

25 June 2019

236 Matua Road

Huapai

GEOTECHNICAL COMPLETION REPORT

Cabra Developments Limited

AKL2016_0630AH Rev 0

AKL2016_0630AH		
Date	Revision	Comments
18 June 2019	A	Initial draft for internal review
24 June 2019	B	Final draft for internal review
25 June 2019	0	Final issue to client

	Name	Signature	Position
Prepared by	Jack Mynett – Johnson		Project Engineering Geologist
Reviewed by	Andrew Linton		Principal Geotechnical Engineer
Authorised by	Richard Knowles		Principal Geotechnical Engineer, CPEng



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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 the 236 Matua Road development. Construction of this residential subdivision has been undertaken in accordance with the Auckland Council Resource Consent numbers BUN60309658, SUB60309875, LUC60309876, and DIS60316310 and Engineering Approval letter dated 25 October 2018. Specific structures constructed during the civil works to create the subdivision include timber pole retaining walls and segmental block retaining walls.

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 October 2018 to May 2019 and is intended to be used for certification purposes for new lots (listed below) created from Lot 3 DP 171599 as follows:

- 19 new residential lots numbered lots 1 to 19;
- 1 Common Access Lot numbered lot 20;
- 1 extension of the existing Vogwill Road, numbered lot 21;
- 2 Local Purpose Esplanade Reserves numbered lots 22 and 23;
- 2 Local Purpose Accessways numbered lots 24 and 25; and,

The 236 Matua Road Development is located off Vogwill Road, Huapai. As can be seen from the as-built plans, 10 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 3 metres.

2. PROJECT BACKGROUND

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

- CMW Geosciences Geotechnical Investigation Report for a Proposed Residential Subdivision at 236 Matua Road, Huapai referenced AKL2016_0630AA Rev. 0 dated 31 January 2017;
- CMW Geosciences Timber Retaining Wall Design Report for Lots 18 and 19, 236 Matua Road, Huapai referenced AKL2016-0630AB Rev. 0 dated 30 July 2018;
- CMW Geosciences Eastern Keystone Retaining Wall Design Report for 236 Matua Road, Huapai referenced AKL2016_0630AC Rev. 1 dated 8 October 2018;
- CMW Geosciences Western Keystone Retaining Wall Design Report for 236 Matua Road, Huapai referenced AKL2016_0630AD Rev. 1 dated 8 October 2018; and,
- CMW Geosciences Geotechnical Review of Earthworks Plans for 236 Matua Road, Huapai referenced AKL2016_0630AE Rev. 0 dated 20 August 2018.

3. DESCRIPTION OF EARTHWORKS

Works within the site began in early October 2018 with the removal of existing buildings, accessways, fences and vegetation from the earthworks area by the main contractor Opie Contractors Limited. Silt and erosion control measures were also constructed during this time by earthworks subcontractor Bob Hick Earthmoving

Limited. This including the construction of two temporary silt detention ponds, one within Lots 6 and 7, the second in the lower portion of Lot 13.

Topsoil stripping operations across much of the site began in mid-October with topsoil stockpiled within Lots 9, 10 and 11. Soft alluvial materials were removed from the two gullies within Lots 4 and 5 and Lots 7, 8 and 9, and spread out to be dried before being blended in with other fill materials. Underfill subsoil drains consisting of geotextile cloth wrapped scoria filled drainage trenches with a single 160mm perforated drain coil were installed at the base of the gullies.

Following the installation of the subsoil drainage, cut and fill earthworks operations began throughout the site. Earthworks were mostly complete by early December 2018.

Civil operations began in late November 2018 including construction of the timber pole and segmental block retaining walls, construction of stormwater and sanitary sewer service lines, and road pavement construction.

In January 2019, topsoil began to be respread across the site and the temporary silt pond in Lot 13 was disestablished and removed.

From late January to May 2019 civil works continued including the completion of the retaining walls, combined services, kerb and channel formation, rain garden installation, pavement formation, street lighting and footpaths.

In May 2019 the temporary silt detention pond was decommissioned and backfilled with engineered fill.

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 sewer and stormwater trenches;
- Construction of cantilever pole retaining walls including ground conditions, pile size, spacing and depth, and drainage installation;
- Construction of segmental block retaining walls including ground conditions, block placement, no-fines width and drainage installation: and,
- Placement and compaction of engineered fills.

4.2. Compaction Control

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

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

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

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

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

5. EVALUATION OF COMPLETED EARTHWORKS

5.1. Natural Hazards

The appended as-built drawings depict the extents of 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 71(3) of the Building 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:

- **Flood Plain Consent Notice Zone** – Lots 13 and 14 are situated partially within flood plains from the adjacent Kumeu River. We understand that the flood plain zone within these lots is at an RL of 16.3m (including allowance for climate change). No building development and /or future earthworks should be undertaken below this level.
- **Specific Design Zones (Retaining)** - intended to protect the retaining walls from overloading at the crest or undermining at the toe that could lead to instability;
- **Specific Design Zones (Slope)** – intended to protect building development from long term creep effects on or adjacent to steep slopes and to protect the slopes from inappropriate loading or undermining.

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. Land Stability and Erosion Control

Stability conditions for finished ground profiles have been assessed under a range of groundwater conditions which satisfy ultimate limit state design criteria. The soil parameters for the analyses were selected from extensive investigation undertaken at the site and from experience in this terrain. We consider that the stability results are satisfactory for all building platform areas and we are therefore satisfied that these areas are not subject to the natural stability hazards described in the Building Act.

On all steep land, including on engineered batter slopes, surface stability can be compromised by indiscriminate disposal of stormwater onto the ground surface and/ or by removal of vegetation.

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

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

5.3. Retaining Walls

Cantilever pole and segmental block retaining walls have been constructed in the locations shown on the appended Aspire Consulting Engineers as-built plan. These walls reach a maximum height of approximately 1.8 metres and were designed by CMW Geosciences Limited and the construction was observed by this consultancy. Copies of the Producer Statements - Construction Review are provided in Appendix E.

Descriptions of the building and earthworks restrictions within the vicinity of these walls (Specific Design Zones – Retaining) are contained in the Suitability Statement in Appendix A. Lots containing these zones include lots 1 to 5 inclusive, 18 and 19.

5.4. 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.

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

5.6. Subsoil Drains

The appended Aspire Consulting Engineers as-built plan shows the positions of counterfort drains which were constructed in the natural ground during the earthworks operations. The drains were installed to help control groundwater levels and extend to formed outlets within bush areas. The ongoing operation of these drains is important to the overall stability conditions of the site.

Typical trench excavations were 1 metre deep in the natural ground beneath the filling. Accordingly they are considered to be beyond the depths of anticipated foundations.

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

5.7. 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 replaced with hardfill. 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 Roadtest Limited on each road and those results were also forwarded to Aspire Consulting Engineers Limited.

5.8. Design of Shallow Foundations

5.8.1. 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.

5.8.2. 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.

5.8.3. Soil Expansiveness Classification

Four sets of soil tests were carried out on samples taken from likely foundation level on lots within 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 in this development to be M (moderate). Details of foundation options for this Class are contained in the appended Suitability Statement.

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

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

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

5.9. 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 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.

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

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

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

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on the 236 Matua Road, Huapai Development.
2. The extent of preliminary investigations carried out to date are described in the CMW Geosciences Geotechnical Investigation Report referenced AKL2016_0630AA Rev. 0, dated 31 January 2017. The conclusions and recommendations of this document has been re-evaluated in the preparation of this report. The results of all tests carried out are also appended.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
 - (a) The earth fills shown on the appended Aspire Consulting Engineers Limited As-built Plan have been placed in compliance with NZS 4431, the Auckland Council Unitary Plans, Auckland Council Code of Practice for Land Development and Subdivision and related documents.
 - (b) The completed earthworks give due regard to land slope and foundation stability considerations on the building platform areas, but as shown on the appended building restriction zones plans, areas on some lots have gradients steeper than 1(v) in 4 (h) (and generally up to 1(v) in 3(h)) or are adjacent to land having such gradients. Accordingly, **Specific Design Zone (Slope) areas** have been applied on Lots 11 to 15 inclusive. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Slope) areas** unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the implications of the proposals on both global stability conditions and soil creep on the building buildings, the interaction with service pipes and associated trench backfills, control of surface water, construction sequencing, timing and temporary support requirements construction of all earthworks, foundations and retaining walls and if necessary, comment on what aspects require engineering inspections and certification.

This limitation also applies to long term landscaping works, including any proposed minor cuts either on or near batter toes to be retained by new landscaping walls that might not normally require engineering, and to landscaping fills on or immediately above the batter slopes.
 - (c) **Specific Design Zone (Retaining) areas** have been applied on Lots 1 to 5 inclusive, 18 and 19 for the protection of the function of the retaining walls. The retaining walls on this stage of the development were designed for a maximum of 5 kPa surcharge load and 0° toe slope. No building construction and no earthworks (i.e. cut or fills) should take place that exceed these design limits on the walls unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report who consider the stability implications of the earthworks and/ or building proposals on the retaining walls.
 - (d) Lots 13 and 14 are situated partially within flood plains from the adjacent Kumeu River, as shown on the appended Aspire Consulting Engineers As Built Plan referenced 1032-AB-PG105. No building development and /or future earthworks should be undertaken below this level.

- (e) The function of the subsoil drains installed beneath Lots 4 and 8 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 of 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 all lots has been assessed as AS2870 Class M (Moderate). We recommend that building designers note on the Building Consent drawings the need to maintain appropriate moisture levels across building subgrades and in footing excavations (as described in Section 5.9.3 of the Geotechnical Completion Report) for reference by foundation contractors.
- (h) The backfilling and compaction of the storm water and sanitary sewer trenches on this subdivision has been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.

However, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific design and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and trench backfill. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision this document is provided in Appendix B for clarification. Details for water and wastewater pipes are available in the Watercare COP1 - General Requirements and Procedures.

- (i) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(a), 3(b), 3(c), 3(d), 3(e) 3(f), 3(g) and 3(h) above:
 - (i) The filled and natural ground is generally suitable for residential buildings constructed in accordance with NZS 3604 and the requirements of AS2870 for the appropriate expansive soil class.
 - (ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 (Class M) or alternately, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.

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

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

GCR SUMMARY TABLE								
Condition	Specific Design Zone (slope)	Specific Design Zone (retaining)	Flood Level Consent Notice Zone	Subsoil Drains Present	Geotechnical Ultimate Bearing Capacity (kPa)	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
GCR SOPO Clause	3(b)	3(c)	3(d)	3(e)	3(f)	3(g)	3(h)	
Lot number								
1		●			300	M		150
2		●			300	M	●	150
3		●			300	M	●	100
4		●		●	300	M	●	150
5		●			300	M	●	150
6					300	M	●	200
7					300	M	●	100
8				●	300	M	●	150
9					300	M	●	100
10					300	M	●	150
11	●				300	M	●	250
12	●				300	M	●	200
13	●		●		300	M	●	200
14	●		●		300	M	●	150
15	●				300	M	●	200
16					300	M		150
17					300	M		100
18		●			300	M	●	150
19		●			300	M	●	100

Appendix B: Drawings

Title	Reference No.	Date	Revision
Aspire Consulting Engineers Preliminary and General As Built Plans	1302-AB-PG101-107	June 2019	-
Aspire Consulting Engineers Earthworks As Built Plans	1302-AB-EW201-203	June 2019	-
Aspire Consulting Engineers Roading As Built Plans	1302-AB-RD301-303	June 2019	-
Aspire Consulting Engineers Stormwater As Built Plans	1302-AB-SW401-403	June 2019	-
Aspire Consulting Engineers Wastewater As Built Plans	1302-AB-WW501	June 2019	-
Aspire Consulting Engineers Water Supply As Built Plans	1302-AB-WS601	June 2019	-
Auckland Council Stormwater Pipe and Manhole Construction Clearance Requirements	ACSD SW22	September 2013	1

CABRA DEVELOPMENTS LIMITED AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072



SITE LOCATION



AS BUILT DRAWINGS:

PRELIMINARY & GENERAL

PG101	COVER SHEET
PG102	CONTENTS PAGE
PG103	EXISTING SITE PLAN
PG104	AS BUILT SERVICE LINE RESTRICTIONS CONSENT NOTICE PLAN
PG105	AS BUILT FLOOD LEVEL CONSENT NOTICE PLAN
PG106	AS BUILT RETAINING WALL & SLOPE SPECIFIC DESIGN ZONE CONSENT NOTICE PLAN
PG107	AS BUILT COORDINATE TABLES

WASTEWATER

WW501 AS BUILT WASTEWATER PLAN

WATER SUPPLY

WS601 AS BUILT WATER SUPPLY PLAN

EARTHWORKS

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

ROADING

RD301	AS BUILT ROADING PLAN
RD302-303	AS BUILT ROAD CROSS SECTIONS

STORMWATER

SW401	AS BUILT STORMWATER MANHOLE AND CESSPIT PLAN
SW402	AS BUILT STORMWATER PIPE PLAN
SW403	AS BUILT RAINGARDEN DETAILS

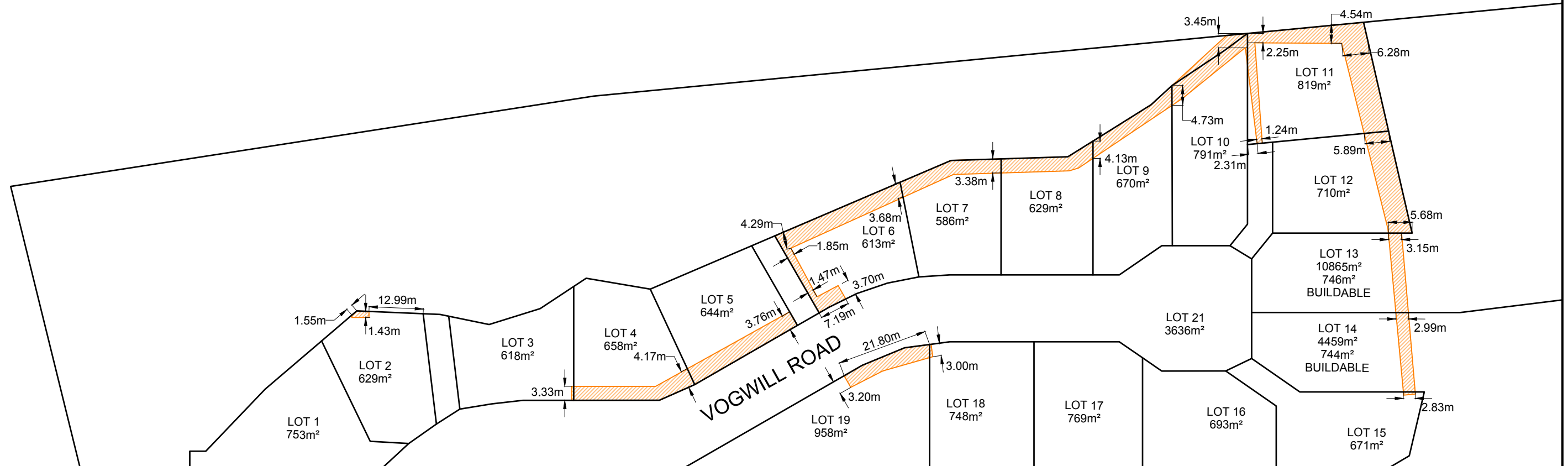
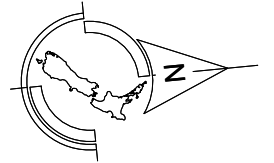
REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	N.T.S. AT A3		CLIENT CABRA DEVELOPMENTS LIMITED Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	SITE ADDRESS AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	DRAWING NUMBER 1302-AB-PG102
						NAME	DATE			
					DESIGN	KC	06.19			
					DRAWN	KC	06.19			
					DRAWING CHECK	MJ	06.19			
					DESIGN CHECK	MJ	06.19	DRAWING TITLE CONTENTS PAGE		DATE JUNE 2019
					APPROVED	MJ	06.19			



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



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:1000 AT A3			CLIENT CABRA DEVELOPMENTS LIMITED <
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NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM:
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

Note:
All survey data has been collected and provided to Aspire by C&R
Surveyors LTD, Registered Surveyors

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), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

LEGEND

 SERVICE LINE RESTRICTIONS
CONSENT NOTICE ZONE

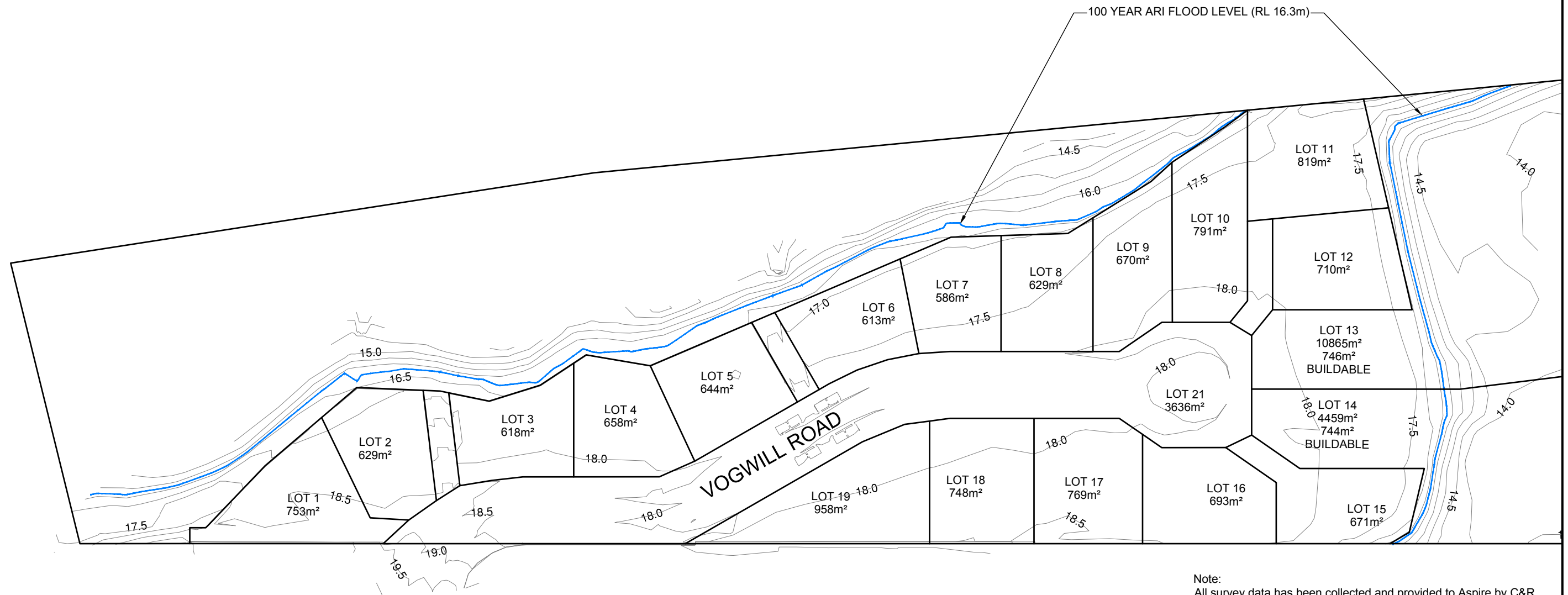
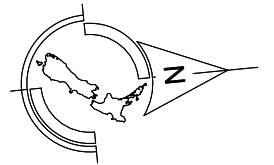
NOTE:
DRAINAGE CONSENT NOTICE ZONE ONLY
SHOWN OUTSIDE OF YARD BOUNDARIES: 3m
FRONT YARD, 1m SIDE & REAR YARDS

Signed:
Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

REV.		DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:1000 AT A3			CLIENT		SITE ADDRESS		DRAWING NUMBER	
							NAME	DATE	CABRA DEVELOPMENTS LIMITED	AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	1302-AB-PG104			
					DESIGN	KC	06.19							
					DRAWN	KC	06.19							
					DRAWING CHECK	MJ	06.19							
					DESIGN CHECK	MJ	06.19	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 SERVICER LINE RESTRICTIONS CONSENT NOTICE PLAN	DATE	REVISION	
					APPROVED	MJ	06.19					JUNE 2019	-	



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



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

LEGEND
100 YEAR ARI (1% AEP) FLOOD
LEVEL: RL 16.3m

NOTE:
THE 100 YEAR ARI (1% AEP) FLOOD LEVEL IS RL 16.3m.
ALLOWING 500mm OF FREEBOARD ABOVE THE FLOOD LEVEL
THE MINIMUM FINISHED FLOOR LEVEL IS RL 16.8m
THE FINISHED GROUND LEVELS ON ALL LOTS INCLUDING
BUILDABLE AREAS OF LOTS 13 & 14 ARE ABOVE THE MINIMUM
FINISHED FLOOR LEVEL.

Note:
All survey data has been collected and provided to Aspire by C&R
Surveyors LTD, Registered Surveyors

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),
and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ
datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed:
Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1000 AT A3
					DESIGN	KC 06.19
					DRAWN	KC 06.19
					DRAWING CHECK	MJ 06.19
					DESIGN CHECK	MJ 06.19
					APPROVED	MJ 06.19

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 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072
DRAWING TITLE
AS BUILT FLOOD LEVEL CONSENT NOTICE PLAN

DRAWING NUMBER
1302-AB-PG105
DATE
JUNE 2019
REVISION
-

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

Note:
All survey data has been collected and provided to Aspire by C&R
Surveyors LTD, Registered Surveyors

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), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed: _____
Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

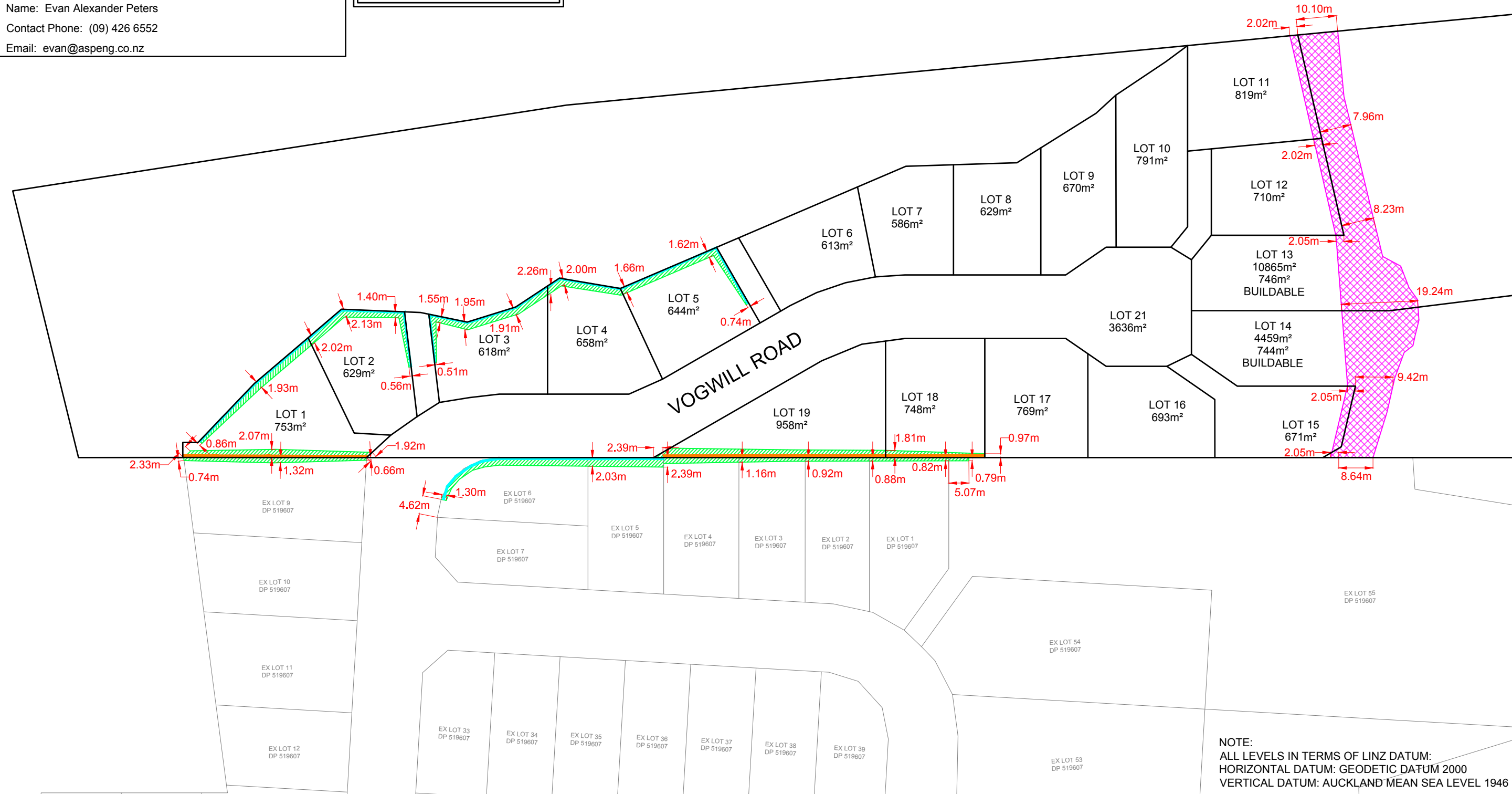
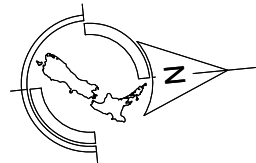
LEGEND

AS BUILT KEYSTONE RETAINING WALL

AS BUILT TIMBER POLE RETAINING WALL

RETAINING WALL SPECIFIC DESIGN ZONE

SLOPE SPECIFIC DESIGN ZONE



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	1:1000 AT A3
					NAME	DATE
					KC	06.19
					KC	06.19
					MJ	06.19
					MJ	06.19
					MJ	06.19

CLIENT

CABRA DEVELOPMENTS LIMITED

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SITE ADDRESS

AS BUILT 19-LOT RESIDENTIAL SUBDIVISION
AT 236 MATUA ROAD, HUAPAI
BUN60306658 / ENG60324072

DRAWING TITLE

AS BUILT RETAINING WALL & SLOPE
SPECIFIC DESIGN ZONE CONSENT NOTICE PLAN

DRAWING NUMBER

1302-AB-PG106

DATE

JUNE 2019

REVISION

-

ASPIRE
CONSULTING ENGINEERS

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

AS BUILT CO-ORDINATE TABLES

STORMWATER CESSPIT

COORDINATES		
POINTS	EASTING	NORTHING
AB-SWCP-DOUBLE01	1736433.445	5930567.217
AB-SWCP-DOUBLE02	1736439.689	5930569.959
AB-SWCP-SINGLE03	1736399.537	5930679.997

STORMWATER RAINGARDEN

COORDINATES		
POINTS	EASTING	NORTHING
AB-SW-RAINGARDEN01	1736433.555	5930562.02
AB-SW-RAINGARDEN02	1736443.343	5930566.659
AB-SW-RAINGARDEN03	1736439.166	5930576.267
AB-SW-RAINGARDEN04	1736429.285	5930571.9

STORMWATER MANHOLE

COORDINATES		
POINTS	EASTING	NORTHING
AB-SWMH-A01	1736398.275	5930563.96
AB-SWMH-A02	1736408.808	5930561.459
AB-SWMH-A03	1736395.218	5930606.072
AB-SWMH-A04	1736397.499	5930634.699
AB-SWMH-A05	1736384.478	5930661.737
AB-SWMH-A06	1736373.367	5930680.462
AB-SWMH-A07	1736374.892	5930704.543
AB-SWMH-A08	1736422.667	5930709.802
AB-SWMH-A09	1736463.023	5930708.994
AB-SWMH-B01	1736426.407	5930569.222
AB-SWMH-B02	1736422.946	5930577.287
AB-SWMH-B03	1736440.298	5930583.666
AB-SWMH-B04	1736438.274	5930600.867
AB-SWMH-B05	1736442.865	5930640.86
AB-SWMH-B06	1736448.471	5930647.217
AB-SWMH-C01	1736443.746	5930574.852
AB-SWMH-D01	1736442.3	5930530.05
AB-SWMH-D02	1736439.882	5930508.988
AB-SWMH-E01	1736401.29	5930463.289
AB-SWMH-E02	1736416	5930461.302

WASTEWATER FLUSHING PIT

COORDINATES		
POINTS	EASTING	NORTHING
AB-WW-FLUSHINGPIT01	1736449.426	5930662.319

WATER SUPPLY FIRE HYDRANT

COORDINATES		
POINTS	EASTING	NORTHING
AB-WS-FH01	1736429.983	5930565.959
AB-WS-FH02	1736444.512	5930671.851

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:2000 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS Ph: 09 426 6552 Web: www.aspeng.co.nz
									CABRA DEVELOPMENTS LIMITED	AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	1302-AB-PG107			
							DESIGN	KC	06.19					
							DRAWN	KC	06.19					
							DRAWING CHECK	MJ	06.19					
							DESIGN CHECK	MJ	06.19					
							APPROVED	MJ	06.19			JUNE 2019	-	
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 COORDINATE TABLES			

Note:
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Surveyors LTD, Registered Surveyors

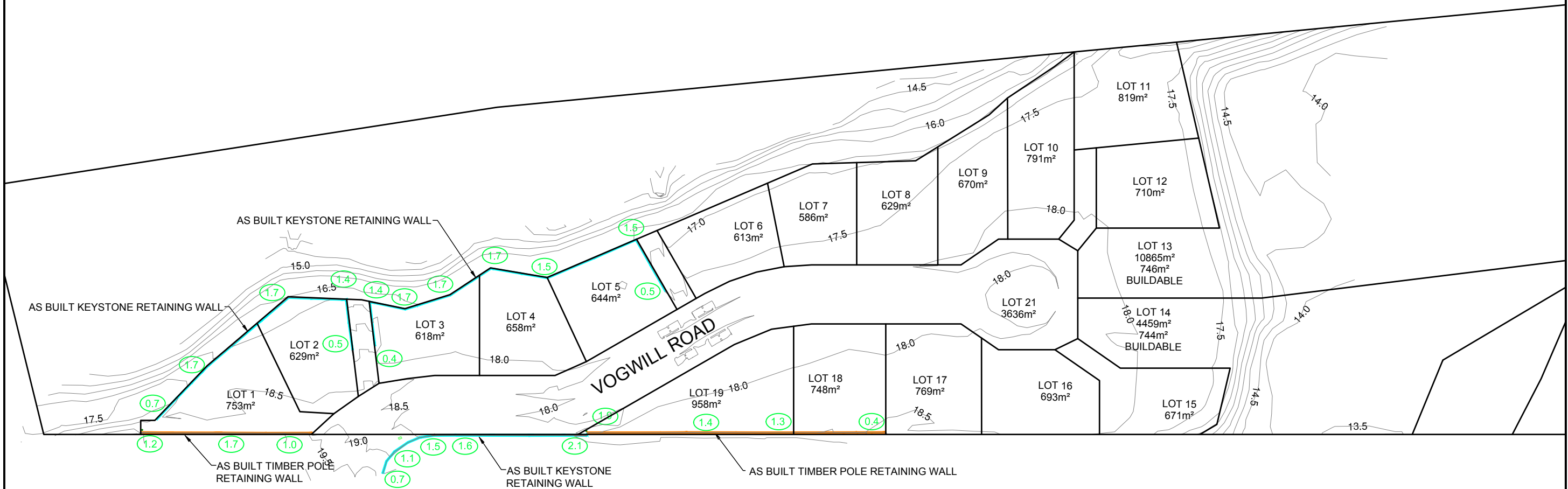
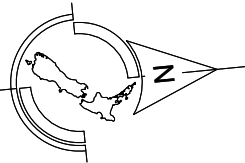
I certify that these AS-built Plans are an accurate record of the works undertaken and that:

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- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed: _____
Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

LEGEND

- AS BUILT KEYSTONE RETAINING WALL
- AS BUILT TIMBER POLE RETAINING WALL
- AS BUILT RETAINING WALL HEIGHT



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1000 AT A3
					DESIGN	KC 06.19
					DRAWN	KC 06.19
					DRAWING CHECK	MJ 06.19
					DESIGN CHECK	MJ 06.19
					APPROVED	MJ 06.19

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 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072
DRAWING TITLE
AS BUILT CONTOUR PLAN

DRAWING NUMBER
1302-AB-EW201
DATE
JUNE 2019
REVISION
-

ASPIRE
CONSULTING ENGINEERS

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

LEGEND

-3.0

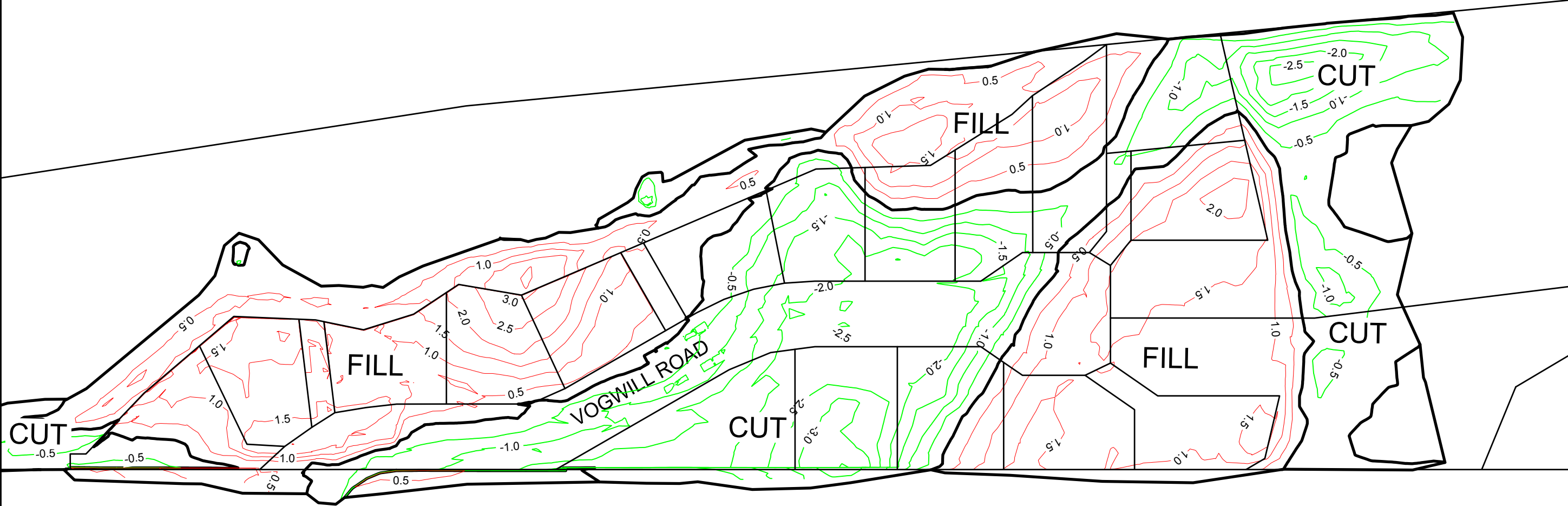
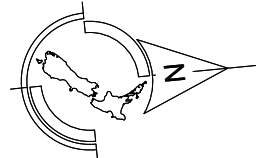
-2.0

CUT VOLUME: 12,473m³
MAX CUT DEPTH: -3.5m

-3.0

-2.0

FILL VOLUME: 13,414m³
MAX FILL DEPTH: 3.0m



Note:
All survey data has been collected and provided to Aspire by C&R
Surveyors LTD, Registered Surveyors

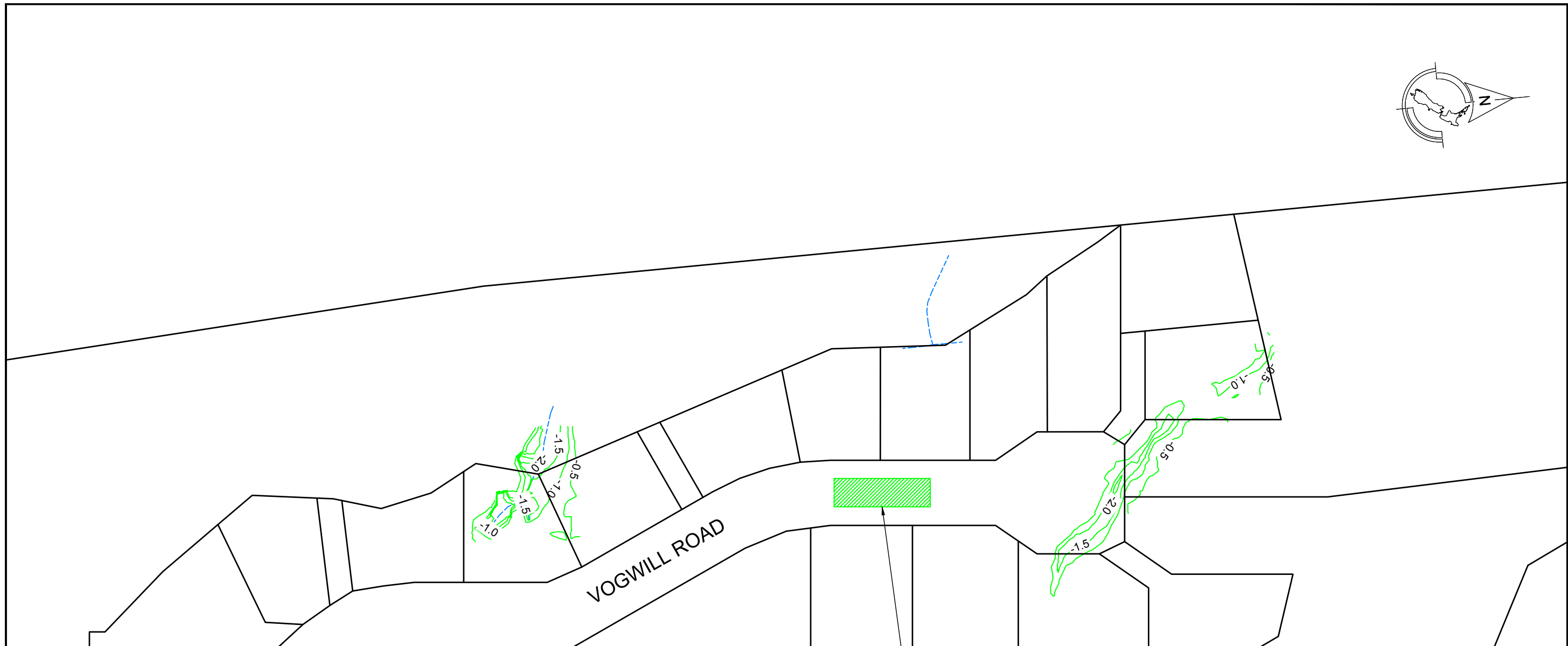
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Signed: 
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Date: 18 June 2019
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NOTE:
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HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

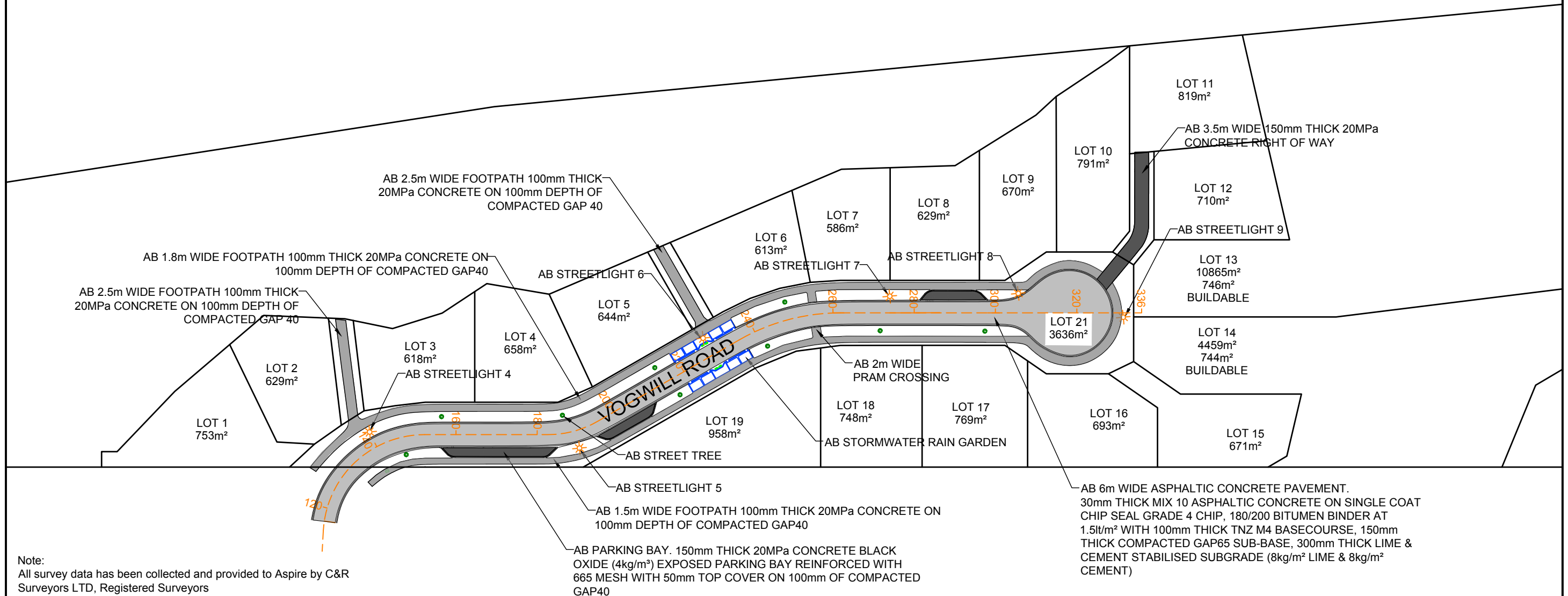
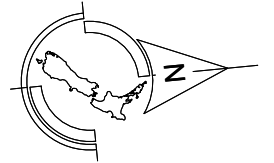
REV.		DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:1000 AT A3			CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	 Ph: 09 426 6552 Web: www.aspeng.co.nz
							NAME	DATE						
						DESIGN	KC	06.19	CABRA DEVELOPMENTS LIMITED	AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	1302-AB-EW202	JUNE 2019	-	
						DRAWN	KC	06.19						
						DRAWING CHECK	MJ	06.19						
						DESIGN CHECK	MJ	06.19	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 CUT & FILL DEPTH CONTOUR PLAN			
						APPROVED	MJ	06.19						



REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1000 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 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	DRAWING NUMBER 1302-AB-EW203	
						NAME	DATE			DATE	REVISION
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					DRAWN	KC	06.19				
					DRAWING CHECK	MJ	06.19				
					DESIGN CHECK	MJ	06.19				
					APPROVED	MJ	06.19				

DRAWING TITLE AS BUILT UNDERCUT DEPTH CONTOUR PLAN	
---	--

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



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- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed:
Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

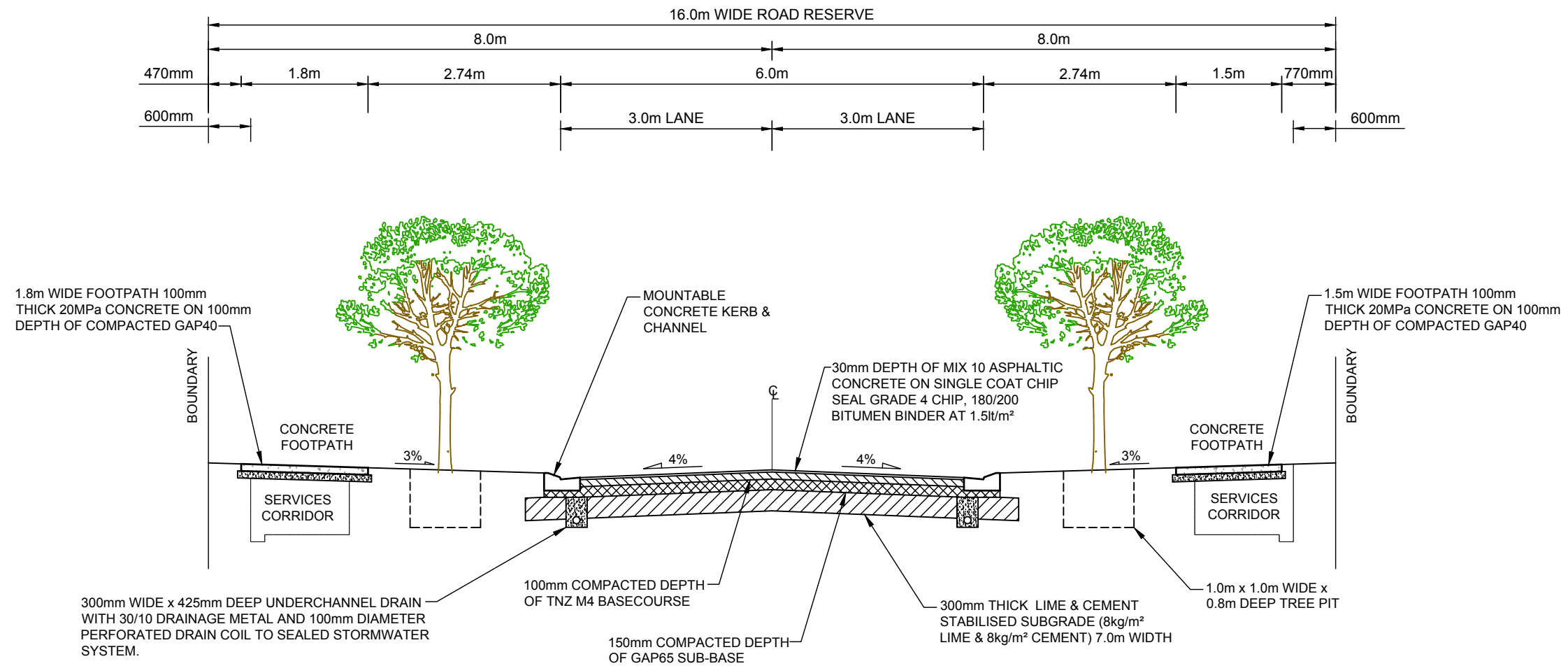
NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM:
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

LEGEND	
	AS BUILT STREET TREE
	AS BUILT STREET LIGHT
	AS BUILT CESSPIT
	AS BUILT CHAINAGE
	AS BUILT STORMWATER RAIN GARDEN

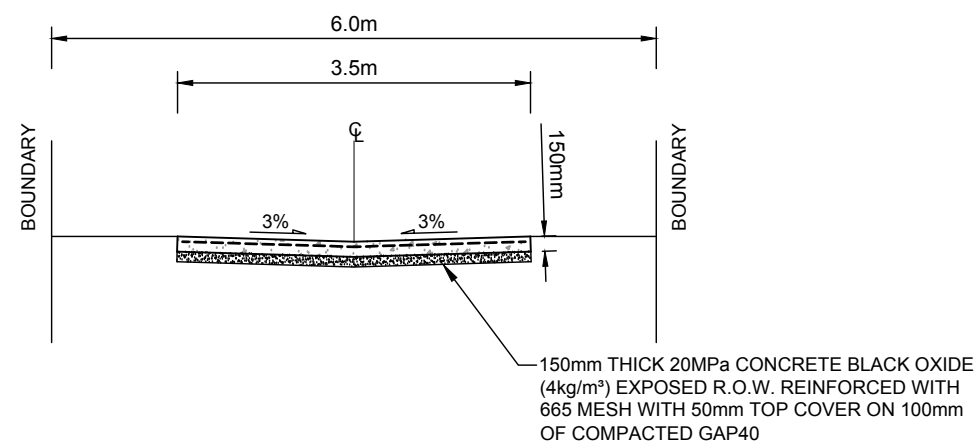
REV.		DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:1000 AT A3		CLIENT CABRA DEVELOPMENTS LIMITED	SITE ADDRESS AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	DRAWING NUMBER 1302-AB-RD301		
						NAME	DATE			DATE	REVISION	
					DESIGN	KC	06.19		Conditions of Use: <i>These 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 ROADING PLAN	JUNE 2019	-
					DRAWN	KC	06.19					
					DRAWING CHECK	MJ	06.19					
					DESIGN CHECK	MJ	06.19					
					APPROVED	MJ	06.19					



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



AS BUILT 6.0m WIDE ROAD CROSS SECTION



AS BUILT 3.5m WIDE R.O.W. CROSS SECTION

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:75 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS
							CABRA DEVELOPMENTS LIMITED	AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	1302-AB-RD302	JUNE 2019	-	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 SECTION-1				

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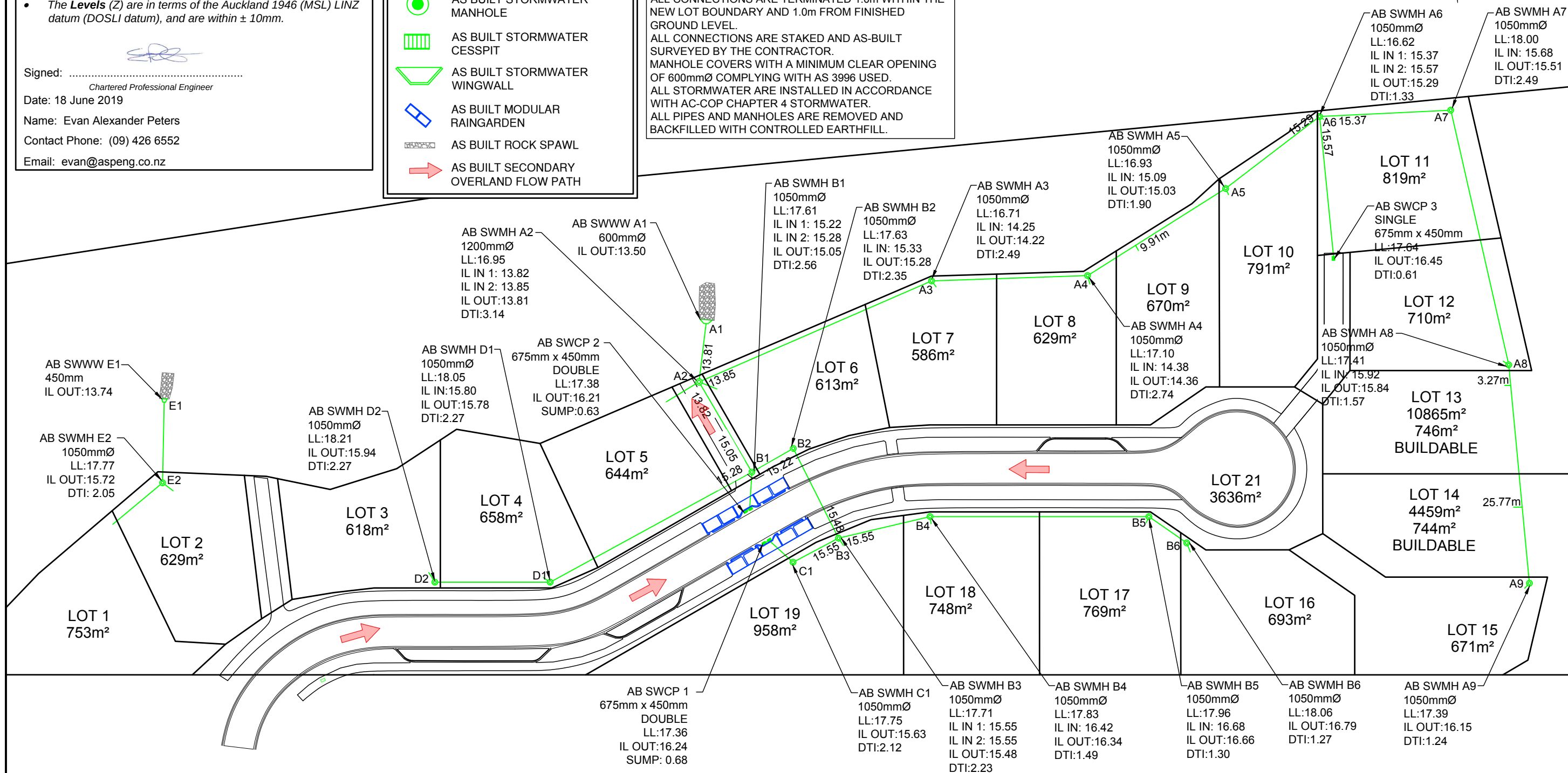
- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000), and are within $\pm 50\text{mm}$.
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Chartered Professional Engineer

Email: evan@aspeng.co.nz

- AS BUILT STORMWATER LINE
- AS BUILT STORMWATER CONNECTION
- AS BUILT STORMWATER MANHOLE
- AS BUILT STORMWATER CESSPIT
- AS BUILT STORMWATER WINGWALL
- AS BUILT MODULAR RAINGARDEN
- AS BUILT ROCK SPAWL
- AS BUILT SECONDARY OVERLAND FLOW PATH

NOTE:
USED 225mmØ CLASS 4 RCRRJ LEAD FOR SINGLE
CESSPITS.
USED 300mmØ CLASS 4 RCRRJ LEAD FOR DOUBLE
CESSPITS.
ALL CONNECTIONS ARE 100mmØ uPVC SN16 AND
BLANK CAPPED.
ALL CONNECTIONS ARE TERMINATED 1.0m WITHIN THE
NEW LOT BOUNDARY AND 1.0m FROM FINISHED
GROUND LEVEL.
ALL CONNECTIONS ARE STAKED AND AS-BUILT
SURVEYED BY THE CONTRACTOR.
MANHOLE COVERS WITH A MINIMUM CLEAR OPENING
OF 600mmØ COMPLYING WITH AS 3996 USED.
ALL STORMWATER ARE INSTALLED IN ACCORDANCE
WITH AC-COP CHAPTER 4 STORMWATER.
ALL PIPES AND MANHOLES ARE REMOVED AND
BACKFILLED WITH CONTROLLED EARTHFILL.



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

REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE	1:750 AT A3	
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					DRAWN	KC	06.19
					DRAWING CHECK	MJ	06.19
					DESIGN CHECK	MJ	06.19
					APPROVED	MJ	06.19

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DRAWING TITLE	AS BUILT STORMWATER MANHOLE AND CESSPIT PLAN
---------------	---

DATE

JUNE 2019



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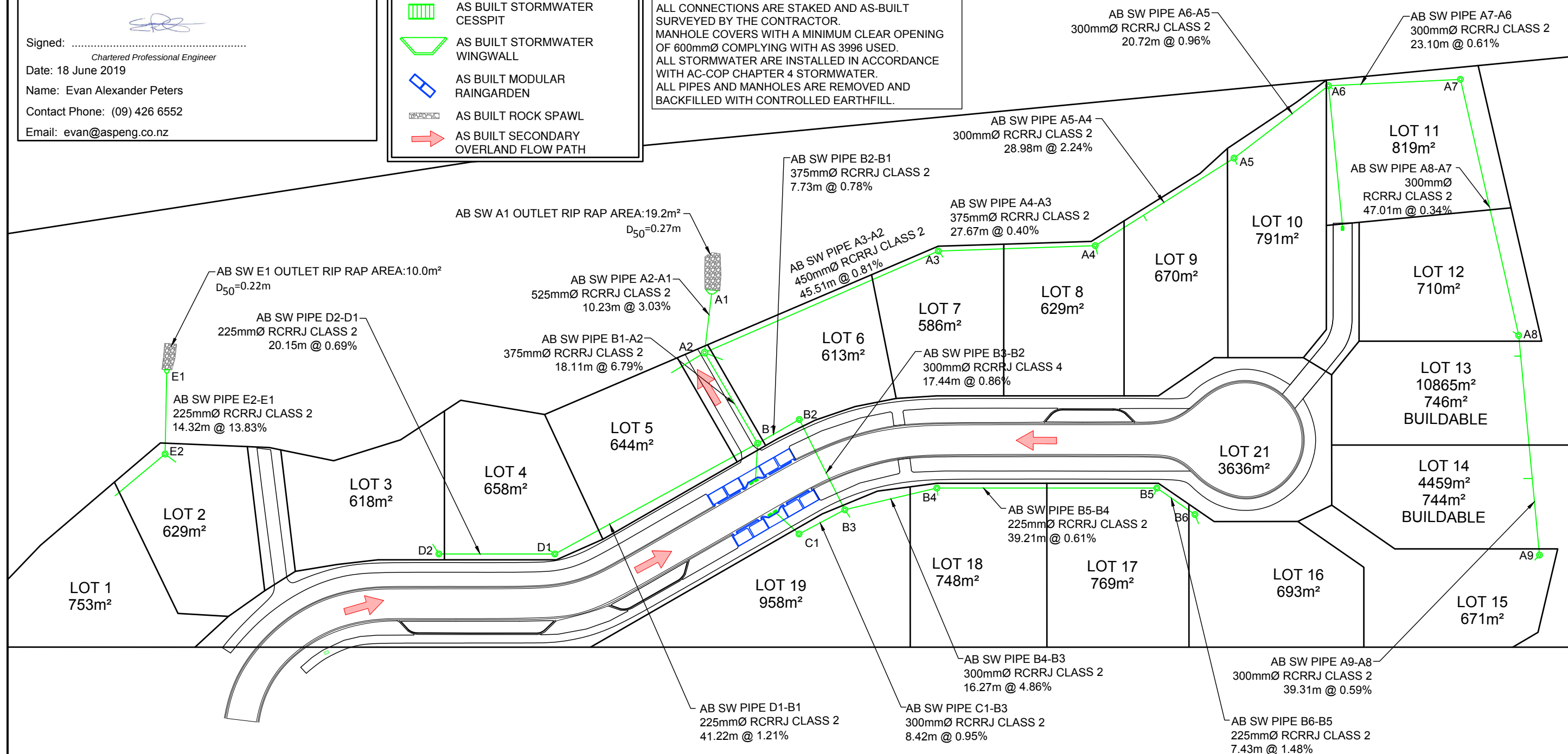
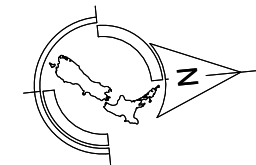
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Chartered Professional Engineer

Email: evan@aspeng.co.nz

- AS BUILT STORMWATER LINE
- AS BUILT STORMWATER CONNECTION
- AS BUILT STORMWATER MANHOLE
- AS BUILT STORMWATER CESSPIT
- AS BUILT STORMWATER WINGWALL
- AS BUILT MODULAR RAINGARDEN
- AS BUILT ROCK SPAWL
- AS BUILT SECONDARY OVERLAND FLOW PATH

NOTE:
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CESSPITS.
USED 300mmØ CLASS 4 RCRRJ LEAD FOR DOUBLE
CESSPITS.
ALL CONNECTIONS ARE 100mmØ uPVC SN16 AND
BLANK CAPPED.
ALL CONNECTIONS ARE TERMINATED 1.0m WITHIN THE
NEW LOT BOUNDARY AND 1.0m FROM FINISHED
GROUND LEVEL.
ALL CONNECTIONS ARE STAKED AND AS-BUILT
SURVEYED BY THE CONTRACTOR.
MANHOLE COVERS WITH A MINIMUM CLEAR OPENING
OF 600mmØ COMPLYING WITH AS 3996 USED.
ALL STORMWATER ARE INSTALLED IN ACCORDANCE
WITH AC-COP CHAPTER 4 STORMWATER.
ALL PIPES AND MANHOLES ARE REMOVED AND
BACKFILLED WITH CONTROLLED EARTHFILL.



NOTE:
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VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:750 AT A3	
						NAME	DATE
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					DRAWING CHECK	MJ	06.19
					DESIGN CHECK	MJ	06.19
					APPROVED	MJ	06.19

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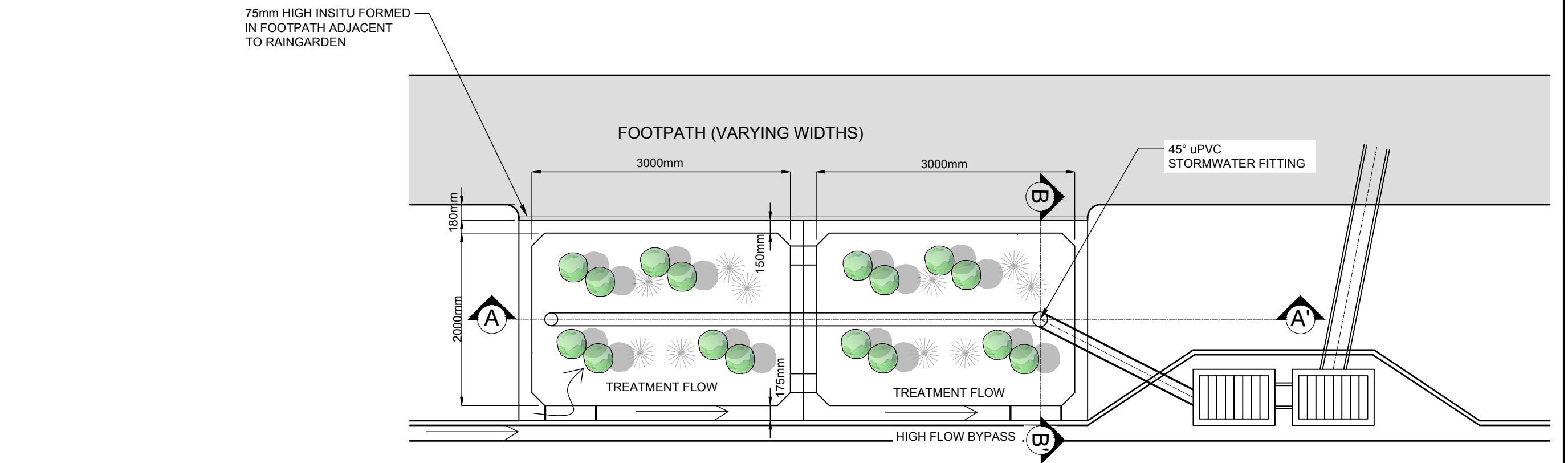
DRAWING TITLE

AS BUILT STORMWATER PIPE PLAN

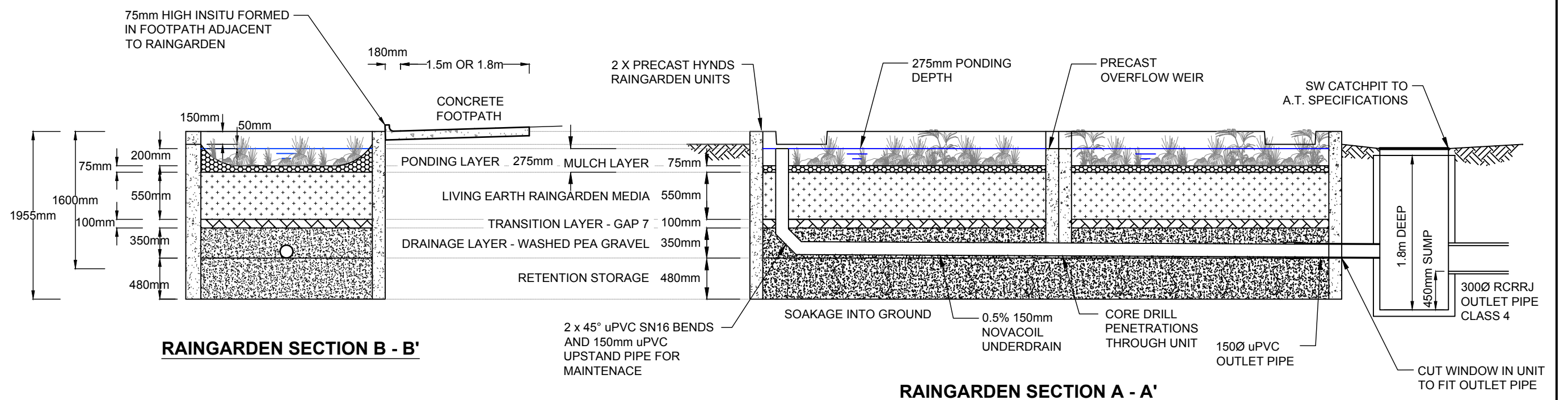
DATE
JUNE 2019



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



RAINGARDEN PLAN VIEW



RAINGARDEN SECTION B - B'

RAINGARDEN SECTION A - A'

NOTE:
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VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

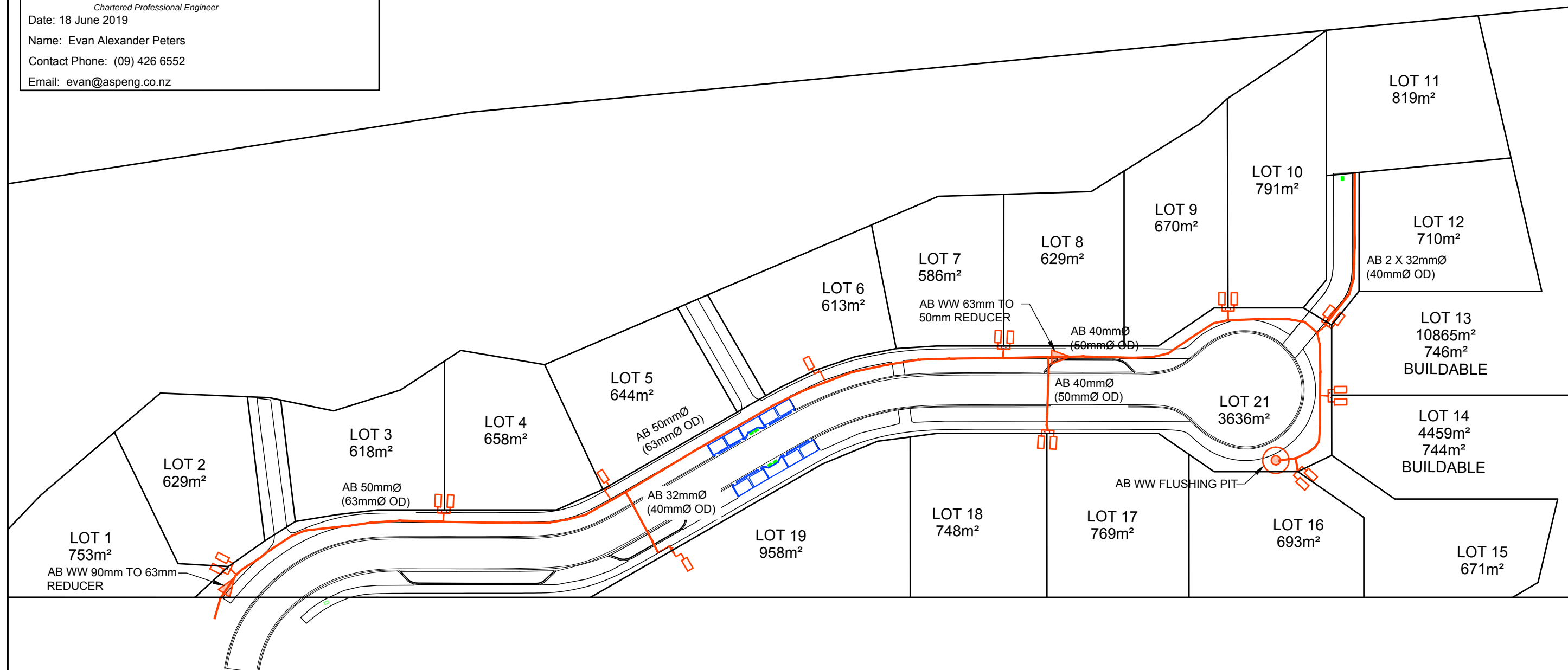
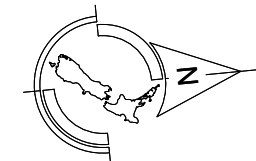
REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:50 AT A3			CLIENT CABRA DEVELOPMENTS LIMITED	SITE ADDRESS AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	DRAWING NUMBER 1302-AB-SW403		 Ph: 09 426 6552 Web: www.aspeng.co.nz
					NAME	DATE	DATE					
					DESIGN	KC	06.19					
					DRAWN	KC	06.19					
					DRAWING CHECK	MJ	06.19	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 STORMWATER RAINGARDEN PLAN	DATE	REVISION	
					DESIGN CHECK	MJ	06.19			JUNE 2019	-	
					APPROVED	MJ	06.19					

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Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

NOTE:
ALL WASTEWATER PIPES ARE MDPE PE100 PN16 SDR11.
ALL PIPES UNDER CARRIAGEWAYS ARE LAID INSIDE AN uPVC SN16 CONDUIT.
ALL LEADS TO SINGLE BOUNDARY KITS ARE 40mmOD (32mmNB).
ALL LEADS TO DOUBLE BOUNDARY KITS ARE 50mmOD (40mmNB).
THE BOUNDARY KIT FOR EACH SITE ARE SITED AT THE ROAD BOUNDARY AND A 20mmOD (16mmNB) PIPE LAID INTO THE BODY OF EACH LOT.
ALL BOUNDARY KITS ARE DRAWN IN EXAGGERATED SCALE FOR CLARITY.



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

AS BUILT BOUNDARY KIT (DOUBLE)	
AS BUILT BOUNDARY KIT (SINGLE)	
AS BUILT WASTEWATER LINE	
AS BUILT WASTEWATER FLUSHING PIT	
AS BUILT REDUCER	

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1000 AT A3		CLIENT CABRA DEVELOPMENTS LIMITED <i>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>	SITE ADDRESS AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	DRAWING TITLE AS BUILT WASTEWATER PLAN	DRAWING NUMBER 1302-AB-WW501	
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					DRAWN	KC	06.19					
					DRAWING CHECK	MJ	06.19					
					DESIGN CHECK	MJ	06.19					
					APPROVED	MJ	06.19					



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

NOTE:
ALL WORKS AND MATERIALS ARE COMPLIED WITH WATERCARE COP.
ALL VALVE LIDS ARE CAST IRON AND PAINTED WHITE.
FIRE HYDRANTS ARE INSTALLED AT 135m MAXIMUM CENTRES.
ALL FIRE HYDRANTS LIDS ARE CAST IRON AND PAINTED YELLOW.
FIRE HYDRANTS ARE IDENTIFIED WITH YELLOW 600x400 ISOSCELES TRIANGLE AND BLUE CATS EYE REFLECTIVE MARKER.
USED ELBOW ONLY WHERE REQUIRED WHEN BENDS CANNOT BE ACHIEVED.

LEGEND

 AS BUILT FIRE HYDRANT

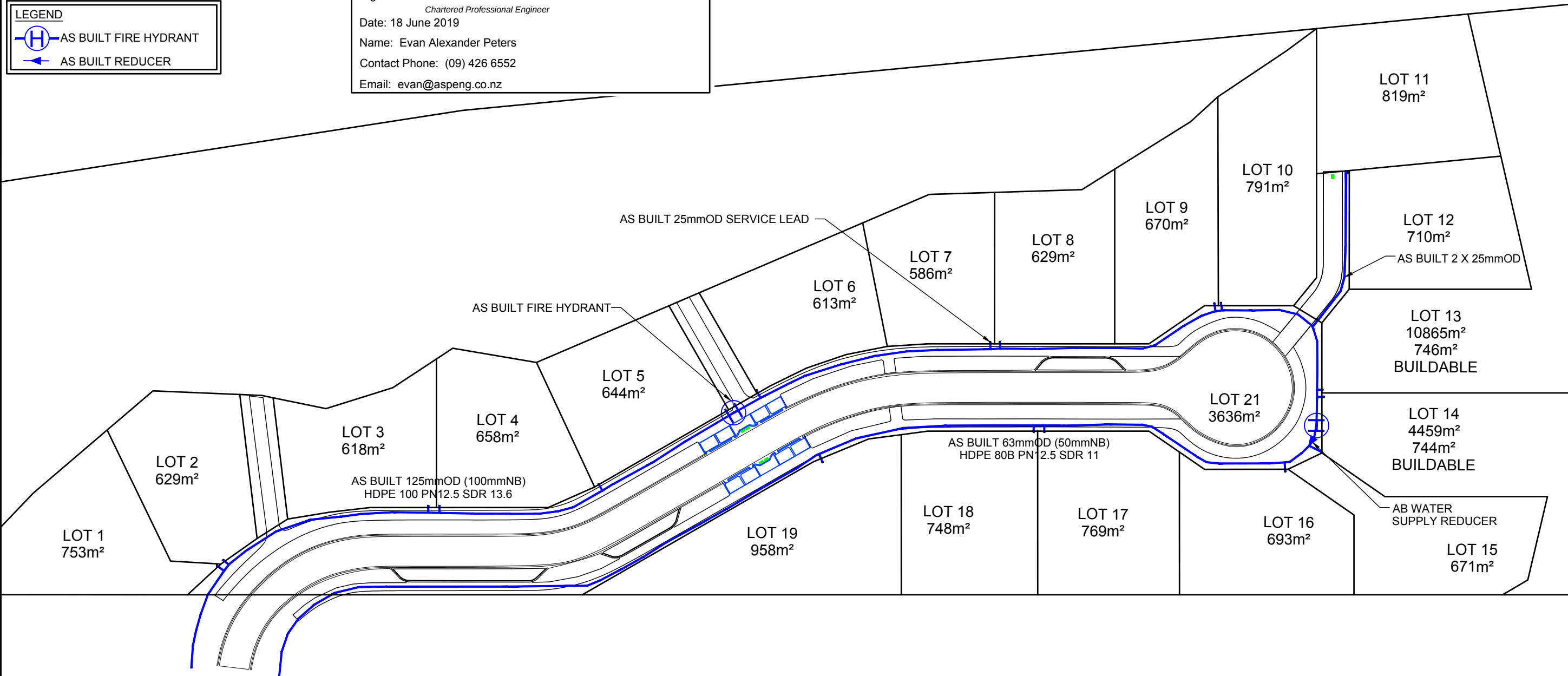
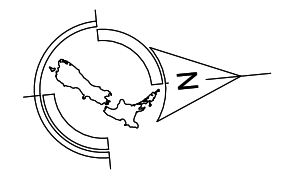
 AS BUILT REDUCER

Note:
All survey data has been collected and provided to Aspire by C&R Surveyors LTD, Registered Surveyors

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), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed: 
Chartered Professional Engineer
Date: 18 June 2019
Name: Evan Alexander Peters
Contact Phone: (09) 426 6552
Email: evan@aspeng.co.nz

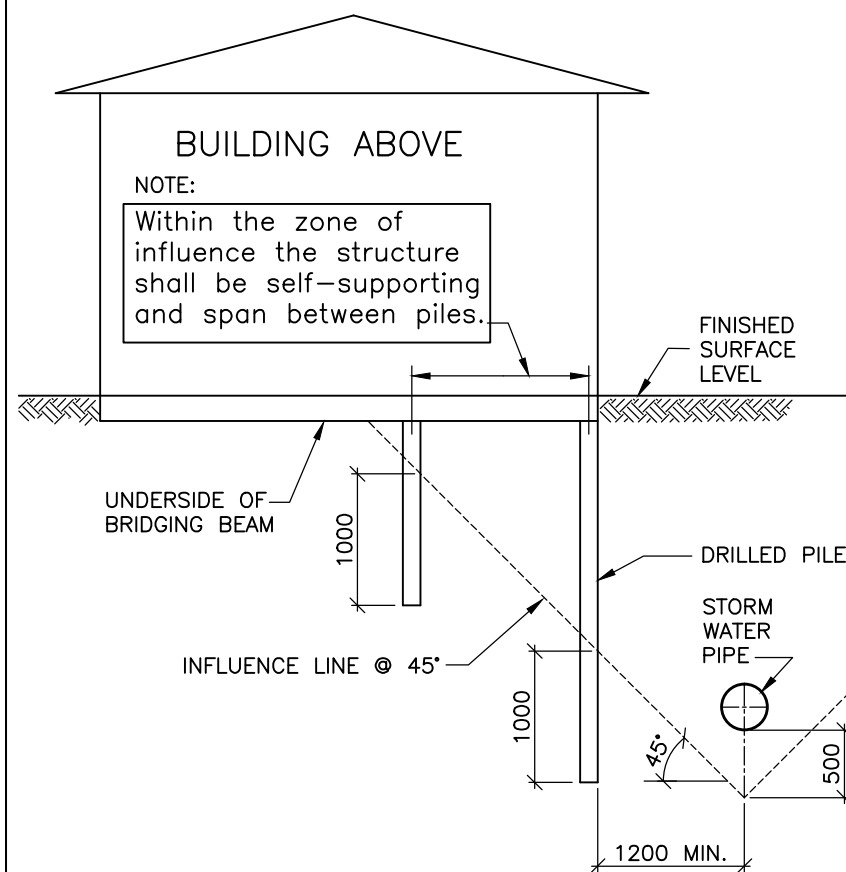


NOTE:
ALL LEVELS IN TERMS OF LINZ DATUM:
HORIZONTAL DATUM: GEODETIC DATUM 2000
VERTICAL DATUM: AUCKLAND MEAN SEA LEVEL 1946

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE 1:750 AT A3			CLIENT	SITE ADDRESS	DRAWING NUMBER		
						NAME	DATE	CABRA DEVELOPMENTS LIMITED	AS BUILT 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI BUN60306658 / ENG60324072	1302-AB-WS601	DATE	REVISION
					DESIGN	KC	06.19				JUNE 2019	-
					DRAWN	KC	06.19			AS BUILT WATER SUPPLY PLAN		
					DRAWING CHECK	MJ	06.19					
					DESIGN CHECK	MJ	06.19	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			
					APPROVED	MJ	06.19					

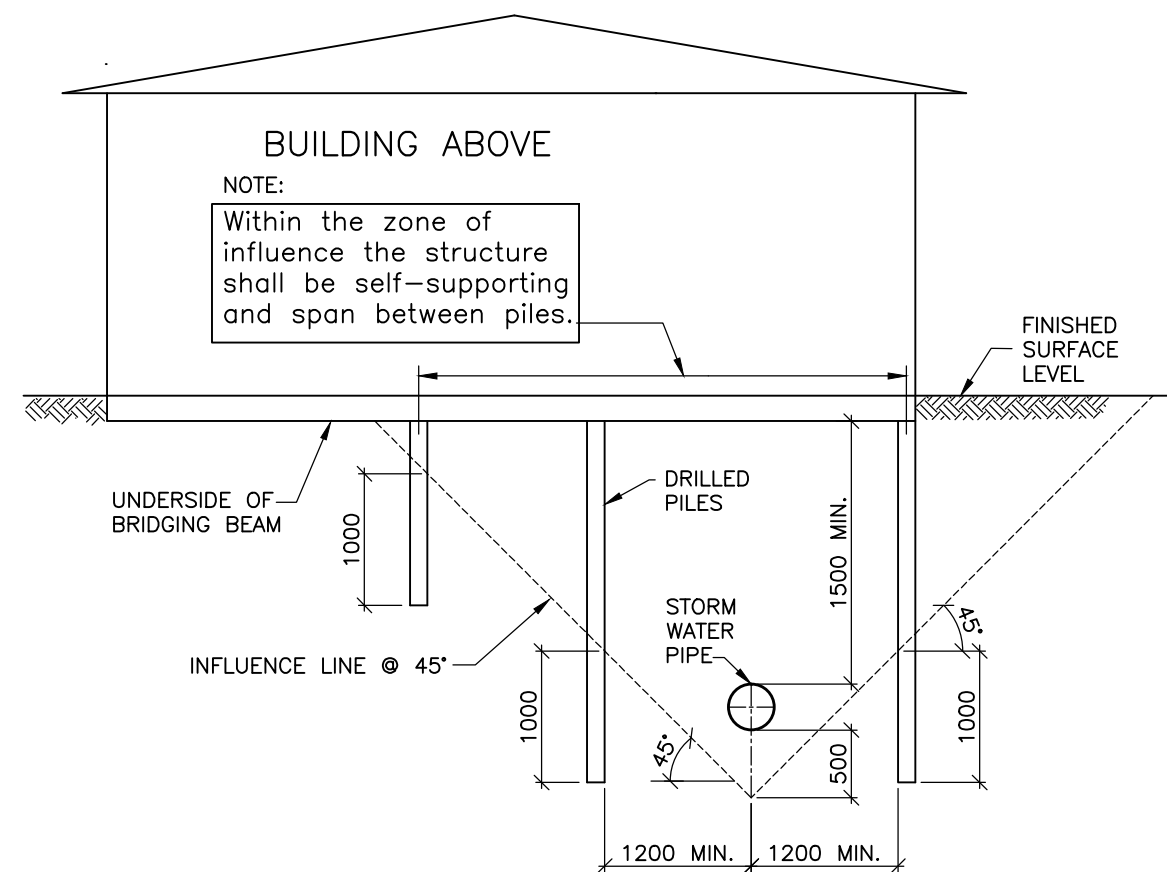


Ph: 09 426 6552
Web: www.aspeng.co.nz



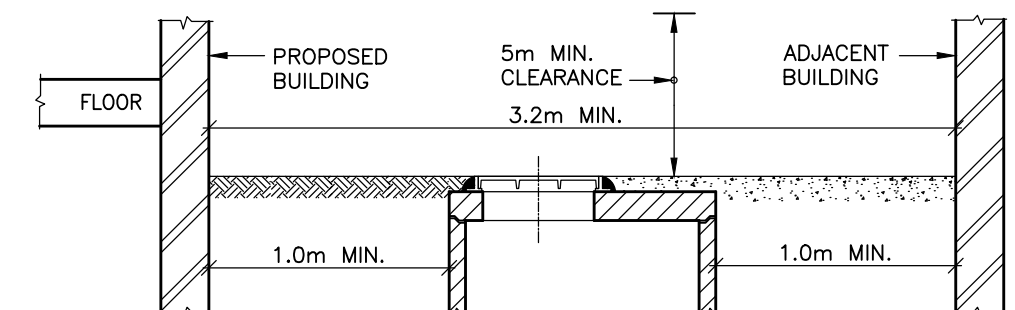
"BUILD CLOSE" NOTES:

1. Specific approval is required from Auckland Council if building adjacent to pipes, larger than 375mm internal diameter, or greater than 3.0m of depth.
2. Building to be outside all overland flow paths and floodplains.
3. Pile constructed to a depth of 1.0m below influence line.
4. Outside zone of influence, normal foundation requirements apply.



"BUILD OVER" NOTES:

1. Applies to stormwater pipes 375mm nominal diameter or less.
2. Bridging over pipes larger than 375mm nominal diameter is NOT allowed under any circumstances.
3. Pile constructed to a depth of 1.0m below influence line.
4. Outside zone of influence, normal foundation requirements apply.
5. Bridging is NOT allowed over pipes where clear vertical separation distance from top of pipe to underside of bridging beam is less than 1.5m



MANHOLE CONSTRUCTION CLEARANCE

NOTES

1. The information on this page is intended to show examples of typical scenarios and should be used for general guidance purposes only. Significant variations on a site by site basis are to be expected and it is in no way implied that meeting any of the above will guarantee approval.
2. Requirements for foundation design etc apply to both sides of pipe.
3. No driven piles are permitted within 10m of brick Stormwater Structures, or within 5m of all other Stormwater Structures.
4. Specific approval is required from Auckland Council for driven piles in partially drilled holes, within the 5m/10m zone.
5. Piles that may be required to resist horizontal forces will require specific design.
6. Pile/Footing location point must be below 45° "Zone of Influence".
7. All Manholes shall have 24 hours unobstructed access.
8. Manholes in basements, or where sufficient clearance is unavailable, are not permitted.
9. All pipe buildovers will require approval by Auckland Council.
10. Refer to section 4.3.21 for pipe buildover requirements.

STORMWATER ENGINEERING
STANDARD DETAILS

ISSUE/REVISION: 1
DATE: 30 September 2013
CAD FILE: AC-STD-SW22

AUCKLAND COUNCIL

STORMWATER PIPE AND MANHOLE CONSTRUCTION CLEARANCE REQUIREMENTS

MANHOLES NEAR BUILDINGS AND BUILDING CLOSE OR OVER PIPES

ENVIRONMENTAL-SW

ORIGINAL
SCALE: AS NOTED



Sht 1 OF 1 Shts	DRAWING No. ACSD	REV
	SW22	A3

Appendix C: Laboratory Test Data

**DETERMINATION OF THE WATER CONTENT, LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.1, 2.2 & 2.6**Project Name : **236 Matua Road, Huapai**Client : CMW Geosciences Ltd
Address : PO Box 300206
Albany, Auckland 0754

Project No : 19 0092 00

Page : 1 of 1

Date of Order : 26.03.19

Attention : Trent Knox

Sample Method : Hand Auger

Sample Date : 22.03.19

Sampled By : CMW Geosciences Ltd

Test Details :

Test performed on :

Whole Sample

History :

Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
307I	Lot 7	0.4 to 0.8	74	20	41.1
308I	Lot 3	0.4 to 0.8	60	19	28.9
309I	Lot 14	0.4 to 0.8	68	20	28.9
310I	Lot 18	0.5 to 0.9	57	14	41.4

Comments :Tested By: EC & SN
Calculated By : ZH
Checked By : ZHDate : 29 & 01.04.19
Date : 03.04.19
Date : 04.04.19

Appendix D: Field Test Data

**LF11 Rev.8 Soil Field Density NDM Direct Transmission with VSS Report (Cohesvie Soils)**

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

Project: 236 Matua Road
Project No: AKL2016-0630
Location: Huapai
Report No: AKL2016-0630LAA Rev.0
Report Date: 29/05/2019
Client: Cabra
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
① Blade size of 19mm used.



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*	Vane ID		In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Head #	Blade # ①	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 (%) *	
9/10/2018	N1	Wallway Area	CLAY	1589	1589	185	185	215+	UTP	195+	1.94	1.53	26.2	3	300	25.3	2.70	1.54	4	
11/10/2018	N2	Lot 14	CLAY	1589	1589	UTP	UTP	215	215	215+	1.99	1.47	30.0	1	300	31.3	2.70	1.52	-4	
18/10/2018	N3	Gully Backfill	CLAY	1589	1589	UTP	UTP	215	UTP	215+	1.82	1.40	30.2	6	300	27.5	2.70	1.42	8	
23/10/2018	N4	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.90	1.51	25.4	3	300	22.9	2.70	1.54	8	
	N5	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.88	1.49	26.4	6	300	22.6	2.70	1.54	9	
	N6	Refer to site plan	CLAY	1589	1589	UTP	UTP	215+	UTP	215+	1.89	1.45	28.4	5	300	29.4	2.70	1.46	3	
	N7	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	215+	215+	1.89	1.48	27.8	4	300	29.2	2.70	1.46	3	
1/03/2019	N8	Near East RW boundary	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.88	1.49	26.2	6	300	26.8	2.70	1.48	5	
	N9	Near East RW boundary	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.88	1.51	24.7	7	300	21.3	2.70	1.54	10	
3/05/2019	N10	Silt Pond Backfill	CLAY	1620	1620	197	197	197	197	197	1.84	1.41	29.9	5	250	28.5	2.70	1.42	6	
	N11	Silt Pond Backfill	CLAY	1620	1620	197	197	197	197	197	1.83	1.39	32.4	3	300	30.0	2.70	1.42	5	

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.

Created By: JLM Date: 15/10/2019
Checked By: JLM Date: 29/05/2019
Authorised Signatory: JMJ Date: 29/05/2019

LEGEND

TOTAL EARTHWORKS AREA: 25,660m²
 CUT VOLUME: 13,030m³
MAX CUT DEPTH: 3.5m

 FILL VOLUME: 12,770m³
MAX FILL DEPTH: 3.0m

NOTE: ALL BUILDINGS AND VEGETATION WITHIN THE EARTHWORKS AREA ARE TO BE REMOVED.



DRAFT

N3
N4
N5
N10
N11

N1

N8
N9

N6

N2

N7

EXISTING WETLAND
IS NOT TO BE
EARTHWORKED



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	1:1000 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS
							CABRA DEVELOPMENTS LIMITED	PROPOSED 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI	1302 - ENG - EW202	JUNE 2018	-	Ph: 09 426 6552 Web: www.aspeng.co.nz
							DESIGN: MJ 05 18					
							DRAWN: MJ 05 18					
							DRAWING CHECK: PF 05 18					
							DESIGN CHECK: IF 05 18					
							APPROVED: EP 05 18					

**LF10 Rev.13 Soil Core Sample with VSS Density Report**

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

Project: 236 Matua Road
Project No: AKL2016-0630
Location: Huapai
Report No: AKL2016-0630LAB Rev.1
Report Date: 4/06/2019
Client: Cabra
Client Address:
Client Reference:

Test Methods: NZS 4402:1986 5.1.3
NZS 4402:1986 2.1
NZGS:August 2001

Notes: Solid Density: Assumed
Testing Locations Selected By: CMW Field Staff
① Blade size of 19mm used.



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

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

Date Sampled	Sample No.	Test Location*	Soil Description*	Vane ID		In-situ Vane Shear Strengths					Field and Laboratory Testing Data					Comments
				Head #	Blade # ①	Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Bulk Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Solid Density (t/m³) *	Calculated Air Voids (%) *	
22/11/2019	C1	Refer to site plan	CLAY	1589	1589	215	UTP	169	159	181+	1.82	1.28	41.6	2.70	-1.3	
	C2	Refer to site plan	CLAY	1589	1589	159	163	166	159	162	1.84	1.30	41.9	2.70	-2.6	
	C3	Refer to site plan	CLAY	1589	1589	157	151	139	160	152	1.94	1.56	25.0	2.70	3.5	

This report should only be reproduced in full.

Created By: JLM

Date: 26/11/2019

Checked By: JLM

Date: 29/05/2019

Authorised Signatory: JLM

Date: 4/06/2019

Page: 1 of 2

LEGEND

TOTAL EARTHWORKS AREA: 25,660m²
 CUT VOLUME: 13,030m³
MAX CUT DEPTH: 3.5m

 FILL VOLUME: 12,770m³
MAX FILL DEPTH: 3.0m

NOTE: ALL BUILDINGS AND VEGETATION WITHIN THE EARTHWORKS AREA ARE TO BE REMOVED.



DRAFT

EXISTING WETLAND
IS NOT TO BE
EARTHWORKED



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	1:1000 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER	DATE	REVISION	ASPIRE CONSULTING ENGINEERS
							CABRA DEVELOPMENTS LIMITED	PROPOSED 19-LOT RESIDENTIAL SUBDIVISION AT 236 MATUA ROAD, HUAPAI	1302 - ENG - EW202	JUNE 2018	-	Ph: 09 426 6552 Web: www.aspeng.co.nz
							DESIGN: MJ 05 18					
							DRAWN: MJ 05 18					
							DRAWING CHECK: PF 05 18					
							DESIGN CHECK: IF 05 18					
							APPROVED: EP 05 18					

			LF14 Rev.11 Dynamic Cone Penetration (DCP) Test Report NZS 4402: Test 6.5.2: 1988								
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address:			236 Matua Road AKL2016-0630 Huapai AKL2016-0630LAC Rev.0 3/12/2018 & 11/12/2018 MMC Cabra				Auckland Laboratory CMW Geosciences (NZ) Ltd Partnership 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  All tests reported herein have been performed in accordance with the laboratory's scope of 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	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		
Chainage & Offset	CH150		CH160R		CH170L		CH180R		CH190L		
Material & Layer	CLAY/SG		CLAY/SG		CLAY/SG		CLAY/SG		CLAY/SG		
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	4	8	3	6	
100 - 200	5	10	7	15	5	10	3	6	3	6	
200 - 300	4	8	4	8	2	4	3	6	2	4	
300 - 400	2	4	2	4	3	6	2	4	3	6	
400 - 500	2	4	1	2	3	6	2	4	3	6	
500 - 600	2	4	2	4	2	4	2	4	3	6	
600 - 700	3	6	2	4	3	6	2	4	2	4	
700 - 800	2	4	3	6	3	6	2	4	3	6	
800 - 900	2	4	3	6	3	6	2	4	3	6	
900 - 1000											
Test No	6		7		8		9		10		
Test Location	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		
Chainage & Offset	CH200R		CH210L		CH220R		CH230L		CH240R		
Material & Layer	CLAY/SG		CLAY/SG		CLAY/SG		CLAY/SG		CLAY/SG		
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	3	6	4	8	6	13	10	20+	
100 - 200	3	6	2	4	6	13	4	8	7	15	
200 - 300	2	4	3	6	4	8	3	6	3	6	
300 - 400	2	4	3	6	3	6	3	6	1	2	
400 - 500	2	4	3	6	3	6	3	6	2	4	
500 - 600	2	4	2	4	2	4	4	8	2	4	
600 - 700	3	6	4	8	2	4	3	6	3	6	
700 - 800	2	4	4	8	2	4	3	6	2	4	
800 - 900	2	4	4	8	2	4	5	10	3	6	
900 - 1000											
Created by: JLM Checked by: JLM Authorised Signatory: JMJ							Date: 29/05/2019 Date: 29/05/2019 Date: 29/05/2019				
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 1 of 5											

			LF14 Rev.11 Dynamic Cone Penetration (DCP) Test Report NZS 4402: Test 6.5.2: 1988								
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address:			236 Matua Road AKL2016-0630 Huapai AKL2016-0630LAC Rev.0 3/12/2018 & 11/12/2018 MMC Cabra				Auckland Laboratory CMW Geosciences (NZ) Ltd Partnership 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				
							 All tests reported herein have been performed in accordance with the laboratory's scope of 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	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		
Chainage & Offset	CH250L		CH260R		CH270L		CH280R		CH290L		
Material & Layer	CLAY/SG		CLAY/SG		CLAY/SG		CLAY/SG		CLAY/SG		
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	3	6	3	6	6	13	3	6	
100 - 200	4	8	6	13	3	6	3	6	3	6	
200 - 300	2	4	4	8	1	2	4	8	3	6	
300 - 400	4	8	2	4	1	2	1	2	0	0	
400 - 500	3	6	1	2	1	2	1	2	1	2	
500 - 600	2	4	1	2	1	2	1	2	3	6	
600 - 700	3	6	3	6	1	2	1	2	1	2	
700 - 800	3	6	3	6	1	2	2	4	2	4	
800 - 900	3	6	2	4	2	4	2	4	2	4	
900 - 1000											
Test No	16		17		18		19		20		
Test Location	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		
Chainage & Offset	CH300R		CH310L		CH320R		CH130L		CH140R		
Material & Layer	CLAY/SG		CLAY/SG		CLAY/SG		LS CLAY/SG		LS CLAY/SG		
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	5	10	4	8	6	13	9	20	
100 - 200	3	6	6	13	3	6	5	10	7	15	
200 - 300	5	10	3	6	1	2	3	6	3	6	
300 - 400	10+	20+	2	4	1	2	2	4	2	4	
400 - 500			2	4	3	6	2	4	2	4	
500 - 600			3	6	4	8	2	4	3	6	
600 - 700			3	6	3	6	3	6	3	6	
700 - 800			3	6	4	8	3	6	2	4	
800 - 900			4	8	4	8	2	4	2	4	
900 - 1000											
Created by: JLM Checked by: JLM Authorised Signatory: JMJ							Date: 29/05/2019 Date: 29/05/2019 Date: 29/05/2019				
							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 5				

			LF14 Rev.11 Dynamic Cone Penetration (DCP) Test Report NZS 4402: Test 6.5.2: 1988								
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address:			236 Matua Road AKL2016-0630 Huapai AKL2016-0630LAC Rev.0 3/12/2018 & 11/12/2018 MMC Cabra				Auckland Laboratory CMW Geosciences (NZ) Ltd Partnership 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  All tests reported herein have been performed in accordance with the laboratory's scope of accreditation * Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation				
Test No	21		22		23		24		25		
Test Location	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		
Chainage & Offset	CH150L		CH160R		CH170L		CH180R		CH190L		
Material & Layer	LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	
0 - 100	10	20+	7	15	7	15	10	20+	7	15	
100 - 200	5	10	3	6	3	6	3	6	4	8	
200 - 300	2	4	2	4	3	6	2	4	2	4	
300 - 400	3	6	3	6	2	4	2	4	2	4	
400 - 500	3	6	2	4	2	4	1	2	2	4	
500 - 600	3	6	2	4	2	4	2	4	2	4	
600 - 700	3	6	2	4	2	4	2	4	2	4	
700 - 800	3	6	2	4	2	4	2	4	1	2	
800 - 900	3	6	2	4	2	4	2	4	2	4	
900 - 1000											
Test No	26		27		28		29		30		
Test Location	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road		
Chainage & Offset	CH200R		CH210L		CH220R		CH230L		CH240R		
Material & Layer	LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		
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	10	20+	8	18	8	18	
100 - 200	4	8	4	8	5	10	11	20+	5	10	
200 - 300	2	4	3	6	3	6	5	10	5	10	
300 - 400	3	6	2	4	3	6	3	6	4	8	
400 - 500	2	4	3	6	1	2	4	8	2	4	
500 - 600	2	4	2	4	2	4	2	4	2	4	
600 - 700	2	4	2	4	3	6	2	4	2	4	
700 - 800	3	6	3	6	3	6	2	4	2	4	
800 - 900	3	6	3	6	2	4	2	4	2	4	
900 - 1000											
Created by: JLM Checked by: JLM Authorised Signatory: JMJ							Date: 29/05/2019 Date: 29/05/2019 Date: 29/05/2019				
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 5											

			LF14 Rev.11 Dynamic Cone Penetration (DCP) Test Report NZS 4402: Test 6.5.2: 1988							
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address:			236 Matua Road AKL2016-0630 Huapai AKL2016-0630LAC Rev.0 3/12/2018 & 11/12/2018 MMC Cabra				Auckland Laboratory CMW Geosciences (NZ) Ltd Partnership 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			
			 All tests reported herein have been performed in accordance with the laboratory's scope of 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 Road		Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road	
Chainage & Offset	CH250R		CH260L		CH270R		CH280R		CH290L	
Material & Layer	LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG	
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	11	20+	4	8	3	6	7	15
100 - 200	3	6	5	10	1	2	0	0	6	13
200 - 300	1	2	18	20+	1	2	1	2	3	6
300 - 400	1	2			1	2	2	4	2	4
400 - 500	1	2			2	4	1	2	1	2
500 - 600	2	4			1	2	1	2	3	6
600 - 700	2	4			1	2	3	6	2	4
700 - 800	2	4			2	4	3	6	2	4
800 - 900	2	4			2	4	2	4	2	4
900 - 1000										
Test No	36		37		38		39			
Test Location	Vogwill Road		Vogwill Road		Vogwill Road		Vogwill Road			
Chainage & Offset	CH300R		CH310R		CH320L		CH320R			
Material & Layer	LS CLAY/SG		LS CLAY/SG		LS CLAY/SG		LS CLAY/SG			
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	8	18	7	15	11	20+		
100 - 200	5	10	3	6	7	15	5	10		
200 - 300	15	20+	2	4	3	6	3	6		
300 - 400			3	6	3	6	3	6		
400 - 500			3	6	1	2	2	4		
500 - 600			3	6	1	2	3	6		
600 - 700			4	8	3	6	3	6		
700 - 800			5	10	3	6	2	4		
800 - 900			5	10	3	6	2	4		
900 - 1000										
Created by: JLM Checked by: JLM Authorised Signatory: JMJ							Date: 29/05/2019 Date: 29/05/2019 Date: 29/05/2019			
							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 4 of 5			



Appendix E: Producer Statements

24 June 2019

Document Ref: AKL2016_0630AI Rev 0

Mr Will Stone
Cabra Developments Limited,
PO Box 197,
Orewa,
0946

Dear Will

**RE: CONSTRUCTION REVIEW FOR THE CONSTRUCTION OF TIMBER POLE AND KEYSTONE
RETAINING WALLS – BCO10274504-A
236 MATUA ROAD, HUAPAI**

1 INTRODUCTION

CMW Geosciences (CMW) has visited the site at 236 Matua Road, legally described as Lot 3 DP 171599 on several occasions between November 2018 and May 2019 to observe the construction of timber pole and segmental block retaining walls.

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

- Conditions of Auckland Council Building Consent referenced BCO10274504-A, issued 17 October 2018;
- Consented construction drawings, prepared by CMW Geosciences, referenced AKL2016-0630 No Fines Concrete Walls dated 8 October 2018 and AKL2016-0630 Timber Pole Retaining Wall Design dated 30 July 2018;
- Eastern keystone retaining walls geotechnical design report for 236 Matua Road prepared by CMW Geosciences, referenced AKL2016-0630AC Rev. 1, dated 8 October 2018;
- Western keystone retaining walls geotechnical design report for 236 Matua Road prepared by CMW Geosciences, referenced AKL2016-0630AD Rev. 1, dated 8 October 2018; and,
- Timber pole retaining wall geotechnical design report for 236 Matua Road prepared by CMW Geosciences, referenced AKL2016-0630AB Rev. 0 dated 30 July 2018.

2 TIMBER POLE RETAINING WALLS

CMW observed the construction of timber post retaining walls on Lots 1, 18 and 19.

The site works observed and/or tested by CMW staff incorporated representative testing and observation of:

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

- pile hole spacing and diameter;
- timber pole size and placement;
- lagging installation; and,
- drainage material and installation

Ground conditions within the pile holes generally consisted of alluvial sediments overlying Waitemata Group deposits. The design parameters prepared by CMW for timber pole retaining walls were used for the construction of the walls and measured vane shear strengths were all in excess of 70kPa. Where groundwater was observed within the pile holes, contractors were requested to pump the water out prior to pouring concrete. Pile dimensions, timber dimensions and drainage works were all in accordance with the design requirements.

3 KEYSONE RETAINING WALLS

CMW observed the construction of keystone retaining walls on Lots 1 to 5 and along the road reserve.

The site works observed and/or tested by CMW staff incorporated representative testing and observation of:

- assessment of soil strengths in exposed foundation excavations;
- block placement;
- no fines concrete width;
- drainage material and installation.

The width of the no fines concrete was observed prior to pouring. On one occasion the no fines concrete width did not meet the required amount. This was reworked and subsequently observed to be correct by CMW.

4 CONCLUSION

On the basis of our observations and testing, we consider that the construction of the timber pole and keystone retaining walls has been undertaken in accordance with the approved Building Consent and related approved documentation described above, is in accordance with the requirements and/or recommendations of the geotechnical report and provides the basis for our attached PS4 Construction Review Producer Statement.

CMW's site presence during construction for this project included periodic observations of specific elements of work as described herein. As we were not on site at all times during construction, we have relied on the Contractor's diligence and construction observations certification to ensure that the works have been carried out in accordance with:

- a) The approved Contract drawings and design details;
- b) The approved Contract specifications;
- c) The conditions of Resource and Building Consents where applicable;
- d) The relevant Geotechnical Investigation reports, recommendations and site instructions;

For and on behalf of CMW Geosciences



Richard Knowles

Principal Geotechnical Engineer, CPEng

Distribution: 1 electronic copy to Aspire Consulting Engineers Limited via email
Original held at CMW Geosciences

Attachments: Producer Statement - Construction Review





New Zealand
Institute of Architects
Incorporated



Building Code Clause(s) **B1**

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance on use of Producer Statements (formerly page 2) is available at www.engineeringnz.org)

ISSUED BY: CMW Geosciences (NZ) Limited Partnership
(Construction Review Firm)

TO: Cabra Developments Limited
(Owner/Developer)

TO BE SUPPLIED TO: Auckland Council
(Building Consent Authority)

IN RESPECT OF: Construction of Timber Pole and Keystone Retaining Walls
(Description of Building Work)

AT: 236 Matua Road, Huapai
(Address)

Town/City: LOT **3** DP **171599** SO
(Address)

We CMW Geosciences (NZ) Limited Partnership have been engaged by Cabra Developments Limited
(Construction Review Firm)

To provide ☐ CM1 ☐ CM2 ☒ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ observation as per agreement with
owner/developer, Cabra Developments Limited

or ☒ other as described in CMW letter referenced AKL2016_0630AI Rev 0 dated 24 June 2019 services
(Extent of Engagement)

in respect of clause(s) **B1** of the Building Code for the building work described in

documents relating to Building Consent No. **BCO10274504** and those relating to

Building Consent Amendment(s) Nos. **BCO10274504-A** issued during the
course of the works. We have sighted these Building Consents and the conditions of attached to them.

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

On the basis of ☒ this review ☐ these review(s) and information supplied by the contractor during the course of the works
and on behalf of the firm undertaking this Construction Review, I believe on reasonable grounds that
☒ All or ☐ Part only of the building works have been completed in accordance with the relevant requirements of the

Building Consent and Building Consent Amendments identified above, with respect to Clause(s) **B1**
of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review have
the necessary competency to do so.

I, Richard Knowles (AC Author #2342) am: ☒ CPEng **160049** # ☐ Reg Arch #
(Name of Construction Review Professional)

I am a member of: ☒ Engineering New Zealand ☐ NZIA and hold the following qualifications **BE (Civil), CMEngNZ, CPEng**
The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than
\$200,000*.

The Construction Review Firm is a member of ACENZ: ☐

SIGNED BY Richard Knowles (AC Author #2342) (Signature) 
(Name of Construction Review Professional)

ON BEHALF OF CMW Geosciences (NZ) Limited Partnership Date **25/6/17**
(Construction Review Firm)

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

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

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