17 October 2017

DEACON POINT SUBDIVISION STAGES 1 AND 2, RIVERHEAD

GEOTECHNICAL COMPLETION REPORT

CABRA PROPERTIES LIMITED

Ref: AKL2016_0326AF Rev: 0

Table of Contents

1. INTRODUCTION 1
2. PROJECT BACKGROUND 1
3. DESCRIPTION OF EARTHWORKS 1
4. GEOTECHNICAL QUALITY CONTROL 2
4.1. Site Observations 2
4.2. Compaction Control 3
5. EVALUATION OF COMPLETED EARTHWORKS 3
5.1. Natural Hazards 3
5.2. Land Stability and Erosion Control 3
5.3. Retaining Walls 4
5.4. Palisade Walls 4
5.5. Fill Induced Settlement 4
5.6. Service Line Trenches 4
5.7. Subsoil Drains 4
5.8. Road Subgrades 5
5.9. Design of Shallow Foundations 5
5.9.1. Bearing Capacity 5
5.9.2. Foundation Settlements 5
5.9.3. Soil Expansiveness Classification 5
5.10. Topsoil Depths 6
6. CLOSURE 6

Appendices

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

Appendix B – Drawings

Appendix C – Laboratory Test Data

Appendix D – Field Test Data

Appendix E – Producer Statements

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 the earthworks to form Stages 1 and 2 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 these stages of the subdivision include timber pole retaining walls, a palisade wall (in-ground wall) 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 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:

- 48 new residential lots numbered 1 to 34 and 52 to 65;
- 3 new roads named Riverhead Point Drive (Road 1), William Blake Way (Road 2) and Drovers Way (Road 3) respectively and an extension to existing Dinning Road.

Stages 1 and 2 of the Deacon Point Subdivision are located off Dinning Road in Riverhead. As can be seen from the as-built plans, 44 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 7.5 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 Palisade Wall Design Report referenced AKL2016_0326AC Rev 0, dated 01 July 2016.
- CMW Geotechnical Retaining Wall Design Report referenced AKL2016_0326AD Rev 1, dated 11 July 2016.
- CMW Design Parameters for Proposed Boardwalk referenced AKL2016_0326AE Rev 0, dated 27 April 2017.

3. DESCRIPTION OF EARTHWORKS

Heritage protection works began in October 2016 following the identification of archaeological remains in the southern portion of the site covering lots 8 and 9 intersecting road 2.

Site stripping had commenced in early October 2016 starting with topsoil stripping of the temporary silt pond at the northern end of the site and the significant excavation of large pines at the western site boundary.

Cut and fill began in October 2016 which included conditioning of natural borrow sources and stockpiled fill from the bulk earthworks making up the remaining portions of the site. These earthworks continued between October 2016 and May 2017, with the majority of the earthworks formed to finished levels by January 2017.

DCP testing of the prepared subgrades for roads not already sealed were undertaken by CMW to provide confirmation of pavement strength to Cabra Properties Limited. Road stabilisation works and the placement of base course metal commenced in February 2017 and continued to June 2017.

Civil construction works continued throughout early 2017 which included construction of kerb and channel, topsoiling works, footpaths, combined services trenches and lot connections. Retaining wall construction including timber post and segmental block gravity walls were undertaken between early January 2017 and June 2017 with final works for these walls including fencing and drainage outlet works undertaken in August and September 2017. Final asphalt placement on all unsealed roads was completed by early August for these stages.

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

- 2 X D6 Bulldozers and Scoops
- 2 X Articulated Dump Trucks
- 1 X D6 Bulldozer
- 1 X Tractor and Discs
- 1 X 4T Front End Loader
- 2 X 5T Excavators
- 2 X 20T Excavators
- 1 X 13T Excavators
- 2 X Road Dump Trucks
- 1 X Water Cart
- 1 X 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;
- Installation of subsoil drains including counterfort drains and gully/underfill drains but excluding road under-channel drains;
- Backfilling of subsoil drains;
- Subsoil drain connections to outlets;
- Retaining wall pile excavations;
- Construction of cantilever pole retaining walls including ground conditions, pile size, spacing and depth;
- Construction of segmental block retaining walls including ground conditions and drainage placement;
- Construction of palisade wall including ground conditions, pile size, spacing and depth; 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%.

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

- **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.
- **Specific Investigation and Design Zone** – intended to prevent inappropriate building development on areas of land within residential lots which do not have suitable stability factors of safety in accordance with Auckland Council Code of Practice or which are immediately adjacent to the palisade (in-ground) wall that provides appropriate factors of safety to the building platform areas.

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

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. Retaining Walls

Cantilever pole and segmental block retaining walls have been constructed in the locations shown on the appended Final Contours and Retaining Walls As-built Plans. These walls reach a maximum height of approximately 1.7 metres and were designed by this consultancy 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 1 to 7, 9, 10, 12 to 29 and 60 inclusive.

5.4. Palisade Walls

A palisade (in-ground) wall was constructed beneath lots 60 to 65 inclusive to protect building platform areas from potential regression of historic instability. This wall was constructed from 300mm H5 treated timber poles fully embedded into existing ground in 450mm diameter pile holes at 1.5m pile spacing (centre to centre). This wall was designed by the consultancy, presented in technical memorandum referenced AKL2016_0326AC Rev.0 dated 1 July 2016. The extents of this wall are depicted on the Final Contours and Retaining Walls As-built Plans. This consultancy observed construction of this palisade wall. A copy of the Producer Statement – Construction Review is provided in Appendix E.

5.5. Fill Induced Settlement

Based on our experience with fills within the geological setting, the works undertaken to prepare the gully areas for filling, including undercuts to rock and underfill drainage measures together with the elapsed time since the majority of the deeper fills were placed, we consider that the remaining post-construction settlements will be within code limits.

5.6. Service Line Trenches

As part of the civil works, stormwater services were trenched throughout the development as shown on the appended Stormwater Reticulation 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. Lots 1, 3, 4, 6 to 9, 17, 18, 20, 22, 23, 25, 26, 28 to 33, 52 and 54 to 64 inclusive are known to have service trenches within the lots as shown on the appended Stormwater Reticulation As-built Plans. The resulting restrictions are presented in the Suitability Statement below.

5.7. Subsoil Drains

The appended Cut Fill As-built Plans shows the positions of subsoils drains which were constructed in the natural ground during the earthworks operations. The drains were installed to help control groundwater levels and are extended to formed outlets within the coastal margins of the subdivision. The ongoing operation of these drains is important to the overall stability conditions of the site.

Typical depths for these drains are depicted on the as-built plans and are generally over 2.5m below finished ground levels. Accordingly, they are predominantly beyond the depths of anticipated foundations.

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

5.8. Road Subgrades

Penetration resistance testing was carried out on the road subgrades during construction and the results of this testing were forwarded to Cato Bolam 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. These undercut areas are depicted on the appended Road As-built Plans. 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.

5.9. Design of Shallow Foundations

5.9.1. Bearing Capacity

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

At current subgrade levels all 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.

5.9.2. Foundation Settlements

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

5.9.3. Soil Expansiveness Classification

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

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

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

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

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

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

5.10. 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 these stages of the development.

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

6. CLOSURE

The appended Statement of Professional Opinion is provided to the Auckland Council and Cabra 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, Auckland, hereby confirm that:

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on Stages 1 and 2 of the Deacon Point Development.

2. The extent of preliminary investigations carried out to date are described in the Geotechnical Investigation Report referenced AKL2016_0326AB Rev.2, dated 13 May 2016 prepared by this consultancy. 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 Specific Design Zone Restriction 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 on Lots 1, 3 to 7, 10 to 12 and 55 to 59 inclusive as depicted on the Specific Design Restriction Zone plans.

   No building construction <u>and</u> 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 Investigation and Design Zone** areas defined on Lots 60 to 65 inclusive have been applied to the seaward side of the palisade (in-ground) wall and within 2 metres of this wall. The wall has been designed to protect the upslope areas from potential long term regression of instability in the coastal margin.

   No building construction and no earthworks may take place in these areas unless <u>further specific investigations and design of all future earthworks, geotechnical remediation and foundation design</u> is endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report, the previous investigation reports and the existing ground remediation works (palisade wall) constructed within these lots.

The endorsement will need to consider the implications of the proposals on the global stability conditions, soil creep effects onto building areas and assessment of vacation potential downslope of existing or proposed remediation works, impact on the existing palisade wall, control of surface water, construction sequencing, timing and temporary support, specifications and requirements for remedial works and for earthworks, construction and foundation works and if necessary document required inspection and certification of such works.

(d) **Specific Design Zone (Retaining)** have been applied on Lots 1 to 7, 9, 10, 12 to 29 and 60 inclusive for the protection of the function of the retaining walls. No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Retaining) areas** unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the stability implications of the earthworks and building proposals on the retaining walls.

(e) The function of the subsoil drains installed beneath Lots 1, 3, 8 to 11, 19 to 23, 59 and 60 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. Lots 1, 3, 4, 6 to 9, 17, 18, 20, 22, 23, 25, 26, 28 to 33, 52 and 54 to 64 are affected by these service lines.

(i) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 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.

For and on behalf of CMW Geosciences

Richard Knowles

Principal Geotechnical Engineer, CPEng

GCR Summary Table

Condition	Specific Design Zone (slope)	Specific Investigation and Design Zone	Specific Design Zone (retaining)	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	●	300
2			●		300	M		250
3	●		●	●	300	M	●	200
4	●		●		300	M	●	200
5	●		●		300	M		200
6	●		●		300	M	●	200
7	●		●		300	M	●	200
8				●	300	M	●	200
9			●	●	300	M	●	250
10	●		●	●	300	M		250
11	●			●	300	M		300
12	●		●		300	M		300
13			●		300	M		250
14			●		300	M		250
15			●		300	M		200
16			●		300	M		350
17			●		300	M	●	200
18			●		300	M	●	300
19			●	●	300	M		200
20			●	●	300	M	●	200

Condition	Specific Design Zone (slope)	Specific Investigation and Design Zone	Specific Design Zone (retaining)	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								
21			●	●	300	M		250
22			●	●	300	M	●	200
23			●	●	300	M	●	250
24			●		300	M		300
25			●		300	M	●	200
26			●		300	M	●	250
27			●		300	M		100
28			●		300	M	●	200
29			●		300	M	●	200
30					300	M	●	150
31					300	M	●	200
32					300	M	●	200
33					300	M	●	300
34					300	M		200
52					300	M	●	300
53					300	M		250
54					300	M	●	250
55	●				300	M	●	300
56	●				300	M	●	300
57	●				300	M	●	200
58	●				300	M	●	300

Condition	Specific Design Zone (slope)	Specific Investigation and Design Zone	Specific Design Zone (retaining)	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								
59	●		●	●	300	M	●	200
60		●	●	●	300	M	●	250
61		●			300	M	●	300
62		●			300	M	●	250
63		●			300	M	●	300
64		●			300	M	●	300
65		●			300	M	●	300

Appendix B

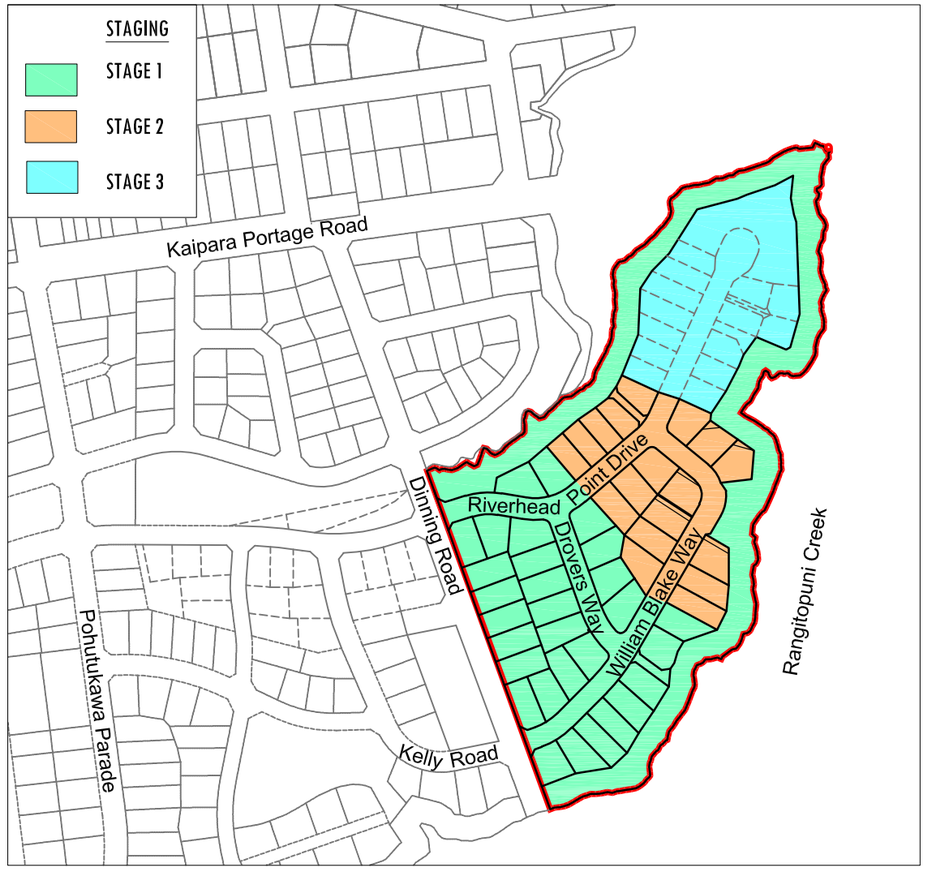
Drawings

Title	Reference No.	Date
Cover Sheet	34147 Sheet E000	10 September 2017
Final Contours and Retaining Walls As-Built Plans (6 Sheets)	34147 Sheets E600 to E605	10 September 2017
Cut Fill As-Built Plans (3 Sheets)	34147 Sheets E606 to E608	10 September 2017
Roading As-Built Plans (4 Sheets)	34147 Sheets E609 to E612	10 September 2017
Wastewater Reticulation As-Built Plans (5 Sheets)	34147 Sheets E613 to E617	10 September 2017
Stormwater Reticulation As-Built Plans (6 Sheets)	34147 Sheets E618 to E623	10 September 2017
Water Reticulation As-Built Plans (3 Sheets)	34147 Sheets E624 to E626	10 September 2017
Esplanade Planting As-Built Plans (3 Sheets)	34147 Sheets E627 to E629	10 September 2017
Retaining Wall Specific Design Zone Plans (3 Sheets)	34147 Sheets E631 to E633	10 September 2017
Specific Design Zone Restriction Plan	34147 Sheet E634	10 September 2017
Auckland Council Stormwater Pipe and Manhole Construction Clearance Requirements	SW22	30 September 2013

Cabra Developments Ltd
Decon Point
Stages 1 & 2
Dinning Road, Riverhead

AS BUILT PLAN SET - 34147 Stages 1 & 2

E000	COVER SHEET
E600	Final Contours & Retaining Walls - Sheet 1 of 6
E601	Final Contours & Retaining Walls - Sheet 2 of 6
E602	Final Contours & Retaining Walls - Sheet 3 of 6
E603	Final Contours & Retaining Walls - Sheet 4 of 6
E604	Final Contours & Retaining Walls - Sheet 5 of 6
E605	Final Contours & Retaining Walls - Sheet 6 of 6
E606	Cut Fill - Sheet 1 of 3
E607	Cut Fill - Sheet 2 of 3
E608	Cut Fill - Sheet 3 of 3
E609	Roading - Sheet 1 of 4
E610	Roading - Sheet 2 of 4
E611	Roading - Sheet 3 of 4
E612	Roading - Sheet 4 of 4
E613	Wastewater Reticulation - Sheet 1 of 5
E614	Wastewater Reticulation - Sheet 2 of 5
E615	Wastewater Reticulation - Sheet 3 of 5
E616	Wastewater Reticulation - Sheet 4 of 5
E617	Wastewater Reticulation - Sheet 5 of 5
E618	Stormwater Reticulation - Sheet 1 of 6
E619	Stormwater Reticulation - Sheet 2 of 6
E620	Stormwater Reticulation - Sheet 3 of 6
E621	Stormwater Reticulation - Sheet 4 of 6
E622	Stormwater Reticulation - Sheet 5 of 6
E623	Stormwater Reticulation - Sheet 6 of 6
E624	Water Reticulation - Sheet 1 of 3
E625	Water Reticulation - Sheet 2 of 3
E626	Water Reticulation - Sheet 3 of 3
E627	Esplanade Planting - Sheet 1 of 3
E628	Esplanade Planting - Sheet 2 of 3
E629	Esplanade Planting - Sheet 3 of 3
E630	Stormwater Drainage Zone of Influence Plan
E631	Retaining Wall Specific Design Plan Sheet 1 of 3
E632	Retaining Wall Specific Design Plan Sheet 1 of 3
E633	Retaining Wall Specific Design Plan Sheet 1 of 3
E634	Specific Investigation & Slope Design Zone Plan



LOCATION DIAGRAM
Scale 1:5,000

As Built Plans - September 2017

R67504
ENG60065935

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

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.

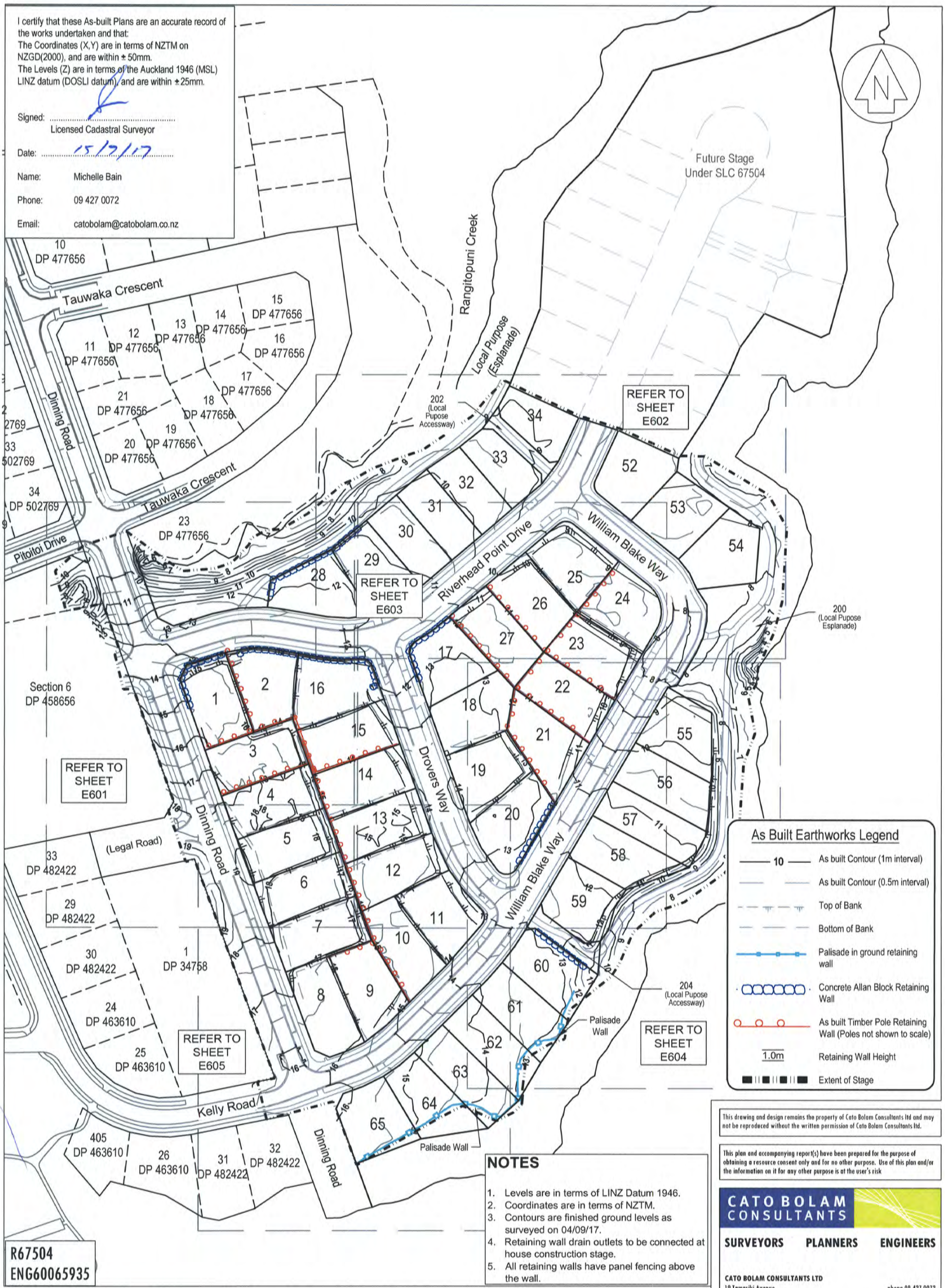
Signed: .....
Licensed Cadastral Surveyor

Date: 15/12/17

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz



R67504
ENG60065935

NOTES

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REVISION (DESCRIPTIONS)	NAME	DATE

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SURVEYED	LD	09/17
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DRAWN	AA	09/17
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APPROVED	TL	09/17

CLIENT
Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Final Contours & Retaining Walls
As Built Plan
Sheet 1 of 6

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
DATE 10/09/17	CAD REFERENCE 34147 E600-E605	SHEET NO E600
DIRECTORY Z:\34147\ACAD\ASBUILTS		JOB NO 34147

23
DP 477656

200
Local Purpose
(Esplanade)

Riverhead Point Drive

Dinning Road

(Legal Road)

Section 6
DP 458656

1
DP 34758

Panel fence above retaining wall

Planter box 1m high (PB) in front of timber retaining wall

As Built Earthworks Legend

10	As built Contour (1m interval)
	As built Contour (0.5m interval)
	Top of Bank
	Bottom of Bank
	Palisade in ground retaining wall
	Concrete Allan Block Retaining Wall
	As built Timber Pole Retaining Wall (Poles not shown to scale)
1.0m	Retaining Wall Height
	Extent of Stage

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Signed: .....
Licensed Cadastral Surveyor

Date: 15/9/17

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

R67504
ENG60065935

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Date: 15/9/17

Name: Michelle Bain

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

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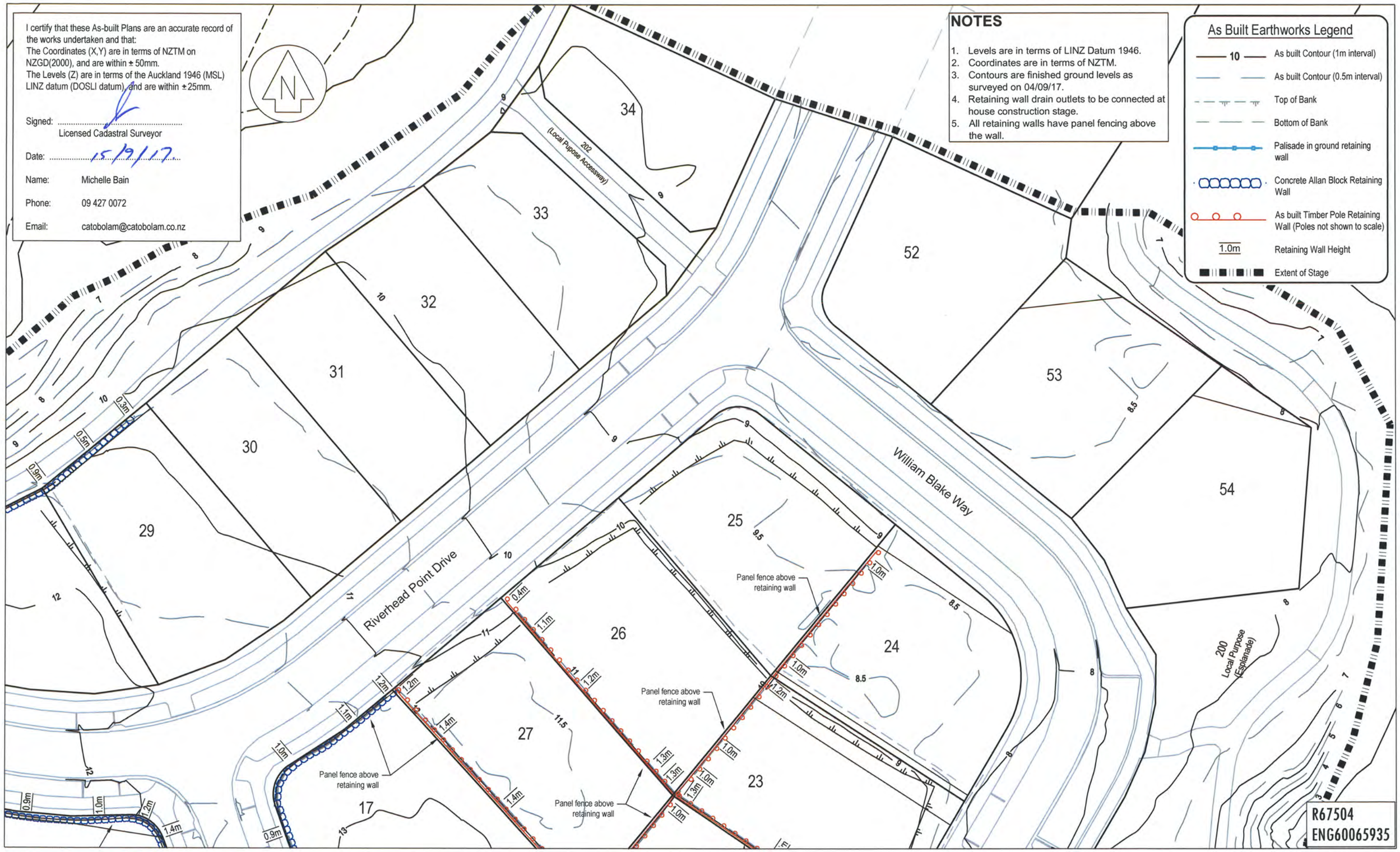
- 1.0m — Retaining Wall Height
- Extent of Stage



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Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Final Contours & Retaining Walls
As Built Plan
Sheet 3 of 6

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DATE 10/09/17	CAD REFERENCE 34147 E600-E605	SHEET NO E602
DIRECTORY Z:\34147\ACAD\ASBUILTS		JOB NO 34147

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Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

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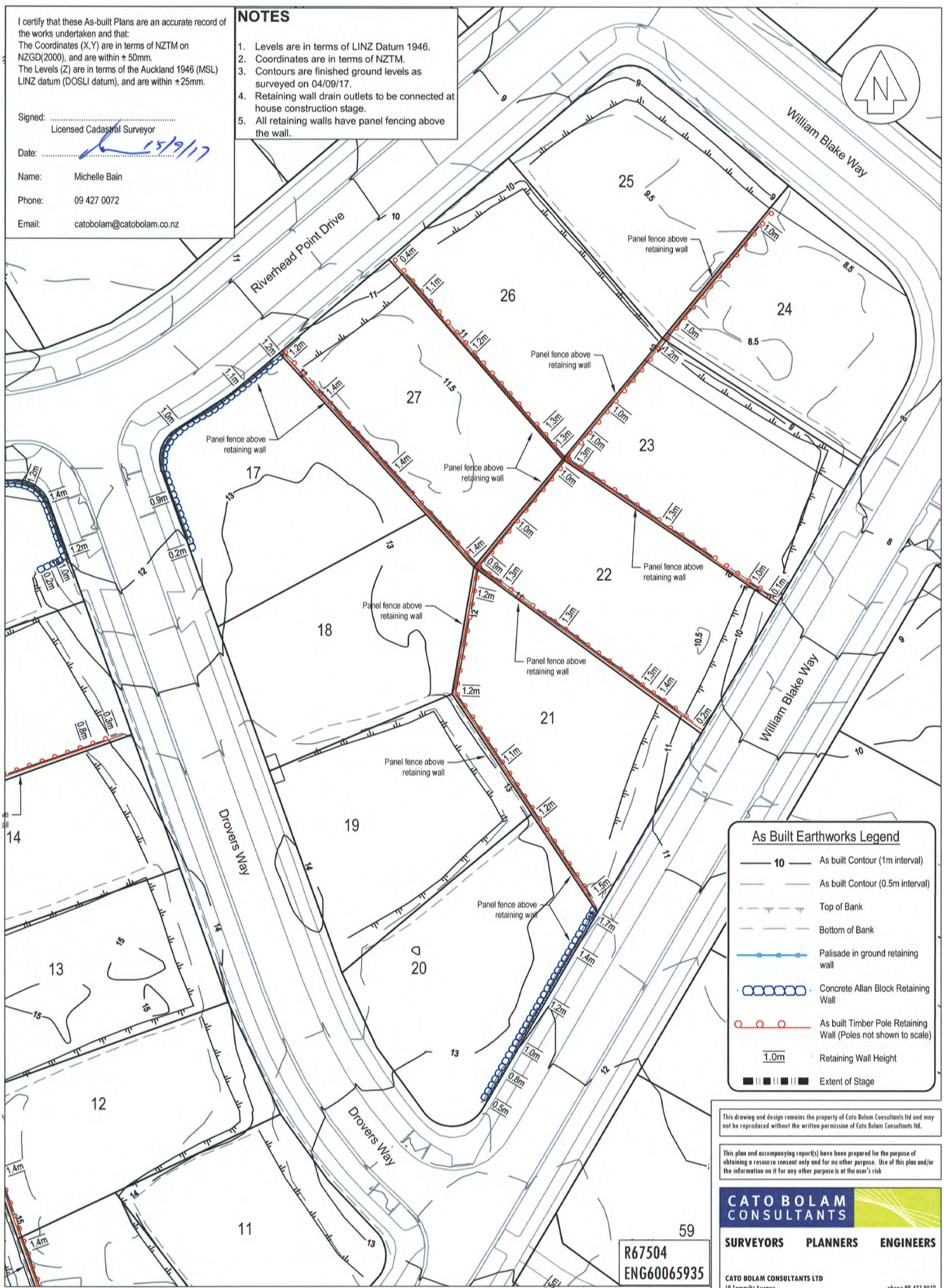

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Sheet 4 of 6

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
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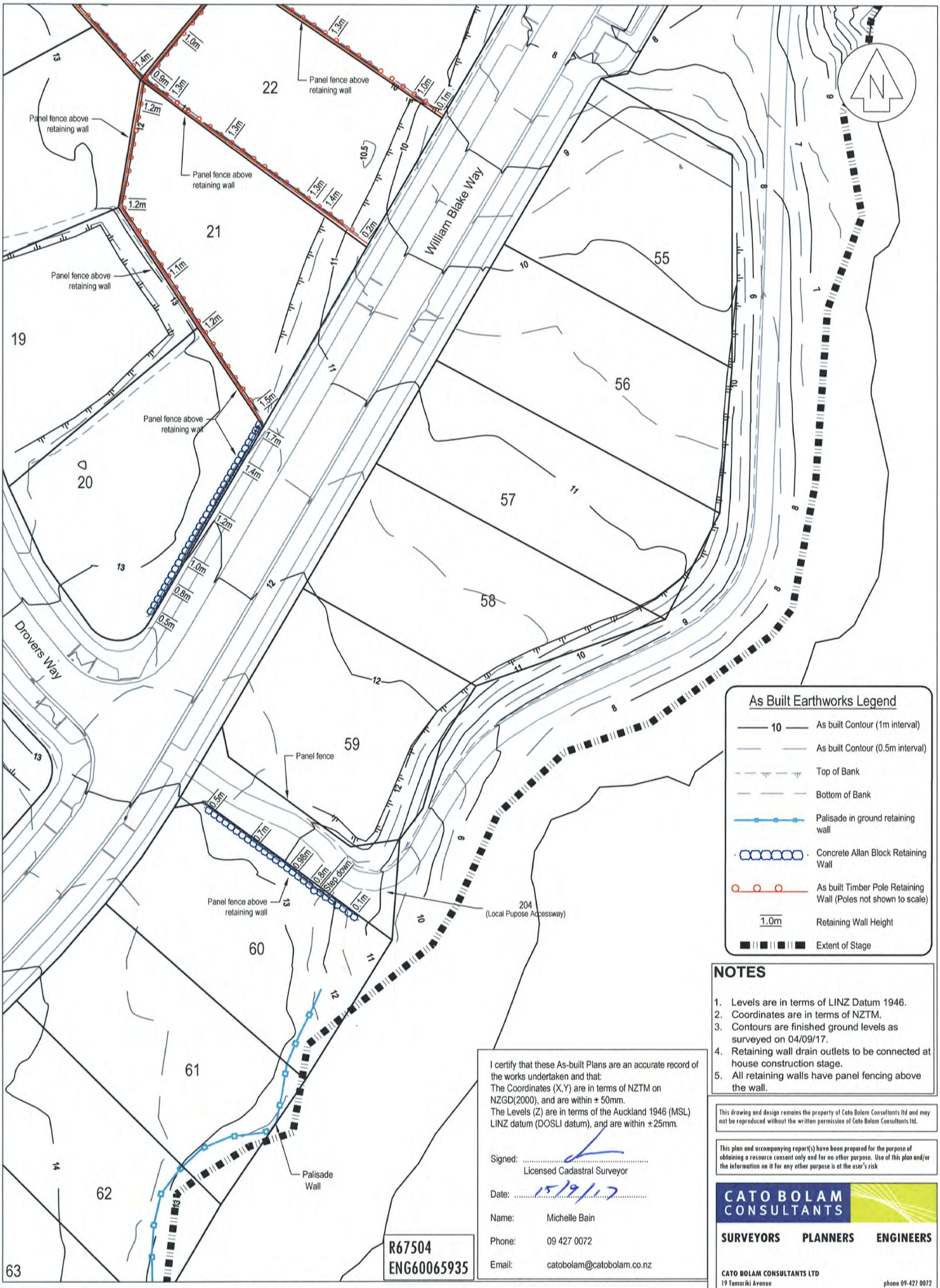
DATE 10/09/17	CAD REFERENCE 34147 E600-E605	SHEET NO E603
DIRECTORY Z:\34147\ACAD\ASBUILTS		JOB NO 34147



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- Palisade in ground retaining wall
- Concrete Allan Block Retaining Wall
- As built Timber Pole Retaining Wall (Poles not shown to scale)
- 1.0m — Retaining Wall Height
- Extent of Stage

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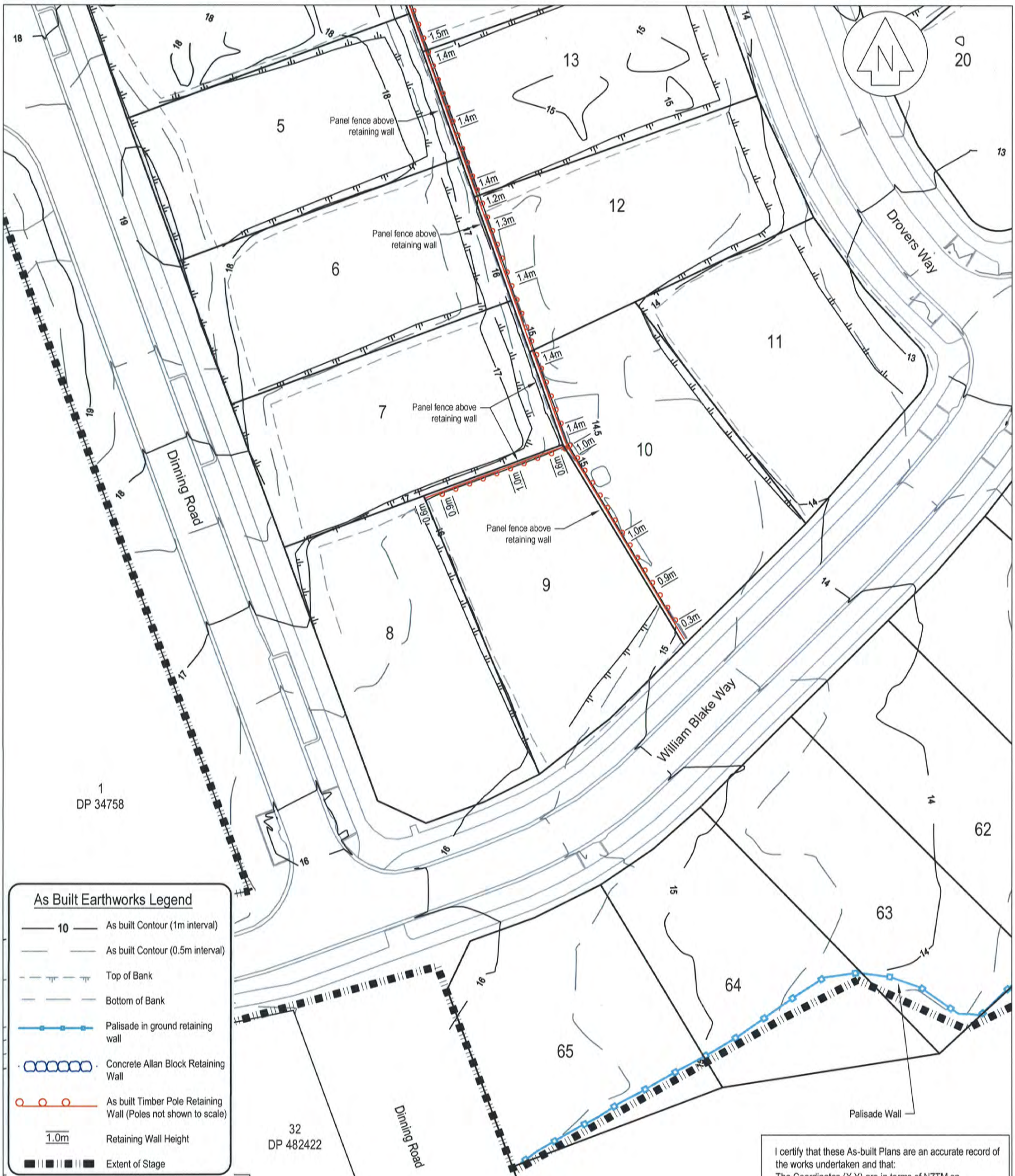

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Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Final Contours & Retaining Walls
As Built Plan
Sheet 6 of 6

Cut to Fill Legend

- 0 Contour
- 1.0 Cut Contours & Area
- 1.0 Fill Contours & Area
- Extent of Earthworks
- As built Timber Retaining Wall
- Palisade Wall
- Concrete Allan Block Retaining Wall
- 5.2 S 5.5 Subsoil Drainage & depth (m)

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Date: 15/12/17

Name: Michelle Bain

Phone: 09 427 0072

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NOTES

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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Cut Fill
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
DATE 10/09/17	CAD REFERENCE 34147 E606-E608	SHEET NO E606
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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Cut Fill
As Built Plan
Sheet 2 of 3

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DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

Riverhead Point Drive

Refer to Diagram 1 Sheet E608

Area undercut & backfilled with certified fill

Road undercut

Drovers Way

William Blake Way

Dinning Road

Rangitopuni Creek

1 x 150Ø highway grade perforated draincoils with GAP50 surround & geotextile cloth cover

2 x 150Ø highway grade perforated draincoils with GAP50 surround & geotextile cloth cover

1 x 150Ø highway grade perforated draincoils with GAP50 surround & geotextile cloth cover

204 (Local Pupose Accessway)

Palisade Wall

Palisade Wall

1 DP 34758

24 DP 463610

32 DP 482422

Cut to Fill Legend

- 0 — 0 Contour
- -1.0 — Cut Contours & Area
- 1.0 — Fill Contours & Area
- Extent of Earthworks
- As built Timber Retaining Wall
- Palisade Wall
- Concrete Allan Block Retaining Wall
- 5.2 S 5.5 — Subsoil Drainage & depth (m)

DIAGRAM 1
1:500

Existing bore cut off & capped with bentonite pellets approximately 1.5m below finished level

Area undercut & backfilled with certified fill

Road undercut

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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Cut Fill
As Built Plan
Sheet 3 of 3

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NOTES

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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

Parking Bays

175mm 20MPa exposed aggregate concrete, one layer of 665 mesh on 100mm GAP65 subbase

Vehicle Crossing

150mm 20MPa concrete, one layer of 665 mesh on 100mm GAP65 subbase

Road Footpaths

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

Esplanade Footpaths

2.5m wide, 125mm 20mPa concrete on 30mm AP25 bedding

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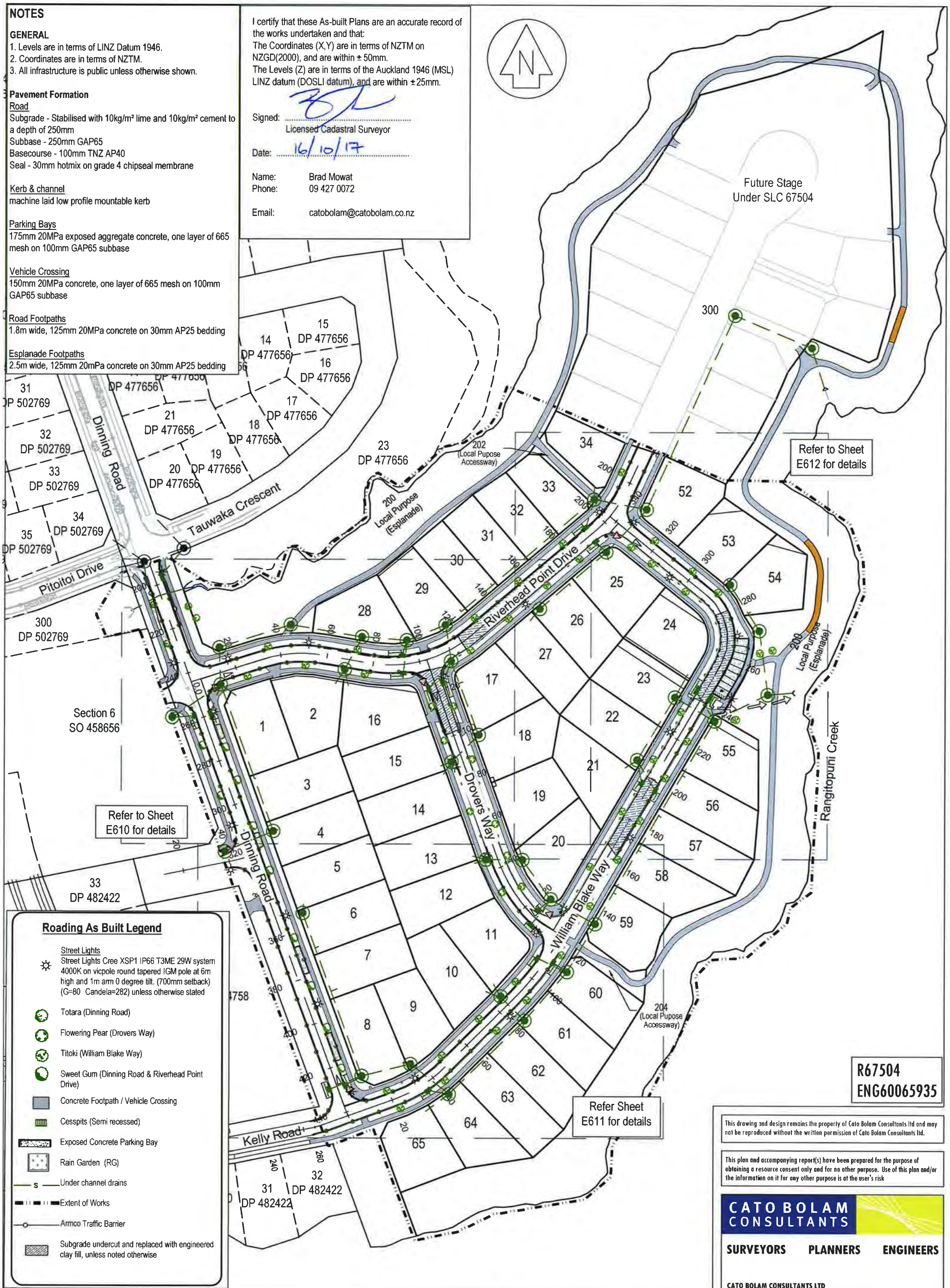
Licensed Cadastral Surveyor

Date: 16/10/17

Name: Brad Mowat
Phone: 09 427 0072

Email: catobolam@catobolam.co.nz



Roading As Built Legend

Street Lights
Street Lights Cree XSP1 IP66 T3ME 29W system 4000K on vicpole round tapered IGM pole at 6m high and 1m arm 0 degree tilt. (700mm setback) (G=80 Candela=282) unless otherwise stated

- Totara (Dinning Road)
- Flowering Pear (Drovers Way)
- Titoki (William Blake Way)
- Sweet Gum (Dinning Road & Riverhead Point Drive)
- Concrete Footpath / Vehicle Crossing
- Cesspits (Semi recessed)
- Exposed Concrete Parking Bay
- Rain Garden (RG)
- Under channel drains
- Extent of Works
- Armco Traffic Barrier
- Subgrade undercut and replaced with engineered clay fill, unless noted otherwise

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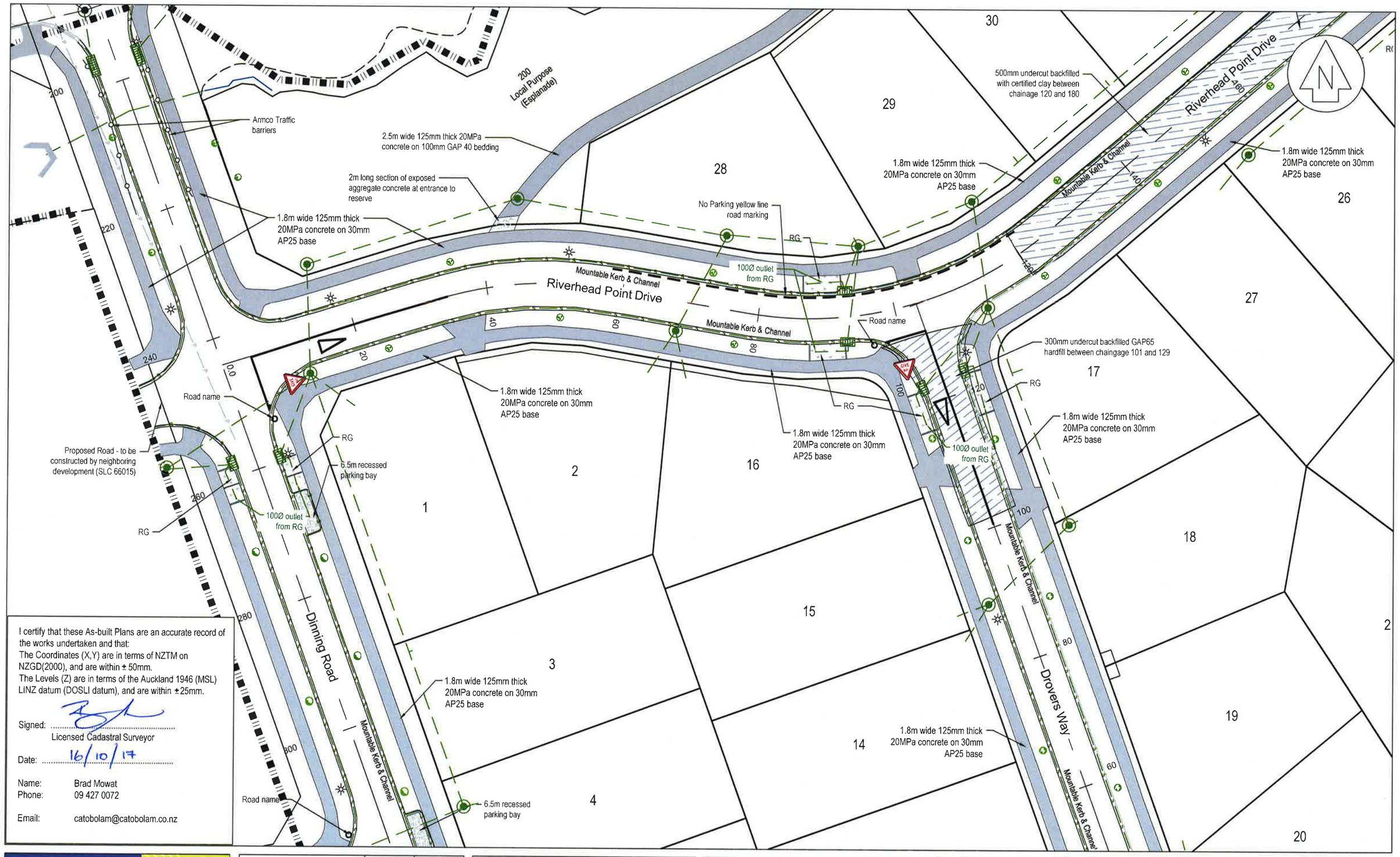
DRAWING TITLE
Road
As Built Plan
Sheet 1 of 4

ORIGINAL SCALE 1:1500	ORIGINAL SIZE A3	REVISION NO R2
DATE 10/09/2017	CAD REFERENCE 34147 E609-E612 Roading	SHEET NO E609
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147



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Signed: .....
Licensed Cadastral Surveyor

Date: 16/10/17

Name: Brad Mowat
Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

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	NAME	DATE
SURVEYED	LD & BJ	08/17
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DRAWN	BJ	09/17
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APPROVED	TL	09/17

Refer to E609 for Drawing Legend and Notes

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CLIENT

Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Road
As Built Plan
Sheet 2 of 4

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ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	R2
DATE 10/09/2017	CAD REFERENCE 34147 E609-E612 Roading	SHEET NO E610
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

Proposed Road - to be constructed by neighboring development (SLC 66015)

150Ø thick 20MPa concrete vehicle crossing for 32 Dinning Road

1.8m wide 125mm thick 20MPa concrete on 30mm AP25 base

12m recessed parking bay

12.5m recessed parking bay

RG-6 Give Way sign attached to streetlight

Road name

100Ø outlet from RG

RG

Mountable Kerb & Channel

2m long section of exposed aggregate concrete at entrance to reserve

2.5m wide 125mm thick 20MPa concrete on 100mm GAP 40 bedding

204 (Local Purpose Accessway)

200 Local Purpose (Esplanade)

1 DP 34758

Dinning Road

Drovers Way

William Blake Way

Kelly Road

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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Road
As Built Plan
Sheet 3 of 4

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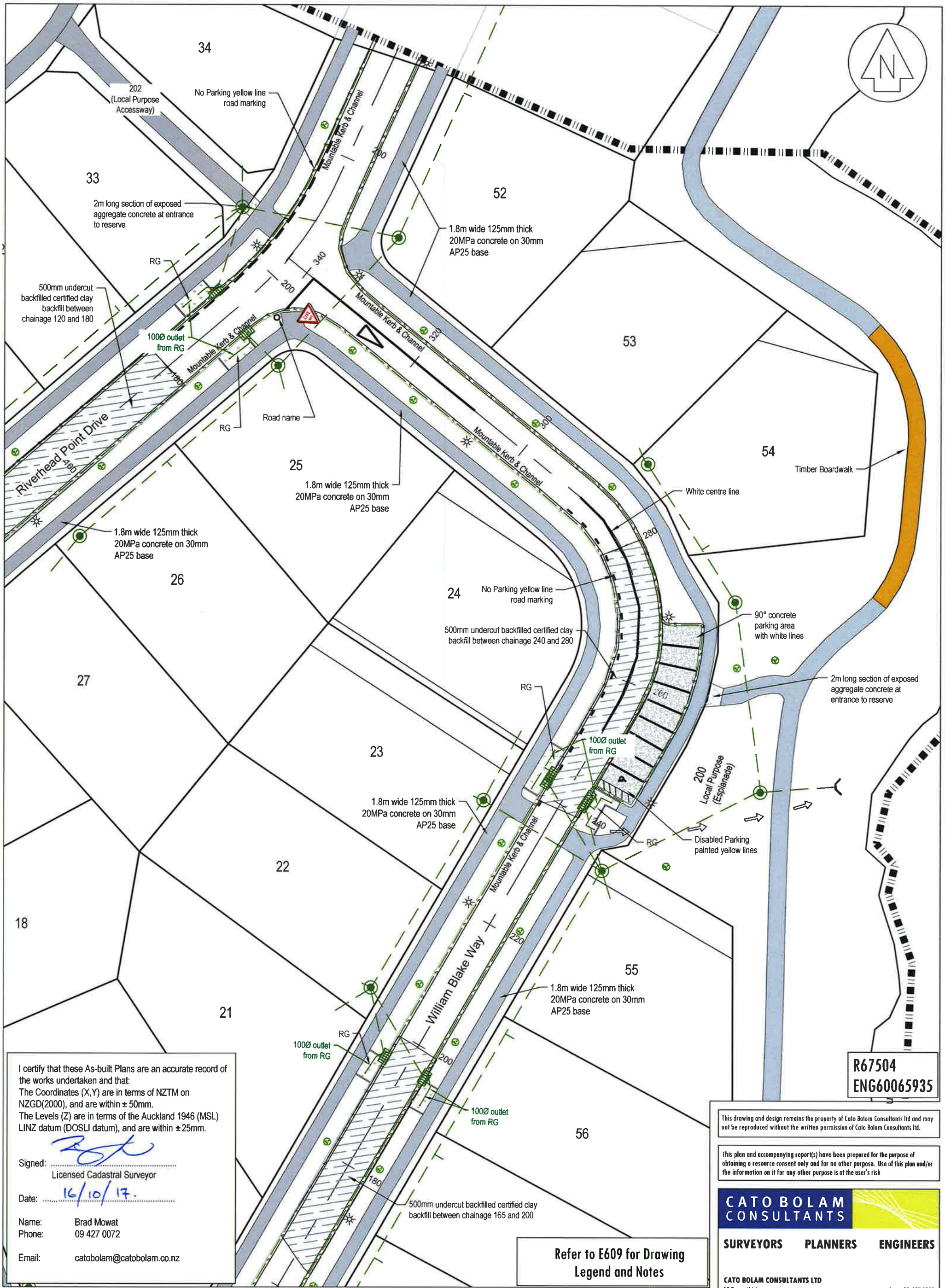
ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	R2
DATE	CAD REFERENCE	SHEET NO
10/09/2017	34147 E609-E612 Roading	E611
DIRECTORY		JOB NO
Z:\34147\ACAD\As Built Stage 1 and 2		34147



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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Roading
As Built Plan
Sheet 4 of 4

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO R2
DATE 10/09/2017	CAD REFERENCE 34147 E609-E612 Roading	SHEET NO E612
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

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Date: 15/9/17

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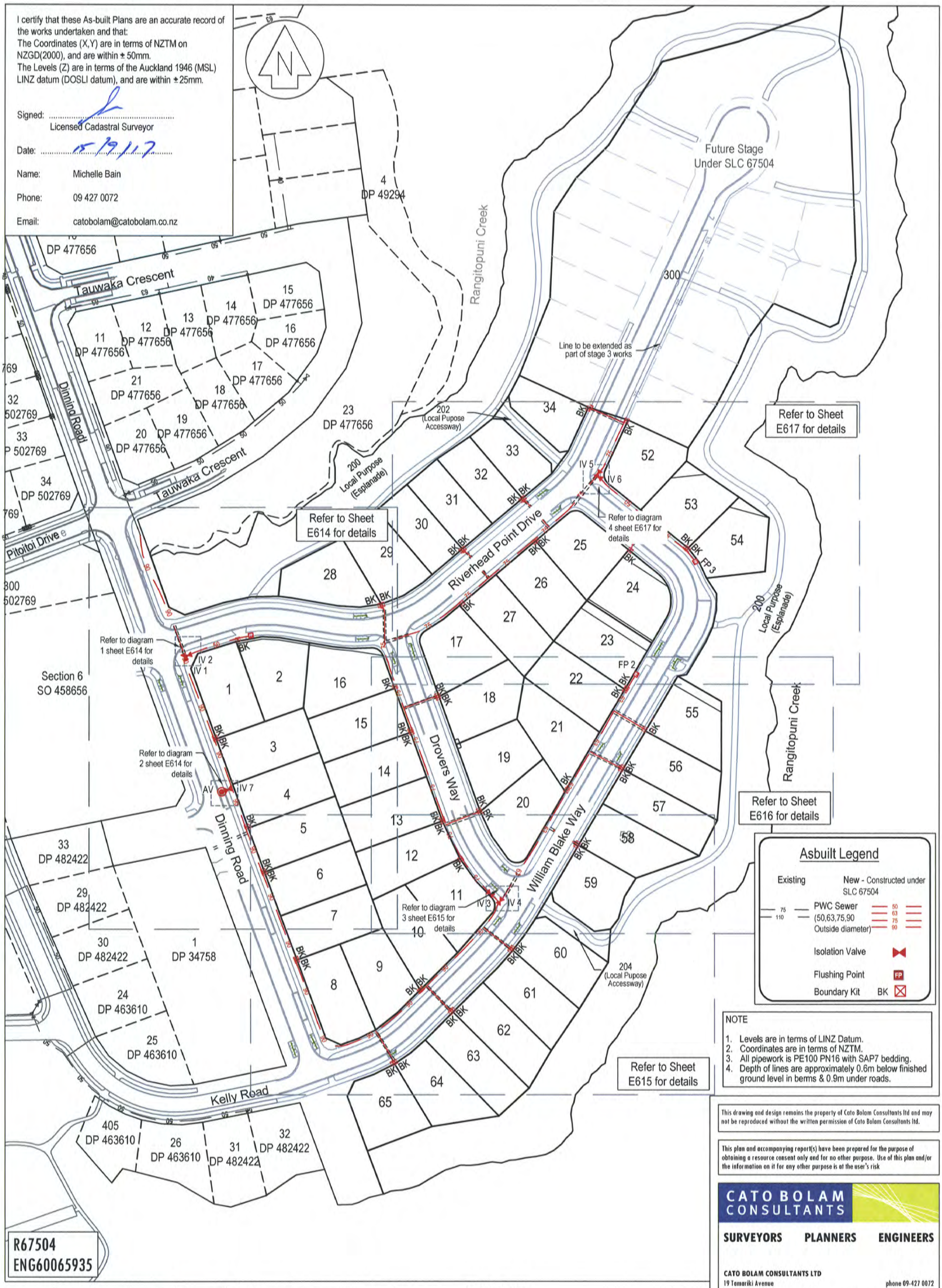
Email: catobolam@catobolam.co.nz



Asbuilt Legend

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

NOTE

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

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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Wastewater Reticulation
As Built Plan
Sheet 1 of 5

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
DATE 10/09/17	CAD REFERENCE 34147 E613-E617 Sewer Retic	SHEET NO E613
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

Connection to existing sewer by Watercare approved contractor Downers

23
DP 477656

200
Local Purpose
(Esplanade)

29

28

Riverhead Point Drive

150mm duct under carriageway

Refer to diagram 1 sheet E614 for details

IV 1
5930002.15 mN
1742532.03 mE

IV 2
5930002.88 mN
1742533.54 mE

50mmOD PE100 PN16

FP 1
5930010.94 mN
1742561.70 mE

100mm duct under carriageway

1

2

16

15

3

14

4

13

5

6

Dinning Road

Refer to diagram 2 sheet E614 for details

Combination air & vaccum release valve vent O mat model RGX (PN16)

IV 1
5930002.88 mN
1742533.54 mE

100Ø Duct for future servicing of 32 Dinning Road

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Licensed Cadastral Surveyor

Date: 15/9/17

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Diagram 1
Scale 1:100

Tee

IV 2
5930002.88 mN
1742533.54 mE

IV 1
5930002.15 mN
1742532.03 mE

Diagram 2
Scale 1:100

IV 1
5930002.88 mN
1742533.54 mE

Combination air & vaccum release valve vent O mat model RGX (PN16)

Tee

Dinning Road

AV
5929943.77 mN
1742546.79 mE

Refer to E613 for Drawing Legend & Notes

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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Wastewater Reticulation
As Built Plan
Sheet 2 of 5

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
DATE 10/09/17	CAD REFERENCE 34147 E613-E617 Sewer Retic	SHEET NO E614
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

100Ø Duct for future servicing of 32 Dinning Road

100mm duct under carriageway

150mm duct under carriageway

100mm duct under carriageway

IV 3
5929897.57 mN
1742661.93 mE

IV 4
5929894.08 mN
1742665.91 mE

Refer to diagram 3 sheet E615 for details

100mm duct under carriageway

100mm duct under carriageway

100mm duct under carriageway

90mmOD PE100 PN16

Drovers Way

William Blake Way

Dinning Road

Kelly Road

204 (Local Purpose Accessway)

200 Local Purpose (Esplanade)

5 6 7 8 9 10 11 12 13 58 59 60 61 62 63 64 65

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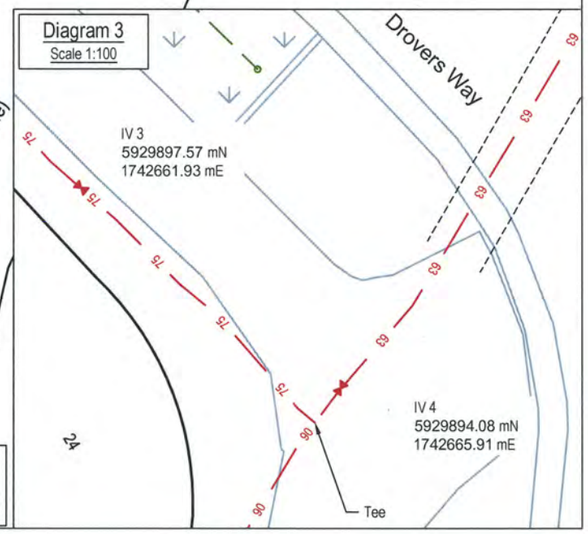
Diagram 3
Scale 1:100



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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Wastewater Reticulation
As Built Plan
Sheet 3 of 5

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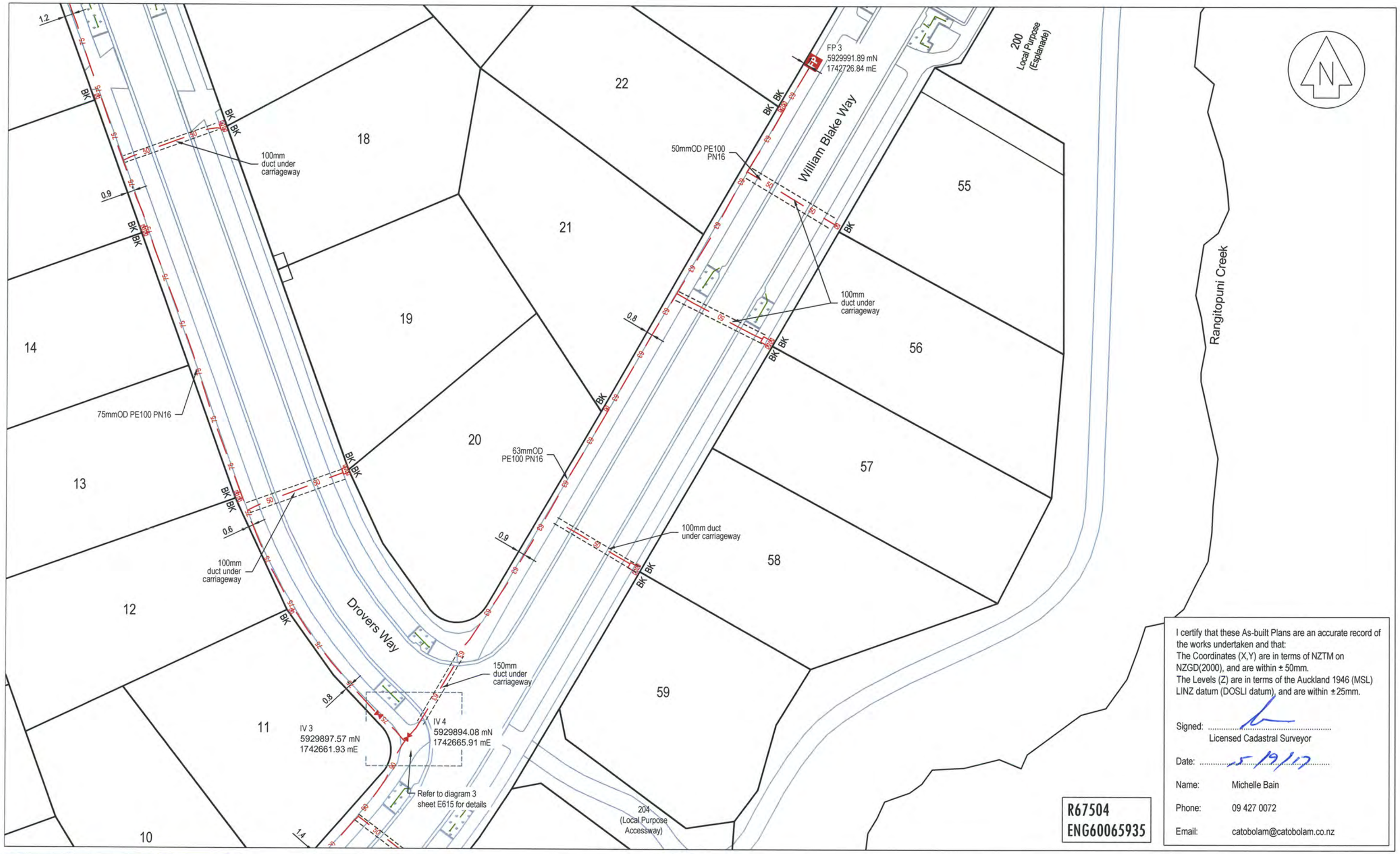
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147



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Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Wastewater Reticulation
As Built Plan
Sheet 4 of 5

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ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:500	A3	
DATE	CAD REFERENCE	SHEET NO
10/09/2017	34147 E613-E617 Sewer Retic	E616
DIRECTORY		JOB NO
Z:\34147\ACAD\As Built Stage 1 and 2		34147

34
51
202
(Local Purpose
Accessway)
100mm
duct under
carriageway
Line to be extended as
part of stage 3 works
1.1
33
52
63mmOD
PE100 PN16
IV 5
5930078.14 mN
1742711.84 mE
IV 6
1742712.03 mE
5930076.76 mN
32
150mm
duct under
carriageway
Refer to diagram
4 sheet E617 for
details
31
53
100mm
duct under
carriageway
50mmOD
PE100 PN16
30
0.9
1.3
Riverhead Point Drive
William Blake Way
54
25
FP 2
5930038.47 mN
1742753.09 mE
100mm
duct under
carriageway
0.8
75mmOD PE100 PN16
26
24
27
0.9
150mm
duct under
carriageway
17
23
FP 3
5929991.89 mN
1742726.84 mE
200
Local Purpose
(Esplanade)
22

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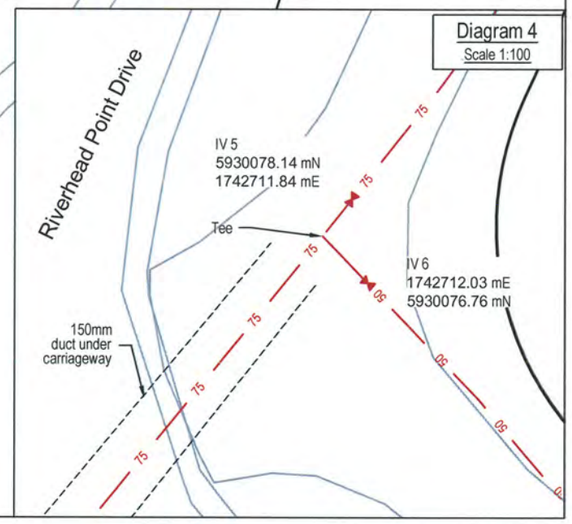
Diagram 4
Scale 1:100



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Deacon Point
Stages 1 & 2, Dinning Road
Riverhead

DRAWING TITLE
Wastewater Reticulation
As Built Plan
Sheet 5 of 5

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ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 10/09/2017	CAD REFERENCE 34147 E613-E617 Sewer Retic	SHEET NO E617
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

NZTM Manhole Co-ordinates Table		
Name	mN	mE
A-4	5930078.1	1742716.7
A-5	5930082.9	1742694.4
A-6	5930030	1742629.9
A-7	5930023.7	1742613.3
A-8	5930025.5	1742594.1
A-9	5930031.3	1742563.6
A-10	5930022.1	1742532.9
A-11	5930006.3	1742533.2
A-12	5929943	1742554.7
A-13	5929934.5	1742534
F-1	5930060.2	1742699.2
F-2	5930036.2	1742670.4
G-1	5930014.6	1742632
G-2	5929982.9	1742643.4
G-3	5929971.4	1742631.5
H-2	5930011.8	1742586.5
I-1	5929992.9	1742512.3
J-2	5929998	1742767.2
J-3	5929986.9	1742744.2
J-4	5929900.9	1742691.9
J-5	5929880.6	1742679.5
J-6	5929860	1742661
J-7	5929829.1	1742628.1
J-8	5929842.2	1742611.8
J-9	5929837.5	1742590.9
J-10	5929907.8	1742566.7
K-1	5930025.3	1742764.1
L-1	5929997.5	1742727.6
L-2	5929970.9	1742711
M-1	5929911.7	1742673.2
M-2	5929928.8	1742661.3
M-3	5929929.2	1742645.6
N-1	5929870.6	1742651

NZTM Catchpit Co-ordinates Table		
Name	mN	mE
CP 1	5929994.1	1742528.6
CP 2	5929993.3	1742521.8
CP 4	5929884.9	1742673.8
CP 5	5929832.2	1742577
CP 6	5929833.7	1742583.6
CP 7	5929831	1742619.3
CP 8	5929901.3	1742664.5
CP 9	5929907.2	1742667.6
CP 10	5930009.9	1742611.5
CP11	5930017.3	1742611.2
CP 12	5930003	1742622.4
CP 13	5930005.4	1742628.4
CP 16	5930070.9	1742690.5
CP 17	5930064.9	1742694.7
CP 23	5929886.7	1742667
CP 24	5929957.8	1742718.4
CP 25	5929961.0	1742713.0
CP 14	5930000.0	1742736.7
CP 14/1	5930001.0	1742737.3
CP 15	5929997.5	1742742.6
CP 15/1	5929997.5	1742742.6
CP 26	5930051.7	1742502.1
CP 26/1	5930050.8	1742502.5

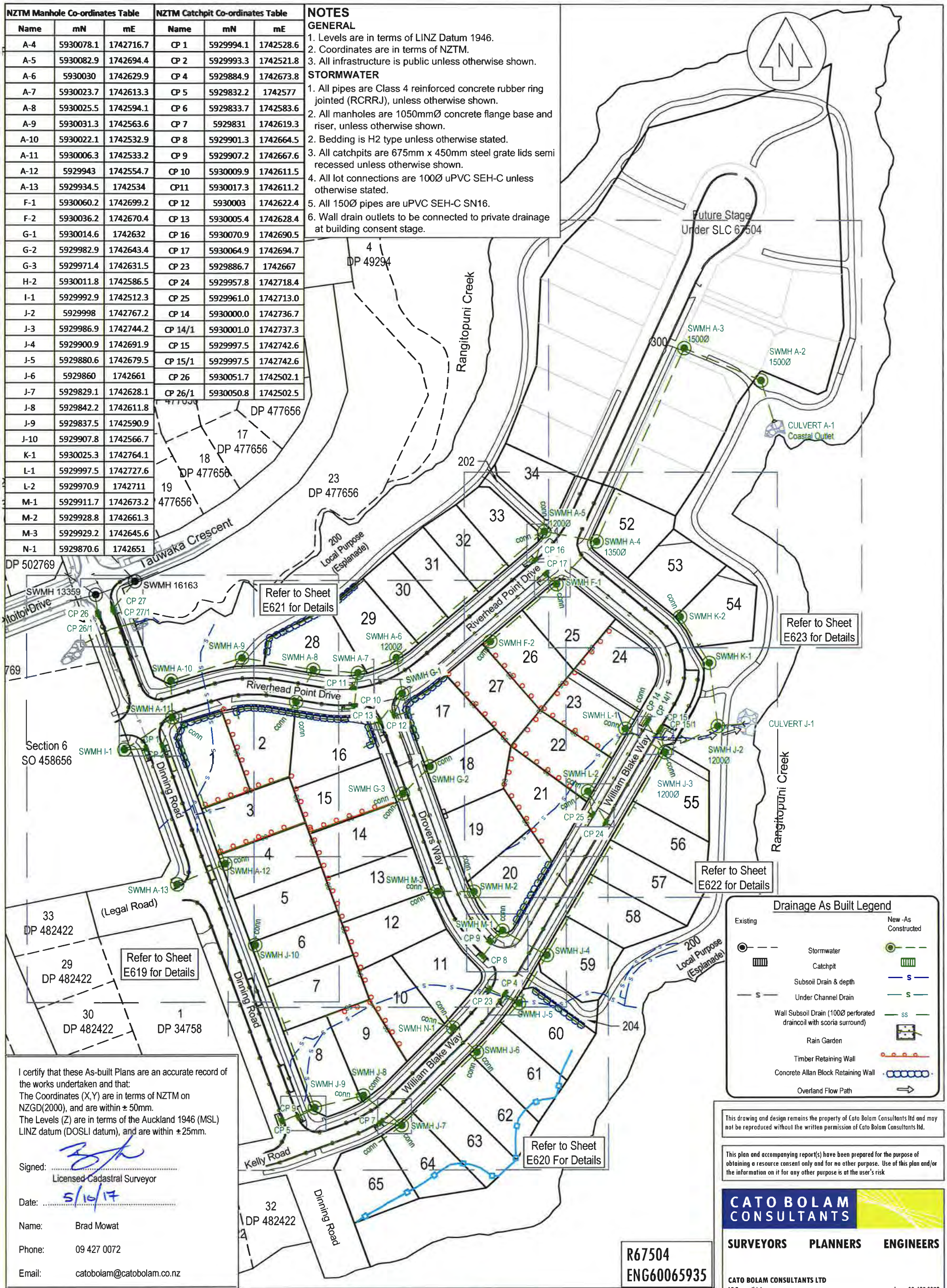
NOTES

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.



Drainage As Built Legend

Existing		New -As Constructed
	Stormwater	
	Catchpit	
	Subsoil Drain & depth	
	Under Channel Drain	
	Wall Subsoil Drain (100Ø perforated draincoil with scoria surround)	
	Rain Garden	
	Timber Retaining Wall	
	Concrete Allan Block Retaining Wall	
	Overland Flow Path	

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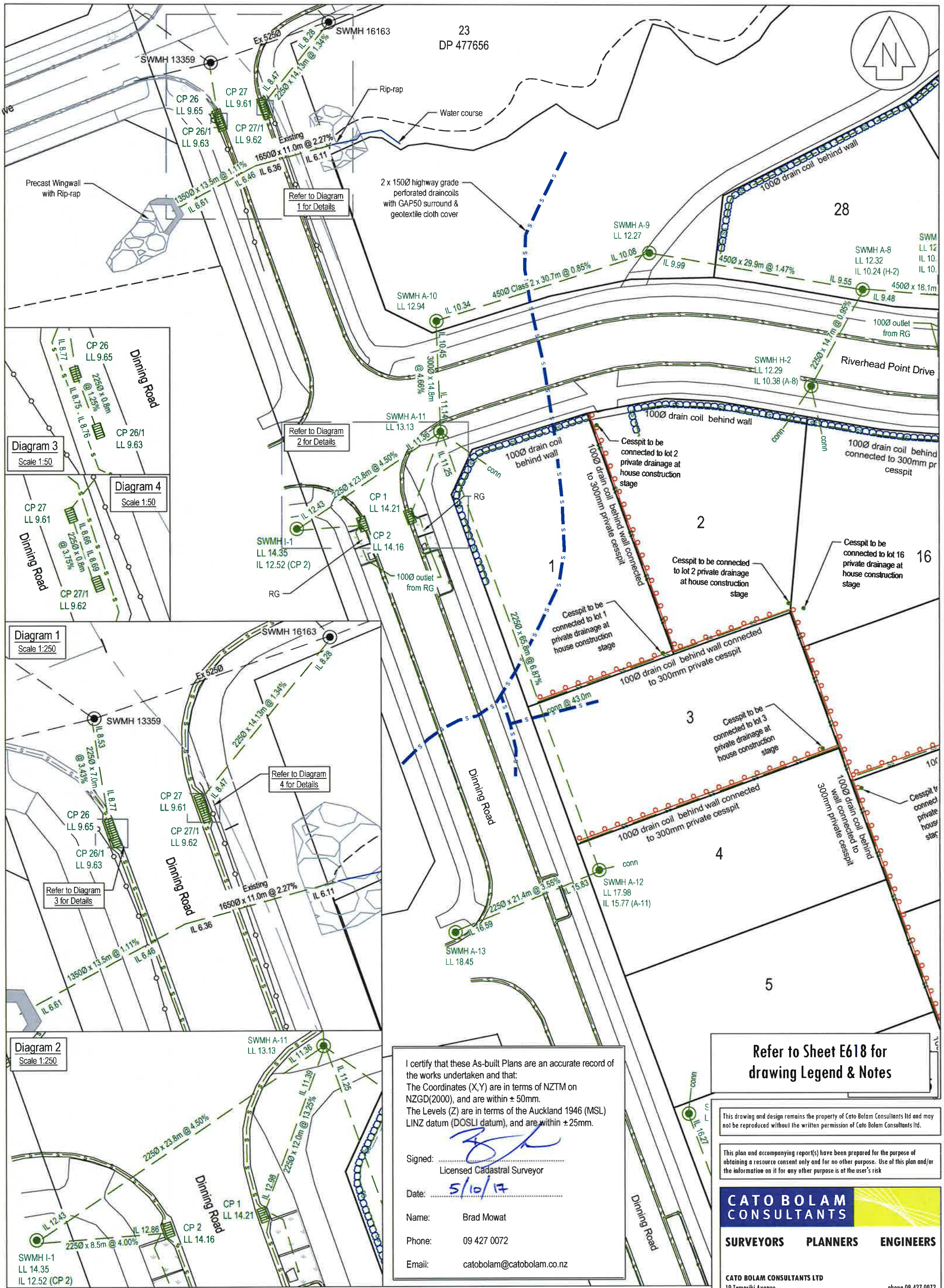
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Stormwater Reticulation
As Built Plan
Sheet 1 of 6

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	R2
DATE 04/10/17	CAD REFERENCE 34147 E618-E623	SHEET NO E618
DIRECTORY Z:\34147\ACAD\AsBuilt\		JOB NO 34147



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Signed: .....
Licensed Cadastral Surveyor

Date: 5/10/17

Name: Brad Mowat

Phone: 09 427 0072

Email: catobolam@catobolam.co.nz

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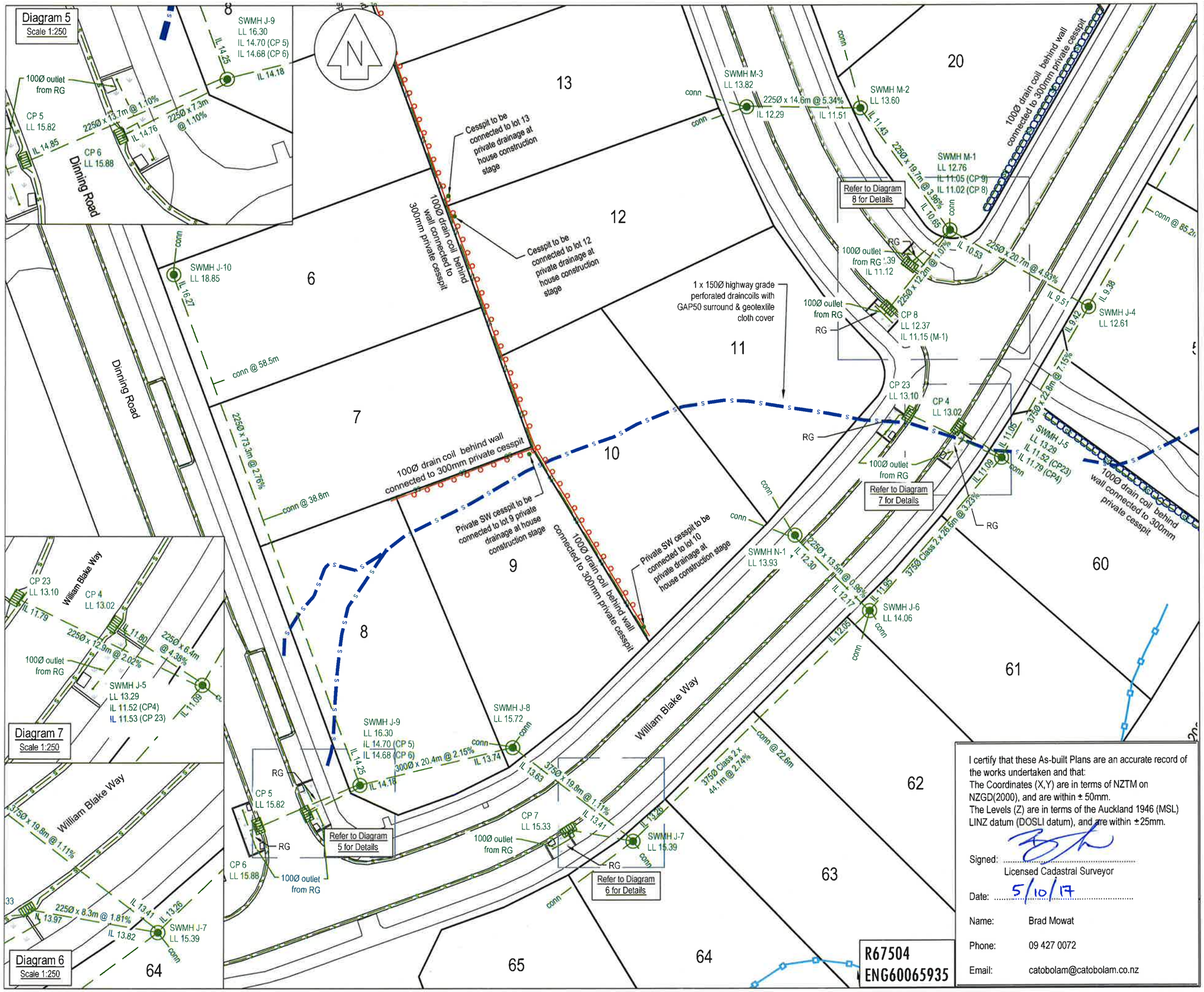
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Stormwater Reticulation
As Built Plan
Sheet 2 of 6

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO R2
DATE 04/10/2017	CAD REFERENCE 34147 E618-E623	SHEET NO E619
DIRECTORY Z:\34147\ACAD\		JOB NO 34147



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DRAWING TITLE
Stormwater Reticulation
As Built Plan
Sheet 3 of 6

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ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO	R2
DATE 04/10/17	CAD REFERENCE 34147 E618-E623	SHEET NO	E620
DIRECTORY Z:\34147\ACAD\		JOB NO	34147

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Refer to Diagram 9 for Details

Refer to Diagram 10 for Details

Refer to Diagram 8 for Details

Diagram 8
Scale 1:250

Diagram 9
Scale 1:250

Diagram 10
Scale 1:250

Refer to Sheet E618 for drawing Legend & Notes

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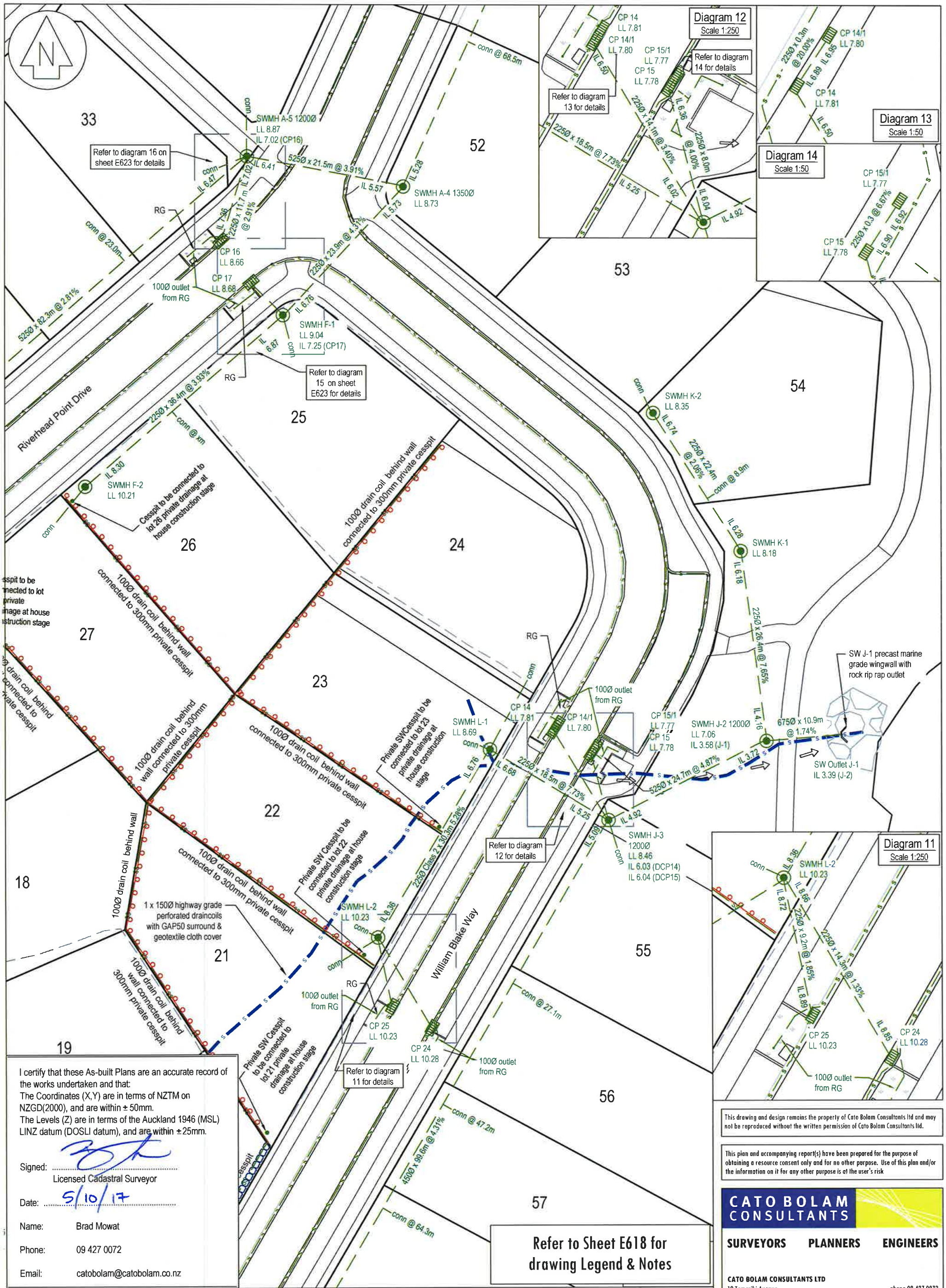
Dinning Road, Riverhead

DRAWING TITLE
Stormwater Reticulation
As Built Plan
Sheet 4 of 6

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO R2
DATE 04/10/17	CAD REFERENCE 34147 E618-E623	SHEET NO E621
DIRECTORY Z:\34147\ACAD\		JOB NO 34147



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Stormwater Reticulation
As Built Plan
Sheet 5 of 6

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ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
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DATE 04/10/17	CAD REFERENCE 34147 E618-E623	SHEET NO E622
DIRECTORY Z:\34147\ACAD\		JOB NO 34147

RAIN GARDEN
Typical Cross Section
NTS

RAIN GARDEN
Typical Long Section
NTS

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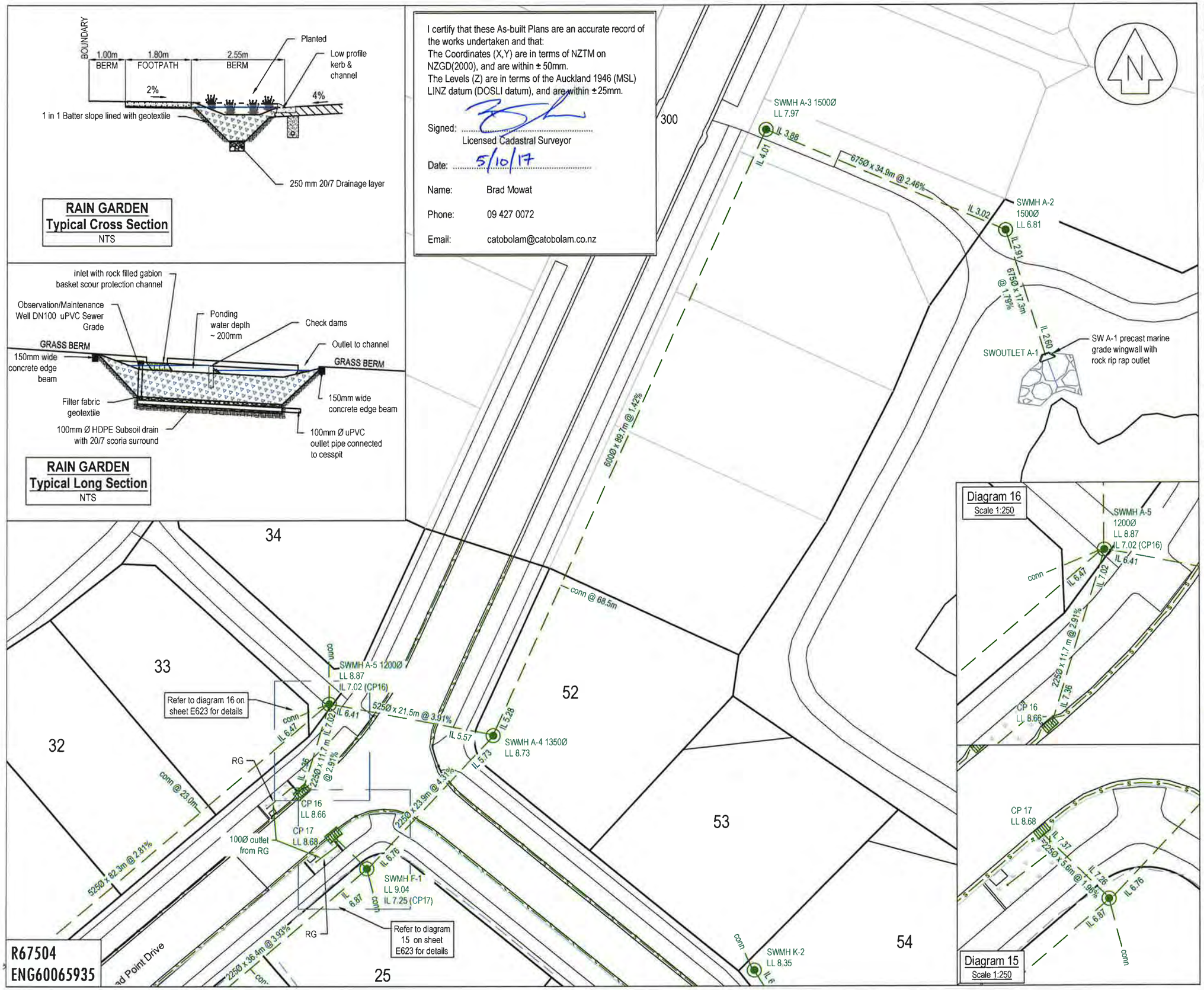

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DRAWING TITLE
Stormwater Reticulation
As Built Plan
Sheet 6 of 6

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO	R2
DATE 04/10/17	CAD REFERENCE 34147 E618-E623	SHEET NO	E623
DIRECTORY Z:\34147\ACAD\		JOB NO	34147

Water Reticulation Legend

Existing		New - constructed under SLC 67504
32 / 63 / 125	Watermain (Ø)	32 / 63 / 125
⋈	Sluice Valve	⋈
△	Peet Valve	▲
	Lot Service Connections	
H	Fire Hydrant	H

NOTES

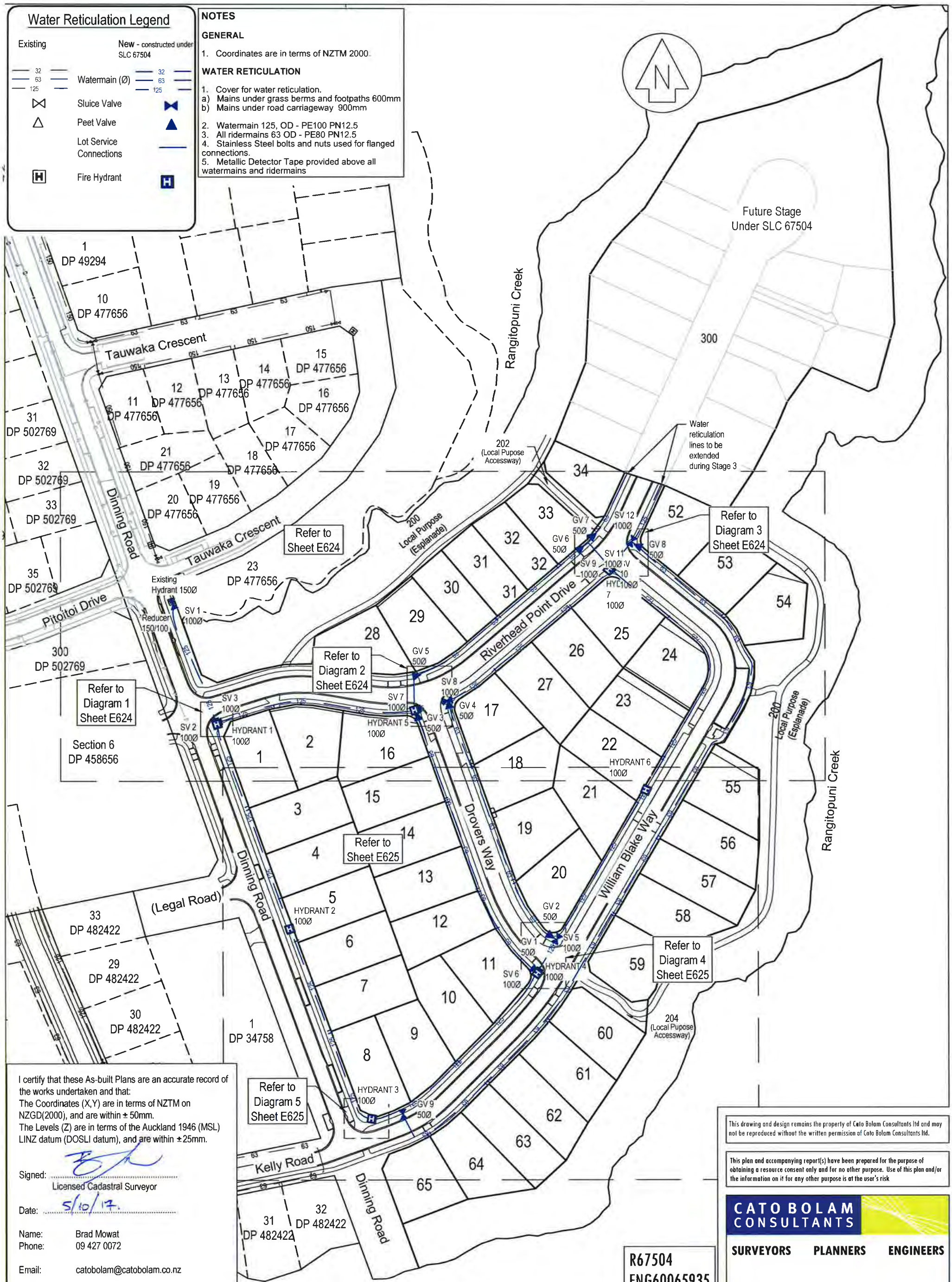
GENERAL

1. Coordinates are in terms of NZTM 2000

WATER RETICULATION

1. Cover for water reticulation.
a) Mains under grass berms and footpaths 600mm
b) Mains under road carriageway 900mm

2. Watermain 125, OD - PE100 PN12.5
3. All ridermains 63 OD - PE80 PN12.5
4. Stainless Steel bolts and nuts used for flanged connections.
5. Metallic Detector Tape provided above all watermains and ridermains



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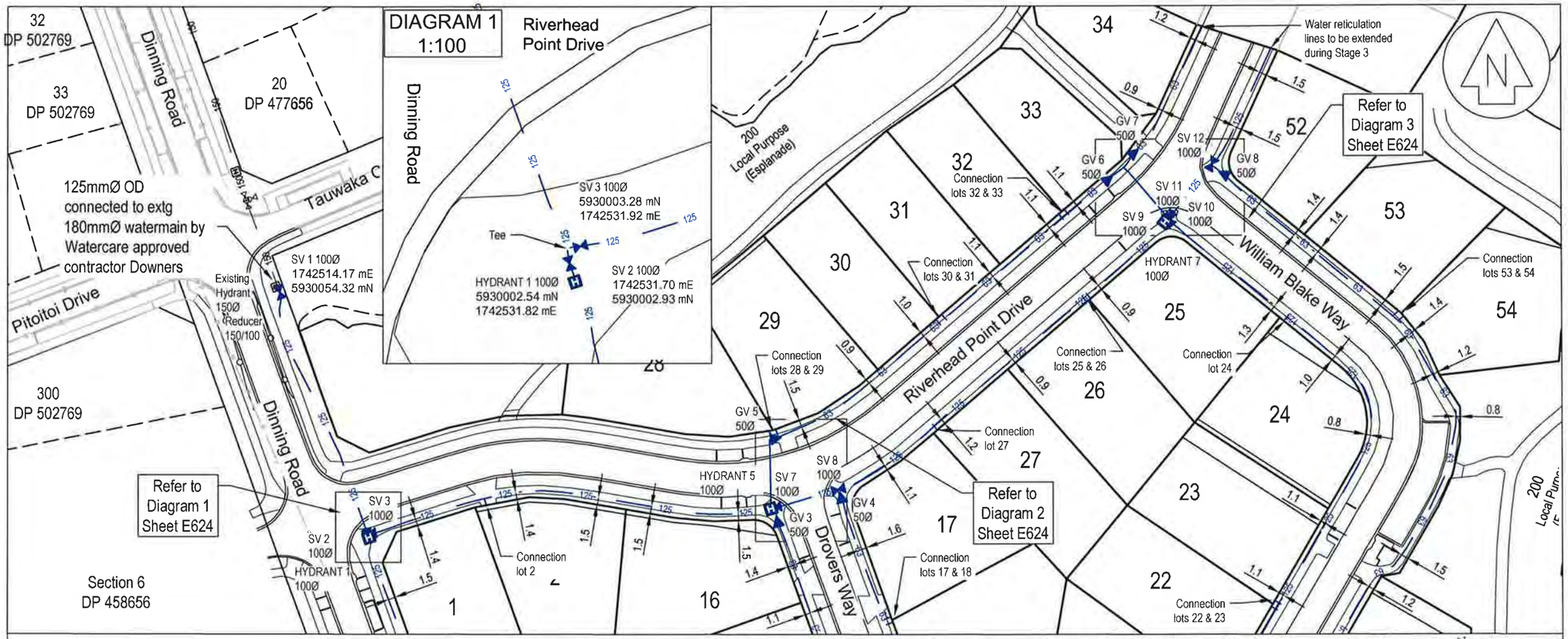
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE
Water Reticulation
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	R2
DATE 04/10/17	CAD REFERENCE 34147 E624-E626	SHEET NO E624
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147



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Existing		New - constructed under SLC 67504
32 / 63 / 125	Watermain (Ø)	32 / 63 / 125
	Sluice Valve	
	Peet Valve	
	Lot Service Connections	
	Fire Hydrant	

NOTES

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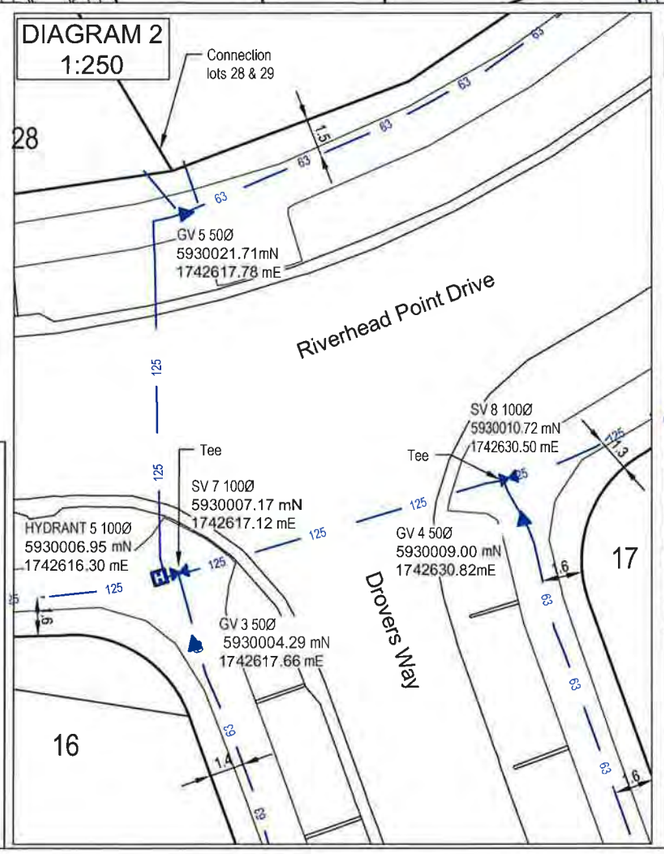

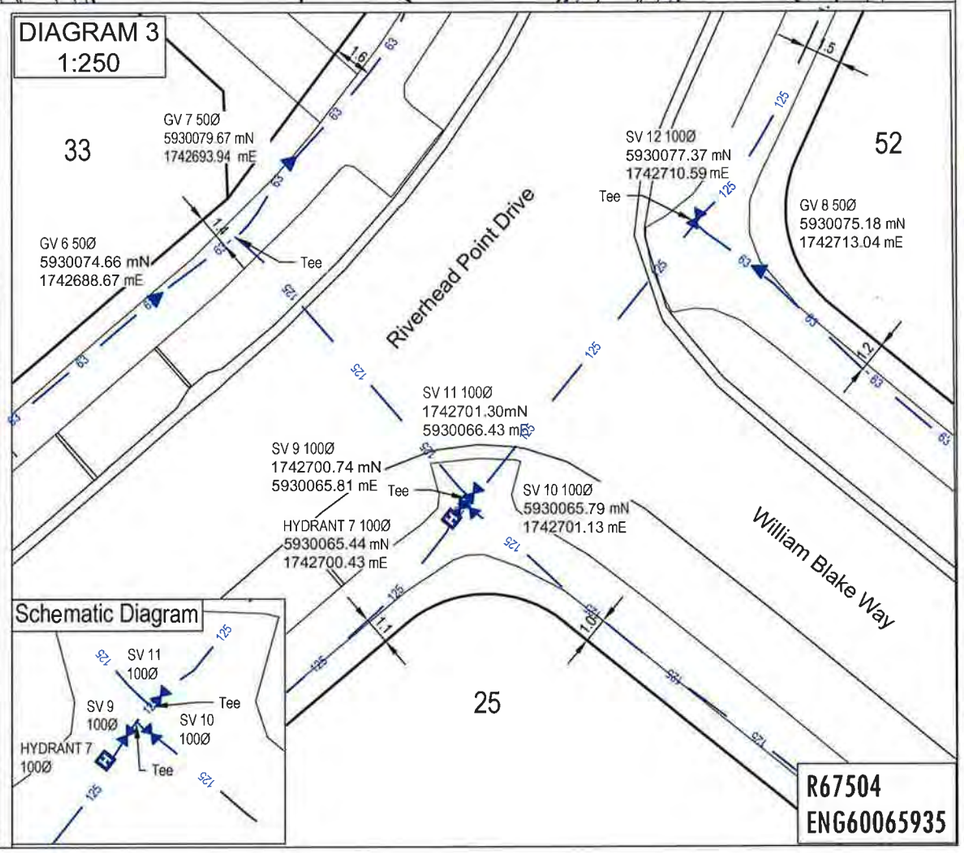

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DRAWING TITLE
Water Reticulation
As Built Plan
Sheet 2 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
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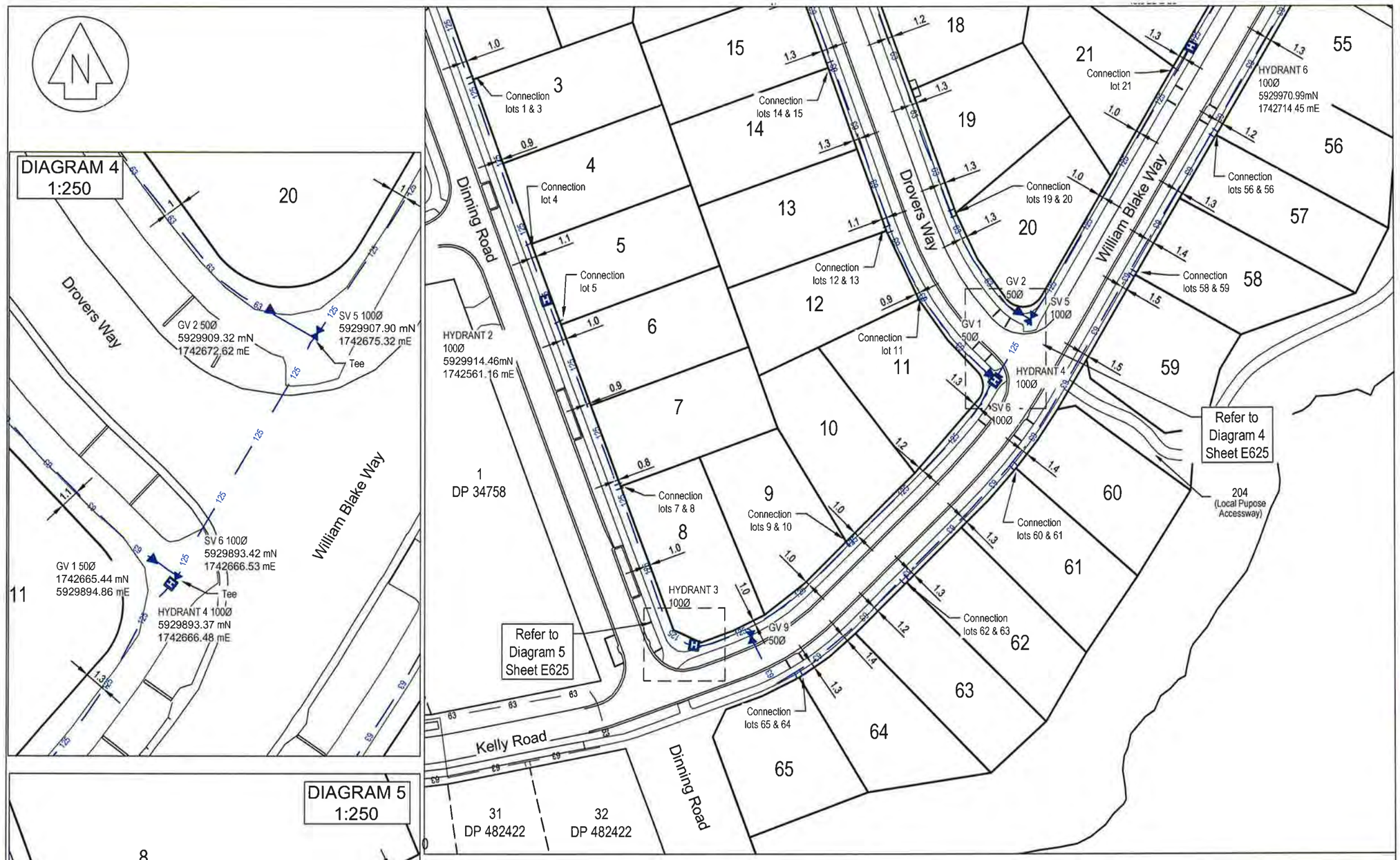
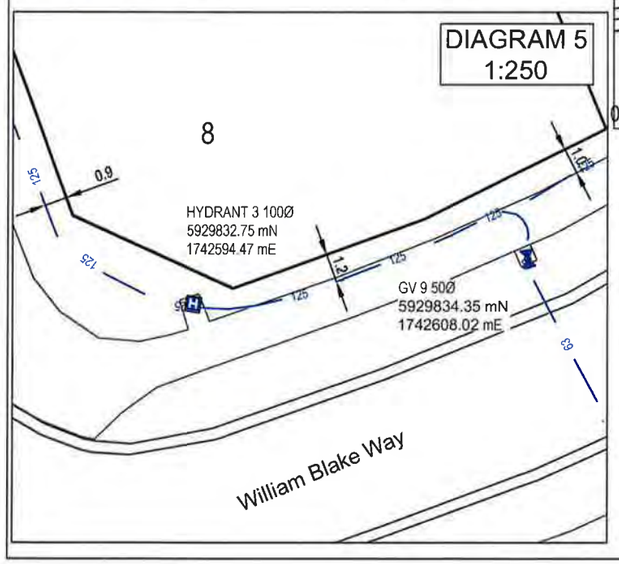
DATE 04/10/17	CAD REFERENCE 34147 E624-E626	SHEET NO E625
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147





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Water Reticulation Legend

Existing		New - constructed under SLC 67504
32 / 63 / 125	Watermain (Ø)	32 / 63 / 125
⋈	Sluice Valve	⋈
△	Peet Valve	▲
	Lot Service Connections	
H	Fire Hydrant	H

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Dinning Road, Riverhead

DRAWING TITLE
Water Reticulation
As Built Plan
Sheet 3 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE 04/10/17	CAD REFERENCE 34147 E624-E626	SHEET NO E626
DIRECTORY Z:\34147\ACAD\As Built Stage 1 and 2		JOB NO 34147

Planting Legend

Trees:

- Totara (Dinning Road)
- Flowering Pear (Drovers Way)
- Titoki (William Blake Way)
- Sweet Gum (Dinning Road & Riverhead Point Drive)
- Midden Planting Area
- Reserve Planting Area
- Concrete Footpath
- Timber Boardwalk

Esplanade Plants:
Carex flagellifera
Karamu
Taupata
Cabbage Tree
Whau
Pohutukawa
Hebe
Mahoe
Ngaio
Saltmarsh ribbon wood
Karo
Houpara
Kowhoai

N

Shallow rooting esplanade species within midden areas, Carex & Hebe

Power easement in favour of Vector

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Shallow rooting esplanade species within midden areas, Carex & Hebe

Future Stage Under SLC 67504

Lower growing esplanade species up to path

Rangitopuni Creek

300

Timber boardwalk

Refer to Sheet E637

202 (Local Pupose Accessway)

Shallow rooting esplanade species within midden areas, Carex & Hebe

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

200 (Local Pupose Esplanade)

Shallow rooting esplanade species within midden areas, Carex & Hebe

Timber boardwalk

200 (Local Pupose Esplanade)

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Refer to Sheet E636

Shallow rooting esplanade species within midden areas, Carex & Hebe

Shallow rooting esplanade species within midden areas, Carex & Hebe

Lower growing esplanade species above path

204 (Local Pupose Accessway)

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Rangitopuni Creek

Section 6 SO 458656

(Legal Road)

Tauwaka Crescent

Dinning Road

Pitoitoi Drive

Riverhead Point Drive

Drovers Way

William Blake Way

Kelly Road

4 DP 49294
10 DP 477656
11 DP 477656
12 DP 477656
13 DP 477656
14 DP 477656
15 DP 477656
16 DP 477656
17 DP 477656
18 DP 477656
19 DP 477656
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24 DP 463610
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405 DP 463610
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31 DP 482422
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Stages 1 & 2
Dinning Road
Riverhead

DRAWING TITLE
Esplanade Reserve Planting
As Built Plan
Sheet 1 of 3

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
DATE 14/09/17	CAD REFERENCE 34147 E627-E629	SHEET NO E627
DIRECTORY Z:\34147\ACAD\ASBUILTS		JOB NO 34147

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

200 (Local Pupose Esplanade)

Shallow rooting esplanade species within midden areas, Carex & Hebe

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Timber boardwalk

Shallow rooting esplanade species within midden areas, Carex & Hebe

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Shallow rooting esplanade species within midden areas, Carex & Hebe

Shallow rooting esplanade species within midden areas, Carex & Hebe

Lower growing esplanade species above path

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Riverhead Point Drive

William Blake Way

Drovers Way

Dinning Road

Rangitopuni Creek

Planting Legend

Trees:

- Totara (Dinning Road)
- Flowering Pear (Drovers Way)
- Titoki (William Blake Way)
- Sweet Gum (Dinning Road & Riverhead Point Drive)
- Midden Planting Area
- Reserve Planting Area
- Concrete Footpath
- Timber Boardwalk

R67504
ENG60065935

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CATO BOLAM CONSULTANTS

SURVEYORS PLANNERS ENGINEERS

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

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE 10/09/17	CAD REFERENCE 34147 E627-E629	SHEET NO E628
DIRECTORY Z:\34147\ACAD\ASBUILTS		JOB NO 34147

REVISION (DESCRIPTIONS)	NAME	DATE

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CHECKED	TL	09/17
APPROVED	TL	09/17

CLIENT

Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Esplanade Reserve Planting
As Built Plan
Sheet 2 of 3

Shallow rooting esplanade species within midden areas, Carex & Hebe

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Power easement in favour of Vector

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Shallow rooting esplanade species within midden areas, Carex & Hebe

Future Stage
Under SLC 67504

Rangitopuni Creek

200
(Local Pupose Esplanade)

Lower growing esplanade species up to path

4
DP 49294

Rangitopuni Creek

300

Timber boardwalk

34

33

32

31

30

52

53

54

25

26

24

27

23

22

55

56

William Blake Way

Riverhead Point Drive

Shallow rooting esplanade species within midden areas, Carex & Hebe

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Timber boardwalk

Shallow rooting esplanade species within midden areas, Carex & Hebe

Esplanade management & planting in accordance with Wildlands Consultants - Ecological Assessment & Management Plan April 2016

Shallow rooting esplanade species within midden areas, Carex & Hebe

R67504
ENG60065935

Planting Legend

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Deacon Point
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Dinning Road, Riverhead

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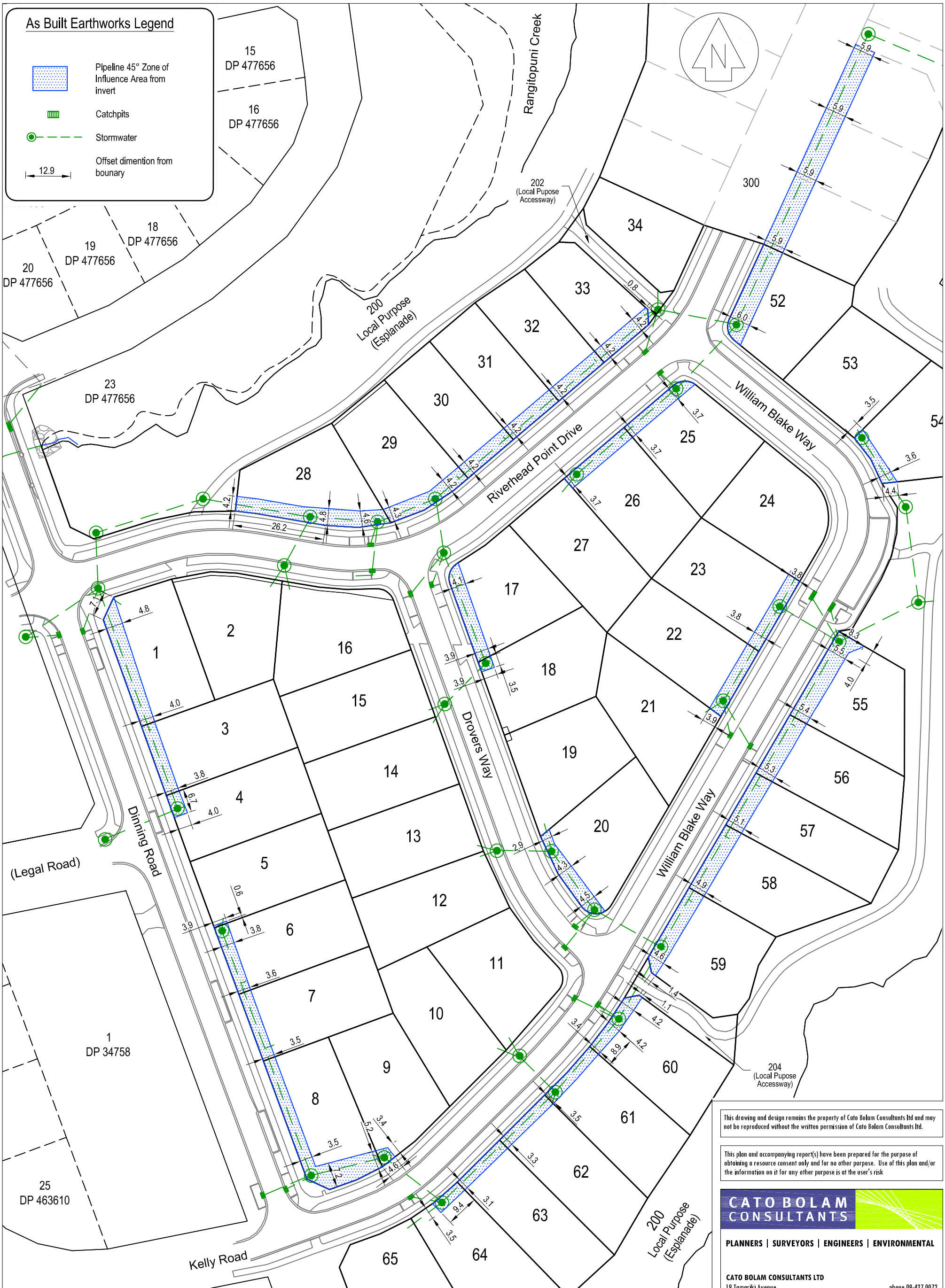
Esplanade Reserve Planting
As Built Plan
Sheet 3 of 3



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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

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Stormwater Drainage Zone of Influence Plan

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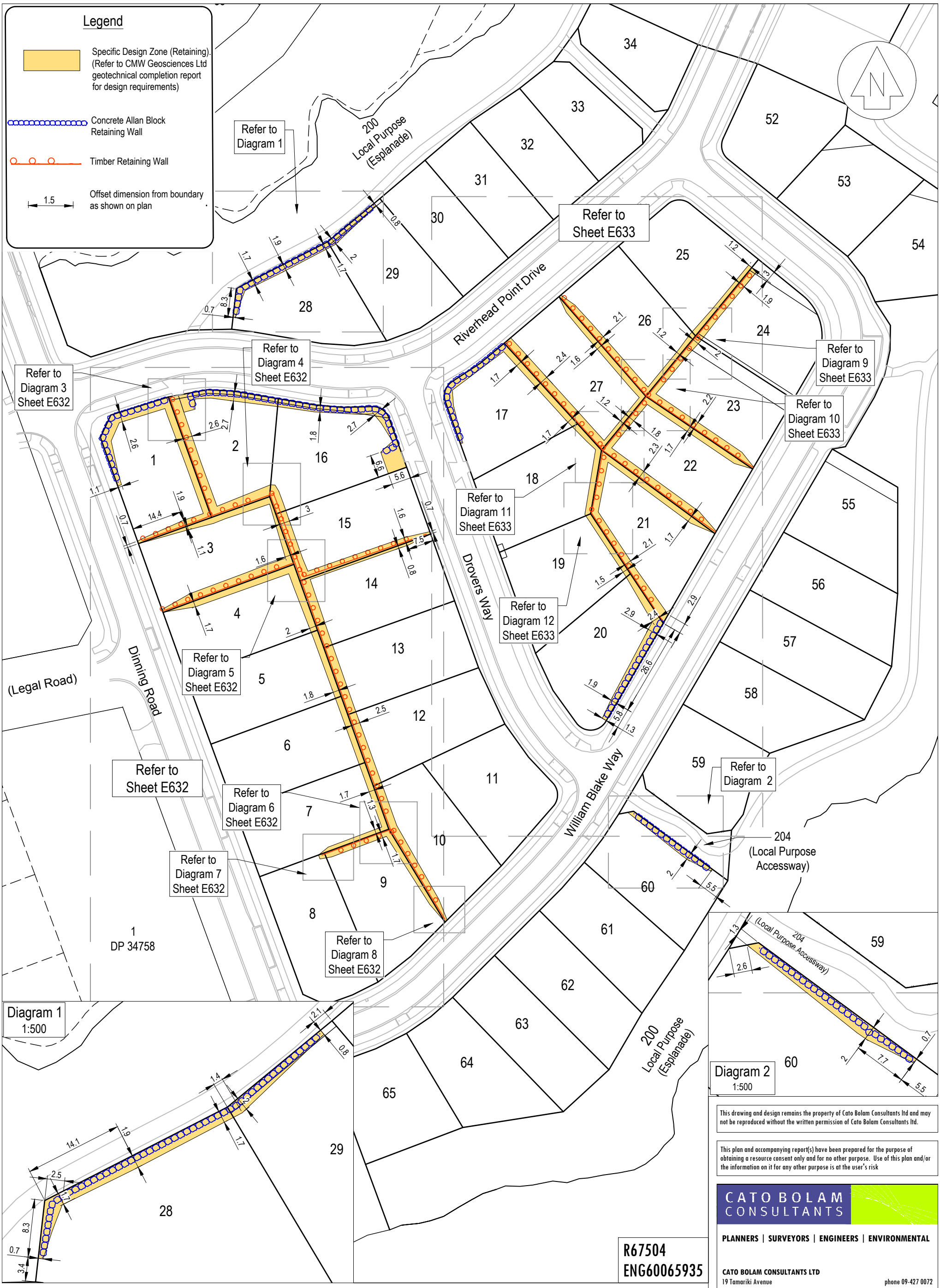
DATE 10/09/17	CAD REFERENCE 34147 E630	SHEET NO E630
DIRECTORY Z:\34147\Acad		JOB NO 34147



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Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Retaining Wall
Specific Design Plan
Sheet 1 of 3

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ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
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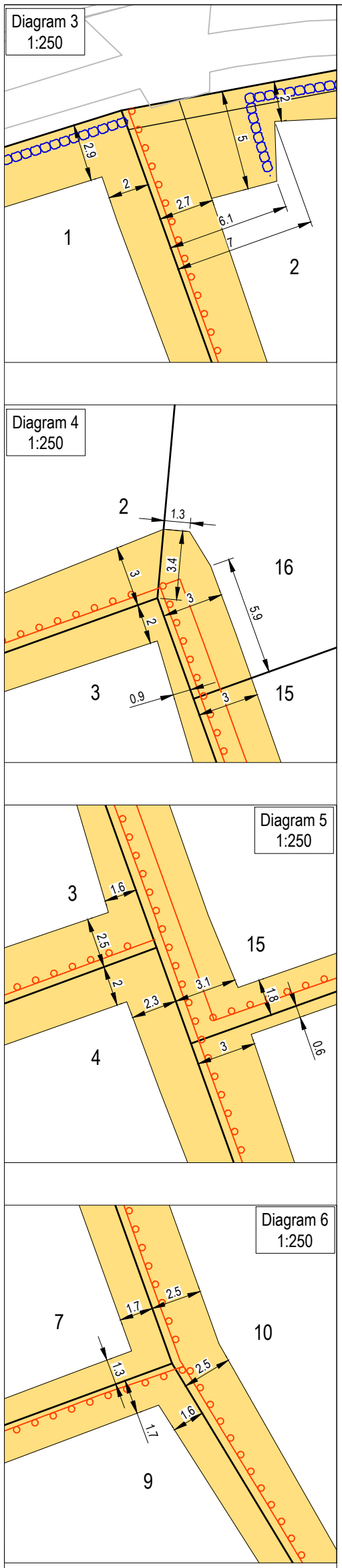
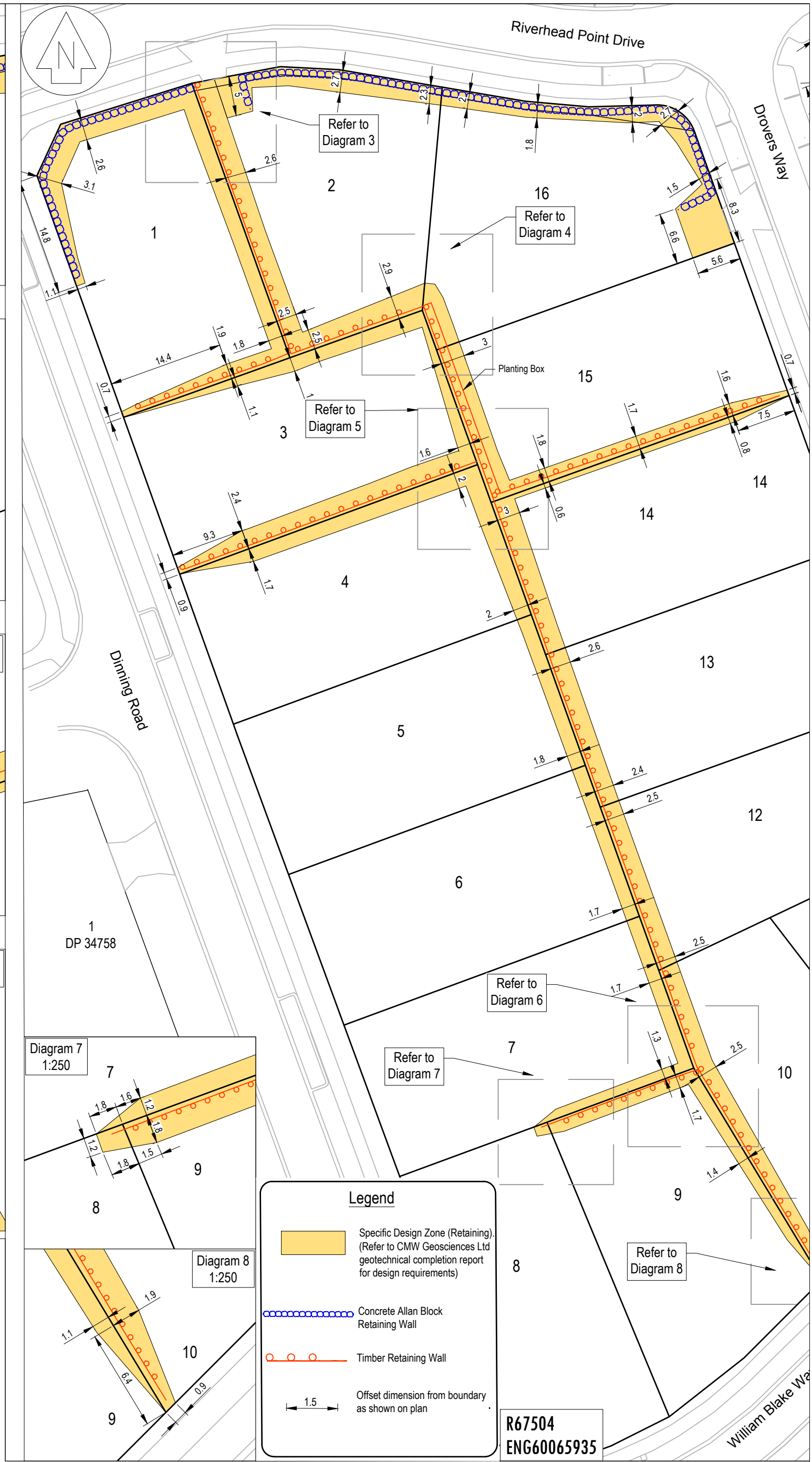
DATE 10/09/17	CAD REFERENCE 34147 E631-E633	SHEET NO E631
DIRECTORY Z:\34147\Acad		JOB NO 34147





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DATE 10/09/17	CAD REFERENCE 34147 E631-E63	SHEET NO E632
DIRECTORY Z:\34147\Acad		JOB NO 34147

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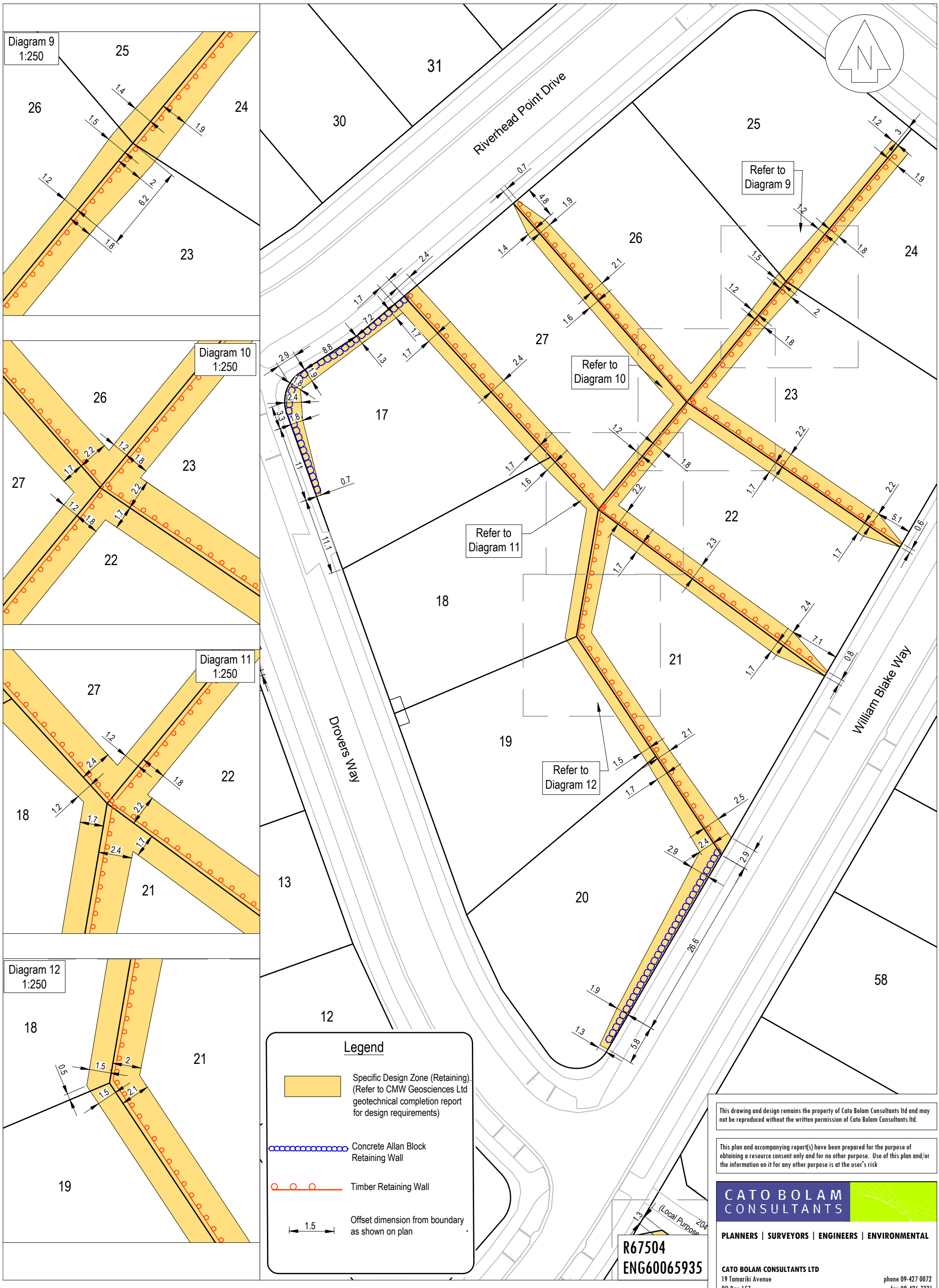
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Retaining Wall
Specific Design Plan
Sheet 2 of 3



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APPROVED	TL	09/17

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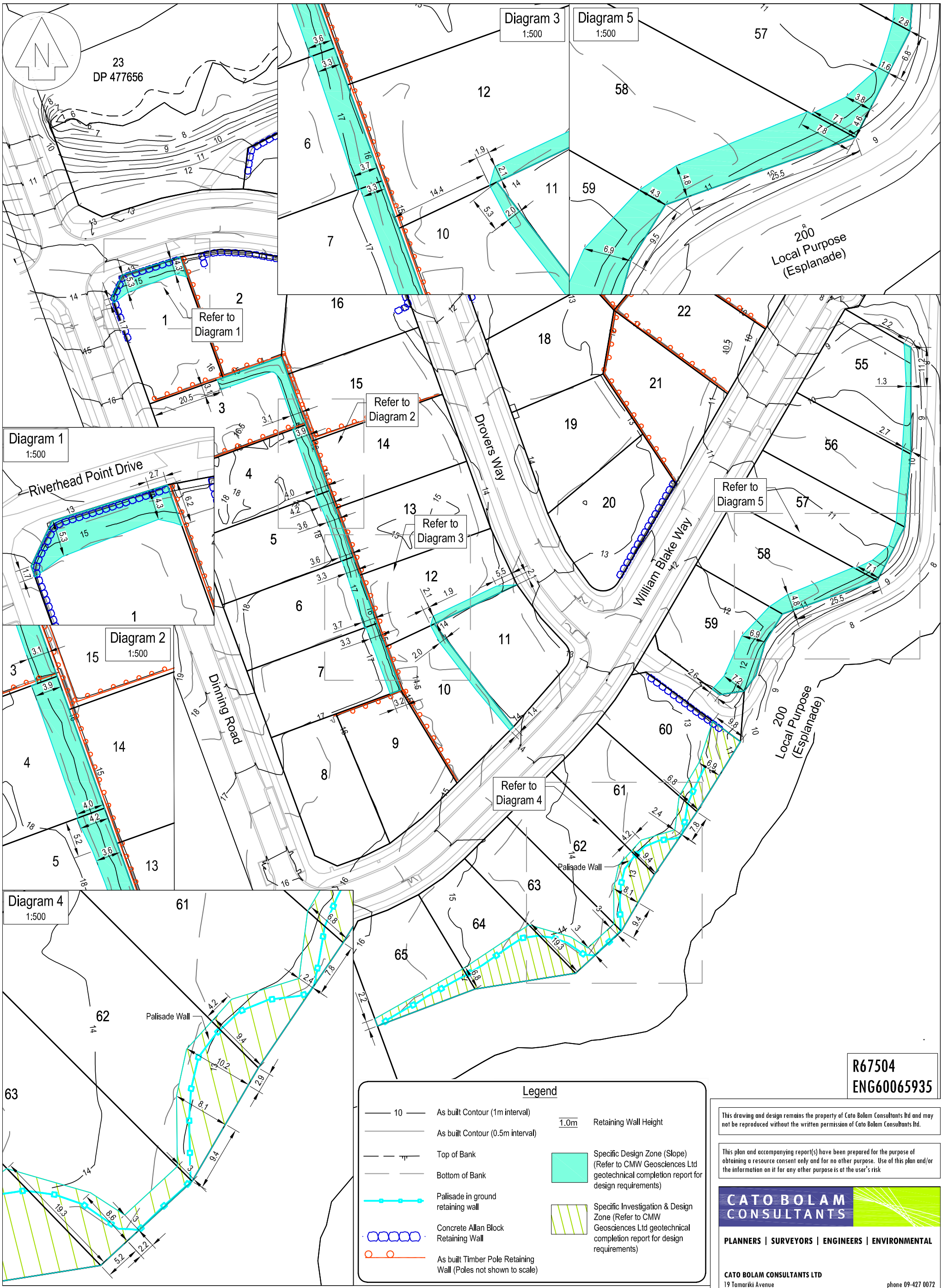
Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Retaining Wall
Specific Design Plan
Sheet 3 of 3

ORIGINAL SCALE 1:500	ORIGINAL SIZE A3	REVISION NO
DATE 10/09/17	CAD REFERENCE 34147 E631-E633	SHEET NO E633
DIRECTORY Z:\34147\Acad		JOB NO 34147



Legend

- 10 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- Top of Bank
- Bottom of Bank
- Palisade in ground retaining wall
- Concrete Allan Block Retaining Wall
- As built Timber Pole Retaining Wall (Poles not shown to scale)
- 1.0m — Retaining Wall Height
- Specific Design Zone (Slope) (Refer to CMW Geosciences Ltd geotechnical completion report for design requirements)
- Specific Investigation & Design Zone (Refer to CMW Geosciences Ltd geotechnical completion report for design requirements)

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Cabra Developments Ltd
Deacon Point
Stages 1 & 2
Dinning Road, Riverhead

DRAWING TITLE

Specific Design Restriction Zone Plan

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1000	A3	
DATE 10/09/17	CAD REFERENCE 34147 E634	SHEET NO E634
DIRECTORY Z:\34147\Acad		JOB NO 34147

Appendix C

Laboratory Test Data

ROADTEST LTD

Revision: 1

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

ROADTEST LTD

Revision: 1

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**		
Date of order:	-	Sample origin:	As below
Sample method:	Hand auger	Sample Description:	-
Sample By:	CMW Geosciences NZ Ltd	Date:	29.06.17

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

ROADTEST LTD

Revision: 1

Report No: 17 0199 00
Page: 1 of 1

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

Job:	**29 Dinning Road, Riverhead**		
Date of order:	03.08.17	Sample origin:	As below
Sample method:	Hand auger	Sample Description:	-
Sample By:	CMW Geosciences NZ Ltd	Date:	26.07.17

Test Details :

Test performed on : Whole Sample
History : Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
433F	42	0.2 to 0.6	59	16	28.7
434F	51	0.2 to 0.6	50	13	28.3
435F	33	0.4 to 0.8	52	12	30.2
436F	57	0.2 to 0.5	60	15	28.1

Comments :

Tested By:	SN & MW	Date :	04 to 07.08.17
Calculated By :	ZH	Date :	11.08.17
Checked By :	KH	Date :	11.08.17

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

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

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

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/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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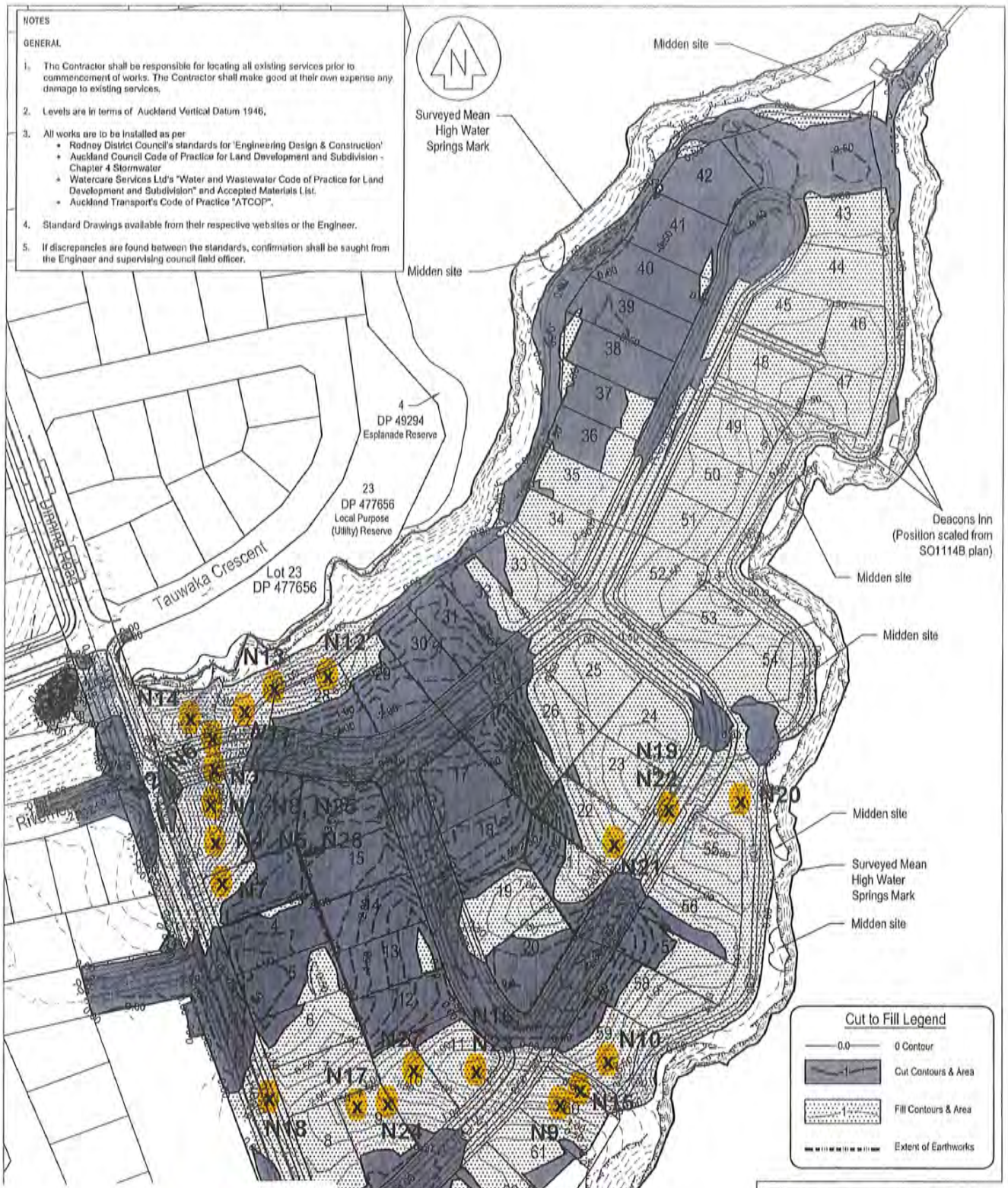
Created By: TG Date: 5/12/2016
Checked By: TG Date: 6/12/2016
Authorised Signatory: Date: 6/12/2016

NOTES

GENERAL

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



NOTE
Fence off archaeological areas prior to commencing work. Work required with these areas to be completed under the supervision of the project archaeologist.

CMW Geosciences

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Walkway amended, culvert added	GW	06/05/16
REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED		
DESIGNED	GW	13/04/2016
DRAWN	GW	13/04/2016
CHECKED		
APPROVED		

CLIENT
CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE
PROPOSED
CUT AND FILL
CONTOURS

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

IANZ ACCREDITED LABORATORY

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

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

Date Sampled	Sample No.	Test Location	Soil Description	In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/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 (%)*	
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	
20/12/2016	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	
	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	
22/12/2016	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	
	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	
30/12/2016	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	
	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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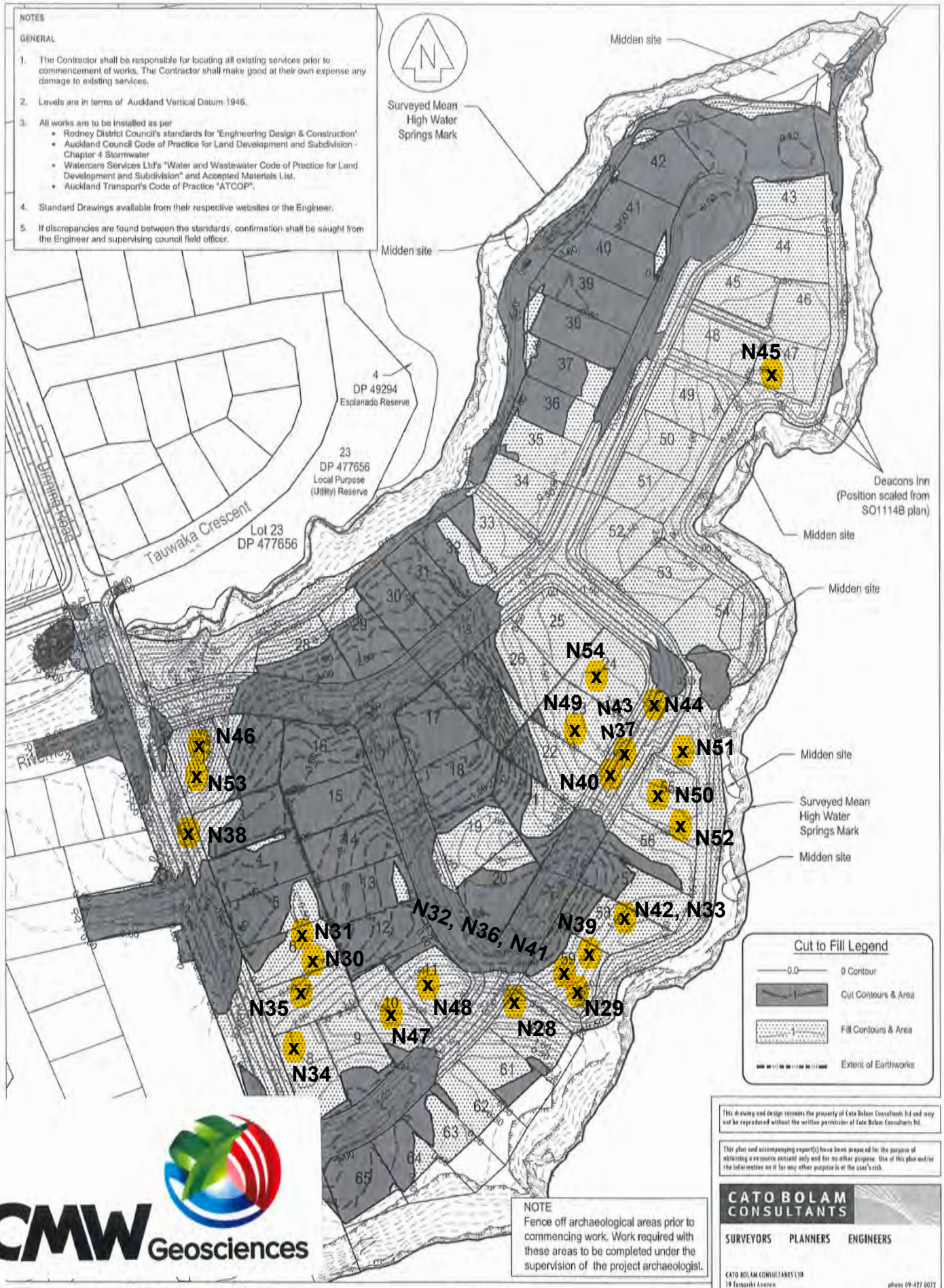
Created By: TG Date: 5/12/2016
Checked By: TG Date: 11/01/2017
Authorised Signatory: Date: 11/01/2017

NOTES

GENERAL

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



NOTE
Fence off archaeological areas prior to commencing work. Work required with these areas to be completed under the supervision of the project archaeologist.

CMW Geosciences

REVISION (DESCRIPTIONS)	NAME	DATE
Walkway amended, culvert added	GW	06/05/16
	NAME	DATE
SURVEYED		
DESIGNED	GW	12/04/2016
DRAWN	GW	13/04/2016
CHECKED		
APPROVED		

CLIENT
CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE
PROPOSED
CUT AND FILL
CONTOURS

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CATO BOLAM CONSULTANTS
SURVEYORS PLANNERS ENGINEERS

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

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

IANZ ACCREDITED LABORATORY

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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: Greg Snook Date: 23/08/2017

NOTES

GENERAL

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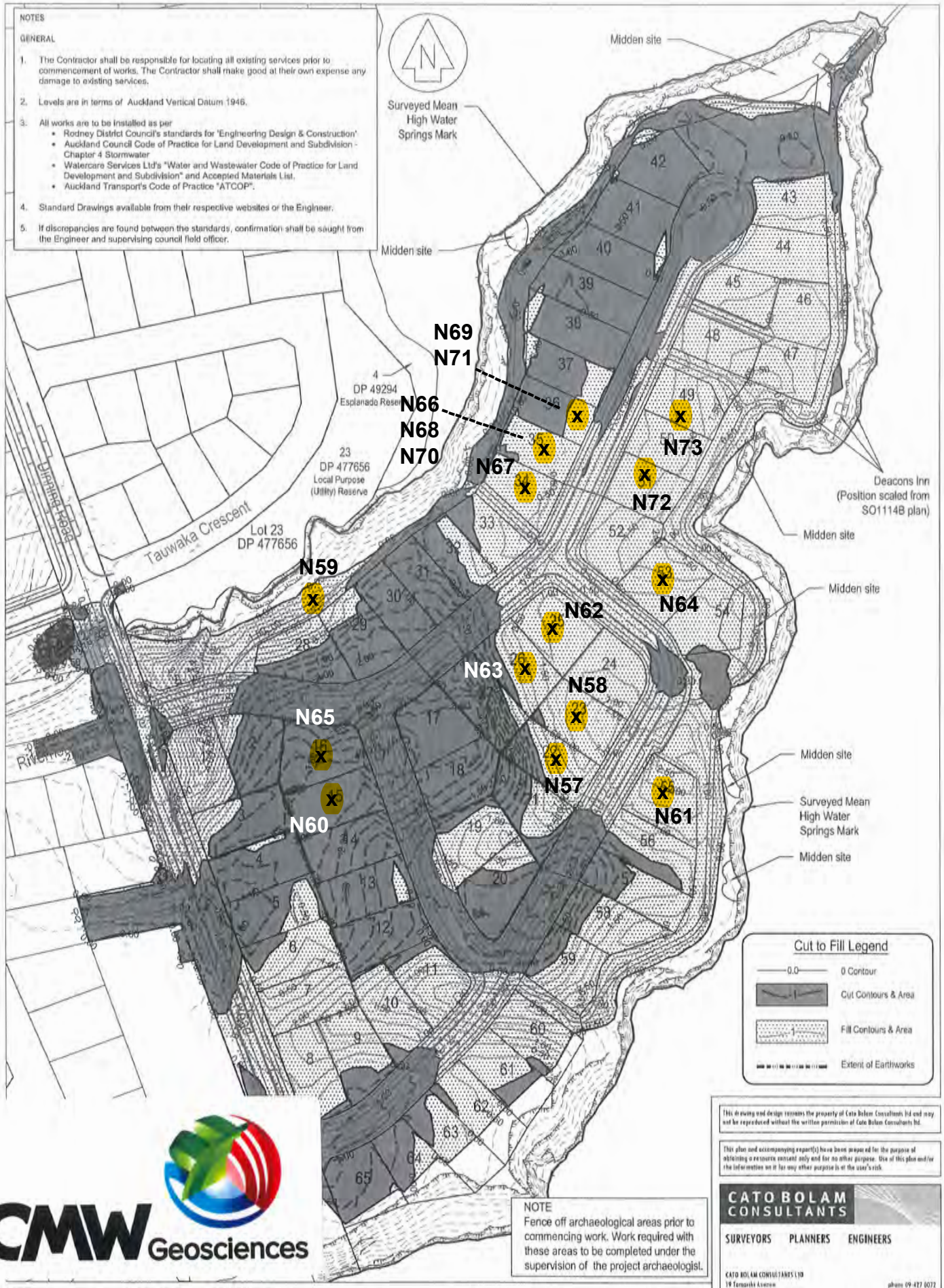

NOTE
Fence off archaeological areas prior to commencing work. Work required with these areas to be completed under the supervision of the project archaeologist.

CMW Geosciences

REVISION (DESCRIPTIONS)	NAME	DATE
Walkway amended, culvert added	GW	06/05/16
	NAME	DATE
SURVEYED		
DESIGNED	GW	12/04/2016
DRAWN	GW	13/04/2016
CHECKED		
APPROVED		

CLIENT
CABRA DEVELOPMENTS LTD
29 DINNING ROAD
RIVERHEAD

DRAWING TITLE
PROPOSED
CUT AND FILL
CONTOURS

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CATO BOLAM CONSULTANTS
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phone 09-427 0072
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email catobolam@catobolam.co.nz

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

CMW Geosciences
Chapman Martin Woodward

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

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

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

Test No.	1		2		3		4		5	
Test Location	Road 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	6	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:	JMJ	Date:	17/01/2017
Checked by:	TG	Date:	5/04/2017
Authorised Signatory:	Jack Mylett-Johnson	Date:	5/4/2017

JACK MYLETT-JOHNSON

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_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

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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:	Jack Myatt-Johnson JACK MYATT-JOHNSON	Date:	5/4/2017

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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

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

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

Test No.	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 Mylett-Johnson	Date:	5/4/2017

JACK MYLETT-JOHNSON

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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
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Testing Locations Selected By: CMW Field Staff

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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*	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*	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
Checked by:	TG	Date:	5/04/2017
Authorised Signatory:	Jack Mynett-Johnson JACK MYNETT-JOHNSON	Date:	5/4/2017

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NOTES

GENERAL

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   - Auckland Council Code of Practice for Land Development and Subdivision - Chapter 4 Stormwater
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   - Auckland Transport's Code of Practice "ATCOP".
4. Standard Drawings available from their respective websites or the Engineer.
5. If discrepancies are found between the standards, confirmation shall be sought from the Engineer and supervising council field officer.

ROADS

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

ROAD MARKING AND SIGNAGE

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

FOR RESOURCE CONSENT

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
Orewa 0946
fax 09-426 7331
email catabolam@catabolam.co.nz

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:1500	A3	
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
Project Name:	29 Dinning Road
Project Location:	Riverhead
Project Number:	AKL2016_0326
Test Date:	16/01/2017
Tested By:	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

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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 Mynett-Johnson	Date:	5/4/2017

JACK MYNETT-JOHNSON

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAE Rev. 0
Project Name:	29 Dinning Road
Project Location:	Riverhead
Project Number:	AKL2016_0326
Test Date:	16/01/2017
Tested By:	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

IANZ ACCREDITED LABORATORY

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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	Date:	17/01/2017
Checked by:	TG	Date:	5/04/2017
Authorised Signatory:	Jade Mynott-Johnson	Date:	5/4/2017

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NOTES

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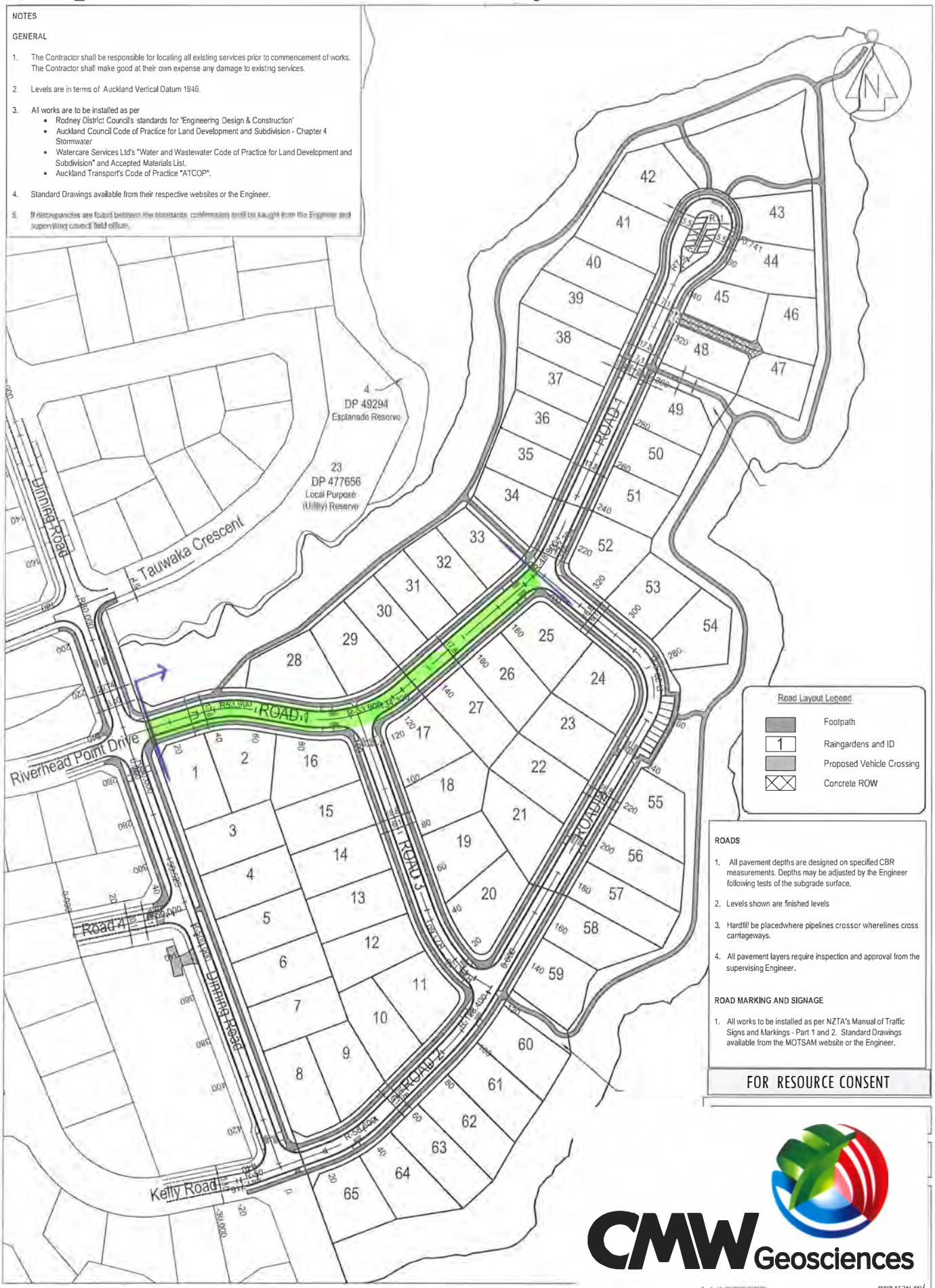

ROADS

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ROAD MARKING AND SIGNAGE

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FOR RESOURCE CONSENT

CMW Geosciences

PO Box 157
Orewa 0946
fax 09-426 7331
email catabolam@catabolam.co.nz

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 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_0326LAF Rev. 0
Project Name:	29 Dinning Road
Project Location:	Riverhead
Project Number:	AKL2016_0326
Test Date:	16/01/2017
Tested By:	JMJ
Client:	Cabra Developments Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
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Testing Locations Selected By: CMW Field Staff

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

Jack Myatt-Johnson

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

NZS 4402: Test 6.5.2: 1988

Report No:	AKL2016_0326LAF Rev. 0
Project Name:	29 Dinning Road
Project Location:	Riverhead
Project Number:	AKL2016_0326
Test Date:	16/01/2017
Tested By:	JMJ
Client:	Cabra Developments Limited
Client Address:	
Client Reference:	

Auckland Laboratory
CMW Geosciences (NZ) Limited
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PO Box 300206, Albany, Auckland, NZ 0752
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Testing Locations Selected By: CMW Field Staff

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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:	Jack Myrett Johnson	Date:	5/4/2017

Jack Myrett-Johnson

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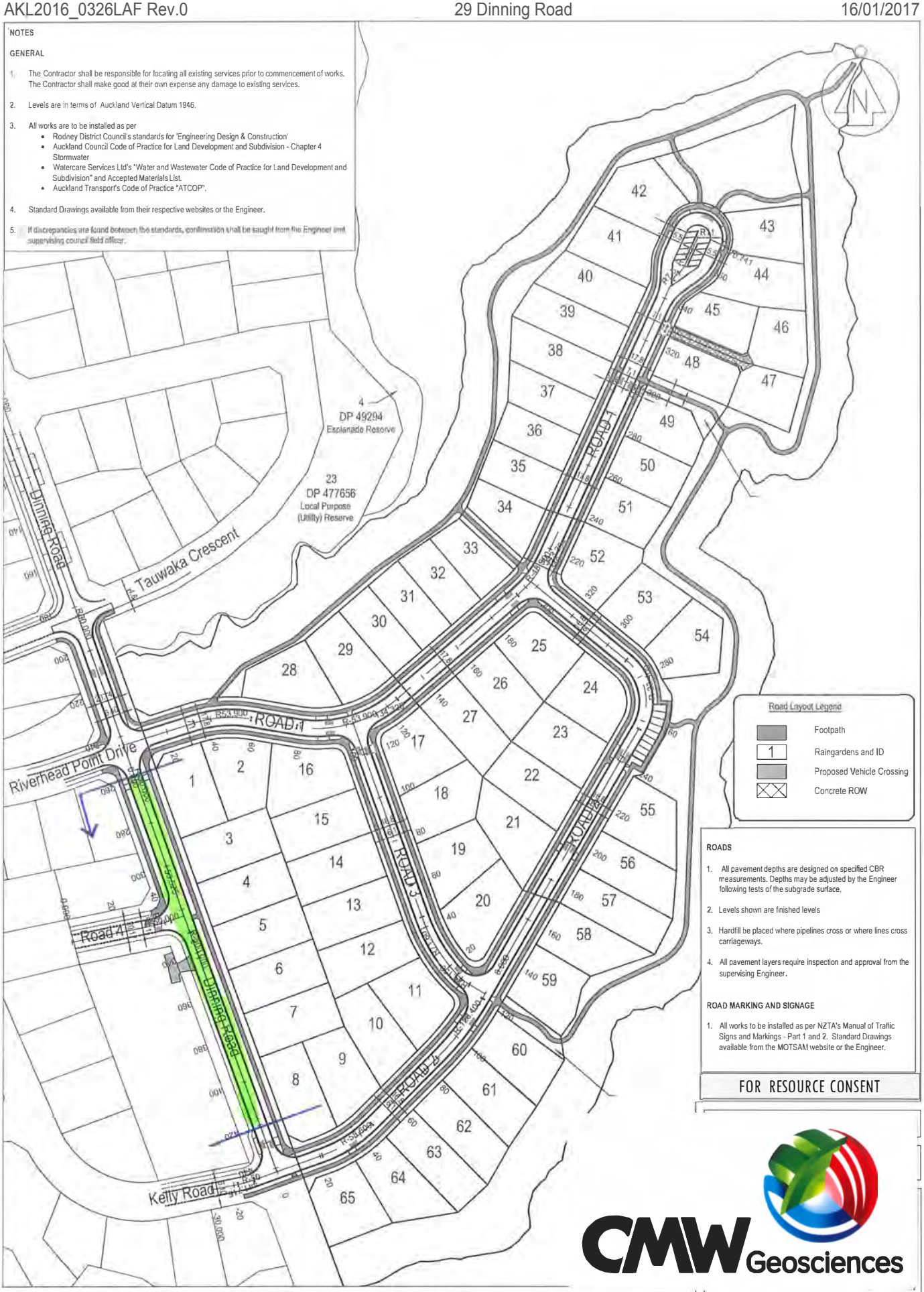

ROADS

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FOR RESOURCE CONSENT

CMW Geosciences

PO Box 157
Orewa 0946
fax 09-426 7331
email catabolam@catabolam.co.nz

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 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
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

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

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

Test No.	1		2		3		4		5	
Test Location	Road 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 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

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

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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:	

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

Testing Locations Selected By: CMW Field Staff

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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						

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

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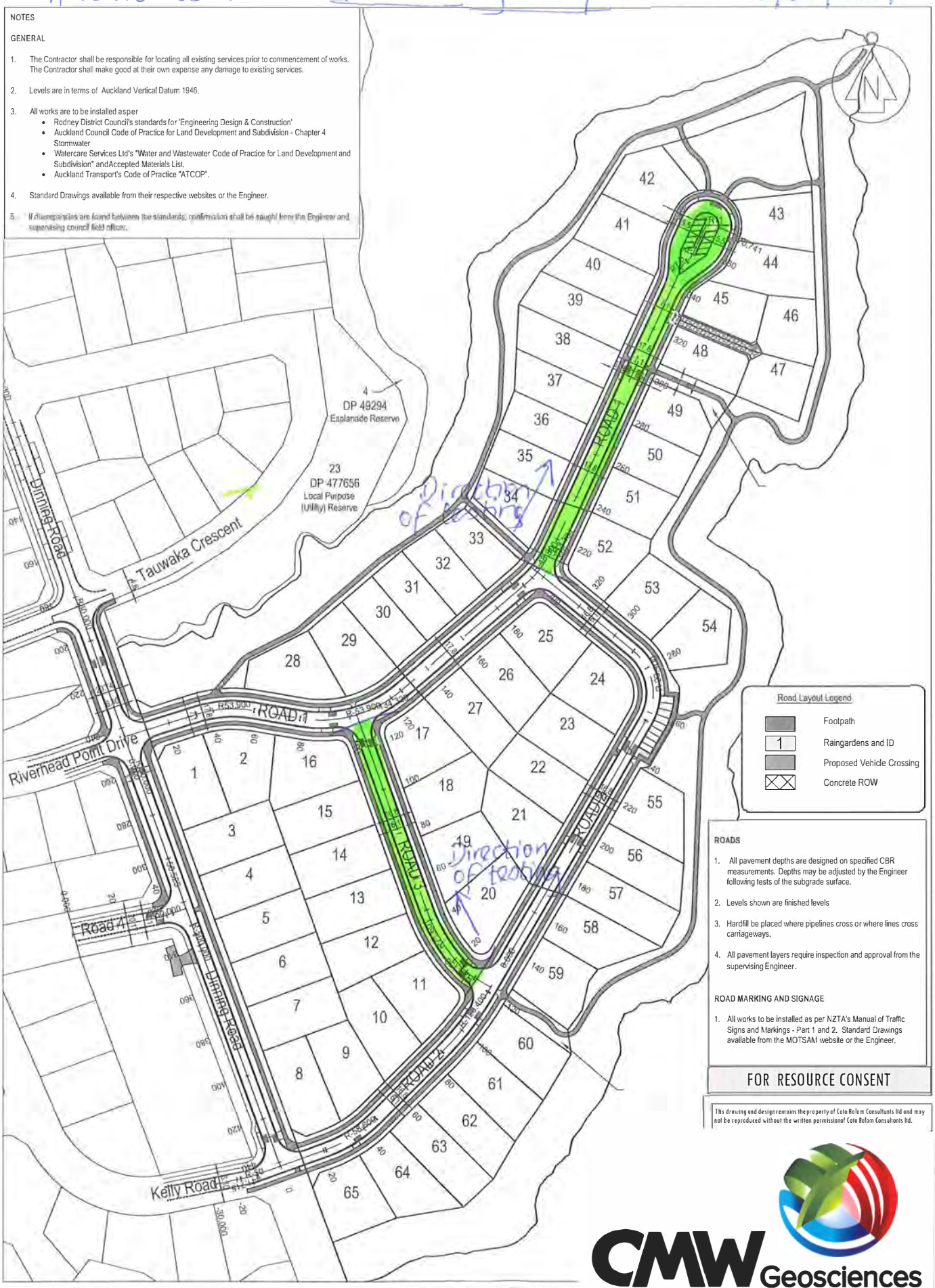
AKL2016-0326 DCP Testing Site plan 3/02/2017

NOTES

GENERAL

1. The Contractor shall be responsible for locating all existing services prior to commencement of works. The Contractor shall make good at their own expense any damage to existing services.
2. Levels are in terms of Auckland Vertical Datum 1946.
3. All works are to be installed asper
   - 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" andAccepted Materials List.
   - Auckland Transport's Code of Practice "ATCOP".
4. Standard Drawings available from their respective websites or the Engineer.
5. If discrepancies are found between the standards, confirmation shall be sought from the Engineer and supervising council field officer.



ROADS

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

ROAD MARKING AND SIGNAGE

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

FOR RESOURCE CONSENT

This drawing and design remains the property of Cato Bolam Consultants ltd and may not be reproduced without the written permissionof Cato Bolam Consultants ltd.

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 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_0326LAH Rev.0
Project Name:	29 Dinning Road
Project Location:	Riverhead
Project Number:	AKL2016_0326
Test Date:	15/03/2017
Tested By:	KP
Client:	Cabra Developments Limited
Client Address:	
Client Reference:	

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

Testing Locations Selected By: CMW Field Staff

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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

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Tested By:	KP
Client:	Cabra Developments Limited
Client Address:	
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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	Date:	16/03/2017
Checked by:	CS	Date:	16/03/2017
Authorised Signatory:		Date:	16/3/2017

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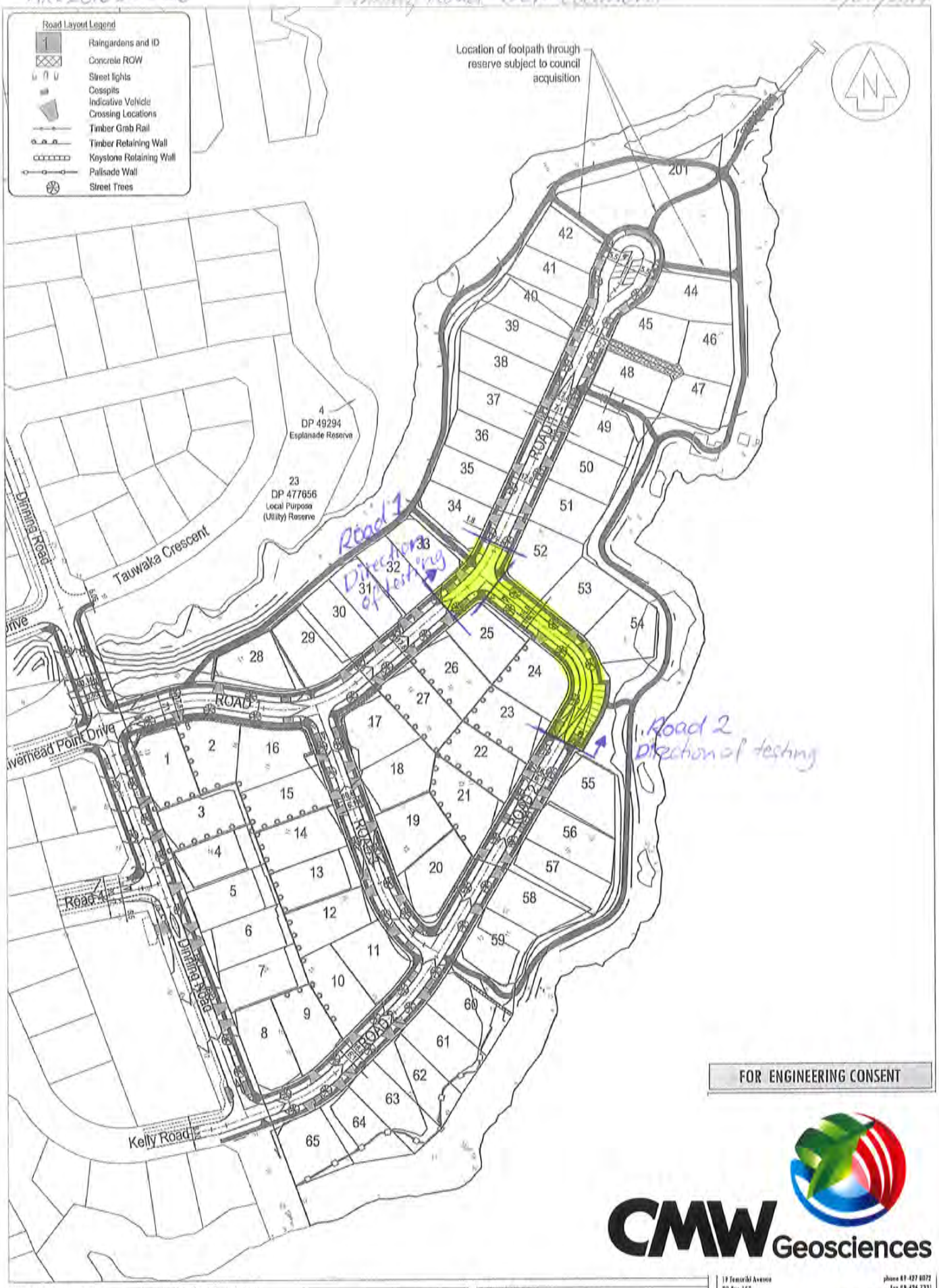
AKL2016_0326 Dinning Road DCP locations 15/03/2017



FOR ENGINEERING CONSENT

CMW Geosciences

R6 For Engineering Approval	GW	27/09/16
R5 Accessible car parks added, bdy amended	GW	17/08/16
R4 Keystone wall amended, Palisade added	GW	18/07/16
REVISION (DESCRIPTIONS)	NAME	DATE

	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 Tomorrow Avenue
PO Box 157
Orewa 0946
phone 09-427 8072
fax 09-426 7331
email cmwbelem@cmwbelem.co.nz

ORIGINAL SCALE 1:1500	ORIGINAL SIZE A3	REVISION NO R6
DATE 08/04/2016	CAD REFERENCE 34147 E200 Roading	SHEET NO E200
DIRECTORY G:\34147\ACAD		JOB NO 34147

Appendix E

Producer Statements

17 October 2017 Ref: AKL2016_0326AG Rev.0

Cabra Properties Limited
PO Box 197
Orewa
Auckland 0946

Attention: Duncan Unsworth

Dear Duncan,

RE: CERTIFICATION FOR THE CONSTRUCTION OF TIMBER POLE RETAINING WALLS AND KEYSTONE WALLS AT 29 DINNING ROAD, RIVERHEAD - RMA R67504, ENG 60065935

CMW Geosciences (CMW) has visited the site at 29 Dinning Road, Riverhead, legally described as Lot 1 DP 124412, on numerous occasions during January 2017 through to June 2017 to observe the site works for the construction of timber pole and keystone retaining walls.

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

- Engineering approval from Auckland Council referenced RMA R67504 and ENG 60065935, issued 25 November 2016;
- Geotechnical Retaining Wall Design Report for 26 Dinning Road, Riverhead prepared by CMW Geosciences, referenced AKL2016_0326 AD Rev.1, dated 25 October 2016.

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

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

Construction aspects of the timber pole and keystone retaining walls were checked for the aforementioned points over numerous visits.

Compaction of the reinforced hardfill was checked by proof rolling on site to observe deflection under compaction and was tested using a NDM and an impact hammer.

Ground conditions were tested using a handheld shear vane in the bases and sides of the pile excavations. The retained soil was also tested as part of the observations. All ground conditions met or exceeded design specifications.

When water was observed in the pile excavations the contractor was advised to either tremie the concrete to the base of the excavation or remove the water immediately prior to pouring concrete. CMW were not present at the time of concrete pouring.

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

For and on behalf of CMW Geosciences

Richard Knowles

Principal Geotechnical Engineer, CPEng

Attachments: Producer Statement - Construction Review

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

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

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

ISSUED BY: .....R.J. KNOWLES of CMW GEOSCIENCES (NZ) LIMITED.....
(Construction Review Firm)

TO: ....CABRA PROPERTIES 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: .....29 DINNING ROAD, RIVERHEAD ... .
(Address)

LOT..... 1 .... **DP** .....124412..... **SO** .....

.. ....CMW GEOSCIENCES... ... .has been engaged by ..... CABRA PROPERTIES LIMITED .....
(Construction Review Firm)

To provide☐CM1☐CM2☐CM3☐CM4☐CM5*(Engineering Categories)* or ☐ observation as per agreement with owner/developer

or ☒other ...REFER TO ATTACHED DOCUMENT AKL2016_0326AG REV.0 DATED 17/10/2017.....services
(Extent of Engagement)

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

documents relating to Building Consent No. .....RMA R67504 and ENG 60065935..... and those relating to

Building Consent Amendment(s) Nos. ..... N/A .....issued during the

course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variations(s) No. .....N/A..... (copies attached)

or by the attached Schedule ☐ have been issued during the course of the works.

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

I, ...R. J. KNOWLES.....am: ☒CPEng No. 160049 AUCKLAND COUNCIL AUTHOR #2342
(Name of Construction Review Professional)

☐Reg Arch No. .....

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

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

SIGNED BY ..... R. J. KNOWLES ..... **ON BEHALF OF** .....CMW GEOSCIENCES (NZ) LIMITED.....

Date:... .....18/10/17..... Signature:.....

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

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

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, IPENZ AND NZIA

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

PS2 Design Review Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

PS3 Construction Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011[2]

PS4 Construction Review Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

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As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to $500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers[3]). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

1 Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013

2 NZIA Standard Conditions of Contract SCC 2011

3 Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)

4 PN Guidelines on Producer Statements

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz

17 October 2017 Ref: AKL2016_0326AH Rev.0

Cabra Properties Limited
PO Box 197
Orewa
Auckland 0946

Attention: Duncan Unsworth

Dear Duncan,

RE: CERTIFICATION FOR THE CONSTRUCTION OF A PALISADE (IN-GROUND) WALL AT 29 DINNING ROAD, RIVERHEAD - RMA R67504, ENG 60065935

CMW Geosciences (CMW) have visited the site at 29 Dinning Road, Riverhead, legally described as Lot 1 DP124414, on multiple occasions during April 2017 to observe the site works for the construction of a palisade (in-ground) wall.

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

- Engineering approval from Auckland Council referenced RMA R67504 and ENG 60065935, issued 25 November 2016;
- Geotechnical Palisade Retaining Wall Design Report for 26 Dinning Road, Riverhead prepared by CMW Geosciences, referenced AKL2016_0326 AC Rev.0, dated 1 July 2016.

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

- Assessment of soil strengths in the exposed pile hole excavations;
- Pile size, depth, spacing and diameter;
- Timber treatment and placement;

Our testing showed that ground conditions were in excess of the design assumptions of 100kPa, and embedment depth, spacing and diameter of pile holes were in accordance with the design. The offset of the palisade wall from the crest of the slope was greater than 2.0m.

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

For and on behalf of CMW Geosciences

Richard Knowles

Principal Geotechnical Engineer, CPEng

Attachments: Producer Statement - Construction Review

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

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

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

ISSUED BY: .....R.J. KNOWLES of CMW GEOSCIENCES (NZ) LIMITED.....
(Construction Review Firm)

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

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

IN RESPECT OF: .. .. CONSTRUCTION OF A PALISADE (IN-GROUND) WALL.....
(Description of Building Work)

AT: .....29 DINNING ROAD, RIVERHEAD ... .
(Address)

LOT..... 1 .... **DP** .....124412..... **SO** .....

.. ....CMW GEOSCIENCES... ... .has been engaged by ..... CABRA PROPERTIES LIMITED .....
(Construction Review Firm)

To provide☐CM1☐CM2☐CM3☐CM4☐CM5*(Engineering Categories)* or ☐ observation as per agreement with owner/developer

or ☒other ...REFER TO ATTACHED DOCUMENT AKL2016_0326AH REV.0 DATED 17/10/2017.....services
(Extent of Engagement)

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

documents relating to Building Consent No. .....RMA R67504 and ENG 60065935..... and those relating to

Building Consent Amendment(s) Nos. ..... N/A .....issued during the

course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variations(s) No. .....N/A..... (copies attached)

or by the attached Schedule ☐ have been issued during the course of the works.

On by the basis of ☒this ☐these review(s) and information supplied by the contractor during the course of the works and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that ☒All ☐Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) .....B1.....of the Building Code.
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SIGNED BY ..... R. J. KNOWLES ..... **ON BEHALF OF** .....CMW GEOSCIENCES (NZ) LIMITED.....

Date:... .....18/10/17..... Signature:.....

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