12 November 2021

BARTLETT BLOCK

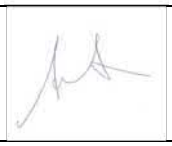
25 BANKSIDE ROAD, SILVERDALE

GEOTECHNICAL COMPLETION REPORT

WFH Properties Ltd

AKL2020-0082AH Rev. 0

AKL2020-0082AH		
Date	**Revision**	**Comments**
5 November 2021	A	Initial draft for internal review
12 November 2021	0	Final issue to Client

	Name	**Signature**	**Position**
Prepared by	Scott Cole		Project Geotechnical Engineer
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 WFH Properties Ltd as part of the documentation to be submitted to Auckland Council following earthworks to form the development. Construction of this residential subdivision has been undertaken in accordance with the Auckland Council Resource Consent number SUB60361402/LUC60361401 and Engineering Approval letter ENG60371708 dated 2 June 2021. A timber pole retaining wall was also constructed during the civil works.

This report contains our Suitability Statement (presented in ***Appendix A***), specific comments related to items raised in the Resource Consent, relevant test data and Woods as-built plan set as provided in ***Appendix B***.

This report covers the construction period January 2021 to October 2021 and is intended to be used for certification purposes for new lots (listed below) created from Lot 1 DP 445482 and Lot 3 DP 168595 as follows:

- 38 new residential lots numbered 1 to 38;
- 3 new roads named as follows;
    - Butler Stoney Crescent;
    - Memory Place;
    - Botanical Drive.

The Bartlett Block development is located off Bankside Road in Silverdale. As can be seen from the as-built plans, 22 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 4 metres.

2. PROJECT BACKGROUND

The geotechnical investigations and design were undertaken by CMW as presented in the following reports:

- CMW Geosciences, Geotechnical Investigation Report referenced AKL2020-0082AB Rev. 1 dated 5 August 2020;
- CMW Geosciences, Settlement Monitoring Plan referenced AKL2020-0082AD Rev. 0 dated 9 December 2020;
- CMW Geosciences, Retaining Wall Design Report referenced AKL2020-0082AG Rev. 0 dated 27 April 2021.

3. DESCRIPTION OF EARTHWORKS

JG Civil Limited commenced work across the development in late-January 2021, with the removal of topsoil from the gully area, mucking out of the gully base and installation of the underfill gully drain. This coincided with the installation of a sediment control pond within the Metro Park West Reserve and the establishment of the site office adjacent to Bankside Road. A settlement monitoring plate was installed within the base of the gully to facilitate settlement monitoring throughout the filling operations.

Various topsoil stripping operations continued in late January, with Radich Contractors mobilised on site to begin the bulk cut to fill operations.

Cut to fill operations continued through February, along with the construction of an additional sediment control pond within the northern portion of the site. Stockpiling of surplus cut and topsoil was conducted along the Metro Park West Reserve area throughout February and into March.

By the end of March, the majority of bulk cut to fill had been completed with the trimming of roads to design subgrade levels commencing.

At the start of April, crews were mobilised on site to begin civil works for the development, which continued through April and into May. Lots within the central portion of the site which had been earthworked to design subgrade underwent topsoiling during the month of April.

By May, roading aggregates had been laid, with civil subcontractors continuing service installation across the development. Various topsoiling works progressed. Road kerbing works commenced and were undertaken through May while existing services at the northern end of site were exposed to facilitate the installation of new services to the development.

Kerbing works progressed into June, along with various civil works and the backfilling of service trenches where service installation had been completed. By late June, JG Civil began filling works along the strip within the Metro Park West Reserve area.

Filling of the Reserve area continued into July, where the decommissioning of the northern sediment pond was also undertaken. By late July, Ruiterman Contracting were mobilised on site to begin the construction of the retaining wall within the north-western portion of the site. As part of the closing civil works, contractors began excavation of the common service trench adjacent to Bankside Road, with service installation following.

By the start of August, the construction of the retaining wall was complete. Hiway Stabilizers arrived on site to undertake lime stabilisation for the remaining filling, which was to be placed within the Reserve, the northern lots and behind the retaining wall. Minor topsoiling works across the site were ongoing.

By mid-August, the majority of the pavement and kerbing works had been completed. Tree planting and the construction of the speed table within the development commenced.

No earthworks or civil works were undertaken during late August and the majority of September 2021 due to government-enforced COVID-19 restrictions.

On returning to site in late September, various completion works re-commenced, including tree planting, the construction of kerbs and footpaths, speed tables and minor topsoiling and filling works.

The remainder of the subdivision works including road sealing and streetlight installation were completed by late-October.

The main items of plant used by the contractor, JG Civil Limited, included:

- 3 x 20T Excavators;
- 3 x 13T Excavators;
- 2 x 5T Excavators;
- 1 x 2.2T Excavator;
- 1 x 1.8T Excavator;
- 2 x Motorscrapers;
- 1 x CAT 815 4-wheel Compactor;
- 1 x Padfoot Compactor;
- 1 x Smooth Drum Roller;
- 1 x Water Cart;
- 2 x Graders.

4. GEOTECHNICAL QUALITY CONTROL

4.1. Site Observations

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

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

- Adequate topsoil stripping;
- Fill areas prior to the placement of fill materials to ascertain that all mullock, and soft inorganic subsoils had been removed;
- Installation of underfill drains but excluding road under-channel drains;
- Backfilling of underfill drains;
- Excavation and backfilling of sewer and stormwater trenches. Stormwater and wastewater lines where constructed beneath the roads were backfilled using compacted aggregate. Compaction testing was not requested or completed;
- Underfill drain connections to outlets;
- Construction of a timber pole retaining wall including ground conditions, pile size, spacing and depth; and
- Placement and compaction of engineered fills.

4.2. Compaction Control

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

General Fills

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

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

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

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

Metro Park West Reserve Filling

A reduced strength criterion was adopted for the filling works conducted within the Metro Park West Reserve. The filling was required to achieve a minimum undrained shear strength of 100kPa.

Uncontrolled Filling

There may be shallow, uncompacted fills in isolated areas outside of lot boundaries where minor re-shaping of the contour occurred near the extent of the earthworks. These fills were not tested and the extent of any such fills or any (undiscovered) fills that existed in these areas prior to the works are not depicted on the as-built plans.

5. EVALUATION OF COMPLETED EARTHWORKS

5.1. Natural Hazards

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

The single applied zone comprises **Specific Design Zone (Retaining)**, which is intended to protect the retaining wall from overloading that could lead to instability.

A full description of the restrictions associated with this zone is presented in the Suitability Statement (***Appendix A***). Additional information is also provided in some of the following sections.

5.2. Land Stability and Erosion Control

Slope gradients for the finished development are relatively gentle and do not exceed a nominal gradient of 1V:6H. We are therefore satisfied that these areas are not subject to the natural stability hazards described in the Building Act.

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

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

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

5.3. Retaining Wall

A cantilever timber pole retaining wall has been constructed in the location shown on the appended Woods As-built Plan referenced 37050-1300-AB Rev.1. The timber pole retaining wall is located within Lots 17, 18 and 20. This wall reaches a maximum height of approximately 0.9 metres and was designed by CMW Geosciences who also observed the construction of the wall. 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 Zone – retaining) are contained in the Suitability Statement in ***Appendix A*** and shown on the appended Woods Retaining Wall Asbuilt Plan referenced 37050-1301-AB Rev. 2. Lots containing this zone include Lots 17, 18 and 20.

5.4. Fill Induced Settlement

The majority of the filling on this stage of the development was placed prior to late-March 2021. A settlement marker was installed within the deepest area of fill prior to the commencement of filling and was periodically monitored for vertical movements. As shown on the settlement monitoring results presented in ***Appendix F***, a maximum settlement of 63mm was recorded. Settlement monitoring was then ceased once it was

assessed to have reached t_{90}, with final readings only depicting vertical movements which were typical of seasonal shrink/swell variations.

On the basis of the results, we are satisfied that t_{90} primary consolidation settlement has been achieved here and that fill-induced settlement does not pose a hazard to NZS 3604 type building development.

5.5. Service Line Trenches

As part of the civil works, sanitary sewer and stormwater services were trenched throughout the development as shown on the appended Woods Stormwater and Wastewater 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 provided in ***Appendix B*** extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision depicts their requirements for stormwater pipes. Details for water and wastewater pipes are available in the Watercare COP1 - General Requirements and Procedures. The resulting restrictions are presented in the Suitability Statement below.

5.6. Underfill Drains

The appended Woods as-built plan referenced 37050-1200-AB Rev. 1 shows the position of the underfill drain which was constructed in the natural ground during the earthwork's operations prior to the filling of the gully feature. The drain was installed to help control groundwater levels and is linked to the reticulated storm water system.

The trench excavation ranged between 1 and 2 metres deep in the natural ground beneath the filling. Accordingly, it is considered to be beyond the depths of anticipated foundations.

Descriptions of restrictions associated with this drain are contained in the appended Suitability Statement.

5.7. Road Subgrades

Penetration resistance testing was carried out on the road subgrades during construction and the results of this testing were forwarded to Woods for pavement / remedial design. Where soft ground with low equivalent CBR values was identified it was generally undercut and replaced with lime stabilised fill. All road subgrade areas were subsequently lime stabilised to achieve appropriate CBR values.

5.8. Design of Shallow Foundations

5.8.1. Bearing Capacity

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

At current subgrade levels, Lots 1 to 38 inclusive have been assessed as having a geotechnical ultimate bearing capacity of 300 kPa within the influence of conventional shallow residential building foundation loads.

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

5.8.2. Foundation Settlements

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

5.8.3. Soil Expansiveness Classification

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.

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

Seven sets of soil tests were carried out on samples taken from the likely foundation level on lots within the development. Testing was carried out in accordance with NZS 4402, "Methods of Testing Soils for Civil Engineering Purposes" test 2.2 and 2.6 and were used in conjunction with visual-tactile assessment of the site soils and BRANZ Report SR120A[5] to determine expansive site Classes as defined in AS 2870, "Residential Slabs and Footings – Construction". All test results are appended.

The expansive soil hazard is addressed by a combination of appropriate foundation design, careful site preparation and diligent maintenance of plantings near the foundations.

Foundation Design

We have assessed the AS 2870 Site Classes for the development as follows:

- H1 (high): Lots 1 to 13, 18, 20 and 27 to 33 inclusive;
- H2 (high): Lots 14 to 17, 19, 21 to 26 and 34 to 38 inclusive.

Details of foundations options for these Classes are contained in the appended Suitability Statement.

Site Preparation

There have been 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 re-building 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 the footings and building platform subgrade between the time of excavation and the pouring of concrete.

[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

[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

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

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.

5.9. Topsoil Depths

Topsoil depths have been checked by the drilling of a borehole in the approximate centre of the building platform on each lot. The results are considered indicative for each lot but may be subject to variations. Topsoil depths are between 50mm and 300mm within the development.

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

6. CLOSURE

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

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

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

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

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

I, Andrew Linton, of CMW Geosciences (NZ) Limited Partnership, Auckland, hereby confirm that:

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in Section 1.2.2 of NZS 4404 and was retained by the Developer as the Geotechnical Engineer on the Bartlett Block Residential Development.

2. The extent of preliminary investigations carried out to date are described in the CMW Geosciences Geotechnical Investigation Report referenced AKL2020-0082AB Rev. 1 dated 5 August 2020. The conclusions and recommendations of those documents have been re-evaluated in the preparation of this report. The results of all tests carried out are also appended.

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

   (a) The earth fills shown within the limits of the development on the appended Woods As-built Plans referenced 37050-1100-AB Rev. 1 to 37050-1102-AB Rev.2 have been placed in compliance with NZS 4431, the Auckland Council Unitary Plan and related documents. Earth fills shown within the Metro Park West Reserve have been placed in accordance with the specifications in our Geotechnical Completion Report.

   (b) **Specific Design Zone (Retaining) areas** have been applied on Lots 17, 18 and 20 inclusive for the protection of the function of the retaining walls. The retaining walls on this stage of the development were designed for a maximum of 12 kPa surcharge load and 0° toe slope. No building construction and no earthworks (i.e. cut or fills) should take place that exceed these design limits on the walls unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report who consider the stability implications of the earthworks and/ or building proposals on the retaining walls. The extents of the Specific Design Zone (Retaining) is shown on the appended Woods retaining Wall As-Built plan referenced 37050-1301-AB Rev. 2.

   (c) The function of the subsoil drains installed beneath Lots 10, 11, 27, 28 and 32 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 1 to 38 inclusive.

   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 expansive site Class for Lots 1 to 13, 18, 20 and 27 to 33 inclusive has been assessed as AS2870 Class H1 (high) and Lots 14 to 17, 19, 21 to 26 and 34 to 38 inclusive has been assessed as H2 (high). We recommend that building designers note on the Building Consent drawings the need to maintain appropriate moisture levels across building subgrades and in footing excavations (as described in Section 5.8.3 of the Geotechnical Completion Report) for reference by foundation contractors.

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

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

(g) Subject to the geotechnical limitations, restrictions and recommendations contained in clauses 3(b), 3(c), 3(d), 3(e) and 3(f) 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 H1 or H2) or alternately, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.

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

The following table summarises the conditions on each of 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 (retaining)**	**Subsoil Drains Present**	**Geotechnical Ultimate Bearing Capacity (kPa)**	**AS2870 Expansive Class**	**Service Line Restrictions**	**Indicative Topsoil Depth (mm)**
GCR SOPO Clause	**3(b)**	**3(c)**	**3(d)**	**3(e)**	**3(f)**	
Lot number						
1			300	H1		100
2			300	H1		150
3			300	H1		150
4			300	H1	●	300
5			300	H1		200
6			300	H1		200
7			300	H1		250
8			300	H1		100
9			300	H1	●	100
10		●	300	H1		100
11		●	300	H1		200
12			300	H1		300
13			300	H1	●	150
14			300	H2		200
15			300	H2	●	150
16			300	H2	●	250
17	●		300	H2	●	100
18[1]	●		300	H1		-
19			300	H2		200
20	●		300	H1		200

Table 1: GCR SUMMARY TABLE						
Condition	**Specific Design Zone (retaining)**	**Subsoil Drains Present**	**Geotechnical Ultimate Bearing Capacity (kPa)**	**AS2870 Expansive Class**	**Service Line Restrictions**	**Indicative Topsoil Depth (mm)**
GCR SOPO Clause	**3(b)**	**3(c)**	**3(d)**	**3(e)**	**3(f)**	
21			300	H2	●	200
22			300	H2	●	150
23			300	H2		200
24			300	H2		200
25			300	H2		300
26			300	H2		250
27		●	300	H1		250
28		●	300	H1		250
29			300	H1		150
30			300	H1		250
31			300	H1		50
32		●	300	H1	●	100
33			300	H1	●	100
34			300	H2	●	100
35			300	H2	●	100
36			300	H2	●	200
37			300	H2	●	150
38			300	H2	●	100
Notes: [1] No topsoil placed on Lot 18. Hardfill placed across lot to accommodate future construction.						

Appendix B: Drawings

Title	Reference No.	Date	Revision
Woods – Final Surface Asbuilt Plan	37050-00-1000-AB	29/10/21	1
Woods – Cut and Fill Asbuilt Plans	37050-1100-AB to 37050-1101-AB	29/10/21	1
Woods – Cut and Fill Asbuilt Plan	37050-1102-AB	5/11/21	2
Woods – Undercut, Shearkey and Subsoil Asbuilt Plan	37050-1200-AB	29/10/21	1
Woods – Retaining Wall Asbuilt Plan	37050-1300-AB	01/11/21	1
Woods – Retaining Wall Asbuilt Plan	37050-1301-AB	5/11/21	2
Woods - Roading Asbuilt Plans	37050-2000-AB to 37050-2003-AB	29/10/21	1
Woods – Stormwater Asbuilt Plans	37050-3000-AB to 37050-3003-AB	29/10/21	1
Woods – Wastewater Asbuilt Plans	37050-4000-AB to 37050-4003-AB	29/10/21	1

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

WOODS
Est.1970

NOTES

1. CONTOURS ARE AT 0.25m INTERVALS
2. BOUNDARIES ARE SUBJECT TO FINAL SURVEY

LEGEND

- CONTOURS MAJOR
- CONTOURS MINOR
- STAGE BOUNDARIES
- LOT BOUNDARIES
- EXISTING BOUNDARIES

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD

FINAL SURFACE ASBUILT PLAN

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1 : 1000 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-00-1000-AB	

DISCLAIMER:
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF DISCUSSION. WFH PROPERTIES LTD AND WOOD AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS DRAWING FILE.

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

NOTES

1. CONTOURS ARE AT 0.5 METRE INTERVALS
2. BOUNDARIES ARE SUBJECT TO FINAL SURVEY

LEGEND

- ZERO CONTOUR
- CUT CONTOUR
- FILL CONTOUR
- STAGE BOUNDARIES
- LOT BOUNDARIES
- EXISTING BOUNDARIES

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD

CUT AND FILL ASBUILT
SHEET 1 OF 3
LOWEST TO FINAL SURFACE

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1 : 1000 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-1100-AB	

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

WOODS
Est.1970

NOTES

1. CONTOURS ARE AT 0.5 METRE INTERVALS
2. BOUNDARIES ARE SUBJECT TO FINAL SURVEY

LEGEND

- ZERO CONTOUR
- CUT CONTOUR
- FILL CONTOUR
- STAGE BOUNDARIES
- LOT BOUNDARIES
- EXISTING BOUNDARIES

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD

CUT AND FILL ASBUILT
SHEET 2 OF 3
ORIGINAL TO LOWEST SURFACE

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1 : 1000 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-1101-AB	

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 5/11/2021

Name: KENDALL REID

NOTES

1. CONTOURS ARE AT 0.5 METRE INTERVALS
2. BOUNDARIES ARE SUBJECT TO FINAL SURVEY

LEGEND

- ZERO CONTOUR
- CUT CONTOUR
- FILL CONTOUR
- STAGE BOUNDARIES
- LOT BOUNDARIES
- EXISTING BOUNDARIES

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21
2	TITLEBLOCK UPDATED	MRB	5/11/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD

CUT AND FILL ASBUILT
SHEET 3 OF 3
ORIGINAL TO FINAL SURFACE

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1 : 1000 @ A3	2
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-1102-AB	

DISCLAIMER:
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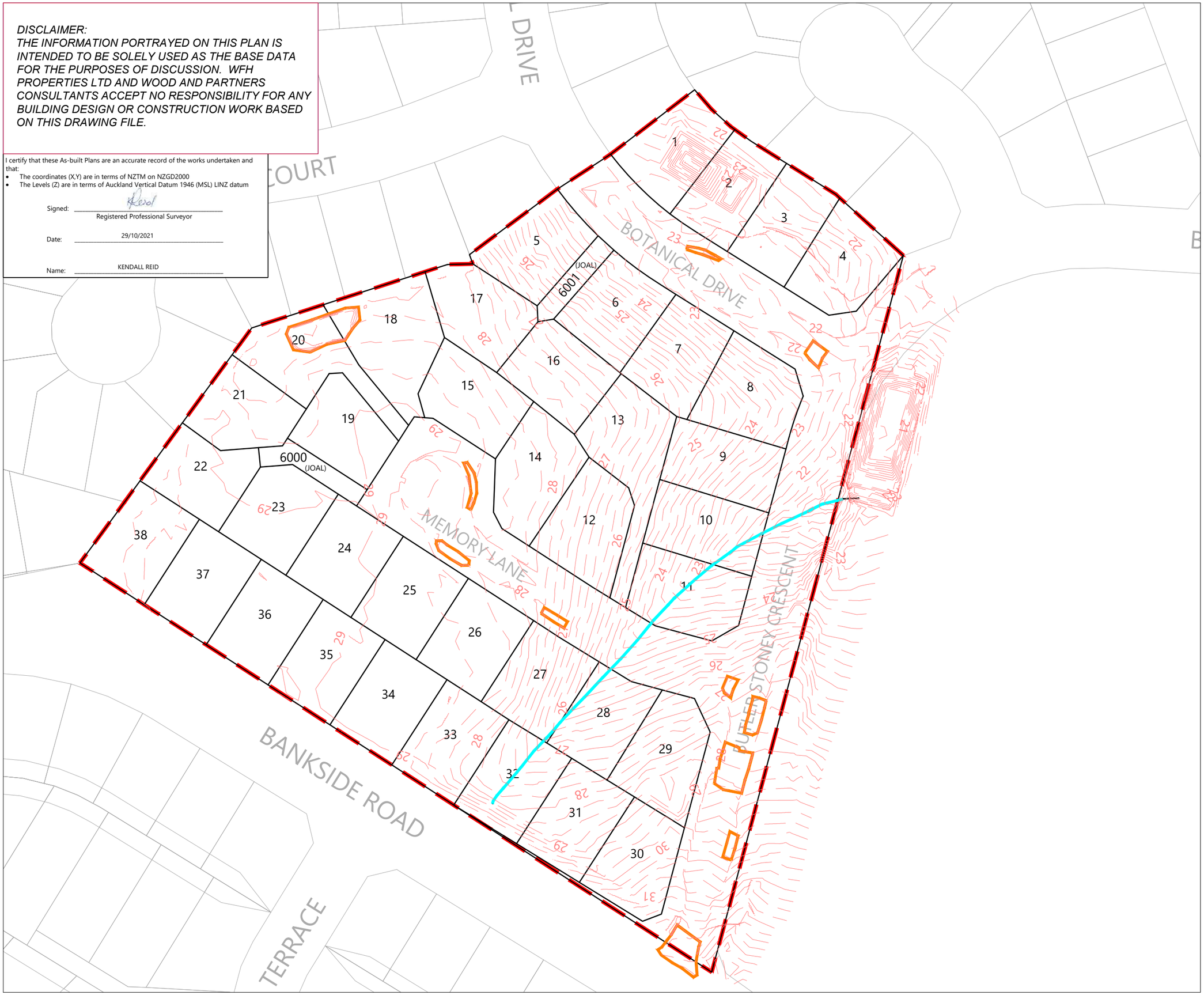
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID



NOTES

1. SUBSOIL DATA SUPPLIED BY CONTRACTOR
2. LOT BOUNDARIES SUBJECT TO FINAL SURVEY
3. CONTOURS ARE AT 0.5 METRE\ INTERVALS

LEGEND

- STAGE BOUNDARIES
- LOT BOUNDARIES
- EXISTING BOUNDARIES
- GULLY DRAIN
- MAJOR CONTOURS
- MINOR CONTOURS
- UNDERCUT AREA EXTENTS

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

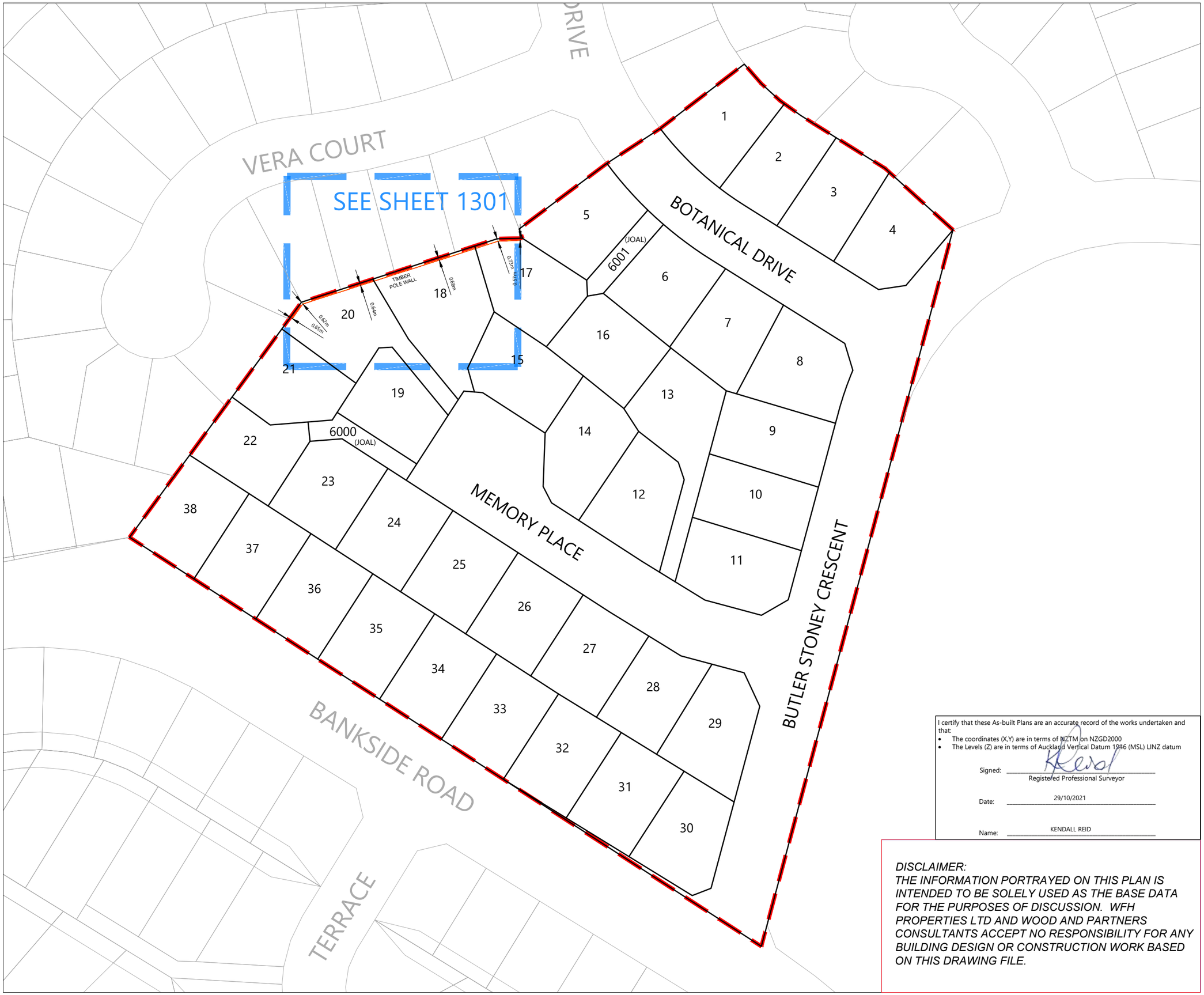
SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD

UNDERCUT, SHEARKEY & SUBSOIL ASBUILT PLAN

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1 : 1000 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-1200-AB	



WOODS
EST.1970

LEGEND:

- BOTTOM FACE OF WALL
- TOP FACE OF WALL
- BOUNDARY
- STAGE BOUNDARY
- EXISTING BOUNDARY
- 0.10m OFFSET TO BOUNDARY (FROM WALL)

NOTES:

BOUNDARIES ARE SUBJECT TO FINAL SURVEY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

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Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

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SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

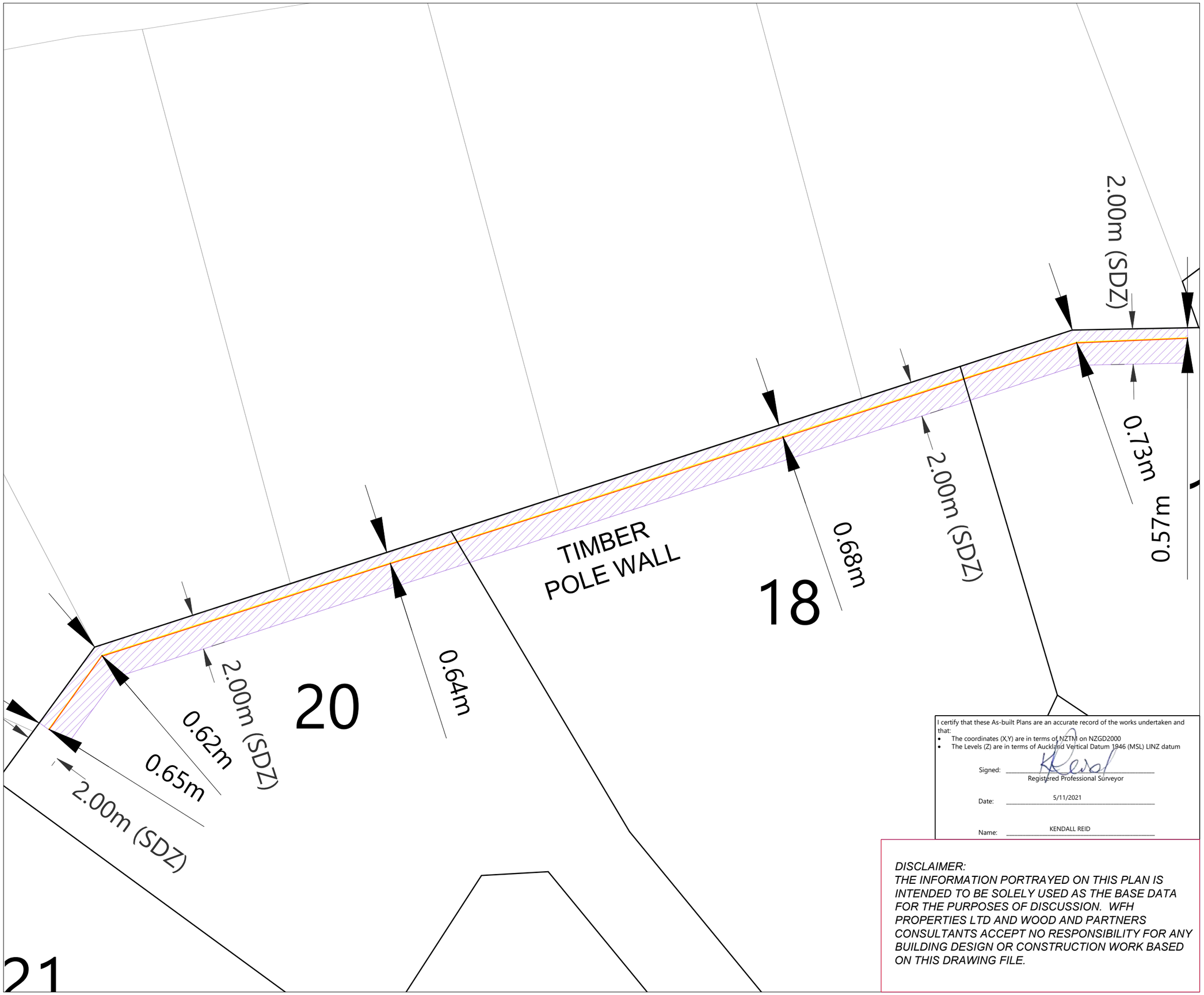
N

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD

RETAINING WALL ASBUILT
LAYOUT PLAN
SHEET 1 OF 2

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1000 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-1300-AB	



LEGEND:

- BOTTOM FACE OF WALL
- TOP FACE OF WALL
- BOUNDARY
- STAGE BOUNDARY
- EXISTING BOUNDARY
- 0.10m OFFSET TO BOUNDARY (FROM WALL)
- SPECIFIC DESIGN ZONE (SDZ)

NOTES:

BOUNDARIES ARE SUBJECT TO FINAL SURVEY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	28/10/21
2	DESIGN ZONE ADDED	MRB	5/11/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	WOODS.CO.NZ

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Signed: _____
Registered Professional Surveyor

Date: 5/11/2021

Name: KENDALL REID

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MILLWATER
25 BANKSIDE ROAD

RETAINING WALL ASBUILT
LAYOUT PLAN
SHEET 2 OF 2

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:200 @ A3	2
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-1301-AB	

SCHEDULE OF COORDINATES			
STREET TREES			
ID	EASTING	NORTHING	TYPE
ST01			KOHEKOHE
ST02	1749290.48	5948128.13	
ST03	1749294.85	5948136.63	
ST04	1749326.65	5948104.99	
ST05	1749336.11	5948110.19	
ST06	1749355.61	5948112.19	PRUNUS
ST07	1749367.78	5948110.71	
ST08	1749337.03	5948081.09	
ST09	1749331.70	5948062.18	
ST10	1749341.18	5948061.43	
ST11	1749326.50	5948042.59	
ST12	1749335.61	5948039.94	
ST13	1749321.71	5948025.14	
ST14	1749224.30	5948052.36	TITOKI
ST15	1749236.44	5948073.48	
ST16	1749245.49	5948048.89	
ST17	1749252.40	5948033.92	
ST18	1749263.91	5948036.95	
ST19			
ST20	1749307.35	5948006.10	
ST21	1749326.36	5948006.20	PRUNUS
ST22	1749311.12	5947985.26	
ST23	1749320.77	5947985.03	
ST24	1749300.34	5947944.95	
ST25	1749309.52	5947942.62	

SCHEDULE OF COORDINATES		
STREET LIGHTS		
ID	EASTING	NORTHING
SL01		
SL02	1749298.19	5948123.10
SL03	1749334.24	5948100.22
SL04	1749352.58	5948093.16
SL05	1749333.96	5948068.92
SL06	1749325.18	5948036.76
SL07	1749222.71	5948070.55
SL08	1749255.37	5948041.97
SL09	1749295.55	5948009.71
SL10	1749323.72	5947996.79
SL11	1749317.16	5947972.81
SL12	1749297.51	5947934.94
SL13		
SL14		

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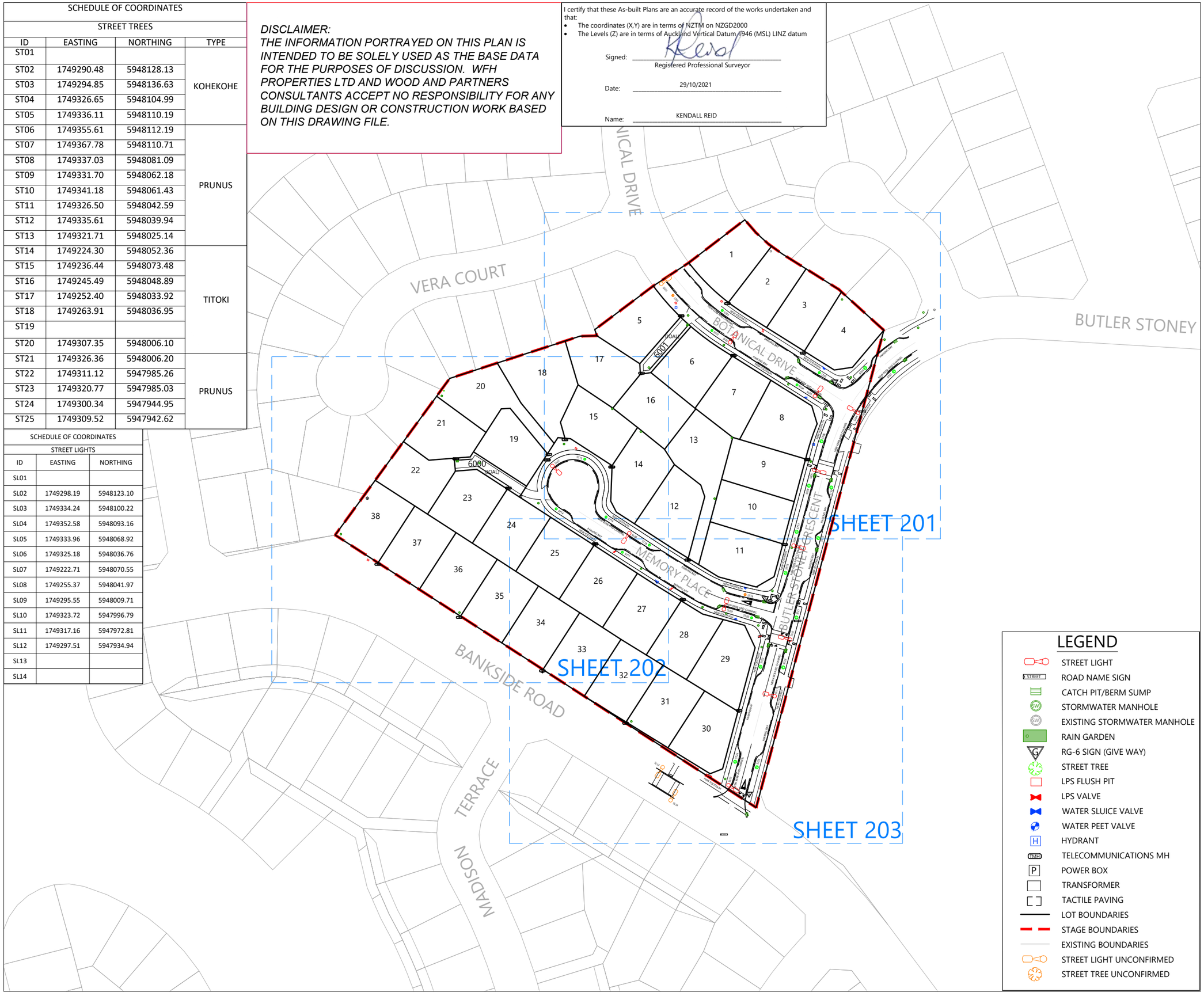
Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID



LEGEND

- STREET LIGHT
- ROAD NAME SIGN
- CATCH PIT/BERM SUMP
- STORMWATER MANHOLE
- EXISTING STORMWATER MANHOLE
- RAIN GARDEN
- RG-6 SIGN (GIVE WAY)
- STREET TREE
- LPS FLUSH PIT
- LPS VALVE
- WATER SLUICE VALVE
- WATER PEET VALVE
- HYDRANT
- TELECOMMUNICATIONS MH
- POWER BOX
- TRANSFORMER
- TACTILE PAVING
- LOT BOUNDARIES
- STAGE BOUNDARIES
- EXISTING BOUNDARIES
- STREET LIGHT UNCONFIRMED
- STREET TREE UNCONFIRMED

WOODS EST.1970

NOTES

1. ALL WORKS AND MATERIALS COMPLY WITH AC STANDARDS FOR ENGINEERING DESIGN AND CONSTRUCTION ISSUE NOV 2005.
2. ALL ROADS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH APPROVED ENGINEERING PLANS.
3. ALL FINISHED ROAD SURFACES ARE ASHPHALT CONCRETE 30mm THICK.
4. ALL FOOTPATHS ARE 100mm THICK BRUSHED CONCRETE OR EXPOSED AGGREGATE AS NOTED.
5. ALL PIPE CROSSINGS UNDER ROADS HAVE BEEN HARDFILL BACKFILLED
6. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY DATA AND CONTRACTOR RECEIVED DATA.
7. BOUNDARIES SUBJECT TO FINAL SURVEY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD
ROADING ASBUILT PLAN
LAYOUT SHEET
SHEET 1 OF 4

STATUS	ASBUILT	REV
SCALE	1 : 1500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-2000-AB	

DISCLAIMER:
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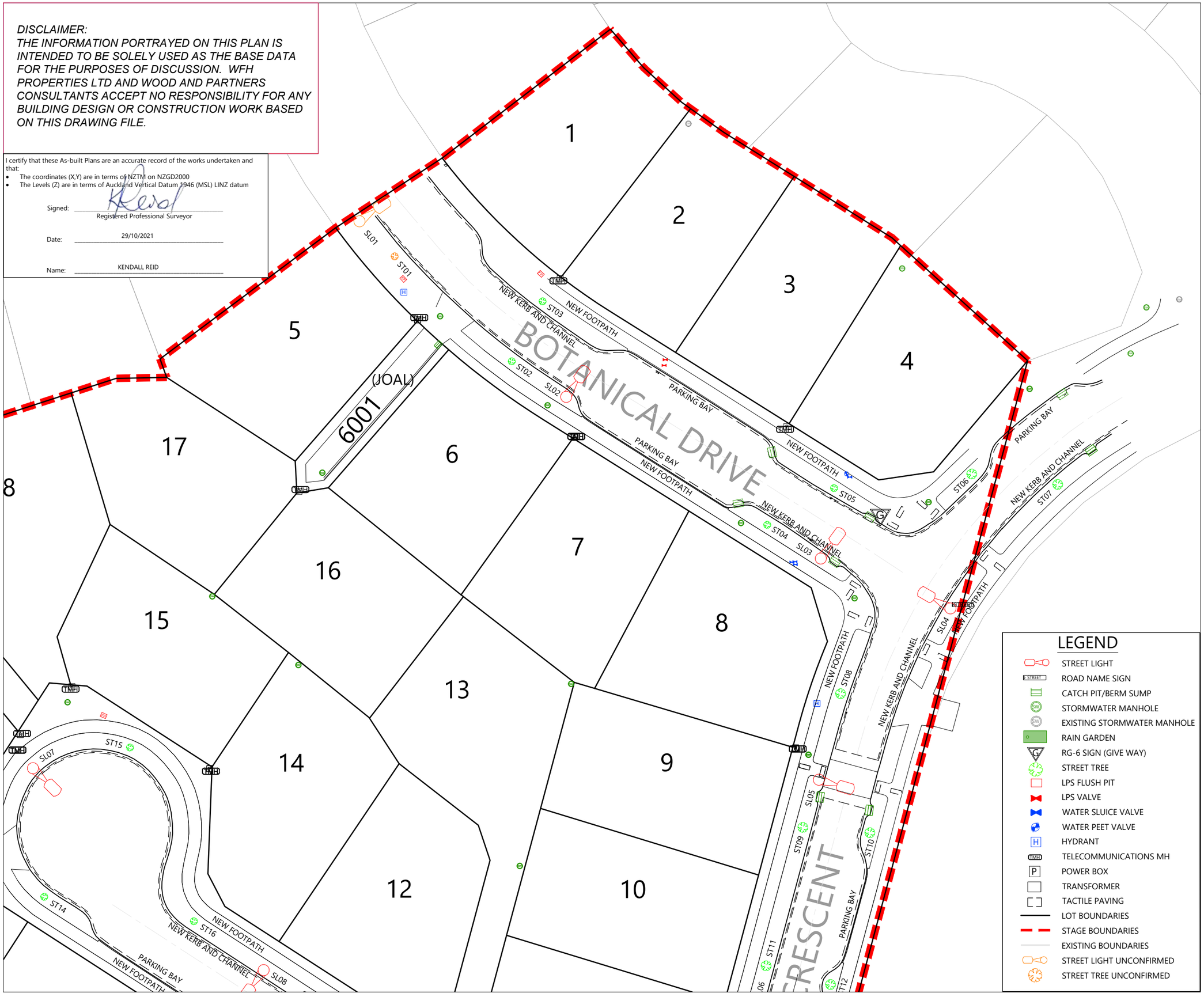
Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID



LEGEND

- STREET LIGHT
- ROAD NAME SIGN
- CATCH PIT/BERM SUMP
- STORMWATER MANHOLE
- EXISTING STORMWATER MANHOLE
- RAIN GARDEN
- RG-6 SIGN (GIVE WAY)
- STREET TREE
- LPS FLUSH PIT
- LPS VALVE
- WATER SLUICE VALVE
- WATER PEET VALVE
- HYDRANT
- TELECOMMUNICATIONS MH
- POWER BOX
- TRANSFORMER
- TACTILE PAVING
- LOT BOUNDARIES
- STAGE BOUNDARIES
- EXISTING BOUNDARIES
- STREET LIGHT UNCONFIRMED
- STREET TREE UNCONFIRMED

NOTES

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4. ALL FOOTPATHS ARE 100mm THICK BRUSHED CONCRETE OR EXPOSED AGGREGATE AS NOTED.
5. ALL PIPE CROSSINGS UNDER ROADS HAVE BEEN HARDFILL BACKFILLED
6. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY DATA AND CONTRACTOR RECEIVED DATA.
7. BOUNDARIES SUBJECT TO FINAL SURVEY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	WOODS.CO.NZ

N

MILLWATER
25 BANKSIDE ROAD
ROADING ASBUILT PLAN
LAYOUT SHEET
SHEET 2 OF 4

STATUS	ASBUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-2001-AB	

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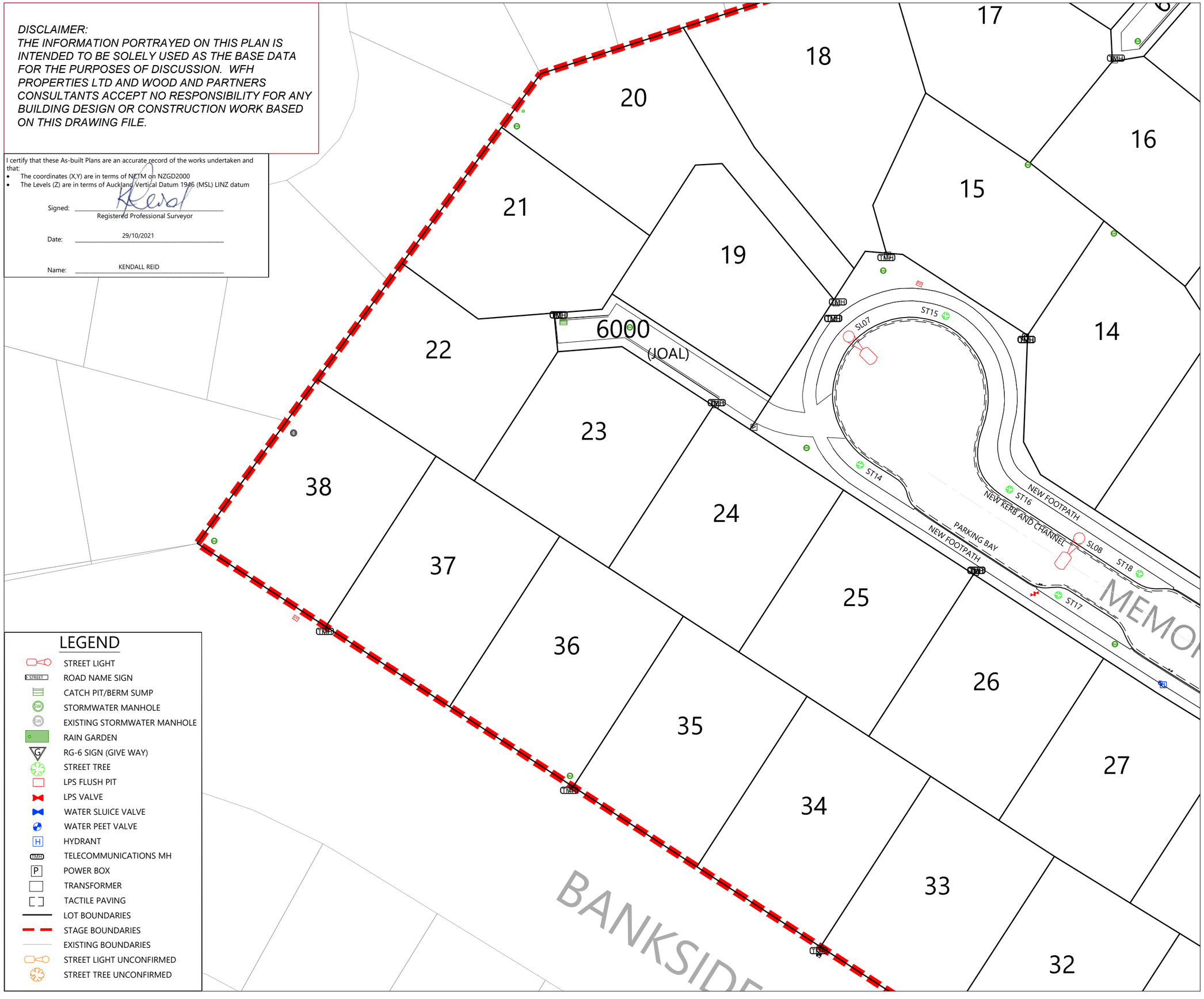
Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID



LEGEND

- STREET LIGHT
- ROAD NAME SIGN
- CATCH PIT/BERM SUMP
- STORMWATER MANHOLE
- EXISTING STORMWATER MANHOLE
- RAIN GARDEN
- RG-6 SIGN (GIVE WAY)
- STREET TREE
- LPS FLUSH PIT
- LPS VALVE
- WATER SLUICE VALVE
- WATER PEET VALVE
- HYDRANT
- TELECOMMUNICATIONS MH
- POWER BOX
- TRANSFORMER
- TACTILE PAVING
- LOT BOUNDARIES
- STAGE BOUNDARIES
- EXISTING BOUNDARIES
- STREET LIGHT UNCONFIRMED
- STREET TREE UNCONFIRMED

NOTES

1. ALL WORKS AND MATERIALS COMPLY WITH AC STANDARDS FOR ENGINEERING DESIGN AND CONSTRUCTION ISSUE NOV 2005.
2. ALL ROADS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH APPROVED ENGINEERING PLANS.
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4. ALL FOOTPATHS ARE 100mm THICK BRUSHED CONCRETE OR EXPOSED AGGREGATE AS NOTED.
5. ALL PIPE CROSSINGS UNDER ROADS HAVE BEEN HARDFILL BACKFILLED
6. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY DATA AND CONTRACTOR RECEIVED DATA.
7. BOUNDARIES SUBJECT TO FINAL SURVEY

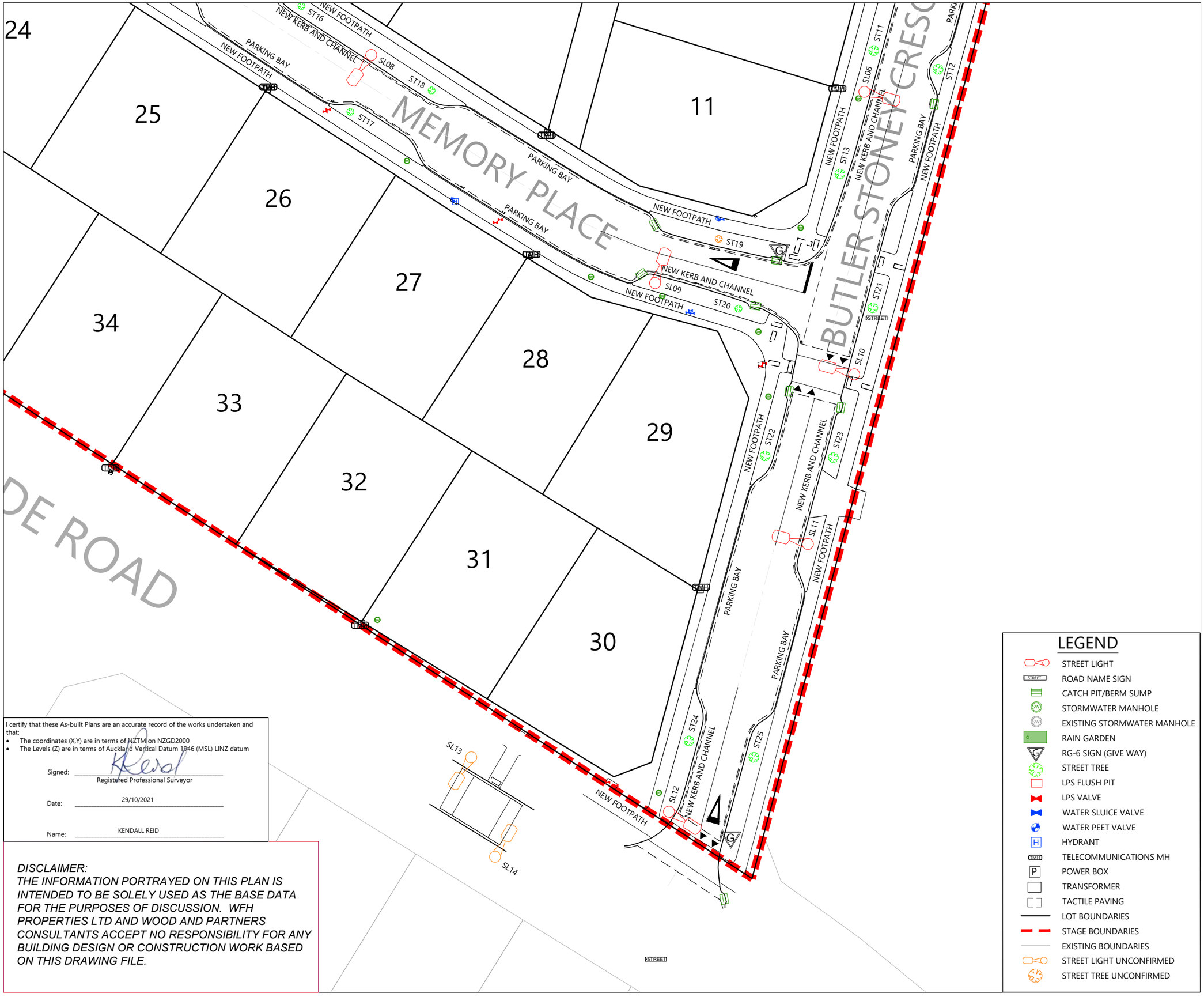
REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD
ROADING ASBUILT PLAN
LAYOUT SHEET
SHEET 3 OF 4

STATUS	ASBUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-2002-AB	



NOTES

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5. ALL PIPE CROSSINGS UNDER ROADS HAVE BEEN HARDFILL BACKFILLED
6. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY DATA AND CONTRACTOR RECEIVED DATA.
7. BOUNDARIES SUBJECT TO FINAL SURVEY

LEGEND

- STREET LIGHT
- ROAD NAME SIGN
- CATCH PIT/BERM SUMP
- STORMWATER MANHOLE
- EXISTING STORMWATER MANHOLE
- RAIN GARDEN
- RG-6 SIGN (GIVE WAY)
- STREET TREE
- LPS FLUSH PIT
- LPS VALVE
- WATER SLUICE VALVE
- WATER PEET VALVE
- HYDRANT
- TELECOMMUNICATIONS MH
- POWER BOX
- TRANSFORMER
- TACTILE PAVING
- LOT BOUNDARIES
- STAGE BOUNDARIES
- EXISTING BOUNDARIES
- STREET LIGHT UNCONFIRMED
- STREET TREE UNCONFIRMED

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Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

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REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD
ROADING ASBUILT PLAN
LAYOUT SHEET
SHEET 4 OF 4

STATUS	ASBUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-2003-AB	

SCHEDULE OF COORDINATES		
Lot No.	Easting (m)	Northing (m)
STORMWATER LOT CONNECTION VALUES		
Lot 1	1749304.04	5948170.54
Lot 2	1749314.72	5948160.51
Lot 3	1749343.73	5948142.81
Lot 4	1749344.40	5948139.68
Lot 5	1749275.83	5948134.00
Lot 6	1749291.47	5948117.44
Lot 7	1749308.57	5948106.56
Lot 8	1749319.25	5948100.15
Lot 9	1749326.62	5948070.69
Lot 10	1749321.50	5948051.18
Lot 11	1749317.82	5948035.88
Lot 12	1749285.91	5948058.61
Lot 13	1749295.44	5948083.55
Lot 14	1749260.60	5948082.19
Lot 15	1749246.03	5948092.55
Lot 16	1749264.38	5948106.88
Lot 17	1749258.42	5948112.00
Lot 18	1749223.75	5948092.14
Lot 19	1749195.86	5948074.20
Lot 20	1749177.53	5948101.41
Lot 21	1749173.74	5948096.07
Lot 22	1749151.73	5948065.73
Lot 23	1749190.24	5948066.72
Lot 24	1749213.55	5948049.71
Lot 25	1749231.10	5948038.48
Lot 26	1749255.28	5948023.49
Lot 27	1749258.50	5948021.05
Lot 28	1749292.18	5948003.39
Lot 29	1749296.82	5948001.60
Lot 30	1749296.95	5947963.25
Lot 31	1749258.15	5947962.39
Lot 32	1749245.89	5947970.89
Lot 33	1749224.76	5947983.81
Lot 34	1749203.81	5947997.64
Lot 35	1749186.13	5948008.78
Lot 36	1749168.82	5948019.68
Lot 37	1749153.81	5948030.20
Lot 38	1749145.72	5948055.99

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Registered Professional Surveyor

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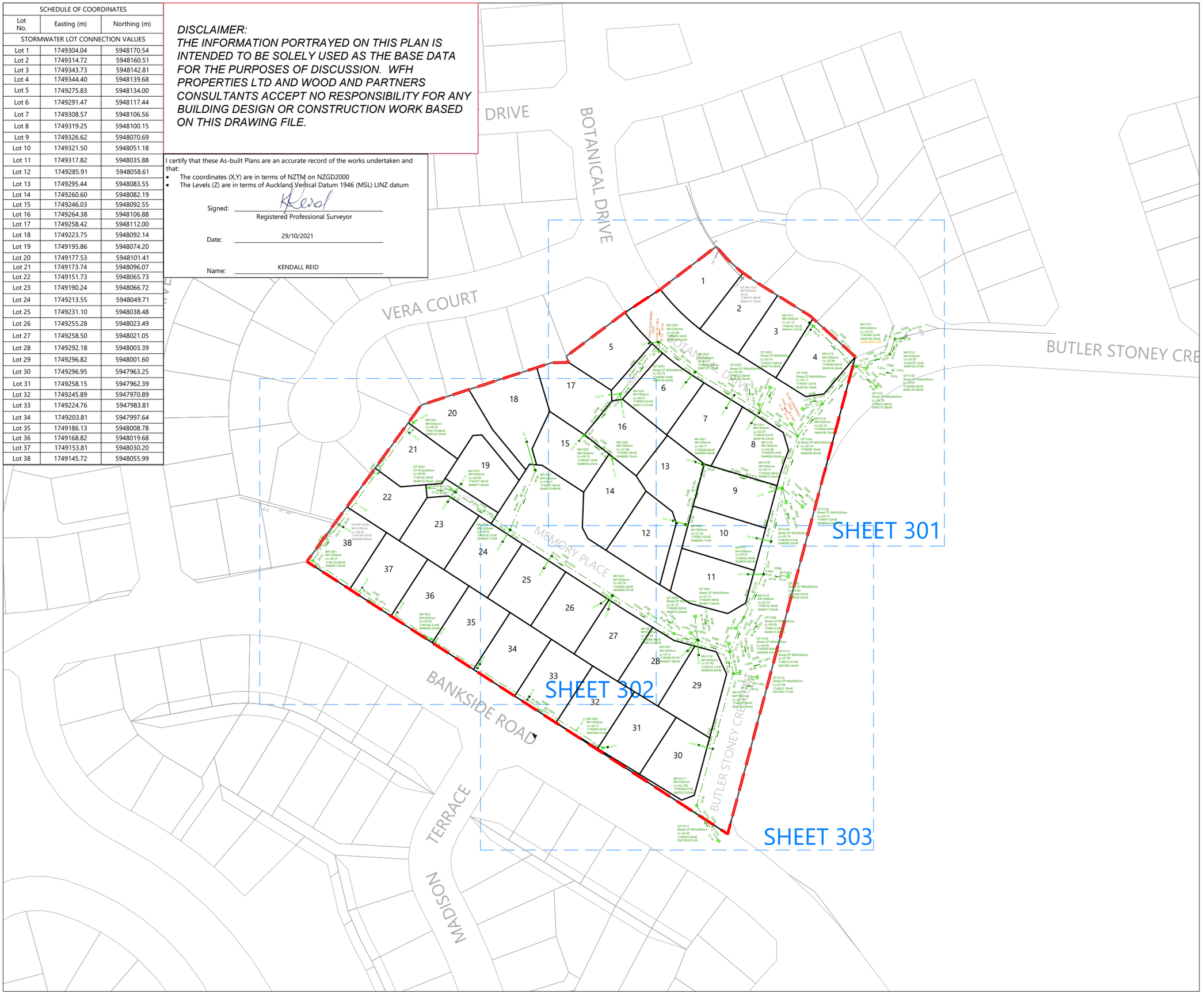

LEGEND

- STORMWATER MANHOLE
- STORMWATER CESSPIT
- EXISTING MANHOLE
- NEW STORMWATER
- EXISTING STORMWATER
- STAGE BOUNDARY
- LOT BOUNDARY

NOTES

1. ALL WORKS AND MATERIALS COMPLY WITH AC STANDARDS FOR ENGINEERING DESIGN AND CONSTRUCTION.
2. ALL PIPE BEDDING COMPLIES WITH AC STANDARDS
3. ALL CESSPIT LEADS AND PIPES UNDER THE ROAD AND CARRIDGEWAYS ARE REINFORCED CONCRETE PIPES CLASS 4 (Z) RRJ. ALL OTHER PIPELINES ARE REINFORCED CONCRETE CLASS 2 (X) RRJ UNLESS OTHERWISE NOTED.
4. ALL PIPE CROSSINGS UNDER ROADS AND ACCESSWAYS HAVE BEEN HARDFILL BACKFILLED.
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6. ALL PRIVATE DRAINAGE CONNECTIONS ARE 100mmø.
7. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
8. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	KR	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD
STORMWATER ASBUILT
OVERALL LAYOUT
SHEET 1 OF 4

STATUS	AS-BUILT	REV
SCALE	1 : 1500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-3000-AB	

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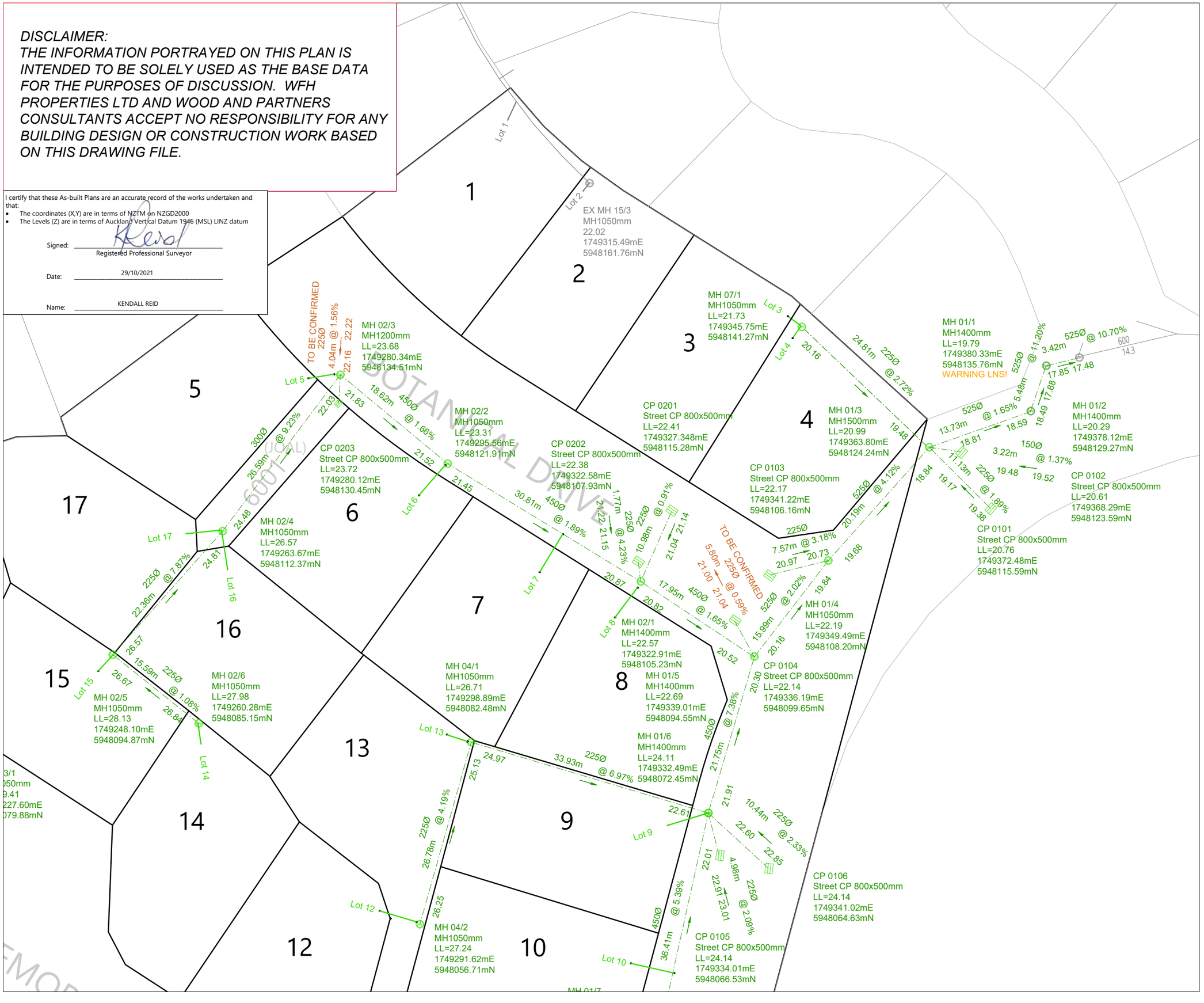
Signed: KReid
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID



WOODS
EST.1970

LEGEND

STORMWATER MANHOLE	SW
STORMWATER CESSPIT	▤
EXISTING MANHOLE	SW
NEW STORMWATER	— - —
EXISTING STORMWATER	— - —
STAGE BOUNDARY	━
LOT BOUNDARY	━

NOTES

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REVISION DETAILS		BY	DATE
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DESIGNED	MRB	
DRAWN	EC	
CHECKED	KR	
APPROVED	KR	WOODS.CO.NZ

N

WFH
PROPERTIES

MILLWATER
25 BANKSIDE ROAD

STORMWATER ASBUILT
OVERALL LAYOUT
SHEET 2 OF 4

STATUS	AS-BUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-3001-AB	

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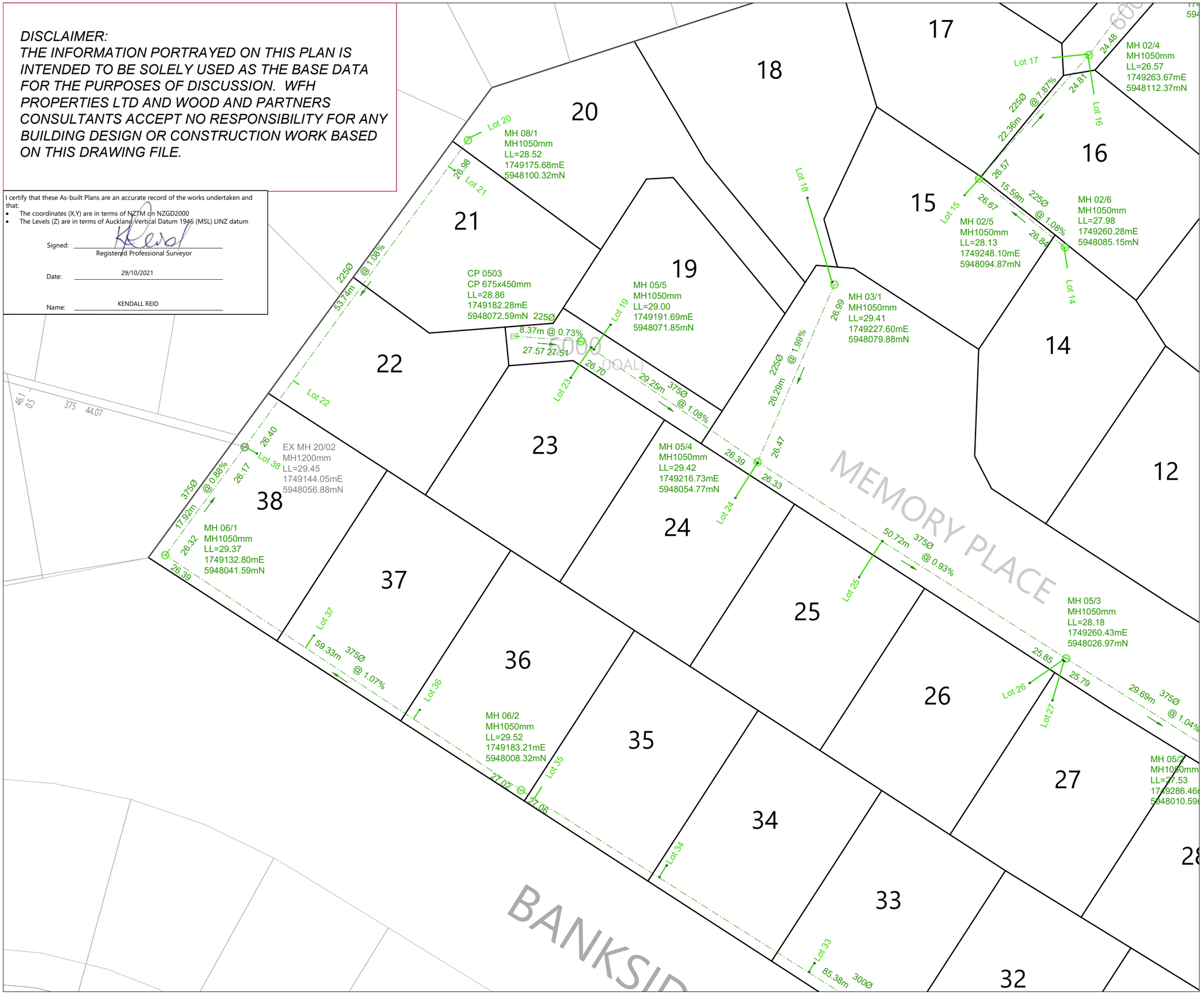

LEGEND

- STORMWATER MANHOLE
- STORMWATER CESSPIT
- EXISTING MANHOLE
- NEW STORMWATER
- EXISTING STORMWATER
- STAGE BOUNDARY
- LOT BOUNDARY

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REVISION DETAILS		BY	DATE
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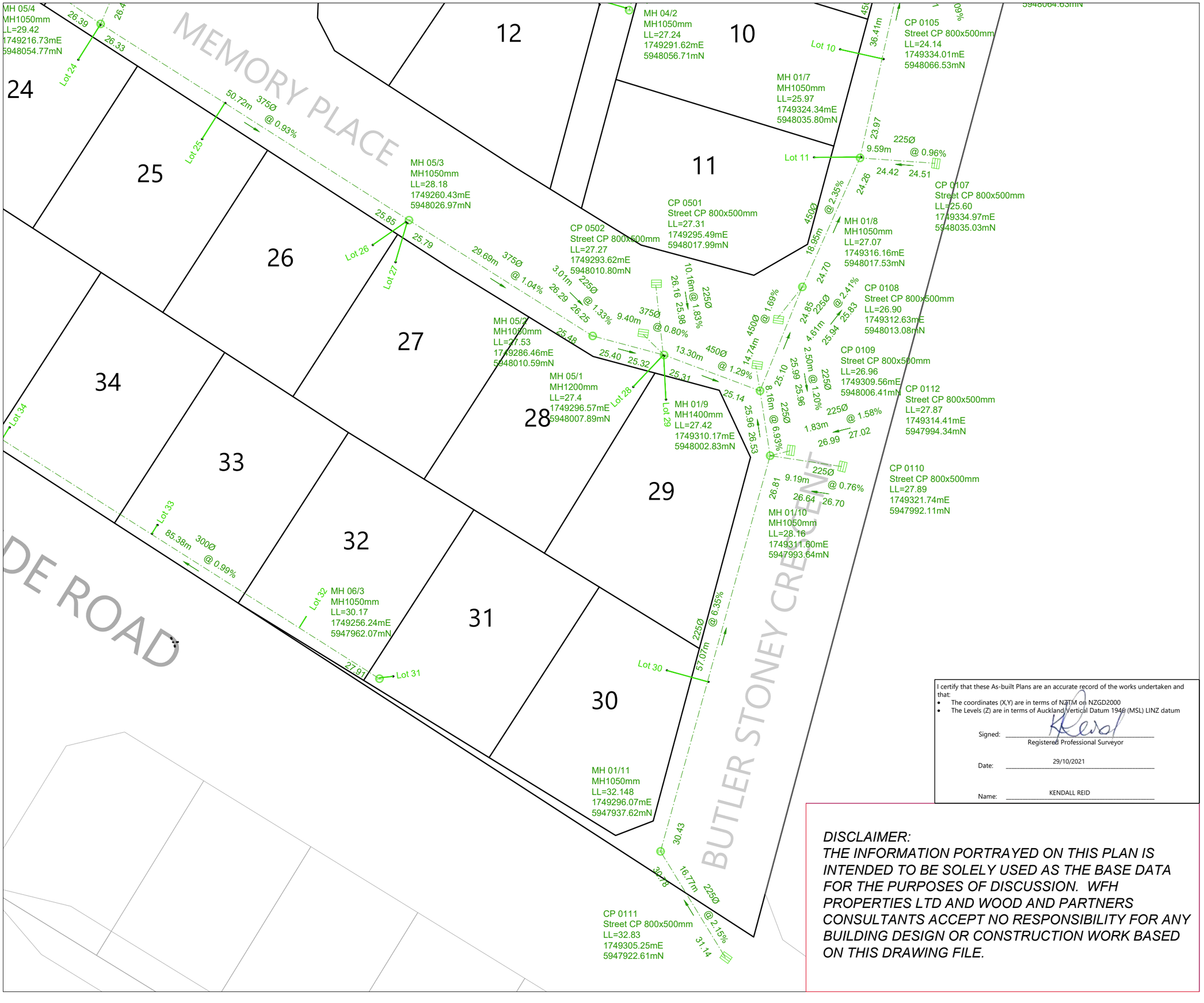
DESIGNED	MRB	
DRAWN	EC	
CHECKED	KR	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD
STORMWATER ASBUILT
OVERALL LAYOUT
SHEET 3 OF 4

STATUS	AS-BUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-3002-AB	



LEGEND

- STORMWATER MANHOLE
- STORMWATER CESSPIT
- EXISTING MANHOLE
- NEW STORMWATER
- EXISTING STORMWATER
- STAGE BOUNDARY
- LOT BOUNDARY

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DESIGNED	MRB	
DRAWN	EC	
CHECKED	KR	
APPROVED	KR	

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Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

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MILLWATER
25 BANKSIDE ROAD
STORMWATER ASBUILT
OVERALL LAYOUT
SHEET 4 OF 4

STATUS	AS-BUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-3003-AB	

SCHEDULE OF COORDINATES		
LOW PRESSURE SEWER LOT CONNECTION		
NAME	EASTING	NORTHING
Lot 1	1749296.82	5948139.77
Lot 2	1749297.68	5948139.29
Lot 3	1749329.07	5948119.29
Lot 4	1749329.79	5948118.74
Lot 5	1749276.85	5948134.29
Lot 6	1749298.99	5948117.64
Lot 7	1749299.81	5948117.17
Lot 8	1749330.75	5948073.91
Lot 9	1749330.61	5948073.05
Lot 10	1749321.20	5948037.73
Lot 11	1749320.99	5948036.97
Lot 12	1749257.67	5948045.57
Lot 13	1749280.65	5948030.82
Lot 14	1749257.07	5948045.98
Lot 15	1749230.67	5948081.52
Lot 16	1749277.93	5948133.48
Lot 17	1749277.46	5948133.73
Lot 18	1749227.57	5948081.89
Lot 19	1749212.43	5948062.52
Lot 20	1749221.24	5948075.77
Lot 21	1749211.97	5948061.91
Lot 22	1749209.65	5948058.01
Lot 23	1749209.23	5948057.30
Lot 24	1749221.93	5948049.42
Lot 25	1749222.66	5948048.96
Lot 26	1749258.67	5948025.38
Lot 27	1749259.36	5948024.90
Lot 28	1749294.92	5948005.63
Lot 29	1749295.79	5948005.32
Lot 30	1749272.08	5947950.49
Lot 31	1749254.44	5947961.34
Lot 32	1749253.63	5947961.75
Lot 33	1749218.89	5947983.47
Lot 34	1749218.17	5947984.00
Lot 35	1749183.89	5948006.24
Lot 36	1749183.21	5948006.87
Lot 37	1749149.05	5948028.83
Lot 38	1749148.29	5948029.22

SCHEDULE OF COORDINATES		
LOW PRESSURE SEWER VALVES AND FLUSH PITS		
NAME	EASTING	NORTHING
FP01	1749275.14	5948139.82
FP02	1749294.61	5948140.58
FP03	1749232.73	5948078.03
FP04	1749144.42	5948030.69
V01	1749312.22	5948128.37
V02	1749312.06	5948127.56
V03	1749248.83	5948033.96
V04	1749249.26	5948034.25
V05	1749272.94	5948018.27
V06	1749273.64	5948018.68
V07	1749310.45	5947997.95
V08	1749311.03	5947998.36
V09	1749288.83	5947939.09
V10	1749290.01	5947938.66

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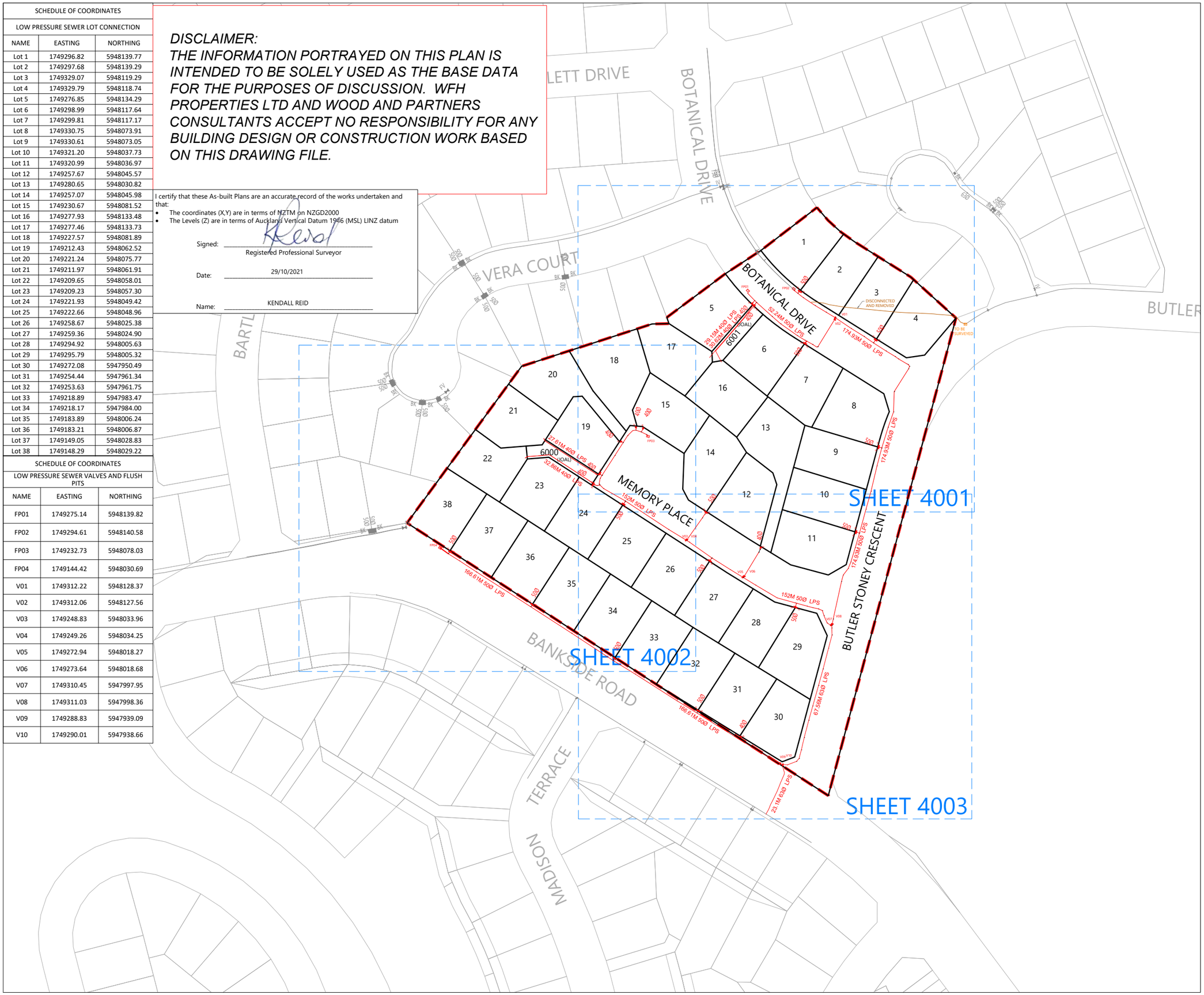

LEGEND

- NEW LPS (LOW PRESSURE SEWER)
- LOT BOUNDARIES
- STAGE BOUNDARY
- EXISTING BOUNDARIES
- NEW LPS FLUSH PIT (FP)
- NEW LPS ISOLATION VALVE
- NEW LPS BOUNDARY KIT

NOTES

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REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/2021

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD

WASTEWATER ASBUILT
OVERALL LAYOUT
SHEET 1 of 4

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-4000-AB	

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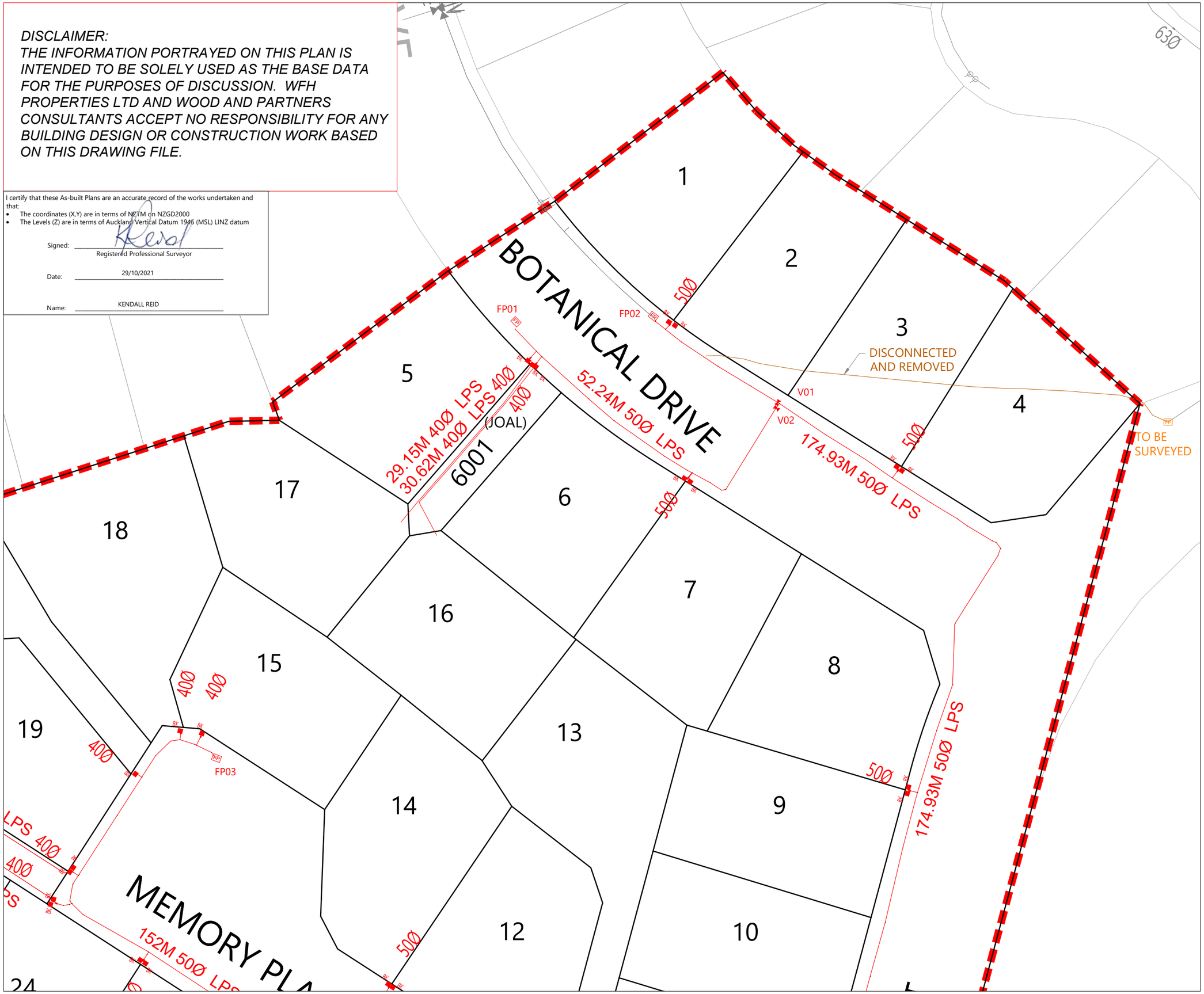

LEGEND

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- LOT BOUNDARIES
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DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	WOODS.CO.NZ

N

MILLWATER
25 BANKSIDE ROAD

WASTEWATER ASBUILT
OVERALL LAYOUT
SHEET 2 of 4

STATUS	ASBUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-4001-AB	

29/10/2021
KENDALL REID

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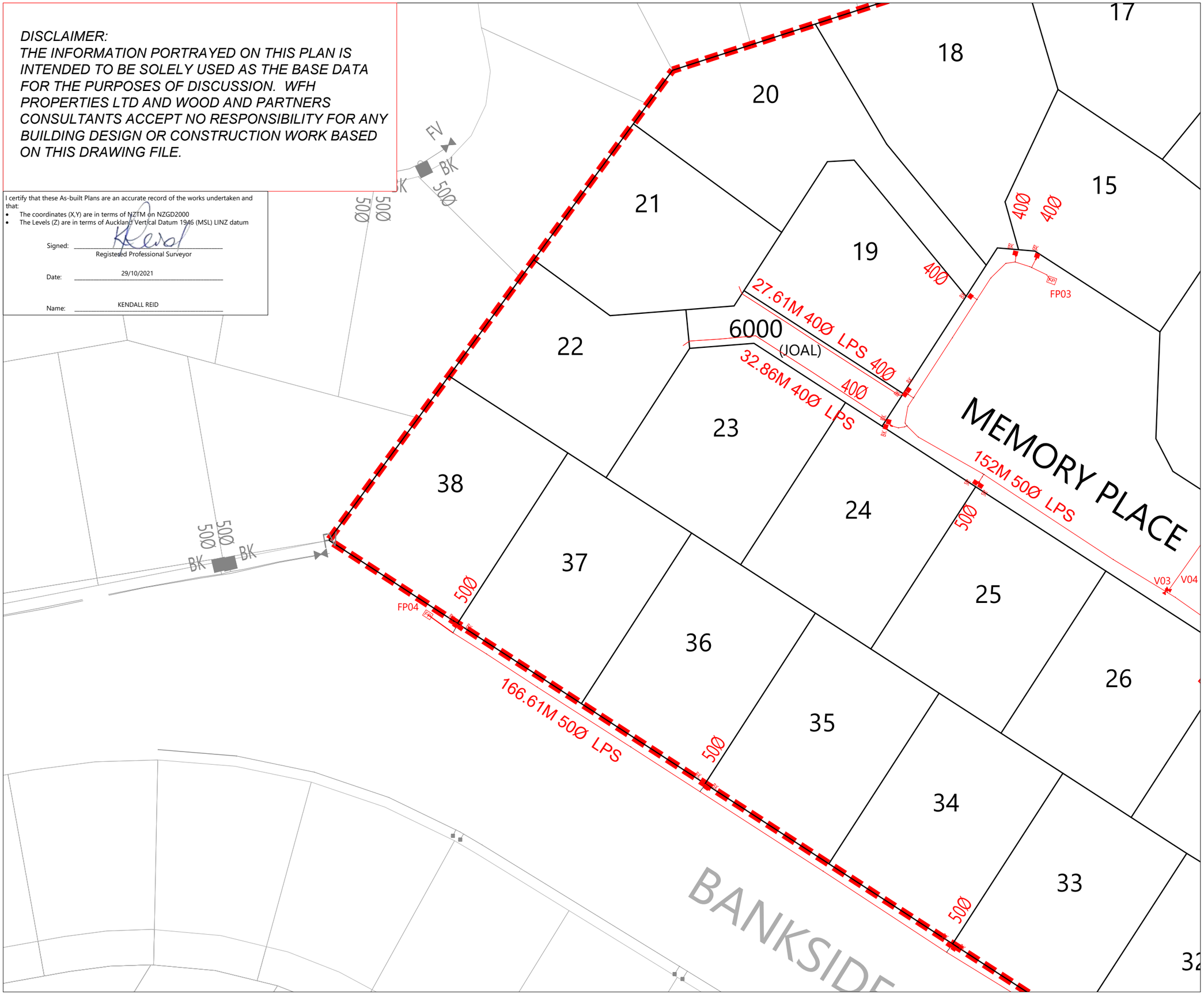

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N

MILLWATER
25 BANKSIDE ROAD

WASTEWATER ASBUILT
OVERALL LAYOUT
SHEET 3 of 4

STATUS	ASBUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-4002-AB	

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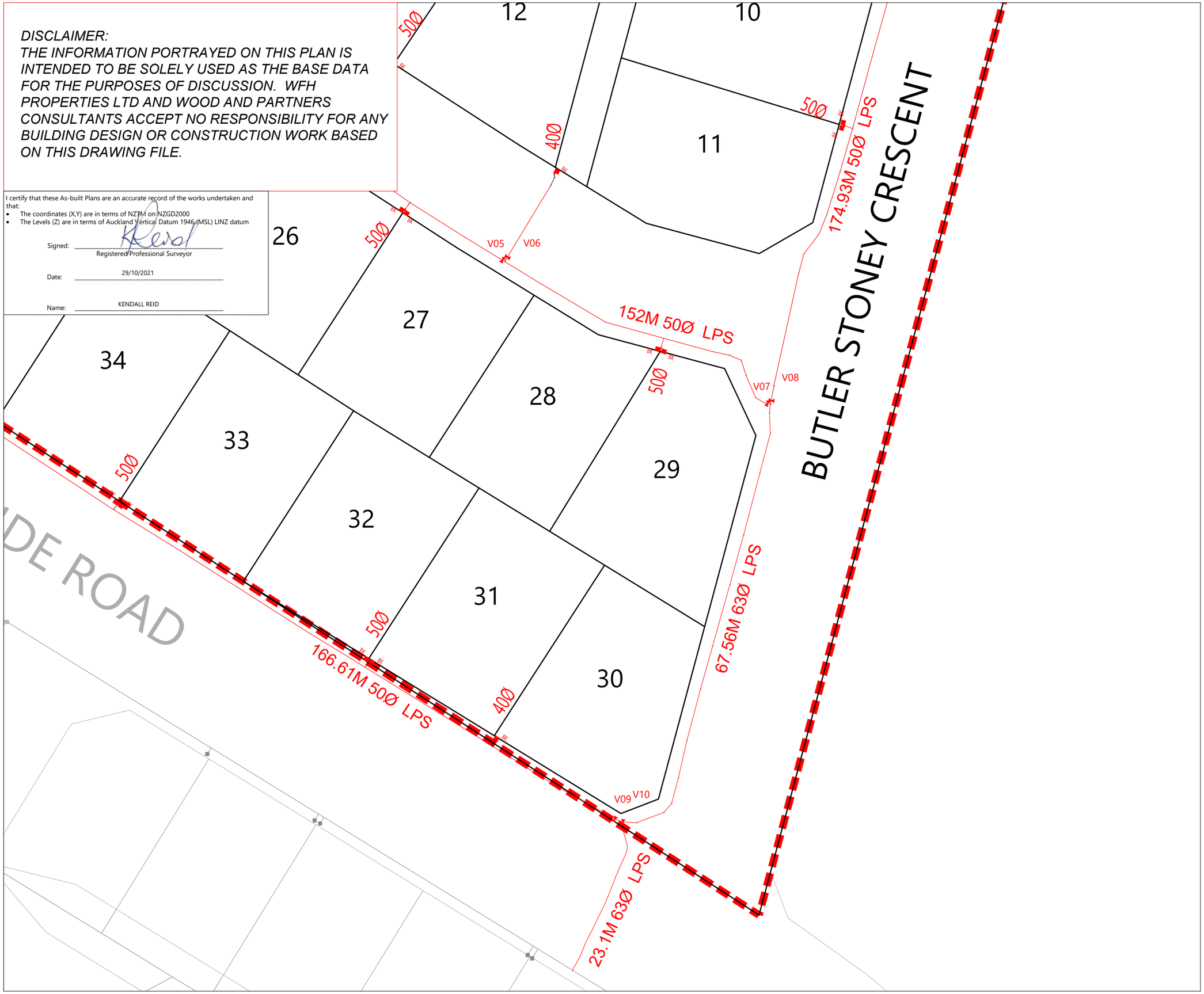

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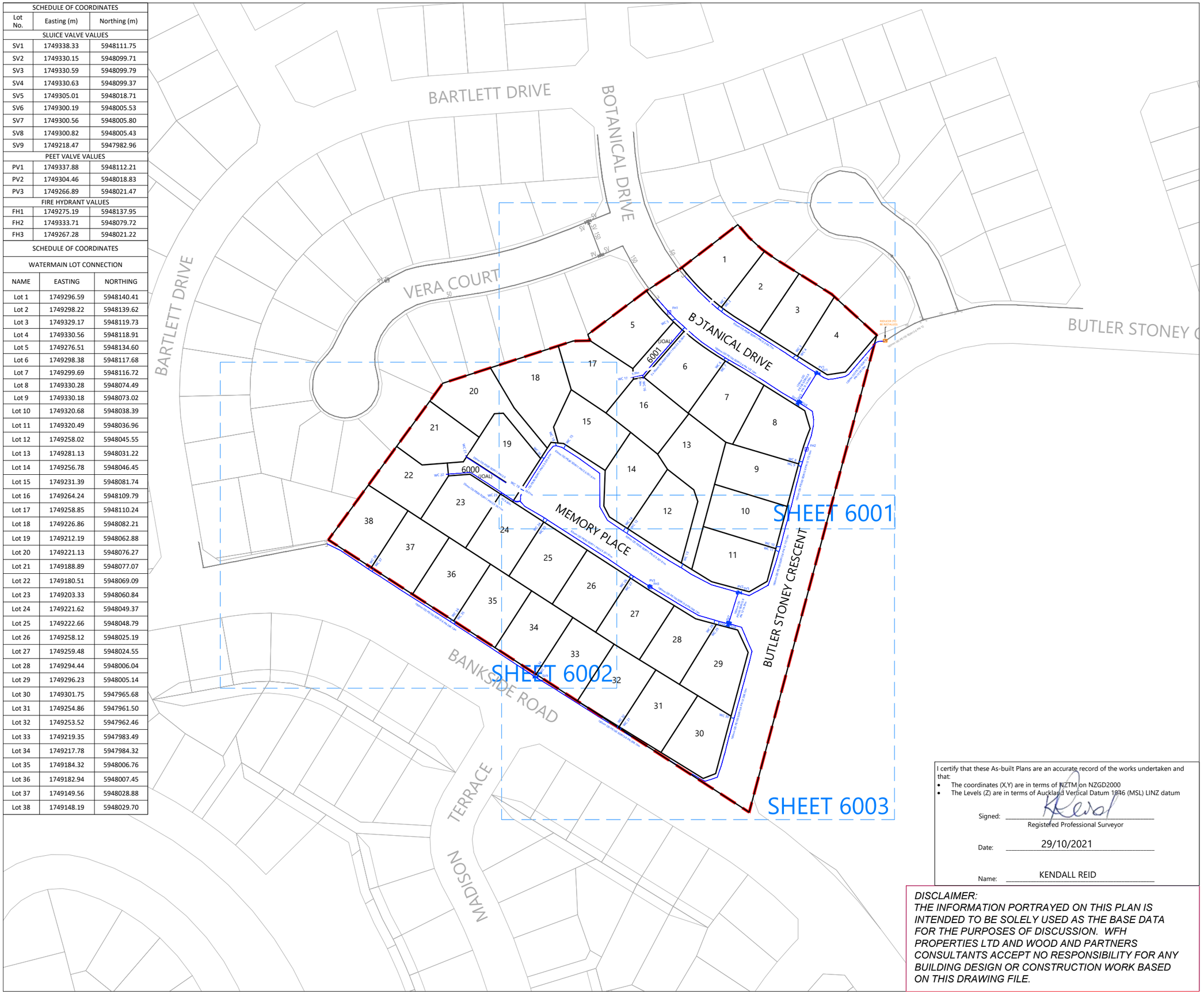
MILLWATER
25 BANKSIDE ROAD
WASTEWATER ASBUILT
OVERALL LAYOUT
SHEET 4 of 4

STATUS	ASBUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-4003-AB	

SCHEDULE OF COORDINATES		
Lot No.	Easting (m)	Northing (m)
SLUICE VALVE VALUES		
SV1	1749338.33	5948111.75
SV2	1749330.15	5948099.71
SV3	1749330.59	5948099.79
SV4	1749330.63	5948099.37
SV5	1749305.01	5948018.71
SV6	1749300.19	5948005.53
SV7	1749300.56	5948005.80
SV8	1749300.82	5948005.43
SV9	1749218.47	5947982.96
PEET VALVE VALUES		
PV1	1749337.88	5948112.21
PV2	1749304.46	5948018.83
PV3	1749266.89	5948021.47
FIRE HYDRANT VALUES		
FH1	1749275.19	5948137.95
FH2	1749333.71	5948079.72
FH3	1749267.28	5948021.22

SCHEDULE OF COORDINATES		
WATERMAIN LOT CONNECTION		
NAME	EASTING	NORTHING
Lot 1	1749296.59	5948140.41
Lot 2	1749298.22	5948139.62
Lot 3	1749329.17	5948119.73
Lot 4	1749330.56	5948118.91
Lot 5	1749276.51	5948134.60
Lot 6	1749298.38	5948117.68
Lot 7	1749299.69	5948116.72
Lot 8	1749330.28	5948074.49
Lot 9	1749330.18	5948073.02
Lot 10	1749320.68	5948038.39
Lot 11	1749320.49	5948036.96
Lot 12	1749258.02	5948045.55
Lot 13	1749281.13	5948031.22
Lot 14	1749256.78	5948046.45
Lot 15	1749231.39	5948081.74
Lot 16	1749264.24	5948109.79
Lot 17	1749258.85	5948110.24
Lot 18	1749226.86	5948082.21
Lot 19	1749212.19	5948062.88
Lot 20	1749221.13	5948076.27
Lot 21	1749188.89	5948077.07
Lot 22	1749180.51	5948069.09
Lot 23	1749203.33	5948060.84
Lot 24	1749221.62	5948049.37
Lot 25	1749222.66	5948048.79
Lot 26	1749258.12	5948025.19
Lot 27	1749259.48	5948024.55
Lot 28	1749294.44	5948006.04
Lot 29	1749296.23	5948005.14
Lot 30	1749301.75	5947965.68
Lot 31	1749254.86	5947961.50
Lot 32	1749253.52	5947962.46
Lot 33	1749219.35	5947983.49
Lot 34	1749217.78	5947984.32
Lot 35	1749184.32	5948006.76
Lot 36	1749182.94	5948007.45
Lot 37	1749149.56	5948028.88
Lot 38	1749148.19	5948029.70



NOTES

1. ALL WORK AND MATERIALS COMPLIES WITH AC STANDARD FOR ENGINEERING DESIGN AND CONSTRUCTION.
2. PIPE BEDDING COMPLIES WITH AC STD DETAIL DRAWING 18000 SHEET 4.4 UNLESS OTHERWISE NOTED.
3. WATERMAINS ARE AN AVERAGE 0.6m BELOW GROUND IN BERMS AND 0.9m BELOW GROUND UNDER ROADS. HARDFILL BACKFILLED BENEATH ROAD CROSSINGS.
4. PIPE SIZES SHOWN ARE EXTERNAL DIAMETER.
5. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
6. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.
7. LOT CONNECTIONS ARE 25MM DIAMETER PIPES UNLESS SHOWN OTHERWISE

LEGEND

- EXISTING WATERMAIN
- HIGH PESSURE WATERMAIN
- SLUICE VALVE
- PEET VALVE
- FIRE HYDRANT
- WATER CONNECTION (WC)
- END CAP
- STAGE BOUNDARY
- LOT BOUNDARY
- EXISTING BOUNDARY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

DISCLAIMER:
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF DISCUSSION. WFH PROPERTIES LTD AND WOOD AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS DRAWING FILE.

MILLWATER
25 BANKSIDE ROAD
WATERMAIN ASBUILT LAYOUT PLAN
SHEET 1 of 4

STATUS	AS-BUILT	REV
SCALE	1 : 1500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-6000-AB	

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

DISCLAIMER:
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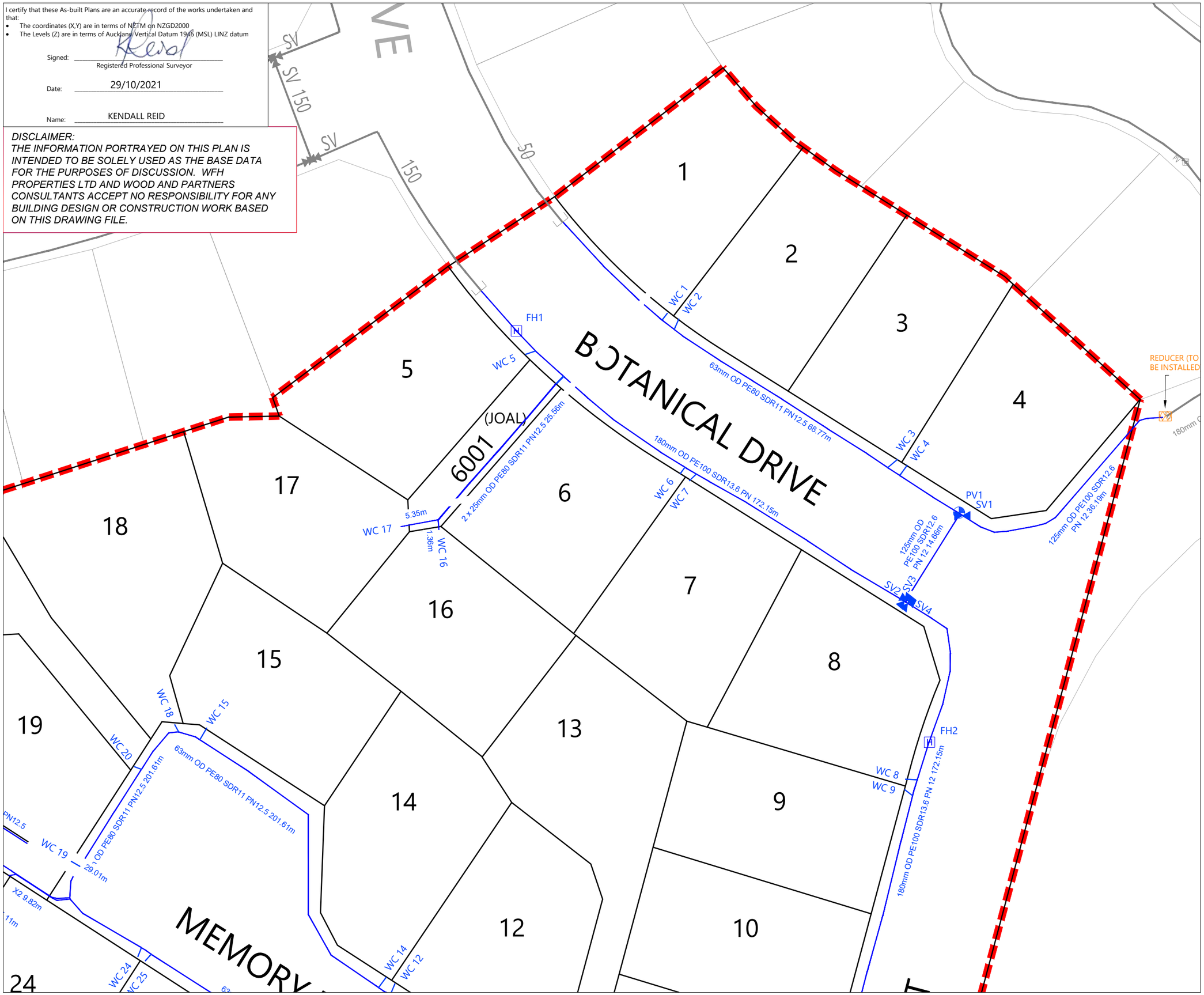

NOTES

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5. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
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7. LOT CONNECTIONS ARE 25MM DIAMETER PIPES UNLESS SHOWN OTHERWISE

LEGEND

- EXISTING WATERMAIN
- HIGH PESSURE WATERMAIN
- SLUICE VALVE
- PEET VALVE
- FIRE HYDRANT
- WATER CONNECTION (WC)
- END CAP
- STAGE BOUNDARY
- LOT BOUNDARY
- EXISTING BOUNDARY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

MILLWATER
25 BANKSIDE ROAD
WATERMAIN
ASBUILT PLAN
SHEET 2 of 4

STATUS	AS-BUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-6001-AB	

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

DISCLAIMER:
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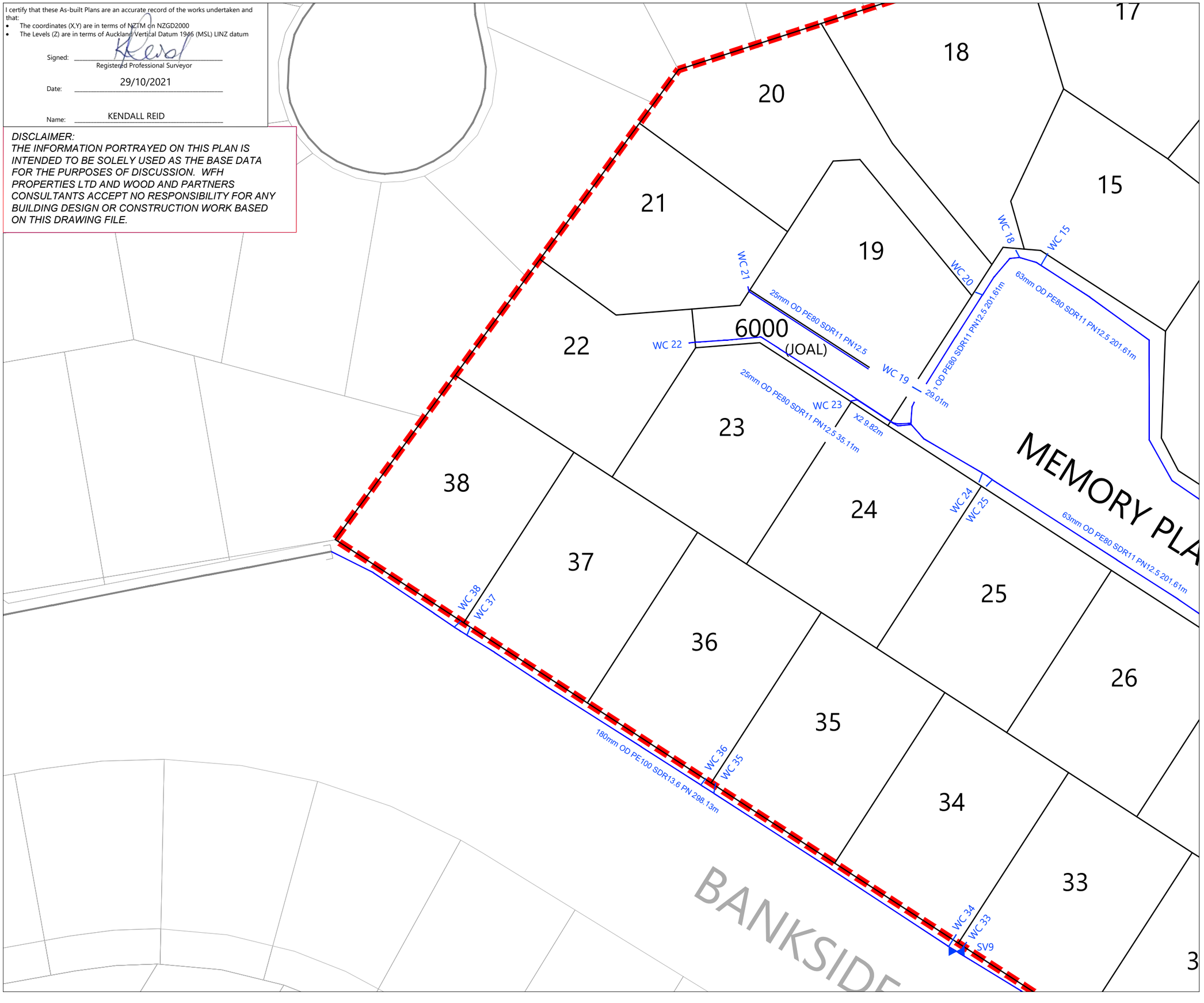

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- EXISTING WATERMAIN
- HIGH PESSURE WATERMAIN
- SLUICE VALVE
- PEET VALVE
- FIRE HYDRANT
- WATER CONNECTION (WC)
- END CAP
- STAGE BOUNDARY
- LOT BOUNDARY
- EXISTING BOUNDARY

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

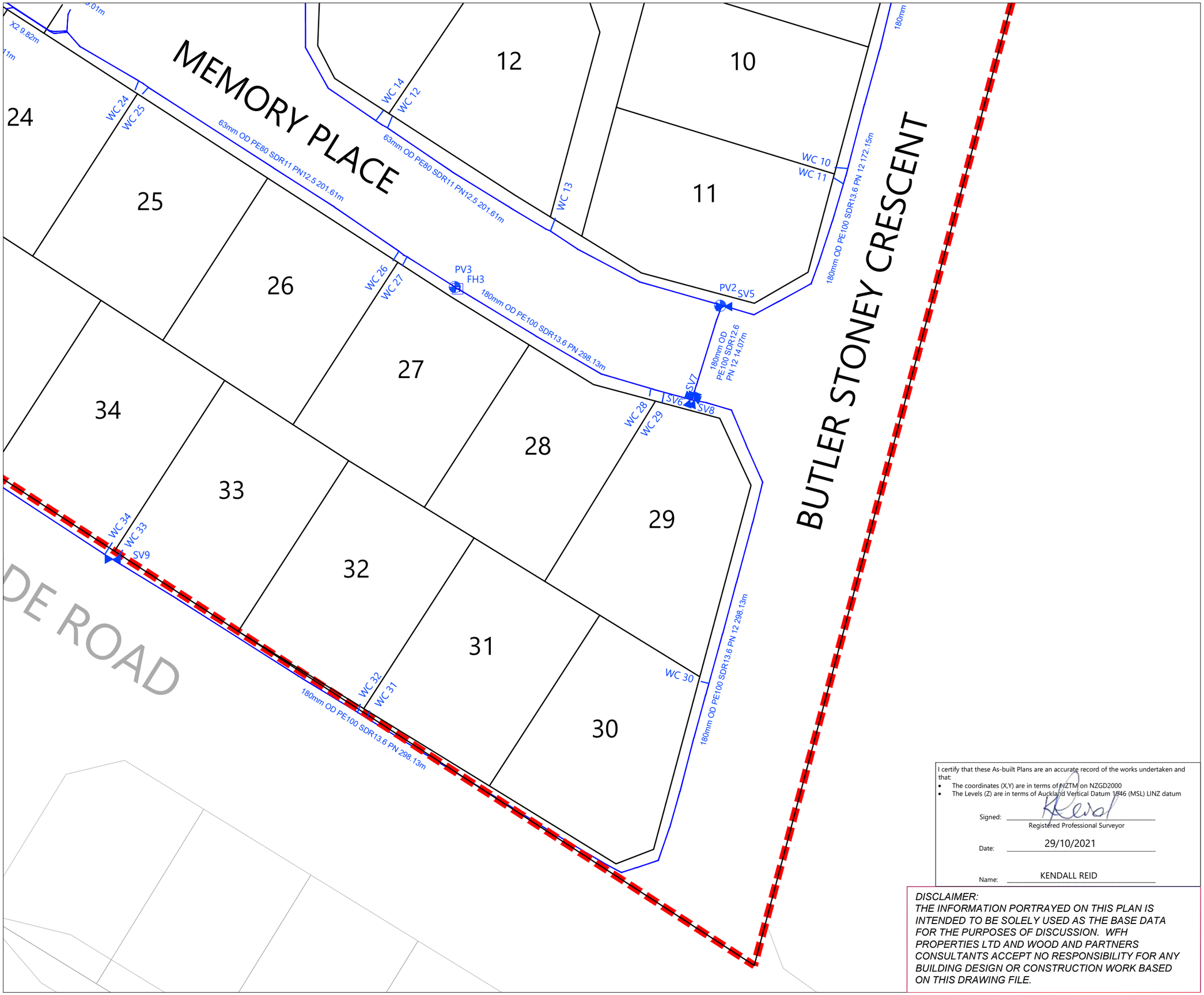
SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229 WOODS.CO.NZ
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	

N

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD
WATERMAIN
ASBUILT PLAN
SHEET 3 of 4

STATUS	AS-BUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-6002-AB	



WOODS
EST.1970

NOTES

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LEGEND

EXISTING WATERMAIN	
HIGH PESSURE WATERMAIN	
SLUICE VALVE	
PEET VALVE	
FIRE HYDRANT	H
WATER CONNECTION	WC
END CAP	]
STAGE BOUNDARY	
LOT BOUNDARY	
EXISTING BOUNDARY	

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	KR	29/10/21

SURVEYED	WOODS	WOODS Ltd LEVEL 1 BUILDING B 8 NUGENT STREET, GRAFTON AUCKLAND 1023 09 308 9229
DESIGNED	MRB	
DRAWN	EC	
CHECKED	MRB	
APPROVED	KR	WOODS.CO.NZ

N

WFH PROPERTIES

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 NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: _____
Registered Professional Surveyor

Date: 29/10/2021

Name: KENDALL REID

DISCLAIMER:
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MILLWATER
25 BANKSIDE ROAD
WATERMAIN
ASBUILT PLAN
SHEET 4 of 4

STATUS	AS-BUILT	REV
SCALE	1 : 500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-6003-AB	

Appendix C: Laboratory Test Data

ROADTEST LTD

Revision: 1

DETERMINATION OF THE WATER CONTENT, LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.1, 2.2 & 2.6

Project Name : **Bartlett Block, Millwater**

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

Attention : Luke Stuart-Williams

Project No : 21 0001 114
Page : 1 of 1
Date of Order : 17.08.21

Sample Method : Hand auger
Sample Date : 17.08.21
Sampled By : CMW Geosciences Ltd

Test Details :

Test performed on : Whole Sample
History : Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
583N	Lot 5	0.4 - 0.8	84	21	51.4
584N	Lot 7	0.4 - 0.8	59	18	34.0
585N	Lot 16	0.4 - 0.8	126	26	55.1
586N	Lot 28	0.4 - 0.8	100	20	47.4
587N	Lot 35	0.4 - 0.8	98	22	35.6
588N	Lot 38	0.4 - 0.8	95	22	41.0

Comments :

Tested By: CL Date : 23.09.21
Calculated By : AS Date : 27.09.21
Checked By : EC Date : 27.09.21

ROADTEST LTD

Revision: 1

DETERMINATION OF THE WATER CONTENT, LIQUID LIMIT & LINEAR SHRINKAGE
TEST METHOD NZS 4402 : 1986 TEST 2.1, 2.2 & 2.6

Project Name : **Bartlett Block**

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

Attention : Scott Cole

Project No : 21 0001 118
Page : 1 of 1
Date of Order : 03.10.21

Sample Method : Hand auger
Sample Date : 29.09.21
Sampled By : CMW Geosciences Ltd

Test Details :

Test performed on : Whole Sample
History : Natural

Sample No.	Location	Depth (m)	Liquid Limit	Linear Shrinkage	Natural Water Content (%)
611N	Lot 2	0.4 - 0.8	85	19	40.5
612N	Lot 9	0.4 - 0.8	103	21	33.7

Comments :

Tested By:	AS	Date :	04.10.21
Calculated By :	AS	Date :	08.10.21
Checked By :	EC	Date :	11.10.21

Appendix D: Field Test Data

LF11 Rev.13 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:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAA Rev.0
Report Date:	18/08/2021
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

Test Methods:
NZS 4407 2015 Test 3.1 ◊
NZS 4407 2015 Test 4.2
NZGS:August 2001

Notes:
Solid Density: Assumed
Solid Density Data Source: N/A
Testing Locations Selected By: CMW Field Staff
◊ Only samples <2.0mm will be considered for endorsed testing
① Blade size of 19mm used.

Test results 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*	Solid Density (t/m³) *	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 (%)	Oven Dry Density (t/m³)	Oven Calculated Air Voids (%) *	
26/01/2021	N1	Gully	CLAY	2.70	1702	1702	216+	216+	216+	216+	216+	1.82	1.34	36.3	2	300	32.2	1.38	5	
28/01/2021	N2	Gully	CLAY	2.70	1702	1702	148	167	216+	136	167+	1.87	1.43	30.9	3	300	28.2	1.45	5	
29/01/2021	N3	Refer to site plan	CLAY/SILT	2.70	1702	1702	216+	216+	UTP	UTP	216+	1.82	1.33	37.0	2	300	29.9	1.40	6	
3/02/2021	N4	Gully Fill	CLAY/SILT	2.70	1620	1620	142	187+	174	171	169+	1.84	1.48	24.6	9	300	20.9	1.52	12	
5/02/2021	N5	Gully	CLAY	2.70	1702	1702	158	216+	148	136	165+	1.83	1.37	33.0	4	300	34.0	1.36	3	
23/02/2021	N6	Bulk Fill	CLAY/SILT	2.70	1620	1620	187+	187+	187+	187+	187+	1.83	1.34	36.3	1	300	32.6	1.38	4	
25/02/2021	N7	Bulk Fill	CLAY/SILT	2.70	1620	1620	187+	176	168	187+	180+	1.86	1.30	42.2	-3	300	36.6	1.36	0	
9/03/2021	N8	Bulk Fill	CLAY/SILT	2.70	1620	1620	UTP	UTP	UTP	UTP	UTP	1.86	1.36	36.4	0	300	34.3	1.38	1	
	N9	Bulk Fill	CLAY/SILT	2.70	1620	1620	187+	187+	UTP	UTP	187+	1.83	1.36	34.1	3	300	31.9	1.39	5	
16/07/2021	N10	Northern Pond	LS CLAY	2.70	2080	2080	164	173	155	158	163	1.79	1.27	41.0	1	300	38.8	1.29	2	
29/07/2021	N11	Refer to site plan	LS CLAY	2.70	1603	1603	154	166	148	160	157	1.74	1.27	37.6	5	300	42.6	1.22	3	
	N12	Refer to site plan	LS CLAY	2.70	1603	1603	148	151	163	169	158	1.76	1.24	42.1	2	300	41.3	1.25	2	
5/08/2021	N13	Refer to site plan	LS CLAY/SILT	2.70	1620	1620	127	155	164	197+	161+	1.71	1.19	43.6	4	300	40.4	1.22	6	
	N14	Refer to site plan	LS CLAY/SILT	2.70	1620	1620	138	155	164	124	145	1.74	1.30	34.4	7	300	39.0	1.25	5	
12/08/2021	N15	NW Pond	LS CLAY	2.70	2080	2080	176	203	173	173	181	1.77	1.26	40.8	2	300	46.6	1.21	-1	
	N16	NW Pond	LS CLAY	2.70	2080	2080	176	203	173	173	181	1.77	1.26	40.8	2	300	42.0	1.25	1	Redry of N15

** 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: 28/01/2021
Checked By: JLM Date: 25/08/2021
Authorised Signatory: HN Date: 8/09/2021

METRO PARK WEST
PROPOSED RESERVE EARTHWORKS

CUT = 87m³

FILL = 402m³

AREA =757m²

LEGEND:

- SITE BOUNDARY
- EXTENT OF EARTHWORKS IN METRO PARK WEST
- UNDERLYING LOT BOUNDARIES
- CUT / FILL CONTOURS (0.5m)
- TOTAL FILL (21,000m³)
- TOTAL CUT (21,000m³)
- TOTAL EW AREA = 32,566m²

SCALEBAR (m) 0 10 20 50

SCALE | 1:1000 @A3 | 1:500 @A1

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	MB	17/07/20
2	DESIGN CHANGES	MRB	19/10/20
3	CUT & FILL UPDATED	MRB	11/02/21

SURVEYED	WOODS	25 BANKSIDE ROAD SILVERDALE AUCKLAND
DESIGNED	MB	
DRAWN	FA	
CHECKED		
APPROVED		WOODS.CO.NZ

N

MILLWATER
25 BANKSIDE ROAD

PROPOSED CUT-FILL PLAN

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1000 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-120-EW	

Document No. C:\12DSYNERGY\DATA\WP-PEN-APP-01\37050 - BARTLETT BLOCK_329\CAD\ENG\37050-100-EW - EXISTING CONTOUR PLAN.DWG

LF14 Rev.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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

Testing Locations Selected By: CMW Field Staff

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	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH20L		CH30R		CH40L		CH50R		CH60L	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	7	15	4	8	2	4	1	2	1	2
100 - 200	1	2	2	4	1	2	1	2	1	2
200 - 300	2	4	3	6	1	2	1	2	1	2
300 - 400	2	4	2	4	1	2	1	2	1	2
400 - 500	2	4	2	4	1	2	1	2	1	2
500 - 600	2	4	2	4	1	2	2	4	1	2
600 - 700	2	4	2	4	2	4	2	4	2	4
700 - 800	2	4	2	4	4	8	2	4	1	2
800 - 900	2	4	2	4	2	4	2	4	1	2
900 - 1000										

Test No	6		7		8		9		10	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH70R		CH80L		CH90R		CH100L		CH110R	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	1	2	2	4	5	10	10	20+	4	8
100 - 200	1	2	3	6	2	4	4	8	4	8
200 - 300	2	4	1	2	2	4	3	6	4	8
300 - 400	3	6	2	4	2	4	6	13	4	8
400 - 500	2	4	3	6	2	4	5	10	4	8
500 - 600	2	4	2	4	2	4	6	13	4	8
600 - 700	1	2	1	2	2	4	4	8	3	6
700 - 800	1	2	1	2	1	2	6	13	4	8
800 - 900	1	2	2	4	1	2	5	10	5	10
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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

Testing Locations Selected By: CMW Field Staff

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	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH120L		CH130R		CH140L		CH150R		CH160L	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	3	6	11	20+	6	13	6	13
100 - 200	3	6	3	6	8	18	3	6	6	13
200 - 300	3	6	4	8	6	13	4	8	5	10
300 - 400	6	13	5	10	7	15	6	13	4	8
400 - 500	5	10	6	13	6	13	5	10	6	13
500 - 600	5	10	5	10	7	15	6	13	6	13
600 - 700	6	13	4	8	5	10	4	8	8	18
700 - 800	9	20	4	8	6	13	6	13	10	20+
800 - 900	7	15	5	10	9	20	6	13	5	10
900 - 1000										

Test No	16		17		18		19		20	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH170R		CH180L		CH190R		CH200L		CH210L	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	8	18	6	13	4	8	1	2	4	8
100 - 200	6	13	4	8	4	8	1	2	3	6
200 - 300	4	8	4	8	4	8	2	4	4	8
300 - 400	5	10	2	4	3	6	2	4	5	10
400 - 500	6	13	3	6	3	6	2	4	3	6
500 - 600	4	8	2	4	2	4	2	4	3	6
600 - 700	5	10	1	2	2	4	3	6	1	2
700 - 800	4	8	1	2	2	4	3	6	3	6
800 - 900	5	10	1	2	2	4	3	6	1	2
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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

Testing Locations Selected By: CMW Field Staff

ACCREDITED IANZ TESTING LABORATORY

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Test No	21		22		23		24		25	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 2	
Chainage & Offset	RH Parking Bay CH150		RH Parking Bay CH130		RH Parking Bay CH120		RH Parking Bay CH105		CH0L	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	4	8	5	10	6	13	3	6
100 - 200	3	6	2	4	5	10	7	15	2	4
200 - 300	1	2	2	4	4	8	4	8	2	4
300 - 400	2	4	4	8	4	8	5	10	2	4
400 - 500	5	10	4	8	3	6	8	18	3	6
500 - 600	5	10	5	10	4	8	7	15	2	4
600 - 700	10	20+	5	10	4	8	4	8	3	6
700 - 800	7	15	4	8	3	6	3	6	2	4
800 - 900	6	13	5	10	4	8	2	4	2	4
900 - 1000										

Test No	26		27		28		29		30	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH10R		CH20L		CH30R		CH40L		CH50R	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	1	2	2	4	1	2	2	4
100 - 200	3	6	2	4	1	2	1	2	2	4
200 - 300	2	4	1	2	1	2	1	2	1	2
300 - 400	2	4	2	4	3	6	1	2	1	2
400 - 500	2	4	2	4	1	2	1	2	1	2
500 - 600	1	2	2	4	2	4	1	2	1	2
600 - 700	2	4	1	2	4	8	1	2	1	2
700 - 800	2	4	3	6	4	8	1	2	2	4
800 - 900	4	8	4	8	5	10	2	4	1	2
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

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LF14 Rev.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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Test No	31		32		33		34		35	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH60L		CH70R		CH90L		RH Parking Bay CH90		LH Parking Bay CH50	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	7	15	1	2	1	2	3	6
100 - 200	2	4	3	6	2	4	3	6	2	4
200 - 300	2	4	2	4	1	2	4	8	2	4
300 - 400	2	4	2	4	2	4	2	4	1	2
400 - 500	2	4	2	4	2	4	3	6	2	4
500 - 600	1	2	2	4	1	2	2	4	1	2
600 - 700	1	2	2	4	2	4	2	4	2	4
700 - 800	2	4	2	4	4	8	3	6	3	6
800 - 900	1	2	2	4	4	8	4	8	4	8
900 - 1000										

Test No	36		37		38		39		40	
Test Location	Road 2		Road 2		Road 2		Road 3		Road 3	
Chainage & Offset	LH Parking Bay CH30		RH Parking Bay CH50		RH Parking Bay CH30		CH0L		CH10R	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	1	2	2	4	3	6	6	13	4	8
100 - 200	1	2	1	2	2	4	6	13	3	6
200 - 300	1	2	2	4	1	2	3	6	5	10
300 - 400	1	2	1	2	2	4	7	15	4	8
400 - 500	2	4	1	2	1	2	4	8	4	8
500 - 600	3	6	2	4	2	4	3	6	3	6
600 - 700	3	6	1	2	2	4	2	4	5	10
700 - 800	5	10	2	4	4	8	2	4	5	10
800 - 900	5	10	2	4	4	8	2	4	5	10
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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Testing Locations Selected By: CMW Field Staff

ACCREDITED IANZ TESTING LABORATORY

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Test No	41		42		43		44		45	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	CH20L		CH30R		RH Parking Bay CH40		RH Parking Bay CH50		CH40L	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	13	20+	8	18	14	20+	10	20+
100 - 200	4	8	8	18	6	13	5	10	8	18
200 - 300	5	10	5	10	6	13	4	8	5	10
300 - 400	7	15	6	13	6	13	4	8	5	10
400 - 500	5	10	6	13	7	15	6	13	5	10
500 - 600	4	8	9	20	5	10	10	20+	5	10
600 - 700	5	10	6	13	5	10	6	13	5	10
700 - 800	6	13	5	10	3	6	5	10	5	10
800 - 900	6	13	5	10	4	8	7	15	6	13
900 - 1000										

Test No	46		47		48		49		50	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	LH Parking Bay CH30		RH Parking Bay CH50		CH50R		CH60L		CH70R	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	13	20+	10	20+	12	20+	10	20+	8	18
100 - 200	6	13	6	13	5	10	8	18	5	10
200 - 300	6	13	9	20	4	8	7	15	10	20+
300 - 400	6	13	4	8	4	8	7	15	15	20+
400 - 500	5	10	4	8	6	13	4	8	7	15
500 - 600	5	10	4	8	4	8	6	13	3	6
600 - 700	4	8	4	8	3	6	5	10	3	6
700 - 800	5	10	6	13	3	6	5	10	4	8
800 - 900	6	13	6	13	4	8	5	10	1	2
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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CMW Geosciences (NZ) Ltd Partnership
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Test No	51		52		53		54		55	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	CH80L		LH Parking CH80		CH90R		LH Parking CH90		CH100L	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	5	10	4	8	3	6	3	6	4	8
100 - 200	3	6	4	8	2	4	2	4	2	4
200 - 300	2	4	3	6	2	4	3	6	3	6
300 - 400	3	6	3	6	2	4	2	4	3	6
400 - 500	1	2	2	4	1	2	2	4	2	4
500 - 600	2	4	2	4	2	4	1	2	2	4
600 - 700	2	4	2	4	1	2	2	4	3	6
700 - 800	2	4	3	6	2	4	3	6	2	4
800 - 900	2	4	2	4	2	4	4	8	2	4
900 - 1000										

Test No	56		57		58		59		60	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	Turning Head		Turning Head		Turning Head		Turning Head		Turning Head	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	4	8	5	10	6	13	5	10	4	8
100 - 200	2	4	5	10	5	10	4	8	2	4
200 - 300	2	4	2	4	3	6	3	6	2	4
300 - 400	2	4	3	6	3	6	2	4	2	4
400 - 500	2	4	2	4	3	6	1	2	2	4
500 - 600	1	2	2	4	2	4	2	4	2	4
600 - 700	3	6	2	4	2	4	2	4	2	4
700 - 800	2	4	2	4	2	4	1	2	2	4
800 - 900	3	6	2	4	2	4	2	4	2	4
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

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LF14 Rev.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAB Rev.0
Test Date:	24/03/2021 & 25/03/2021
Tested By:	KVR/LSW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale 0992

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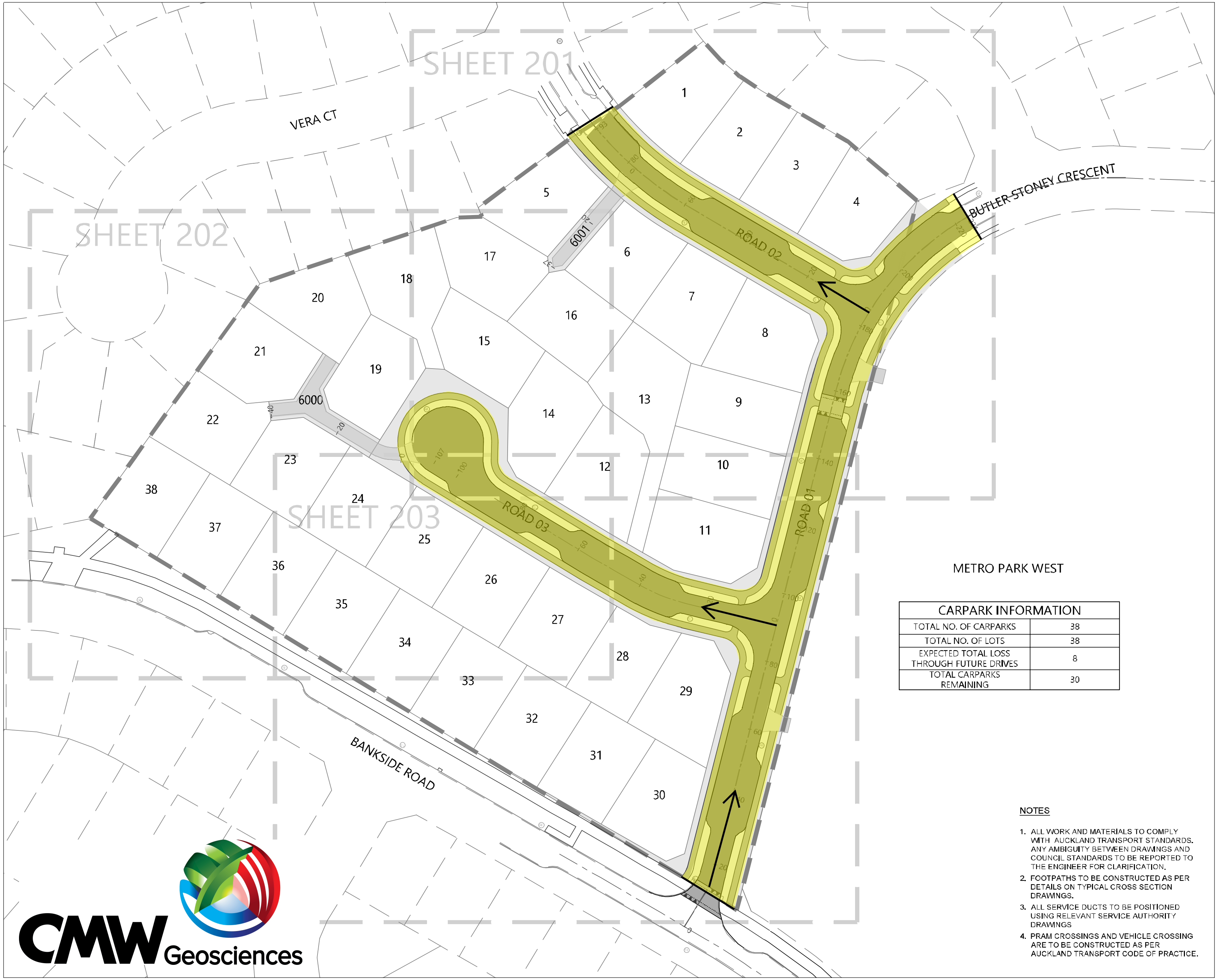
Test No	61		62		63		64		65	
Test Location	Road 3		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	Turning Head		LH Parking Bay CH60		LH Parking Bay CH50		LH Parking Bay CH40		RH Parking Bay CH30	
Material & Layer	CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE		CLAY/SUBGRADE	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	3	6	1	2	3	6	1	2
100 - 200	3	6	2	4	1	2	1	2	3	6
200 - 300	2	4	2	4	1	2	1	2	3	6
300 - 400	2	4	2	4	2	4	2	4	2	4
400 - 500	2	4	2	4	2	4	2	4	3	6
500 - 600	2	4	1	2	2	4	2	4	2	4
600 - 700	2	4	2	4	3	6	2	4	3	6
700 - 800	2	4	4	8	3	6	1	2	3	6
800 - 900	3	6	4	8	3	6	3	6	3	6
900 - 1000										

Test No	66									
Test Location	Road 1									
Chainage & Offset	RH Parking Bay CH20									
Material & Layer	CLAY/SUBGRADE									
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	0	0								
100 - 200	1	2								
200 - 300	1	2								
300 - 400	2	4								
400 - 500	2	4								
500 - 600	2	4								
600 - 700	3	6								
700 - 800	4	8								
800 - 900	5	10								
900 - 1000										

Created by:	JLM	Date:	25/03/2021
Checked by:	JLM	Date:	25/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.



CARPARK INFORMATION	
TOTAL NO. OF CARPARKS	38
TOTAL NO. OF LOTS	38
EXPECTED TOTAL LOSS THROUGH FUTURE DRIVES	8
TOTAL CARPARKS REMAINING	30

NOTES

1. ALL WORK AND MATERIALS TO COMPLY WITH AUCKLAND TRANSPORT STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND COUNCIL STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
2. FOOTPATHS TO BE CONSTRUCTED AS PER DETAILS ON TYPICAL CROSS SECTION DRAWINGS.
3. ALL SERVICE DUCTS TO BE POSITIONED USING RELEVANT SERVICE AUTHORITY DRAWINGS
4. PRAM CROSSINGS AND VEHICLE CROSSING ARE TO BE CONSTRUCTED AS PER AUCKLAND TRANSPORT CODE OF PRACTICE.

WOODS Est.1970

LEGEND:

- EXTENT OF WORKS
- PROPOSED LOT BOUNDARIES
- UNDERLYING LOT BOUNDARIES
- CENTRELINE
- CHAINAGES
- JOAL
- PROPOSED CARRIAGEWAY
- FOOTPATH
- BERM
- RESERVE
- STREETLIGHTS - NEW
- STREETLIGHTS - EXISTING
- INDICATIVE CARPARKS

SCALEBAR (m) 0 10 20 50 — SCALE | 1:1000 @A3 | 1:500 @A1|

REVISION DETAILS		BY	DATE
1	ISSUED FOR EPA	MB	17/07/20
2	S92 RESPONSE	MRB	08/09/20
3	LOA DESIGN CHANGES	MRB	28/10/20
4	FOR EPA	MRB	03/02/21

SURVEYED	WOODS	25 BANKSIDE ROAD SILVERDALE AUCKLAND
DESIGNED	MRB	
DRAWN	FA	
CHECKED	MB	
APPROVED	MB	WOODS.CO.NZ

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD

OVERALL ROAD LAYOUT PLAN

STATUS	ISSUED FOR EPA	REV
SCALE	1:1000 @ A3	4
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-200-RD	

Document No. C:\12D\SYNERGY\DATA\WP-PFN-APP-01\37050 - BARTLETT BLOCK_329\CAD\ENG\37050-200-RD - ROADING LAYOUT PLAN.DWG

CMW Geosciences

LF14 Rev.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAC Rev.0
Test Date:	6/05/2021
Tested By:	FS/DW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale, Auckland 0944

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

ACCREDITED IANZ TESTING LABORATORY

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Test No	1		2		3		4		5	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH30R		CH40L		CH50R		CH60L		CH70R	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	12	20+	5	10	8	18	3	6	6	13
100 - 200	13	20+	2	4	11	20+	3	6	3	6
200 - 300	14	20+	1	2	7	15	3	6	2	4
300 - 400	5	10	4	8	5	10	1	2	1	2
400 - 500	2	4	5	10	6	13	1	2	1	2
500 - 600	3	6	2	4	2	4	2	4	2	4
600 - 700	2	4	3	6	2	4	1	2	3	6
700 - 800	3	6	2	4	1	2	1	2	4	8
800 - 900	2	4	2	4	2	4	1	2	4	8
900 - 1000										

Test No	6		7		8		9		10	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH80L		CH90R		CH100L		CH110R		CH120L	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	8	18	3	6	7	15	4	8	9	20
100 - 200	4	8	3	6	7	15	3	6	7	15
200 - 300	3	6	2	4	3	6	3	6	7	15
300 - 400	2	4	2	4	3	6	3	6	4	8
400 - 500	2	4	2	4	4	8	5	10	5	10
500 - 600	1	2	2	4	6	13	5	10	4	8
600 - 700	2	4	1	2	6	13	5	10	5	10
700 - 800	2	4	2	4	7	15	6	13	8	18
800 - 900	2	4	2	4	7	15	6	13	8	18
900 - 1000										

Created by:	JLM	Date:	26/05/2021
Checked by:	JLM	Date:	28/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

Project:	Bartlett Block
Project No:	AKL2020-0082
Location:	Millwater
Report No:	AKL2020-0082LAC Rev.0
Test Date:	6/05/2021
Tested By:	FS/DW
Client:	WFH Properties Limited
Client Address:	157 Millwater Parkway, Silverdale, Auckland 0944

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

Testing Locations Selected By: CMW Field Staff

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	Road 1		Road 1		Road 1		Road 1		Road 1	
Chainage & Offset	CH130R		CH140L		CH150R		CH160L		CH170R	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	3	6	6	13	6	13	6	13	10	20+
100 - 200	3	6	8	18	7	15	6	13	4	8
200 - 300	8	18	7	15	3	6	2	4	7	15
300 - 400	6	13	6	13	7	15	5	10	5	10
400 - 500	5	10	7	15	6	13	4	8	5	10
500 - 600	6	13	6	13	8	18	4	8	6	13
600 - 700	5	10	6	13	7	15	5	10	5	10
700 - 800	9	20	8	18	7	15	5	10	6	13
800 - 900	9	20	5	10	7	15	5	10	6	13
900 - 1000										

Test No	16		17		18		19		20	
Test Location	Road 1		Road 1		Road 1		Road 1		Road 2	
Chainage & Offset	CH180L		CH190R		CH200L		CH210R		CH10R	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	10	20+	13	20+	7	15	12	20+	10	20+
100 - 200	6	13	7	15	5	10	7	15	8	18
200 - 300	3	6	4	8	3	6	4	8	5	10
300 - 400	3	6	3	6	2	4	4	8	2	4
400 - 500	3	6	2	4	3	6	2	4	2	4
500 - 600	2	4	2	4	3	6	3	6	2	4
600 - 700	3	6	2	4	3	6	2	4	1	2
700 - 800	2	4	2	4	4	8	3	6	2	4
800 - 900	2	4	2	4	4	8	2	4	2	4
900 - 1000										

Created by:	JLM	Date:	26/05/2021
Checked by:	JLM	Date:	28/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.

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Project No:	AKL2020-0082
Location:	Millwater
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Test Date:	6/05/2021
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Client:	WFH Properties Limited
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Building C, 9 Piermark Drive, Rosedale, NZ 0632
PO Box 300206, Albany, Auckland, NZ 0752
Phone: +64 (09) 4144 632

Testing Locations Selected By: CMW Field Staff

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	21		22		23		24		25	
Test Location	Road 2		Road 2		Road 2		Road 2		Road 2	
Chainage & Offset	CH20L		CH30R		CH40L		CH50R		CH60L	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	8	18	8	18	9	20	8	18	11	20+
100 - 200	6	13	8	18	4	8	7	15	6	13
200 - 300	3	6	4	8	15	20+	6	13	9	20
300 - 400	2	4	1	2	10	20+	5	10	2	4
400 - 500	1	2	1	2	5	10	4	8	2	4
500 - 600	1	2	1	2	1	2	2	4	2	4
600 - 700	1	2	1	2	1	2	2	4	3	6
700 - 800	3	6	2	4	2	4	1	2	3	6
800 - 900	2	4	2	4	2	4	2	4	3	6
900 - 1000										

Test No	26		27		28		29		30	
Test Location	Road 2		Road 2		Road 2		Road 3		Road 3	
Chainage & Offset	CH70R		CH80L		CH90R		CH10L		CH20R	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	13	20+	3	6	7	15	18	20+	4	8
100 - 200	7	15	4	8	4	8	20	20+	4	8
200 - 300	3	6	1	2	4	8	UTP	UTP	3	6
300 - 400	2	4	2	4	2	4			4	8
400 - 500	3	6	3	6	2	4			6	13
500 - 600	2	4	3	6	3	6			4	8
600 - 700	3	6	4	8	3	6			7	15
700 - 800	2	4	4	8	3	6			9	20
800 - 900	2	4	4	8	3	6			8	18
900 - 1000										

Created by:	JLM	Date:	26/05/2021
Checked by:	JLM	Date:	28/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

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LF14 Rev.12 Dynamic Cone Penetration (DCP) Test Report

NZS 4402: 1988 Test 6.5.2

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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

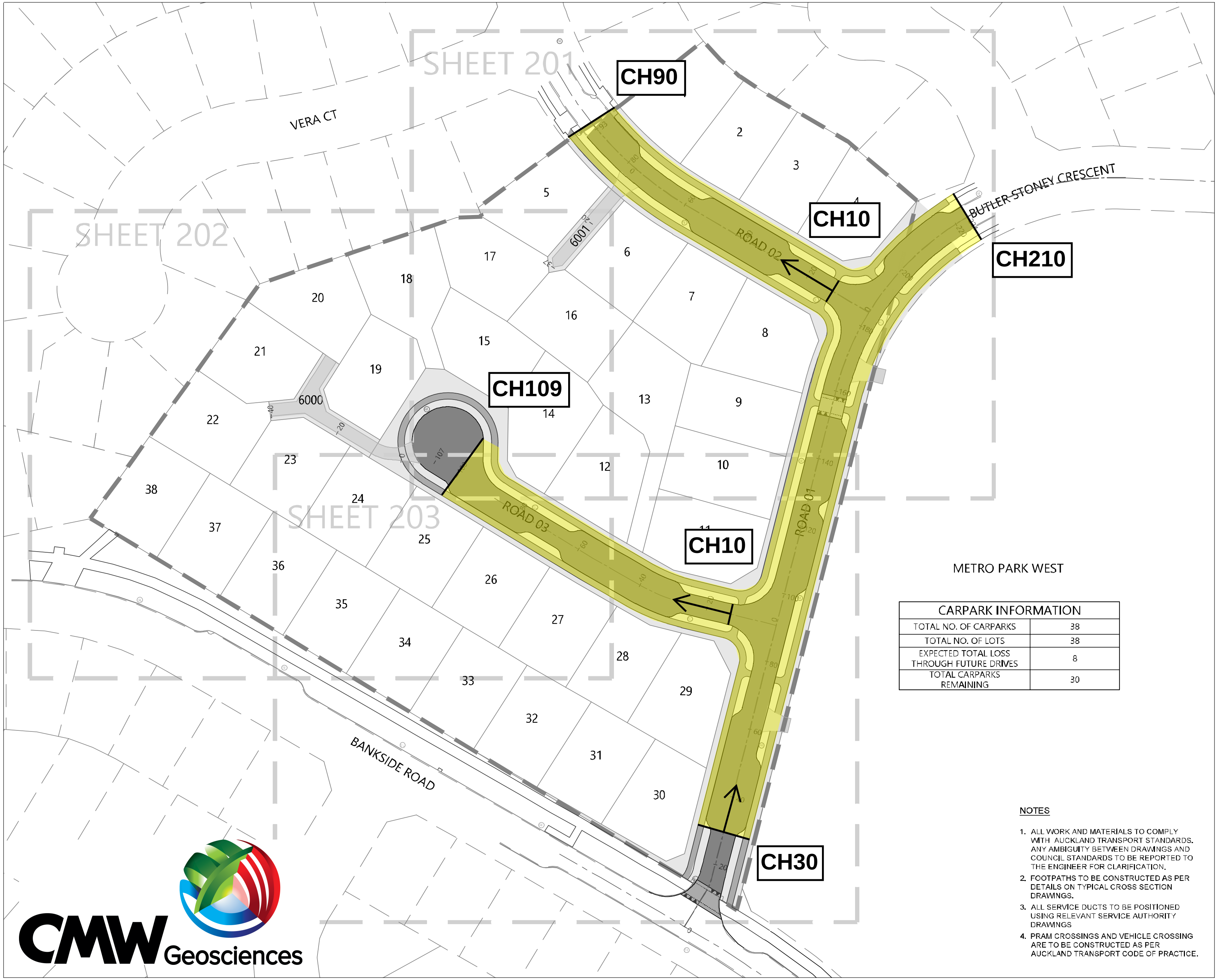
*** Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation**

Test No	31		32		33		34		35	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	CH30L		CH40R		CH50L		CH60R		CH70L	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
Depth (mm)	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	5	10	9	20	8	18	7	15	7	15
100 - 200	2	4	5	10	4	8	4	8	5	10
200 - 300	3	6	3	6	3	6	4	8	4	8
300 - 400	3	6	4	8	4	8	5	10	4	8
400 - 500	4	8	7	15	6	13	5	10	2	4
500 - 600	8	18	6	13	5	10	5	10	1	2
600 - 700	8	18	7	15	4	8	4	8	2	4
700 - 800	9	20	8	18	4	8	3	6	2	4
800 - 900	9	20	7	15	4	8	3	6	1	2
900 - 1000										

Test No	36		37		38		39		40	
Test Location	Road 3		Road 3		Road 3		Road 3		Road 3	
Chainage & Offset	CH80R		CH90L		CH100L		CH100C		CH100R	
Material & Layer	SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY		SG/ Stabilised CLAY	
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	4	8	5	10	6	13	7	15
100 - 200	5	10	2	4	3	6	4	8	6	13
200 - 300	2	4	1	2	2	4	2	4	2	4
300 - 400	2	4	2	4	2	4	2	4	2	4
400 - 500	1	2	4	8	2	4	2	4	2	4
500 - 600	2	4	4	8	3	6	3	6	2	4
600 - 700	1	2	4	8	2	4	3	6	2	4
700 - 800	2	4	4	8	3	6	3	6	2	4
800 - 900	2	4	4	8	2	4	2	4	2	4
900 - 1000										

Created by:	JLM	Date:	26/05/2021
Checked by:	JLM	Date:	28/06/2021
Authorised Signatory:	JW	Date:	2/07/2021

*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.



CARPARK INFORMATION

TOTAL NO. OF CARPARKS	38
TOTAL NO. OF LOTS	38
EXPECTED TOTAL LOSS THROUGH FUTURE DRIVES	8
TOTAL CARPARKS REMAINING	30

NOTES

1. ALL WORK AND MATERIALS TO COMPLY WITH AUCKLAND TRANSPORT STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND COUNCIL STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
2. FOOTPATHS TO BE CONSTRUCTED AS PER DETAILS ON TYPICAL CROSS SECTION DRAWINGS.
3. ALL SERVICE DUCTS TO BE POSITIONED USING RELEVANT SERVICE AUTHORITY DRAWINGS
4. PRAM CROSSINGS AND VEHICLE CROSSING ARE TO BE CONSTRUCTED AS PER AUCKLAND TRANSPORT CODE OF PRACTICE.

WOODS Est.1970

LEGEND:

- EXTENT OF WORKS
- PROPOSED LOT BOUNDARIES
- UNDERLYING LOT BOUNDARIES
- CENTRELINE
- CHAINAGES
- JOAL
- PROPOSED CARRIAGEWAY
- FOOTPATH
- BERM
- RESERVE
- STREETLIGHTS - NEW
- STREETLIGHTS - EXISTING
- INDICATIVE CARPARKS

SCALEBAR (m) 0 10 20 50 — SCALE | 1:1000 @A3 | 1:500 @A1 |

	REVISION DETAILS	BY	DATE
1	ISSUED FOR EPA	MB	17/07/20
2	S92 RESPONSE	MRB	08/09/20
3	LOA DESIGN CHANGES	MRB	28/10/20
4	FOR EPA	MRB	03/02/21

SURVEYED	WOODS	25 BANKSIDE ROAD SILVERDALE AUCKLAND
DESIGNED	MRB	
DRAWN	FA	
CHECKED	MB	
APPROVED	MB	WOODS.CO.NZ

WFH PROPERTIES

MILLWATER
25 BANKSIDE ROAD

OVERALL ROAD LAYOUT PLAN

STATUS	ISSUED FOR EPA	REV
SCALE	1:1000 @ A3	4
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-200-RD	

CMW Geosciences

Appendix E: Retaining Wall PS4

12 October 2021 Document Ref: AKL2020-0082AI Rev. 0

WFH Properties Ltd
C/- Woods
P.O Box 6752
Victoria Street West
Auckland 1142

Attention: Michael Bates

Dear Michael

RE: CONSTRUCTION REVIEW OF A TIMBER POLE RETAINING WALL – BCO10328830
BARTLETT BLOCK, 25 BANKSIDE ROAD, SILVERDALE

CMW Geosciences (CMW) visited the site at Bartlett Block, 25 Bankside Road, Silverdale, legally described as Lot 3 DP168595 on several occasions between July 2021 and August 2021 to observe the site works for the construction of a <1m high timber pole retaining wall along the northern western site boundary.

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

- Conditions of Auckland Council Building Consent referenced BCO10328830, issued 18 June 2021;
- Consented Retaining Wall construction drawings, prepared by CMW Geosciences, referenced AKL2020-0082AG DG01 through to DG03 Rev. 0 dated 22 April 2021;
- Retaining Wall design report for Bartlett Block, Silverdale prepared by CMW Geosciences, referenced AKL2020-0082AG Rev. 1 dated 27 April 2021.

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

- Pile hole depth, size and spacing;
- Timber pole size, treatment and pole placement;
- Drainage materials and installation;
- Lagging construction.

Ground conditions within the timber pole pile holes ranged from stiff to very stiff residual soils, with vane shear strengths in the bases and sides of the pile holes ranging between 89kPa and 166kPa. Four piles demonstrated undrained shear strengths within the base of the holes which were below the required design specification of 100kPa. Retaining wall analysis was re-run by CMW to represent actual site conditions, which showed that this section of retaining wall is able to resist the respective design loading even with a reduced foundation soil strength. No groundwater was encountered in any of the pile holes.

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 CPEng

Distribution: 1 electronic copy to Michael Bates at Woods via email
Original held at CMW Geosciences

Attachments: Producer Statement - Construction Review (PS4)
Approved Drawings
Contractor PS3

engineering new zealand

ace new zealand

association of consulting and engineering

Building Code Clause(s) B1

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

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

TO: WFH Properties Ltd
(Owner/Developer)

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

IN RESPECT OF: Construction of a Timber Pole Retaining Wall
(Description of Building Work)

AT: Bartlett Block, 25 Bankside Road, Silverdale
(Address)

Town/City: Auckland **LOT** 3 **DP** 168595 **SO**
(Address)

We CMW Geosciences (NZ) Limited Partnership have been engaged by WFH Properties Ltd
(Construction Review Firm)

To provide ☐ CM1 ☐ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ■ observation as per agreement with owner/developer. WFH Properties Ltd

or ■ other as described in CMW letter referenced AKL2020-0082AI Rev. 0, dated 12 October 2021 services
(Extent of Engagement)

in respect of clause(s) B1 of the Building Code for the building work described in documents relating to Building Consent No. BCO10328830 and those relating to Building Consent Amendment(s) Nos. N/A issued during the course of the works. We have sighted these Building Consents and the conditions of attached to them.

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

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

I, Richard Knowles (AC Author #2342) am: ■ CPEng.# 160049
(Name of Construction Review Professional)

I am a member of: ■ Engineering New Zealand and hold the following qualifications BE (Civil), CMEngNZ, CPEng

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

The Construction Review Firm is a member of ACE New Zealand: ☐

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

ON BEHALF OF CMW Geosciences (NZ) Limited Partnership Date 12/10/21
(Construction Review Firm)

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

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

GUIDANCE ON USE OF PRODUCER STATEMENTS

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

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

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

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

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

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

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

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

Competence of Design Professional

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

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

Membership of a professional body, such as Engineering New Zealand (formerly IPENZ), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the 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 design 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, small projects. If the parties deem this inappropriate for large projects the minimum may be up to $500,000.

Professional Services during Construction Phase

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

Requirement to provide Producer Statement PS4

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

Attached Particulars

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

Refer Also:

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

2 NZIA Standard Conditions of Contract SCC 2011

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

4 PN Guidelines on Producer Statements

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

METRO PARK WEST

LEGEND

- BOUNDARY (NEW)
- BOUNDARY (EXISTING)
- RETAINING WALL
- APPROVED STORMWATER
- EXISTING STORMWATER
- DISTANCE FROM BOUNDARY TO BOTTOM OF WALL — 0.5m to BW

NOTES

1. RETAINING WALLS ARE TO BE BUILT IN ACCORDANCE WITH CMW'S DESIGN SPECIICATIONS.
2. REFER TO CMW'S DESIGN DRAWINGS FOR TIMBER POLE WALL DETAILS.
3. SUBSOIL DRAINS ARE TO BE CONNECTED TO A STORMWATER MANHOLE OR CATCH PIT.
4. RETAINING WALL BUILDING CONSENTS ARE TO BE SUBMITTED SEPARATELY.

SCALEBAR (m) 0 10 20 50 SCALE | 1:1000 @A3 | 1:500 @A1|

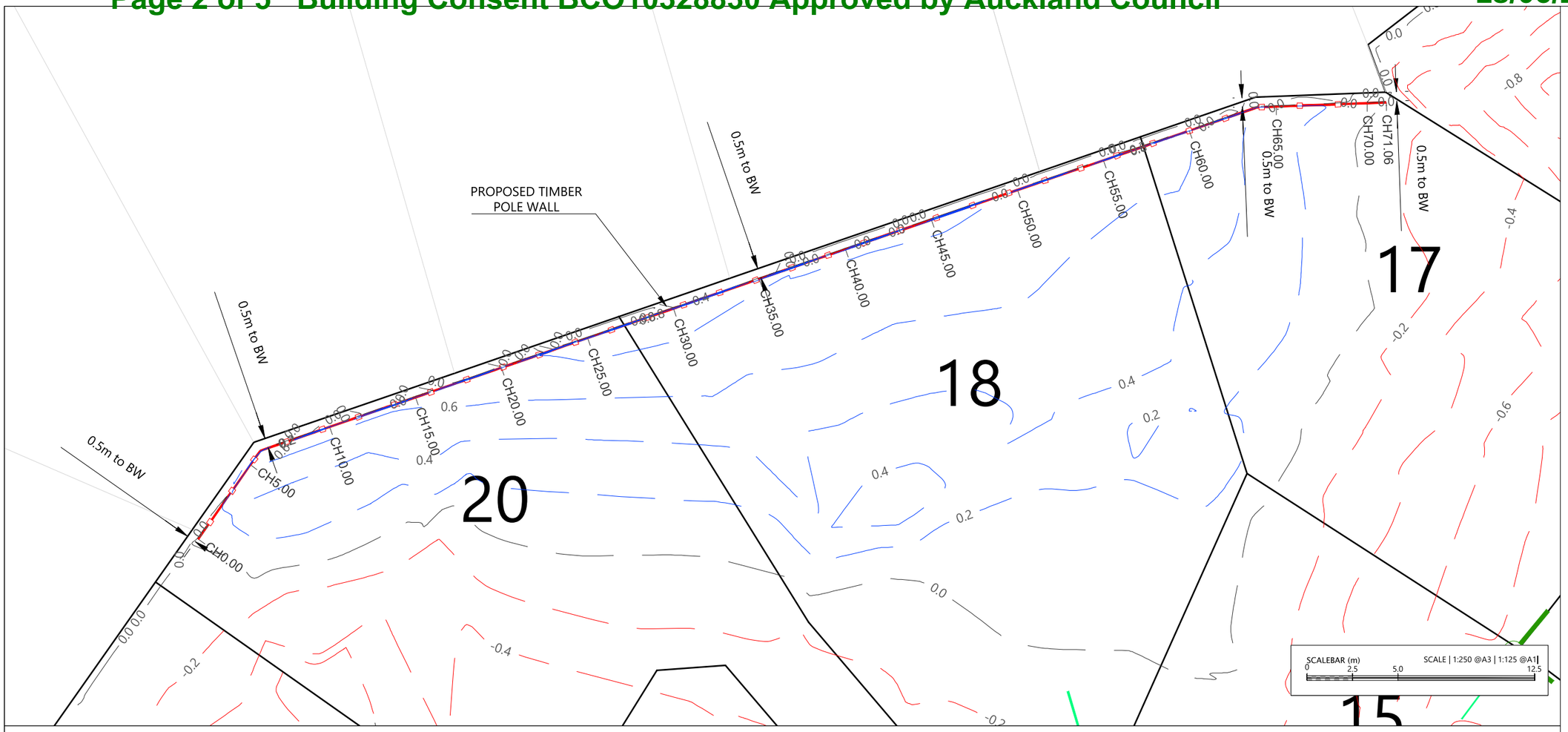
REVISION DETAILS		INT	DATE	SURVEYED		25 BANKSIDE ROAD SILVERDALE AUCKLAND LOT 3 DP168595
1	FOR INFORMATION	MRB	13/05/21	DESIGNED	MRB	
				DRAWN	MRB	
				CHECKED		
				APPROVED		WOODS.CO.NZ

MILLWATER - 25 BANKSIDE ROAD

RETAINING WALL LAYOUT PLAN
SHEET 1 OF 2

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1000 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-150-RW	

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\37050 - BARTLETT BLOCK_329\CAD\ENG\37050-150-RW- RETAINING WALL PLAN.DWG



LEGEND

- BOUNDARY (NEW)
- BOUNDARY (EXISTING)
- RETAINING WALL
- APPROVED STORMWATER
- EXISTING STORMWATER
- DISTANCE FROM BOUNDARY TO BOTTOM OF WALL — 0.5m to BW

EARTHWORKS LEGEND

- ZERO LINE — 0.0
- CUT — -0.2
- FILL — 0.2

NOTES:
1. CONTOURS SHOWN IN 0.2m INCREMENTS.

DATUM R.L. = 22.00

TOP OF RETAINING	28.26	28.37	28.63	28.80	28.80	28.80	28.72	28.53	28.17
RETAINED HEIGHT	0.04	0.50	0.79	0.90	0.86	0.71	0.62	0.38	0.00
BOTTOM OF RETAINING	28.22	27.87	27.83	27.90	27.94	28.09	28.11	28.15	28.17
CHAINAGE	0.00	5.92	20.00	29.61	40.00	58.46	60.00	63.88	70.96

NOTES

1. RETAINING WALLS ARE TO BE BUILT IN ACCORDANCE WITH CMW'S DESIGN SPECIICATIONS.
2. REFER TO CMW'S DESIGN DRAWINGS FOR TIMBER POLE WALL DETAILS.
3. SUBSOIL DRAINS ARE TO BE CONNECTED TO A STORMWATER MANHOLE OR CATCH PIT.
4. RETAINING WALL BUILDING CONSENTS ARE TO BE SUBMITTED SEPARATELY.

REVISION DETAILS		INT	DATE	SURVEYED		25 BANKSIDE ROAD SILVERDALE AUCKLAND LOT 3 DP 168595
1	FOR INFORMATION	MRB	13/05/21	DESIGNED	MRB	
				DRAWN	MRB	
				CHECKED		
				APPROVED		WOODS.CO.NZ

MILLWATER - 25 BANKSIDE ROAD

RETAINING WALL LAYOUT PLAN
SHEET 2 OF 2

STATUS	ISSUED FOR INFORMATION	REV
SCALE	AS SHOWN	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37050-151-RW	

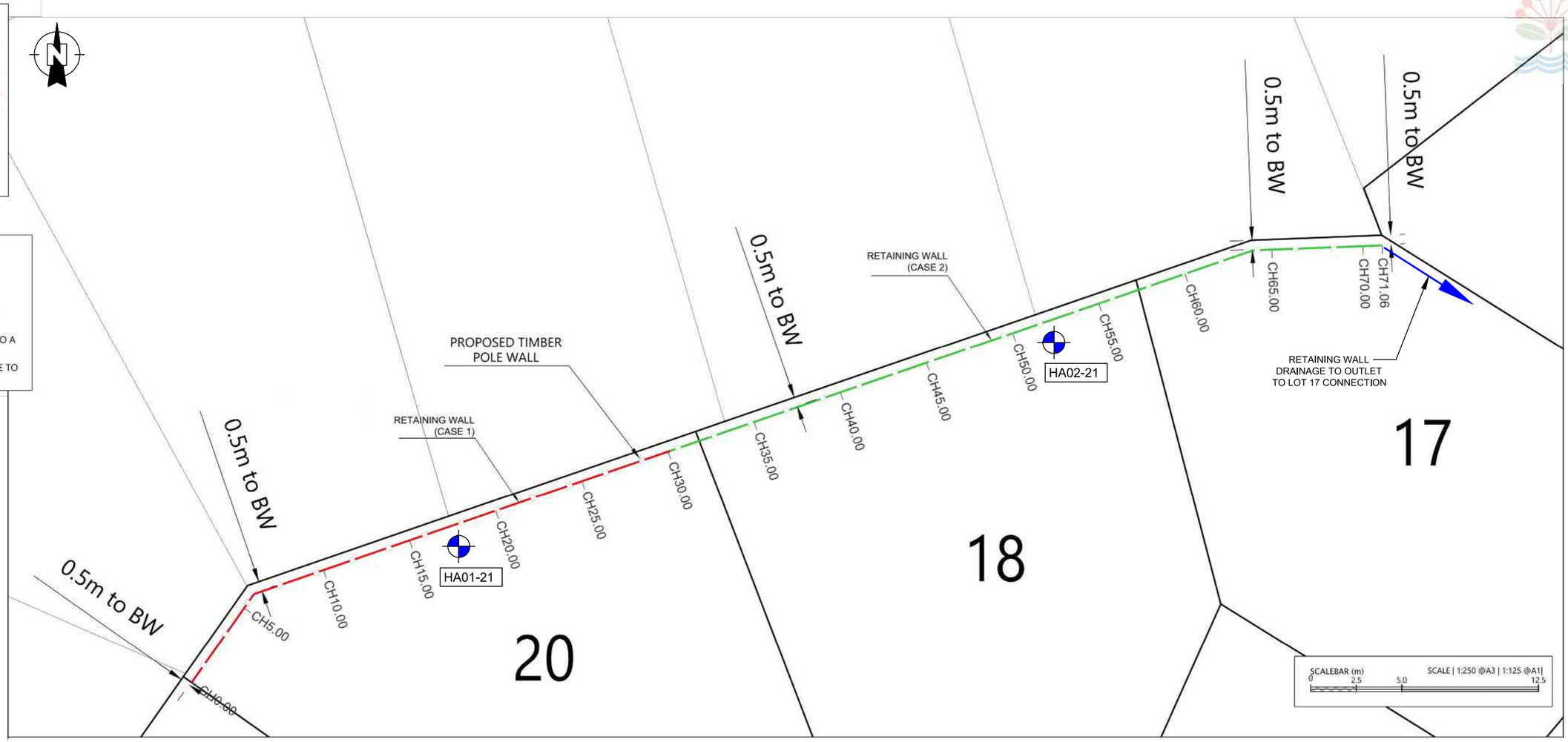
File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\37050 - BARTLETT BLOCK_329\CAD\ENG\37050-150-RW- RETAINING WALL PLAN.DWG

LEGEND

- BOUNDARY (NEW)
- BOUNDARY (EXISTING)
- RETAINING WALL CASE 1
- RETAINING WALL CASE 2
- DISTANCE FROM BOUNDARY TO BOTTOM OF WALL (0.5m to BW)
- HAND AUGER BOREHOLE LOCATION

NOTES

1. RETAINING WALLS ARE TO BE BUILT IN ACCORDANCE WITH CMW'S DESIGN SPECIICATIONS.
2. REFER TO CMW'S DESIGN DRAWINGS FOR TIMBER POLE WALL DETAILS.
3. SUBSOIL DRAINS ARE TO BE CONNECTED TO A STORMWATER MANHOLE OR CATCH PIT.
4. RETAINING WALL BUILDING CONSENTS ARE TO BE SUBMITTED SEPARATELY.



DATUM R.L. = 22.00

TOP OF RETAINING	28.26	28.37	28.63	28.80	28.80	28.80	28.72	28.53	28.17
RETAINED HEIGHT	0.04	0.50	0.79	0.90	0.86	0.71	0.62	0.38	0.00
BOTTOM OF RETAINING	28.22	27.87	27.83	27.90	27.94	28.09	28.11	28.15	28.17
CHAINAGE	0.00	5.92	20.00	29.61	40.00	58.46	60.00	63.88	70.96

REV	DATE	DESCRIPTION	BY
A	21/04/2021	ISSUE FOR INTERNAL REVIEW	CZ
0	22/04/2021	ISSUE FOR BUILDING CONSENT	CZ

CMW Geosciences

CLIENT: WHF PROPERTIES LTD		DRAWN: CZ	PROJECT No: AKL2020-0082
PROJECT: BARTLETT BLOCK MILLWATER		CHECKED: SC	DRAWING: DG01(AG)
		REVISION: 0	SCALE: N.T.S.
TITLE: RETAINING WALL CASE PLAN		DATE: 22/04/2021	SHEET: A3

C:\USERS\CHAUDHARYZOHAIB\CMW GEOSCIENCES PTY LTD\CMW CONNECT - AKL2020-0082 BARTLETT BLOCK, MILLWATER\DRAWINGS\RETAINING WALL DESIGN DRAWINGS\REV - 0\AKL2020-0082 01 03 AG REV-0.DWG

NOTES

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RETAINING WALL DESIGN REPORT REFERENCE: AKL2020-0082AG REV 0.

SPECIFICATION

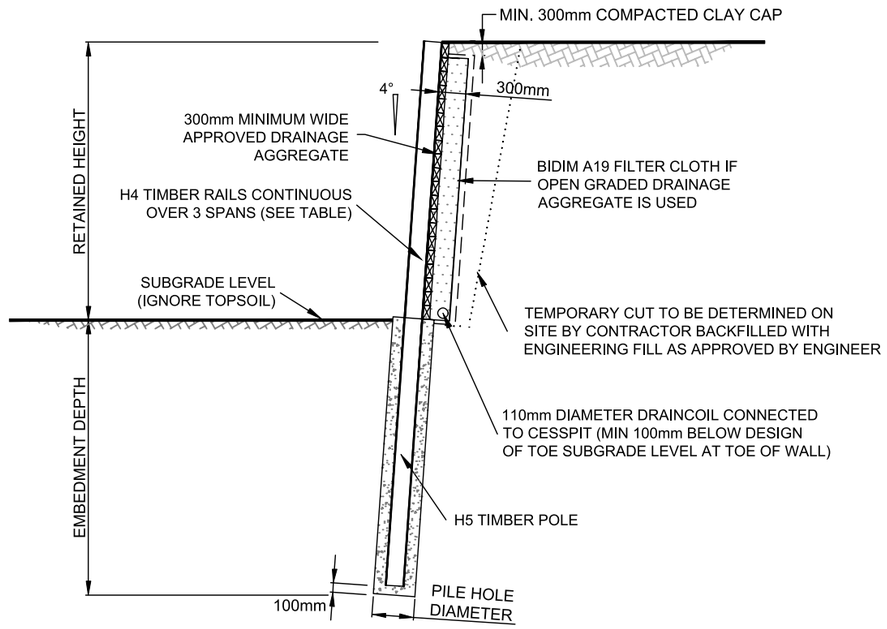
1. MATERIAL PROPERTIES

CONCRETE:	CHARACTERISTIC COMPRESSIVE STRENGTH F'C = 17.5 MPa UNLESS OTHERWISE NOTED.
TIMBER POLES:	H5 TREATED RADIATA PINE, HIGH DENSITY IN ACCORDANCE WITH NZS 3603 UNLESS OTHERWISE SPECIFIED.
TIMBER RAILINGS:	H4 TREATED RADIATA PINE
RAILING FIXINGS:	GALVANISED NAILS
DRAIN COIL:	110mm DIAMETER
DRAINAGE AGGREGATE:	APPROVED DRAINAGE-GRADED AGGREGATE OR SCORIA (USE OF COMPOSITE DRAINAGE PRODUCTS OR POLYSTYRENE NOT APPROVED)

2. FOR LOCATION AND EXTENT OF TIMBER POLE WALLS REFER TO PROJECT ENGINEERING DRAWINGS. SET OUT LOCATIONS TO BE PROVIDED BY OTHERS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
3. MINIMUM CONCRETE COVER TO TIMBER POLES IS 50mm WITH A MINIMUM COVER OF 100mm AT THE PILE BASE. THIS WILL REQUIRE EITHER A PACKER OR POURING OF A PUNCH PAD TO ACHIEVE DESIGN. POLE HOLE DIAMETER MAY ONLY BE VARIED BY DESIGNER IN WRITING.
4. RAILS SHOULD BE CONTINUOUS OVER 3 SPANS WITH STAGGERED JOINTS. CUTTING OF TIMBERS SHALL BE AVOIDED WHEREVER POSSIBLE. TONGUE AND GROOVE BOARDS ARE NOT TO BE USED FOR RAILS. USE A NAIL WIDTH GAP BETWEEN RAILS.
5. IF CUTTING OF POLES OR RAILS IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE WOOD PRESERVATIVE.
6. THE MAXIMUM RETAINING HEIGHT, TOE SLOPE AND SURCHARGE SLOPE SHALL BE AS SPECIFIED ON THE DESIGN AND SHALL NOT BE EXCEEDED UNLESS APPROVED BY THE DESIGN ENGINEER IN WRITING.
7. THE EXTENT OF EXCAVATION REQUIRED SHALL BE MARKED OUT ON THE GROUND HAVING REGARD TO THE POSITIONS OF POLES, WORKING SPACE FOR CONSTRUCTION, BACKFILL AND DRAINAGE PROVISIONS.
8. ALL PILE HOLES TO BE AUGERED AND DRILLING SPOIL DISPOSED OF AWAY FROM THE RETAINING WALL.
9. A PERFORATED SUBSOIL DRAIN WITHOUT FILTER SOCK SHALL BE LAID AND SURROUNDED IN APPROVED DRAINAGE-GRADED AGGREGATE OR SCORIA WITH INVERT 100mm BELOW DESIGN TOE SUBGRADE LEVELS CONNECTED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE OR CONNECTED TO STORMWATER SYSTEM.
10. THE CONTRACTOR SHALL REFER TO THE DESIGN ENGINEER AS SOON AS POSSIBLE FOR FURTHER INSTRUCTION SHOULD ANY UNFORESEEN CIRCUMSTANCE OR ABNORMAL SITE CONDITION BE ENCOUNTERED DURING CONSTRUCTION.
11. WHERE EXCAVATIONS ARE UNDERTAKEN MORE THAN A FEW DAYS IN ADVANCE OF WALL CONSTRUCTION, THE CUT FACE MUST BE COVERED WITH POLYTHENE TO PREVENT IT DRYING OUT AND CRACKING, ESPECIALLY WHERE EXPANSIVE CLAY SOILS ARE PRESENT. SIMILARLY DURING PERIODS OF WET WEATHER THE EXCAVATION FACE SHOULD BE PROTECTED WITH POLYTHENE AND SURFACE WATER DIRECTED AWAY FROM THE CREST AND TOE OF THE EXCAVATION.
12. CONTRACTOR IS RESPONSIBLE FOR ENSURING EXCAVATIONS ARE STAGED SO THAT EXCAVATED FACES ARE NOT LEFT UNSUPPORTED FOR ANY SIGNIFICANT LENGTH OF TIME. THIS IS ESPECIALLY CRITICAL FOR BOUNDARY CUT FACES.

INSPECTION HOLD POINTS:

1. GROUND CONDITIONS & DIMENSIONS IN PILE HOLES - PRIOR TO INSERTING POLES.
2. MEASUREMENT OF TIMBER POLE AND RAIL SIZES AND CONFIRMATION OF TREATMENT.
3. DRAINCOIL PLACEMENT - PRIOR TO RAILING UP.
4. DRAINAGE AGGREGATE QUALITY AND RAILING - PRIOR TO BACKFILL WITH DRAINAGE AGGREGATE.
5. FINAL INSPECTION AND DRAINAGE CONNECTIONS.



RETAINING WALL CASE 1 (CH0.0m TO CH30.0m)

RETAINING WALL DESIGN CASE 1 (CH0.0m to CH30.0m) - SP1.2m	
MAXIMUM SURCHARGE SLOPE	0 °
MAXIMUM TOE SLOPE	0 °
FACTORED SURCHARGE LOADING	12 kPa
RETAINED SOIL FRICTION ANGLE	30 °
FOUNDATION SOIL UNDRAINED SHEAR STRENGTH	100 kPa
TIMBER GRADE	HIGH

Maximum Retained Height, H	Pile Spacing C/C	Minimum Embedment Depth, E	Pile Hole Diameter, D	Timber Pole SED Size	Lagging Options		
					Single	Stacked	Round
(m)	(m)	(m)	(mm)	(mm)	(mm)	(mm)	SED
0.50	1.2	0.9	400	150	50	1 x 50	150
1.00	1.2	1.1	400	175	50	1 x 50	150

RETAINING WALL DESIGN CASE 1 (CH0.0m to CH30.0m) - SP1.5m	
MAXIMUM SURCHARGE SLOPE	0 °
MAXIMUM TOE SLOPE	0 °
FACTORED SURCHARGE LOADING	12 kPa
RETAINED SOIL FRICTION ANGLE	30 °
FOUNDATION SOIL UNDRAINED SHEAR STRENGTH	100 kPa
TIMBER GRADE	HIGH

Maximum Retained Height, H	Pile Spacing C/C	Minimum Embedment Depth, E	Pile Hole Diameter, D	Timber Pole SED Size	Lagging Options		
					Single	Stacked	Round
(m)	(m)	(m)	(mm)	(mm)	(mm)	(mm)	SED
0.50	1.5	0.9	400	150	50	1 x 50	150
1.00	1.5	1.2	400	175	50	1 x 50	150

REV	DATE	DESCRIPTION	BY
A	21/04/2021	ISSUE FOR INTERNAL REVIEW	CZ
0	22/04/2021	ISSUE FOR BUILDING CONSENT	CZ

CMW Geosciences

CLIENT: WHF PROPERTIES LTD		DRAWN: CZ	PROJECT No: AKL2020-0082
PROJECT: BARTLETT BLOCK MILLWATER		CHECKED: SC	DRAWING: DG02(AG)
		REVISION: 0	SCALE: N.T.S.
TITLE: RETAINING WALL DESIGN - CASE 1		DATE: 22/04/2021	SHEET: A3

C:\USERS\CHAUDHARYZOHAIB\CMW GEOSCIENCES PTY LTD\CMW CONNECT - AKL2020-0082 BARTLETT BLOCK, MILLWATER\DRAWINGS\RETAINING WALL DESIGN DRAWINGS\REV - 0\AKL2020-0082 01 03 AG REV-0.DWG

NOTES

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RETAINING WALL DESIGN REPORT REFERENCE: AKL2020-0082AG REV 0.

SPECIFICATION

1. MATERIAL PROPERTIES

CONCRETE:	CHARACTERISTIC COMPRESSIVE STRENGTH F'C = 17.5 MPa UNLESS OTHERWISE NOTED.
TIMBER POLES:	H5 TREATED RADIATA PINE, HIGH DENSITY IN ACCORDANCE WITH NZS 3603 UNLESS OTHERWISE SPECIFIED.
TIMBER RAILINGS:	H4 TREATED RADIATA PINE
RAILING FIXINGS:	GALVANISED NAILS
DRAIN COIL:	110mm DIAMETER
DRAINAGE AGGREGATE:	APPROVED DRAINAGE-GRADED AGGREGATE OR SCORIA (USE OF COMPOSITE DRAINAGE PRODUCTS OR POLYSTYRENE NOT APPROVED)

2. FOR LOCATION AND EXTENT OF TIMBER POLE WALLS REFER TO PROJECT ENGINEERING DRAWINGS. SET OUT LOCATIONS TO BE PROVIDED BY OTHERS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
3. MINIMUM CONCRETE COVER TO TIMBER POLES IS 50mm WITH A MINIMUM COVER OF 100mm AT THE PILE BASE. THIS WILL REQUIRE EITHER A PACKER OR POURING OF A PUNCH PAD TO ACHIEVE DESIGN. POLE HOLE DIAMETER MAY ONLY BE VARIED BY DESIGNER IN WRITING.
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5. IF CUTTING OF POLES OR RAILS IS NECESSARY THE EXPOSED SURFACES SHALL BE FLOODED WITH A COPPER NAPTHENATE TYPE WOOD PRESERVATIVE.
6. THE MAXIMUM RETAINING HEIGHT, TOE SLOPE AND SURCHARGE SLOPE SHALL BE AS SPECIFIED ON THE DESIGN AND SHALL NOT BE EXCEEDED UNLESS APPROVED BY THE DESIGN ENGINEER IN WRITING.
7. THE EXTENT OF EXCAVATION REQUIRED SHALL BE MARKED OUT ON THE GROUND HAVING REGARD TO THE POSITIONS OF POLES, WORKING SPACE FOR CONSTRUCTION, BACKFILL AND DRAINAGE PROVISIONS.
8. ALL PILE HOLES TO BE AUGERED AND DRILLING SPOIL DISPOSED OF AWAY FROM THE RETAINING WALL.
9. A PERFORATED SUBSOIL DRAIN WITHOUT FILTER SOCK SHALL BE LAID AND SURROUNDED IN APPROVED DRAINAGE-GRADED AGGREGATE OR SCORIA WITH INVERT 100mm BELOW DESIGN TOE SUBGRADE LEVELS CONNECTED TO A FREE OUTLET AT A POINT OF SAFE DISCHARGE OR CONNECTED TO STORMWATER SYSTEM.
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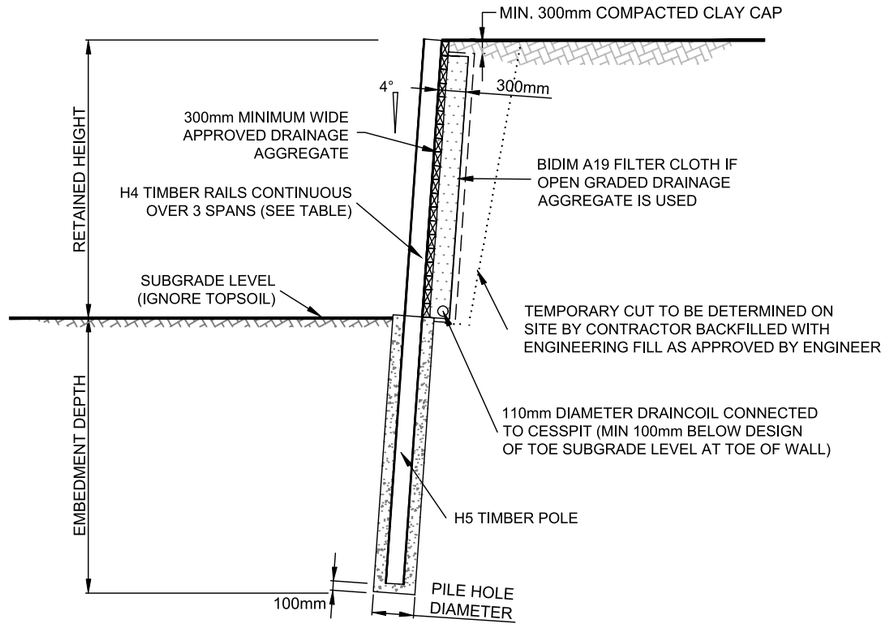
11. WHERE EXCAVATIONS ARE UNDERTAKEN MORE THAN A FEW DAYS IN ADVANCE OF WALL CONSTRUCTION, THE CUT FACE MUST BE COVERED WITH POLYTHENE TO PREVENT IT DRYING OUT AND CRACKING, ESPECIALLY WHERE EXPANSIVE CLAY SOILS ARE PRESENT. SIMILARLY DURING PERIODS OF WET WEATHER THE EXCAVATION FACE SHOULD BE PROTECTED WITH POLYTHENE AND SURFACE WATER DIRECTED AWAY FROM THE CREST AND TOE OF THE EXCAVATION.
12. CONTRACTOR IS RESPONSIBLE FOR ENSURING EXCAVATIONS ARE STAGED SO THAT EXCAVATED FACES ARE NOT LEFT UNSUPPORTED FOR ANY SIGNIFICANT LENGTH OF TIME. THIS IS ESPECIALLY CRITICAL FOR BOUNDARY CUT FACES.

INSPECTION HOLD POINTS:

1. GROUND CONDITIONS & DIMENSIONS IN PILE HOLES - PRIOR TO INSERTING POLES.
2. MEASUREMENT OF TIMBER POLE AND RAIL SIZES AND CONFIRMATION OF TREATMENT.
3. DRAINCOIL PLACEMENT - PRIOR TO RAILING UP.
4. DRAINAGE AGGREGATE QUALITY AND RAILING - PRIOR TO BACKFILL WITH DRAINAGE AGGREGATE.
5. FINAL INSPECTION AND DRAINAGE CONNECTIONS.



RETAINING WALL CASE 2 (CH30.0m TO CH71.06m)

RETAINING WALL DESIGN CASE 2 (CH30.0m to CH71.06m) - SP1.2m	
MAXIMUM SURCHARGE SLOPE	0 °
MAXIMUM TOE SLOPE	0 °
FACTORED SURCHARGE LOADING	12 kPa
RETAINED SOIL FRICTION ANGLE	30 °
FOUNDATION SOIL UNDRAINED SHEAR STRENGTH	100 kPa
TIMBER GRADE	HIGH

Maximum Retained Height, H	Pile Spacing C/C	Minimum Embedment Depth, E	Pile Hole Diameter, D	Timber Pole SED Size	Lagging Options		
					Single	Stacked	Round
(m)	(m)	(m)	(mm)	(mm)	(mm)	(mm)	SED
0.50	1.2	3.7	500	275	50	1 x 50	150
1.00	1.2	3.75	500	300	50	1 x 50	150

RETAINING WALL DESIGN CASE 2 (CH30.0m to CH71.06m) - SP1.5m	
MAXIMUM SURCHARGE SLOPE	0 °
MAXIMUM TOE SLOPE	0 °
FACTORED SURCHARGE LOADING	12 kPa
RETAINED SOIL FRICTION ANGLE	30 °
FOUNDATION SOIL UNDRAINED SHEAR STRENGTH	100 kPa
TIMBER GRADE	HIGH

Maximum Retained Height, H	Pile Spacing C/C	Minimum Embedment Depth, E	Pile Hole Diameter, D	Timber Pole SED Size	Lagging Options		
					Single	Stacked	Round
(m)	(m)	(m)	(mm)	(mm)	(mm)	(mm)	SED
0.50	1.5	3.7	500	300	50	1 x 50	150
1.00	1.5	3.75	500	325	50	1 x 50	150

REV	DATE	DESCRIPTION	BY
A	21/04/2021	ISSUE FOR INTERNAL REVIEW	CZ
0	22/04/2021	ISSUE FOR BUILDING CONSENT	CZ

CMW Geosciences

CLIENT: WHF PROPERTIES LTD	DRAWN: CZ	PROJECT No: AKL2020-0082	
PROJECT: BARTLETT BLOCK MILLWATER	CHECKED: SC	DRAWING: DG03(AG)	
	REVISION: 0	SCALE: N.T.S.	
TITLE: RETAINING WALL DESIGN - CASE 2	DATE: 22/04/2021	SHEET: A3	

C:\USERS\CHAUDHARYZOHAIB\CMW GEOSCIENCES PTY LTD\CMW CONNECT - AKL2020-0082 BARTLETT BLOCK, MILLWATER\DRAWINGS\RETAINING WALL DESIGN DRAWINGS\REV - 0\AKL2020-0082 01 03 AG REV-0.DWG

Producer statement construction (PS3)
General construction work

Auckland Council
Te Kaunihera o Tāmaki Makaurau

All sections of this form must be completed

TO BE COMPLETED BY THE PERSON WHO HAS UNDERTAKEN THE BUILDING WORK

Author name:	Shane Ruiterman	Building consent No:	BCO10328830
Author company:	Ruiterman Contracting limited	Author Registration No:	
Description of building work:	Timber Pole Retaining Wall. Max Height = 1m Length = 80m.		
Performance standard for maintenance and inspection, if applicable	■ N/A		
Legal description:	Lot 3 DP 168595		
Site address:	25 Bankside Road Silverdale 0932		

NZBC clauses: (select as applicable)

B1 ✓	B2	C1	C2	C3	C4	C5	C6	D1	D2	E1	E2	E3
F1	F2	F3	F4	F5	F6	F7	F8	G1	G2	G3	G4	G5
G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	H1		

I have sighted the above building consent and read the attached conditions of consent and confirm that I have undertaken the building work described above in accordance with the consented plans and specifications.

I understand that Council will rely upon this producer statement, for the purposes of establishing compliance with the above building consent.

Signature: [signature] Date: 26/07/21

Tradesperson's contact details:

Address:	648B Haruru Road, Kaukapakapa, Auckland	Postcode:	0837
Business:	Ruiterman contracting limited	Fax:	
Mobile:	021500540	Email	Shane@ruitermancontracting.com

COUNCIL USE ONLY

☐ Central ☐ Henderson ☐ Manukau ☐ Orewa ☐ Papakura ☐ Pukekohe ☐ Takapuna

☐ Accepted in support of inspection ☐ Accepted instead of inspection

Register checked: Council ☐ LBP ☐ N/A ☐

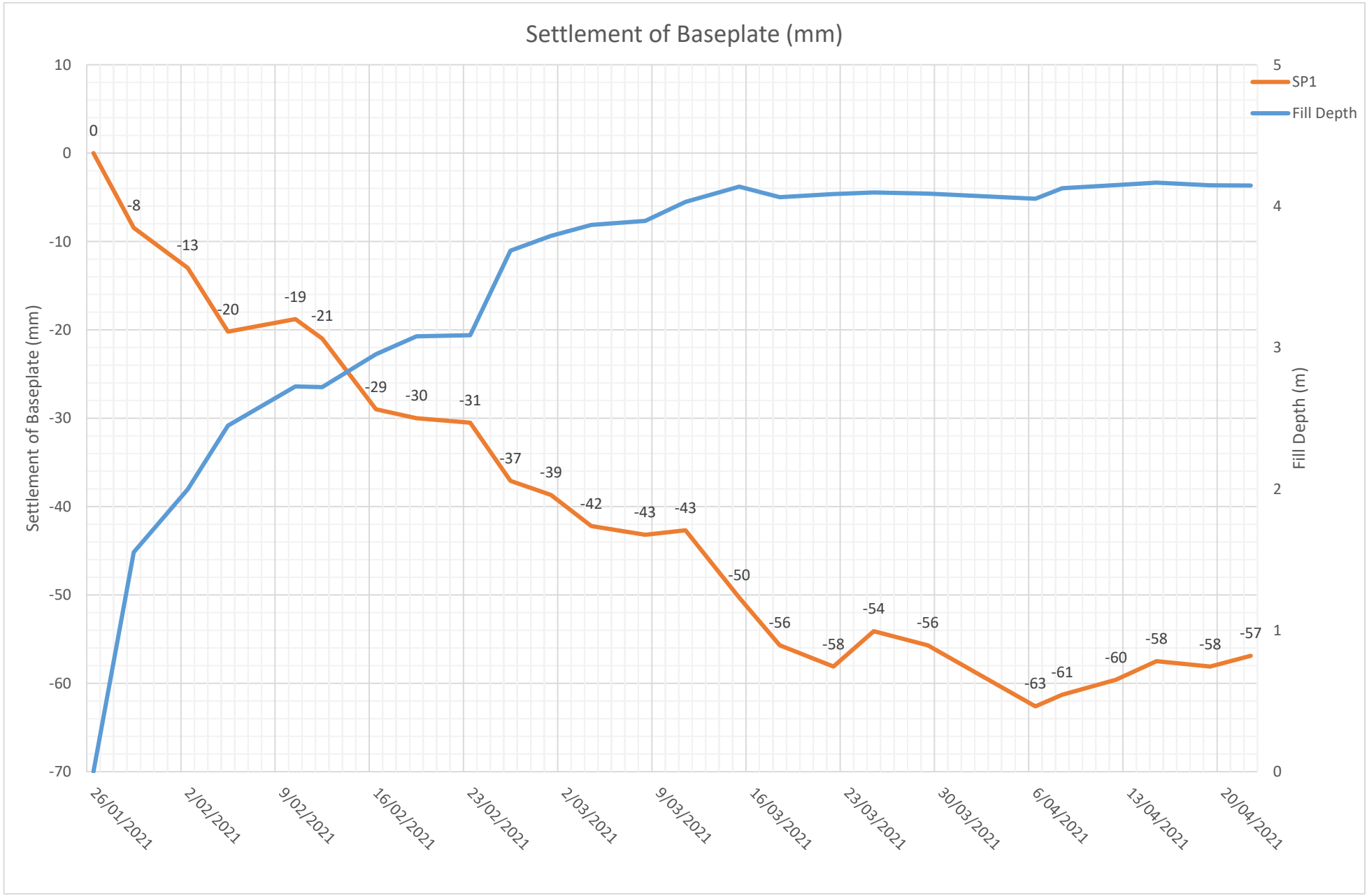
Name: Date:

Producer statement accepted as establishing compliance with the consented plans: YES ☐ NO ☐

Producer statements are accepted solely at Auckland Council's discretion; please refer to the Producer Statement Policy which can be found on Councils website for further details

http://www.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/consents/Consent%20documents/ac2301producerstatementpolicy.pdf

Appendix F: Settlement Monitoring Results


Settlement of Baseplate (mm)
Settlement of Baseplate (mm)
Fill Depth (m)
SP1
Fill Depth
10
0
-10
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-30
-40
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-60
-70
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6/04/2021
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