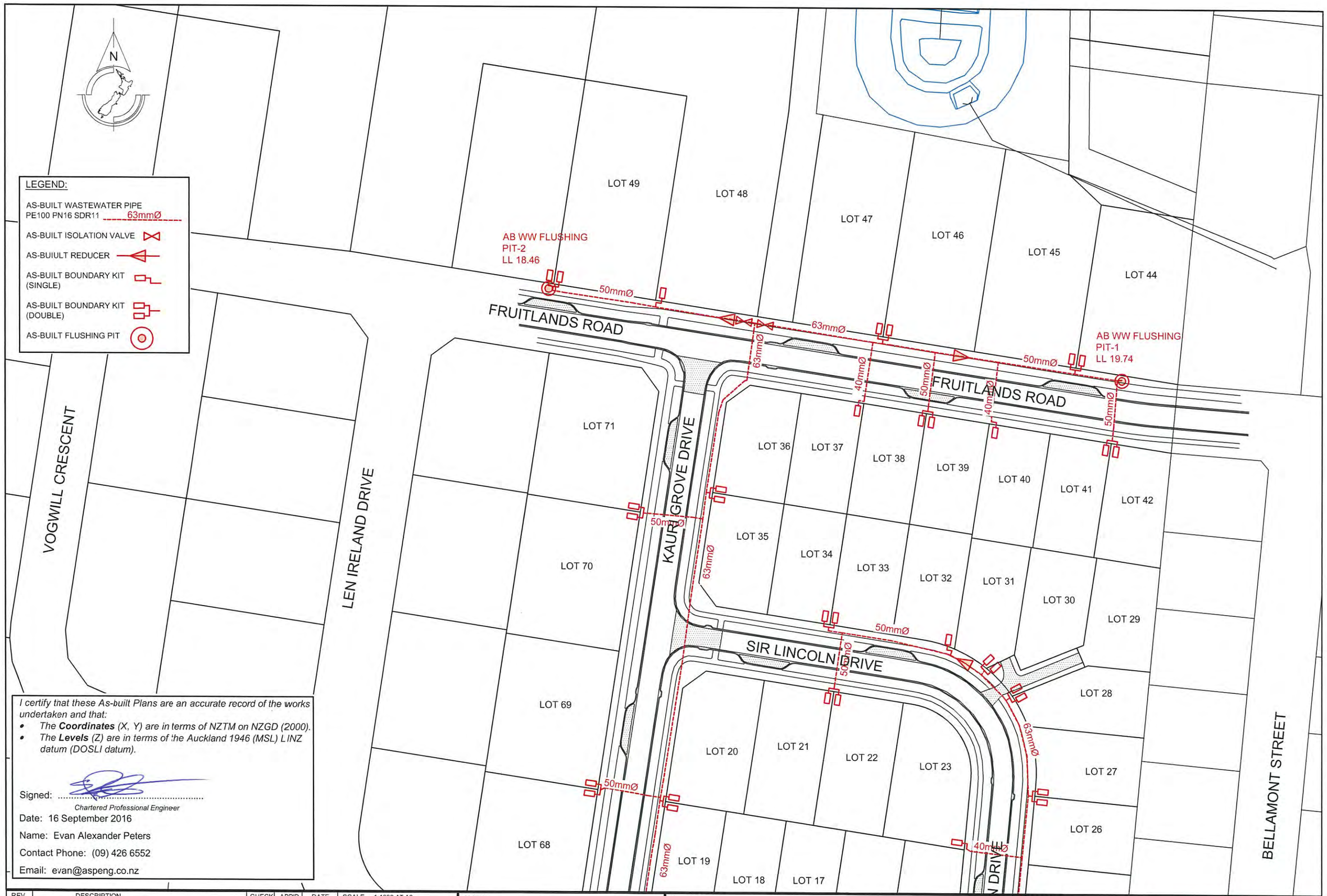

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202 & 218 MATUA ROAD, HUAPAI
R65429 RDC21584 #44397

DRAWING TITLE

ASBUILT WASTEWATER PLAN 2

DRAWING NUMBER

1138 - AB - WW502

DATE	REVISION
SEPT 2016	-

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

Appendix C

Laboratory Test Data

ROADTEST LTD

Revision: 1

Report No: 16 0101

DETERMINATION OF THE LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2 & 2.6

Job:	**218 Matua Road**		
Date of order:	-	Sample origin:	As below
Sample method:	-	Sample Description:	-
Sample By:	AP	Date:	-

Test Details :

Test performed on : fraction passing 0.425mm sieve
History : Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
903 D	LOT 80/81 East	0.3m - 0.8m	61	15	33.1
904 D	LOT 49/50	0.3m - 0.7m	91	16	30.7
919 D	LOT 69/69	0.4m - 0.6m	87	21	33.0
923 D	LOT 65/66/67	0.3m - 0.6m	102	22	43.5
924 D	LOT 53/54	0.3m - 0.7m	48	16	29.6
925 D	LOT 61/62	0.4m - 0.6m	139	26	49.6
926 D	LOT 57/58	0.3m - 0.7m	88	21	35.8

Comments :

Tested By:	MC	Date :	09,10,11,13,14 & 15.06.16
Calculated By :	MC	Date :	16.06.16
Checked By :		Date :	

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

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location: Easting	Northing	RL/Details	Soil Description	In-situ Vane Shear Strengths: Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Field and Laboratory Testing Data: Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³)	Oven Dry Density (t/m³)	Calculated Air Voids (%)	Comments
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	
15/12/2015	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	
6/01/2016	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	
26/01/2016	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	
	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	
29/01/2016	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	
	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	

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Created By: AP Date: 15/12/2015
Checked By: CS Date: 20/05/2016
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AKL2016_0046 NDM test locations

CMW Geosciences

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

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:3000 AT A3

	NAME	DATE
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DRAWN	PBF	05.2015
DRAWING CHECK	PBF	05.2015
DESIGN CHECK	NM	05.2015
APPROVED	NM	05.2015

CLIENT
CABRA DEVELOPMENTS LIMITED

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SITE ADDRESS
202, 218 & 224 MATUA ROAD
HUAPAI

DRAWING TITLE
CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS

DRAWING NUMBER
1138 - ENG - 03

DATE
MAY 2015

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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:	AKl2016_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

IANZ ACCREDITED LABORATORY
ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location: Easting	Northing	RL/Details	Soil Description	In-situ Vane Shear Strengths: Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Field and Laboratory Testing Data: Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³)	Oven Dry Density (t/m³)	Calculated Air Voids (%)	Comments
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	
3/02/2016	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	
9/02/2016	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	
[redacted]											1.9054	1.4270	33.5	-0.80	200	30.3	2.7	1.46	1.6	
											1.8826	1.4362	31.1	2.07	300	28.9	2.7	1.46	3.7	
											1.7874	1.2859	39.0	2.11	300	36.2	2.7	1.32	3.9	
											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	

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Authorised Signatory: Jack Mylett-Johnson Date: 20/05/2016

AKL 2016-0046 NDM test locations

CMW Geosciences

NOTE:
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HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND 1946

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:3000 AT A3

	NAME	DATE
DESIGN	PBF	05.2015
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DESIGN CHECK	NM	05.2015
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DRAWING TITLE
CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS

DRAWING NUMBER
1138 - ENG - 03

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MAY 2015

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ASPIRE CONSULTING ENGINEERS

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:	AKl2016_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

IANZ ACCREDITED LABORATORY ACCREDITATION №: 1131

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.	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	

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Created By: AP Date: 29/01/2016
Checked By: CS Date: 20/05/2016
Authorised Signatory: Jack Myatt-Johnson Date: 20/05/2016

AKL2016-0046 Core test locations

CMW Geosciences

NOTE:
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HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND 1946

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:3000 AT A3

	NAME	DATE
DESIGN	PBF	05.2015
DRAWN	PBF	05.2015
DRAWING CHECK	PBF	05.2015
DESIGN CHECK	NM	05.2015
APPROVED	NM	05.2015

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SITE ADDRESS
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DRAWING TITLE
CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS

DRAWING NUMBER
1138 - ENG - 03

DATE
MAY 2015

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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:	AKl2016_0046
Location:	Huapai
Report No:	AKL2016_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

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1131

Date Sampled	Sample No.	Test Location: Easting	Test Location: Northing	Test Location: RL/Details	Soil Description	In-situ Vane Shear Strengths: Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Field and Laboratory Testing Data: Gauge Wet Density (t/m³)	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³)	Oven Dry Density (t/m³)	Calculated Air Voids (%)	Comments
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	

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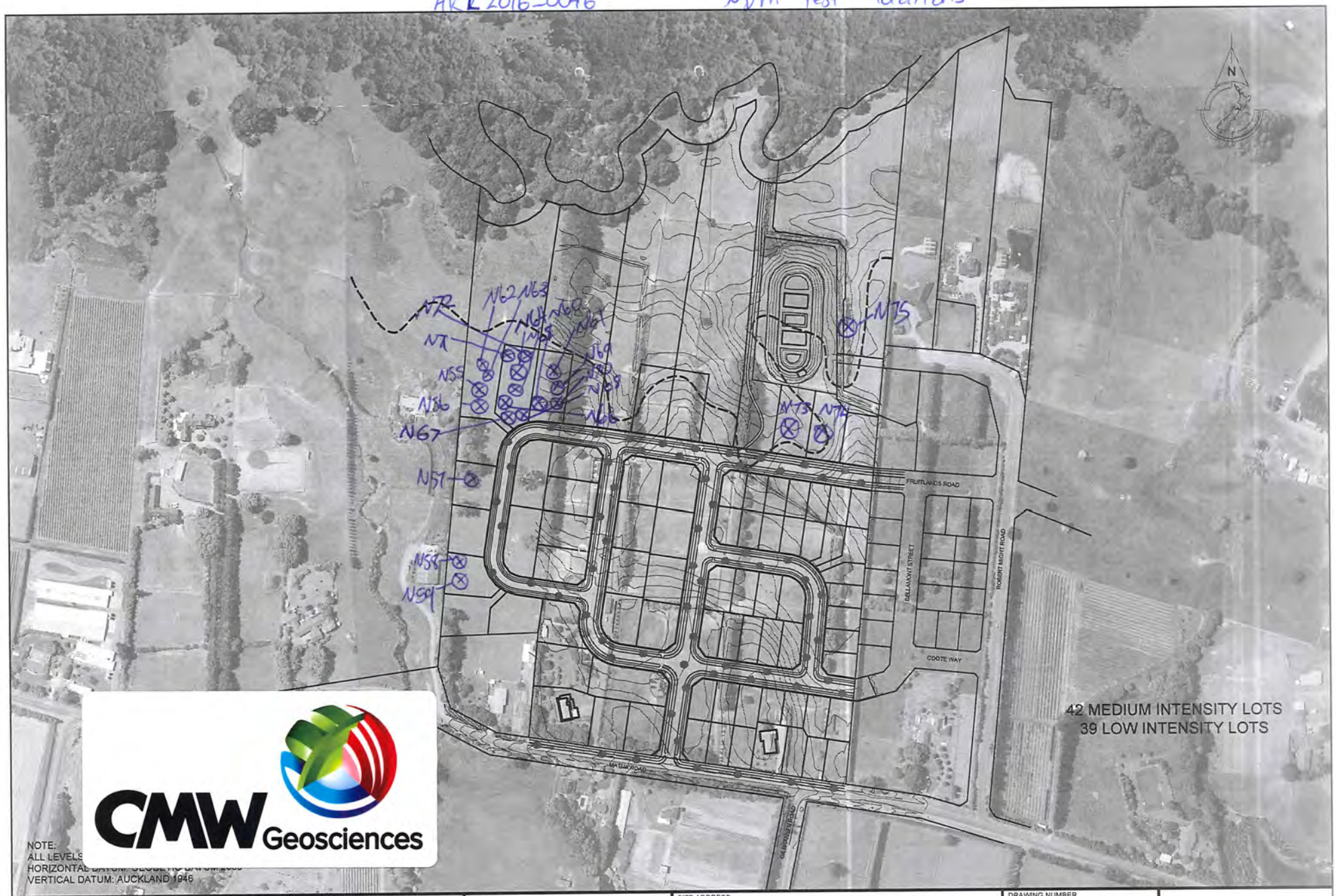
Created By: AP Date: 17/03/2016
Checked By: CS Date: 20/05/2016
Authorised Signatory: Jack Myrett-Johnson Date: 20/05/2016

AKL 2016_0046 NDM test locations



CMW Geosciences

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

REV.	DESCRIPTION	CHECK	APP'D	DATE

SCALE 1:3000 AT A3

	NAME	DATE
DESIGN	PBF	05.2015
DRAWN	PBF	05.2015
DRAWING CHECK	PBF	05.2015
DESIGN CHECK	NM	05.2015
APPROVED	NM	05.2015

CLIENT
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SITE ADDRESS
202, 218 & 224 MATUA ROAD
HUAPAI

DRAWING TITLE
CONCEPT SCHEME PLAN WITH AERIAL & CONTOURS

DRAWING NUMBER
1138 - ENG - 03

DATE
MAY 2015

REVISION
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ASPIRE CONSULTING ENGINEERS

CMW Geosciences

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAF Rev 0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	16/03/2016
Client:	Cobra 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

IANZ ACCREDITED LABORATORY

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: JT Date: 18/04/2016

Authorised Signatory: Date: 19/04/2016

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

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAE Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	16/03/2016
Client:	Cobra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

Auckland Laboratory
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Building C, 9 Piermark Drive, Rosedale, NZ 0632
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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 Date: 12/04/2016

Checked by: JMS Date: 18/04/2016

Authorised Signatory: Janet Mynett Date: 19/04/2016

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

CMW Geosciences

LF14 Rev:5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAE Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	10/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

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Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

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 Date: 12/04/2016

Checked by: JMG Date: 13/04/2016

Authorised Signatory: Jacob Myatt-Jones Date: 19/04/2016

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

F14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAE Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	16/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

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Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

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: Jack Aydell-Jones Date: 19/04/2016

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

LF18 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1986

Report No:	AKL2016_0046LAF Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	17/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

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

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

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: JMG Date: 18/4/2016

Authorised Signatory: Jack Mylett-Johnson Date: 19/4/2016

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

LF14 Rev.5 # Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0046LAF Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	17/03/2016
Client:	Cobra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

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

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

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 Date: 12/04/2016

Checked by: JRJ Date: 18/4/2016

Authorised Signatory: Jack Myrett-Johnson Date: 19/4/2016

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

CMW Geosciences

LF14 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0040LAF Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2015_0046
Test Date:	17/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

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Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

IANZ Accredited Laboratory

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 — Date: 12/04/2016

Checked by: JMJ — Date: 18/4/2016

Authorised Signatory: Joel Myatt-[illegible] — Date: 19/4/2016

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

CMW Geosciences

1116 Rev.5 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAF Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	17/03/2016
Client:	Cabra Developments Ltd
Client Address:	PO Box 197 Orewa 0946
Client Reference:	

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

Testing Locations Selected By: CMW Field Staff

IANZ ACCREDITED LABORATORY

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 Date: 12/04/2016

Checked by: JMJ Date: 18/04/2016

Authorised Signatory: Date: 19/04/2016

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

CMW Geosciences

LF14 Rev.9 **Dynamic Cone Penetration (DCP) Test Report**

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAF Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	17/03/2016
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

IANZ ACCREDITED LABORATORY

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 Date: 12/04/2016

Checked by: JMJ Date: 18/04/2016

Authorised Signatory: Jack Mynott-Gill Date: 19/04/2016

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

LF14 Rev.5 **Dynamic Cone Penetration (DCP) Test Report**

NZS 4402: test 6.5.2: 1988

Report No:	AKL2016_0046LAF Rev.0
Project Name:	218 Matua Road
Project Location:	Huapai
Project Number:	AKL2016_0046
Test Date:	17/03/2016
Client:	Cobra 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

IANZ ACCREDITED LABORATORY

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: JMJ Date: 18/04/2016

Authorised Signatory: Date: 19/04/2016

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