7 December 2022

22 VINTRY DRIVE, HUAPAI

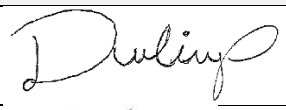
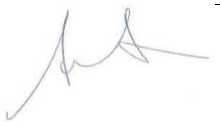
(STAGE 2, 45 STATION ROAD)

GEOTECHNICAL COMPLETION REPORT

Cabra Developments Ltd

AKL2018-0018AD Rev.0

AKL2018-0018AD		
Date	**Revision**	**Comments**
30 November 2022	A	Initial draft for internal review
7 December 2022	0	Final issue to client

	Name	**Signature**	**Position**
Prepared by	Donte Whimp		Engineering Geologist
Reviewed by	Andrew Linton		Principal Geotechnical Engineer CMEngNZ, CPEng
Authorised by	Richard Knowles		Principal Geotechnical Engineer CMEngNZ, CPEng

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Appendices

1 INTRODUCTION

In accordance with our instructions, this Geotechnical Completion Report has been prepared for Cabra Developments Ltd as part of the documentation to be submitted to Auckland Council following earthworks to form Stage 2 of the 45 Station Road development, now known as 22 Vintry Drive, in Huapai.

This report covers the construction period commencing February 2018 to November 2022 and is intended to be used for certification purposes for new lots (listed below) created from existing Lot and DP numbers as follows:

- 12 new residential lots numbered Lots 133 to 144 inclusive;
- 2 road extensions numbered Lots 411 and 413 and named Vintry Drive and Croatia Ave respectively;
- 1 Superlot numbered Lot 300
- 1 Stormwater Reserve numbered Lot 503

This stage of the Huapai Triangle Development is located off Vintry Drive, Huapai. As can be seen from the as-built plans, 8 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 3.5 metres.

Construction of this subdivision has been undertaken in general accordance with;

- Auckland Council's Resource Consent number LAN-66247 and REG-66251 and Engineering Approval letter ENG60388149 – 22 Vintry Drive and dated 23/02/22
- Auckland Council's Building Consent BCO10350728 for cantilever timber pole walls numbered 1 to 6
- NZS4431:2022
- Auckland Council's Code of Practice for Land Development and Subdivision, Chapter 2 - Earthworks and Geotechnical, Version 2.0, July 2022
- Cato Bolam Consultants Ltd consented drawing set referenced 40352, dated 21/07/2021
- CMW Geosciences' Geotechnical Scheme Plan Letter Report referenced AKL2018-0018AA Rev 0, dated 3 April 2018
- CMW Geosciences' Groundwater Level Memo referenced AKL2018-0018AB, Rev 0, dated 14 August 2018
- CMW Geosciences' Geotechnical Design Report referenced AKL2018-0018AC, Rev 0, dated 23 May 2022
- Coffee Geotechnics (NZ) Limited Geotechnical Constraints Report for Huapai Triangle Special Housing Area, Kumeu referenced GENZAUCK16252AA-Rev01 dated 10 September 2014

For the construction of this stage of the development, the following roles were fulfilled as defined in NZS 4402:2002 and the Ministry for the Environment Contaminated Land Management Guidelines:

- Geotechnical Designer: CMW Geotechnical NZ Limited
- Certifier: CMW Geotechnical NZ Limited
- Recognised Laboratory: CMW Geotechnical NZ Limited
- Contractor: Opie Contractors Ltd
- Sub-contractor (earthworks): Bob Hick Earthmoving Ltd

As CMW has fulfilled the roles of both earth fills Certifier and Geotechnical Designer, this report has been prepared as a combined report covering both of these aspects of the project work.

2 DESCRIPTION OF WORKS

Demolition of the Nobilo Winery began in February 2018 and included removal of the existing warehouses, office buildings and storage tanks. Once demolition was completed in early April 2018, Opie Contractors 2014 Ltd and their earthmoving subcontractor Bob Hick Earthmoving mobilised to site. Earthworks were carried out in conjunction with neighbouring earthworks sites, all of which were being observed by CMW Geosciences.

Works began with the removal of existing uncertified fill, associated subsoil drainage and soft, slightly organic material from existing gully areas which were uncovered as part of the demolition works. Once these were completely removed, filling operations began. Fill materials were generally sourced from the neighbouring earthworks sites and blended with available cut materials from within the Huapai Triangle.

Fill was placed and compacted during the 2018/2019 earthworks season with specific localised filling in Stage 2 generally completed during that season by the start of March 2019. Development works then moved to other parts of the site.

The contractor returned to this stage of site in May 2022 to begin civil works and roading. In early May the contractor was forming the Vintry Drive extension and Croatia Ave subgrades, before installing service trenches and crossings late into the season. Works progressed to completion of services and civil works.

July 2022 had efforts focussed on installing the lot boundary retaining walls denoted as RWB 01- RWB 06, which were completed by the end of August 2022.

Following construction of the retaining walls the lots were cut to grade and topsoiled.

The main items of plant used by the contractors included:

- Various Excavators
- 1 x Moxy
- 1 x 10T Twin smooth drum roller
- 1 x 10T Padfoot roller
- Specific civil and roading construction plant

3 GEOTECHNICAL QUALITY CONTROL

3.1 Site Observations

During the works, site visits were typically undertaken several times each week to assess compliance with NZS 4431 and project 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 and backfilling of underfill drains ;
- Excavation and backfilling of sewer and stormwater trenches;
- Retaining wall pile hole excavations;
- Construction of cantilever pole retaining walls including ground conditions, pile size, spacing and depth; and
- Placement and compaction of engineered fills.

3.2 Compaction Control

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

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

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

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

While these tests showed on occasions that the contractor was struggling to achieve the required compaction standards with the prevailing site and soil conditions, to the best of our knowledge, all areas of fill were re-worked as necessary. Subsequent testing confirmed compliance with the specification.

4 EVALUATION OF COMPLETED EARTHWORKS

4.1 Natural Hazards

The appended as-built drawings depict the extents of a series of zones that contain limitations intended to ensure that future building and/ or earthworks on the lots is undertaken in a manner that does not lead to buildings being subject to any of the natural hazards described in Section 71(3) of the Building Act, i.e. erosion, falling debris, subsidence, slippage, and inundation. Consideration of the inundation hazard was outside the scope of CMW's brief and has been assessed by others. The applied zones include:

- **Specific Design Zones (retaining)** - intended to protect the retaining walls from overloading at the crest or undermining at the toe that could lead to instability;
- **Specific Design Zones (slope)** – intended to protect building development from long term creep effects on or adjacent to steep slopes and to protect the slopes from inappropriate loading or undermining.

Full descriptions of the restrictions associated with each of these zones are presented in our Opinion on Suitability in ***Appendix A***. Additional information is also provided in some of the following sections.

4.2 Liquefaction

The liquefaction risk for the lots on this development has been assessed as follows:

- Review of Auckland Council GIS maps confirms the damage category to be: Unlikely
- CMW also consider the liquefaction risk to be unlikely in this area due to the underlying material age and type.

4.3 Land Stability and Erosion Control

The subdivision scheme layout includes a series of batter slopes to form level terraces for building platforms. The batters include portions of the residential lots with moderately steep gradients as depicted on the as-built drawings.

Design of the works to provide appropriate stability conditions that meet regulatory requirements for the land within these stages, including the batters, has led to the construction of deep subsoil drainage and cantilever pole retaining walls.

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

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

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

4.4 Retaining Walls

Cantilever pole retaining walls have been constructed in the locations shown on the appended Cato Bolam As-built Plan. These walls reach a maximum height of approximately 1.95m and were designed by CMW Geosciences. The construction was also observed by this consultancy. A copy of the Producer Statement - Construction Review is provided in ***Appendix E***.

Descriptions of the building and earthworks restrictions within the vicinity of these walls (Specific Design Zones – retaining) are contained in our Opinion on Suitability in ***Appendix A.***

4.5 Fill Induced Settlement

The majority of the filling on this stage of the development was placed prior to March 2019.

On the basis of the relatively minor magnitude of fill depths on this site, together with the elapsed time since it was placed, we consider that remaining post-construction settlements will be within code limits.

4.6 Service Line Trenches

As part of the civil works, sanitary sewer and stormwater services were trenched throughout the development as shown on the appended Cato Bolam Ltd Stormwater and Sanitary Sewer As-built Plans.

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 appended to this report***,*** extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision, depicts their requirements for stormwater pipes. Details for water and wastewater pipes are available in the Watercare COP1 - General Requirements and Procedures. The majority of lots are known to have service trenches within the lots as shown on the appended stormwater and wastewater as-built plans. The resulting restrictions are presented in our Opinion on Suitability in ***Appendix A.***

4.7 Subsoil Drains and Groundwater

The appended Cato Bolam Ltd as-built plan shows the positions of an underfill drain that was installed during the earthworks as described in the preceding sections.

As the drain is located at a minimum depth of 3.5m below the existing ground surface, and was installed as part of the earthworks operations so is covered by engineered fill, we do not anticipate any restrictions on development being necessary for the residential lots. Nonetheless, the presence of the drain shall be considered where any deep foundations or excavations are proposed. Descriptions of restrictions associated with this drain are contained in our appended Opinion on Suitability in ***Appendix A***.

Theis drain was installed at the base of fill to assist with the earthworks operations by capturing seepages at the cleared ground level. It requires no specific maintenance and while its ongoing function is not critical to stability conditions, it provides ongoing control of groundwater levels and pore water pressure relief so its ongoing function should not be compromised by future works.

Typically these drains comprise punched draincoils surrounded by drainage gravel. Specific design details are provided in the project reports and specifications. If drain depths are unclear at specific locations, they can be estimated from the depths of fills depicted on the as-built plans.

4.7.1 Subsoil Drain Outlets

Retaining wall drainage discharges to the reticulated stormwater system within several of the subject lots, via a field catchpit. It is important that the function of these outlets is maintained. Details of the outlet structures and locations are shown on the Cato Bolam Ltd as built plans.

4.7.2 Groundwater

In all areas, based on our work to date we anticipate groundwater levels remaining well below the depth of influence of anticipated earthworks and foundation works for NZS 3604 type dwellings.

4.8 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 as required.

4.9 Reserves

The appended as-built plans depict the formation of a green finger storm water reserve numbered Lot 503.

Any further development of this area will require specific design.

4.10 Design of Shallow Foundations

4.10.1 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 our Opinion on Suitability in ***Appendix A.***

If higher geotechnical ultimate bearing capacities are required than have been specified, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

4.10.2 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.

4.10.3 Soil Expansiveness Classification

Seasonal shrinking and swelling results in vertical surface ground movement which can cause significant cracking of floor slabs and walls. NZS 3604:2011[1] excludes from the definition of 'good ground', soils with a liquid limit of more than 50% and a linear shrinkage of more than 15% due to their potential to shrink and swell as a result of seasonal fluctuations in water content. For soils exceeding these limits, NZS 3604 has historically referenced AS 2870[2]. for foundation design advice. However, the November 2019 update of Acceptable Solution B1/AS1[3] provides amendments to NZS 3604 that define a method for testing and classifying the soils and provides foundation designs for specific, simple house configurations across the range of expansive soil conditions.

[1] Standards New Zealand (2011) Timber-framed buildings, NZS 3604:2011, NZ Standard

[2] Standards Australia Limited (2011) *Residential slabs and footings*, AS 2870-2011, Australian Standard, NSW

[3] Ministry of Business, Innovation and Employment (2019) *Acceptable Solutions and Verification Methods for NZ Building Code Clause B1 Structure,* B1/AS1, Amendment 19

Nevertheless, there is evidence[4] indicating that the use of the B1/AS1 method of assessment of expansiveness may be inaccurate.

Testing of samples obtained from the site was carried out by Road Test Ltd an IANZ registered Testing Authority to provide the geotechnical parameters required for our assessment.

Certificates for the test results are presented in ***Appendix D.***

Test results were used in conjunction with visual-tactile assessment of the site soils and BRANZ Report SR120A[5] to determine expansive site Classes as defined in AS 2870, "Residential Slabs and Footings – Construction". Resulting classifications are provided in the Statement of Suitability in ***Appendix A***.

The expansive soil hazard is addressed by a combination of design that is appropriate for the expansive Class described in our Opinion on Suitability in ***Appendix A***, together with care during site preparation for foundations and diligent maintenance of plantings near the foundations.

Site Preparation

There have been many instances 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 requiring extensive repairs or even complete house re-builds once the soil moisture contents have returned to higher levels. In some instances, perimeter foundations have been appropriately treated but floor slabs have been poured on dry ground. Infiltration of moisture via pipe bedding has then occurred.

Foundation contractors need to be made aware of the extreme damage potentially caused by these circumstances and the need to maintain appropriate moisture contents in both the footings and building platform subgrade between the time of excavation and the pouring of concrete.

Remedial actions that may be appropriate include combinations of 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.

Site Maintenance

Landowners must be mindful that either the planting or removal of high water demand plants where their roots may extend close to footings (i.e. within a lateral distance of 1.5 times the mature tree height) can cause settlement or heave damage.

4.10.4 Site (Seismic) Class

Our assessments of NZS 1170.5 site Class is provided in our Opinion of Suitability and the Summary Table, both in ***Appendix A***.

4.11 Topsoil Depths

Topsoil depths have been checked by the drilling of a borehole in the approximate centre of the building platform on each lot. The results are considered indicative for each lot, but may be subject to variations. Topsoil depths are between 100 and 300mm on these stages of the development.

Site specific findings are contained in our Opinion on Suitability Summary in ***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.

[4] Rogers, N., McDougall, N., Twose, G., Teal, J. & Smith, T. (2020) The Shrink Swell Test: A Critical Analysis, *NZ Geomechanics News,* Issue 99, pages 66-80.

[5] Fraser Thomas Limited (2008) - Addendum Study Report (BRANZ SR120A), Soil Expansivity in the Auckland Region – Final Report

5 CLOSURE

Additional important information regarding the use of your CMW report is provided in the '*Using your CMW Report*' document attached to this report.

This report has been prepared for use by Cabra Developments Ltd in relation to the Stage 2, 22 Vintry Drive, Huapai project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

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 Opinion on Suitability in ***Appendix A*** and our Suitability Statement in ***Appendix B*** also rely 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, they assume 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.

Where a party other than Cabra Developments Ltd seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

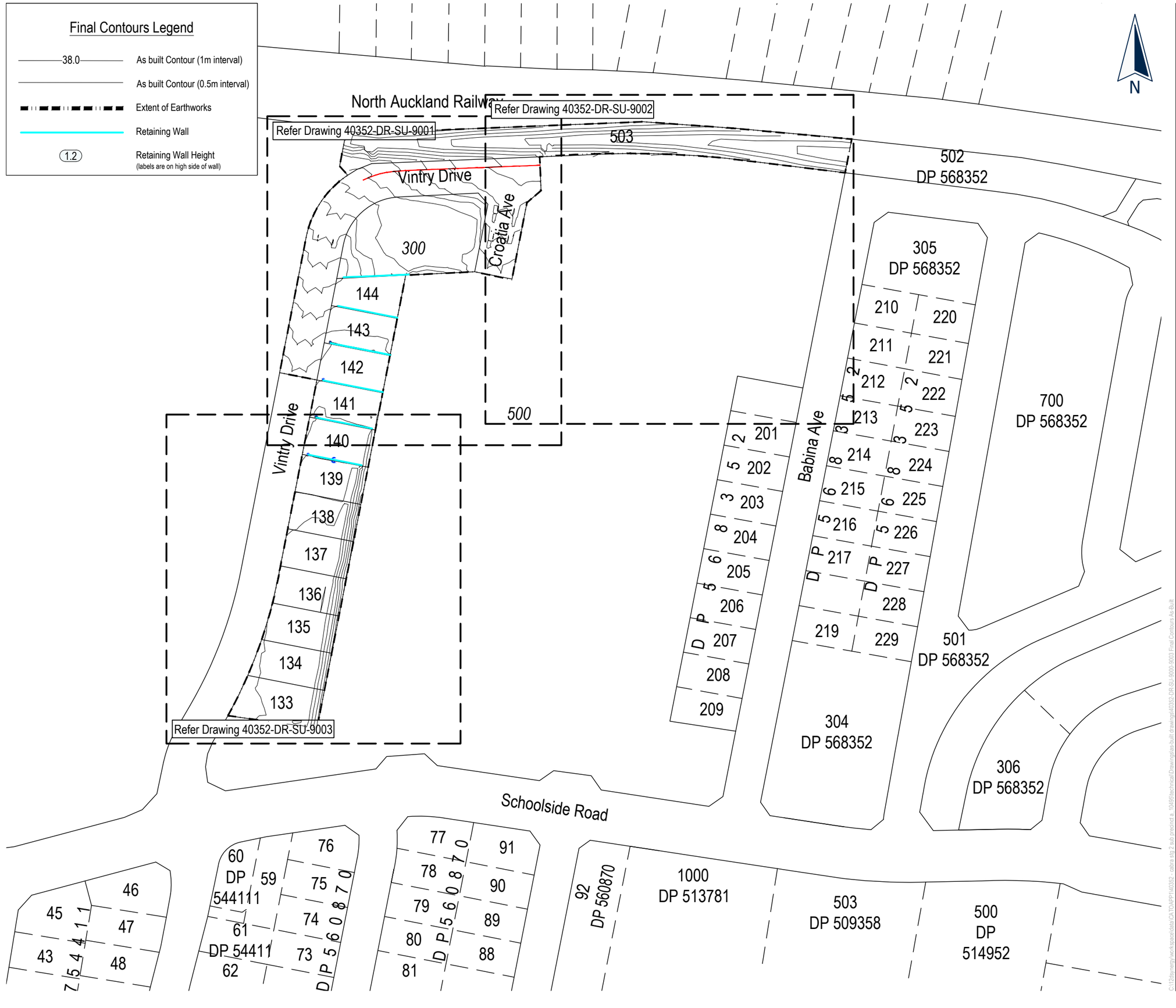
The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

Drawings

Title	Reference No.	Date	Revision
Cover Page	40352-DR-SU-0001-0	December 2022	-
Overall Final Contours As-Built Plan	40352-DR-SU-9000	2/12/2022	0
Enlarged Final Contours As-Built Plan – Sheet 1	40352.DR-SU-9001	2/12/2022	0
Enlarged Final Contours As-Built Plan – Sheet 2	40352.DR-SU-9002	2/12/2022	0
Enlarged Final Contours As-Built Plan – Sheet 3	40352.DR-SU-9003	2/12/2022	0
Overall Cut to Fill As-Built Plan	40352-DR-SU-9010	2/12/2022	0
Enlarged Cut to Fill As-Built Plan – Sheet 1	40352-DR-SU-9011	2/12/2022	0
Enlarged Cut to Fill As-Built Plan – Sheet 2	40352-DR-SU-9012	2/12/2022	0
Enlarged Cut to Fill As-Built Plan – Sheet 3	40352-DR-SU-9013	2/12/2022	0
Overall Roading As-Built Plan	40352-DR-SU-9100	2/12/2022	0
Enlarged Roading As-Built Plan	40352-DR-SU-9101	2/12/2022	0
Overall PWC Sewer As-Built Plan	40352-DR-SU-9200	2/12/2022	2
Enlarged PWC Sewer As-Built Plan	40352-DR-SU-9201	2/12/2022	2
Overall Stormwater As-Built Plan	40352-DR-SU-9300	2/12/2022	0
Enlarged Stormwater As-Built Plan Sheet 1	40352-DR-SU-9301	2/12/2022	0
Enlarged Stormwater As-Built Plan Sheet 2	40352-DR-SU-9302	2/12/2022	0
Enlarged Stormwater and Raingarden As-Built Details	40352-DR-SU-9303	2/12/2022	0
Overall Water Reticulation As-Built Plan	40352-DR-SU-9400	2/12/2022	2
Enlarged Water Reticulation As-Built Plan	40352-DR-SU-9401	2/12/2022	2
Overall Zone of Influence As-Built Plan	40352-DR-SU-9800	2/12/2022	0
Enlarged Zone of Influence As-Built Plan Sheet 1	40352-DR-SU-9801	2/12/2022	0
Enlarged Zone of Influence As-Built Plan Sheet 2	40352-DR-SU-9802	2/12/2022	0

Final Contours Legend

- 38.0 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- Extent of Earthworks
- Retaining Wall
- 1.2 — Retaining Wall Height (labels are on high side of wall)



CABRA Land & Property Development

ENG60388149 /BUN60318445

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 ± 10mm.

Signed: ..... Registered Professional Surveyor

Date: 02/12/2022

Name: Kerryn McPherson
Phone : (09) 427 0072
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Cabra Developments Limited
22 Vintry Drive
Huapai

Overall Final Contours As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:1500	A3

DRAWING NO.	REVISION
40352-DR-SU-9000	0

Final Contours Legend

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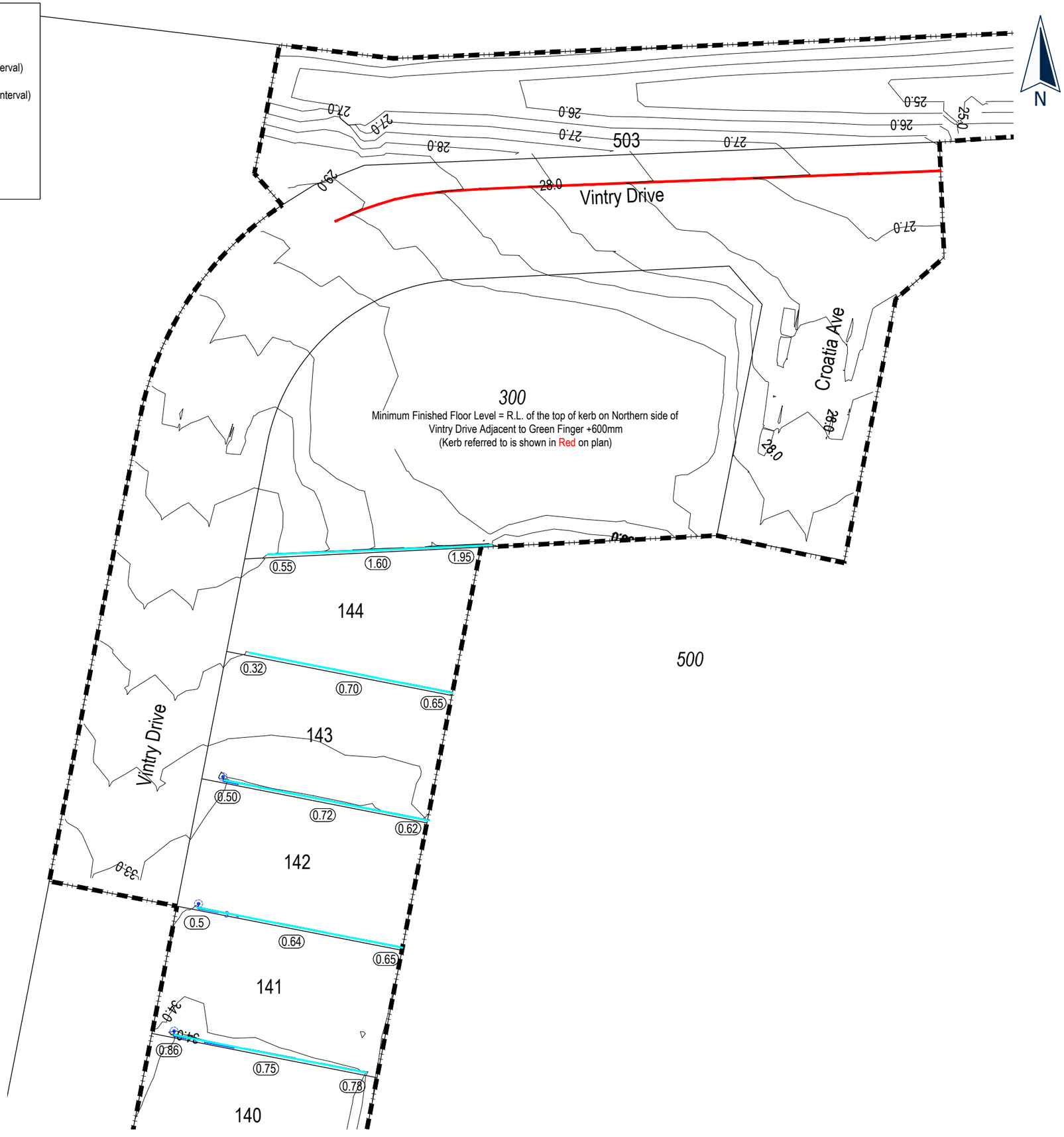

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Signed: .....
Registered Professional Surveyor

Date: 02/12/2022

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Cabra Developments Limited
22 Vintry Drive
Huapai

Enlarged Final Contours
As-Built Plan
Sheet 1

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:500	A3

DRAWING NO.	REVISION
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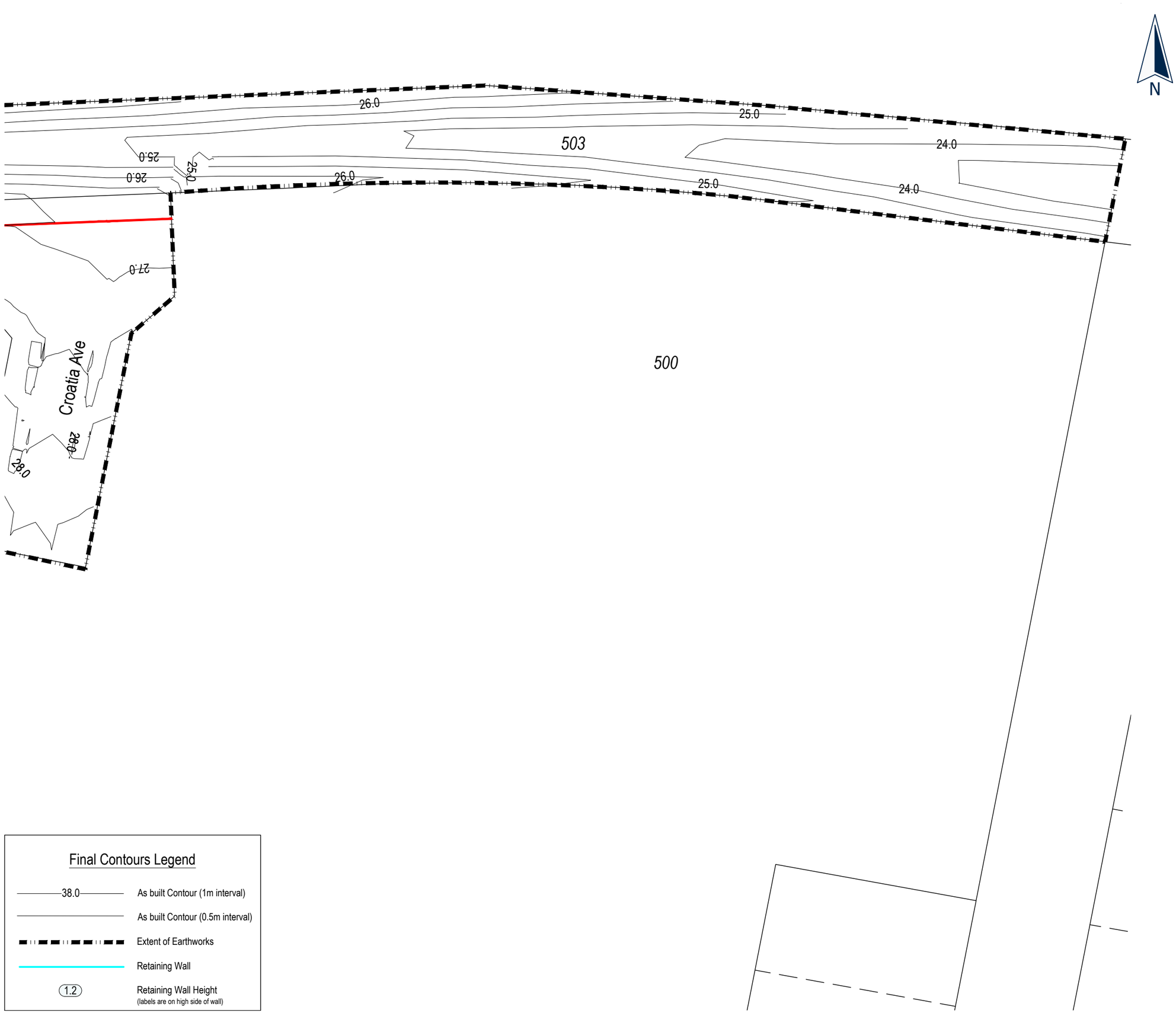

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	Extent of Earthworks
	Retaining Wall
1.2	Retaining Wall Height (labels are on high side of wall)

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ENG60388149 /BUN60318445

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* The levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 10mm.

Signed: .....
Registered Professional Surveyor

Date: 02/12/2022

Name: Kerryn McPherson
Phone : (09) 427 0072
Email : KerrynM@catobolam.co.nz

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Cabra Developments Limited
22 Vintry Drive
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Enlarged Final Contours As-Built Plan Sheet 2

FOR COMPLETION

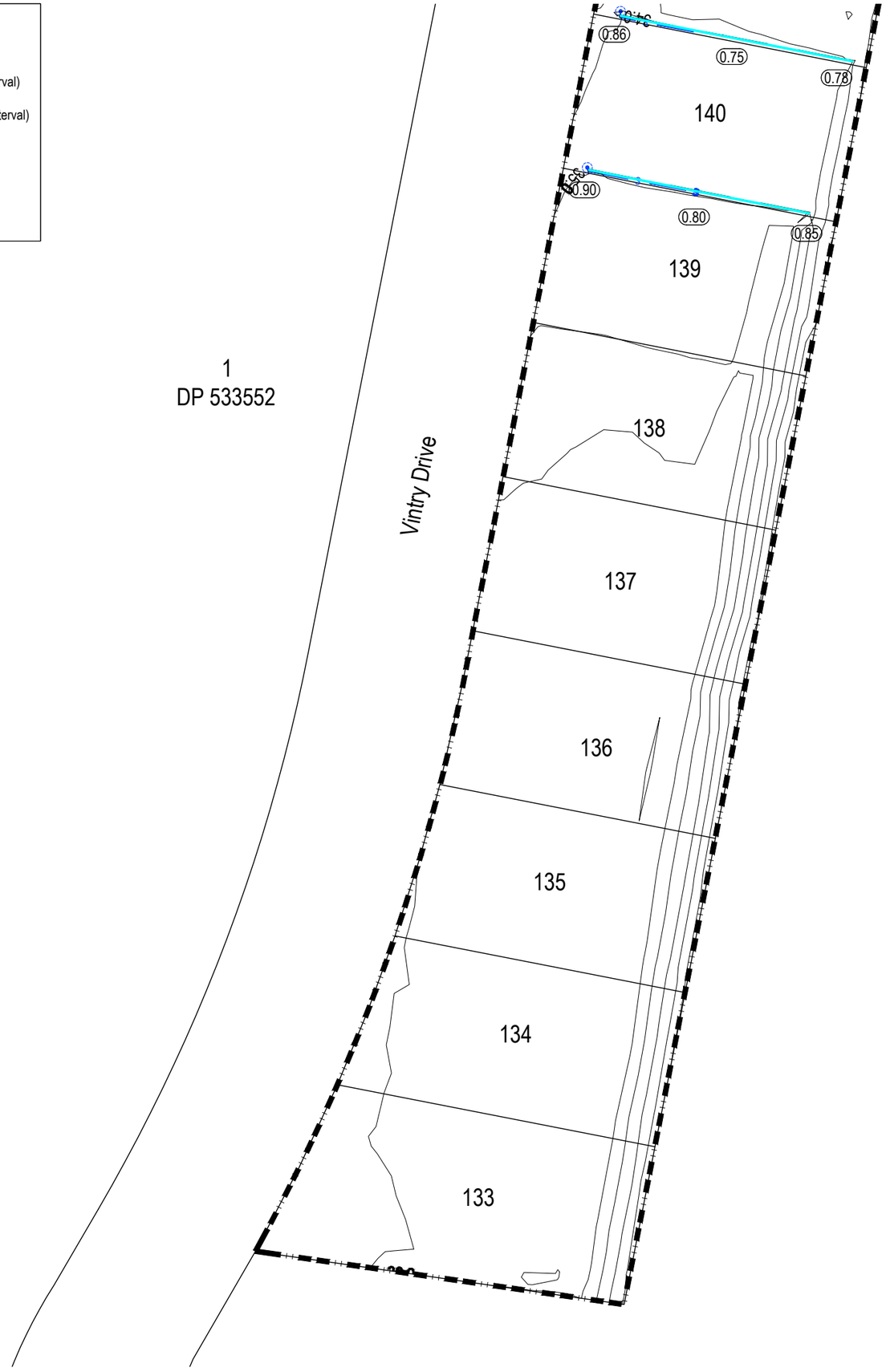
No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9002	0

Final Contours Legend

- 38.0 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- Extent of Earthworks
- Retaining Wall
- 1.2 — Retaining Wall Height (labels are on high side of wall)



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Cabra Developments Limited
22 Vintry Drive
Huapai

Enlarged Final Contours
As-Built Plan
Sheet 3

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9003	0

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Overall Cut to Fill As-Built Plan

FOR COMPLETION

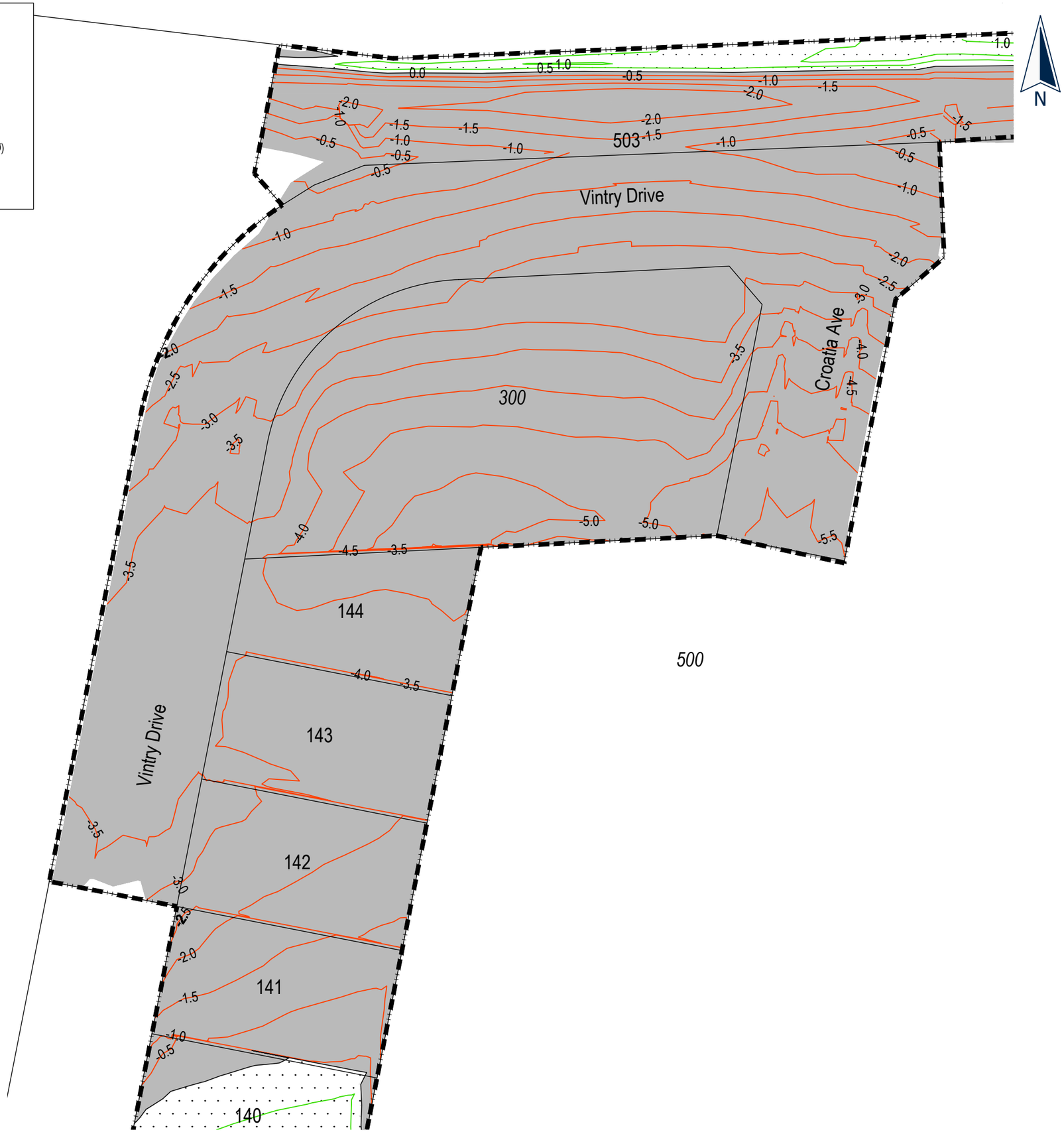
No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	08/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
08/11/2022	1:1500	A3

DRAWING NO. 40352-DR-SU-9010
REVISION 0

Cut / Fill Legend

- 1.0 — 0 Contour
- -1.0 — Cut Contours & Area
- 0.5 — Fill Contours & Area
- SA40 — Subsoil Drainage (150Ø) with depth
- Extent Earthworks



CABRA Land & Property Development

ENG60388149 /BUN60318445

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Cabra Developments Limited
22 Vintry Drive
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Enlarged Cut to Fill As-Built Plan Sheet 1

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
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	DRAWN	B.Nel	08/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
08/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9011	0

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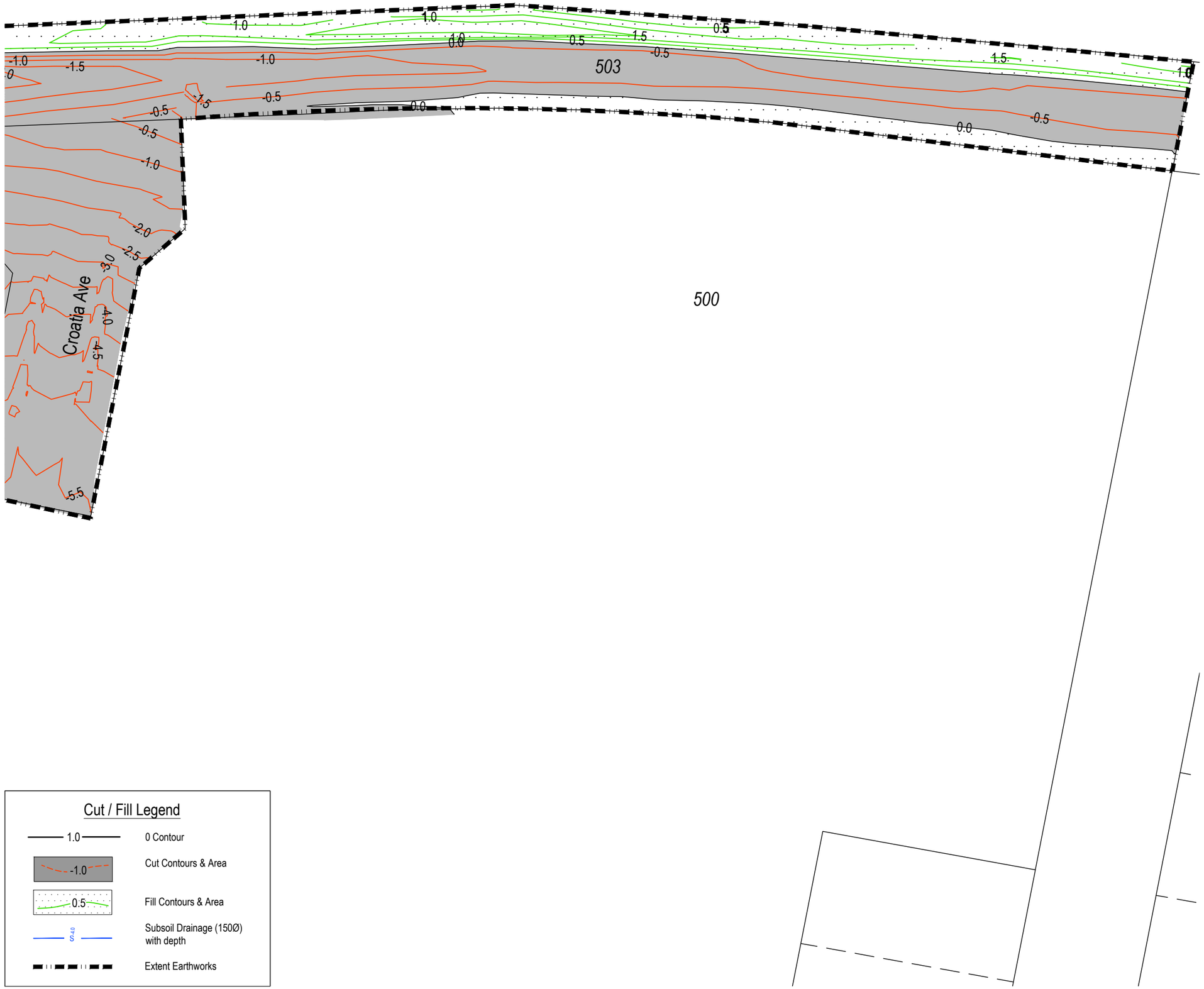

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Cut / Fill Legend

1.0	0 Contour
-1.0	Cut Contours & Area
0.5	Fill Contours & Area
S49	Subsoil Drainage (150Ø) with depth
	Extent Earthworks

CABRA Land & Property Development

ENG60388149 /BUN60318445

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22 Vintry Drive
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Enlarged Cut to Fill As-Built Plan Sheet 2

FOR COMPLETION

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	DRAWN	B.Nel	08/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
08/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9012	0

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Cut / Fill Legend

1.0	0 Contour
-1.0	Cut Contours & Area
0.5	Fill Contours & Area
S140	Subsoil Drainage (150Ø) with depth
	Extent Earthworks

1
DP 533552

500

N

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Enlarged Cut to Fill As-Built Plan Sheet 3

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
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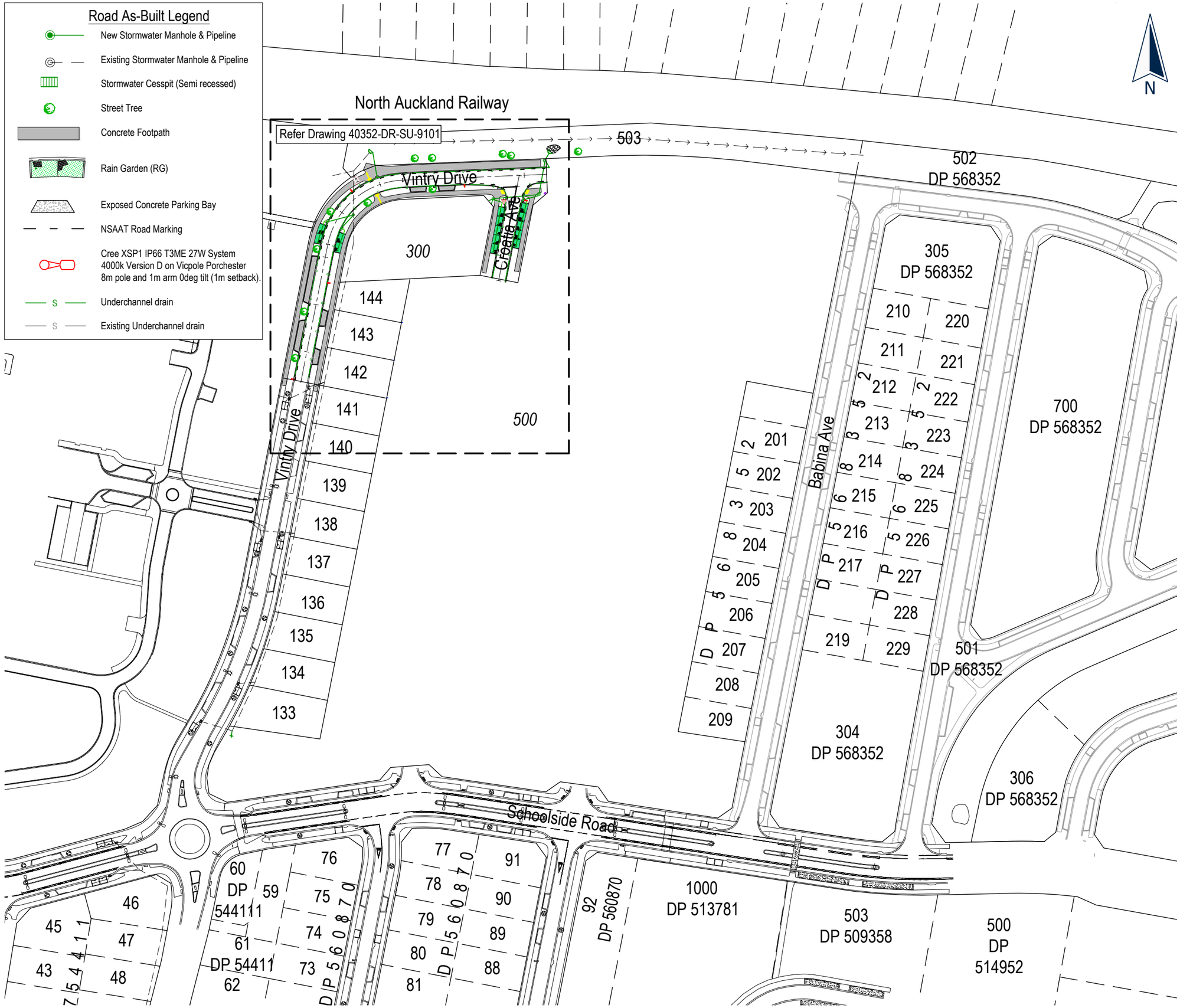
	DRAWN	B.Nel	08/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
08/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9013	0

Road As-Built Legend

- New Stormwater Manhole & Pipeline
- Existing Stormwater Manhole & Pipeline
- Stormwater Cesspit (Semi recessed)
- Street Tree
- Concrete Footpath
- Rain Garden (RG)
- Exposed Concrete Parking Bay
- NSAAT Road Marking
- Cree XSP1 IP66 T3ME 27W System 4000k Version D on Vicpole Porchester 8m pole and 1m arm 0deg tilt (1m setback).
- S — Underchannel drain
- S — Existing Underchannel drain



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Land & Property Development

ENG60388149 /BUN60318445

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22 Vintry Drive
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Overall Roading As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
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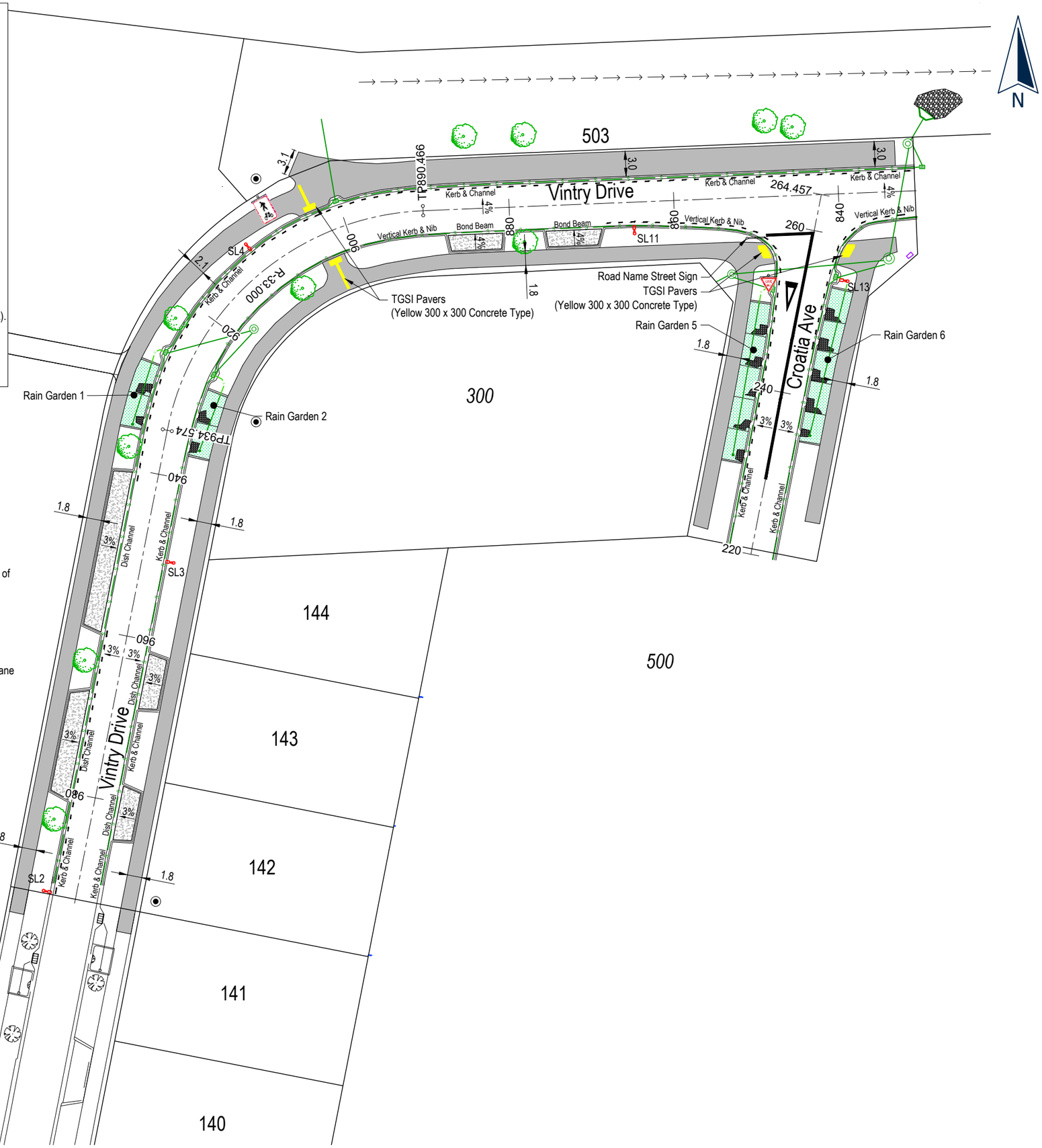
DRAWN		B.Nel	08/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
08/11/2022	1:1500	A3

DRAWING NO.	REVISION
40352-DR-SU-9100	0

Road As-Built Legend

- New Stormwater Manhole & Pipeline
- Existing Stormwater Manhole & Pipeline
- Stormwater Cesspit (Semi recessed)
- Street Tree
- Concrete Footpath
- Rain Garden (RG)
- Exposed Concrete Parking Bay
- NSAAT Road Marking
- Cree XSP1 IP66 T3ME 27W System 4000k Version D on Vicpole Porchester 8m pole and 1m arm 0deg tilt (1m setback).
- S — Underchannel drain
- S — Existing Underchannel drain



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.

Road Footpaths
1.8m wide, 100mm 20MPa concrete on 100mm GAP40 bedding
3.0m wide, 125mm 20MPa concrete, with 1 layer off 665 mesh on 100mm GAP40 bedding

Parking Bays
175mm 20 MPa exposed concrete with 4kg/m² black oxide, 1 layer of 665 mesh on 100mm GAP 65 Subbase

Roads
Subgrade - Stabilised with 12kg/m² of Lime and 4kg/m² of cement
Subbase - 200mm GAP65
Basecourse - 150mm TNZ AP40
Seal - 40mm DG10 asphaltic concrete on grade 4 chipseal membrane

Streetlight Coordinate Table

Streetlight No	mN	mE
SL2	5929137.25	1737455.24
SL3	5929176.69	1737471.77
SL4	5929215.18	1737481.23
SL11	5929215.58	1737528.43
SL13	5929209.35	1737554.18

CABRA Land & Property Development

ENG60388149 /BUN60318445

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22 Vintry Drive
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Enlarged Roading As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	08/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
08/11/2022	1:500	A3

DRAWING NO. 40352-DR-SU-9101
REVISION 0

C:\12dSynergy\Workspaceldata\CATOAPP11\40352 - Cabra Stg 2 Sub Precinct A - 1049510\Technical\Drawings\As-Built Drawings\40352-DR-SU-9100-9101 Road As-Built

Wastewater As-Built Legend

Existing		New
90 / 110	PWC Sewer	63 / 75
	Isolation Valve	
	Reducer	
FP	Flushing Pit	FP
	Boundary Kit	
	Extent of Works	

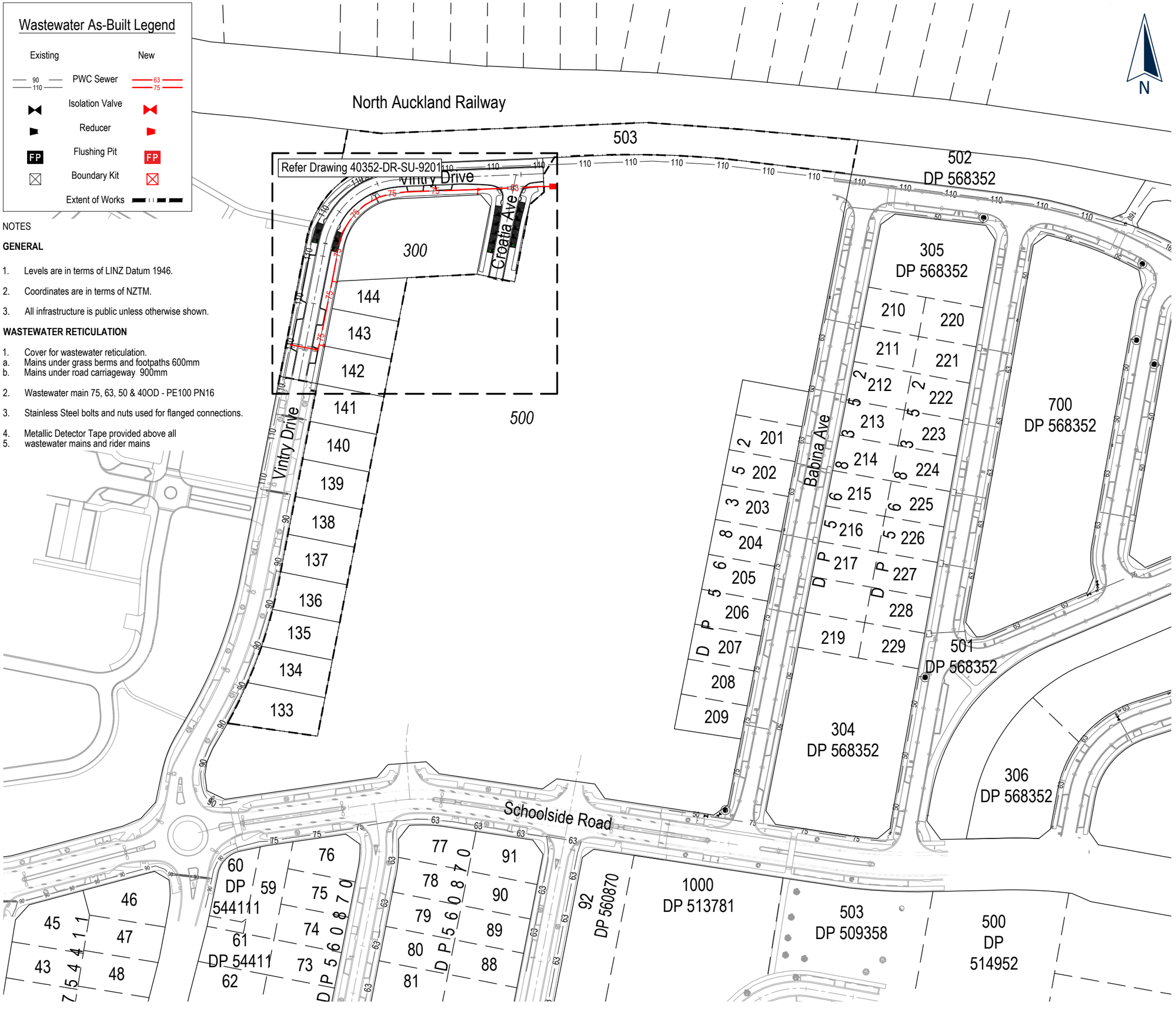
NOTES

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.

WASTEWATER RETICULATION

1. Cover for wastewater reticulation.
   a. Mains under grass berms and footpaths 600mm
   b. Mains under road carriageway 900mm
2. Wastewater main 75, 63, 50 & 40OD - PE100 PN16
3. Stainless Steel bolts and nuts used for flanged connections.
4. Metallic Detector Tape provided above all
5. wastewater mains and rider mains



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22 Vintry Drive
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Overall
PWC Sewer
As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	27/07/2022
1	Issued For Completion	K.Middeldorp	22/11/2022
2	Issued For Completion	K.Middeldorp	02/12/2022
SURVEYED		H.Baker	07/11/2022
DESIGNED		E.Greene	06/07/2021
DRAWN		B.Nel	10/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
10/11/2022	1:1500	A3

DRAWING NO. 40352-DR-SU-9200
REVISION 2

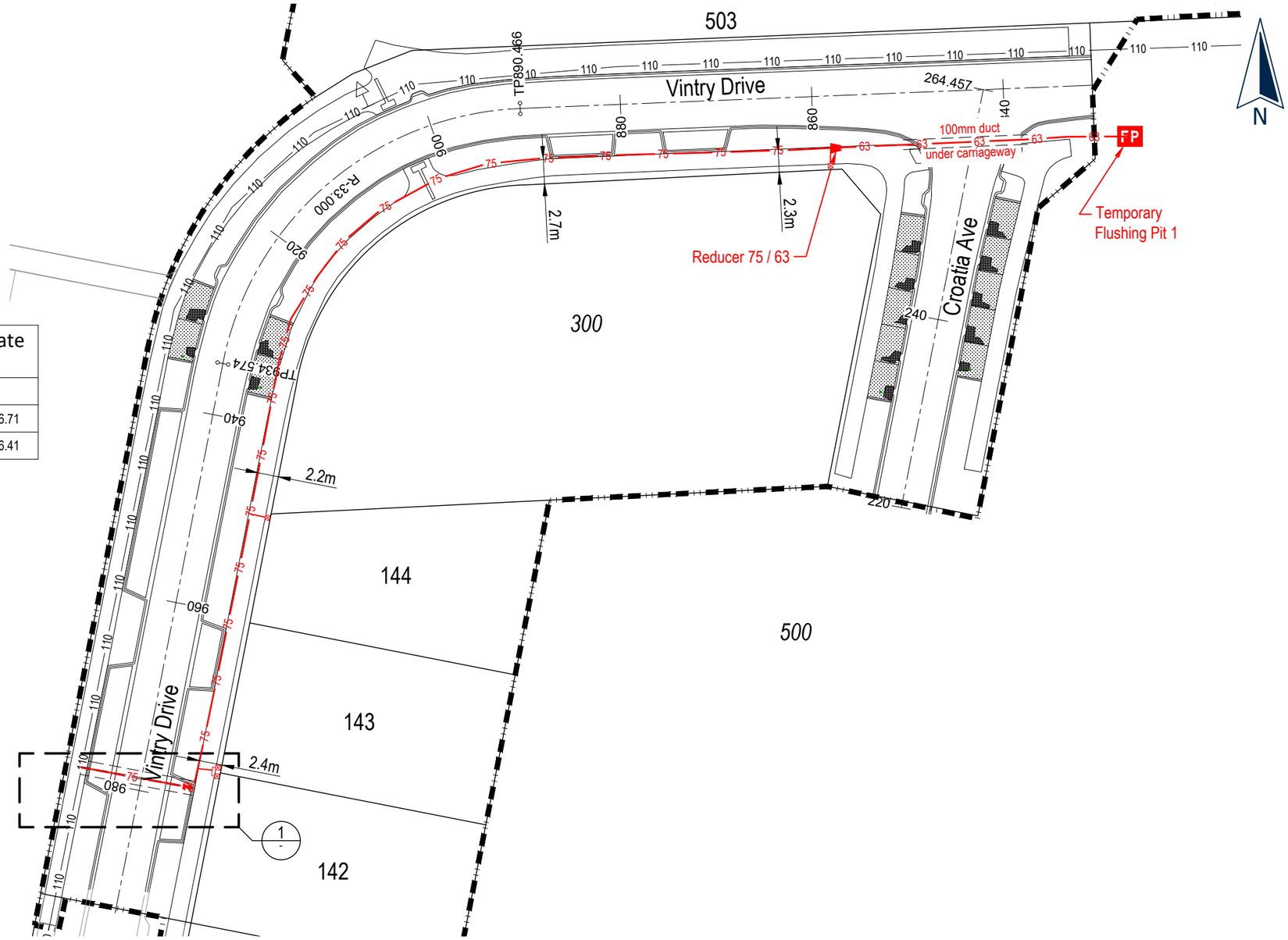
C:\12dSynergyWorkspace\data\CATOAPP1\40352 - Cabra Stg 2 Sub Precinct A_10495\Technical\Drawings\As-Built Drawings\40352-DR-SU-9200 Wastewater As-Built

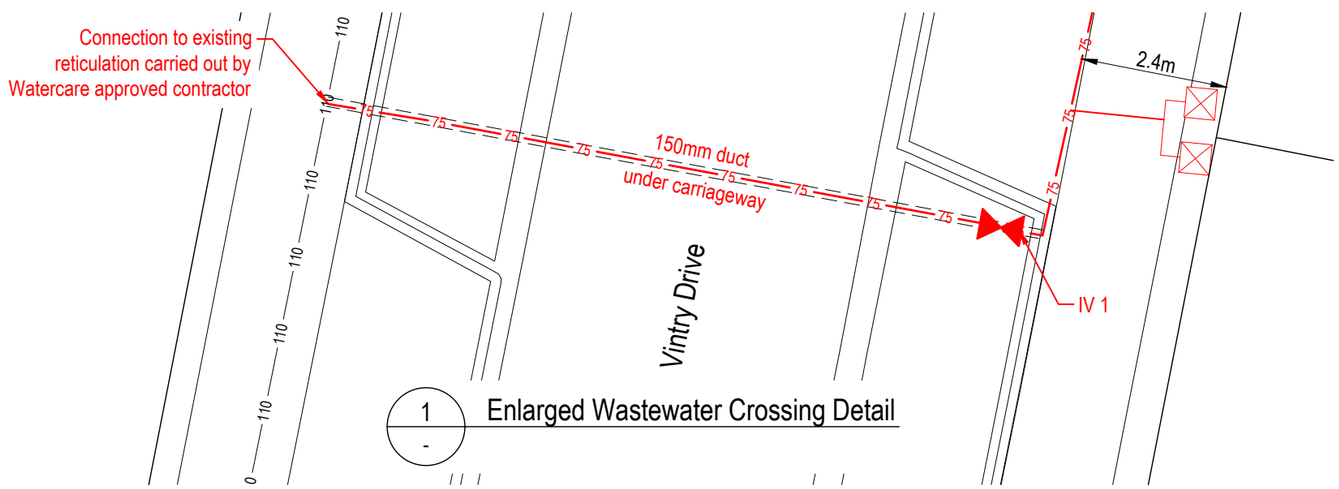
Wastewater As-Built Legend

Existing		New
90 / 110	PWC Sewer	63 / 75
	Isolation Valve	
	Reducer	
FP	Flushing Pit	FP
	Boundary Kit	
	Extent of Works	

Wastewater Assets Coordinate Table

Name	mN	mE
IV1	5929148.67	1737466.71
FP1	5929214.75	1737566.41





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Enlarged PWC Sewer As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	27/07/2022
1	Issued For Completion	K.Middeldorp	22/11/2022
2	Issued For Completion	K.Middeldorp	02/12/2022
SURVEYED		H.Baker	07/11/2022
DESIGNED		E.Greene	06/07/2021
DRAWN		B.Nel	10/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
10/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9201	2

Stormwater As Built Legend

Existing		New
	Stormwater (Public)	
	Cesspit (Public)	
S	Under Channel Drain	S
	Rock Rip Rap	
	Rain Garden	
	Private 270Ø mm uPVC Syphoned catchpit with 100Ø uPVC pipe	S
	Lot connections 100Ø uPVC unless otherwise shown	

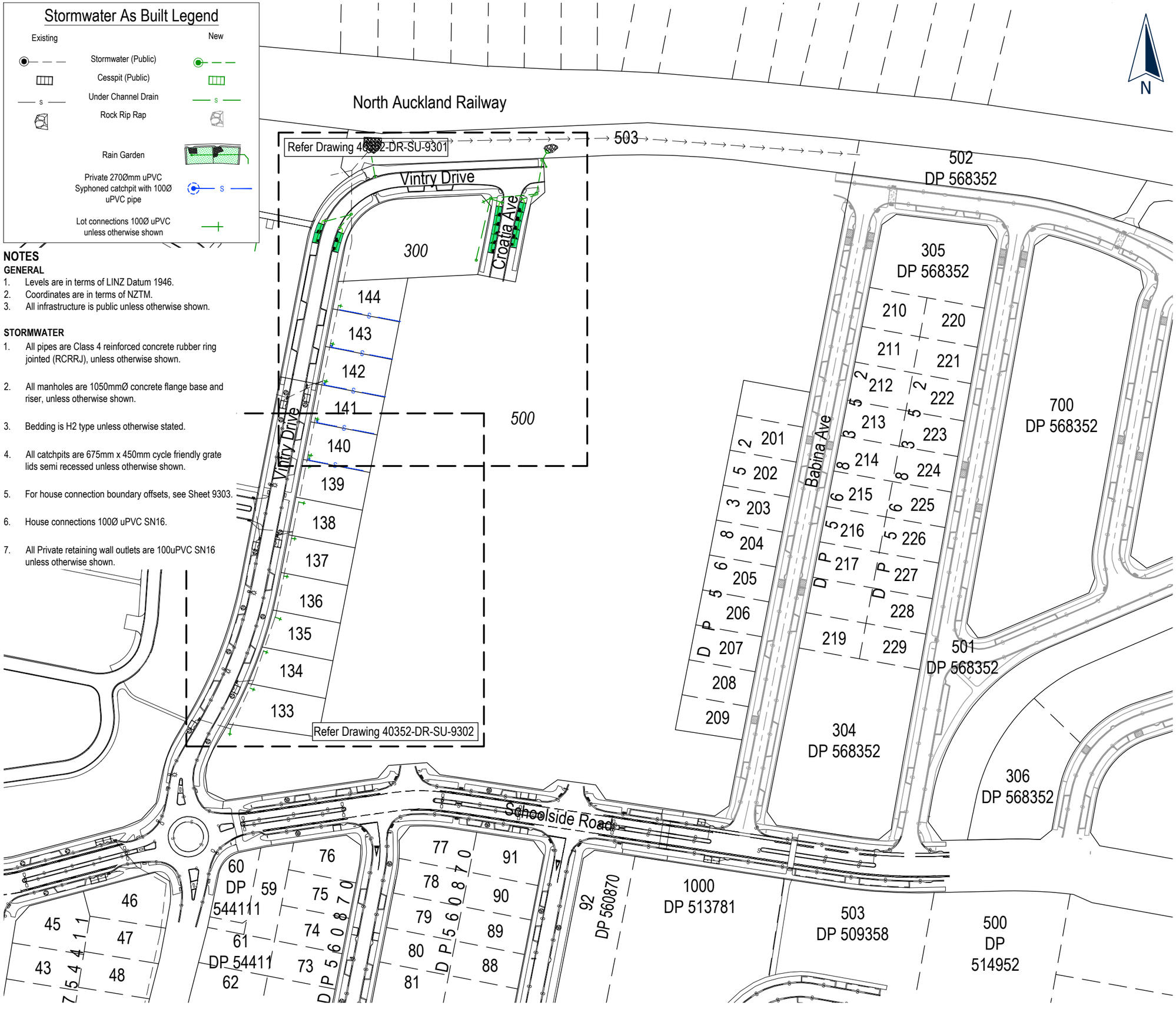
NOTES

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.
3. Bedding is H2 type unless otherwise stated.
4. All catchpits are 675mm x 450mm cycle friendly grate lids semi recessed unless otherwise shown.
5. For house connection boundary offsets, see Sheet 9303.
6. House connections 100Ø uPVC SN16.
7. All Private retaining wall outlets are 100uPVC SN16 unless otherwise shown.



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Overall Stormwater As-Built Plan

FOR COMPLETION

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DATE	ORIGINAL SCALE	ORIGINAL SIZE
10/11/2022	1:1500	A3

DRAWING NO.	REVISION
40352-DR-SU-9300	0

Stormwater As Built Legend

Existing		New
	Stormwater (Public)	
	Cesspit (Public)	
S	Under Channel Drain	S
	Rock Rip Rap	
	Rain Garden	
	Private 270Ømm uPVC Syphoned catchpit with 100Ø uPVC pipe	S
	Lot connections 100Ø uPVC unless otherwise shown	

NOTES

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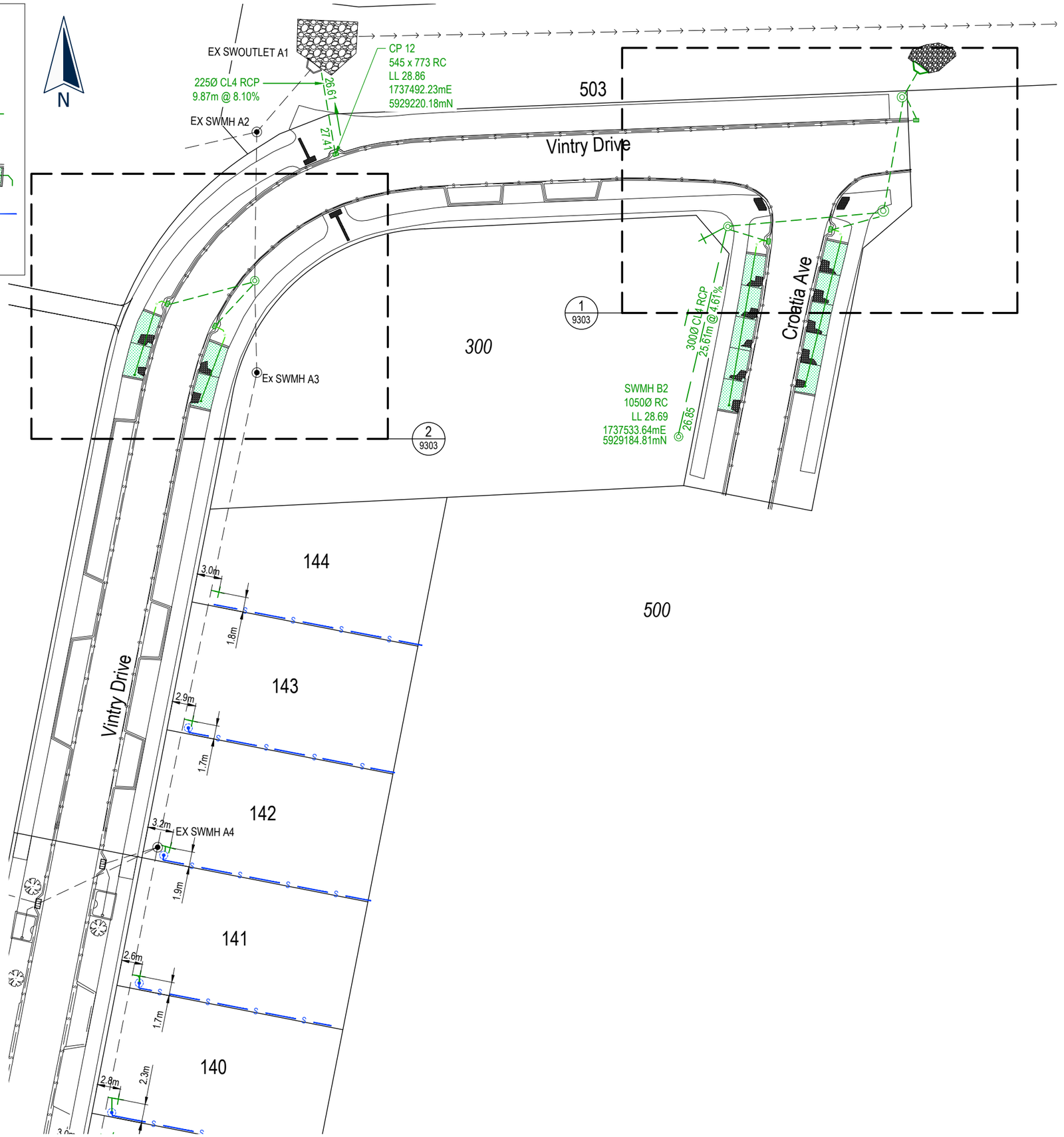

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Enlarged
Stormwater As-Built Plan
Sheet 1

FOR COMPLETION

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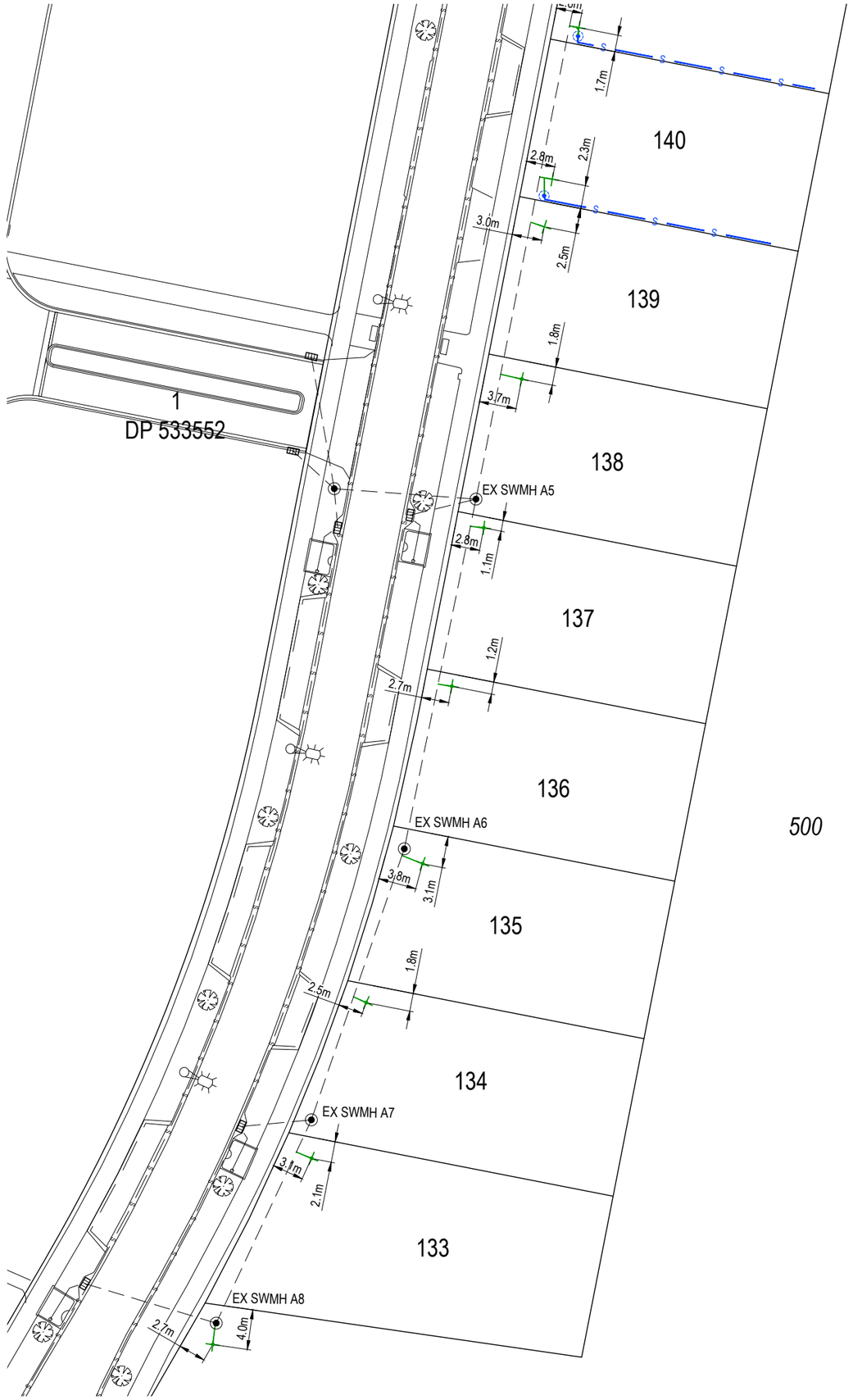
DRAWING NO.	REVISION
40352-DR-SU-9301	0

Stormwater As Built Legend

Existing		New
	Stormwater (Public)	
	Cesspit (Public)	
S	Under Channel Drain	S
	Rock Rip Rap	
	Rain Garden	
	Private 270Ømm uPVC Syphoned catchpit with 100Ø uPVC pipe	S
	Lot connections 100Ø uPVC unless otherwise shown	

N



500

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.
3. Bedding is H2 type unless otherwise stated.
4. All catchpits are 675mm x 450mm cycle friendly grate lids semi recessed unless otherwise shown.
5. For house connection boundary offsets, see Sheet 9303.
6. House connections 100Ø uPVC SN16.
7. All Private retaining wall outlets are 100uPVC SN16 unless otherwise shown.

CABRA Land & Property Development

ENG60388149 /BUN60318445

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 ± 10mm.

Signed: ..... Registered Professional Surveyor

Date: 02/12/2022

Name: Kerryn McPherson
Phone : (09) 427 0072
Email : KerrynM@catobolam.co.nz

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Cabra Developments Limited
22 Vintry Drive
Huapai

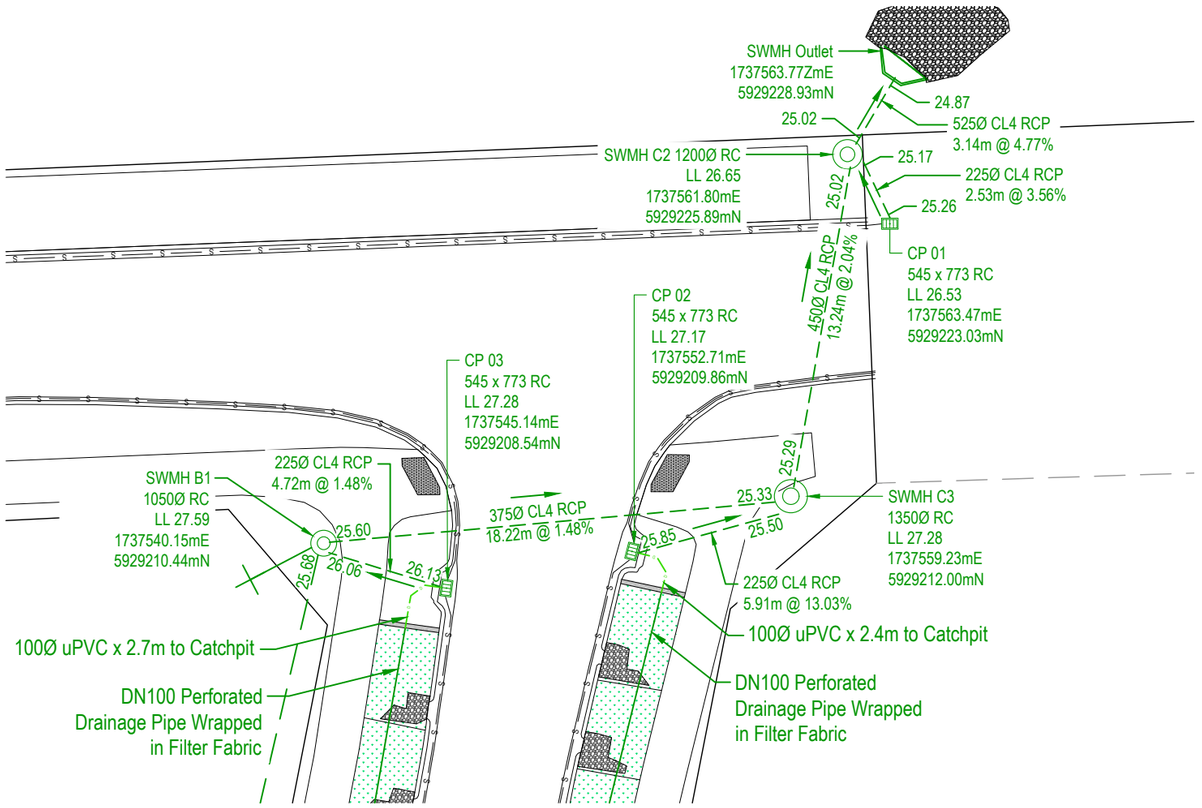
Enlarged Stormwater As-Built Plan Sheet 2

FOR COMPLETION

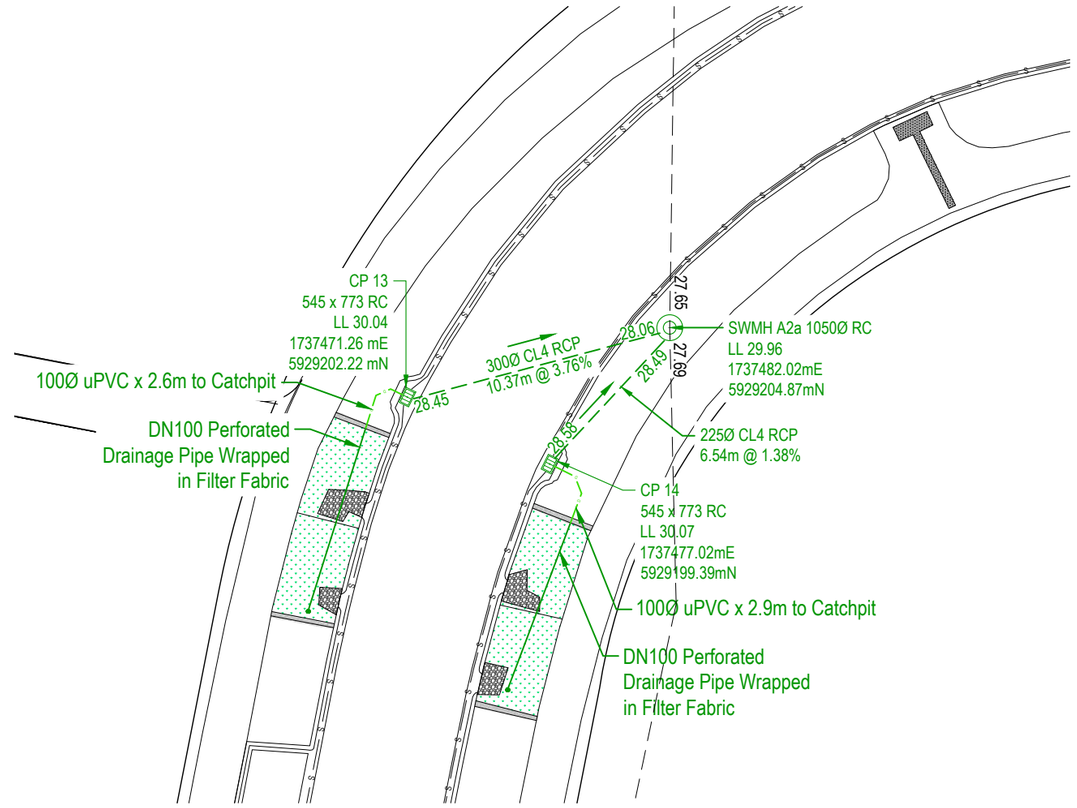
No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	10/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
10/11/2022	1:500	A3

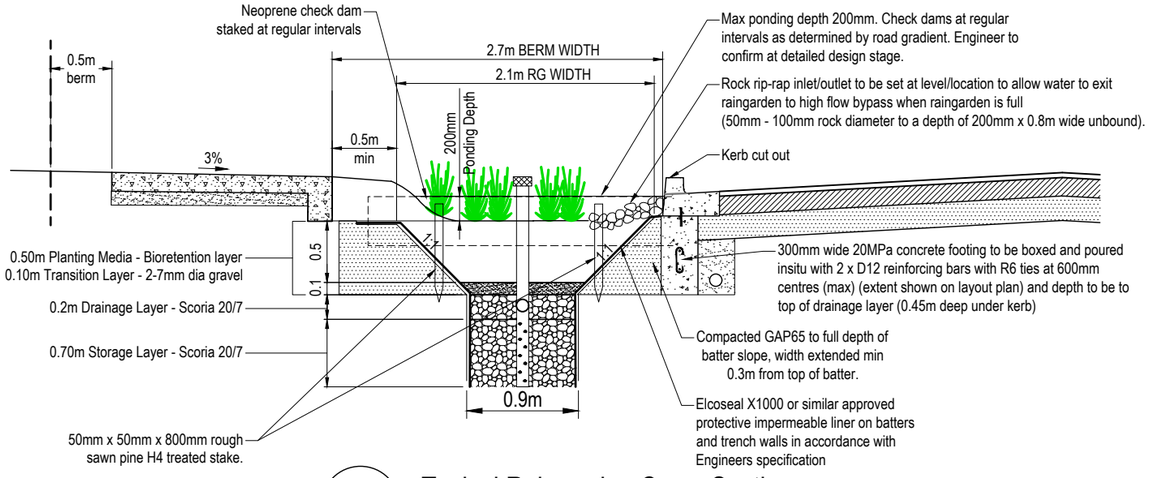
DRAWING NO.	REVISION
40352-DR-SU-9302	0



1 / 9301 **Stormwater Enlarged Detail**
Scale: 1:250



2 / 9301 **Stormwater Enlarged Detail**
Scale: 1:250



3 / - **Typical Raingarden Cross Section**
Scale: 1:50

ENG60388149 /BUN60318445

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Signed: .....
Registered Professional Surveyor

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Phone : (09) 427 0072
Email : KerrynM@catobolam.co.nz

C:\12dsynergy\workspace\data\CATOAPP1\40352 - cabra stg 2 sub precinct a_10495\technical\Drawings\as-built drawings\40352-DR-SU-9300-9302 Stormwater As Built

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Cabra Developments Limited
22 Vintry Drive
Huapai

Enlarged
Stormwater & Raingarden
As-Built Details

No.	REVISION (DESCRIPTIONS)	NAME	DATE
A	Issued For Completion	K.McPherson	02/12/2022

FOR COMPLETION

	NAME	DATE
SURVEYED	H.Baker	07/11/2022
DESIGNED	E.Greene	06/07/2021
DRAWN	B.Nel	01/12/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
01/12/2022	As Drawn	A3

DRAWING NO. 40352-DR-SU-9303
REVISION 0

Water Reticulation As-Built Legend

Existing		New
125 (280 / 280)	Watermain (Ø)	180, 125, 63
◀	Blank Cap	◀
⧖	Sluice Valve	⋈
△	Gate Valve	▲
	25Ø house connection	M
H	Fire Hydrant	H
	Extent of Works	

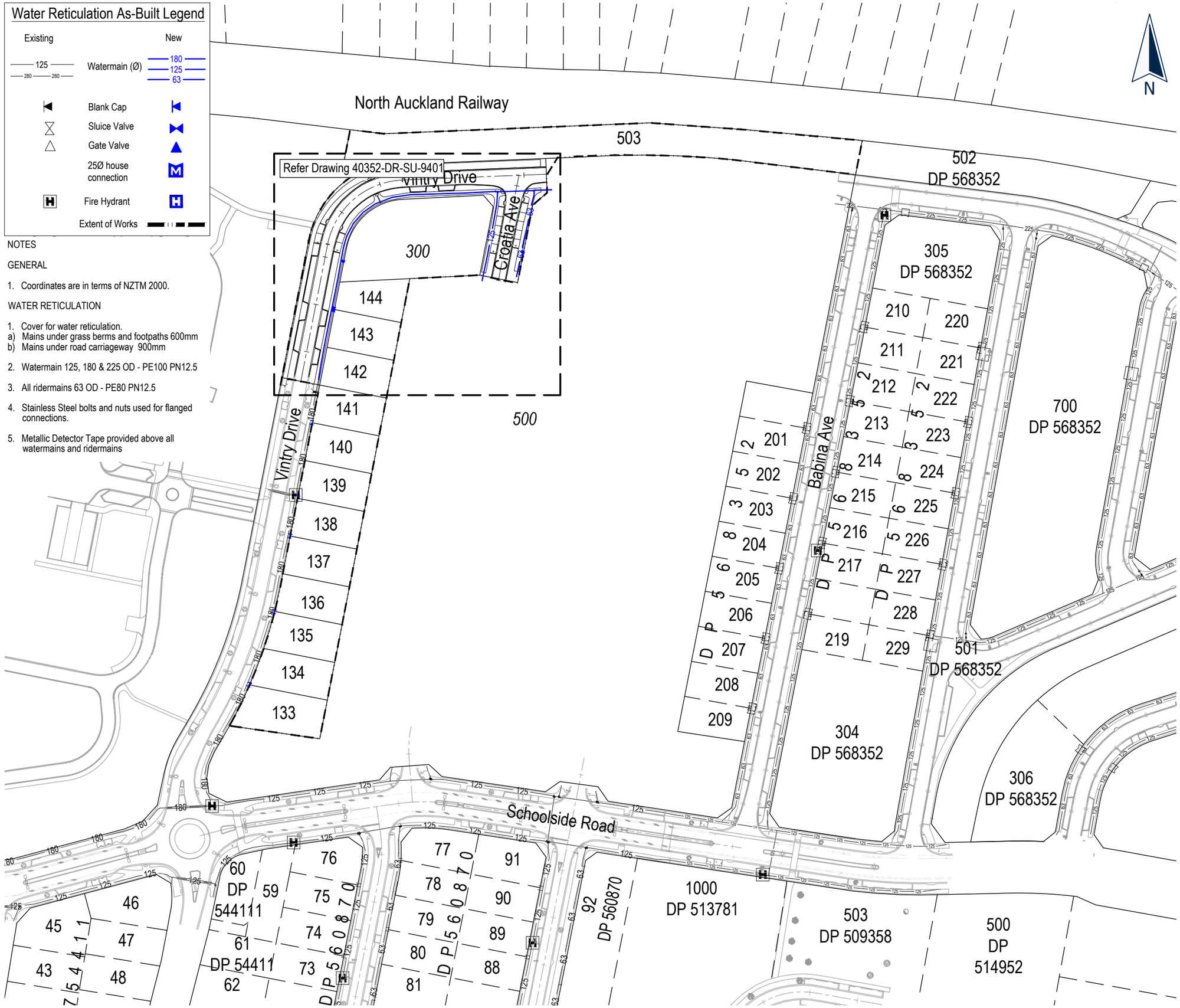
NOTES

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, 180 & 225 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



CABRA Land & Property Development

ENG60388149 /BUN60318445

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* The levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 10mm.

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Registered Professional Surveyor

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Cabra Developments Limited
22 Vintry Drive
Huapai

Overall Water Reticulation As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	27/07/2022
1	Issued For Completion	K.Middeldorp	22/11/2022
2	Issued For Completion	K.Middeldorp	02/12/2022
SURVEYED		H.Baker	07/11/2022
DESIGNED		E.Greene	06/07/2021
DRAWN		B.Nel	10/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
10/11/2022	1:1500	A3

DRAWING NO.	REVISION
40352-DR-SU-9400	2

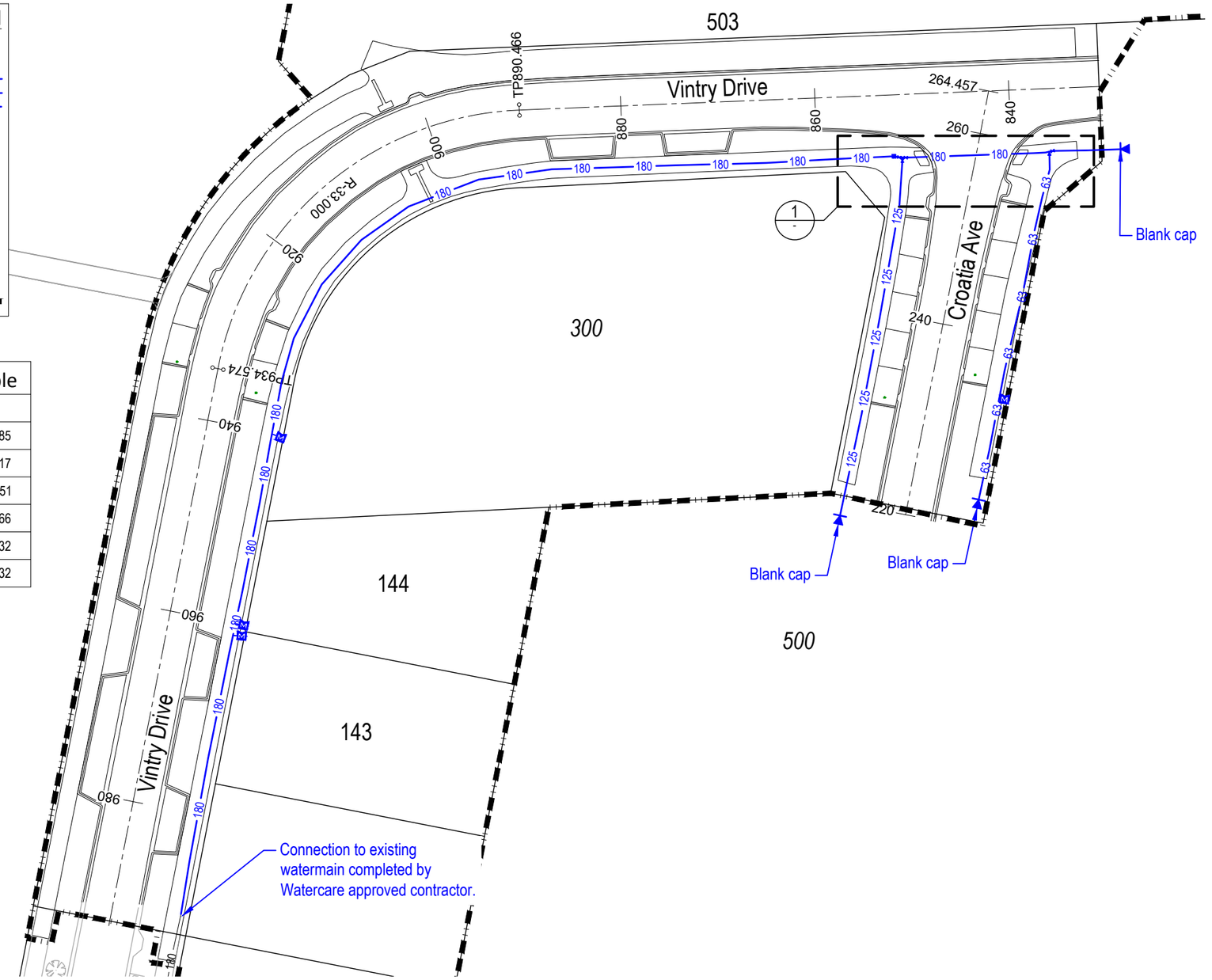
C:\12d\Synergy\Workspaces\data\CATO\APP\140352 - Cabra Stg 2 Sub Precinct A - 104951Technical\Drawings\As-Built Drawings\40352-DR-SU-9400-9401 Water As Built

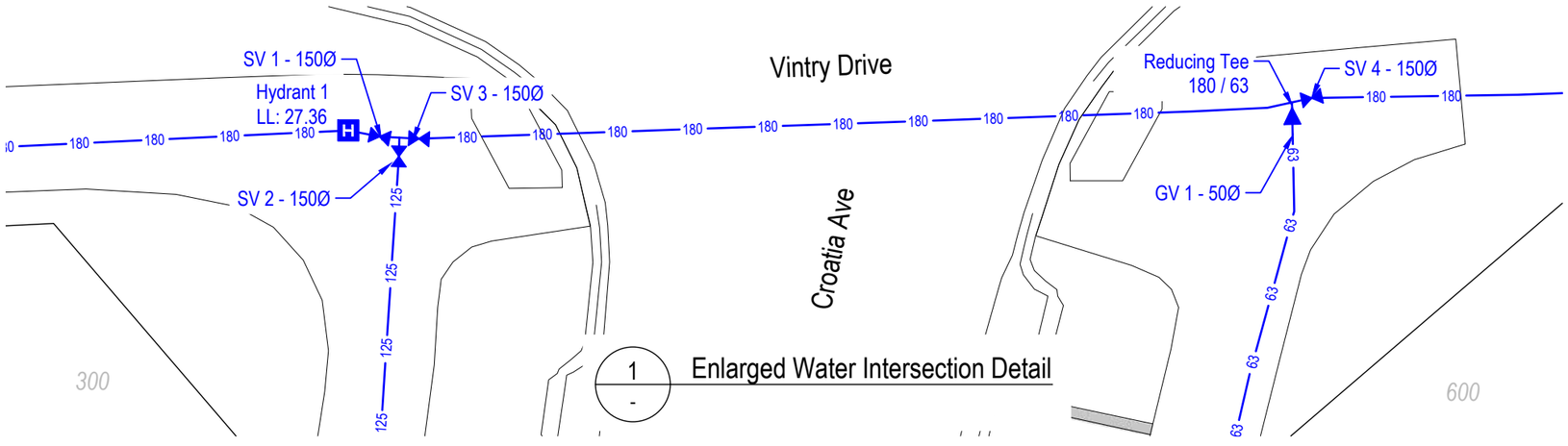
Water Reticulation As-Built Legend

Existing		New
125 (280 — 280)	Watermain (Ø)	180, 125, 63
	Blank Cap	
	Sluice Valve	
	Gate Valve	
	25Ø house connection	
	Fire Hydrant	
	Extent of Works	

Water Assets Coordinate Table

Name	mN	mE
SV1	5929213.26	1737541.85
SV2	5929212.92	1737542.17
SV3	5929213.21	1737542.51
SV4	5929213.62	1737557.66
GV1	5929213.28	1737557.32
Hydrant 1	5929213.37	1737541.32





CABRA Land & Property Development

ENG60388149 /BUN60318445

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Email : KerrynM@catobolam.co.nz

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Cabra Developments Limited
22 Vintry Drive
Huapai

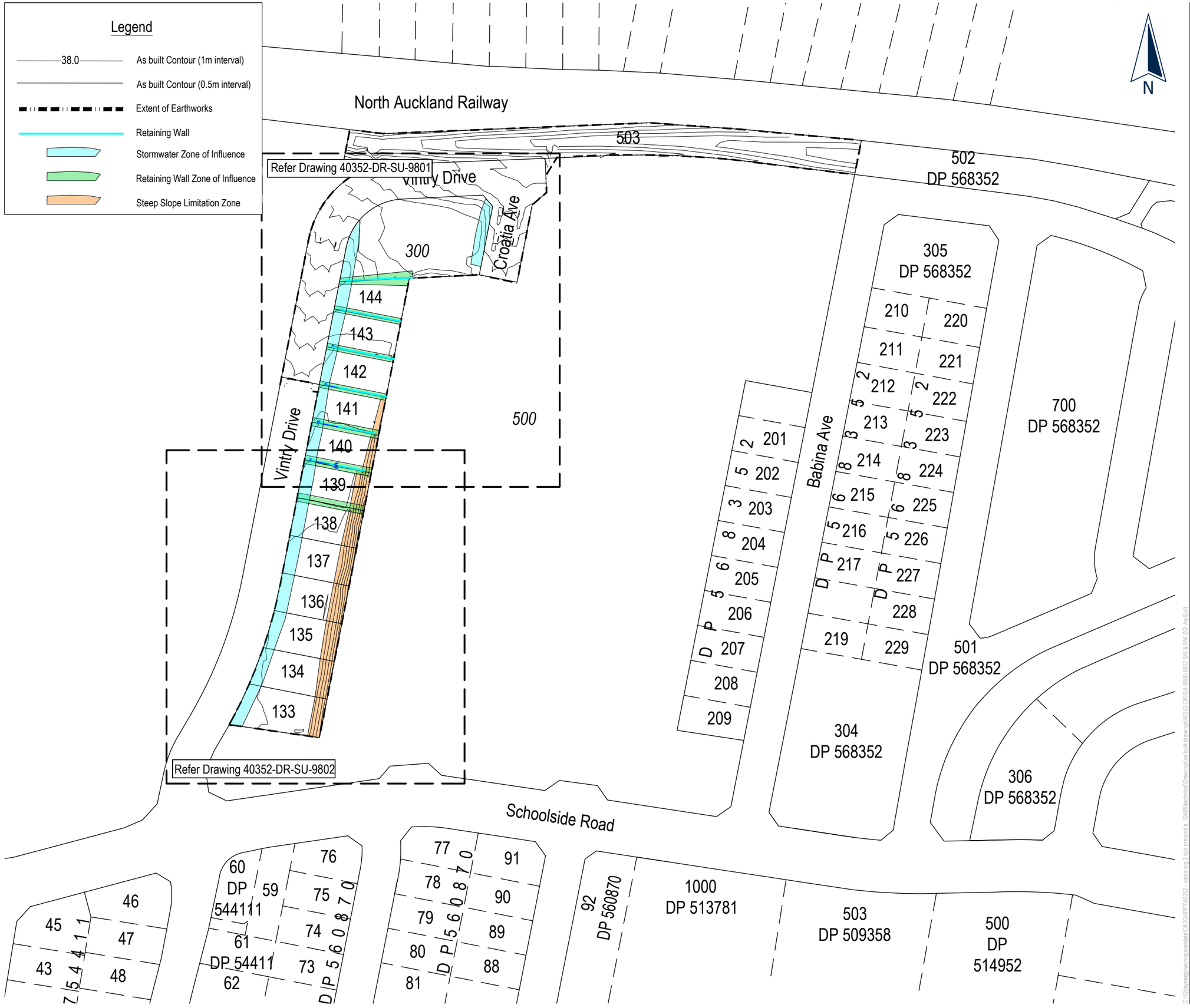
Enlarged Water Reticulation As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	27/07/2022
1	Issued For Completion	K.Middeldorp	22/11/2022
2	Issued For Completion	K.Middeldorp	02/12/2022
SURVEYED		H.Baker	07/11/2022
DESIGNED		E.Greene	06/07/2021
DRAWN		B.Nel	10/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
10/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9401	2



CABRA
Land & Property Development

ENG60388149 /BUN60318445

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Cabra Developments Limited
22 Vintry Drive
Huapai

Overall
Zone Of Influence
As-Built Plan

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
SURVEYED		H.Baker	07/11/2022
DESIGNED		E.Greene	06/07/2021
DRAWN		B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:1500	A3

DRAWING NO.	REVISION
40352-DR-SU-9800	0

Legend

- 38.0 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- Extent of Earthworks
- Retaining Wall
- Stormwater Zone of Influence
- Retaining Wall Zone of Influence
- Steep Slope Limitation Zone

CABRA Land & Property Development

ENG60388149 /BUN60318445

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 ± 10mm.

Signed: .....
Registered Professional Surveyor

Date: 02/12/2022

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Cabra Developments Limited
22 Vintry Drive
Huapai

Enlarged Zone Of Influence
As-Built Plan
Sheet 1

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9801	0

Legend

- 38.0 — As built Contour (1m interval)
- As built Contour (0.5m interval)
- Extent of Earthworks
- Retaining Wall
- Stormwater Zone of Influence
- Retaining Wall Zone of Influence
- Steep Slope Limitation Zone

N

500

CABRA Land & Property Development

ENG60388149 /BUN60318445

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* The levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ± 10mm.

Signed: ..... Registered Professional Surveyor

Date: 02/12/2022

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Cabra Developments Limited
22 Vintry Drive
Huapai

Enlarged Zone Of Influence As-Built Plan Sheet 2

FOR COMPLETION

No.	REVISION (DESCRIPTIONS)	NAME	DATE
0	Issued For Completion	K.Middeldorp	02/12/2022
	SURVEYED	H.Baker	07/11/2022
	DESIGNED	E.Greene	06/07/2021
	DRAWN	B.Nel	09/11/2022

DATE	ORIGINAL SCALE	ORIGINAL SIZE
09/11/2022	1:500	A3

DRAWING NO.	REVISION
40352-DR-SU-9802	0

Appendix A: Statement of Professional Opinion on Suitability of Land for Building Construction

STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

Development: Stage 2 of the 45 Station Road (now 22 Vintry Drive) Development
Developer: Cabra Developments Ltd
Location: 22 Vintry Drive, Huapai

I, Andrew Linton, of CMW Geotechnical NZ Limited, 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 Clause 1.2.2 of NZS 4404:2010 and was retained by the Developer as the geo-professional on the above development.

2. The extent of preliminary investigations carried out to date are described in the Coffey Geotechnics (NZ) Limited Geotechnical Investigation Report referenced GENZAUCK16252AA-Rev01, dated 10 September 2014. The conclusions and recommendations of this document have been re-evaluated in the preparation of this report. The extent of my inspections during construction, and the results of all tests and/ or evaluations carried out are as described in my Geotechnical Completion Report dated 7 December 2022.

3. My certification of the earth fills placed on this site is contained in ***Appendix B***.

4. In my professional opinion, not to be construed as a guarantee, I consider that:

   (a) The completed earthworks take into account land slope and foundation stability considerations on the building platform areas, but as shown on the appended building restriction zones plans, areas on Lots 133 to 141 inclusive have gradients steeper than 1(v) in 4 (h) or are adjacent to land having such gradients. Accordingly, restrictions incorporating Specific Design Zones (Slope) have been applied as depicted on the as-built plans.

   No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Slope) areas** unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the implications of the proposals on both global stability conditions and soil creep on the building, 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.

   (b) **Specific Design Zone (Retaining) areas** have been applied on Lots 138 to 144 and 300 inclusive for the protection of the function of the retaining walls as depicted on the as-built plans. The retaining walls on this stage of the development were designed for a maximum of 12 kPa surcharge load and 0° toe slope.

   No building construction and no earthworks (i.e. cut or fills) should take place within these Specific Design Zones that exceed these design limits on the walls unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report who consider the stability implications of the earthworks and/ or building proposals on the retaining walls.

(c) The function of the subsoil drains installed beneath Lots 138 and 139 inclusive as shown on the as-built plans 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.

(d) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on the building platforms of Lots 133 to 144 inclusive, and Superlot 300.

If for any reason higher geotechnical bearing capacities are required, further specific site investigation and design of foundations should be carried out prior to Building Consent application.

(e) The site (seismic) subsoil class for each lot has been assessed in accordance with NZS1170.5:2004 Clause 3.1.3 from borelogs that included measurements of geotechnical properties. Our assessment is that all Lots 133 to 144 inclusive, and Superlot 300, are Class C-shallow soil

(f) The expansive site Class for all Lots 133 to 144 inclusive has been assessed as AS2870 Class M (Moderate), while Lot 300 is Class H1 (highly). 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 4.10.3 of the Geotechnical Completion Report) for reference by foundation contractors.

(g) No building development should take place within the 45 degree zone of influence of stormwater or sewer line or manhole 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 pipes and trench backfills. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision is provided in ***Appendix B*** for clarification. Details for water and wastewater pipes are available in the Watercare COP1 - General Requirements and Procedures.

(h) On the basis of the earth fill certification and subject to the geotechnical limitations, restrictions and recommendations contained in clauses 4(a), 4(b), 4(c), 4(d), 4(e), 4(f) and 4(g) above:

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

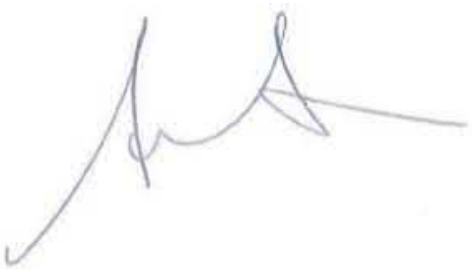
(ii) Where shallow foundations are appropriate, design may be carried out in accordance with AS 2870 (Class M or H1) or alternately, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.

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

6. Stormwater reserve areas have been formed with appropriate regard for slope stability and seepage risks. Any future development of Lot 503, designated storm water reserve, will require specific engineering design 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, 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.

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

For and on behalf of CMW Geosciences



Andrew Linton

Principal Geotechnical Engineer CMEngNZ, CPEng

Table 1: GCR Summary Table									
Condition	**Specific Design Zone (slope)**	**Specific Design Zone (retaining)**	**Subsoil Drains Present**	**On-site Drainage Outlet Present**	**Geotechnical Ultimate Bearing Capacity (kPa)**	**NZS 1170.5 Site (seismic) Class**	**AS2870 Expansive Class**	**Service Lines Restrictions**	**Indicative Topsoil Depth (mm)**
GCR SOPO Clause	**4(a)**	**4(b)**	**4(c)**		**4(d)**	**4(e)**	**4(f)**	**4(g)**	
Lot number									
133	●				300	C	M	●	200
134	●				300	C	M	●	200
135	●				300	C	M	●	200
136	●				300	C	M	●	200
137	●				300	C	M	●	300
138	●	●	●	●	300	C	M	●	200
139	●	●	●	●	300	C	M	●	300
140	●	●		●	300	C	M	●	200
141	●	●		●	300	C	M	●	150
142		●		●	300	C	M	●	300
143		●		●	300	C	M	●	150
144		●		●	300	C	M	●	150
300		●		●	300	C	H1	●	200

Appendix B: Statement of Suitability of Engineered Fill for Lightweight Structures

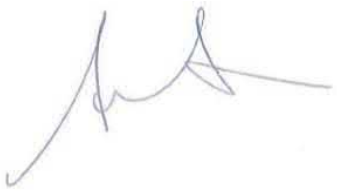
STATEMENT OF SUITABILITY OF ENGINEERED FILLS FOR LIGHTWEIGHT STRUCTURES

To:	Auckland Council
Development:	Stage 2 of the 22 Vintry Drive Development
Land Title(s):	Lot 1 DP56080, Lot 2 DP544111
Location:	22 Vintry Drive, Huapai
Resource Consent Nos:	LAN – 66247, Reg-66251
Developer:	Cabra Developments Ltd
Geotechnical Designer:	Andrew Linton of CMW Geotechnical NZ Limited
Certifier:	Andrew Linton of CMW Geotechnical NZ Limited

This Statement of Suitability is provided as an appendix to the CMW Geosciences Geotechnical Completion Report referenced in the page footer below, that also contains all as-built plans, inspection and test plan, geotechnical works specification, test results and test inspection records relevant to the work completed.

1. I, Andrew Linton, confirm that I am qualified as a certifier as defined in NZS4431:2022.
2. During this work, I was retained as certifier and I or my certifier's representative undertook inspections and testing as documented in the Geotechnical Completion Report.
3. I am satisfied that the engineered fill shown in the attached as-built survey was placed, compacted and tested in accordance with the attached specification and that all variations and non-compliances have been documented in the Geotechnical Completion Report.
4. Based on the information available, I certify that, to the best of my knowledge, the intent of the geotechnical designer (as presented in the design, drawings and Geotechnical Works Specification) has been achieved.
5. The fill areas shown on the Cato Bolam Consultants Ltd as-built cut and fill plan(s) attached are considered suitable for development as per NZS 3604, subject to any other restrictions described in the Geotechnical Completion Report by the Geotechnical Designer.
6. This certification does not remove the necessity for normal inspection and design of foundations as would be made in natural ground.

For and on behalf of CMW Geosciences



Andrew Linton

Principal Geotechnical Engineer CMEngNZ, CPEng

Appendix C: Field Test Data

LF14 Rev.14 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	45 Station Road Stage 2
Project No:	AKL2018-0018
Location:	Huapai
Report No:	AKL2018-0018LAD Rev.0
Test Date:	1/08/2022
Tested By:	CL/RS
Client:	Cabra Developments Limited
Client Address:	19 Tamariki Avenue, Orewa, Auckland 0931
CBR Test Calculation:	Austroads (2010) (fine grained cohesive)

Auckland Laboratory
CMW Geosciences (NZ) Ltd Partnership
11/63, Arrenway Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

Test results 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	Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive	
Chainage & Offset	CH 960 RHS		CH 950 LHS		CH 940 RHS		CH 930 LHS		CH 920 RHS	
Material & Layer	SG Post Stabalized		SG Post Stabalized		SG Post Stabalized		SG Post Stabalized		SG Post Stabalized	
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	4	8	7	15	3	6
100 - 200	6	13	5	10	3	6	5	10	3	6
200 - 300	4	8	4	8	3	6	3	6	4	8
300 - 400	1	2	1	2	2	4	2	4	2	4
400 - 500	2	4	1	2	1	2	1	2	1	2
500 - 600	1	2	1	2	2	4	2	4	2	4
600 - 700	2	4	2	4	2	4	2	4	2	4
700 - 800	2	4	2	4	2	4	2	4	2	4
800 - 900										
900 - 1000										

Test No	6		7		8		9		10	
Test Location	Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive	
Chainage & Offset	CH 910 LHS		CH 898 RHS		CH 890 LHS		CH 880 RHS		CH 870 LHS	
Material & Layer	SG Post Stabalized		SG Post Stabalized		SG Post Stabalized		SG Post Stabalized		SG Post Stabalized	
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	6	13	8	18	5	10	6	13
100 - 200	6	13	7	15	7	15	4	8	6	13
200 - 300	3	6	4	8	4	8	4	8	5	10
300 - 400	4	8	3	6	3	6	2	4	4	8
400 - 500	1	2	3	6	2	4	2	4	3	6
500 - 600	1	2	4	8	1	2	1	2	2	4
600 - 700	2	4	6	13	3	6	2	4	4	8
700 - 800	3	6	6	13	2	4	2	4	4	8
800 - 900										
900 - 1000										

Created by:	RS	Date:	7/09/2022
Checked by:	RS	Date:	12/10/2022
Authorised Signatory:	JLM	Date:	13/10/2022

* Equivalent CBR values are taken from Fig 5.3, Austroads Guide to Pavement Technology, Part 2: Pavement Structural Design, Austroads 2010. Values are relevant to fine grained soils only.

LF14 Rev.14 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	45 Station Road Stage 2
Project No:	AKL2018-0018
Location:	Huapai
Report No:	AKL2018-0018LAD Rev.0
Test Date:	1/08/2022
Tested By:	CL/RS
Client:	Cabra Developments Limited
Client Address:	19 Tamariki Avenue, Orewa, Auckland 0931
CBR Test Calculation:	Austroads (2010) (fine grained cohesive)

Auckland Laboratory
CMW Geosciences (NZ) Ltd Partnership
11/63, Arrenway Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

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

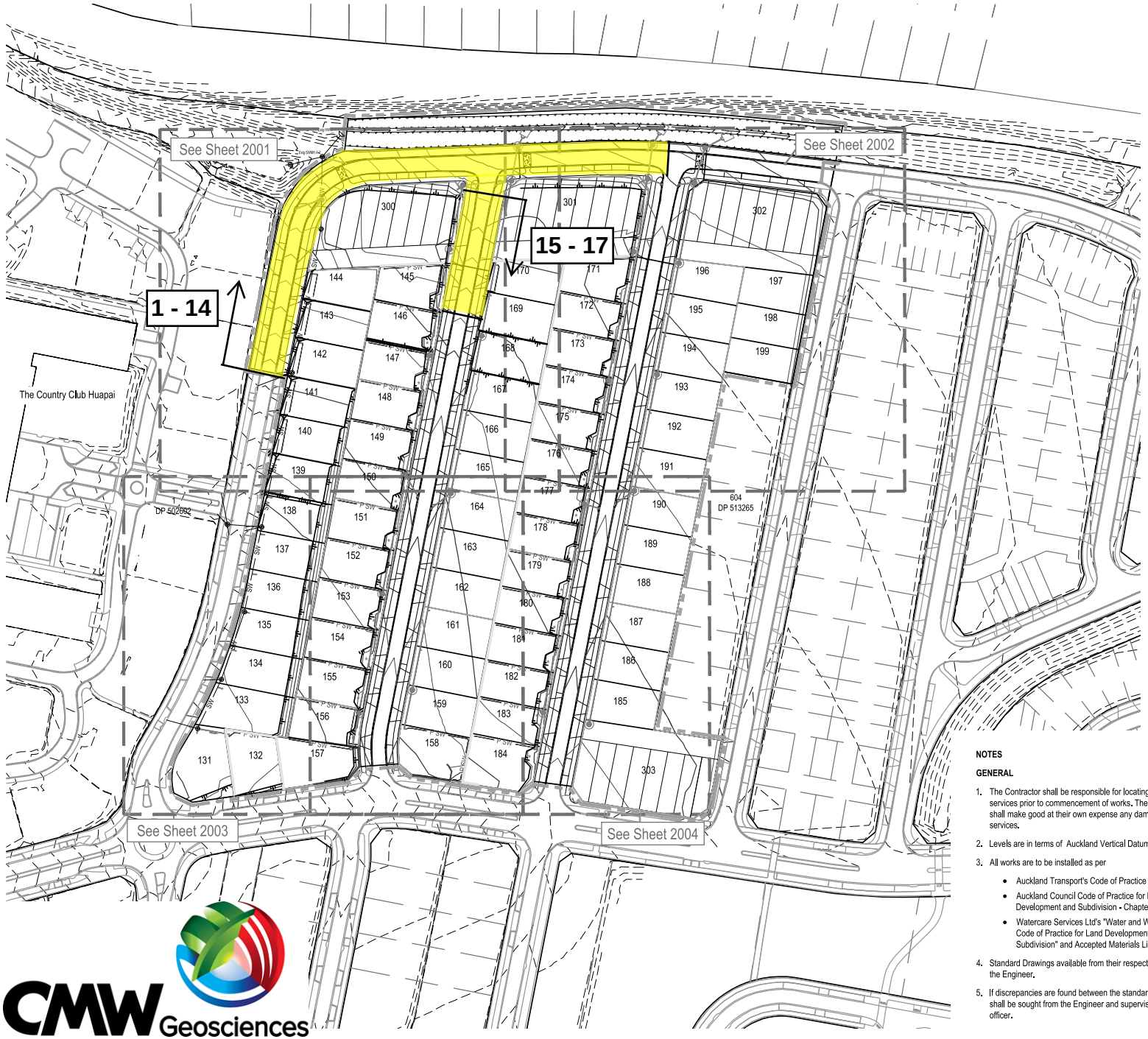
*** Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation**

Test No	11		12		13		14		15	
Test Location	Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive		Croatia Road	
Chainage & Offset	CH 860 RHS		CH 850 LHS		CH 840 RHS		CH 830 LHS		CH 20 RHS	
Material & Layer	SG Post Stabalized		SG Post Stabalized		SG Post Stabalized		SG Post Stabalized		SG Post Stabalized	
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	4	8	6	13	UTP	UTP	8	18
100 - 200	5	10	4	8	8	18			5	10
200 - 300	5	10	5	10	9	20			3	6
300 - 400	2	4	3	6	4	8			2	4
400 - 500	2	4	3	6	2	4			2	4
500 - 600	2	4	2	4	2	4			3	6
600 - 700	2	4	2	4	3	6			2	4
700 - 800	2	4	2	4	2	4			2	4
800 - 900										
900 - 1000										

Test No	16		17							
Test Location	Croatia Road		Croatia Road							
Chainage & Offset	CH 30 LHS		CH 40 LHS							
Material & Layer	SG Post Stabalized		SG Post Stabalized							
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	11	20+	10	20+						
100 - 200	9	20	8	18						
200 - 300	4	8	4	8						
300 - 400	5	10	3	6						
400 - 500	4	8	2	4						
500 - 600	2	4	4	8						
600 - 700	4	8	4	8						
700 - 800	4	8	4	8						
800 - 900										
900 - 1000										

Created by:	RS	Date:	7/09/2022
Checked by:	RS	Date:	12/10/2022
Authorised Signatory:	JLM	Date:	13/10/2022

* Equivalent CBR values are taken from Fig 5.3, Austroads Guide to Pavement Technology, Part 2: Pavement Structural Design, Austroads 2010. Values are relevant to fine grained soils only.



Proposed Earthworks Legend

- 35.00 — Proposed Contours Major
- Proposed Contours Minor
- 35.00 — Existing Contours Major
- Existing Contours Minor
- Proposed Timber Retaining Wall
- Proposed Stone Retaining Wall
- Extent of Stage 2
- Proposed Batter (1:2.5 Typ)
- * Plot Access (1:20 Typ)
- Public Stormwater Reticulation
- P SW — Private Stormwater Reticulation

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
   - Auckland Transport's Code of Practice "ATCOP".
   - 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.
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.

CMW Geosciences

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ARCHITECTS | ENVIRONMENTAL

Cabra Developments Ltd
45 & 53 Station Road
Huapai - Stage 2

Proposed Contours and Retaining Walls
Sheet 1 of 5

FOR BUILDING CONSENT

No.	REVISION (DESCRIPTIONS)	NAME	DATE
A	Issued for Resource Consent	JB	17/01/2018
B	Issued for Resource Consent	JB	17/05/2018
C	Issued for Discussion	KM	21/07/2021
D	Issued for Building Consent	KM	28/07/2021
SURVEYED			
DESIGNED		KM	21/07/2021
DRAWN		GH	21/07/2021

DATE	ORIGINAL SCALE	ORIGINAL SIZE
21/07/2021	1:1500	A3

DRAWING NO.	REVISION
40352-DR-C-2000	D

LF14 Rev.13 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	45 Station Road Stage 2
Project No:	AKL2018-0018
Location:	Huapai
Report No:	AKL2018-0018LAC Rev.0
Test Date:	5/05/2022
Tested By:	DW
Client:	Cabra Developments Limited
Client Address:	19 Tamariki Avenue, Orewa, Auckland 0931
CBR Test Calculation:	Austroad (2010)

Auckland Laboratory
CMW Geosciences (NZ) Ltd Partnership
11/63, Arrenway Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

Test results 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	Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive	
Chainage & Offset	CH990 + 1.5m L		CH1000 +1.8m R		CH1010 1.5m L		CH1020 + 1.5m R		CH1030 + 1.5m L	
Material & Layer	Subgrade		Subgrade		Subgrade		Subgrade		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+	10+	20+	10+	20+	10+	20+	3	6
100 - 200	UTP		UTP		UTP				2	4
200 - 300									2	4
300 - 400									2	4
400 - 500									4	8
500 - 600									4	8
600 - 700									4	8
700 - 800									5	10
800 - 900									5	10
900 - 1000									5	10

Test No	6		7		8		9		10	
Test Location	Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive		Vintry Drive	
Chainage & Offset	CH1040		CH1050 + 1.5m L		CH1060 + 1.5m R		CH1070 1.5m L		CH1080 1.5m R	
Material & Layer	Subgrade		Subgrade		Subgrade		Subgrade		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	2	4	3	6	3	6	3	6
100 - 200	3	6	2	4	3	6	3	6	3	6
200 - 300	3	6	2	4	3	6	3	6	3	6
300 - 400	3	6	3	6	3	6	3	6	4	8
400 - 500	3	6	3	6	3	6	3	6	4	8
500 - 600	3	6	4	8	3	6	3	6	4	8
600 - 700	3	6	5	10	4	8	3	6	4	8
700 - 800	4	8	5	10	5	10	3	6	4	8
800 - 900	4	8	5	10	5	10	3	6	4	8
900 - 1000	4	8	6	13	5	10	3	6	4	8

Created by:	JLM	Date:	16/05/2022
Checked by:	RS	Date:	12/10/2022
Authorised Signatory:	JLM	Date:	13/10/2022

*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.13 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	45 Station Road Stage 2
Project No:	AKL2018-0018
Location:	Huapai
Report No:	AKL2018-0018LAC Rev.0
Test Date:	5/05/2022
Tested By:	DW
Client:	Cabra Developments Limited
Client Address:	19 Tamariki Avenue, Orewa, Auckland 0931
CBR Test Calculation:	Austroad (2010)

Auckland Laboratory
CMW Geosciences (NZ) Ltd Partnership
11/63, Arrenway Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

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

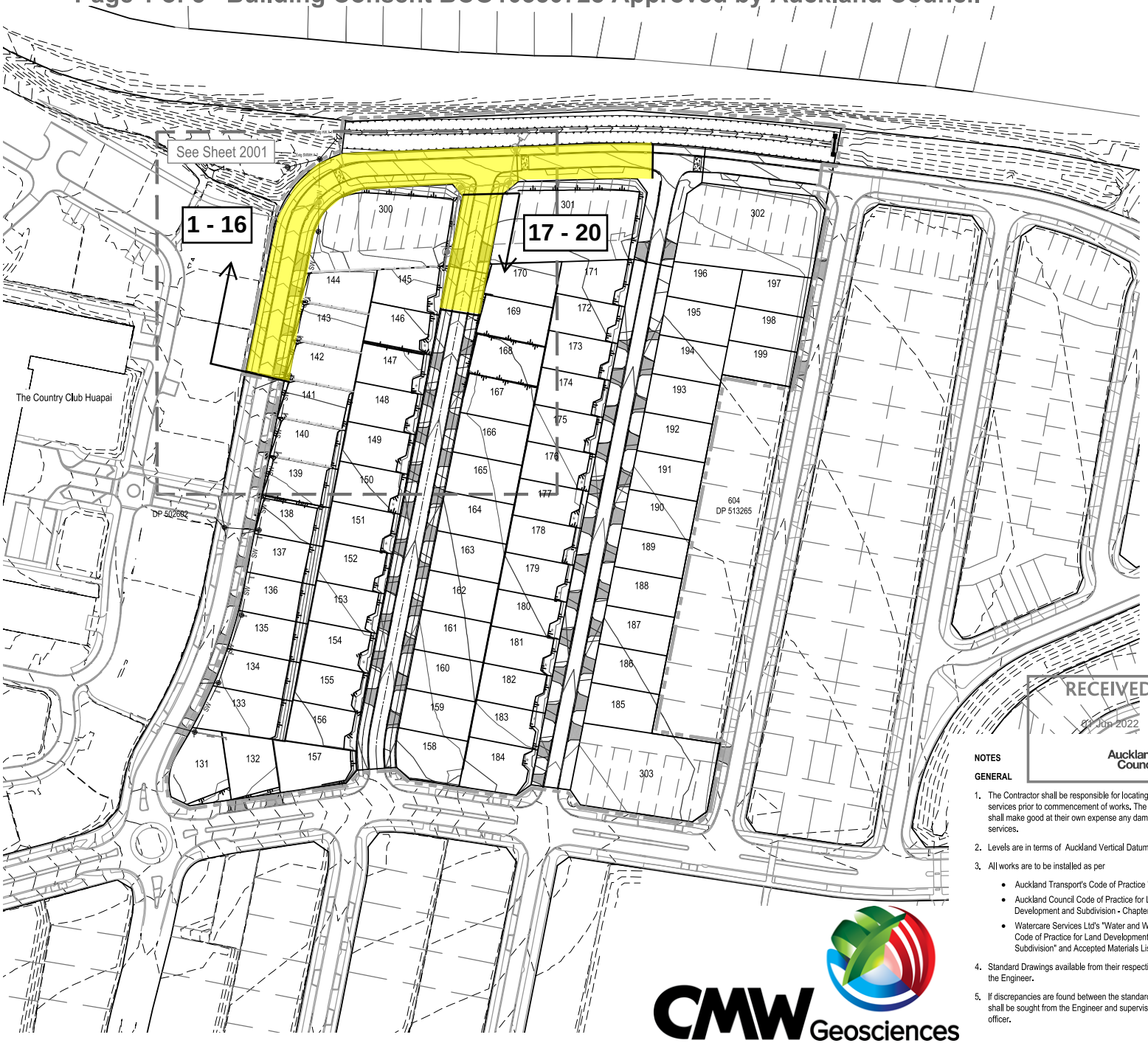
*** Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation**

Test No	11		12		13		14		15	
Test Location	Vintry Drive		Vintry Drive		Intersection		Vintry Drive		Vintry Drive	
Chainage & Offset	CH1090 + 1.5m L		CH1100 + 1.5m R		CH1110 + 1.5m L		CH1120 + 1.5m R		CH1130 + 1.5m L	
Material & Layer	Subgrade		Subgrade		Subgrade		Subgrade		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	3	6	3	6	3	6	3	6
100 - 200	4	8	3	6	3	6	3	6	3	6
200 - 300	4	8	4	8	3	6	3	6	3	6
300 - 400	4	8	4	8	3	6	4	8	3	6
400 - 500	4	8	4	8	4	8	3	6	3	6
500 - 600	5	10	4	8	4	8	3	6	3	6
600 - 700	5	10	5	10	3	6	3	6	4	8
700 - 800	5	10	5	10	2	4	3	6	4	8
800 - 900	6	13	5	10	2	4	3	6	4	8
900 - 1000	6	13	5	10	2	4	4	8	4	8

Test No	16		17		18		19		20	
Test Location	End of road cut		Croatia Ave		Croatia Ave		Croatia Ave		Croatia Ave	
Chainage & Offset	CH1140 + 1.5m R		Side Road + 10m from CL +1.5m R		+20m +1.5m L CL		+30m from Vinty CL (+1.5m CLR)		+40m from Vinty CL	
Material & Layer	Subgrade		Subgrade		Subgrade		Subgrade		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	5	10	3	6	4	8	4	8
100 - 200	5	10	6	13	3	6	4	8	4	8
200 - 300	5	10	5	10	3	6	4	8	3	6
300 - 400	4	8	5	10	3	6	4	8	3	6
400 - 500	4	8	4	8	3	6	3	6	3	6
500 - 600	2	4	4	8	3	6	3	6	3	6
600 - 700	2	4	4	8	3	6	3	6	3	6
700 - 800	2	4	3	6	3	6	3	6	3	6
800 - 900	3	6	3	6	3	6	3	6	3	6
900 - 1000	3	6	3	6	3	6	3	6	3	6

Created by:	JLM	Date:	16/05/2022
Checked by:	RS	Date:	12/10/2022
Authorised Signatory:	JLM	Date:	13/10/2022

*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.



Proposed Earthworks Legend

- 35.00 Proposed Contours Major
- Proposed Contours Minor
- 35.00 Existing Contours Major
- Existing Contours Minor
- Proposed Timber Retaining Wall
- Proposed Stone Retaining Wall
- Extent of Stage 2
- Proposed Batter (1:2.5 Typ)
- Lot Access (1:20 Typ)
- Public Stormwater Reticulation
- P SW Private Stormwater Reticulation
- 110mm Novacoil to 300mm diametre private cesspit connected to Drainage with 100mm uPVC SN16 pipe.

RECEIVED
6th Jun 2022
Auckland Council

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
   - Auckland Transport's Code of Practice "ATCOP".
   - 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.
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.

CMW Geosciences

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Cabra Developments Ltd
22 Vintry Drive
Huapai - Stage 2

Proposed Contours and Retaining Walls Sheet 1

FOR BUILDING CONSENT

No.	REVISION (DESCRIPTIONS)	NAME	DATE
F	Retaining Wall Staging Amendments	KM	16/02/2022
G	Issued For Building Consent	KM	27/04/2022
H	Deleted Wall south of Lot 133 and updated site address	KJM	31/05/2022
SURVEYED			
DESIGNED		KM	21/07/2021
DRAWN		GH	21/07/2021

DATE	ORIGINAL SCALE	ORIGINAL SIZE
21/07/2021	1:1500	A3

DRAWING NO.	REVISION
40352-DR-C-2000	H

LF11 Rev.9 Soil Field Density NDM Direct Transmission with VSS Report (Cohesive Soils)

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

Project:	45 Station Road - Stage 2
Project No:	AKL2018-0018
Location:	Huapai
Report No:	AKL2018-0018LAB Rev.0
Report Date:	25/06/2019
Client:	Cabra
Client Address:	
Client Reference:	

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

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

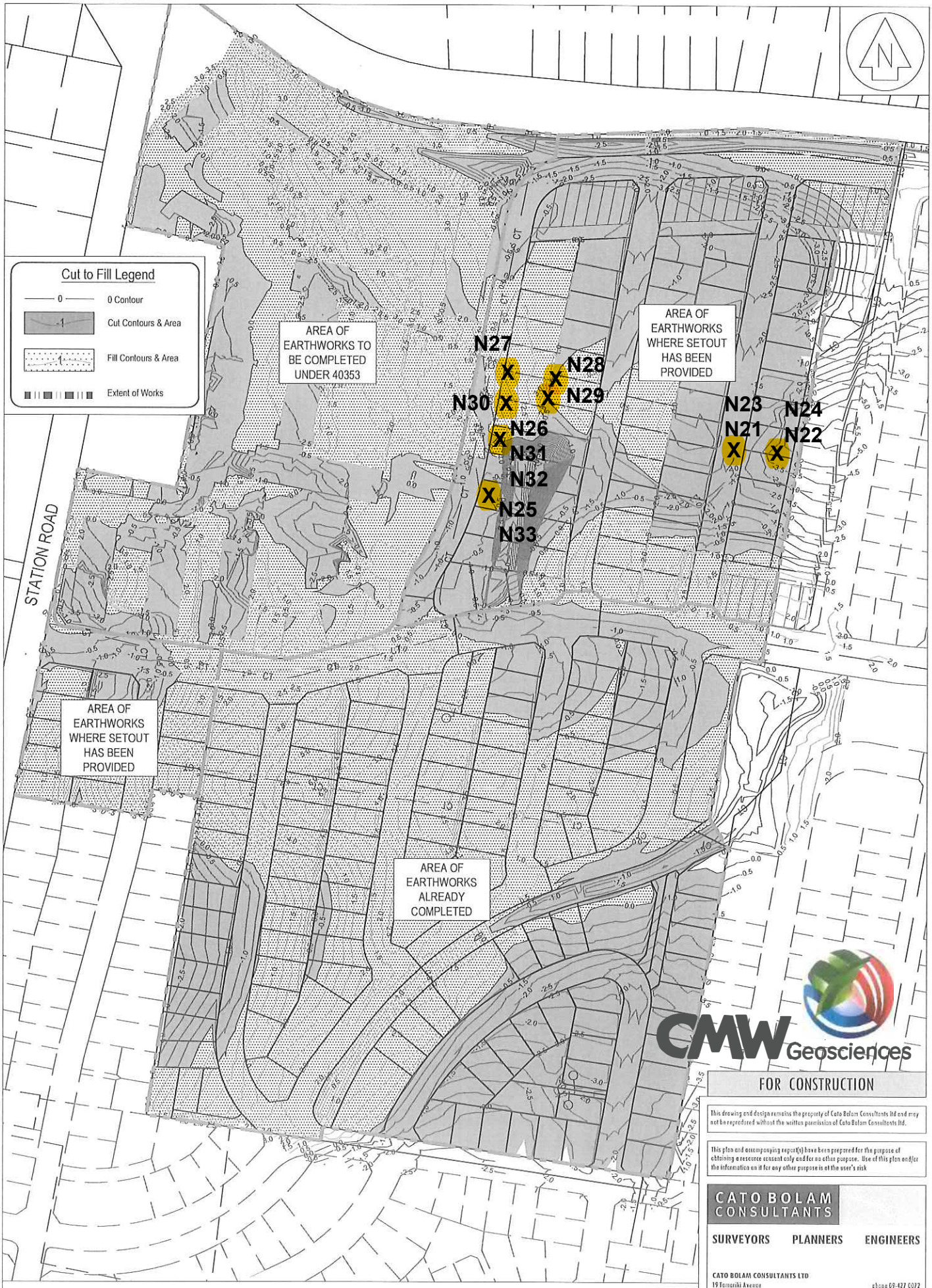
IANZ ACCREDITED LABORATORY — Tests indicated as not accredited are outside the scope of the laboratory's accreditation

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

Date Sampled	Sample No.	Test Location*	Soil Description*	Vane ID		In-situ Vane Shear Strengths					Field and Laboratory Testing Data									Comments
				Head #	Blade # ①	Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m³) **	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth (mm)	Oven Water Content (%)	Solid Density (t/m³) *	Oven Dry Density (t/m³)	Calculated Air Voids (%) *	
30/01/2019	N21	Silt pond backfill	CLAY	1589	1589	154	151	157	163	156	1.77	1.24	42.1	2	300		2.70			No sample taken
	N22	Silt pond backfill	CLAY	1589	1589	198	151	154	154	164	1.78	1.24	43.8	0	300		2.70			No sample taken
4/02/2019	N23	Silt pond backfill	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.83	1.41	29.6	6	300	31.0	2.70	1.40	5	Retest of N21
	N24	Silt pond backfill	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.83	1.39	32.0	4	300	28.4	2.70	1.42	7	Retest of N22
22/02/2019	N25	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.97	1.52	26.7	4	300	29.9	2.70	1.52	-2	
	N26	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.92	1.51	27.3	3	300	33.3	2.70	1.44	-1	
27/02/2019	N27	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.91	1.50	27.6	3	300	23.9	2.70	1.54	6	
	N28	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.88	1.50	28.2	4	300	23.1	2.70	1.52	8	
	N29	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.90	1.60	27.8	7	300	24.5	2.70	1.52	6	
	N30	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.90	1.54	23.9	6	300	25.9	2.70	1.52	5	
	N31	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.88	1.41	32.1	1	300	31.4	2.70	1.44	2	
6/03/2019	N32	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.81	1.34	35.1	3	300	27.4	2.70	1.42	9	
	N33	Refer to site plan	CLAY	1589	1589	UTP	UTP	UTP	UTP	UTP	1.81	1.33	35.5	3	300	29.4	2.70	1.40	7	

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

Created By: JLM Date: 07/02/2019
Checked By: JLM Date: 25/06/2019
Authorised Signatory: JLM Date: 27/06/2019



FOR CONSTRUCTION

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

REVISION (DESCRIPTIONS)	NAME	DATE
	NAME	DATE
SURVEYED		
DESIGNED	KM	20/12/2017
DRAWN	SL	20/12/2017
CHECKED		
APPROVED		

CLIENT
CABRA DEVELOPMENTS LTD
45 STATION ROAD,
HUAPAI

DRAWING TITLE
CUT AND FILL DEPTH CONTOURS PLAN

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1 : 2000	A3	.
DATE	CAD REFERENCE	SHEET NO
20/12/2017	40352 2100 Cut/Fill.p	2100
DIRECTORY		JOB NO
120 SYN\40352\ACAD\		40352

LF11 Rev 6 Soil Field Density NDM Direct Transmission with VSS Report

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

Project:	45 Station Road Stage 2
Project No:	AKL2018-0018
Location:	Huapai
Report No:	AKL2018-0018LAA Rev.0
Report Date:	23/01/2019
Client:	Cabra
Client Address:	
Client Reference:	

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

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

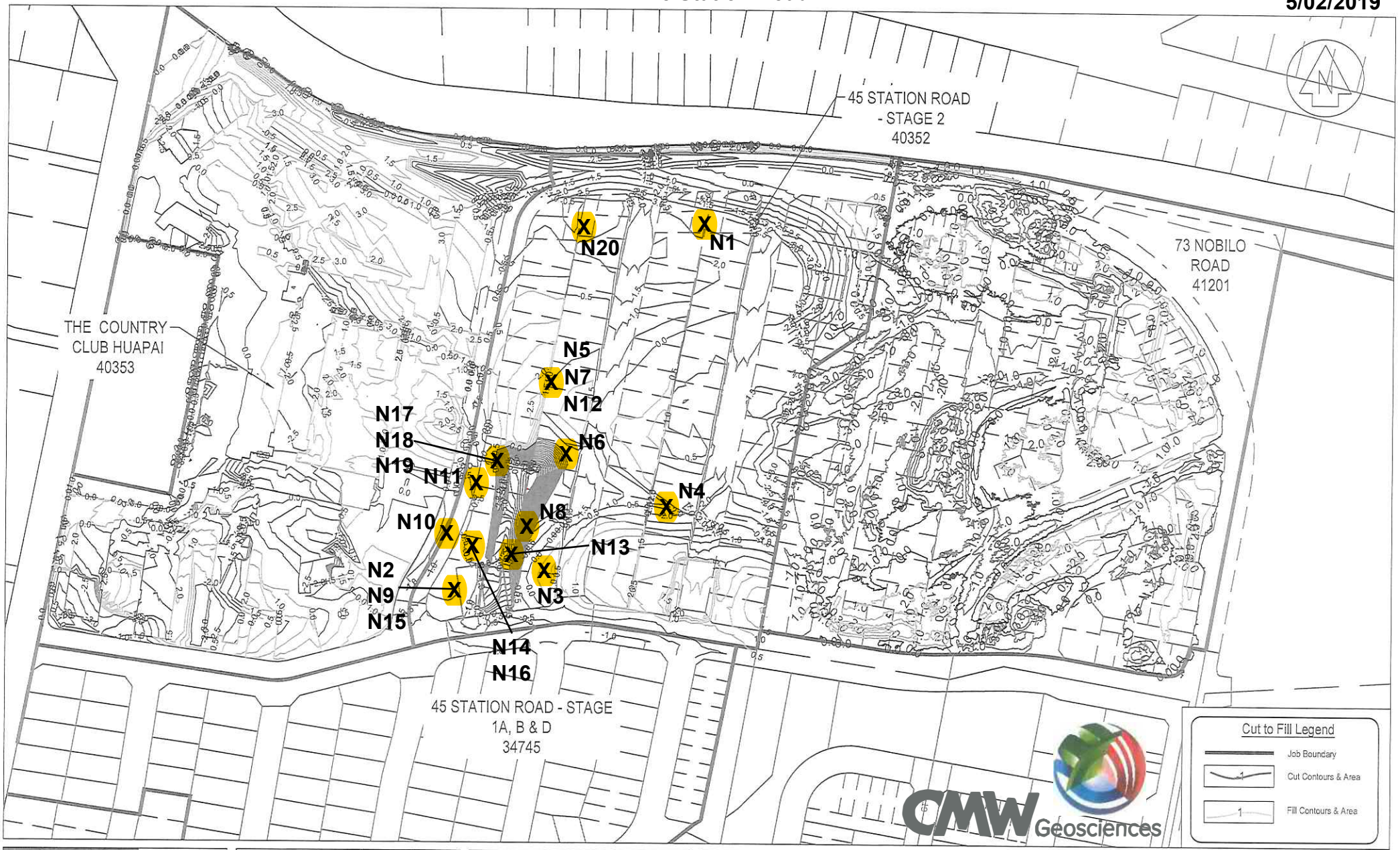
IANZ ACCREDITED LABORATORY

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/m³) **	Gauge Dry Density (t/m³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth	Oven Water Content (%)	Solid Density (t/m³) *	Oven Dry Density (t/m³)	Calculated Air Voids (%) *	
26/04/2018	N1	Refer to site plan	CLAY	133	147	133	142	139	1.83	1.35	35.0	1.3	300	29.8	2.70	1.40	5.9	
9/04/2018	N2	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.85	1.43	29.0	5.4	300	30.8	2.70	1.42	4.2	
	N3	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.83	1.40	30.2	5.5	300	31.0	2.70	1.40	5.1	
19/04/2018	N4	Refer to site plan	LS CLAY	UTP	UTP	UTP	UTP	UTP	1.90	1.44	34.2	2.6	300	31.3	2.70	1.44	1.1	
	N5	Refer to site plan	LS CLAY	UTP	UTP	UTP	UTP	UTP	1.85	1.39	35.0	3.8	300	45.9	2.70	1.26	-5.0	
	N6	Refer to site plan	LS CLAY	133	147	133	147	140	1.79	1.37	35.1	4.5	300	41.5	2.70	1.26	0.9	
	N7	Refer to site plan	LS CLAY	133	186	133	142	149	1.82	1.34	33.1	3.6	300	38.7	2.70	1.32	0.6	
	N8	Refer to site plan	LS CLAY	105	95	133	142	119	1.78	1.30	35.0	5.0	300		2.70			No Sample taken
23/04/2018	N9	Refer to site plan	CLAY	147	147	96	120	128	1.89	1.34	35.0	2.6	300		2.70			Retest of N8. No Sample taken
	N10	Refer to site plan	CLAY	80	107	93	93	93	1.78	1.25	41.1	1.7	300		2.70			No Sample taken
	N11	Refer to site plan	CLAY	61	80	107	133	95										No Sample taken
	N12	Refer to site plan	CLAY	80	101	112	120	103										No Sample taken
	N13	Refer to site plan	CLAY	133	91	132	75	108										No Sample taken
7/05/2018	N14	Refer to site plan	LS CLAY	133	147	133	147	140	1.65	1.16	37.0	11	300		2.70			Retest of N10. No sample taken
9/05/2018	N15	Refer to site plan	LS CLAY	UTP	UTP	UTP	UTP	UTP	1.80	1.28	38.1	4.0	300	38.3	2.70	1.30	2.0	Retest of N9
	N16	Refer to site plan	LS CLAY	UTP	UTP	UTP	UTP	UTP	1.83	1.29	36.0	5.2	300	33.7	2.70	1.36	3.4	Retest of N14
	N17	Refer to site plan	LS CLAY	UTP	UTP	UTP	UTP	UTP	1.80	1.30	37.6	8.1	300		2.70			No Sample taken
	N18	Refer to site plan	LS CLAY	UTP	UTP	UTP	UTP	UTP	1.79	1.33	32.8	6.6	300	38.0	2.70	1.30	2.8	
	N19	Refer to site plan	LS CLAY	UTP	186	UTP	186+	186+	1.77	1.30	34.0	6.4	300		2.70			No Sample taken
29/11/2018	N20	Refer to site plan	CLAY	UTP	UTP	UTP	UTP	UTP	1.86	1.45	27.7	5.8	300	31.3	2.70	1.42	3.4	

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

Created By: JLM Date: 27/04/2018
Checked By: JLM Date: 5/02/2019
Authorised Signatory: JMJ Date: 7/02/2019



CATO BOLAM CONSULTANTS

PLANNERS | SURVEYORS | ENGINEERS | ENVIRONMENTAL

CATO BOLAM CONSULTANTS LTD
19 Temeriki Avenue
PO Box 157
Orewa 0946
phone 09-427 0672
fax 09-426 7331
email catobolam@catobolam.co.nz

REVISION (DESCRIPTIONS)	NAME	DATE

	NAME	DATE
SURVEYED		
DESIGNED	DL	02/18
DRAWN	DL	02/18
CHECKED		
APPROVED		

This plan and accompanying report(s) have been prepared for the purpose of obtaining a resource consent only and for no other purpose. Use of this plan and/or the information on it for any other purpose is at the user's risk

CLIENT
CABRA DEVELOPMENTS LTD
73 NOBILO ROAD,
HUAPAI

DRAWING TITLE
JOB BOUNDARY PLAN
73 NOBILO ROAD &
45 STATION ROAD

ORIGINAL SCALE	ORIGINAL SIZE	REVISION NO
1:2000	A3	
DATE	CAD REFERENCE	SHEET NO
08/02/18	41201 HT boundaries	1304
DIRECTORY	IMAGE FILE	JOB NO
		41201

Appendix D: Laboratory Test Data

ROADTEST LTD

Revision: 1

DETERMINATION OF THE WATER CONTENT, CONE PENETRATION LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.1, 2.5 & 2.6

Project Name : **45 Station Road**

Client : CMW Geosciences
Address : PO Box 300206
Albany, Auckland 0754

Attention : H.Phadnis

Project No : 22 0001 87
Page : 1 of 1
Date of Order : 23.11.22

Sample Method : Hand auger
Sample Date : 17.11.22
Sampled By : CMW Geosciences

Test Details :

Test performed on : Whole Sample
History : Natural

Sample No.	Location	Depth (m)	Cone Penetration (CPL)	Linear Shrinkage (LS)	Natural Water Content (%)
271o	Lot 133	0.4-0.8	68	18	32.1
272o	Lot 136	0.4-0.8	69	19	30.3
273o	Lot 139	0.4-0.8	74	19	29.5
2740	Lot 142	0.4-0.8	70	19	32.2
275o	HA05	0.4-0.8	67	16	49.1
2760	HA06	0.4-0.8	78	20	50.7

Comments :

Tested By: RA Date : 24.11.22
Calculated By : EC Date : 01.12.22
Checked By : ZH Date : 01.12.22

Appendix E: Retaining Wall Producer Statement

8 December 2022 Document Ref: AKL2018-0018AE Rev. 0

Cabra Developments Limited
19 Tamariki Avenue
PO Box 197
Orewa

Attention: Duncan Unsworth

Dear Duncan

RE: GEOTECHNICAL CONSTRUCTION REVIEW (PS4) OF SITE WORKS FOR SIX (6) RETAINING WALLS – BCO10350728.

22 VINTRY DRIVE, HUAPAI

CMW Geosciences (CMW) visited the site at 22 Vintry Drive, Huapai, legally described as Lot 1 DP560870, Lot 2 DP 544111 on several occasions during July and August 2022 to observe the site works for the construction of six (6) cantilever timber pole retaining walls located along the common boundaries of new lots numbered 138 to 144 and 300.

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

- Conditions of Auckland Council Building Consent referenced BCO10350728, issued 15 June 2022;
- Consented construction drawings, prepared by Cato Bolam Consultants Ltd, referenced 40352 Rev. H dated 21/07/2021 ;
- Geotechnical design report for 22 Vintry Drive prepared by CMW Geosciences Ltd, referenced AKL2018-0018AC Rev. 1, dated 2 June 2022 .

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

- Assessment of the ground conditions and soil strengths in the exposed timber pole retaining wall pile hole excavations (RW1, 2, 3, 4, 5, and 6). Our testing demonstrated vane shear strengths on average in excess of 100kPa. Test results from within RW1 were lower than those for RW2 to RW6, but still exceeded the minimum design specification of 50kPa. The retained materials demonstrated vane shear strengths in excess of 80kPa.
- Measurements of retaining wall pile dimensions (depth, spacing and diameter) and small end diameter (SED) of timber poles for all walls and confirmation of the timber SED treatment. All retaining wall pile dimensions (depth, spacing and diameter), SED of timber poles and treatment matched the CMW Geosciences Ltd Design Report requirements.
- Observations of retaining wall drainage coils, lot connections, timber lagging, thickness and treatment grade are compliant with design

On the basis of our observations and testing, we consider that the site works observed and/ or tested have been completed in accordance with the approved Building Consent and related approved documentation described above, are in accordance with the requirements and/or recommendations of the geotechnical report and provide the basis for our attached PS4 Construction Review producer statement.

CMW's site presence during construction for this project included periodic observations of specific elements of work as described herein. As we were not on site at all times during construction, we have relied on the Contractor's attached PS3 certification, diligence and their construction observations to ensure that the works have been carried out in accordance with:

a) The approved Contract drawings and design details.

b) The approved Contract specifications.

c) Authorised Variations to (a) and (b) during the execution of the works.

d) The conditions of Resource and Building Consents where applicable.

e) The relevant Geotechnical Investigation reports, recommendations, and site instructions.

and that all as-built information and other details provided to the Client and/or CMW are accurate and correct in all respects.

For and on behalf of CMW Geosciences

Richard Knowles
Principal Geotechnical Engineer

Distribution: 1 electronic copy to Cabra via email
Original held at CMW Geosciences

Attachments: Producer Statement - Construction Review

PRODUCER STATEMENT – PS4
CONSTRUCTION REVIEW

BUILDING CODE CLAUSE(S): B1 **JOB NUMBER:** AKL2018-0018

ISSUED BY: CMW GEOTECHNICAL NZ LIMITED
(Construction Monitoring Firm)
TO: Cabra Developments Ltd
(Owner/Developer)
TO BE SUPPLIED TO: Auckland Council
(Building Consent Authority)
IN RESPECT OF: Six timber pole retaining walls (on common boundaries of new lots numbered 138 to 144 & 300
(Description of Building Work)
AT: 22 Vintry Drive, Huapai
(Address, Town/City)
LEGAL DESCRIPTION: Lot 1, DP 560870, Lot 2 DP 544111 **N/A** ☑

We have been engaged by the owner/developer referred to above to provide Choose one **level of construction monitoring relating to** the Clause(s) named above of the Building Code for the building work which is covered by PS1(s) issued by CMW Geosciences (*Engineering Design Firm*) and which is described in the documents relating to the Building Consent No. BCO10350728 and those relating to Building Consent Amendment(s) No. N/A issued during the course of the works, .

We have sighted these Building Consents and the conditions attached to them.
If any of the fields above are too small, please write "refer the Schedule".

Authorised instructions/variation(s) detailed/listed in the Schedule have been issued during the course of the works.

On the basis of these review(s) and information supplied by the contractor during the course of the works and **on behalf of the engineering firm** undertaking this Construction Monitoring, **I believe on reasonable grounds** that the building works covered by the above-mentioned PS1(s) have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above or in the Schedule on page 2, 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, *(Name of Construction Monitoring Professional)* Richard Knowles (AC #2342) , am:

- CPEng number 160049
- I hold the following qualifications BE (Civil), CPEng

The Construction Monitoring Firm holds a current policy of Professional Indemnity Insurance no less than $200,000 The Construction Monitoring Firm Is a member of ACE New Zealand.

SIGNED BY *(Name of Construction Monitoring Professional)*: Richard Knowles (AC #2342)
(Signature below):

ON BEHALF OF *(Construction Monitoring Firm)*: CMW GEOTECHNICAL NZ LIMITED Date: 8/12/22

Note: This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Construction Monitoring Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, is limited to the sum of $200,000.

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

SCHEDULE to PS4

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below:

CMW Geosciences letter referenced AKL2018-0018AE Rev.0, dated 8 December 2022

GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on the Engineering New Zealand website
https://www.engineeringnz.org/engineer-tools/engineering-documents/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 (NZIA), Institution of Professional Engineers New Zealand (now Engineering New Zealand), Association of Consulting and Engineering New Zealand (ACE NZ) in consultation with the Building Officials Institute of New Zealand (BOINZ). The original suite of producer statements has been revised at the date of this form to ensure standard use within the industry.

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

PS1 DESIGN Intended for use by a suitably qualified independent engineering 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 engineering design review 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 engineering construction monitoring professional who either undertakes or supervises 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 ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

Competence of Engineering Professional
This statement is made by an engineering 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 personnel.

The person signing the Producer Statement on behalf of the engineering firm will have a professional qualification and proven current competence through registration on a national competence-based register such as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand provides additional assurance of the designer's standing within the profession. If the engineering firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

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

Professional Indemnity Insurance
As part of membership requirements, ACE New Zealand 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 practice for the relationship between the BCA and the engineering firm.

Professional Services during Construction Phase
There are several levels of service that an engineering 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 engineering 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.

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 (ACE New Zealand/Engineering New Zealand 2004)
4 PN01 Guidelines on Producer Statements

www.acenz.org.nz
www.engineeringnz.org