

2 April 2024

RESIDENTIAL SUBDIVISION OF

751 & 787 KAIPARA COAST HIGHWAY, KAUKAPAKAPA

GEOTECHNICAL COMPLETION REPORT

Riverview Properties Limited

AKL2021-0052AF Rev. 0

AKL2021-0052AF		
Date	Revision	Comments
15 March 2024	A	Initial draft for internal review
2 April 2024	0	Final issue to client



	Name	Signature	Position
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Reviewed by	Richard Knowles		Principal Geotechnical Engineer CMEngNZ, CPEng
Authorised by	Chris Ritchie		Principal Engineering Geologist CMEngNZ, PEngGeol



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1 INTRODUCTION

In accordance with our instructions, this Geotechnical Completion Report has been prepared for Riverview Properties Limited as part of the documentation to be submitted to Auckland Council following earthworks to form the 15-lot residential subdivision.

This report covers the construction period October 2023 to January 2024 and is intended to be used for certification purposes for new lots (listed below) created from Lot 1 DP 523159 and Lot 2 DP 523159 as follows:

- 15 new residential lots numbered 1 to 5 and 7 to 16;
- 2 new JOALs numbered Lot 17 and Lot 18.

This stage of the development is a subdivision of 751 and 787 Kaipara Coast Highway, Kaukapakapa with the newly formed lots being accessed from the recently created MacLennan Farm Lane and Awatiro Drive. As can be seen from the as-built plans, 2 of the lots have been affected by filling as part of the earthworks operations to a maximum depth of approximately 1.0 metre. At the time of writing this report an existing historic farm services shed is present on Lot 3.

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

- Auckland Council's Resource Consent number LUC60385483 and SUB60385484 and Engineering Approval letter dated 15 May 2023
- NZS4431:2022
- Auckland Council's Code of Practice for Land Development and Subdivision, Chapter 2 - Earthworks and Geotechnical, Version 2.0, May 2023
- Aspire Consulting Engineers consented drawing set referenced 1664-ENG-PG101, PG102, EW201 to EW206, RD301 to RD304, SW401, SW402, WS501 and WS502, dated December 2022
- The following CMW Geosciences reports:

Project Documentation	
Report Type	Reference
Geotechnical Investigation Report	AKL2021-0052AC Rev. 0
Geotechnical Works Specification (earthworks)	AKL2021-0052AD Rev. 0

For the construction of this stage of the development, the following roles were fulfilled as defined in NZS 4431:2022:

- Geotechnical Designer: CMW Geotechnical NZ Limited
- Certifier: CMW Geotechnical NZ Limited
- Recognised Laboratory: CMW Geotechnical NZ Limited
- Contractor: Opie Contractors Limited

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

2 DESCRIPTION OF WORKS

Opie Contractors Limited commenced works on the JOALs, which were subsequently stabilised in October 2023. Around this time, topsoil stripping was undertaken across lots 10 and 11 in preparation for placement of fills.

Bulk filling operations commenced in late December 2023, followed by backfilling of temporary sediment retention ponds through to late January. Fill material was sourced from on-site drainage works and water tank excavations.

The main items of plant used by the contractors included:

- 1x 10t excavator
- 1x 20t excavator
- 1x single drum pad foot compactor

3 GEOTECHNICAL QUALITY CONTROL

3.1 Site Observations

During the works site visits were undertaken periodically to assess compliance with NZS 4431 and project specific design recommendations and specifications.

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

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

4 QUALITY ASSURANCE TESTING

Quality assurance testing of materials was completed as required by the Geotechnical Works Specification presented and shown below. Test results are presented in **Appendix D**.

Cohesive Materials (Soil Fill and Soil/ Rock Blended Fill) Compaction Test Criteria for Engineered Filling						
Fill Type	Air Voids ⁽¹⁾		Vane Shear Strength ⁽²⁾		Moisture Content ⁽³⁾	Dry Density ⁽³⁾
	Average	Maximum Single Value	Average	Minimum Single Value	Maximum	Minimum
General Fill	10%	12%	140 kPa	110 kPa	40%	1.25 t/m ³
⁽¹⁾ Air Voids Percentage (as defined in NZS 4402:1986) ⁽²⁾ Undrained Shear Strength (Measured by hand shear vane – calibrated using NZGS 2001 method) ⁽³⁾ Moisture content and minimum dry density non-compliance may be accepted on site by the Geotechnical Engineer on a case-by-case basis depending on the nature of the material and the other criteria results.						

5 EVALUATION OF COMPLETED EARTHWORKS

5.1 Natural Hazards

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

- **Specific Design Zones (slope)** – intended to protect building development from creep effects on or adjacent to roadside and inter-lot batters and to protect these slopes from inappropriate loading or undermining.
- **No Build / Bush Covenant Zones** – intended to protect vegetation on planted noise bunds and to ensure that stability conditions are not able to be compromised here.

Lot 3 contains an existing shed structure and therefore proposed development within the vicinity of the structures footprint requires specific engineering investigation and design as the subsoils have not yet been assessed.

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

5.2 Liquefaction

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

- Review of Auckland Council GIS maps confirms the damage category to be: Low Vulnerability
- In accordance with MBIE/NZGS guidance¹ the liquefaction susceptibility of the soils at this site was assessed with respect to geological age and compositional (soil fabric and density) criteria during initial investigations. Our assessment was described in our Geotechnical Investigation Report referenced in Section 1 above and confirmed a low liquefaction risk.

5.3 Land Stability and Erosion

Lots 1, 2 and 3 include low batter slopes to form level building platforms. The batters include portions of the residential lots with maximum gradients of 1(v) in 2.5(h) as depicted on the as-built drawings.

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

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

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

¹ Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (November 2021)

5.4 No Build / Bush Covenant Zones

Lots 4, 5 and 10 to 16 inclusive contain a vegetated topsoil noise bund, predominantly along the Kaipara Coast Highway boundary. Areas on these lots labelled as “Planting Areas” on the appended as-built plans 1664-AB-RD301 are protected by Resource Consent conditions for the development and building development within these areas is prohibited.

5.5 Fill Induced Settlement

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

5.6 Service Line Trenches

As part of the civil works, stormwater services were trenched throughout the development as shown on the appended Aspire Stormwater 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 C** 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.

5.6.1 Groundwater

Based on our initial investigations, groundwater levels should typically be deeper than 3.0m, subject to seasonal variations, and therefore below the depth of influence of anticipated earthworks and foundation works for NZS 3604-type dwellings.

5.7 Road Subgrades

Penetration resistance testing was carried out on the JOAL subgrades during construction and the results of this testing were forwarded to Aspire Consulting Engineers for pavement remedial design.

5.8 Effluent Disposal

The subdivision did not include construction of reticulated wastewater systems and therefore all residential lots are to use on-site wastewater disposal methods.

Our GCR boreholes included an assessment of soil categories as defined in Appendix B of Auckland Council GD06: On-site Wastewater Management in the Auckland Region. The soils encountered in the upper 1m of the profile have been assessed as follows:

- Topsoil: Category 3
- Inorganic soils: Category 6

Table 11 of GD06 recommends pressure compensating drip irrigation system for Category 6 soils and low pressure shallow irrigation systems for Category 3 soils.

Apart from specific Design Zone (slope) areas, the entire area of each lot, including the covenanted topsoil noise bund is considered suitably stable for wastewater disposal, albeit that due to the planting covenants, the topsoil noise bund cannot be disturbed so is only suitable for surface mounted dripper lines.

5.9 Design of Shallow Foundations

5.9.1 Bearing Capacity

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

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

5.9.2 Foundation Settlements

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

5.9.3 Soil Expansiveness Classification

Seasonal soil moisture variations within most clay-rich soils typically result in the soil swelling during winter months and then shrinking during summer months. These seasonal movements can cause issues such as cracking of concrete floors, brittle cladding and masonry walls or distortion of building frames causing doors and windows to jam from differential settlement. The effects are further compounded by local influences that worsen differential movements. These may include growth of high demand trees and shrubs that cause localised soil drying or either leaking pipes or tree root removal, leading to localised wetting.

The potential effects need to be managed in a combination of appropriate:

- classification of the level of risk
- design of foundations
- management of soil moisture conditions by contractors during construction
- management of landscaping and plantings by homeowners throughout a building's lifetime

Testing on 5 samples was completed in accordance with the requirements of NZS 3604 and ACCoPs. All testing was completed by RoadTest Limited, a testing laboratory accredited by IANZ for the tests undertaken. Results are provided in **Appendix E** and plots of the tests on the Plasticity Chart are also included.

The testing confirms that:

- All of the soils tested were expansive in terms of the NZS 3604 definition and were therefore outside the definition of "good ground".
- The samples tested demonstrated a relatively limited range of expansivity characteristics.

Results of our assessment of the maximum characteristic surface movement (γ_s) for each lot are contained in our Statement of Opinion on Suitability of Land in **Appendix A**.

5.9.4 Site (Seismic) Class

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

5.10 Topsoil Depths

Topsoil depths have been checked by the drilling of a borehole in the approximate centre of the building platform on each lot. The results are considered indicative for each lot, but may be subject to variations. Topsoil depths are between 150mm and 300mm on this stage of the development. Lot 3 contained predominantly gravel hardstand of approximately 200mm thickness.

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

5.11 Site Preparation During Construction

Foundation contractors need to be aware of the extreme damage potentially caused by expansive soils and the imperativeness of maintaining optimum moisture contents in all footing excavations and across building platform subgrades between the time of excavation and the pouring of concrete. Pouring foundations on dry, desiccated ground in summer months can lead to heaving and cracking, requiring extensive repairs or even complete house re-builds. Similarly, where perimeter foundations have been treated but floor slabs have been poured on dry ground, infiltration of moisture via pipe bedding can lead to localised heave, uplift and significant slab damage.

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

5.12 Site Maintenance and Landscaping

Due to soil expansivity, landowners must be mindful of the potential impacts of 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), these actions can lead to significant settlement or heave damage.

For a comprehensive understanding of the potential effects of expansive soils, maintenance recommendations and vegetation management information, we strongly recommend that land owners obtain a copy of CSIRO publication BTF 18 (Foundation Maintenance and Footing Performance – A Homeowners Guide) that is available online.

6 CLOSURE

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

This report has been prepared for use by Riverview Properties Limited in relation to the Residential Subdivision of 751 & 787 Kaipara Coast Highway, Kaukapakapa in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

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

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

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

USING YOUR CMW GEOTECHNICAL REPORT

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

Preparation of your report

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

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

Your geotechnical report is based on your project's requirements

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

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

Interpretation of geotechnical data

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

Subsurface conditions can change

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

Interpretation and use by other design professionals

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

Your report's recommendations require confirmation during construction

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

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

Environmental Matters Are Not Covered

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

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

APPENDIX A: STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

Development: 751 & 787 Kaipara Coast Highway Residential Subdivision
Developer: Riverview Properties Limited
Location: Kaukapakapa

I, Richard Knowles, of CMW Geotechnical NZ Limited, Auckland, hereby confirm that:

1. As a Chartered Professional Engineer experienced in the field of geotechnical engineering, I am a Geo-professional as defined in clause 1.2.2 of NZS 4404:2010 and was retained by the Developer as the geo-professional on the above development.
2. The extent of preliminary investigations carried out to date are described in the CMW Geosciences Geotechnical Investigation Report referenced AKL2021-0052AC Rev. 0, dated 18 August 2021. The conclusions and recommendations of that document have been re-evaluated in the preparation of this report. The extent of my inspections during construction, and the results of all tests and/or evaluations carried out are as described in my Geotechnical Completion Report dated 2 April 2024.
3. My certification of the earth fills placed on this site is contained in **Appendix B**.
4. In my professional opinion, not to be construed as a guarantee, I consider that:

- a. The completed earthworks take into account land slope and foundation stability considerations on the building platform areas, but as shown on the appended building restriction zones plans, areas on Lots 1, 2 and 3 have gradients steeper than 1(v) in 4 (h) (and generally up to 1(v) in 2.5(h)). Accordingly, restrictions incorporating Specific Design Zones (Slope) have been applied as depicted on the as-built plans.

No building construction and no earthworks (i.e. cut or fills of any depth) should take place within the designated **Specific Design Zone (Slope) areas** unless endorsed by a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report. The endorsement will need to consider the implications of the proposals on both global stability conditions and soil creep on the buildings, the interaction with service pipes and associated trench backfills, control of surface water, retaining walls and if necessary, comment on what aspects require engineering inspections and certification.

This limitation also applies to long term landscaping works, including any proposed minor cuts either on or near batter toes to be retained by new landscaping walls that might not normally require engineering, and to landscaping fills on or immediately above the batter slopes.

- b. **No Build / Bush Covenant Zone** areas defined on Lots 4, 5, and 10 to 16 inclusive and referenced as "Planting Areas" on the as-built plans are designated no-build zones within the topsoil bund area.

No building construction and no earthworks may take place in these areas.

- c. **Specific Design Zone (existing structure)** is applied to areas on Lot 3 that contain existing structures. Any proposed building development within these zones is subject to specific investigation and design by a chartered professional engineer familiar with the contents of this report.
- d. A geotechnical ultimate bearing capacity of 300kPa may be assumed for shallow foundation design on the building platforms of Lots 1 to 5 and 7 to 16 inclusive.

- e. The site (seismic) subsoil class for each lot has been assessed in accordance with NZS1170.5:2004 Clause 3.1.3 from borelogs that included measurements of geotechnical properties. Our assessment is that all lots are Class C - shallow soil.
- f.

Assessment of Characteristic Surface Movements and Design Classes for NZS 3604 Compliant Buildings		
Lots	Assessed AS2870 Site Class / 300 Year Design Characteristic Surface Movement (Ys)	Anticipated Equivalent NZBC B1/AS1 Expansivity Class for Design / 500 Year Design Characteristic Surface Movement(Ys)
7, 15, 16	M (moderately reactive) / 40mm	M / 44mm
1 to 5 & 8 to 14	H1 (highly reactive) / 60mm	H / 78mm

B1/AS1 provides an Acceptable Solution through NZS 3604 for foundation design applying to a limited range of compliant building sizes, shapes and materials and only for concrete floor design with strip footings. In all other cases, NZS 3604 directs the use of AS2870 or a specific design.

If AS2870 is used for the design solution, it must be noted that the characteristic surface movements in that code apply to a (less conservative) 300 year return period drought while B1/AS1 provides for a 500 year return period drought.

Prior to the introduction of the B1/AS1 design information in November 2019, minimum foundation depths recommended as appropriate by geotechnical consultants in Auckland for shallow footing design under AS2870 were typically of the order of 600mm for Class M and 750mm for Class H1.

For building types where neither B1/AS1 nor AS2870 design solutions are required to be applied, such as for IL1 buildings, the structural designer should still consider the implications of the potential characteristic surface movement.

- g. No building development should take place within the 45-degree zone of influence of stormwater or manhole inverts unless endorsed by specific design and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of pipes and trench backfills. A copy of drawing SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land development and Subdivision 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.
- h. On the basis of the earth fill certification and subject to the geotechnical limitations, restrictions and recommendations contained in clauses 4(a), 4(b), 4(c), 4(d), 4(e), 4(f) and 4(g) above:
- The filled and natural ground is generally suitable for buildings constructed in accordance with NZS 3604 and the requirements of either NZBC Clause B1/AS1 where appropriate, or AS2870 for the expansive soil class associated with the characteristic surface movement. Alternatively, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer.
5. Accessway 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



Richard Knowles

Principal Geotechnical Engineer CMEngNZ, CPEng

Table 1: GCR Summary Table

Condition	Specific Design Zone (slope)	Bush Covenant / No Build Zone	Specific Design Zone (existing structure)	Geotechnical Ultimate Bearing Capacity (kPa)	NZS 1170.5 Site (seismic) Class	AS2870 Expansive Class	Service Lines Restrictions	Indicative Topsoil Depth (mm)
GCR SOPO Clause	4(a)	4(b)	4(c)	4(d)	4(e)	4(f)	4(g)	
Lot number								
1	✓			300	C	H1		200
2	✓			300	C	H1		200
3	✓		✓	300	C	H1		200 (gravel)
4		✓		300	C	H1		300
5		✓		300	C	H1		300
7				300	C	M		200
8				300	C	H1		200
9				300	C	H1		250
10		✓		300	C	H1		200
11		✓		300	C	H1	✓	200
12		✓		300	C	H1	✓	200
13		✓		300	C	H1	✓	200
14		✓		300	C	H1	✓	250
15		✓		300	C	M	✓	200
16		✓		300	C	M		250

APPENDIX B: STATEMENT OF SUITABILITY OF ENGINEERED FILL FOR LIGHTWEIGHT STRUCTURES

STATEMENT OF SUITABILITY OF ENGINEERED FILLS FOR LIGHTWEIGHT STRUCTURES

To: Auckland Council
Development: 751 & 787 Kaipara Coast Highway Residential Subdivision
Land Title(s): Lot 1 DP 523159 and Lot 2 DP 523159
Location: 751 and 787 Kaipara Coast Highway, Kaukapakapa
Resource Consent Nos: LUC60385483
Developer: Riverview Properties Limited
Geotechnical Designer: Richard Knowles of CMW Geotechnical NZ Limited
Certifier: Richard Knowles of CMW Geotechnical NZ Limited

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

1. I, Richard Knowles, confirm that I am qualified as a certifier as defined in NZS4431:2022.
2. During this work, I was retained as certifier and I or my certifier's representative undertook inspections and testing as documented in the Geotechnical Completion Report.
3. I am satisfied that the engineered fill shown in the attached as-built survey was placed, compacted and tested in accordance with the attached specification and that all variations and non-compliances have been documented in the Geotechnical Completion report.
4. Based on the information available, I certify that, to the best of my knowledge, the intent of the geotechnical designer (as presented in the design, drawings and Geotechnical Works Specification) has been achieved.
5. This certification does not remove the necessity for normal inspection and design of foundations as would be made in natural ground.
- 6.

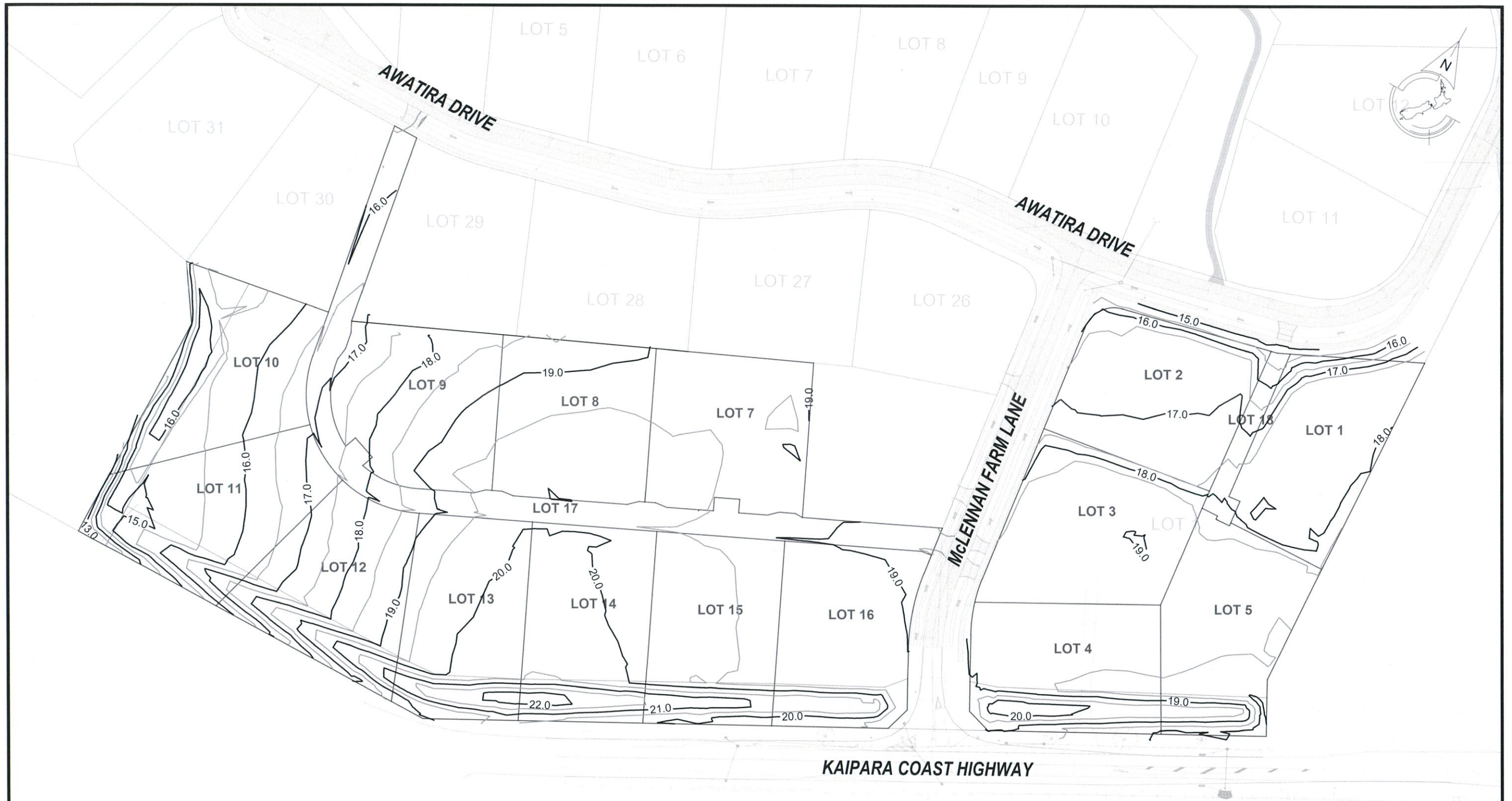
For and on behalf of CMW Geosciences



Richard Knowles
Principal Geotechnical Engineer CMEngNZ, CPEng



APPENDIX C: AS-BUILT DRAWINGS

Title	Reference No.	Date	Revision
Aspire As-built Contour Plan	1664-AB-EW201	March 2024	-
Aspire As-built Earthworks Contour Plan	1664-AB-EW202	March 2024	-
Aspire As-built Roding Plan	1664-AB-RD301	March 2024	-
Aspire As-built Roding Plan	1664-AB-RD302	March 2024	-
Aspire As-built Roding Plan	1664-AB-RD303	March 2024	-
Aspire As-built Typical JOAL Section	1664-AB-RD304	March 2024	-
Aspire As-built Stormwater Plan	1664-AB-SW401	March 2024	-
Aspire As-built Stormwater Plan	1664-AB-SW402	March 2024	-
Aspire As-built Stormwater Plan	1664-AB-SW403	March 2024	-
Aspire As-built Fire Fighting Water Supply Plan	1664-AB-WS501	March 2024	-
Aspire As-built Fire Fighting Water Supply Plan	1664-AB-WS502	March 2024	-
Specific Design Zone Plan	1664-AB-EW201 (SDZ)	March 2024	-
Stormwater Pipe and Manhole Construction Clearance Requirements	SW22 ACSD	30/09/2013	-



NOTES

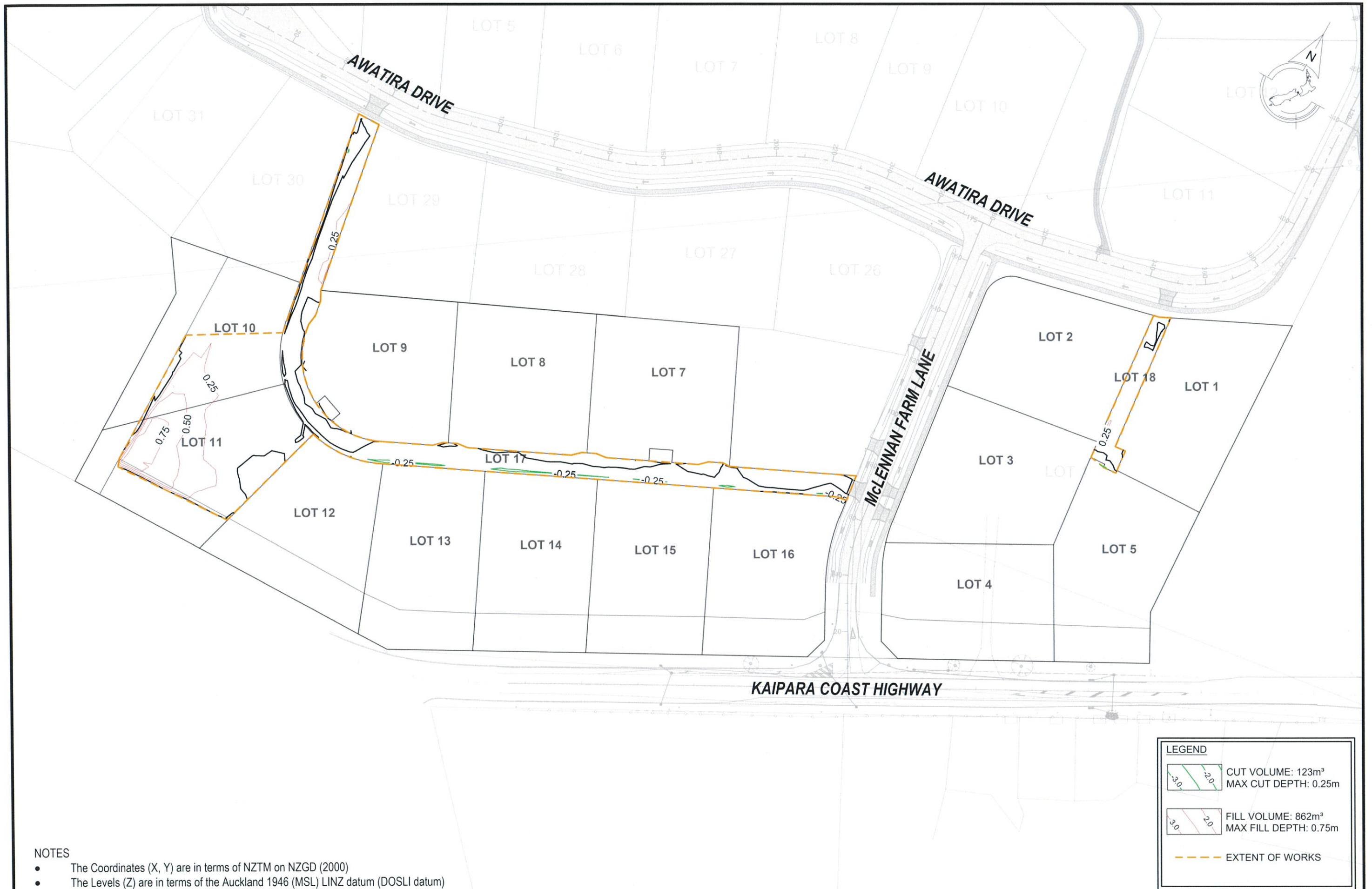
- The Coordinates (X, Y) are in terms of NZTM on NZGD (2000)
- The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum)

LEGEND	
	AB CONTOUR MAJOR (INTERVAL 1.0m)
	AB CONTOUR MINOR (INTERVAL 0.5m)

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1250 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER
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					DESIGN	PF			
					DRAWN	OC			
					DRAWING CHECK	TVZ			
					DESIGN CHECK	PF			
					APPROVED	MB			
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	DATE
								ASBUILT CONTOUR PLAN EPA REF#: ENG60414608	MAR 2024
									REVISION
									-



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



- NOTES
- The Coordinates (X, Y) are in terms of NZTM on NZGD (2000)
 - The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum)

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1250 AT A3
-	ISSUED FOR ASBUILTS	TVZ	MB	03.2024		
					DESIGN	PF 03.2024
					DRAWN	OC 03.2024
					DRAWING CHECK	TVZ 03.2024
					DESIGN CHECK	PF 03.2024
					APPROVED	MB 03.2024

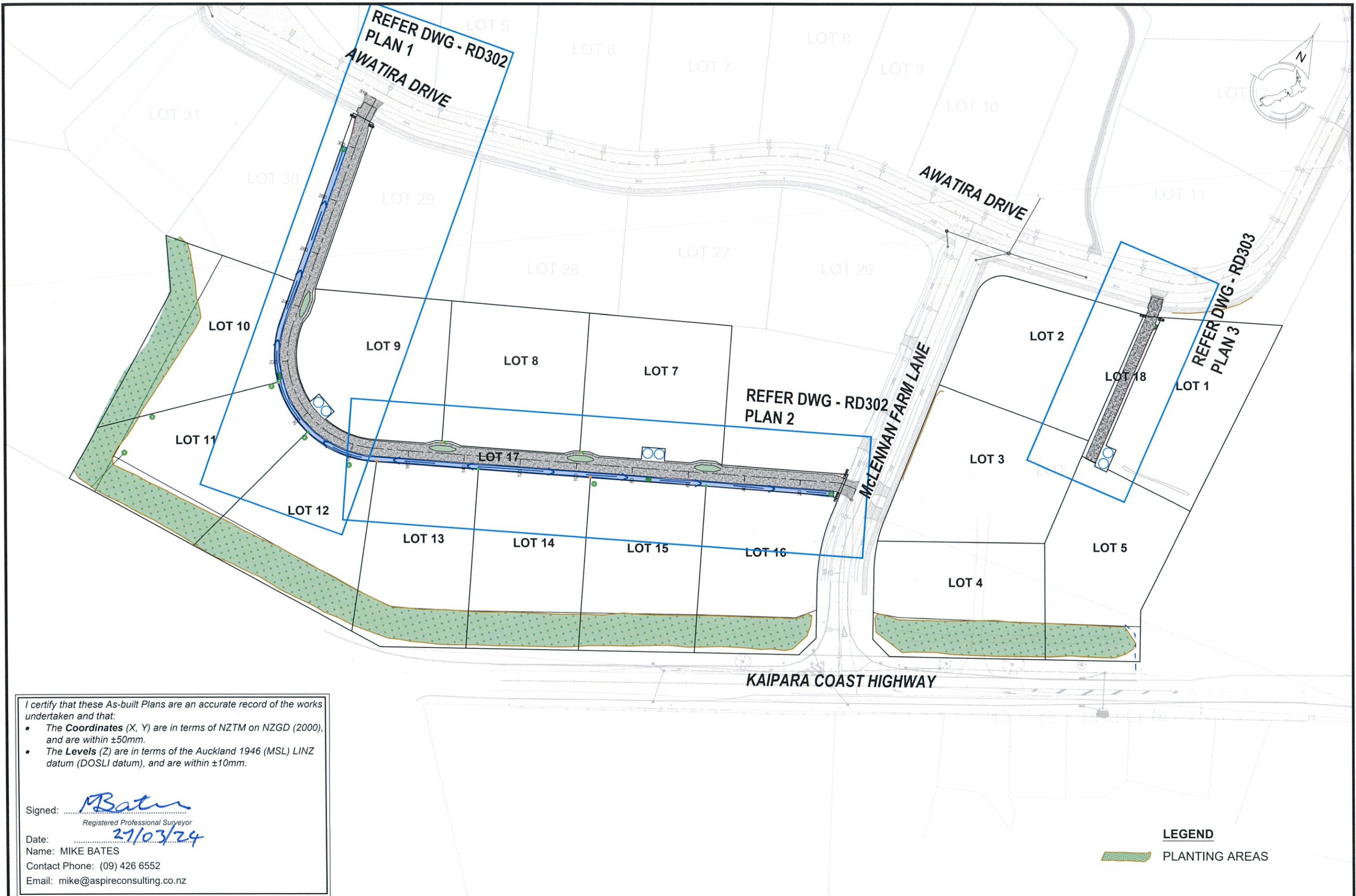
CLIENT
RIVERVIEW PROPERTIES LTD
Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

SITE ADDRESS
MacLENNAN FARM LANE KAUKAPAKAPA
DRAWING TITLE
ASBUILT EARTHWORKS CONTOUR PLAN EPA REF#: ENG60414608

DRAWING NUMBER
1664 - AB - EW202
DATE
MAR 2024
REVISION
-

ASPIRE
CONSULTING ENGINEERS

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



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

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000), and are within ±50mm.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within ±10mm.

Signed: MBates
Registered Professional Surveyor
Date: 27/03/24
Name: MIKE BATES
Contact Phone: (09) 426 6552
Email: mike@aspireconsulting.co.nz

LEGEND
 PLANTING AREAS

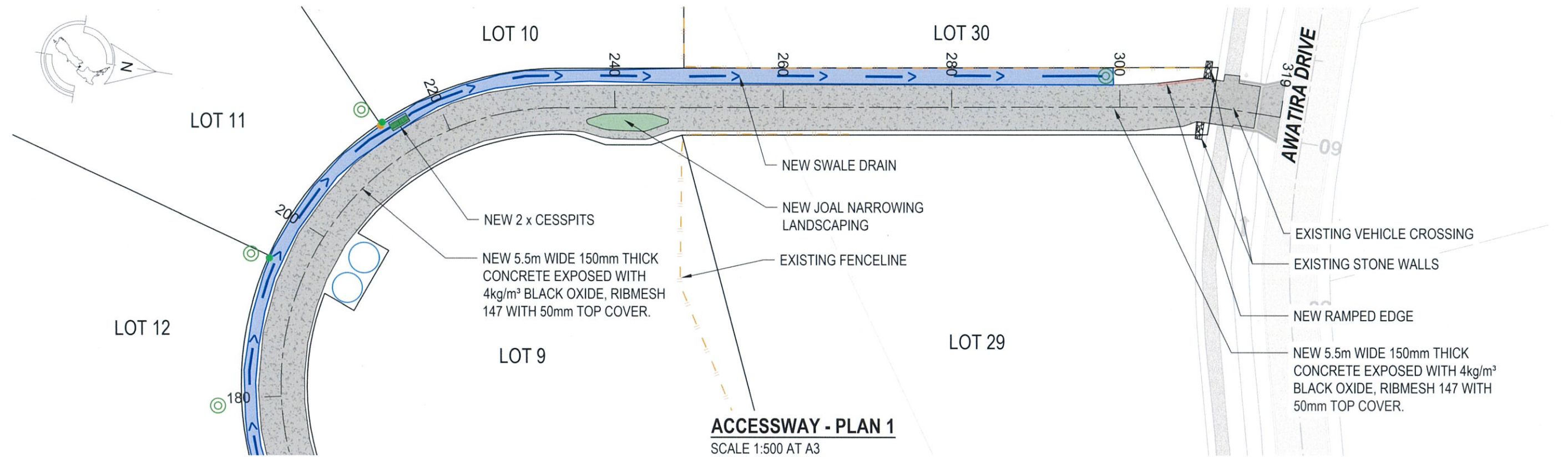
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					DRAWING CHECK	TVZ 03.2024
					DESIGN CHECK	PF 03.2024
					APPROVED	MB 03.2024

CLIENT
RIVERVIEW PROPERTIES LTD
Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.

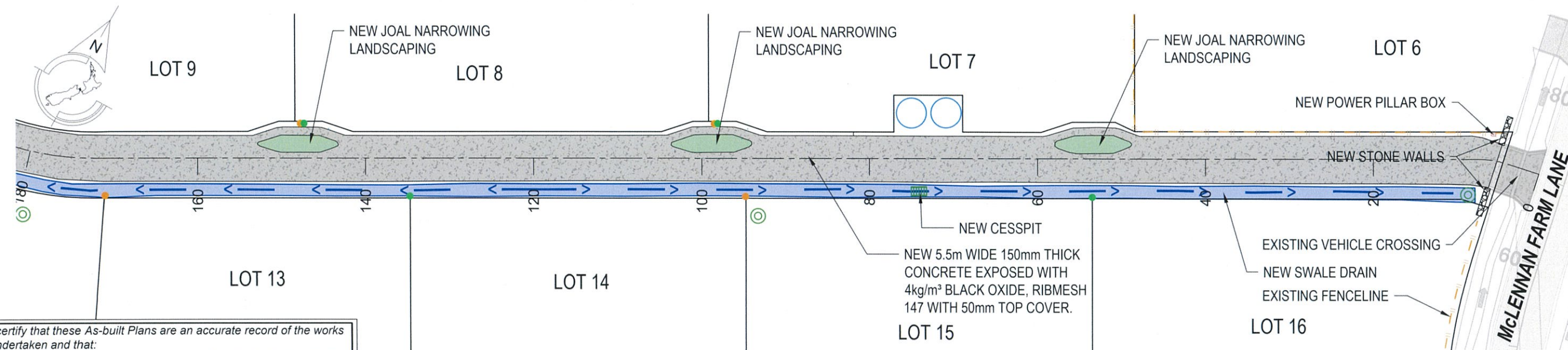
SITE ADDRESS
MacLENNAN FARM LANE KAUKAPAKAPA
DRAWING TITLE
ASBUILT ROADING PLAN EPA REF#: ENG60414608

DRAWING NUMBER
1664 - AB - RD301
DATE
MAR 2024
REVISION
-

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



ACCESSWAY - PLAN 1
SCALE 1:500 AT A3



ACCESSWAY - PLAN 2
SCALE 1:500 AT A3

- LEGEND**
- NEW POWER TUDD
 - NEW TELECOM PIT
 - NEW PUBLIC STORMWATER MANHOLE
 - NEW PUBLIC STORMWATER CESSPIT
 - NEW PRIVATE FIREFIGHTING WATER TANKS

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

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

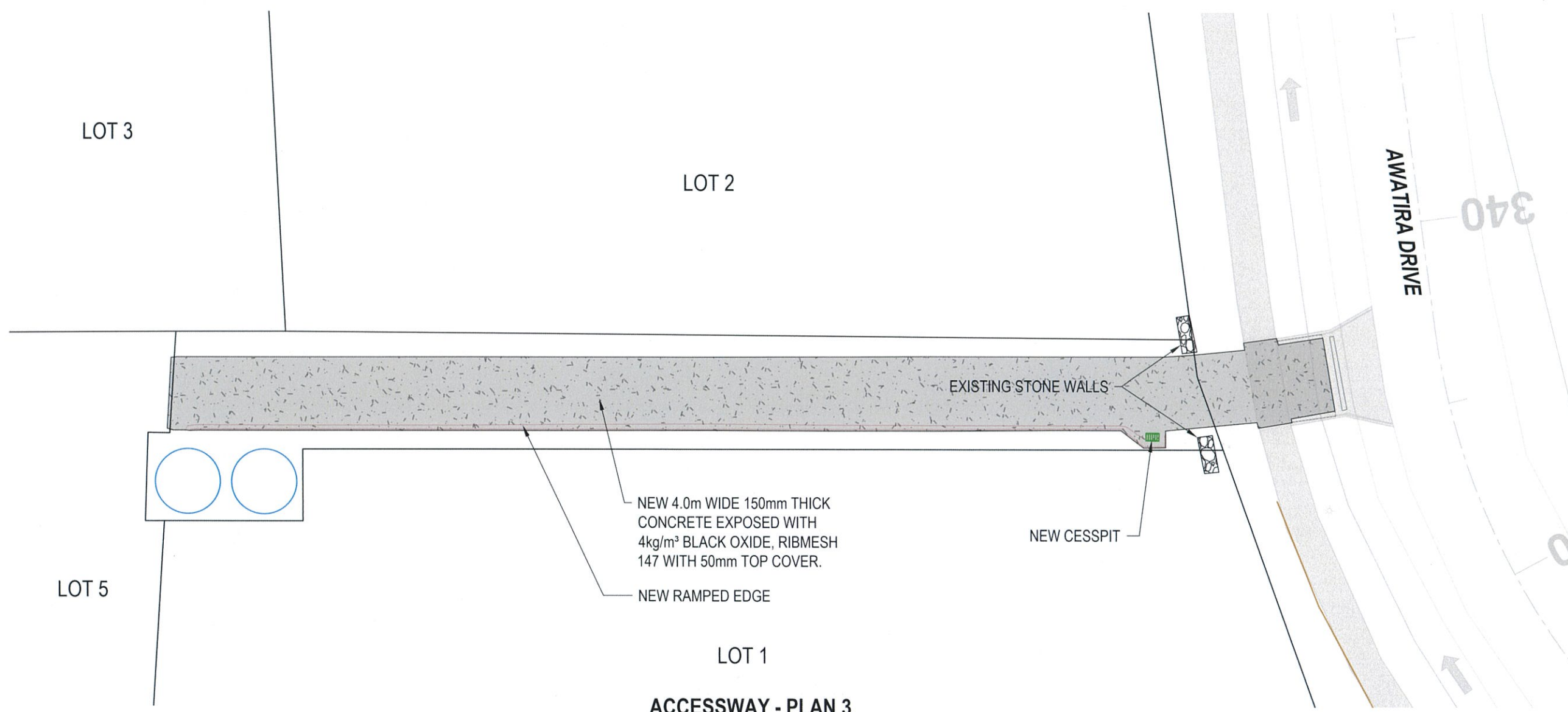
Signed: 
Registered Professional Surveyor
Date: 27/03/24
Name: MIKE BATES
Contact Phone: (09) 426 6552
Email: mike@aspireconsulting.co.nz

REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE	AS SHOWN
-	ISSUED FOR ASBUILTS	TVZ	MB	03.2024		
					DESIGN	PF 03.2024
					DRAWN	OC 03.2024
					DRAWING CHECK	TVZ 03.2024
					DESIGN CHECK	PF 03.2024
					APPROVED	MB 03.2024

CLIENT	SITE ADDRESS
RIVERVIEW PROPERTIES LTD	MacLENNAN FARM LANE KAUKAPAKAPA
Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE ASBUILT ROADING PLAN EPA REF#: ENG60414608

DRAWING NUMBER	DATE	REVISION
1664 - AB - RD302	MAR 2024	-


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ACCESSWAY - PLAN 3
SCALE 1:250 AT A3

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

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed: 
Registered Professional Surveyor

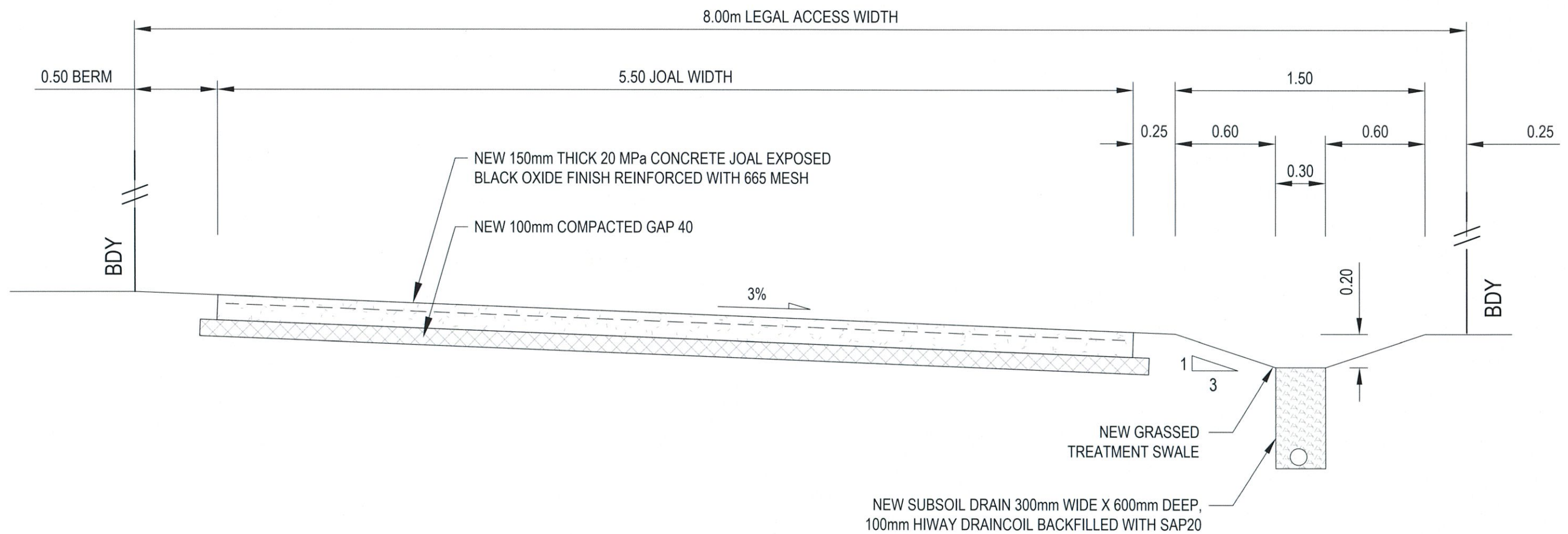
Date: 22/03/24
Name: MIKE BATES
Contact Phone: (09) 426 6552
Email: mike@aspireconsulting.co.nz

- LEGEND**
-  NEW PUBLIC STORMWATER CESSPIT
 -  NEW PRIVATE FIREFIGHTING WATER TANKS

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	AS SHOWN	CLIENT	SITE ADDRESS	DRAWING NUMBER
-	ISSUED FOR ASBUILTS	TVZ	MB	03.2024			RIVERVIEW PROPERTIES LTD	MacLENNAN FARM LANE KAUKAPAKAPA	1664 - AB - RD303
					DESIGN	PF			
					DRAWN	OC			
					DRAWING CHECK	TVZ			
					DESIGN CHECK	PF			
					APPROVED	MB			
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	REVISION
								ASBUILT ROADING PLAN EPA REF#: ENG60414608	MAR 2024



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

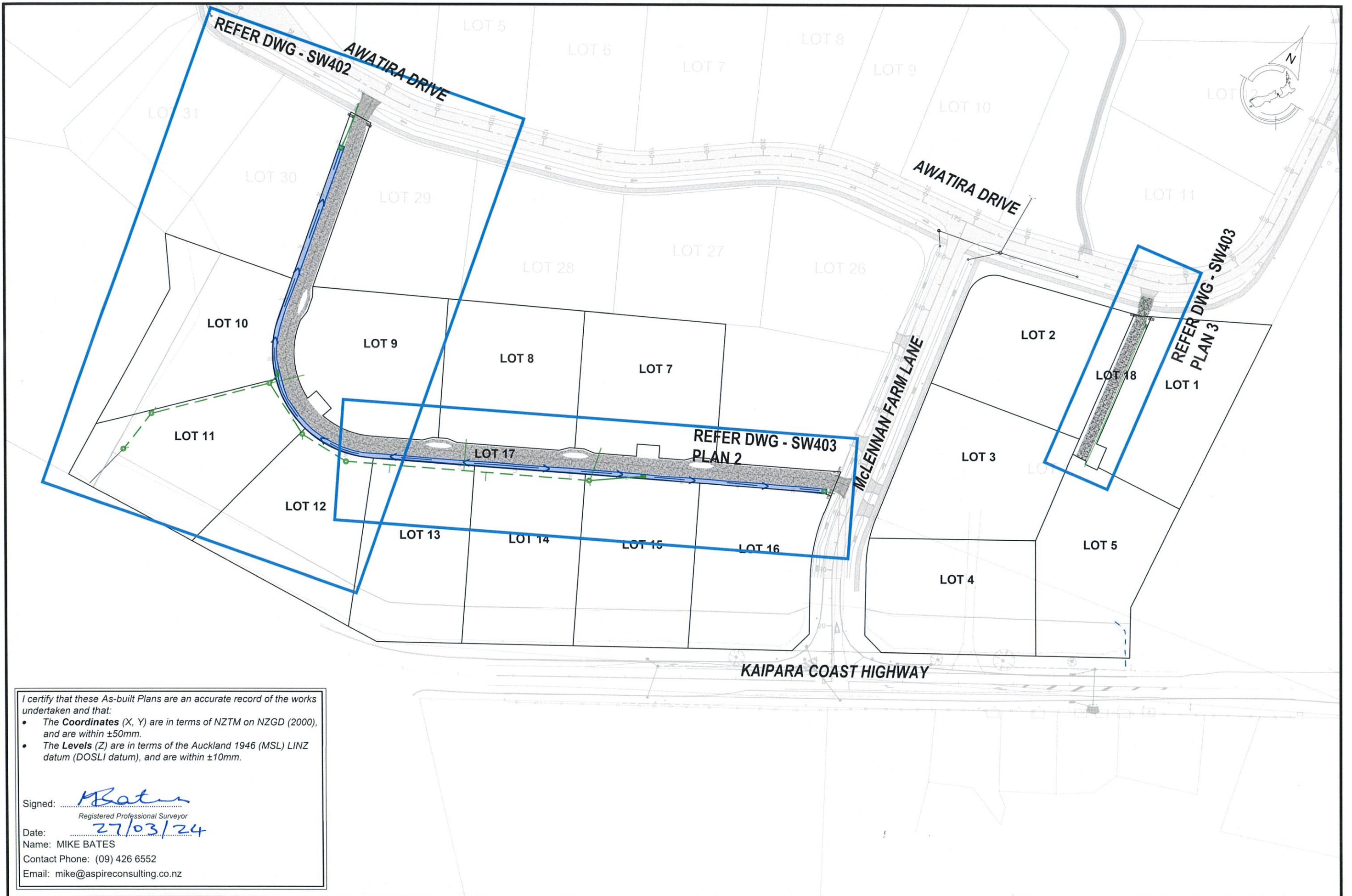


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					DRAWN	OC 03.2024
					DRAWING CHECK	TVZ 03.2024
					DESIGN CHECK	PF 03.2024
					APPROVED	MB 03.2024

CLIENT	SITE ADDRESS
RIVERVIEW PROPERTIES LTD	MacLENNAN FARM LANE KAUKAPAKAPA
Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	

DRAWING NUMBER	DRAWING TITLE
1664 - AB - RD304	ASBUILT TYPICAL JOAL SECTION EPA REF#: ENG60414608
DATE	REVISION
MAR 2024	-

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



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

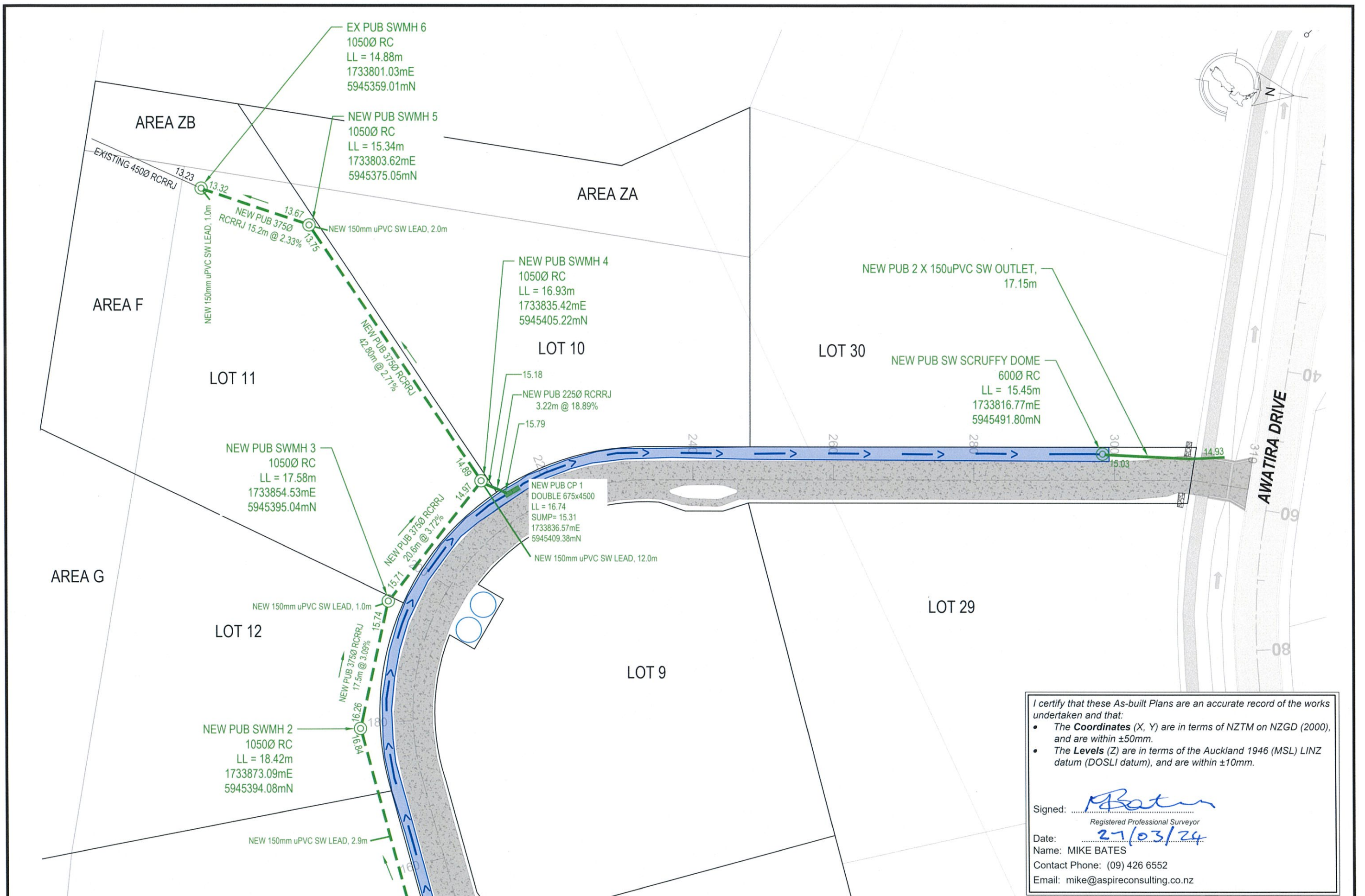
- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed: 
Registered Professional Surveyor
Date: 27/03/24
Name: MIKE BATES
Contact Phone: (09) 426 6552
Email: mike@aspireconsulting.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1250 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER
-	ISSUED FOR ASBUILTS	TVZ	MB	03.2024			RIVERVIEW PROPERTIES LTD	MacLENNAN FARM LANE KAUKAPAKAPA	1664 - AB - SW401
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					DRAWN	OC	03.2024		
					DRAWING CHECK	TVZ	03.2024		
					DESIGN CHECK	PF	03.2024		
					APPROVED	MB	03.2024		
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	REVISION
								ASBUILT STORMWATER PLAN EPA REF#: ENG60414608	MAR 2024
									-



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



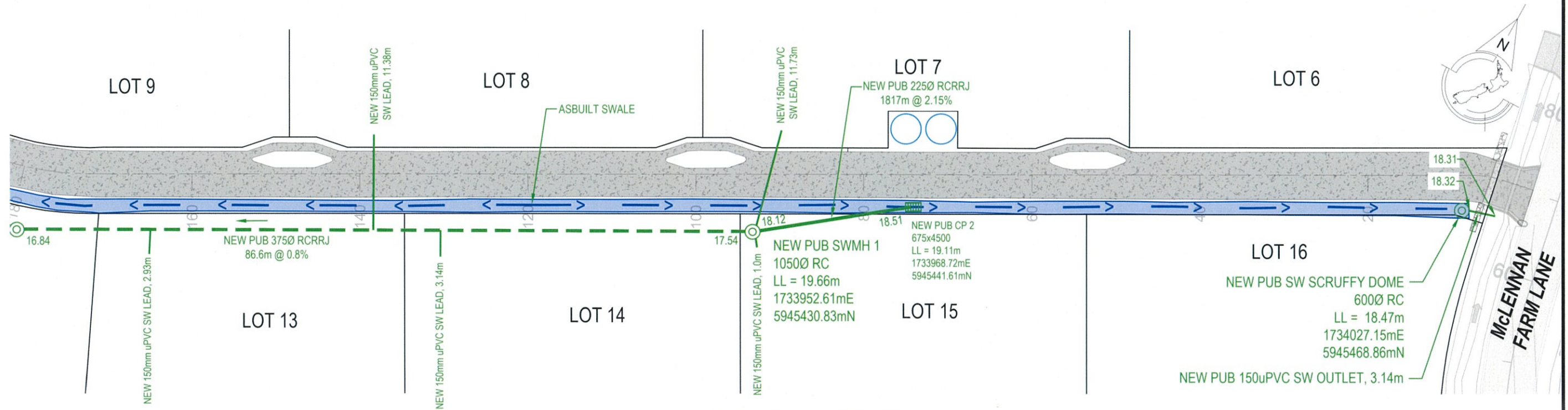
I certify that these As-built Plans are an accurate record of the works undertaken and that:

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

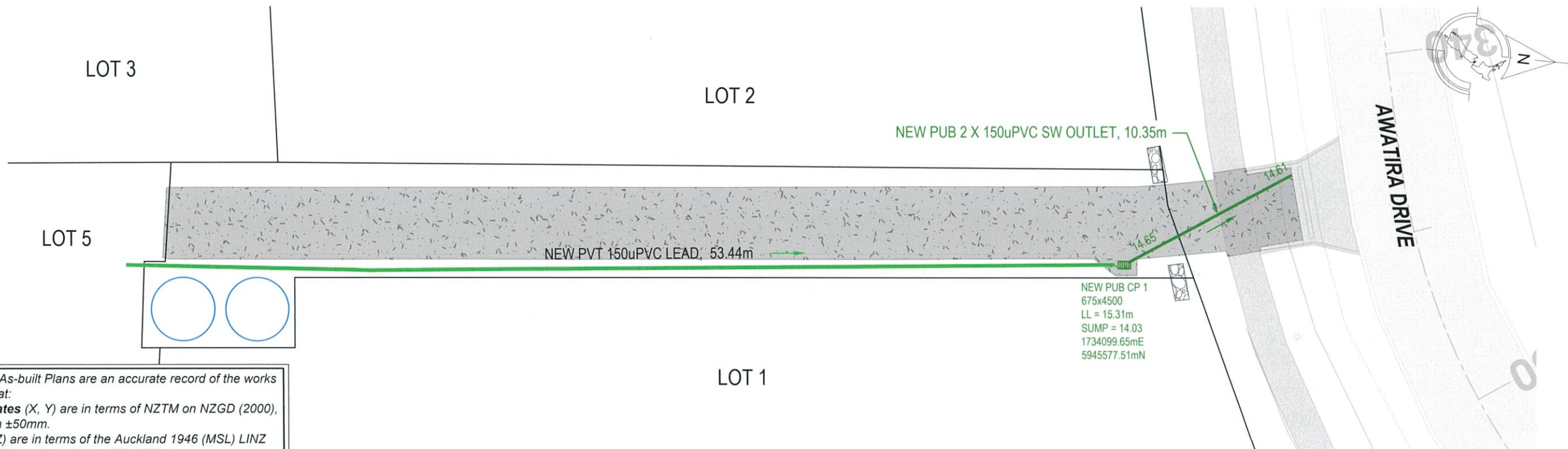
Signed: *Mike Bates*
Registered Professional Surveyor
Date: *27/03/24*
Name: MIKE BATES
Contact Phone: (09) 426 6552
Email: mike@aspireconsulting.co.nz

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:500 AT A3	CLIENT	SITE ADDRESS	DRAWING NUMBER
-	ISSUED FOR ASBUILTS	TVZ	MB	03.2024			RIVERVIEW PROPERTIES LTD	MacLENNAN FARM LANE KAUKAPAKAPA	1664 - AB - SW402
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					APPROVED	MB	03.2024		
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	REVISION
								ASBUILT STORMWATER PLAN EPA REF#: ENG60414608	MAR 2024
									-

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



STORMWATER ASBUILT - PLAN 2
SCALE 1:500 AT A3



STORMWATER ASBUILT - PLAN 3
SCALE 1:250 AT A3

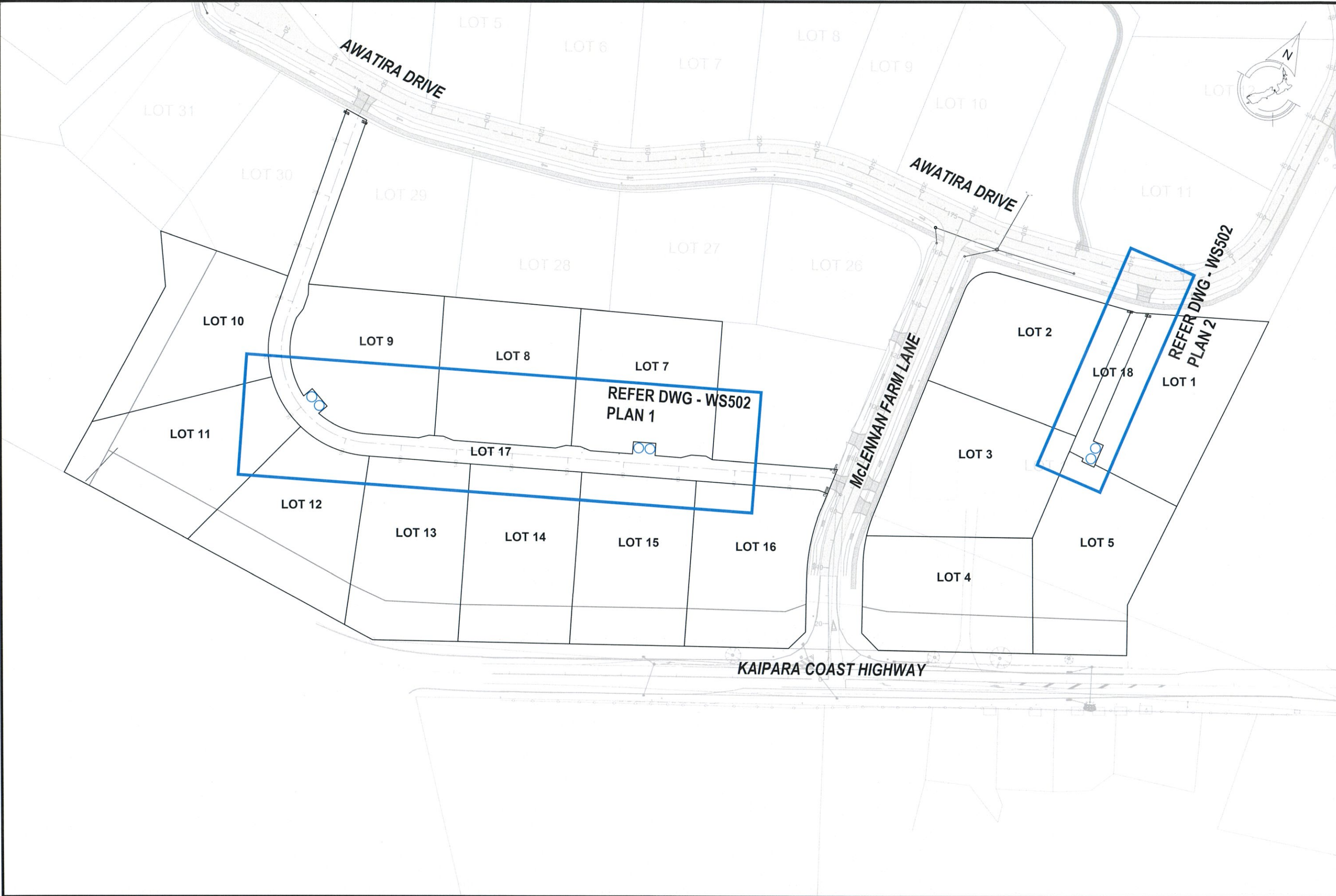
I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000), and are within $\pm 50\text{mm}$.
- The **Levels** (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within $\pm 10\text{mm}$.

Signed: *Mike Bates*
Registered Professional Surveyor
Date: *27/03/24*
Name: MIKE BATES
Contact Phone: (09) 426 6552
Email: mike@aspireconsulting.co.nz

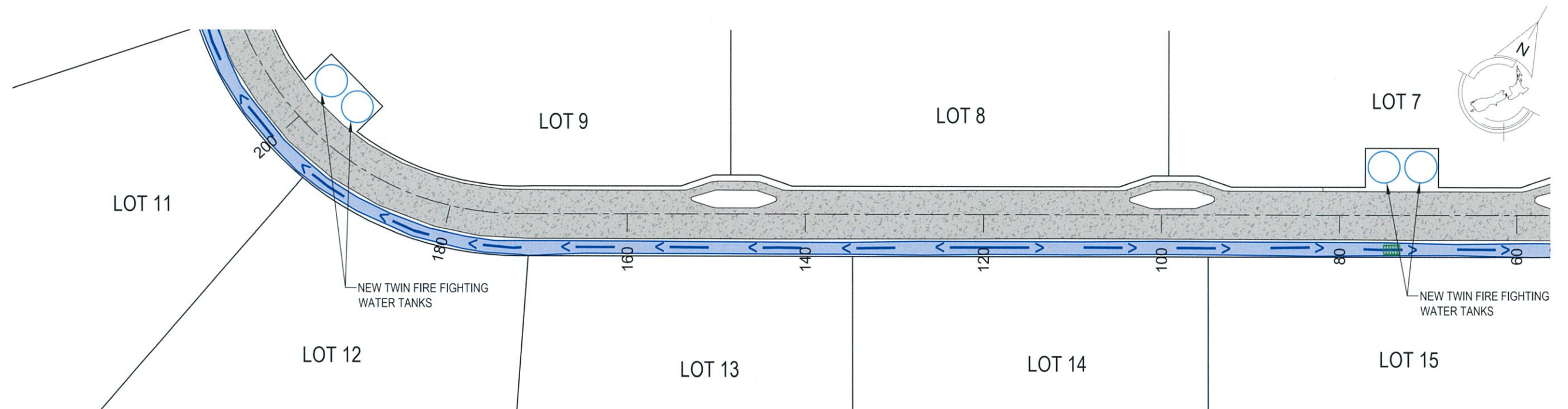
REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	AS SHOWN	CLIENT	SITE ADDRESS	DRAWING NUMBER
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					DESIGN	PF			
					DRAWN	OC			
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					DESIGN CHECK	PF			
					APPROVED	MB			
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	REVISION
								ASBUILT STORMWATER PLAN EPA REF#: ENG60414608	MAR 2024
									-

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

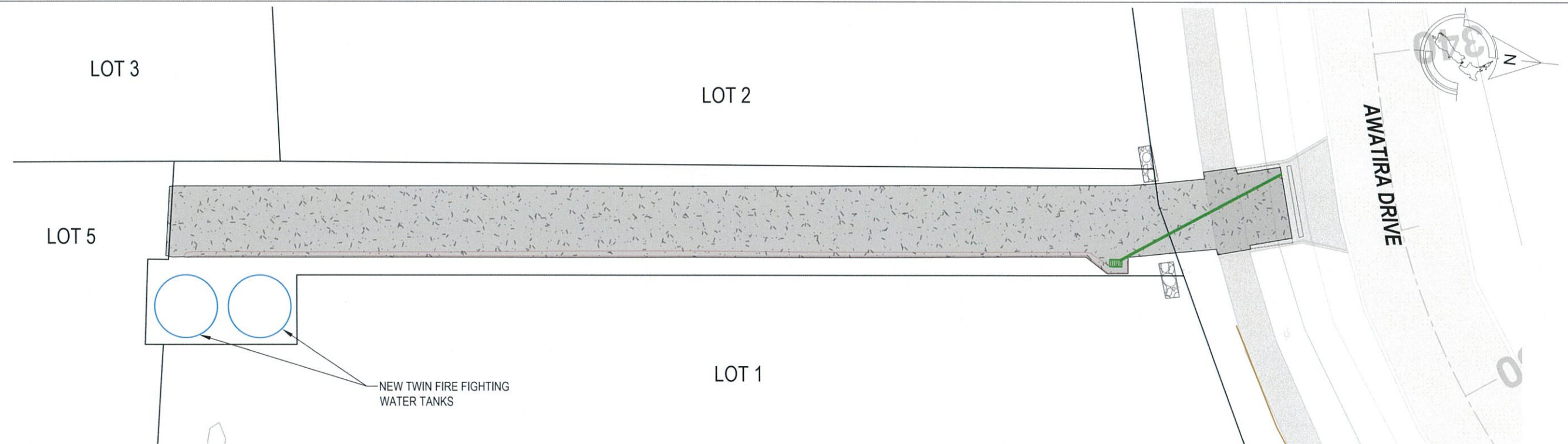


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					DESIGN	PF			
					DRAWN	OC			
					DRAWING CHECK	TVZ			
					DESIGN CHECK	PF			
					APPROVED	MB			
							Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	REVISION
								ASBUILT FIRE FIGHTING WATER SUPPLY PLAN EPA REF#: ENG60414608	MAR 2024


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

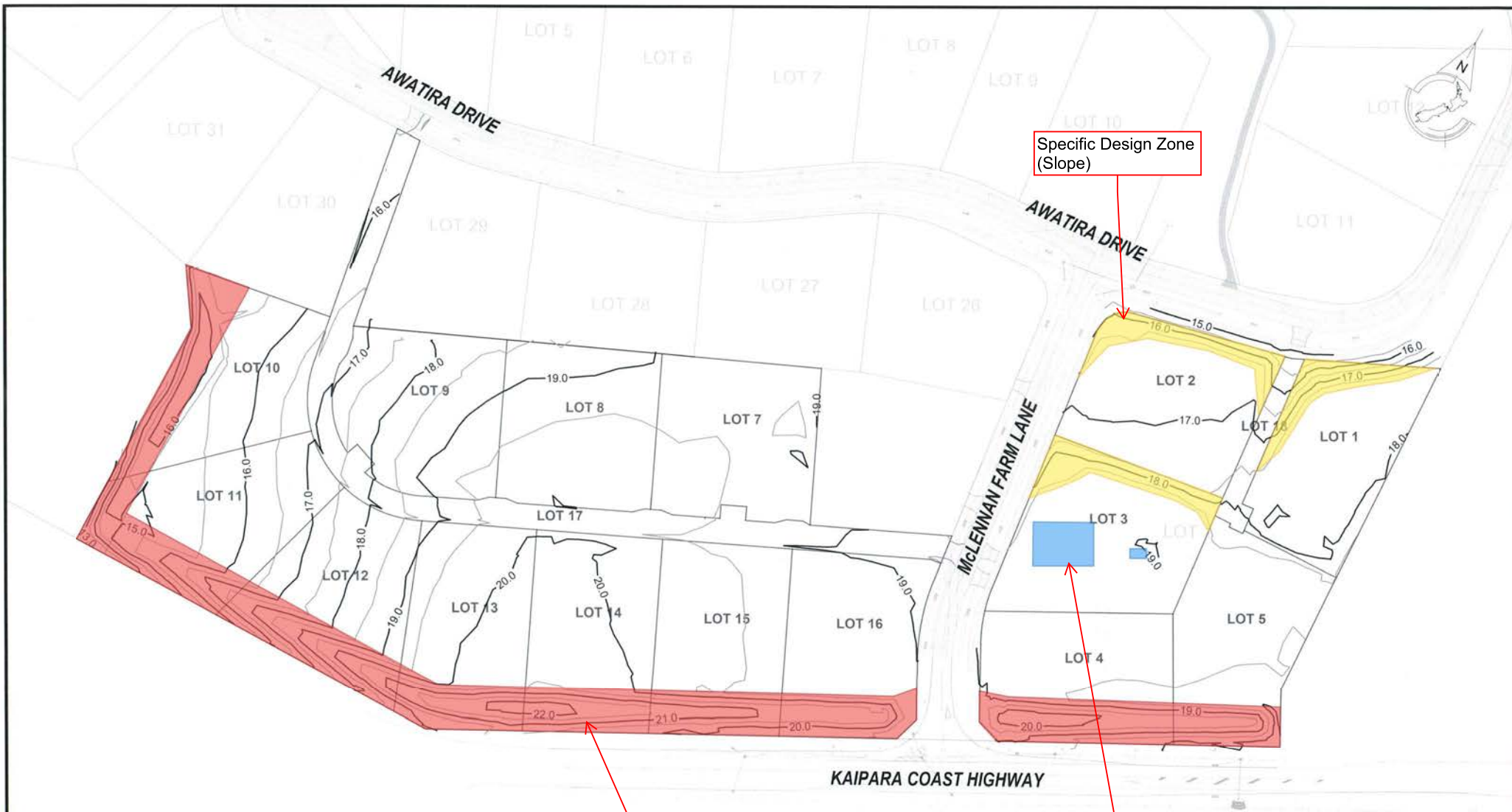


FIRE-FIGHTING WATER TANK ASBUILT - PLAN 1
SCALE 1:500 AT A3





FIRE-FIGHTING WATER TANK ASBUILT- PLAN 2
SCALE 1:250 AT A3

REV.	DESCRIPTION	CHECK	APP'D	DATE	SCALE	AS SHOWN		CLIENT RIVERVIEW PROPERTIES LTD	SITE ADDRESS MacLENNAN FARM LANE KAUKAPAKAPA	DRAWING NUMBER 1664 - AB - WS502		 Ph: 09 426 6552 Web: www.aspeng.co.nz	
-	ISSUED FOR ASBUILTS	TVZ	MB	03.2024		NAME	DATE			DATE			REVISION
					DESIGN	PF	03.2024						
					DRAWN	OC	03.2024						
					DRAWING CHECK	TVZ	03.2024						
					DESIGN CHECK	PF	03.2024	Conditions of Use: <i>These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.</i>	DRAWING TITLE ASBUILT FIRE FIGHTING WATER SUPPLY PLAN EPA REF#: ENG60414608	DATE MAR 2024	REVISION -		
					APPROVED	MB	03.2024						



NOTES

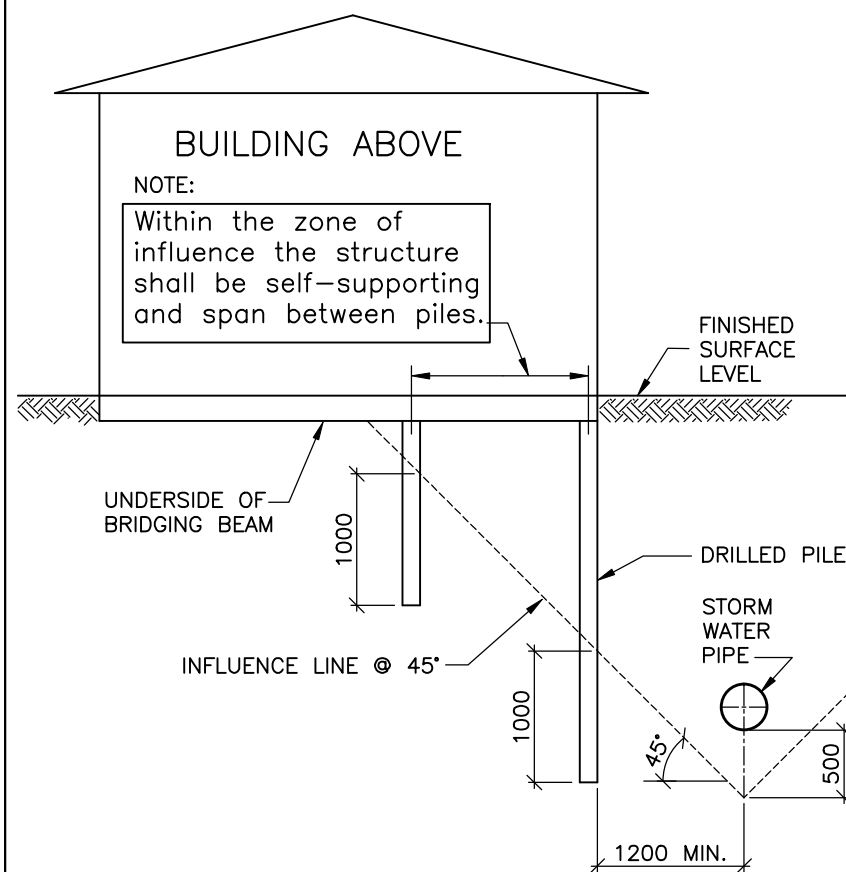
- The Coordinates (X, Y) are in terms of NZTM on NZGD (2000)
- The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum)

LEGEND	
	AB CONTOUR MAJOR (INTERVAL 1.0m)
	AB CONTOUR MINOR (INTERVAL 0.5m)

REV	DESCRIPTION	CHECK	APP'D	DATE	SCALE	1:1250 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER
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					DESIGN		PF	03-2024			
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					DRAWING CHECK		TVZ	03-2024			
					DESIGN CHECK		PF	03-2024			
					APPROVED		MB	03-2024			
Conditions of Use: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer										DRAWING TITLE	ASBUILT CONTOUR PLAN EPA REF#: ENG60414608
										DATE	MAR 2024
										REVISION	-

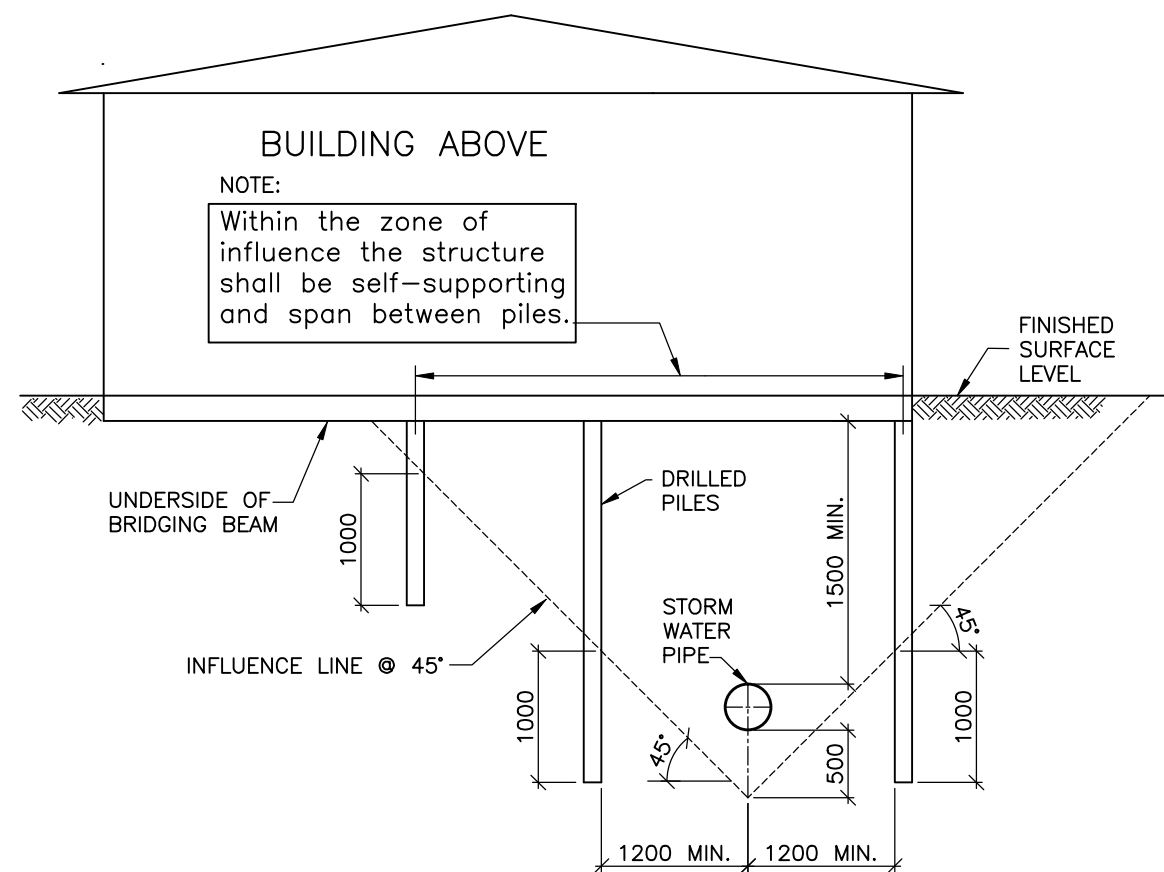


Ph: 09 426 6552
Web: www.aspeng.co.nz



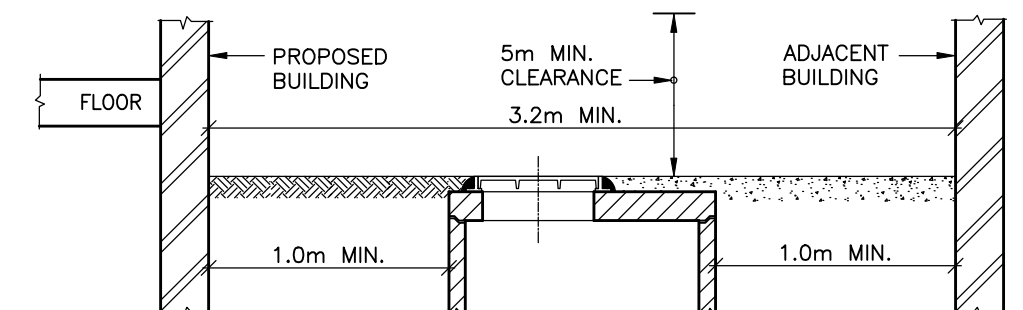
"BUILD CLOSE" NOTES:

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



"BUILD OVER" NOTES:

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



MANHOLE CONSTRUCTION CLEARANCE

NOTES

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

STORMWATER ENGINEERING
STANDARD DETAILS

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

AUCKLAND COUNCIL

STORMWATER PIPE AND MANHOLE CONSTRUCTION CLEARANCE REQUIREMENTS

MANHOLES NEAR BUILDINGS AND BUILDING CLOSE OR OVER PIPES

ENVIRONMENTAL-SW

ORIGINAL
SCALE: AS NOTED

Auckland Council
Technical Services

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

APPENDIX D: FIELD TEST DATA

LF11 Soil Field Density NDM Direct Transmission with VSS Report (Cohesive Soils) (Rev 18)

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

Project:	787 Kaipara Coast Highway	Test Methods:	Notes:	Solid Density:	Assumed
Project No:	AKL2021-0052			Solid Density Data Source:	N/A
Location:	Kaukapakapa			Testing Locations Selected By:	CMW Field Staff
Report No:	AKL2021-0052LAB Rev.0			Only samples <2.0mm will be considered for endorsed testing	
Report Date:	20/03/2024				
Client:	Riverview Properties				
Client Address:	787 Kaipara Coast Highway, Kaukapakapa, 0871				

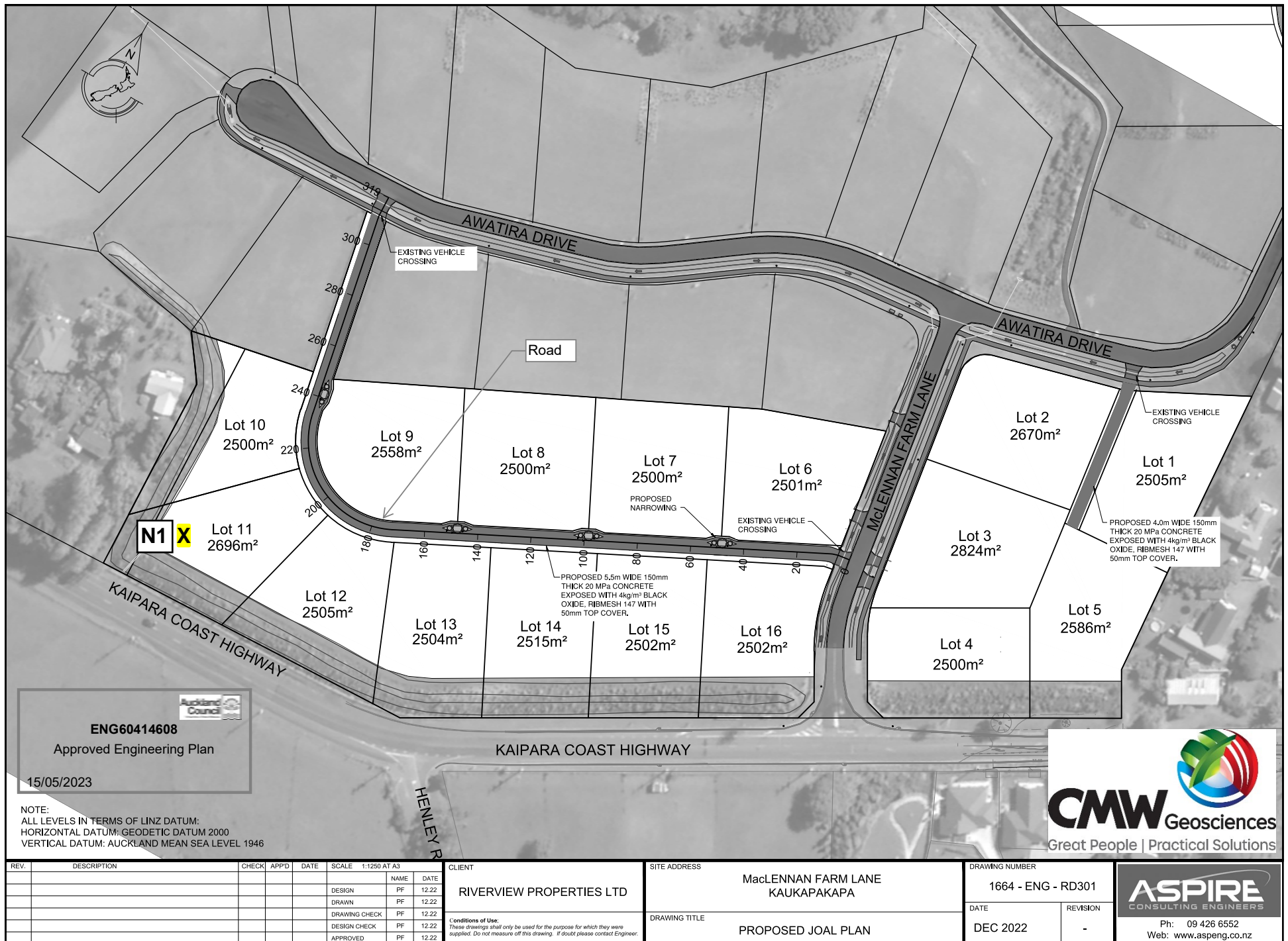




Test results indicated as not accredited are outside the scope of the laboratory's accreditation



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/m ³) *	Vane ID		In-situ Vane Shear Strengths					Field and Laboratory Testing Data								Comments
					Head #	Blade # ①	Test 1 (kPa)	Test 2 (kPa)	Test 3 (kPa)	Test 4 (kPa)	Ave.	Gauge Wet Density (t/m ³) **	Gauge Dry Density (t/m ³)	Gauge Water Content (%)	Gauge Air Voids (%)	Gauge Probe Depth (mm)	Oven Water Content (%)	Oven Dry Density (t/m ³)	Oven Calculated Air Voids (%) *	
19/12/2023	N1	Refer to Site Plan	CLAY Fill	2.70	3661	3661	UTP	UTP	UTP	237+	237+	1.87	1.42	31.8	2	300	25.7	1.49	7	

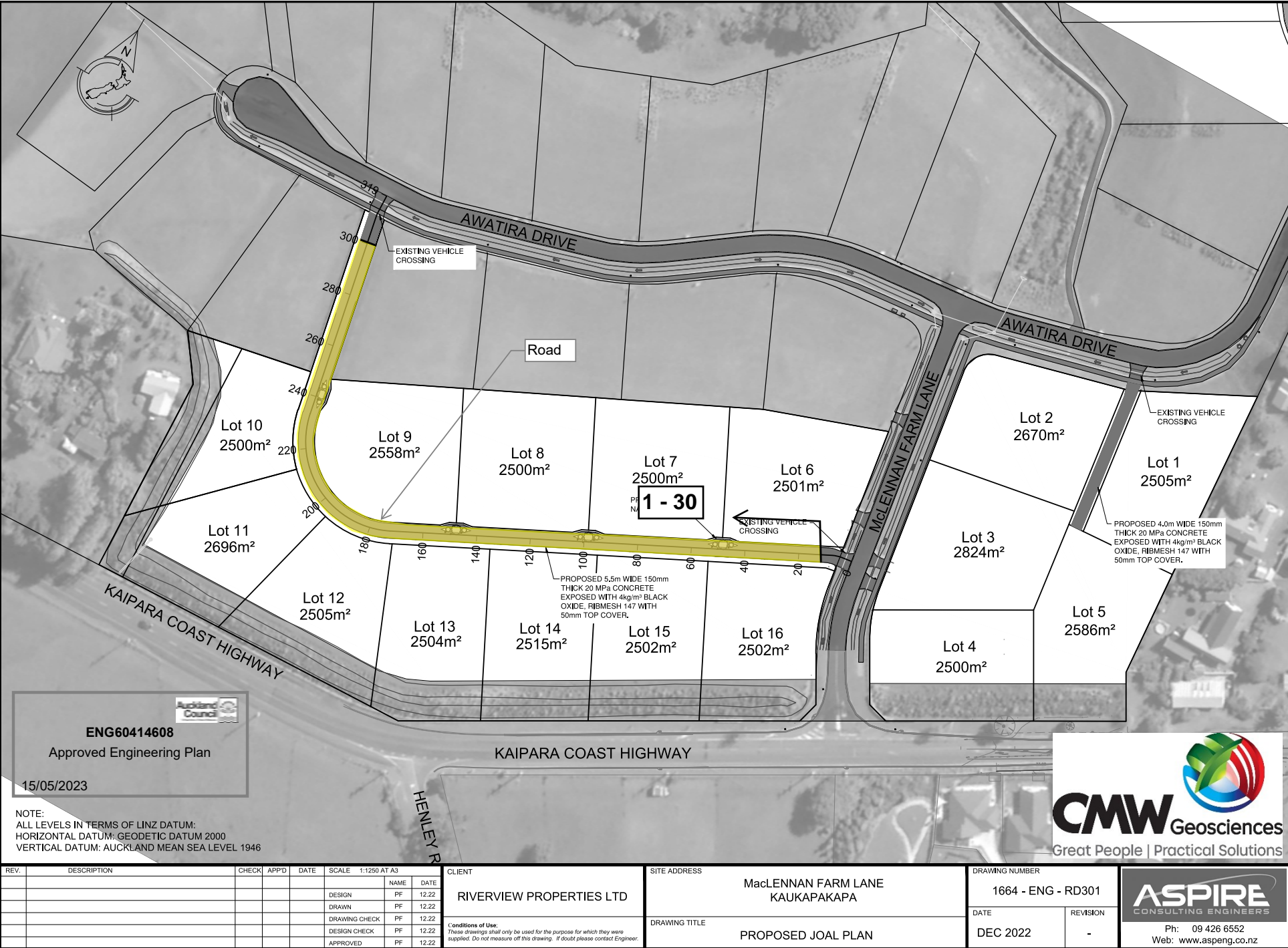
This report should only be reproduced in full. ** Gauge Wet Densities outside of the calibrated range of 1.754 to 2.611 t/m³ are not accredited and are outside the laboratories scope of accreditation.



 <p>CMW Geosciences Great People Practical Solutions</p>		<h2 style="text-align: center;">LF14 Dynamic Cone Penetration (DCP) Test Report (Rev 17)</h2> <p style="text-align: center;">NZS 4402: 1988 Test 6.5.2</p>								
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address: CBR Test Calculation:		751 & 787 Kaipara Coast Highway AKL2021-0052 Kaukapakapa AKL2021-0052LAA Rev.0 19/10/2023 SS Riverview Properties PO Box 540 Silverdale Austroads (2010) (fine grained cohesive)				Auckland Laboratory CMW Geotechnical NZ Limited 11/63, Arrenway Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632 Testing Locations Selected By: CMW Field Staff <div style="display: flex; align-items: center;">  <div> <p>Test results indicated as not accredited are outside the scope of the laboratory's accreditation</p> <p>* Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation</p> </div> </div>				
Test No	1		2		3		4		5	
Test Location	Road		Road		Road		Road		Road	
Chainage & Offset	CH10 L of CL		CH20 R of CL		CH30 L of CL		CH40 R of CL		CH 50 L of CL	
Material & Layer	Lime Stabilised 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	6	13	7	15	8	18	4	8
100 - 200	5	10	3	6	7	15	6	13	4	8
200 - 300	3	6	2	4	4	8	4	8	2	4
300 - 400	3	6	2	4	2	4	3	6	2	4
400 - 500	3	6	2	4	3	6	2	4	2	4
500 - 600	3	6	3	6	3	6	3	6	3	6
600 - 700	3	6	3	6	5	10	3	6	3	6
700 - 800	3	6	3	6	4	8	3	6	3	6
800 - 900	2	4	3	6	3	6	3	6	2	4
900 - 1000										
Test No	6		7		8		9		10	
Test Location	Road		Road		Road		Road		Road	
Chainage & Offset	CH60 R of CL		CH70 L of CL		CH80 R of CL		CH90 L of CL		CH100 R of CL	
Material & Layer	Lime Stabilised Clay Subgrade									
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	6	13	5	10	7	15	8	18	12	20+
100 - 200	5	10	4	8	7	15	10	20+	8	18
200 - 300	2	4	5	10	4	8	7	15	6	13
300 - 400	3	6	3	6	5	10	5	10	4	8
400 - 500	3	6	2	4	3	6	4	8	3	6
500 - 600	2	4	3	6	4	8	5	10	4	8
600 - 700	3	6	2	4	3	6	5	10	3	6
700 - 800	3	6	3	6	2	4	5	10	4	8
800 - 900	3	6	2	4	3	6	4	8	4	8
900 - 1000										
Created by: RS Checked by: JP Authorised Signatory (KTP): JLM							Date: 3/11/2023 Date: 7/11/2023 Date: 15/11/2023			
							This report should only be reproduced in full * Equivalent CBR values are taken from Fig 5.3, Austroads Guide to Pavement Technology, Part 2: Pavement Structural Design, Austroads 2010. Values are relevant to fine grained soils only. Page 1 of 4			

 <p>CMW Geosciences Great People Practical Solutions</p>		<h2 style="text-align: center;">LF14 Dynamic Cone Penetration (DCP) Test Report (Rev 17)</h2> <p style="text-align: center;">NZS 4402: 1988 Test 6.5.2</p>								
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address: CBR Test Calculation:		751 & 787 Kaipara Coast Highway AKL2021-0052 Kaukapakapa AKL2021-0052LAA Rev.0 19/10/2023 SS Riverview Properties PO Box 540 Silverdale Austroads (2010) (fine grained cohesive)				Auckland Laboratory CMW Geotechnical NZ Limited 11/63, Arrenway Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632 Testing Locations Selected By: CMW Field Staff <div style="display: flex; align-items: center;">  <div> <p>Test results indicated as not accredited are outside the scope of the laboratory's accreditation</p> <p>* Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation</p> </div> </div>				
Test No	11		12		13		14		15	
Test Location	Road		Road		Road		Road		Road	
Chainage & Offset	CH110 L of CL		CH120 R of CL		CH130 L of CL		CH140 R of CL		CH150 L of CL	
Material & Layer	Lime Stabilised 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	9	20	5	10	8	18	11	20+
100 - 200	5	10	4	8	3	6	5	10	7	15
200 - 300	4	8	2	4	2	4	3	6	5	10
300 - 400	4	8	4	8	3	6	4	8	3	6
400 - 500	3	6	3	6	2	4	3	6	2	4
500 - 600	5	10	2	4	2	4	3	6	2	4
600 - 700	4	8	3	6	2	4	3	6	2	4
700 - 800	5	10	3	6	2	4	3	6	2	4
800 - 900	4	8	3	6	3	6	3	6	3	6
900 - 1000										
Test No	16		17		18		19		20	
Test Location	Road		Road		Road		Road		Road	
Chainage & Offset	CH160 R of CL		CH170 L of CL		CH180 R of CL		CH190 L of CL		CH200 R of CL	
Material & Layer	Lime Stabilised 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	12	20+	7	15	6	13	8	18	10	20+
100 - 200	8	18	5	10	4	8	5	10	5	10
200 - 300	4	8	4	8	3	6	4	8	5	10
300 - 400	4	8	4	8	2	4	2	4	3	6
400 - 500	2	4	2	4	3	6	3	6	3	6
500 - 600	3	6	2	4	2	4	2	4	2	4
600 - 700	2	4	3	6	2	4	3	6	3	6
700 - 800	2	4	3	6	2	4	3	6	2	4
800 - 900	2	4	3	6	2	4	3	6	2	4
900 - 1000										
Created by: RS Checked by: JP Authorised Signatory (KTP): JLM							Date: 3/11/2023 Date: 7/11/2023 Date: 15/11/2023			
							This report should only be reproduced in full * Equivalent CBR values are taken from Fig 5.3, Austroads Guide to Pavement Technology, Part 2: Pavement Structural Design, Austroads 2010. Values are relevant to fine grained soils only. Page 2 of 4			

		<h2 style="text-align: center;">LF14 Dynamic Cone Penetration (DCP) Test Report (Rev 17)</h2> <p style="text-align: center;">NZS 4402: 1988 Test 6.5.2</p>								
Project: Project No: Location: Report No: Test Date: Tested By: Client: Client Address: CBR Test Calculation:		751 & 787 Kaipara Coast Highway AKL2021-0052 Kaukapakapa AKL2021-0052LAA Rev.0 19/10/2023 SS Riverview Properties PO Box 540 Silverdale Austroads (2010) (fine grained cohesive)				Auckland Laboratory CMW Geotechnical NZ Limited 11/63, Arrenway Drive, Rosedale, NZ 0632 PO Box 300206, Albany, Auckland, NZ 0752 Phone: +64 (09) 4144 632 Testing Locations Selected By: CMW Field Staff <div style="display: flex; align-items: center;">  <div> Test results indicated as not accredited are outside the scope of the laboratory's accreditation </div> <div style="margin-left: 20px; font-size: small;"> * Equivalent CBR Values are not accredited and are outside the scope of the laboratory's accreditation </div> </div>				
Test No	21		22		23		24		25	
Test Location	Road		Road		Road		Road		Road	
Chainage & Offset	CH210 L of CL		CH220 R of CL		CH230 L of CL		CH240 R of CL		CH250 L of CL	
Material & Layer	Lime Stabilised 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	7	15	7	15	6	13	9	20
100 - 200	4	8	4	8	5	10	4	8	4	8
200 - 300	4	8	3	6	4	8	4	8	3	6
300 - 400	3	6	3	6	3	6	4	8	3	6
400 - 500	3	6	3	6	3	6	3	6	4	8
500 - 600	3	6	2	4	2	4	4	8	5	10
600 - 700	4	8	3	6	2	4	2	4	3	6
700 - 800	3	6	2	4	2	4	2	4	3	6
800 - 900	3	6	2	4	2	4	4	8	2	4
900 - 1000										
Test No	26		27		28		29		30	
Test Location	Road		Road		Road		Road		Road	
Chainage & Offset	CH260 R of CL		CH270 of CL		CH280 R of CL		CH290 L of CL		CH300 R of CL	
Material & Layer	Lime Stabilised Clay Subgrade									
Depth	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*	Blow Count	Equiv CBR*
0 - 100	5	10	3	6	2	4	2	4	2	4
100 - 200	4	8	5	10	4	8	3	6	2	4
200 - 300	4	8	4	8	3	6	4	8	3	6
300 - 400	3	6	2	4	3	6	3	6	1	2
400 - 500	2	4	2	4	2	4	2	4	2	4
500 - 600	2	4	3	6	3	6	4	8	4	8
600 - 700	3	6	3	6	3	6	3	6	2	4
700 - 800	3	6	2	4	3	6	2	4	2	4
800 - 900	2	4	4	8	2	4	2	4	2	4
900 - 1000										
Created by: RS Checked by: JP Authorised Signatory (KTP): JLM							Date: 3/11/2023 Date: 7/11/2023 Date: 15/11/2023			
							This report should only be reproduced in full * Equivalent CBR values are taken from Fig 5.3, Austroads Guide to Pavement Technology, Part 2: Pavement Structural Design, Austroads 2010. Values are relevant to fine grained soils only. Page 3 of 4			



REV.	DESCRIPTION	CHECK	APPD	DATE	SCALE	1:1250 AT A3	NAME	DATE	CLIENT	SITE ADDRESS	DRAWING NUMBER
							DESIGN	PF 12.22	RIVERVIEW PROPERTIES LTD	MacLENNAN FARM LANE KAUKAPAKAPA	1664 - ENG - RD301
							DRAWN	PF 12.22			
							DRAWING CHECK	PF 12.22			
							DESIGN CHECK	PF 12.22			
							APPROVED	PF 12.22			
									CONDITIONS OF USE: These drawings shall only be used for the purpose for which they were supplied. Do not measure off this drawing. If doubt please contact Engineer.	DRAWING TITLE	REVISION
										PROPOSED JOAL PLAN	
										DEC 2022	-

APPENDIX E: EXPANSIVITY TESTING

TEST METHOD NZS 4402 : 1986 TEST 2.1, 2.3, 2.4, 2.5 & 2.6

Project No : 24 0001 14

Date of Order : 05.03.24

Sample Method : Hand Auger
Sample Date : 05.03.24
Sampled By : CMW Geosciences Ltd

Tested By:	KC	Date :	06.03.24 to 08.03.23
Calculated By :	KC	Date :	11.03.24
Checked By :	ZH	Date :	12.03.24

1 of 1

TEST ID	PLASTICITY INDEX	LIQUID LIMIT
Lot 5	51	85
Lot 7	38	65
Lot 15	43	68
Lot 13	64	95
Lot 10	56	87

