

13 February 2018

**DEACON POINT SUBDIVISION STAGE 3,
RIVERHEAD**

GEOTECHNICAL COMPLETION REPORT

CABRA PROPERTIES LIMITED

Ref: AKL2016_0326AG Rev: 0

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1. INTRODUCTION

In accordance with our instructions, this Geotechnical Completion Report has been prepared for Cabra Properties Ltd as part of the documentation to be submitted to Auckland Council following earthworks to form Stage 3 of the Deacon Point Subdivision development. Construction of this residential subdivision has been undertaken in accordance with the Auckland Council Resource Consent number SLC-67504 and Engineering Approval letter for Earthworks, Retaining, Roading and Stormwater dated 25 November 2016 and Engineering Approval letter for Wastewater and Water Supply dated 23 January 2017. Specific structures constructed during the civil works to create the subdivision include a timber boardwalk.

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

This report covers the construction period October 2016 to July 2017 and is intended to be used for certification purposes for new lots (listed below) created from Lot 1 DP 124412 as follows:

- 14 new residential lots numbered 35 to 41 and 45 to 51 inclusive;
- An extension to the existing Riverhead Point Drive;
- 2 new local purpose reserves numbered lots 200 and 201;
- A new local purpose accessway numbered lot 203

This stage of the Deacon Point Subdivision Development is located off Riverhead Point Drive, Riverhead. As can be seen from the as-built plans, all 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 design for this development were undertaken by CMW Geosciences as presented in the following reports:

- CMW Geotechnical Investigation Report referenced AKL2016_0326AB Rev. 2, dated 13 May 2016.
- CMW Design Parameters for Proposed Boardwalk referenced AKL2016_0326AE Rev. 0, dated 27 April 2017.
- CMW Geotechnical Completion Report for Deacon Point Subdivision Stages 1 & 2 referenced AKL2016_0326AF Rev. 0, dated 17 October 2017.

3. DESCRIPTION OF EARTHWORKS

Earthworks for this stage of the development were undertaken as part of the previous stage of development between October 2016 and July 2017.

Civil works for this stage of the development began in July 2017 and continued until December 2017 with works to form the roads, footpaths, boardwalks and service lines undertaken during this time together with topsoiling and seeding of lots and formation of coastal outlet structures and planting.

The main items of plant used by the earthworks subcontractor, BHE Limited, included:

- 2x D6 Bulldozers and Scoops
- 2x Articulated Dump Trucks
- 1x D6 Bulldozer

- 1x Tractor and Discs
- 1x 4T Front End Loader
- 2 x 5T Excavators
- 2 x 20T Excavators
- 1x 13T Excavator
- 2x Road Dump Trucks
- 1x Water Cart
- 1x 815 Compactor

4. GEOTECHNICAL QUALITY CONTROL

4.1. Site Observations

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

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

- Adequate topsoil stripping;
- Fill areas prior to the placement of fill materials to ascertain that all mullock and soft inorganic subsoils had been removed;
- Excavation and backfilling of sewer and stormwater trenches;
- Placement and compaction of engineered fills.

4.2. Compaction Control

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

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

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

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

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

5. EVALUATION OF COMPLETED EARTHWORKS

5.1. Natural Hazards

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

this site, the applied **Specific Design Zones (slope)** is 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 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

On all steep land, 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.

Wherever practical 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. 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.

5.4. Service Line Trenches

As part of the civil works, sanitary sewer and stormwater services were trenched throughout the development as shown on the appended Stormwater As-built Plans. Sanitary sewer services within this subdivision are based on Pressure Wastewater Collection (PWC) systems, which are installed in the common services trenches outside of the residential lots.

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

Lots 36 to 45 and 47 to 51 inclusive are affected by service lines as indicated on the appended Stormwater Drainage Zone of Influence Plan.

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 Cato Bolam Consultants Limited for pavement remedial design. Where soft ground with low equivalent CBR values was identified it was generally undercut and replaced with engineered fill. 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 Cato Bolam Consultants.

5.6. Future Development on Reserve Areas

Any future development of buildings or structures within the Local Purpose Reserve area (Lot 200) to be undertaken as part of reserve works by Auckland Council should be preceded by specific investigation and design of such works to confirm that ground conditions and geotechnical constraints are suitable for the proposed works. This should include confirmation of bearing capacity, land stability and coastal inundation assessments given the position of the reserve areas adjacent to the estuary.

5.7. Design of Shallow Foundations

5.7.1. 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 lots 35 to 41 and 45 to 51 inclusive 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.

5.7.2. 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.

5.7.3. 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 these stages of the development to be M (moderate). Details of foundation options for this Class are contained in the appended Suitability Statement.

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

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

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

5.8. 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 100 and 300mm on this stage of the development.

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

6. CLOSURE

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

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

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

For and on behalf of CMW Geosciences

Prepared by:



Greg Snook

Senior Engineering Geologist

Reviewed and Approved by:



Richard Knowles

Principal Geotechnical Engineer, CPEng

Appendix A

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

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

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

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on Stage 3 of the Deacon Point Subdivision Development.
2. The extent of preliminary investigations carried out to date are described in the CMW Geosciences Geotechnical Investigation Report referenced AKL2016-0326AB Rev. 2, dated 13 May 2016. The conclusions and recommendations of those documents have been re-evaluated in the preparation of this report. The results of all tests carried out are also appended.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
 - (a) The earth fills shown on the appended Cut Fill As-built Plan have been placed in compliance with NZS 4431, the Auckland Council District Plans (Rodney Section) 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 all lots have gradients steeper than 1(v) in 4 (h) or are adjacent to land having such gradients. Accordingly, restrictions incorporating **Specific Design Zones (Slope)** have been applied as depicted on the as-built plans on Lots 37 to 41 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) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on the building platforms of all the lots on this stage of the development.

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.

- (d) 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 5.7.3 of the Geotechnical Completion Report) for reference by foundation contractors.

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

However, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific design and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and trench backfill. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision this document is provided in Appendix B for clarification. Details for water and wastewater pipes are available in the Watercare Code of Practice for Land Development and Subdivision, with drawings referenced WW 53, WW54 and WW60 applicable to bridging wastewater pipes. Lots 35 to 45 and 47 to 51 inclusive are affected by service line drainage as indicated on the appended Stormwater Drainage Zone of Influence Plan.

- (f) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(a), 3(b), 3(c), 3(d), and 3(e) above:
- (i) The filled and natural ground is generally suitable for residential buildings constructed in accordance with NZS 3604 and the requirements of AS2870 for the appropriate expansive soil class.
 - (ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 (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.
5. Local Purpose (esplanade) Reserve Lot 200 has not been significantly worked as part of the development in accordance with the constraints and limitations required by Council's Parks department.
6. Local Purpose Reserve Lot 201 has been formed to standards appropriate for its intended use. However, if future building development is to occur on this site, it should be preceded by site specific investigations and design to confirm appropriate soil conditions and parameters.

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

For and on behalf of CMW Geosciences



Richard Knowles

Principal Geotechnical Engineer, CPEng

GCR Summary Table

Condition	Specific Design Zone (slope)	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)	
Lot number					
35		300	M	●	200
36		300	M	●	250
37	●	300	M	●	300
38	●	300	M	●	200
39	●	300	M	●	300
40	●	300	M	●	300
41	●	300	M	●	100
45		300	M	●	300
46		300	M		300
47		300	M	●	300
48		300	M	●	300
49		300	M	●	250
50		300	M	●	200
51		300	M	●	200

Appendix B

Drawings

Title	Reference No.	Date	Revision
Cover Sheet	34147 E000	Nov 2017	
Final Contours	34147 E635	Nov 2017	
Cut Fill	34147 E636	Nov 2017	
Roading	34147 E637	Nov 2017	
Wastewater Reticulation	34147 E638	Nov 2017	
Stormwater Reticulation (2 Sheets)	34147 E639 and E640	Nov 2017	
Water Reticulation	34147 E641	Nov 2017	
Stormwater Drainage Zone of Influence Plan	34147 E642	Nov 2017	
Specific Design Zone Plan	34147 E643	Nov 2017	

Cabra Properties Ltd

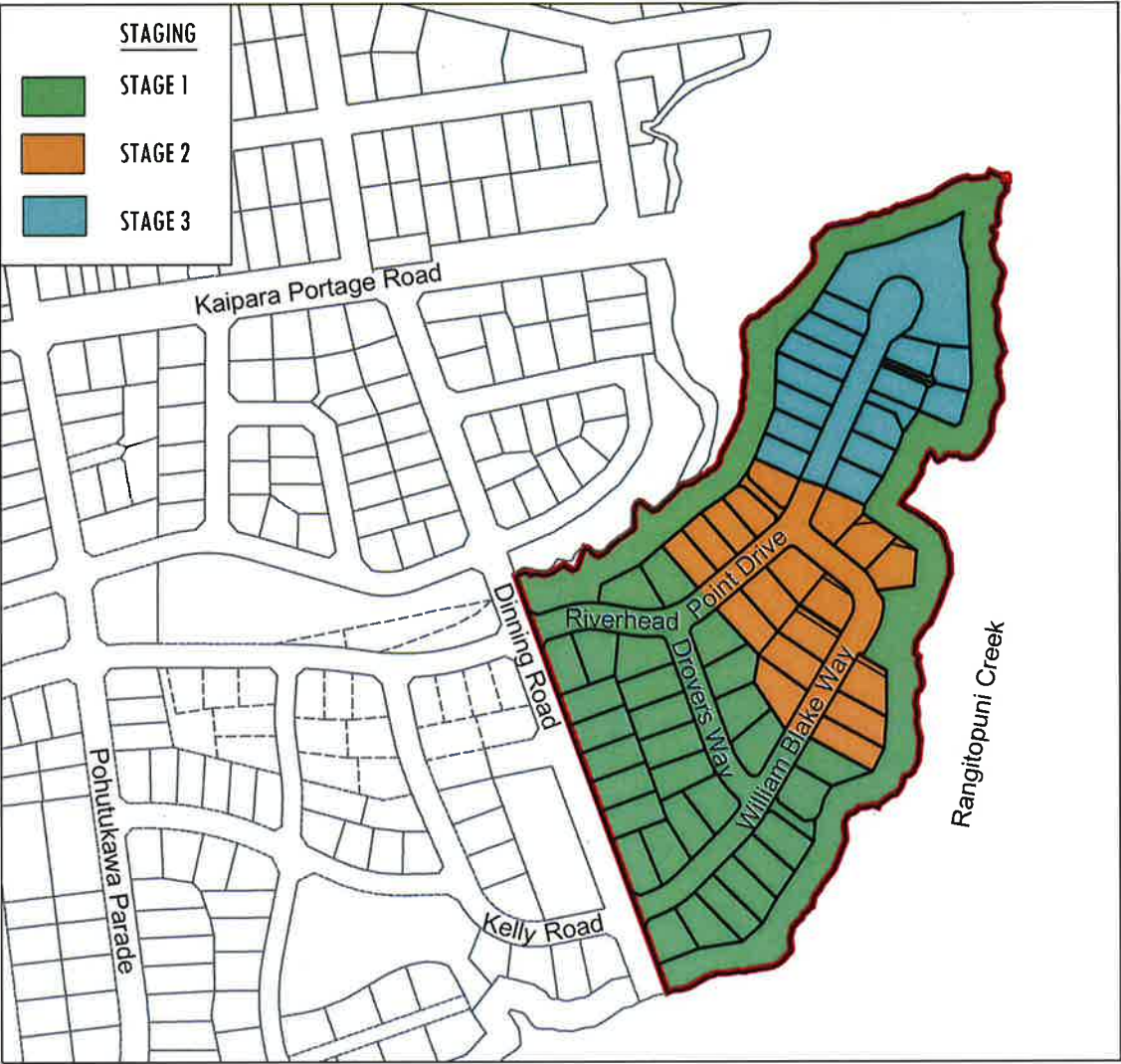
Deacon Point

Stage 3

Dinning Road, Riverhead

AS BUILT PLAN SET - 34147 Stages 3

E000	Cover Sheet
E635	Final Contours
E636	Cut Fill
E637	Roading
E638	Wastewater Reticulation
E639	Stormwater Reticulation - Sheet 1 of 2
E640	Stormwater Reticulation - Sheet 2 of 2
E641	Water Reticulation
E642	Stormwater Drainage Zone of Influence Plan



LOCATION DIAGRAM
Scale 1:5,000

As Built Plans - November 2017

R67504
ENG60065935

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CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946

phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

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 ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

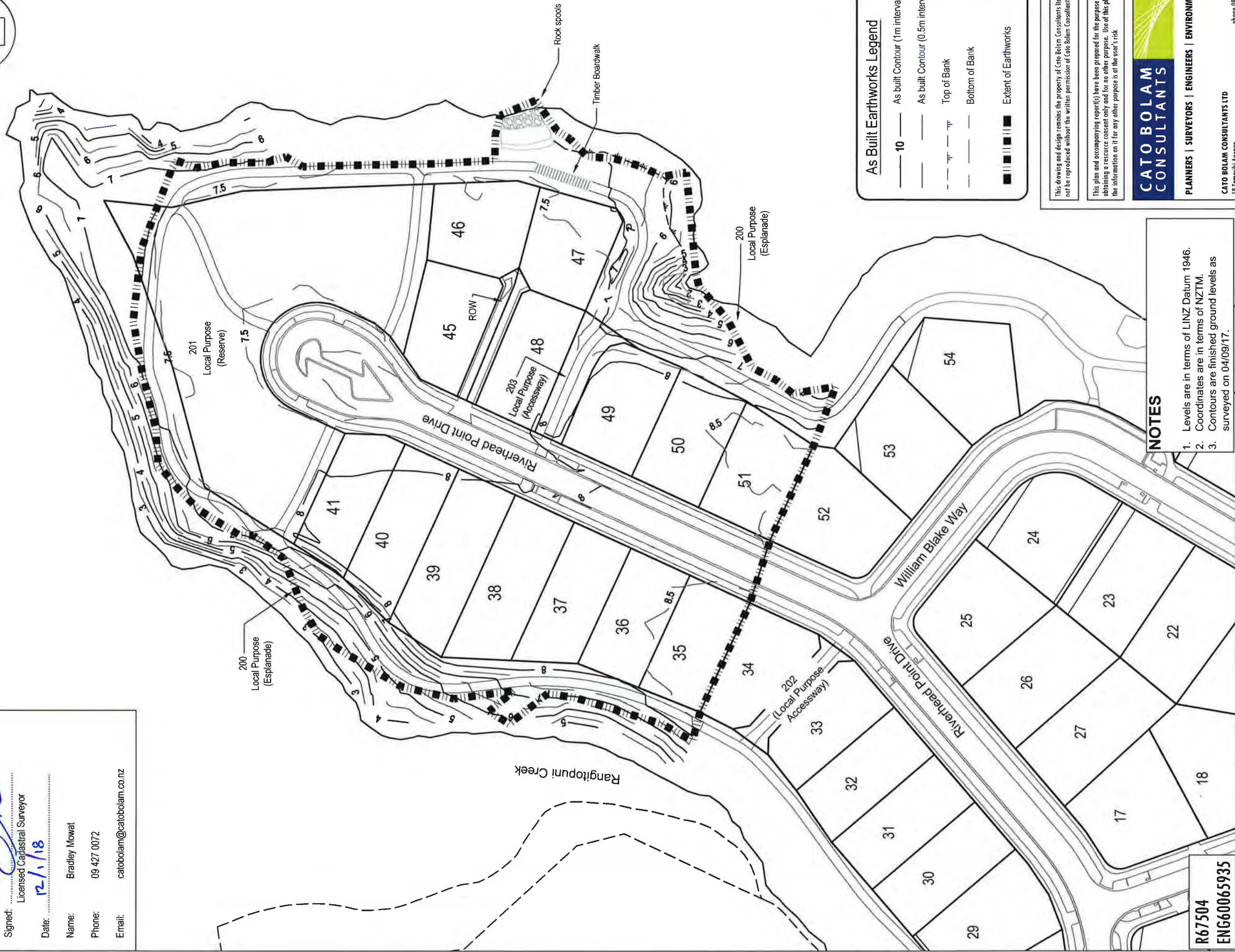
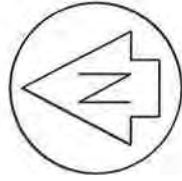
Signed: 
Licensed Cadastral Surveyor

Date: 12/1/18

Name: Bradley Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz



- As Built Earthworks Legend**
- 10 — As built Contour (1m interval)
 - As built Contour (0.5m interval)
 - Top of Bank
 - Bottom of Bank
 - Extent of Earthworks

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CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Dunedin 9046
phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

NOTES

- Levels are in terms of LINZ Datum 1946.
- Coordinates are in terms of NZTM.
- Contours are finished ground levels as surveyed on 04/09/17.

R67504
ENG60065935

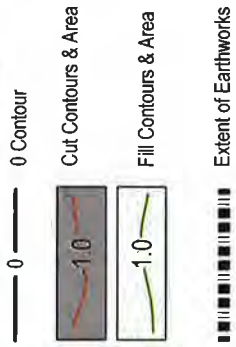
REVISION (DESCRIPTIONS)		NAME	DATE
SURVEYED		NAME	DATE
DESIGNED		LD	10/17
DRAWN		AA	11/17
CHECKED		BJ	11/17
APPROVED		TL	11/17

CLIENT
Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE
Stage 3:
Final Contours
As Built Plan

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE	CAD REFERENCE	SHEET NO
24/11/17	34147 E635	E635
DIRECTORY	Z:\34147\ACAD\ASBUILTS	JOB NO
		34147

Cut to Fill Legend



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 $\pm 25\text{mm}$.

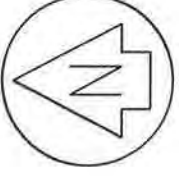
Signed: 
Licensed Cadastral Surveyor

Date: 12/01/18

Name: Bradley Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz



NOTES

GENERAL

- Levels are in terms of LINZ Datum 1946.
- Coordinates are in terms of NZTM.
 - All infrastructure is public unless otherwise shown.
 - Cut/fill contours are from the original ground level, plus undercuts, to finished ground level as surveyed on 04/09/17.

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

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE	CAD REFERENCE	SHEET NO
24/11/17	3417 E636	E636
DIRECTORY		JOB NO
Z:\3417\ACAD\As Built Stage 3		34147

DRAWING TITLE

Stage 3:
Cut Fill
As Built Plan

CLIENT

Cabra Properties Ltd
Deacon Point
Stages 3
Dinning Road, Riverhead

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED	LD	10/17
DESIGNED	AA	11/17
DRAWN	BM	11/17
CHECKED	BM	11/17
APPROVED	TM	11/17

NOTES

GENERAL

1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.

Pavement Formation

Road
Subgrade - Stabilised with 10kg/m² lime and 10kg/m² cement to a depth of 250mm
Subbase - 250mm GAP65
Basecourse - 100mm TNZ AP40
Seal - 30mm hotmix on grade 4 chipseal membrane

Kerb & channel
machine laid low profile mountable kerb

Vehicle Crossing & Right of Way
150mm 20MPa concrete, one layer of 665 mesh on 100mm GAP65 subbase. Right of Way includes 4kg/m² of black oxide and exposed finished surface.

Road Footpaths
1.8m wide, 125mm 20MPa concrete on 30mm AP25 bedding

Esplanade Footpaths
2.5m wide, 125mm 20MPa concrete on 30mm AP25 bedding

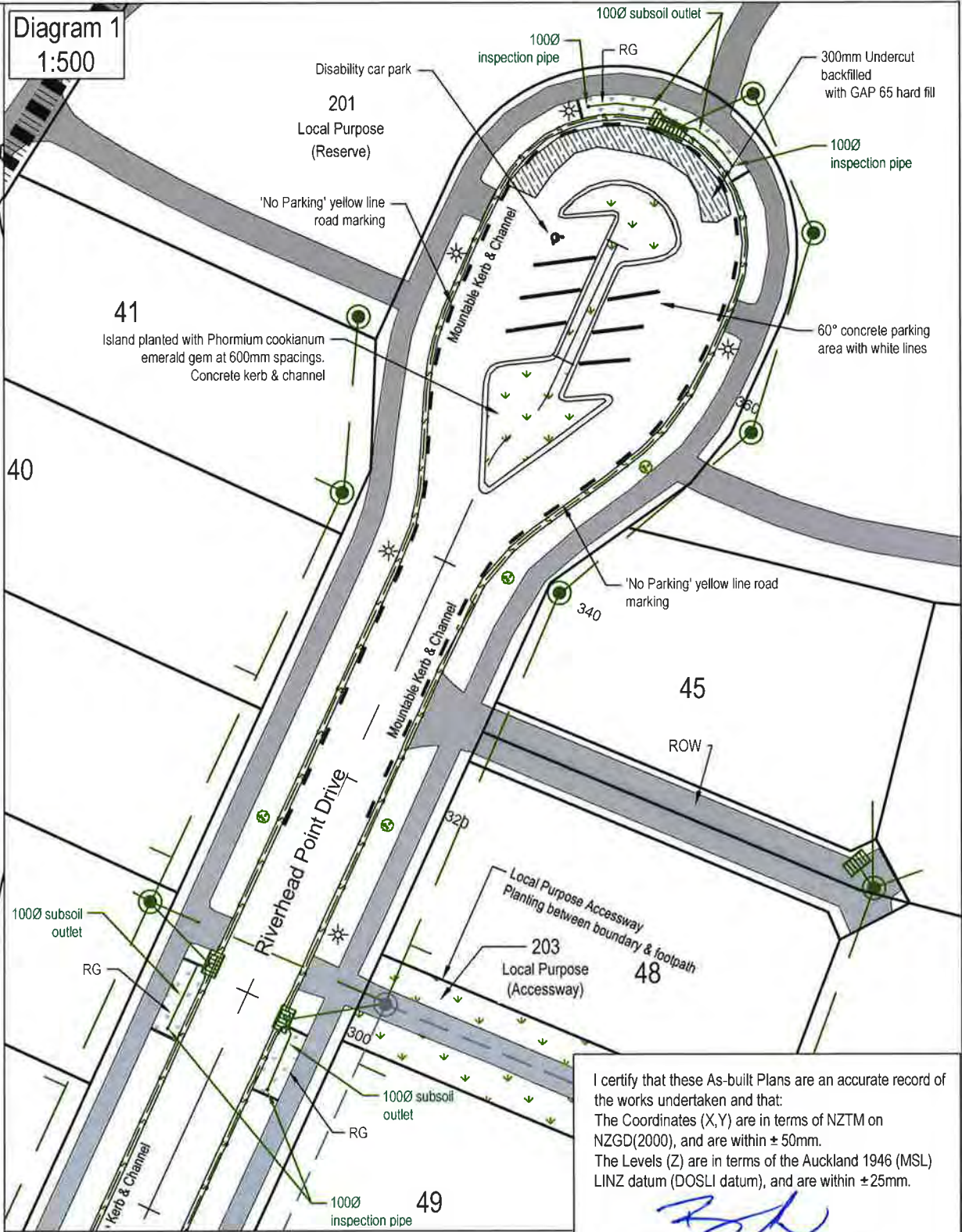
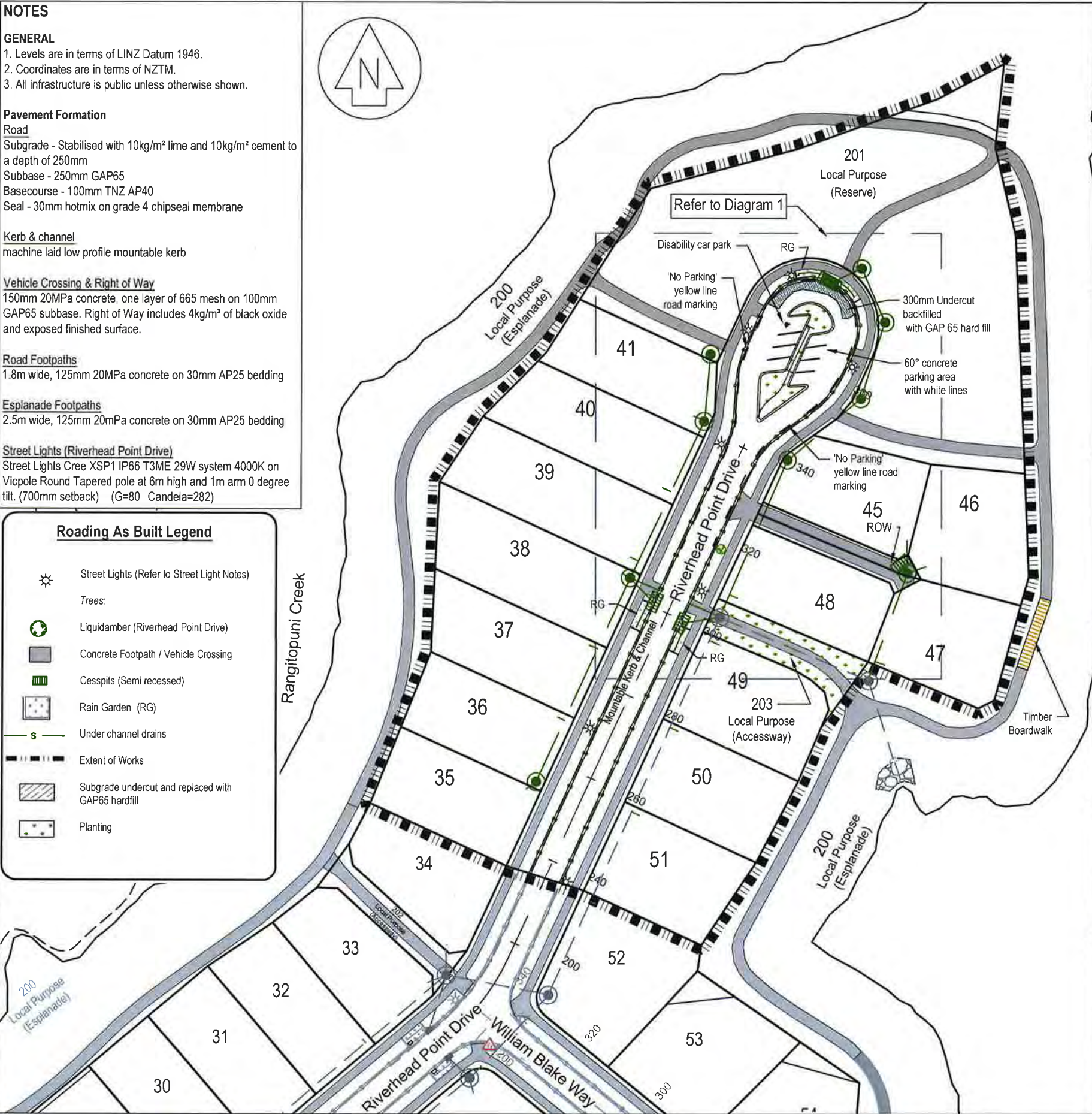
Street Lights (Riverhead Point Drive)
Street Lights Cree XSP1 IP66 T3ME 29W system 4000K on Vicpole Round Tapered pole at 6m high and 1m arm 0 degree tilt. (700mm setback) (G=80 Candela=282)

Roading As Built Legend

☼ Street Lights (Refer to Street Light Notes)

Trees:

- 🌳 Liquidamber (Riverhead Point Drive)
- 🌳 Concrete Footpath / Vehicle Crossing
- 🌳 Cesspits (Semi recessed)
- 🌳 Rain Garden (RG)
- 🌳 Under channel drains
- 🌳 Extent of Works
- 🌳 Subgrade undercut and replaced with GAP65 hardfill
- 🌳 Planting



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 ± 50mm.
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Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

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CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946

phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED	LD & BJ	10/17
DESIGNED	AA	11/17
DRAWN	BM	11/17
CHECKED	TL	11/17
APPROVED		

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CLIENT

Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE

Stage 3:
Roding
As Built Plan

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE	CAD REFERENCE	SHEET NO
24/11/2017	34147 E637	E637
DIRECTORY		JOB NO
Z:\34147\ACAD\As Built Stage 3		34147

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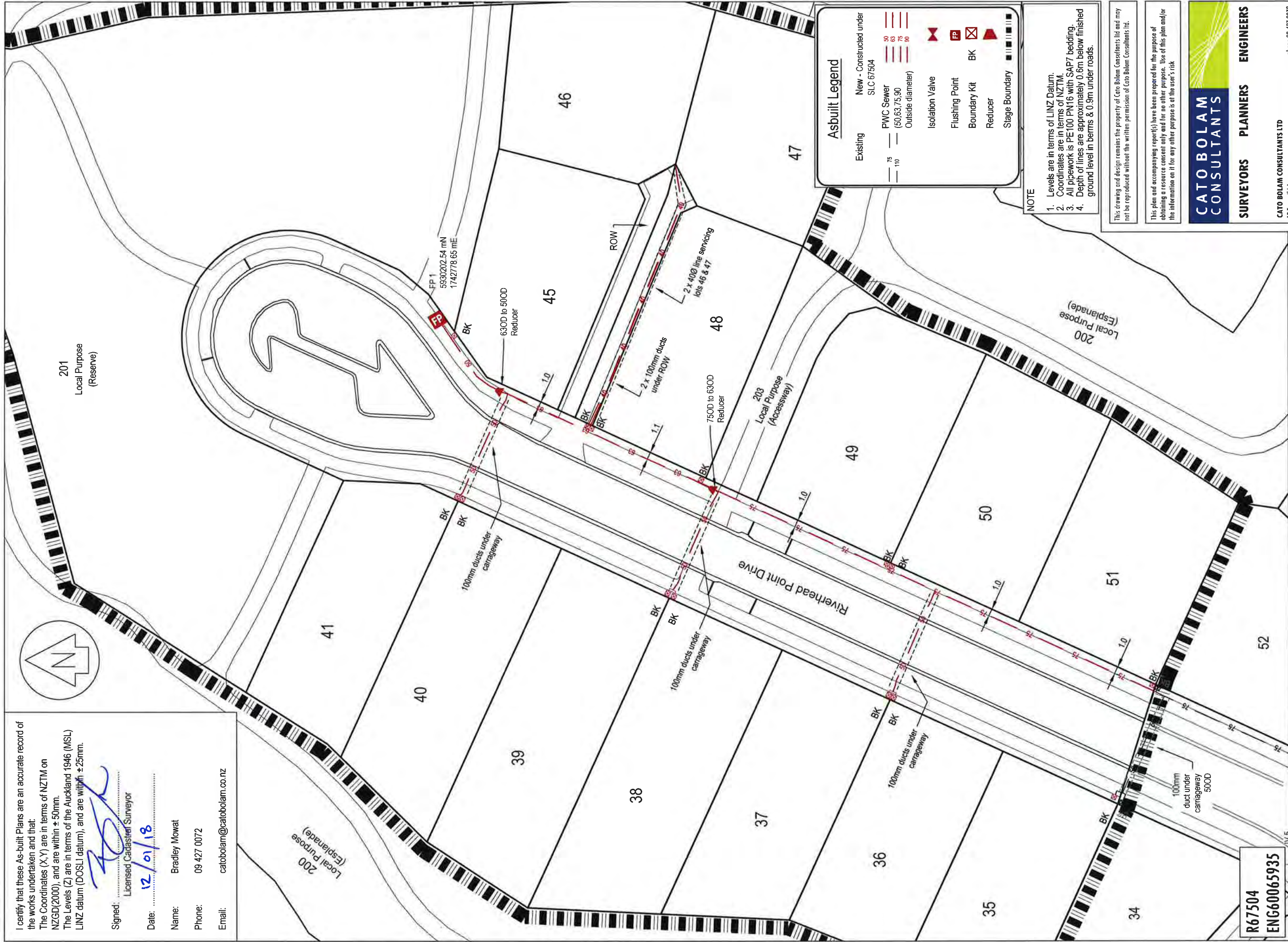
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Date: 12/01/18

Name: Bradley Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz



Asbuilt Legend

Existing	New - Constructed under SLC 67504
75	PWC Sewer
110	(50,63,75,90 Outside diameter)
	Isolation Valve
	Flushing Point
	Boundary Kit
	Reducer
	Stage Boundary

NOTE

- Levels are in terms of LINZ Datum.
- Coordinates are in terms of NZTM.
- All pipework is PE100 PN16 with SAP7 bedding.
- Depth of lines are approximately 0.6m below finished ground level in berms & 0.9m under roads.

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CATO BOLAM CONSULTANTS LTD
19 Tamaki Avenue
PO Box 157
Dunedin 9046
phone 09 427 0072
fax 09 426 7331
email catobolam@catobolam.co.nz

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
24/11/17	34147 E638	E638
DIRECTORY		JOB NO
		34147

CLIENT

Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE

Stage 3:
Wastewater Reticalation
As Built Plan

R67504
ENG0065935

REVISION (DESCRIPTIONS)		NAME	DATE
SURVEYED		NAME	DATE
DESIGNED		LD	10/17
DRAWN		AA	11/17
CHECKED		BA	11/17
APPROVED		TL	11/17

NZTM Manhole Co-ordinates Table

Name	mN	mE
B-1	5930169.59	1742797.75
C-1	5930194.84	1742771.35
C-2	5930208.01	1742787.84
C-3	5930224.70	1742793.52
C-4	5930236.55	1742788.61
D-1	5930169.52	1742736.25
D-2	5930203.65	1742753.13
D-3	5930218.40	1742754.83
E-1	5930125.08	1742714.77

NZTM Catchpit Co-ordinates Table

Name	mN	mE
CP 18	5930164.07	1742741.38
CP 19	5930159.35	1742747.27
CP 20	5930234.25	1742780.94
CP 20/1	5930233.74	1742781.86
CP 21	5930171.62	1742796.11

Drainage As Built Legend

Existing	New -As Constructed

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 ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed:
Licensed Cadastral Surveyor

Date: 12/01/18

Name: Bradley Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

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

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED	LD & AA	09/17
DESIGNED	AA	11/17
DRAWN	BM	11/17
CHECKED	TL	11/17
APPROVED		

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CLIENT

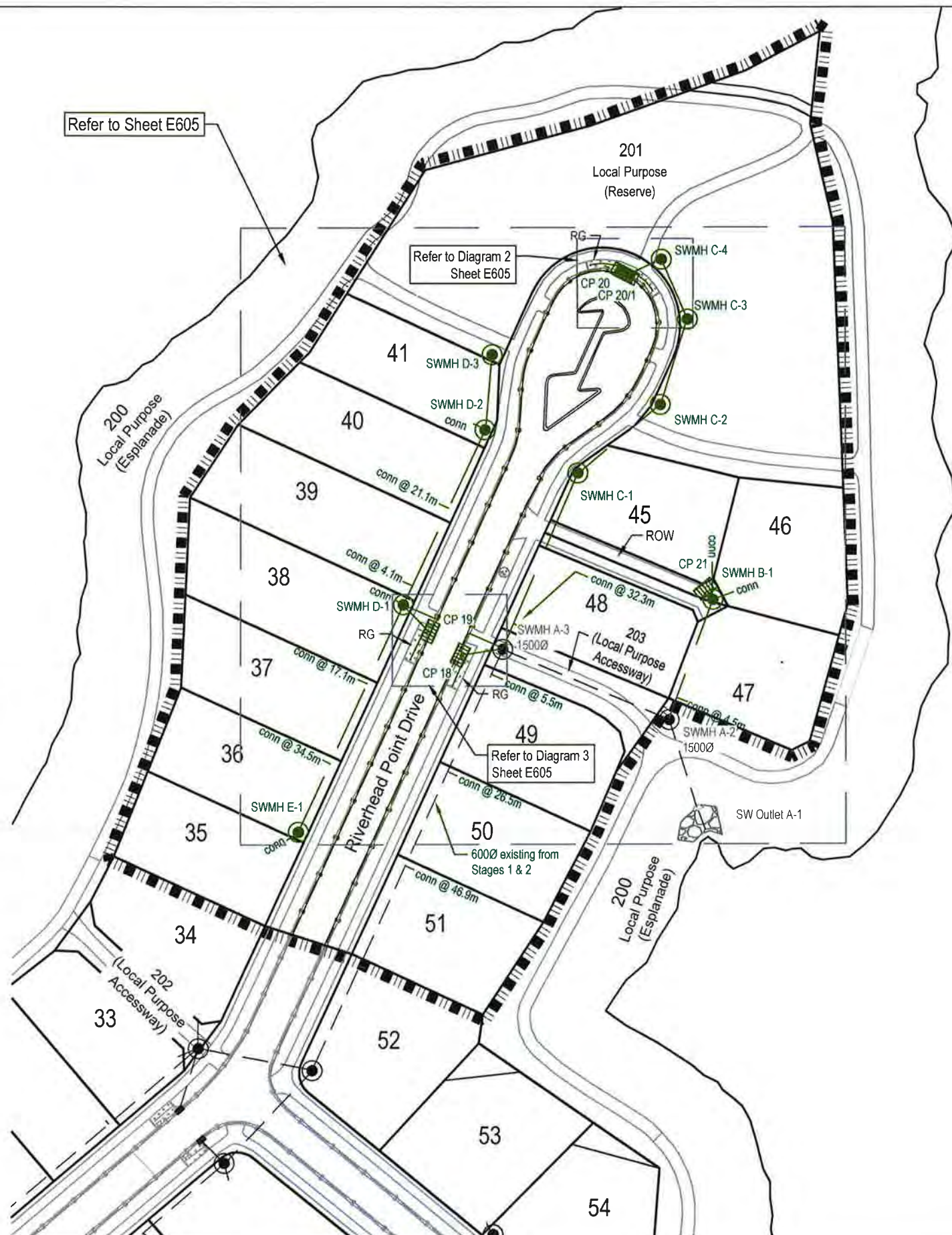
Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE

Stage 3:
Stormwater Reticulation
As Built Plan
Sheet 1 of 2

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ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE	CAD REFERENCE	SHEET NO
24/11/17	34147 E639-E640	E639
DIRECTORY	IMAGE FILE	JOB NO
Z:\34147\ACAD\AsBuilt\		34147



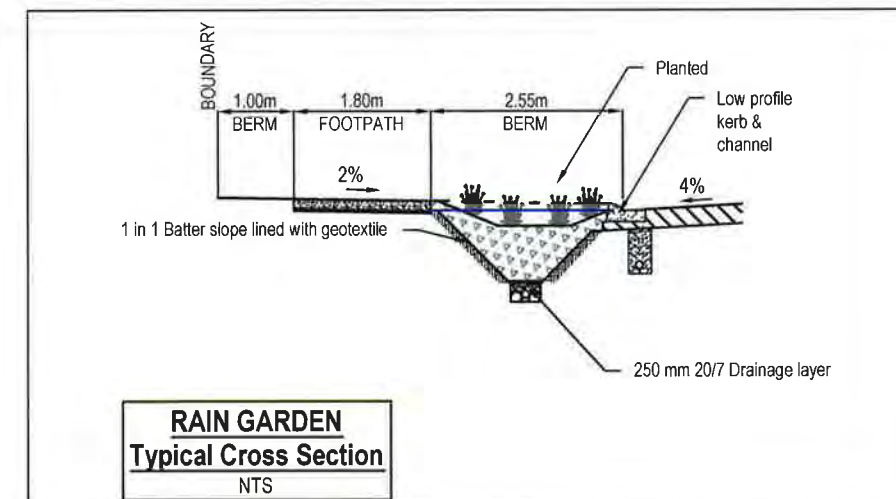
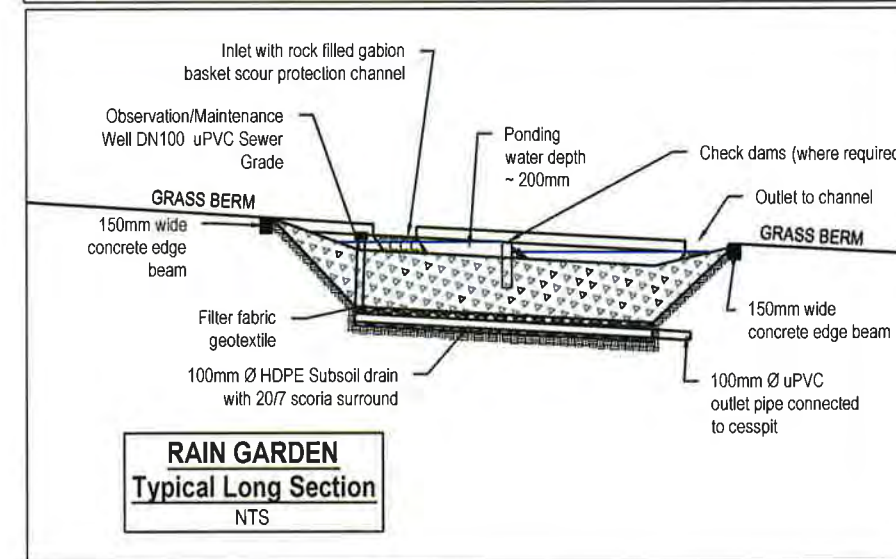
NOTES

GENERAL

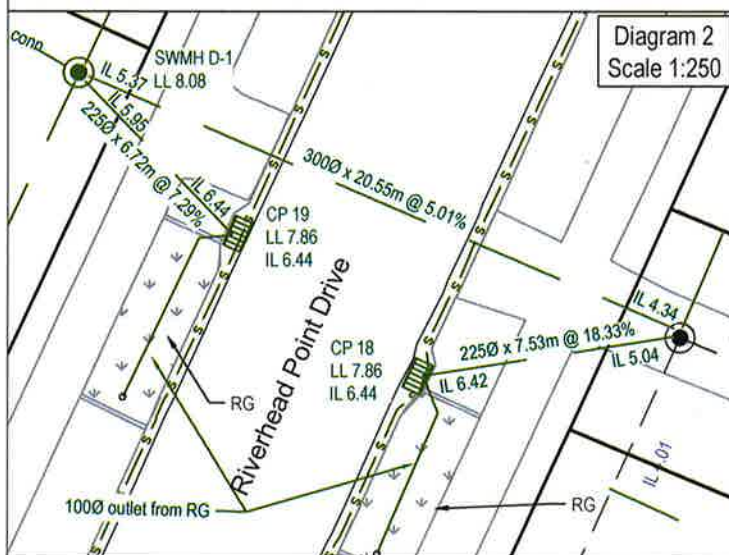
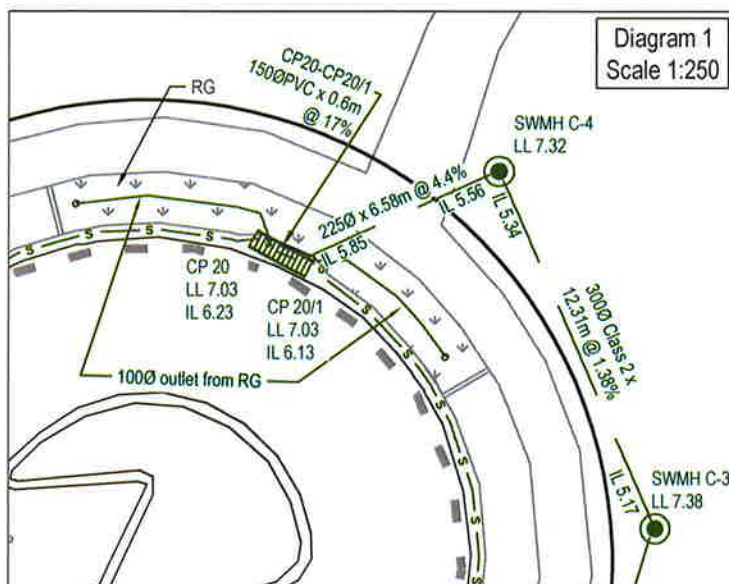
1. Levels are in terms of LINZ Datum 1946.
2. Coordinates are in terms of NZTM.
3. All infrastructure is public unless otherwise shown.

STORMWATER

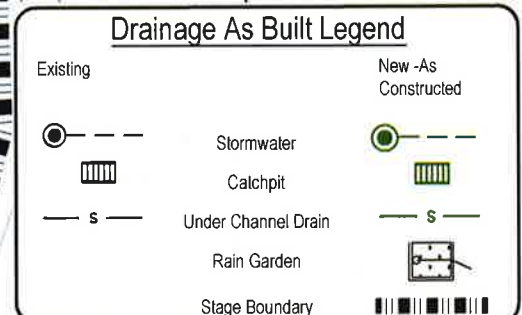
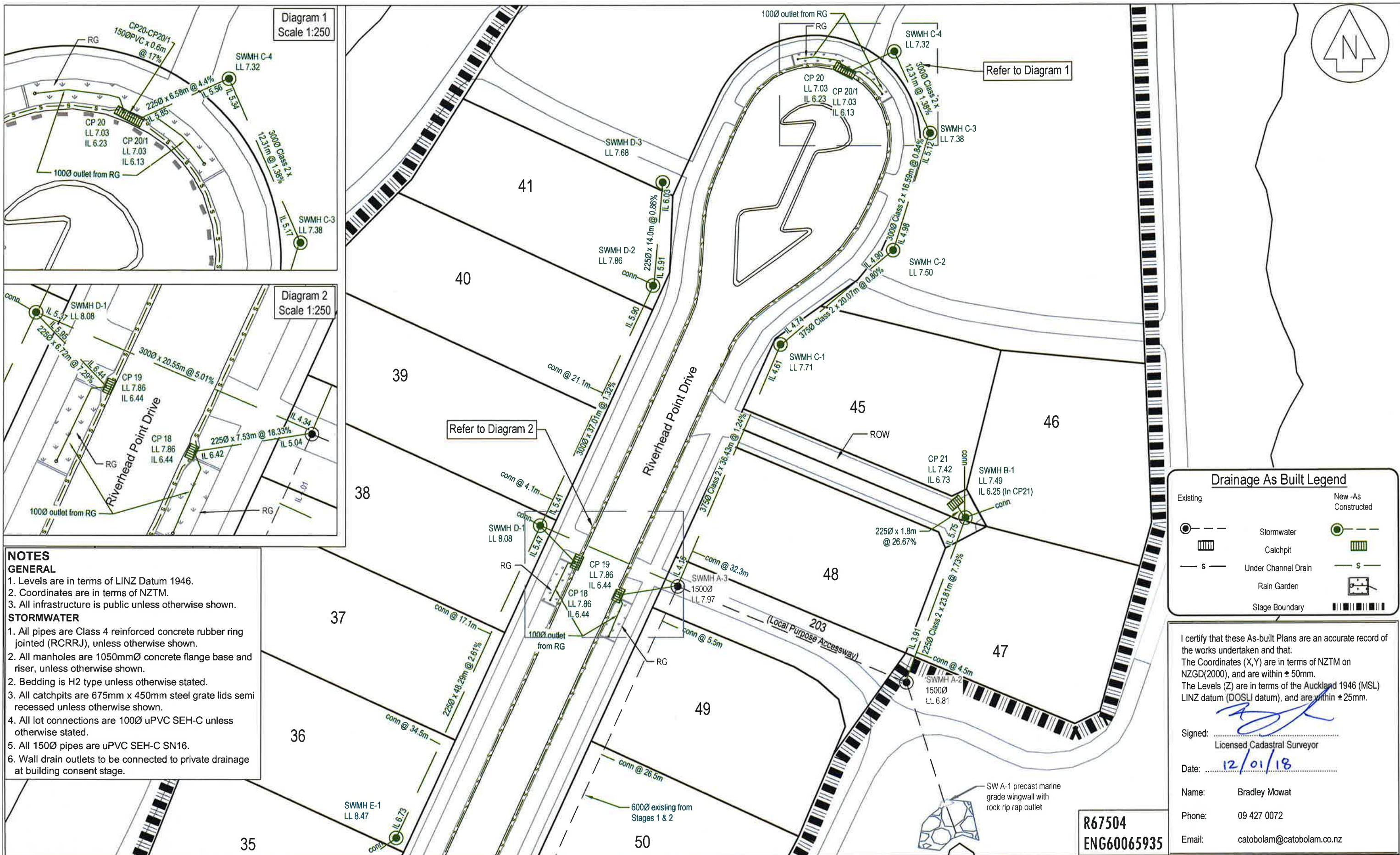
1. All pipes are Class 4 reinforced concrete rubber ring jointed (RCRRJ), unless otherwise shown.
2. All manholes are 1050mmØ concrete flange base and riser, unless otherwise shown.
2. Bedding is H2 type unless otherwise stated.
3. All catchpits are 675mm x 450mm steel grate lids semi recessed unless otherwise shown.
4. All lot connections are 100Ø uPVC SEH-C unless otherwise stated.
5. All 150Ø pipes are uPVC SEH-C SN16.
6. Wall drain outlets to be connected to private drainage at building consent stage.



R67504
ENG60065935



- NOTES**
- GENERAL**
1. Levels are in terms of LINZ Datum 1946.
 2. Coordinates are in terms of NZTM.
 3. All infrastructure is public unless otherwise shown.
- STORMWATER**
1. All pipes are Class 4 reinforced concrete rubber ring jointed (RCRRJ), unless otherwise shown.
 2. All manholes are 1050mmØ concrete flange base and riser, unless otherwise shown.
 2. Bedding is H2 type unless otherwise stated.
 3. All catchpits are 675mm x 450mm steel grate lids semi recessed unless otherwise shown.
 4. All lot connections are 100Ø uPVC SEH-C unless otherwise stated.
 5. All 150Ø pipes are uPVC SEH-C SN16.
 6. Wall drain outlets to be connected to private drainage at building consent stage.



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 ± 50mm.
 The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed:
 Licensed Cadastral Surveyor

Date: 12/01/18

Name: Bradley Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

CATO BOLAM CONSULTANTS

PLANNERS | SURVEYORS | ENGINEERS | ENVIRONMENTAL

CATO BOLAM CONSULTANTS LTD
 19 Tamariki Avenue
 PO Box 157
 Orewa 0946

phone 09-427 0072
 fax 09-426 7331
 email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED	LD & AA	09/17
DESIGNED	AA	11/17
DRAWN	BM	11/17
CHECKED	TL	11/17
APPROVED		

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CLIENT

Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE

Stage 3:
Stormwater Reticulation
As Built Plan
Sheet 2 of 2

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
24/11/17	34147 E639-E640	E640
DIRECTORY	IMAGE FILE	JOB NO
Z:\34147\ACAD\AsBuilt\		34147

Water Reticulation Legend

Existing	New - constructed
32	Watermain (Ø)
63	Sluice Valve
125	Peet Valve
	Lot Service Connections
	Fire Hydrant
	Stage Boundary

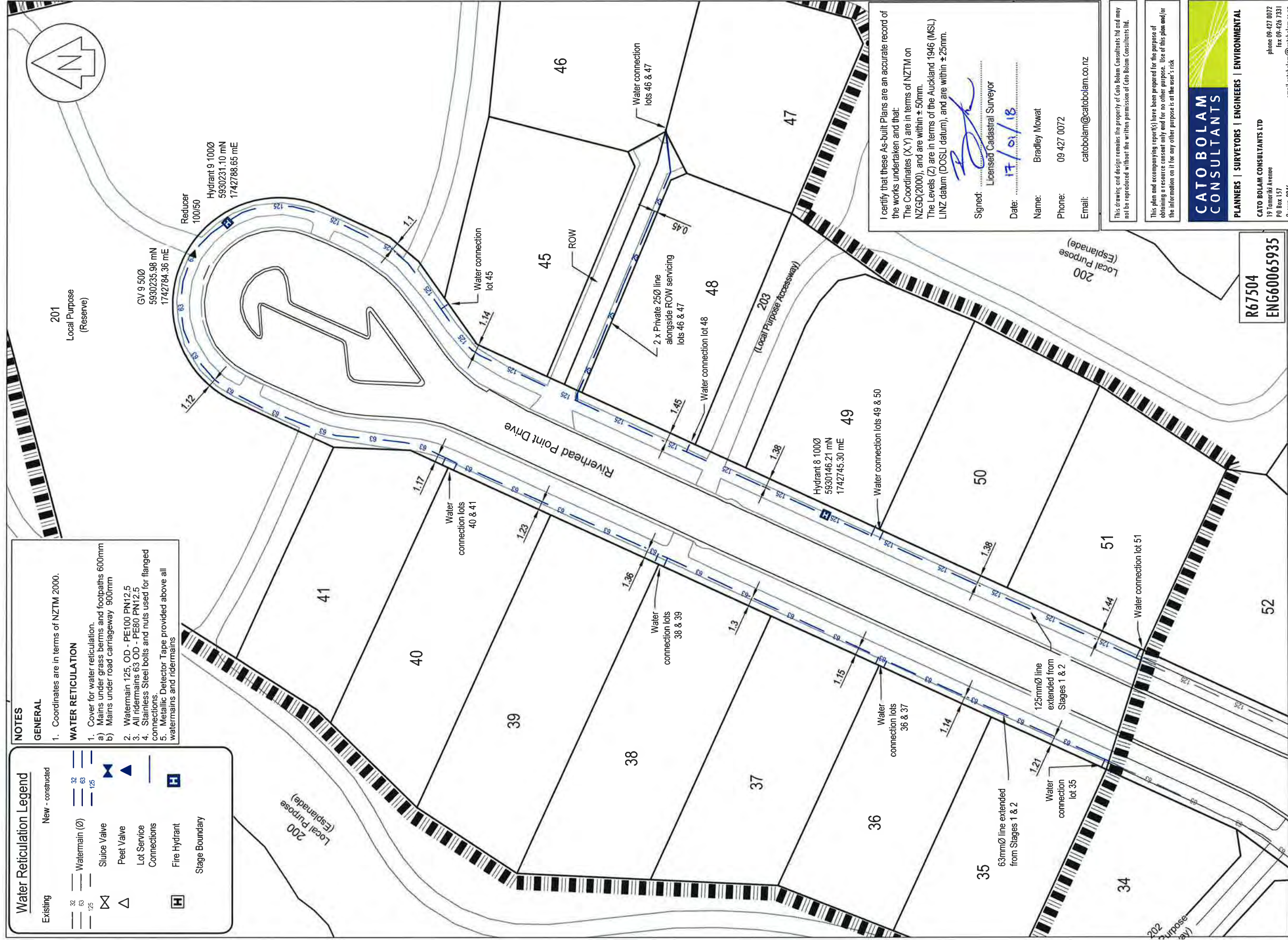
NOTES

GENERAL

1. Coordinates are in terms of NZTM 2000.

WATER RETICULATION

- Cover for water reticulation.
 - Mains under grass berms and footpaths 600mm
 - Mains under road carriageway 900mm
- Watermain 125, OD - PE100 PN12.5
- All risers 63 OD - PE80 PN12.5
- Stainless Steel bolts and nuts used for flanged connections.
- Metallic Detector Tape provided above all watermain and risers.



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The Coordinates (X,Y) are in terms of NZTM on NZGD(2000), and are within ± 50mm.
The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 25mm.

Signed: *[Signature]*
Licensed Cadastral Surveyor

Date: 17/01/18

Name: Bradley Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

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CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Dunedin 9096

phone 09-427 0072
fax 09-426 7331
email catobolam@catobolam.co.nz

CLIENT

Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE

Stage 3:
Water Reticulation
As Built Plan

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED	NAME	DATE
DESIGNED	LD	10/17
DRAWN	AA	11/17
CHECKED	BM	11/17
APPROVED	TL	11/17

ORIGINAL SCALE 1:500 ORIGINAL SIZE A3 REVISION NO

DATE 24/11/17 CAD REFERENCE 34147 E641 SHEET NO

DIRECTORY Z:\34147\ACAD\As Built Stage 3 JOB NO 34147

E641

34147

As Built Earthworks Legend

Existing

Pipeline 45° Zone of Influence Area from invert

Catchpits

Stormwater

Offset dimension from boundary

Extent of Stage

New - As Built

Pipeline 45° Zone of Influence Area from invert

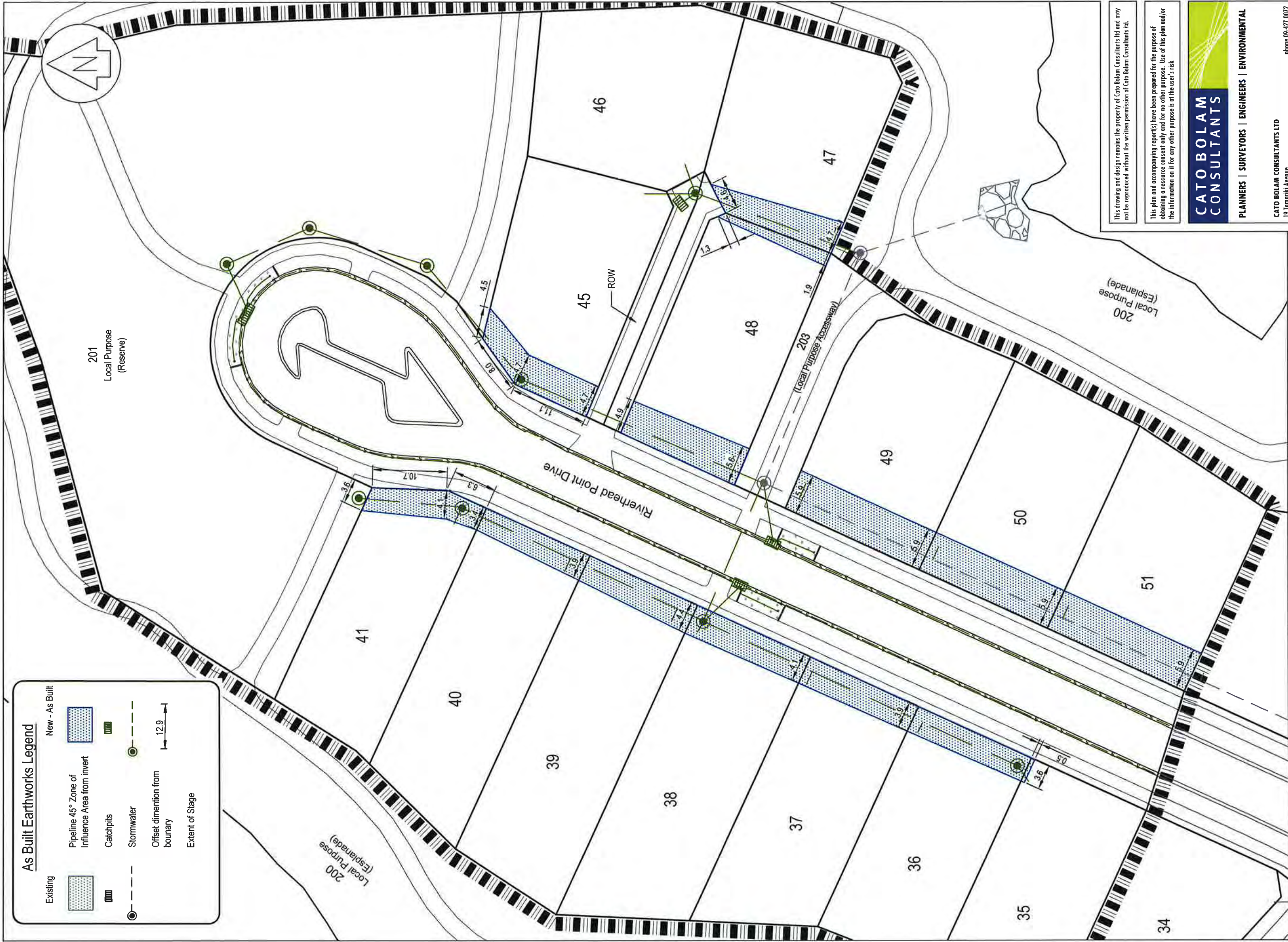
Catchpits

Stormwater

Offset dimension from boundary

Extent of Stage

12.9



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CATO BOLAM CONSULTANTS LTD

19 Tamariki Avenue

PO Box 157

Orewa 0946

phone 09-427 0072

fax 09-426 7331

email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)		NAME	DATE
SURVEYED		NAME	DATE
DESIGNED		LD & AA	10/17
DRAWN		AA	11/17
CHECKED		BA	11/17
APPROVED		TL	11/17

Cabra Properties Ltd

Deacon Point

Stage 3

Dinning Road, Riverhead

CLIENT

DRAWING TITLE

Stage 3:

Stormwater Drainage Zone

of Influence Plan

ORIGINAL SCALE

1:500

ORIGINAL SIZE

A3

DATE

24/11/17

DIRECTORY

Z:\34147\Acad

REVISION NO

34147 E642

SHEET NO

34147 E642

JOB NO

34147



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CATO BOLAM CONSULTANTS LTD
19 Tamariki Avenue
PO Box 157
Orewa 0946

phone 09-427 0072
fax 09-426 7331
email catabolam@catabolam.co.nz

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 30/01/17	CAD REFERENCE 34147 E643	SHEET NO E643
DIRECTORY Z:\34147\Acad		JOB NO 34147

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED	LD & AA	10/17
DESIGNED	AA	01/18
DRAWN	BM	01/18
CHECKED	TL	01/18
APPROVED		

CLIENT

Cabra Properties Ltd
Deacon Point
Stage 3
Dinning Road, Riverhead

DRAWING TITLE

Stage 3:
Specific Design Zone - Slope

Appendix C

Laboratory Test Data

Report No: 16 0033 00
Page: 1 of 1

**DETERMINATION OF THE
LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2, 2.3, 2.4 & 2.6**

Job:	29 Dinning Road		
Date of order:	19.2.16	Sample origin:	-
Sample method:	HA	Sample Description:	-
Sample By:	MB	Date:	18.2.16

Test Details :

Test performed on :	Whole Sample
History :	Natural

Sample No.	Location	Depth (m)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Linear Shrinkage (LS)	Natural Water Content (%)
E145A	HA2	0.8m - 1.2m	69	24	45	19	26.0
E146A	HA10	0.4m	31	21	10	6	18.6

Comments :

Tested By:	EC	Date :	24.02.16
Calculated By :	EC	Date :	25.02.16
Checked By :	EC	Date :	29.02.16

Report No: 17 0183 00
Page: 1 of 1**DETERMINATION OF THE LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.2 & 2.6**

Job:	Dinning Road, Riverhead	Sample origin:	As below
Date of order:	-	Sample Description:	-
Sample method:	Hand auger	Date:	29.06.17
Sample By:	CMW Geosciences NZ Ltd		

Test Details :

Test performed on :	Whole Sample
History :	Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
418F	Lot 65	0.4 to 0.6	57	14	30.7
419F	Lot 16	0.4 to 0.6	56	16	30.7

Comments :

Tested By:	EC	Date :	14.07.17
Calculated By :	ZH	Date :	19.07.17
Checked By :	ZH	Date :	20.07.17

Appendix D

Field Test Data

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

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

Project: 29 Dinning Road, Riverhead
Project No: AKL2016_0326
Location: Riverhead
Report No: AKL2016_0326LAA Rev.0
Report Date: 5/12/2016
Client: Cabra Developments Limited
Client Address: PO Box 197, Orewa 0946
Client Reference:

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

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



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 laboratory's
accreditation

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m ³)	Gauge Dry Density (t/m ³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m ³) *	Oven Dry Density (t/m ³)	Calculated Air Voids (%)	
21/10/2016	N1	Lot 1	CLAY	119	113	127	132	123	1.7840	1.3086	36.3	3.89	300	41.8	2.7	1.26	0.83	Failed
	N2	Road 1	CLAY	94	103	100	113	103	1.7893	1.2463	43.6	-0.58	300	40.9	2.7	1.28	1.0	Failed
28/10/2016	N3	Road 1	CLAY	>189	>189	162	189	>182	1.8754	1.4339	30.8	2.65	300	28.8	2.7	1.46	4.1	Re-test of N2
	N4	Lot 1	CLAY	>189	>189	>189	>189	>189	1.8459	1.4006	31.8	3.49	300	29.7	2.7	1.42	5.0	Re-test of N1
1/11/2016	N5	Lot 1	CLAY	UTP	UTP	UTP	UTP	UTP	1.8568	1.4171	31.0	3.45	300	25.1	2.7	1.48	7.8	
	N6	Road 1 Entrance	CLAY	UTP	UTP	UTP	UTP	UTP	1.8781	1.4157	32.7	1.23	300	31.0	2.7	1.44	2.4	
3/11/2016	N7	Lot 3	CLAY	186	167	154	173	170	1.8372	1.3599	35.1	1.80	300	30.2	2.7	1.42	5.1	
	N8	Lot 1	CLAY	181	186	UTP	UTP	184	1.8323	1.3963	31.2	4.59	300	31.6	2.7	1.40	4.5	
10/11/2016	N9	Lot 60	CLAY	148	159	178	189	169	1.9667	1.5537	26.6	1.06	250	24.2	2.7	1.58	3.0	
	N10	Lot 59	CLAY	146	159	159	165	157	1.8702	1.4299	30.8	2.91	300	27.3	2.7	1.46	5.5	
	N11	Counterfort 1 North	CLAY	151	186	189	151	169	1.8963	1.4274	32.9	0.13	300	30.5	2.7	1.46	1.9	
	N12	Lot 28	CLAY	159	151	178	189	169	1.8746	1.4222	31.8	1.98	300	29.9	2.7	1.44	3.4	
11/11/2016	N13	West Gully	CLAY	154	159	140	148	150	1.8919	1.4524	30.3	2.16	300	29.9	2.7	1.46	2.5	
	N14	West Gully	CLAY	178	189	>189	>189	>186	1.8613	1.4147	31.6	2.85	300	30.3	2.7	1.42	3.8	
22/11/2016	N15	Lot 60	CLAY	189	151	165	189	174	1.9591	1.5290	28.1	0.26	300	23.9	2.7	1.58	3.7	
	N16	Lot 11	CLAY	189	148	189	165	173	1.9240	1.5193	26.6	3.17	300	26.3	2.7	1.52	3.5	
	N17	Lot 9	CLAY	165	140	189	189	171	1.9545	1.5419	26.8	1.54	300	23.8	2.7	1.58	4.0	
	N18	West of Lot 7	CLAY	189	189	146	157	170	1.8578	1.4319	29.7	4.29	300	29.4	2.7	1.44	4.6	
	N19	South of Lot 23	CLAY	165	189	>189	>189	>183	1.9085	1.5348	24.3	5.71	300	26.4	2.7	1.50	4.2	
	N20	North of Lot 55	CLAY	UTP	UTP	UTP	UTP	UTP	1.8741	1.4089	33.0	1.20	300	24.7	2.7	1.50	7.2	
24/11/2016	N21	Lot 22	Sandy CLAY	181	165	147	178	168	1.9493	1.5666	24.4	3.62	300	23.3	2.7	1.58	4.6	
	N22	South of Lot 23	Sandy CLAY	140	151	140	146	144	1.9840	1.5828	25.3	1.17	300	24.9	2.7	1.58	1.6	
29/11/2016	N23	Lot 11	CLAY	>189	>189	UTP	UTP	>189	1.9533	1.6101	21.3	5.97	250	22.1	2.7	1.60	5.4	
	N24	Lot 9	CLAY	UTP	UTP	UTP	UTP	UTP	2.0175	1.5963	26.4	-1.34	300	24.5	2.7	1.62	0.29	
	N25	Lot 1 N	CLAY	159	167	167	178	168	1.9583	1.5634	25.3	2.52	300	26.2	2.7	1.56	1.9	
	N26	Lot 1 S	CLAY	159	162	170	154	161	1.9076	1.5170	25.7	4.67	300	24.1	2.7	1.54	6.0	
2/12/2016	N27	Lot 10	CLAY	146	140	165	165	154	1.8827	1.5055	25.0	6.44	300	22.9	2.7	1.54	8.2	

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Created By: TG
Checked By: TG
Authorised Signatory: 

Date: 5/12/2016
Date: 6/12/2016
Date: 6/12/2016



CATO BOLAM CONSULTANTS
 19 Tanjong Pagar Avenue
 PO Box 157
 Geylang 0946

SURVEYORS PLANNERS ENGINEERS

phone 65-427 8572
 fax 65-424 7331
 email cato@catobolam.com.sg

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
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DATE 12/04/2015	CAD REFERENCE 34147 E101 Cat F10	SHEET NO E104
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DIRECTORY 3:34147, CAD	JOB NO 34147
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LF11 Rev 4 Soil Field Density NDM Direct Transmission with VSS Report

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

Project: 29 Dinning Road, Riverhead
Project No: AKL2016_0326
Location: Riverhead
Report No: AKL2016_0326LAB Rev.0
Report Date: 11/01/2017
Client: Cabra Developments Limited
Client Address: PO Box 197, Orewa 0946
Client Reference:

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

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



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

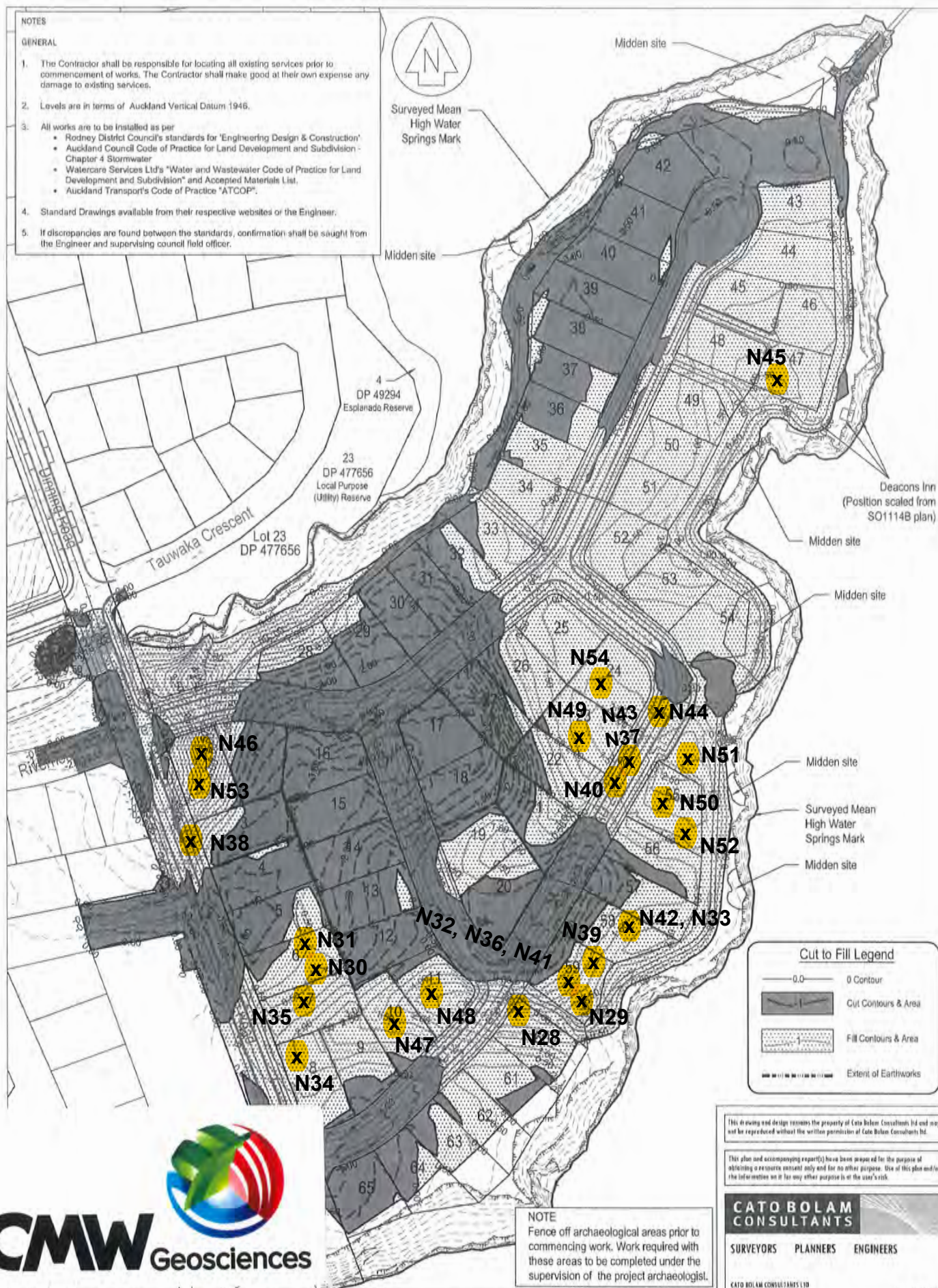
Measurements marked * are not accredited and are outside the scope of the laboratories accreditation

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data								Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m ³)	Gauge Dry Density (t/m ³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m ³)*	Oven Dry Density (t/m ³)	
2/12/2016	N28	Lot 60	CLAY	178	189	UTP	UTP	184	1.9852	1.6217	22.4	3.50	300	25.0	2.7	1.58	1.5
	N29	Lot 59	CLAY	165	159	189	UTP	171	1.9678	1.5679	25.5	1.85	300	30.2	2.7	1.52	-1.6
5/12/2016	N30	Lot 6	CLAY	189	189	>189	>189	>189	1.9432	1.5263	27.3	1.68	250	29.9	2.7	1.50	-0.2
	N31	Lot 6	CLAY	151	186	189	189	179	1.9223	1.4771	30.8	0.68	200	29.9	2.7	1.48	1.0
	N32	Lot 59	CLAY	189	148	146	186	167	1.9470	1.5538	25.3	3.04	300	23.2	2.7	1.58	4.8
	N33	Lot 58	CLAY	162	151	189	189	173	1.8824	1.4506	29.8	3.00	300	29.6	2.7	1.46	3.2
7/12/2016	N34	Lot 8	Sandy CLAY	162	162	167	151	161	1.9153	1.5425	24.2	5.51	300	24.8	2.7	1.54	5.1
	N35	Lot 7	Sandy CLAY	UTP	UTP	UTP	UTP	UTP	1.9377	1.5994	21.1	6.86	300	21.8	2.7	1.60	6.4
	N36	Lot 59	Sandy CLAY	151	159	162	167	160	1.9168	1.5227	25.9	4.10	300	26.8	2.7	1.52	3.5
	N37	Road between Lot 23 and Lot 55	Sandy CLAY	173	159	143	146	155	1.9195	1.4946	28.4	2.06	300	27.7	2.7	1.50	2.7
15/12/2016	N38	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.9100	1.5186	25.8	4.53	300	36.7	2.7	1.40	-3.0
	N39	Lot 59	CLAY	UTP	UTP	UTP	UTP	UTP	1.9302	1.5066	28.1	1.74	300	28.2	2.7	1.50	1.8
	N40	Refer to site plan	CLAY	173	162	>189	178	>176	1.9091	1.5374	24.2	5.81	300	25.8	2.7	1.52	4.6
	N41	Lot 59	CLAY	189	178	148	154	167	1.9089	1.5013	27.1	3.55	300	27.1	2.7	1.50	3.7
20/12/2016	N42	Lot 58	CLAY	189	189	>189	>189	>189	1.8870	1.4821	27.3	4.53	300	28.1	2.7	1.48	4.0
	N43	Road between Lot 23 and Lot 55	CLAY	UTP	UTP	UTP	UTP	UTP	1.9756	1.5890	24.3	2.40	300	19.9	2.7	1.64	6.2
	N44	Road SE of lot 24	CLAY	UTP	UTP	UTP	UTP	UTP	1.9289	1.5162	27.2	2.49	300	24.8	2.7	1.54	4.5
	N45	Lot 47	CLAY	UTP	UTP	UTP	UTP	UTP	1.9287	1.5526	24.2	4.81	300	25.9	2.7	1.54	3.6
	N46	Lot 1	CLAY	146	146	151	162	151	1.8628	1.3991	33.1	1.71	300	35.2	2.7	1.38	0.5
	N47	Lot 10	CLAY	189	189	>189	>189	>189	1.8219	1.3367	36.3	1.87	300	38.3	2.7	1.32	0.8
22/12/2016	N48	Lot 11	CLAY	UTP	UTP	UTP	UTP	UTP	1.8501	1.4081	31.4	3.55	300	33.7	2.7	1.38	2.1
	N49	Lot 23	CLAY	>189	>189	UTP	UTP	>189	1.9375	1.5395	25.9	3.09	300	24.0	2.7	1.56	4.6
	N50	Lot 55	CLAY	UTP	UTP	>189	>189	>189	1.9371	1.5397	25.8	3.15	300	18.3	2.7	1.64	9.4
	N51	Refer to site plan	CLAY	>194	>194	>194	>194	>194	1.9320	1.5459	25.0	4.06	250	27.3	2.7	1.52	2.3
30/12/2016	N52	Lot 55	CLAY	>194	>194	>194	>194	>194	1.9141	1.4981	27.8	2.83	200	27.3	2.7	1.50	3.3
	N53	Lot 1	CLAY	>194	>194	>194	>194	>194	1.9172	1.5182	26.2	3.81	200	30.2	2.7	1.48	1.0
9/01/2017	N54	Lot 24	CLAY	148	151	162	165	157	1.9105	1.5366	24.3	5.62	250	31.5	2.7	1.46	0.4

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Created By: TG
Checked By: TG
Authorised Signatory: 

Date: 5/12/2016
Date: 11/01/2017
Date: 11/01/2017



REVISION (DISCREPTIONS)	C/W NAME	DATE
Walkway amended, culvert added		06/05/16
	NAME	DATE
SURVEYED		
DESIGNED	GW	12/04/2016
DRAWN	GW	12/04/2016
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE

**PROPOSED
CUT AND FILL
CONTOURS**

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1 : 1500	A3	R1
DATE	CAD REFERENCE	SHEET NO
12/04/2015	34147 E101 Cut Fill	E104
DIRECTORY	JOB NO	
2, 34147, ACAD	34147	

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

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

Project: 29 Dinning Road, Riverhead
Project No: AKL2016_0326
Location: Riverhead
Report No: AKL2016_0326LAC Rev.0
Report Date: 22/08/2017
Client: Cabra Developments Limited
Client Address: PO Box 197, Orewa 0946
Client Reference:

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

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



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

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

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m ³)	Gauge Dry Density (t/m ³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m ³) *	Oven Dry Density (t/m ³)	Calculated Air Voids (%) *	
9/01/2017	N55	Lot 55	Stabilised CLAY	186	189	>189	>189	>188	1.9690	1.5147	30.0	-1.64	300	21.6	2.7	1.62	5.1	
	N56	Lot 57	CLAY	>189	>189	UTP	UTP	>189	2.0064	1.6191	23.9	1.21	300	22.1	2.7	1.64	2.8	
16/01/2017	N57	Lot 22	Sandy CLAY	UTP	UTP	UTP	UTP	UTP	1.9170	1.5581	23.0	6.32	300	22.8	2.7	1.56	6.6	
	N58	Lot 23	Sandy CLAY	UTP	UTP	UTP	UTP	UTP	1.9438	1.5680	24.0	4.26	300	21.5	2.7	1.60	6.4	
	N59	Refer to site plan	Sandy CLAY	UTP	UTP	UTP	UTP	UTP	1.8617	1.4583	27.7	5.56	300	24.2	2.7	1.50	8.2	
	N60	Lot 15	CLAY	UTP	UTP	UTP	UTP	UTP	2.0161	1.6339	23.4	1.18	300	23.1	2.7	1.64	1.5	
25/01/2017	N61	Lot 55	CLAY	UTP	UTP	UTP	UTP	UTP	1.8953	1.4799	28.1	3.56	300	25.5	2.7	1.52	5.6	
	N62	Lot 25	CLAY	UTP	UTP	UTP	UTP	UTP	1.9342	1.5275	26.6	2.67	300	26.6	2.7	1.52	2.8	
	N63	Lot 26	CLAY	151	148	165	146	153	1.9638	1.5707	25.0	2.43	300	24.4	2.7	1.58	3.0	
	N64	Lot 53	CLAY	>189	>189	UTP	UTP	>189	2.0054	1.5871	26.4	-0.70	300	26.2	2.7	1.58	-0.5	
	N65	Lot 16	CLAY	>189	>189	UTP	UTP	>189	1.8715	1.4205	31.8	2.19	300	30.2	2.7	1.44	3.4	
23/02/2017	N66	Lot 35	CLAY	>202	161	>202	180	>186	1.9624	1.5396	27.5	3.23	300	25.4	2.7	1.56	2.3	
	N67	Lot 34	CLAY	>202	UTP	>202	>202	>202	1.9672	1.5840	24.2	5.63	300	24.8	2.7	1.58	2.6	
24/02/2017	N68	Lot 35	CLAY	>219	203	>219	197	>210	1.9279	1.5529	24.1	4.90	300	25.5	2.7	1.54	4.0	
	N69	Lot 36	CLAY	>219	188	156	172	>184	1.8431	1.4810	24.5	8.85	300	25.0	2.7	1.48	8.5	
27/02/2017	N70	Lot 35	CLAY	>219	>219	>219	>219	>219	1.9420	1.5675	23.9	4.41	300	27.0	2.7	1.52	2.1	
	N71	Lot 36	CLAY	>219	>219	>219	>219	>219	1.9601	1.5739	24.5	3.00	300	23.3	2.7	1.58	4.0	
26/04/2017	N72	Lot 51	CLAY	>185	158	161	156	>165	1.9305	1.5308	26.1	3.25	300	26.2	2.7	1.52	3.3	
	N73	Lot 49	CLAY	>185	143	>185	158	>168	1.8960	1.4924	27.0	4.27	300	28.1	2.7	1.48	3.6	

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Created By: TG Date: 10/01/2017
Checked By: TG Date: 22/08/2017
Authorised Signatory:  Date: 23/08/2017



**CATO BOLAM
CONSULTANTS**

SURVEYORS
PLANNERS
ENGINEERS

CATO BOLAM CONSULTANTS LTD
 19 Tanjong Arson
 PO Box 157
 Orren 0946

phone 09 427 907
 fax 09 426 733
 email catabolam@catabolam.co.nz

ORIGINAL SCALE 1 : 1500	ORIGINAL SIZE A3	REVISION NO R1
DATE 12/04/2015	CAD REFERENCE 34147 E101 Cor Fill	SHEET NO E104
DIRECTORY 2:34147 ACAD		JOB NO 34147

Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0326LAD Rev. 0
Project Name: 29 Dinning Road
Project Location: Riverhead
Project Number: AKL2016_0326
Test Date: 13/01/2017
Tested By: JMI / MP
Client: Cabra Developments Limited
Client Address:
Client Reference:

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

Testing Locations Selected By: CMW Field Staff



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

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

Test No.	1		2		3		4		5	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH20 Left		CH30 Right		CH40 Left		CH50 Right		CH60 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	12	20+	8	18	5	13	4	8	11	20+
100 - 200	6	13	6	13	5	10	4	8	5	10
200 - 300	6	13	5	10	5	10	4	8	5	10
300 - 400	5	10	5	10	5	10	3	6	3	6
400 - 500	4	8	4	8	4	8	2	4	4	8
500 - 600	5	10	3	6	5	10	2	4	3	6
600 - 700	2	4	6	13	4	8	2	4	4	8
700 - 800	4	8	7	15	5	10	4	8	3	6
800 - 900	3	6	4	8	5	10	4	8	2	4
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH70 Right		CH80 Left		CH90 Right		CH100 Left		CH110 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	8	18	15	20+	10	20+	14	20+
100 - 200	5	10	3	6	9	20	7	15	7	15
200 - 300	4	8	2	4	5	10	5	10	7	15
300 - 400	3	6	2	4	6	13	6	13	6	13
400 - 500	2	4	2	4	10	20+	7	15	5	10
500 - 600	2	4	2	4	9	20	5	10	4	8
600 - 700	2	4	2	4	5	10	5	10	6	13
700 - 800	2	4	2	4	3	6	11	20+	6	13
800 - 900	2	4	2	4	2	4	8	18	7	15
900 - 1000										

Prepared by: JMI
Checked by: TG
Authorised Signatory: Jack Myllett-Johnson
Date: 17/01/2017
Date: 5/04/2017
Date: 5/4/2017

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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, and are relevant to fine grained cohesive soils only.

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

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0326LAD Rev. 0
Project Name: 29 Dinning Road
Project Location: Riverhead
Project Number: AKL2016_0326
Test Date: 13/01/2017
Tested By: JMJ / MP
Client: Cabra Developments Limited
Client Address:
Client Reference:

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

Testing Locations Selected By: CMW Field Staff



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

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

Test No.	11		12		13		14		15	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH120 Left		CH130 Right		CH140 Left		CH150 Right		CH160 Left	
Material & Layer:	Clay / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	17	20+	14	20+	5	10	15	20+	10	20+
100 - 200	14	20+	8	18	6	13	5	10	3	6
200 - 300	10	20+	6	13	3	6	3	6	2	4
300 - 400	6	13	4	8	3	6	2	4	3	6
400 - 500	6	13	4	8	2	4	3	6	2	4
500 - 600	4	8	2	4	3	6	3	6	3	6
600 - 700	4	8	2	4	2	4	2	4	2	4
700 - 800	4	8	2	4	2	4	3	6	2	4
800 - 900	4	8	2	4	2	4	2	4	2	4
900 - 1000										
Test No.	16		17		18		19		20	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH170 Right		CH180 Left		CH190 Right		CH200 Left		CH210 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	3	6	8	18	9	20	15	20+
100 - 200	1	2	1	2	3	6	5	10	6	13
200 - 300	1	2	1	2	2	4	4	8	4	8
300 - 400	2	4	2	4	1	2	4	8	2	4
400 - 500	1	2	2	4	2	4	3	6	3	6
500 - 600	2	4	2	4	2	4	4	8	2	4
600 - 700	1	2	2	4	1	2	1	2	2	4
700 - 800	1	2	2	4	2	4	2	4	2	4
800 - 900	2	4	2	4	2	4	2	4	2	4
900 - 1000										

Prepared by: JMJ Date: 17/01/2017
Checked by: TG Date: 5/04/2017
Authorised Signatory: *John Myer-Johnson* Date: 5/4/2017

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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, and are relevant to fine grained cohesive soils only.

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAD Rev. 0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632
Project Name:	29 Dinning Road	
Project Location:	Riverhead	
Project Number:	AKL2016_0326	
Test Date:	13/01/2017	
Tested By:	JMJ / MP	Testing Locations Selected By: CMW Field Staff
Client:	Cabra Developments Limited	 Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation
Client Address:		
Client Reference:		

Test No.	21		22		23		24		25	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH220 Left		CH230 Right		CH240 Left		CH250 Right		CH260 Left	
Material & Layer:	Clay / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	8	18	6	13	6	13	3	6	2	4
100 - 200	5	10	4	8	4	8	5	10	4	8
200 - 300	5	10	4	8	2	4	1	2	7	15
300 - 400	4	8	3	6	1	2	1	2	2	4
400 - 500	4	8	3	6	1	2	1	2	1	2
500 - 600	3	6	3	6	2	4	1	2	2	4
600 - 700	4	8	4	8	1	2	1	2	2	4
700 - 800	4	8	3	6	1	2	1	2	2	4
800 - 900	4	8	2	4	2	4	2	4	2	4
900 - 1000										

Test No.	26		27		28		29		30	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH270 Right		CH280 Left		CH290 Right		CH300 Left		CH310 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	13	20+	6	13	4	8		
100 - 200	5	10	7	15	4	8	2	4		
200 - 300	4	8	5	10	4	8	3	6		
300 - 400	3	6	4	8	4	8	7	15		
400 - 500	2	4	3	6	4	8	6	13		
500 - 600	1	2	2	4	3	6	2	4		
600 - 700	2	4	2	4	3	6	2	4		
700 - 800	2	4	2	4	2	4	2	4		
800 - 900	2	4	2	4	2	4	2	4		
900 - 1000										

Prepared by: **JMJ** Date: **17/01/2017**
 Checked by: **TG** Date: **5/04/2017**
 Authorised Signatory: *Jack Myerett-Johnson* Date: **5/4/2017**

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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, and are relevant to fine grained cohesive soils only.

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAD Rev. 0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632
Project Name:	29 Dinning Road	
Project Location:	Riverhead	
Project Number:	AKL2016_0326	
Test Date:	13/01/2017	
Tested By:	JMJ / MP	Testing Locations Selected By: CMW Field Staff
Client:	Cabra Developments Limited	 Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation
Client Address:		
Client Reference:		

Test No.	31			32								
Test Location	Road 2			Road 2								
Chainage & Offset	CH320 Left			CH330 Right								
Material & Layer:	Clay / Subgrade			CLAY / Subgrade								
Depth (mm)	Blow Count	Equiv CBR*		Blow Count	Equiv CBR*		Blow Count	Equiv CBR*		Blow Count	Equiv CBR*	
0 - 100	6	13		4	8							
100 - 200	3	6		1	2							
200 - 300	3	6		1	2							
300 - 400	3	6		9	20							
400 - 500	2	4		9	20							
500 - 600	2	4		6	13							
600 - 700	2	4		4	8							
700 - 800	1	2		2	4							
800 - 900	2	4		2	4							
900 - 1000												
Test No.												
Test Location												
Chainage & Offset												
Material & Layer:												
Depth	Blow Count	Equiv CBR*		Blow Count	Equiv CBR*		Blow Count	Equiv CBR*		Blow Count	Equiv CBR*	
0 - 100												
100 - 200												
200 - 300												
300 - 400												
400 - 500												
500 - 600												
600 - 700												
700 - 800												
800 - 900												
900 - 1000												

Prepared by:	JMJ	Date:	17/01/2017	This report should only be reproduced in full *Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.
Checked by:	TG	Date:	5/04/2017	
Authorised Signatory:	<i>Jack Myllett-Johnson</i>	Date:	5/4/2017	



REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED		
DESIGNED	GW	08/04/16
DRAWN	GW	08/04/16
CHECKED		
APPROVED		

CLIENT
CABRA DEVELOPMENTS LTD 29 DINNING ROAD RIVERHEAD

DRAWING TITLE
ROAD LAYOUT

PO Box 157 Crews 0946		fax 09-426 7331 email crotech@rotabofm.co.nz
ORIGINAL SCALE 1:1500	ORIGINAL SIZE A3	REVISION NO
DATE 08/04/2016	CAD REFERENCE 34147 E200 Roading	SHEET NO E200
DIRECTORY Z:\34147\ACAD		JOB NO 34147



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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAE Rev.0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632	
Project Name:	29 Dinning Road	Testing Locations Selected By: CMW Field Staff  Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation	
Project Location:	Riverhead		
Project Number:	AKL2016_0326		
Test Date:	16/01/2017		
Tested By:	JMJ		
Client:	Cabris Developments Limited		
Client Address:			
Client Reference:			

Test No.	1		2		3		4		5	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH10 Left		CH20 Right		CH30 Left		CH40 Right		CH50 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	9	20	7	15	11	20+	8	18	6	13
100 - 200	10	20+	5	10	7	15	7	15	6	13
200 - 300	7	15	3	6	4	8	4	8	3	6
300 - 400	6	13	4	8	6	13	3	6	3	6
400 - 500	6	13	4	8	3	6	2	4	4	8
500 - 600	5	10	3	6	5	10	3	6	3	6
600 - 700	5	10	4	8	2	4	3	6	4	8
700 - 800	6	13	2	4	2	4	2	4	3	6
800 - 900	6	13	2	4	2	4	3	6	4	8
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH60 Right		CH70 Left		CH80 Right		CH90 Left		CH100 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	5	10	11	20+	1	2	4	8	3	6
100 - 200	4	8	7	15	2	4	4	8	6	13
200 - 300	2	4	6	13	3	6	4	8	4	8
300 - 400	3	6	5	10	3	6	4	8	2	4
400 - 500	2	4	2	4	3	6	4	8	2	4
500 - 600	3	6	4	8	3	6	4	8	3	6
600 - 700	5	10	2	4	4	8	3	6	2	4
700 - 800	4	8	2	4	3	6	2	4	3	6
800 - 900	4	8	2	4	3	6	3	6	4	8
900 - 1000										

Prepared by: JMJ Date: 17/01/2017
 Checked by: TG Date: 5/04/2017
 Authorised Signatory: *Jack Myllett-Johnson* Date: 5/4/2017

This report should only be reproduced in full
 *Equivalent CBR values calculated using AUSTRROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.

		LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report NZS 4402: Test 6.5.2: 1988									
Report No:	AKL2016_0326LAE Rev. 0					Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632					
Project Name:	29 Dinning Road					Testing Locations Selected By: CMW Field Staff  Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation					
Project Location:	Riverhead										
Project Number:	AKL2016_0326										
Test Date:	16/01/2017										
Tested By:	JMJ										
Client:	Cabra Developments Limited										
Client Address:											
Client Reference:											
Test No.	11		12		13		14		15		
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1		
Chainage & Offset	CH110 Left		CH120 Right		CH130 Left		CH140 Right		CH150 Left		
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	
0 - 100	10	20+	0	0	7	15	4	8	1	2	
100 - 200	9	20	0	0	5	10	4	8	1	2	
200 - 300	5	10	1	2	6	13	5	10	1	2	
300 - 400	3	6	0	0	6	13	4	8	0	0	
400 - 500	2	4	3	6	5	10	3	6	1	2	
500 - 600	2	4	4	8	4	8	1	2	0	0	
600 - 700	2	4	3	6	3	6	1	2	1	2	
700 - 800	3	6	2	4	4	8	0	0	1	2	
800 - 900	2	4	2	4	4	8	1	2	2	4	
900 - 1000											
Test No.	16		17		18		19		20		
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1		
Chainage & Offset	CH160 Right		CH170 Left		CH180 Right		CH190 Left		CH200 Right		
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	
0 - 100	7	15	7	15	5	10	12	20+	10	20+	
100 - 200	3	6	4	8	8	18	10+	20+	6	13	
200 - 300	2	4	2	4	4	8			17+	20+	
300 - 400	2	4	3	6	4	8					
400 - 500	2	4	3	6	1	2					
500 - 600	3	6	4	8	1	2					
600 - 700	2	4	3	6	1	2					
700 - 800	2	4	3	6	1	2					
800 - 900	2	4	3	6	2	4					
900 - 1000											
Prepared by: JMJ Checked by: TG Authorised Signatory: 						Date: 17/01/2017 Date: 5/04/2017 Date: 5/4/2017					
						This report should only be reproduced in full * Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.					
						Page 2 of 3					



CMW Geosciences



REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED		
DESIGNED	GW	08/04/16
DRAWN	GW	08/04/16
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE

ROAD LAYOUT

PO Box 157 Dunedin 9046		phone 07-426 7331 fax 07-426 7331 email cotebolen@cotebolen.co.nz	
ORIGINAL SCALE 1:1500		ORIGINAL SIZE A3	
DATE 08/04/2016		REVISION NO	
CAD REFERENCE 34147 E200 Roading		SHEET NO E200	
DIRECTORY 23/34147/ACAD		JOB NO 34147	

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAF Rev. 0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632
Project Name:	29 Dinning Road	
Project Location:	Riverhead	
Project Number:	AKL2016_0326	
Test Date:	16/01/2017	
Tested By:	JMJ	Testing Locations Selected By: CMW Field Staff
Client:	Cabra Developments Limited	 Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation
Client Address:		
Client Reference:		

Test No.	1		2		3		4		5	
Test Location	Dinning Road		Dinning Road		Dinning Road		Dinning Road		Dinning Road	
Chainage & Offset	CH260 Left		CH270 Right		CH280 Left		CH290 Right		CH300 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	9	20	8	18	9	20	10	20+
100 - 200	3	6	5	10	6	13	8	18	10+	20+
200 - 300	3	6	4	8	2	4	8	18		
300 - 400	3	6	4	8	2	4	9	20		
400 - 500	3	6	4	8	4	8	6	13		
500 - 600	4	8	2	4	7	15	6	13		
600 - 700	4	8	3	6	5	10	4	8		
700 - 800	4	8	3	6	5	10	2	4		
800 - 900	4	8	4	8	6	13	2	4		
900 - 1000										

Test No.	6		7		8		9		10	
Test Location	Dinning Road		Dinning Road		Dinning Road		Dinning Road		Dinning Road	
Chainage & Offset	CH310 Right		CH320 Left		CH330 Right		CH340 Left		CH350 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	7	15	7	15	10	20+	10+	20+	12	20+
100 - 200	4	8	5	10	6	13			8	18
200 - 300	3	6	4	8	5	10			4	8
300 - 400	3	6	3	6	4	8			3	6
400 - 500	4	8	4	8	5	10			4	8
500 - 600	4	8	4	8	4	8			3	6
600 - 700	4	8	2	4	3	6			2	4
700 - 800	4	8	3	6	2	4			2	4
800 - 900	4	8	2	4	1	2			2	4
900 - 1000										

Prepared by: JMJ Checked by: TG Authorised Signatory: <i>Jack Myrland-Johnson</i>	Date: 17/01/2017 Date: 5/04/2017 Date: 5/4/2017	This report should only be reproduced in full *Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only. Page 1 of 3
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LF14 Rev.7 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: Test 6.5.2: 1988

Report No:	AKI2016_0326LAF Rev. 0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632	
Project Name:	29 Dinning Road		
Project Location:	Riverhead		
Project Number:	AKI2016_0326		
Test Date:	16/01/2017	Testing Locations Selected By: CMW Field Staff	
Tested By:	JMJ		
Client:	Cabra Developments Limited	 Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation	
Client Address:			
Client Reference:			

Test No.	11		12		13		14		15	
Test Location	Dinning Road		Dinning Road		Dinning Road		Dinning Road		Dinning Road	
Chainage & Offset	CH360 Left		CH370 Right		CH380 Left		CH390 Right		CH400 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	9	20	7	15	6	13	14	20+
100 - 200	11	20+	6	13	7	15	7	15	6	4
200 - 300	11	20+	3	6	9	20	4	8	2	4
300 - 400	8	18	2	4	7	15	2	4	2	4
400 - 500	7	15	2	4	5	10	3	6	2	4
500 - 600	4	8	5	10	3	6	2	4	2	4
600 - 700	5	10	5	10	3	6	2	4	2	4
700 - 800	6	13	5	10	2	4	2	4	2	4
800 - 900	6	13	4	8	2	4	2	4	2	4
900 - 1000										
Test No.	16		17							
Test Location	Dinning Road		Dinning Road							
Chainage & Offset	CH410 Right		CH420 Left							
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade							
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	7	15	4	8						
100 - 200	9	20	7	15						
200 - 300	4	8	6	13						
300 - 400	4	8	3	6						
400 - 500	3	6	2	4						
500 - 600	3	6	3	6						
600 - 700	2	4	2	4						
700 - 800	2	4	2	4						
800 - 900	2	4	2	4						
900 - 1000										

Prepared by: JMJ Date: 17/01/2017 Checked by: TG Date: 5/04/2017 Authorised Signatory: <i>Jack Myer-Johnson</i> Date: 5/4/2017				This report should only be reproduced in full *Equivalent CBR values calculated using AUSTROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only. Page 2 of 3
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REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED		
DESIGNED	GW	08/04/16
DRAWN	GW	08/04/16
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE

ROAD LAYOUT

PO Box 157 Orewa 0946		fax 09-426 7331 email catabolam@catabolam.co.nz
ORIGINAL SCALE 1:1500	ORIGINAL SIZE A3	REVISION NO
DATE 08/04/2016	CAD REFERENCE 34147 E200 Roading	SHEET NO E200
DIRECTORY Z:\34147\ACAD		JOB NO 34147

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAG Rev.0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632
Project Name:	29 Dinning Road	Testing Locations Selected By: CMW Field Staff  Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation
Project Location:	Riverhead	
Project Number:	AKL2016_0326	
Test Date:	3/02/2017	
Tested By:	AP / JMI	
Client:	Cabra Developments Limited	
Client Address:		
Client Reference:		

Test No.	1		2		3		4		5	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	CH10 Left		CH20 Right		CH30 Left		CH40 Right		CH50 Left	
Material & Layer:	CLAY		CLAY		CLAY		CLAY		CLAY	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	14	20+	6	13	7	15	10	20+	17	20+
100 - 200	7	15	5	10	5	10	5	10	6	13
200 - 300	6	13	3	6	4	8	3	6	5	10
300 - 400	3	6	3	6	3	6	3	6	3	6
400 - 500	2	4	3	6	2	4	3	6	3	6
500 - 600	2	4	3	6	3	6	2	4	2	4
600 - 700	2	4	2	4	1	2	2	4	3	6
700 - 800	2	4	3	6	2	4	2	4	3	6
800 - 900	4	8	2	4	2	4	2	4	2	4
900 - 1000	2	4	3	6	3	6	2	4	2	4
Test No.	6		7		8		9		10	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	CH60 Right		CH70 Left		CH80 Right		CH90 Left		CH100 Right	
Material & Layer:	CLAY		CLAY		CLAY		CLAY		CLAY	
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+	6	13	4	8	3	6	3	6
100 - 200	7	15	3	6	2	4	4	8	5	10
200 - 300	3	6	2	4	1	2	5	10	3	6
300 - 400	3	6	2	4	2	4	7	15	3	6
400 - 500	5	10	2	4	2	4	6	13	2	4
500 - 600	UTP	UTP	1	2	2	4	9	20	3	6
600 - 700			2	4	2	4	10	20+	5	10
700 - 800			2	4	2	4	11	20+	13+	20+
800 - 900			3	6	3	6	10	20+	UTP	UTP
900 - 1000			2	4	4	8	10	20+		

Prepared by: TG Date: 7/02/2017
 Checked by: CS Date: 7/02/2017
 Authorised Signatory:  Date: 7/2/2017

This report should only be reproduced in full
 *Equivalent CBR values calculated using AUSTRROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.
 Page 1 of 4

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

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0326LAG Rev.0
Project Name: 29 Dinning Road
Project Location: Riverhead
Project Number: AKL2016_0326
Test Date: 3/02/2017
Tested By: AP / JMJ
Client: Cabra Developments Limited
Client Address:
Client Reference:

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

Testing Locations Selected By: CMW Field Staff



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

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

Test No.	11		12		13		14		15	
Test Location	Road 3		Road 3		Road 1		Road 1		Road 1	
Chainage & Offset	CH110 Left		CH120 Right		CH210 Left		CH220 Right		CH230 Left	
Material & Layer:	CLAY		CLAY		CLAY		CLAY		CLAY	
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	5	10	5	10	9	20	7	15
100 - 200	2	4	3	6	5	10	7	15	6	13
200 - 300	3	6	5	10	2	4	6	13	3	6
300 - 400	3	6	4	8	1	2	3	6	2	4
400 - 500	4	8	3	6	1	2	2	4	2	4
500 - 600	6	13	4	8	2	4	2	4	1	2
600 - 700	7	15	4	8	2	4	2	4	2	4
700 - 800	6	13	4	8	2	4	2	4	1	2
800 - 900	10	20+	5	10	2	4	1	2	2	4
900 - 1000	10	20+	5	10	2	4	2	4	2	4

Test No.	16		17		18		19		20	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH240 Right		CH250 Left		CH260 Right		CH270 Left		CH280 Right	
Material & Layer:	CLAY		CLAY		CLAY		CLAY		CLAY	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	7	15	10	20+	11	20+	6	13
100 - 200	11	20+	7	15	11	20+	7	15	7	15
200 - 300	7	15	4	8	8	18	8	18	5	10
300 - 400	8	18	5	10	4	8	5	10	4	8
400 - 500	3	6	2	4	4	8	3	6	5	10
500 - 600	3	6	2	4	4	8	2	4	3	6
600 - 700	2	4	2	4	4	8	3	6	2	4
700 - 800	2	4	2	4	2	4	2	4	2	4
800 - 900	2	4	2	4	2	4	2	4	2	4
900 - 1000	2	4	2	4	2	4	2	4	2	4

Prepared by: TG
Checked by: CS
Authorised Signatory: 

Date: 7/02/2017
Date: 7/02/2017
Date: 7/2/2017

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

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

NZS 4402: Test 6.5.2: 1988

Report No: AKL2016_0326LAG Rev.0
Project Name: 29 Dinning Road
Project Location: Riverhead
Project Number: AKL2016_0326
Test Date: 3/02/2017
Tested By: AP / JMJ
Client: Cabra Developments Limited
Client Address:
Client Reference:

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

Testing Locations Selected By: CMW Field Staff



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

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

Test No.	21		22		23		24		25	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH290 Left		CH300 Right		CH310 Left		CH320 Right		CH330 Left	
Material & Layer:	CLAY		CLAY		CLAY		CLAY		CLAY	
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	6	13	2	4	3	6
100 - 200	7	15	7	15	5	10	6	13	2	4
200 - 300	6	13	5	10	6	13	5	10	1	2
300 - 400	3	6	8	18	4	8	5	10	1	2
400 - 500	3	6	7	15	4	8	2	4	2	4
500 - 600	2	4	3	6	3	6	3	6	2	4
600 - 700	1	2	3	6	2	4	3	6	2	4
700 - 800	1	2	3	6	3	6	3	6	1	2
800 - 900	2	4	2	4	3	6	2	4	2	4
900 - 1000	2	4	2	4	2	4	2	4	2	4
Test No.	26		27							
Test Location	Road 1		Road 1							
Chainage & Offset	CH340 Right		CH360 Right							
Material & Layer:	CLAY		CLAY							
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	4	8						
100 - 200	2	4	4	8						
200 - 300	3	6	4	8						
300 - 400	2	4	2	4						
400 - 500	2	4	3	6						
500 - 600	2	4	2	4						
600 - 700	2	4	2	4						
700 - 800	2	4	2	4						
800 - 900	1	2	2	4						
900 - 1000	2	4	2	4						

This report should only be reproduced in full

Prepared by: TG

Date: 7/02/2017

Checked by: CS

Date: 7/02/2017

Authorised Signatory: 

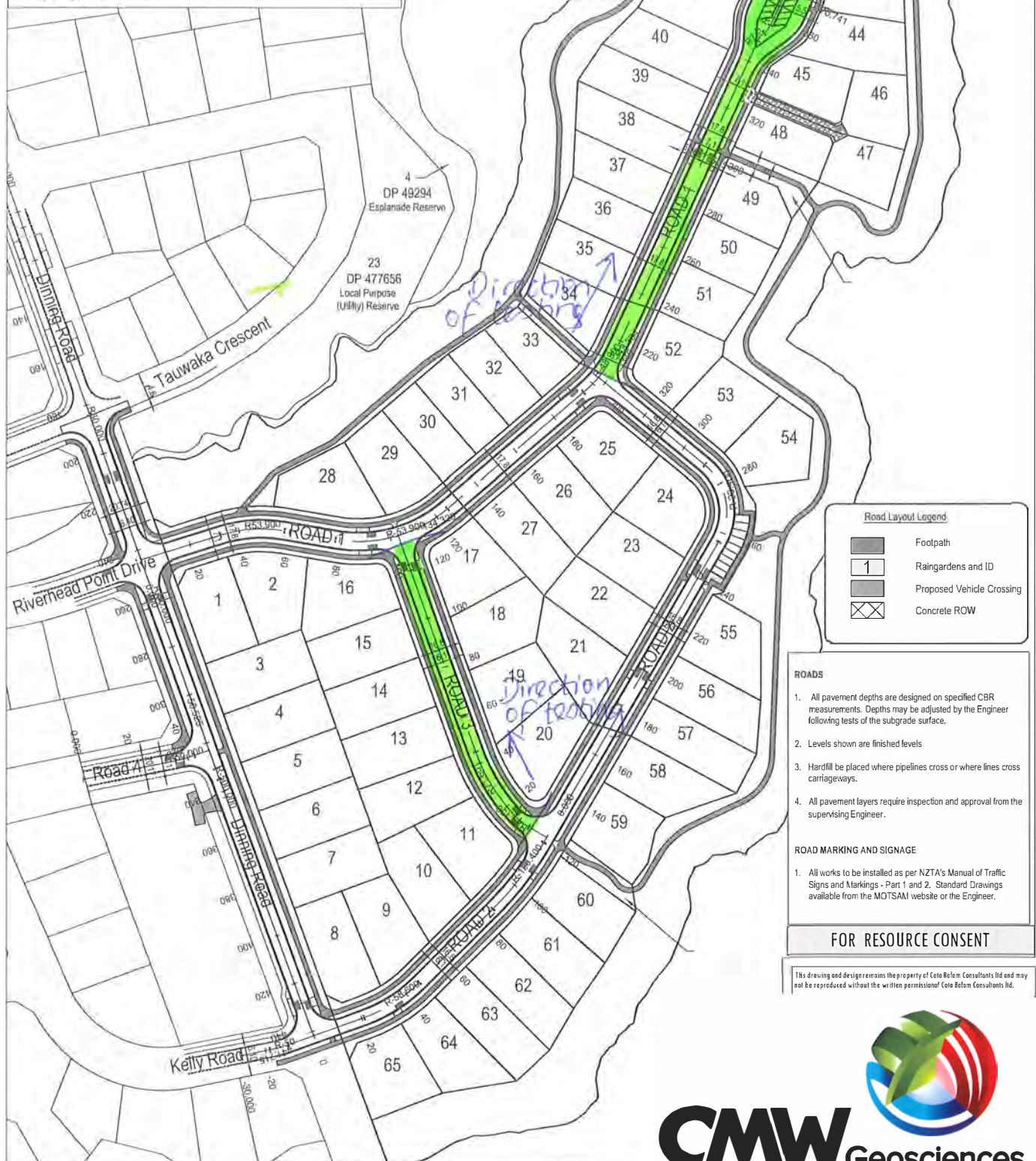
Date: 7/2/2017

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

NOTES

GENERAL

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



Road Layout Legend

- Footpath
- Raingardens and ID
- Proposed Vehicle Crossing
- Concrete ROW

ROADS

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

ROAD MARKING AND SIGNAGE

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

FOR RESOURCE CONSENT

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CMW Geosciences

REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED		
DESIGNED	GW	08/04/16
DRAWN	GW	08/04/16
CHECKED		
APPROVED		

CLIENT
CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE
ROAD LAYOUT

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
DATE	CAD REFERENCE	SHEET NO
08/04/2016	34147 E200 Roading	E200
DIRECTORY		JOB NO
24341147ACAD		34147

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

NZS 4402: Test 6.5.2: 1988

Report No:	ARL2016_0326LAH Rev.0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632
Project Name:	29 Dimming Road	
Project Location:	Riverhead	
Project Number:	ARL2016_0326	
Test Date:	15/03/2017	
Tested By:	KP	Testing Locations Selected By: CMW Field Staff
Client:	Cabra Developments Limited	 Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation
Client Address:		
Client Reference:		

Test No.	1		2		3		4		5	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH240 Right		CH245 Left		CH250 Right		CH255 Left		CH260 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	4	8	6	13	4	8	2	4
100 - 200	5	10	3	6	5	10	2	4	2	4
200 - 300	11	20+	2	4	4	8	2	4	3	6
300 - 400	14	20+	3	6	2	4	2	4	3	6
400 - 500	8	18	2	4	2	4	2	4	2	4
500 - 600	8	18	4	8	4	8	2	4	3	6
600 - 700	8	18	6	13	2	4	3	6	3	6
700 - 800	8	18	4	8	3	6	3	6	3	6
800 - 900	8	18	4	8	3	6	3	6	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	CH265 Left		CH270 Right		CH275 Left		CH280 Right		CH320 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	2	4	5	10	4	8	7	15	6	13
100 - 200	3	6	3	6	2	4	3	6	4	8
200 - 300	5	10	2	4	3	6	4	8	3	6
300 - 400	3	6	4	8	3	6	4	8	2	4
400 - 500	2	4	3	6	3	6	3	6	4	8
500 - 600	3	6	3	6	3	6	2	4	2	4
600 - 700	4	8	4	8	2	4	2	4	3	6
700 - 800	2	4	2	4	2	4	2	4	2	4
800 - 900	2	4	2	4	2	4	2	4	4	8
900 - 1000										

Prepared by: TG Date: 16/03/2017
 Checked by: CS Date: 16/03/2017
 Authorised Signatory:  Date: 16/3/2017

This report should only be reproduced in full
 *Equivalent CBR values calculated using AUSTRROADS (2010) Guide to Pavement Technology Part 2, Figure 5.3, For Fine Grained Cohesive Soils, and are relevant to fine grained cohesive soils only.

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAH Rev.0	Auckland Laboratory CMW Geosciences (NZ) Limited Building C, 9 Piermark Drive, Rosedale, NZ 0632 PO Box 300205, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632	
Project Name:	29 Dinning Road		
Project Location:	Riverhead		
Project Number:	AKL2016_0326		
Test Date:	15/03/2017		
Tested By:	KP	Testing Locations Selected By: CMW Field Staff	
Client:	Cabra Developments Limited	 Tests indicated as not accredited are outside the scope of the laboratory's accreditation Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation	
Client Address:			
Client Reference:			

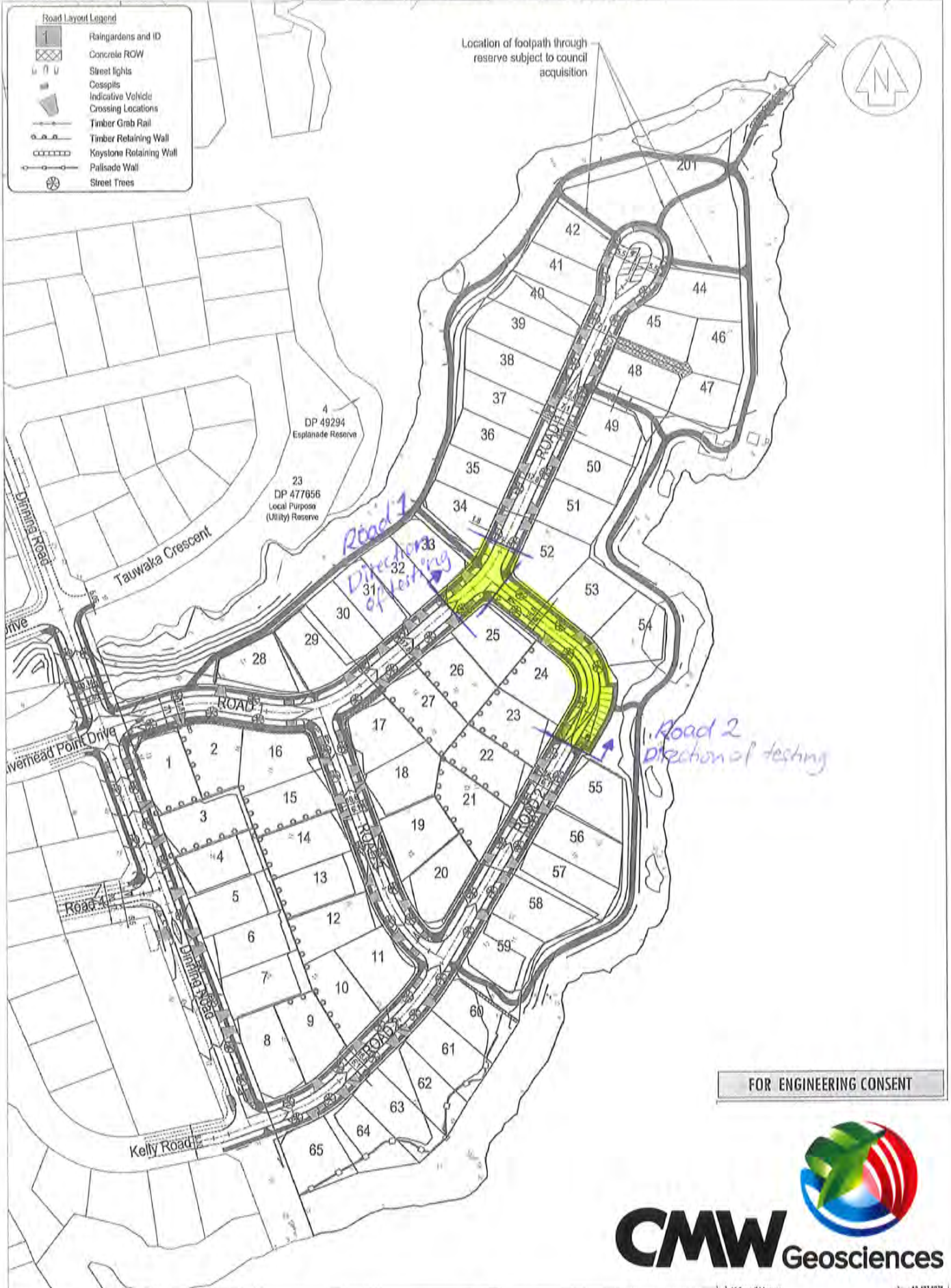
Test No.	11		12		13		14		15	
Test Location	Road 2		Road 2		Road 1		Road 1		Road 1	
Chainage & Offset	CH330 Right		CH340 Left		CH180 Right		CH185 Left		CH190 Right	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	6	13	6	13	5	10	4	8
100 - 200	4	8	4	8	5	10	7	15	4	8
200 - 300	2	4	2	4	3	6	4	8	4	8
300 - 400	2	4	3	6	4	8	7	15	4	8
400 - 500	2	4	3	6	3	6	4	8	2	4
500 - 600	2	4	2	4	4	8	3	6	2	4
600 - 700	2	4	2	4	4	8	3	6	2	4
700 - 800	4	8	2	4	4	8	3	6	2	4
800 - 900	4	8	2	4	4	8	2	4	2	4
900 - 1000										

Test No.	16		17		18		19		20	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH195 Left		CH200 Right		CH205 Left		CH210 Right		CH220 Left	
Material & Layer:	CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade		CLAY / Subgrade	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	5	10	4	8	6	13	4	8
100 - 200	8	18	3	6	3	6	6	13	4	8
200 - 300	4	8	2	4	2	4	5	10	3	6
300 - 400	5	10	3	6	4	8	3	6	2	4
400 - 500	5	10	2	4	2	4	2	4	3	6
500 - 600	5	10	2	4	2	4	3	6	2	4
600 - 700	5	10	3	6	2	4	2	4	3	6
700 - 800	5	10	3	6	2	4	2	4	2	4
800 - 900	4	8	4	8	2	4	2	4	2	4
900 - 1000										

Prepared by: TG
 Checked by: CS
 Authorised Signatory: 

Date: 16/03/2017
 Date: 16/03/2017
 Date: 16/3/2017

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 Page 2 of 3



RAI for Engineering Approval	GW	27/09/16
R5 Accessible car parks added, bdy amended	GW	17/09/16
R4 Keystone wall amended, Palisade added	GW	18/07/16
REVISION (DESCRIPTIONS)	NAME	DATE
SURVEYED		
DESIGNED	GW	08/04/16
DRAWN	GW	08/04/16
CHECKED		
APPROVED		

CLIENT

CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE

ROAD LAYOUT

19 Tenenick Avenue
PO Box 157
Greene 0166

phone 01 437 8879
fax 01 434 7331
email cabra@cmwgeosciences.co.nz

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	R6
DATE	CAD REFERENCE	SHEET NO
08/04/2016	34147 E200 Reading	E200
DIRECTORY		JOB NO
6134147/LACAD		34147

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