Hawthorn Geddes
engineers & architects ltd

EARTHWORK COMPLETION REPORT

PREPARED FOR TRAVERSE LTD

AT 373 KERIKERI ROAD, KERIKERI

LOT 1 DP 25752

7 Selwyn Avenue
Whangarei 0110
09 438 7139

hg@hgcs.co.nz

21A The Grange
Warkworth 0910
09 283 3428

hawthorngeddes.co.nz

EARTHWORK COMPLETION REPORT FOR TRAVERSE LTD

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Report Prepared by: Gurpal Singh,
Geotechnical Engineer
BEng Tech

Report Approved by:

Callum Sands,
Geotechnical Engineer
BE(Hons), MEngNZ, CPEng,

DOCUMENT TRANSMITTAL			
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1. Purpose

The purpose of this report is to summarise the results of observations and testing undertaken during earthworks to form the new lots (Lot 1 to Lot 48) at 373 Kerikeri Road, Kerikeri. This report presents an option on the suitability of the land for residential development.

A copy of the earthworks as-built drawings as prepared by Reyburn & Bryant 1999 Ltd (R&B), dated 26.03.2024, reference EWA16655, Rev A, sheets 01 to 04 are attached to this report, see Appendix A.

2. Background

Hawthorn Geddes Engineers and Architects Ltd (HGEA) have previously been engaged to complete a geotechnical assessment and associated reporting for the underlying subdivision, from which the property subject of this report was formed. The report is titled “Geotechnical Report for proposed subdivision at Lot 1 DP 25752 and PT Lot 2 DP 86081” and dated 28/02/2022, HGEA reference number 12546.

That investigation comprised a visual stability assessment and subsoil investigation. The finding of this assessment is described below:

2.1. Site Description

The site is irregular in shape, some 9.87ha in area, gently sloping at approximately 4° to the southeast. The property is located east of Kerikeri Road and some 1km southeast of the Kerikeri township within a residential zone.

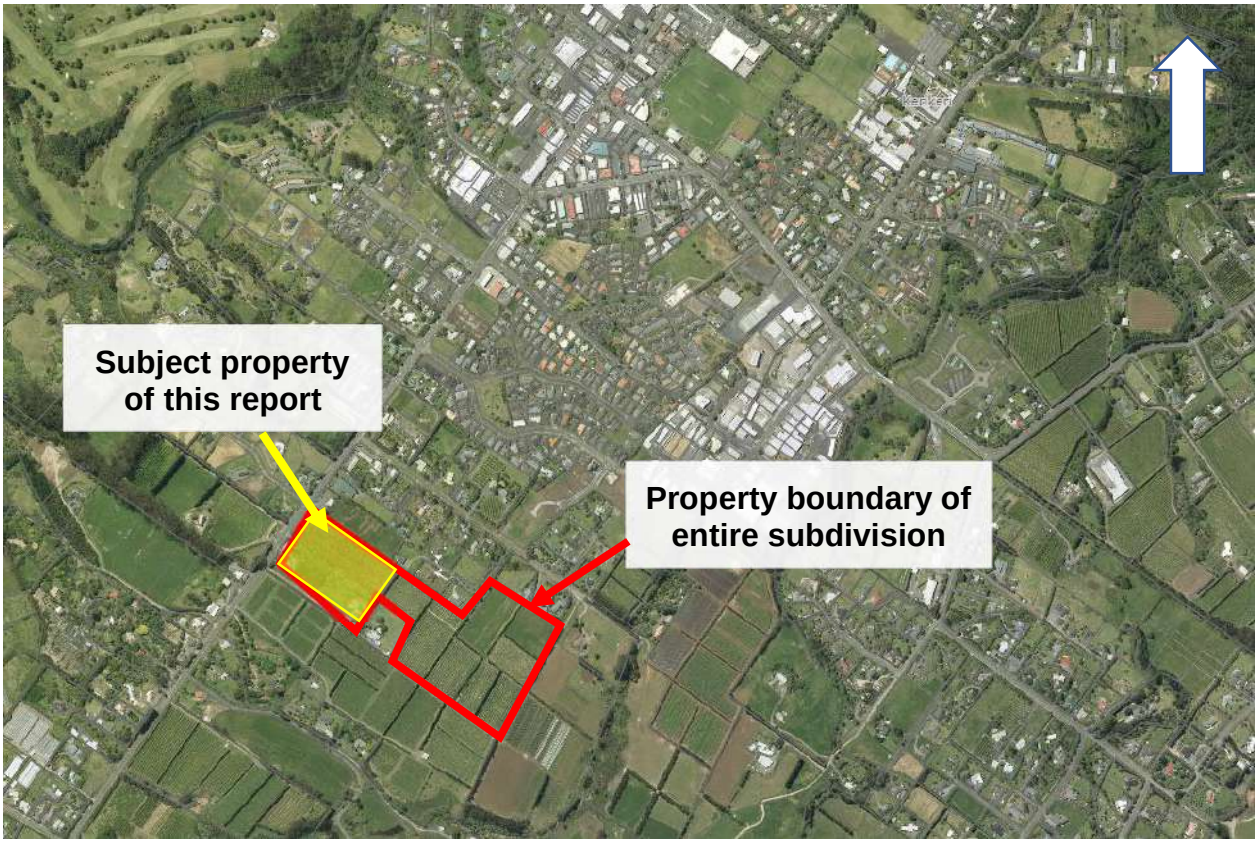


Figure A: Aerial view of the site (source: NRC map)

2.2. Geological Background

The 1:250,000 scale published geology of the area viewed online from GNS Science website indicates that the site is underlain by two geologies:

- "Kerikeri Volcanic Group Late Miocene basalt of Kaikohe - Bay of Islands Volcanic Field". This unit is described as Olivine basalt lava, scoria and tuff.
- "Ruatangata Sandstone of Waro Subgroup (Te Kuiti Group)". This unit is described as Slightly calcareous, glauconitic, muddy, fine-grained sandstone.

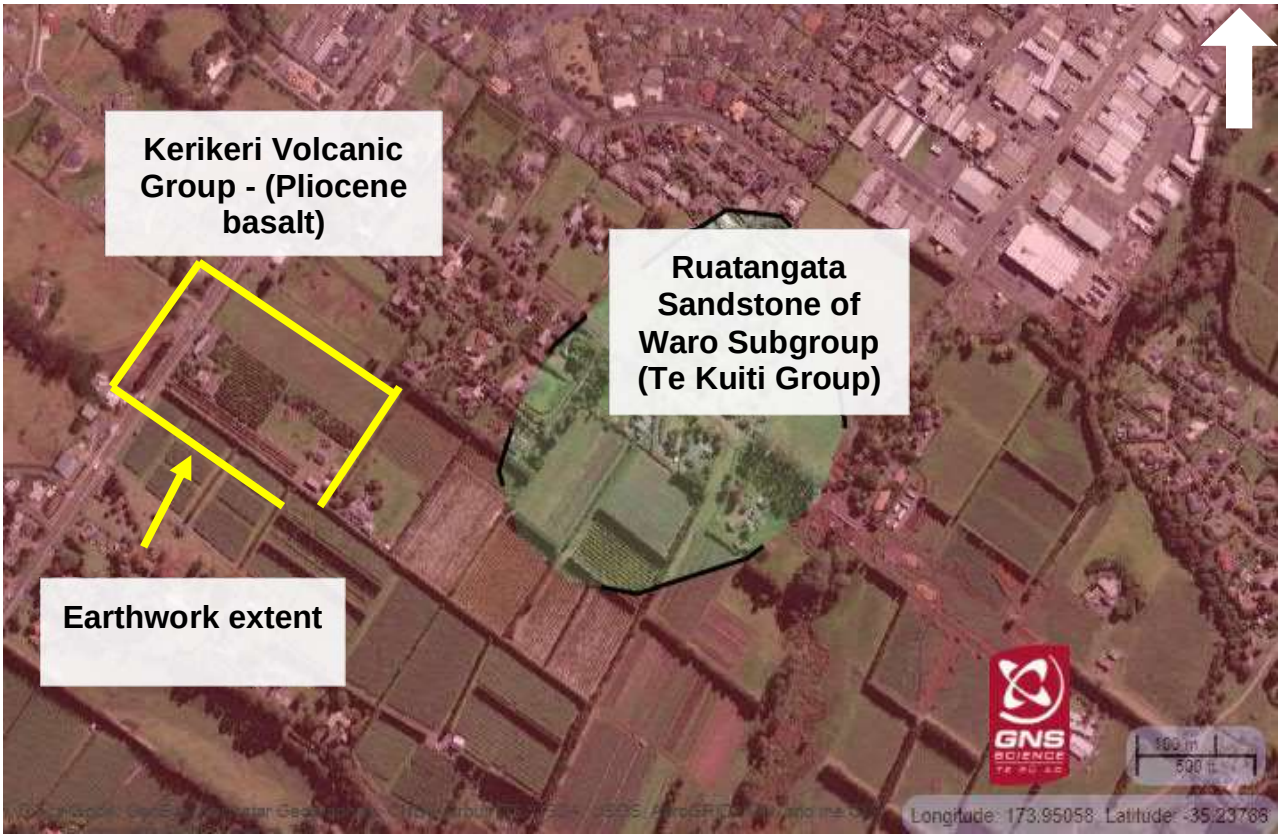


Figure B: GNS published geology (Source GNS Science 1:250K)

Subsoil investigation over the site comprised fourteen hand-augured boreholes (HA1 – HA14), and five Scala Penetrometer testing (SPT1 – SPT5) undertaken on the 6th of September 2021 and 13th of January 2022. Hand augered boreholes were drilled across the property.

The subsoil conditions encountered in the HAs typically comprised dark brown, moist, slightly plastic, hard, silt with minor sand and clay content. Undrained shear strengths measured were typically greater than 160kPa. Scala refusal was encountered at depths between 2.7m and 5.1m bgl, inferred to be contact with the sandstone at depth.

Soils overlying the subject property were consistent with the mapped geology of the Kerikeri Volcanic Group. HA 14 encountered an orange/yellowish silt layer at a depth of 2.2m, more consistent with the underlying Te Kuiti group than the GNS-mapped geology.

Soils encountered/observed during earthwork inspections were consistent with those encountered within our Has, and the GNS mapped geology. No Te Kuiti group soils were encountered.

Groundwater was not observed during earthworks operations.

Logs of the HAs and SPTs are attached to this report.

2.3. Development

The development comprises 48 new residential lots (Lot 1 to Lot 48). Earthworks were carried out to achieve appropriate gradients for residential development and access to each lot.

Earthworks over the subject site comprised a balance of cut-to-fill, see Figure C below.

Figure C - As-Built Earthworks drawings (Source: Sheet 02, EWA16655 R&B Drawings). Green and blues indicate the extent of fill, and oranges and red excavation. Blue lines show the location of the Magnum stone retaining walls.

Earthworks over the property comprised excavation to depths no more than 2.0m and filling up to 1.8m. A balance of excavation and filling was undertaken to form suitable gradients for future residential development.

Where battering was not achievable, Cirtex MagnumStone retaining walls, not more than 0.9m high were used to retain either engineered fill or the excavation natural site soils. These walls were specifically designed by HGEA, and were granted a building Consent Exception by the Far North District Council (FNDC), reference number EXM-2023-31/0. Separate to this report, HGEA have prepared a PS4 and associate schedule to satisfy the FNDC Building Consent Exemption condition.

3. Fill Material

Soils used to fill over the development were excavated from the site. A geotechnical engineer from HGEA had identified the site won soils as appropriate for use as fill, with soil testing performed by Babbage Geotechnical Laboratory (BGL). BGL are an IANZ Accredited Testing Laboratory.

The fill material is described as clayey SILT, dark brown, moist, and moderately plastic.

Laboratory testing comprised dry density/water content relationship (compaction curve) testing to determine the site won soil's optimum moisture content (OMC), and maximum dry density (MDD). This was undertaken in accordance with the relevant New Zealand soil testing standards, as below:

- Water content: NZS4402:1986: Test 2.1
- NZ Standard Compaction: NZS4402:1986L Test 4.1.1
- Wane Shear Strength: NZ Geotechnical Society Guidelines 2001

There was only one source material, and therefore, per NZS4431:2022 Table A1, only one OMC and MDD test was required.

Soil laboratory testing completed by BGL determined the site won soils to have an OMC of 41.2%, an MDD of 1.75t/m^3, with an estimated solid density of 2.68t/m^3.

A copy of the BGL lab results is attached to this report.

3.1. Fill Specification

All fill was placed in loose layers not exceeding 200mm and compacted with appropriate machinery. Fill was compacted within the range of optimum moisture content.

Typically, Nuclear Densometer Testing (NDM) and shear vane testing were performed at 500mm fill depth intervals as the site was developed, with a minimum of 2 tests per 1,000m^2.

Fill specifications, as provided to the contractors by HGEA, were:

- Shear vane Undrained Shear strength of an average not less than 140kPa and no individual value less than 120kPa
- Air voids average value of 8%, with no individual value of more than 10%.

Earthworks were undertaken by Mason Contractors and managed by Mark Noyer from October 2022 to September 2023.

4. Earthworks Compliance Testing

Earthworks over the site comprised a combination of cut and fill to form suitable gradients for residential development. The excavations over the site were not more than 2.0m and filling up to 1.8m.

As built final cut/fill plans prepared by Reyburn and Bryant are attached, see Sheet 03 of 4, Appendix A.

Compaction verification testing over the site was completed between 20/10/2022 and 05/09/2023, in general accordance with the NZS 4431:2022, NZS4402:1986, NZS4407:2015, and the NZGS Guidelines for hand shear vane tests.

Testing over the site comprised a total of 69 Nuclear Densometer tests (NDM), accompanied by not less than four hand-held shear vane tests per NDM test. Following the completion of each NDM a representative soil sample was unearthed from the test site and brought back to the HGEA soil laboratory for water content testing to correct/calibrate the moisture content, dry density and percentage airvoid results produced by the NDM. This testing was undertaken in accordance with NZS4402:1986: Test 2.1.

NDM testing was undertaken at 0.5m fill lifts, with not less than two tests per 1000 cubic meters placed. As the site was developed, and an appropriate compaction methodology established for the site won soils, this testing regime was relaxed, as deemed appropriate by the signory fo this report. Testing was however generally completed at 500mm lift intervals, with the extent of testing undertaken considered appropriate for the works undertaken.

Prior to the placement of any fill, a site strip inspection was undertaken to verify the site subgrade. This comprised soil strength testing with a handheld shear vane, accompanied by a visual inspection to ensure the site was free of topsoil and other unsuitable material.

NDM tests performed over the site showed that compaction achieved the minimum engineering specification. The field worksheets and laboratory corrections of each NDM are attached to this report, see Appendix C. Where testing showed inadequate compaction, further compaction was instructed and retesting was undertaken. All retesting revealed adequate compaction across the site.

A summary of our corrected NDM test results is shown in Table 1 below:

Table 1 – Corrected NDM Result Summary (Cohesive Soils, Fine-Grained)

Test Number	Date	Air Voids (%)	Shear Vane strength (Su)	Pass/Fail
1	20/10/22	<2%	140+	Pass
2	20/10/22	<2%	140+	Pass
3	20/10/22	<2%	140+	Pass
4	26/10/22	<2%	UTP	Pass
5	26/10/22	<2%	120	Pass
6	26/10/22	7.79%	UTP	Pass
7	26/10/22	<2%	UTP	Pass
8	03/11/22	<2%	80	Pass
9	03/11/22	<2%	80	Pass
10	03/11/22	<2%	UTP	Pass
11	03/11/22	<2%	UTP	Pass
12	10/11/22	<2%	UTP	Pass
13	10/11/22	<2%	UTP	Pass
14	10/11/22	<2%	UTP	Pass
15	18/11/22	<2%	UTP	Pass
16	05/12/22	11.16%	UTP	Fail (Retest 23)
17	05/12/22	5.20%	UTP	Pass
18	05/12/22	11.55%	UTP	Fail (Retest 23)
19	05/12/22	11.77%	UTP	Fail (Retest 21)
20	05/12/22	11.04%	UTP	Fail (Retest 22)
21	20/12/22	5.95%	UTP	Pass
22	20/12/22	3.56%	UTP	Pass
23	20/12/22	6.80%	UTP	Pass

Test Number	Date	Air Voids (%)	Shear Vane strength (Su)	Pass/Fail
24	20/12/22	8.53%	UTP	Pass
25	20/12/22	6.60%	UTP	Pass
26	20/12/22	4.85%	UTP	Pass
27	20/12/22	4.49%	UTP	Pass
28	20/12/22	<2%	UTP	Pass
29	20/12/22	5.08%	UTP	Pass
30	20/12/22	<2%	UTP	Pass
31	20/12/22	6.70%	UTP	Pass
32	18/01/23	5.29%	UTP	Pass
33	18/01/23	5.27%	UTP	Pass
34	18/01/23	<2%	UTP	Pass
35	10/02/23	<2%	UTP	Pass
36	10/02/23	<2%	UTP	Pass
37	10/02/23	<2%	UTP	Pass
38	10/02/23	<2%	UTP	Pass
39	10/02/23	4.09%	UTP	Pass
40	10/02/23	<2%	UTP	Pass
41	10/02/23	<2%	UTP	Pass
42	01/03/23	3.69%	UTP	Pass
43	01/03/23	<2%	UTP	Pass
44	27/03/23	7.44%	UTP	Pass
45	27/03/23	7.85%	UTP	Pass
46	24/04/23	<2%	UTP	Pass
47	24/04/23	<2%	UTP	Pass

Test Number	Date	Air Voids (%)	Shear Vane strength (Su)	Pass/Fail
48	24/04/23	<2%	UTP	Pass
49	24/04/23	<2%	UTP	Pass
50	24/04/23	<2%	UTP	Pass
51	13/06/23	<2%	UTP	Pass
52	13/06/23	<2%	UTP	Pass
53	13/06/23	<5%	UTP	Pass
54	13/06/23	<2%	UTP	Pass
55	15/06/23	<2%	UTP	Pass
56	15/06/23	<2%	UTP	Pass
57	15/06/23	<2%	UTP	Pass
58	18/07/23	<2%	110	Pass
59	18/07/23	<2%	90	Pass
60	18/07/23	7.44%	100	Pass
61	09/08/23	<2%	120	Pass
62	09/08/23	<2%	90	Pass
63	09/08/23	<2%	70	Pass
64	09/08/23	(Failed due to low shear strengths)	30	Fail (Retest 67)
65	09/08/23	<2%	UTP	Pass
66	09/08/23	<2%	140+	Pass
67	04/09/23	<2%	UTP	Pass
68	04/09/23	<2%	UTP	Pass
69	04/09/23	<2%	120	Pass

Table 1 Notes:

- UTP = unable to penetrate

All NDM and shear vane tests on fill material achieved the engineering specification.

The field worksheets, laboratory correction for NDM testing, and site inspection records are attached to this report, see Appendix B and C.

5. Subgrade Inspection

Testing of subgrade for the Lots 50,51 and 52 (FNDC vested road) was undertaken by HGEA. The subgrade was formed of a combination of cut and fill.

Localised areas of soft soil over the subgrade within the cut area were identified during earthworks. These areas were excavated to 0.4m depth to competent material and backfilled with hard fill. Clegg testing was performed to verify the compaction of hardfill. The clegg impact values were typically greater than 18 for this compacted fill.

Dynamic Cone Penetrometer (DCP) testing, using a Scala penetrometer, and Static Cone Penetrometer (SCP) testing was performed over the road alignment to correlate the CBR of the access subgrade. Results of the DCP testing at the final subgrade level were typically greater than 6 blows per 100mm penetration, with results of the SCP testing averaging 25 kg/cm^2. These results indicate a California bearing Ratio (CBR) equivalent to 7 for the FNDC-vested road.

The field worksheets and site inspection records showing subgrade testing are attached to this report, see Appendix C.

6. Soil Expansivity (Shrink/Swell) Assessment

Soil expansivity is the result of soil column changes in volume as a response to variations in the soil's moisture content. This process occurs in clay-rich soils, a correlation is observed in clay soils where an increased moisture content causes swelling of the clay particles, and decreased moisture content results in the shrinkage of soil particles. Soil expansivity typically occurs in the upper 1.0m of the subsurface soil column but is also significantly dependent on clay content, moisture variation, soil compaction, and environmental factors.

Expansive soils can impact structures and infrastructure found within these soils. Management of expansive soils is required to mitigate against foundation movement, cracking and damage, differential settlement, and/or infrastructure damage.

We note that Atterberg Limit testing on Kerikeri Volcanic Group soils typically returns an extremely expansive result, which is not usually the case for these soils. The base minerals of basalt includes feldspar, pyroxene, and olivine which are a mix of hydrophilic and hydrophobic minerals comprising iron and magnesium, enabling the soils to absorb a greater amount of water without any change to overall soil structure. Shrink swell occurs when the soil is highly to extremely expansive in nature which is not the case in the Kerikeri Volcanic Group soils.

Based on our site observation during bulk earthworks and experience with similar soils, we consider the site soils align with the description of moderately expansive, Class **M** as described in AS2870:2011 clause 2.1.2.

7. Liquefaction

Liquefaction is a phenomenon where saturated low plasticity soils lose strength due to high pore pressure development during earthquake shaking. This generally occurs in loose to medium-dense, cohesionless soils such as sands and river deposited non-plastic silts, most common in low-lying and coastal areas with associated high groundwater tables. Liquefaction of near-surface soils typically results in surface cracking, dislocation, ground deformation, and lateral spreading.

Results of our previous subsoil investigation and observations during earthworks indicate that the site is underlain by residual weathered tuff silts, transitioning to weathered basalt rock which is inferred at depths from some 1.0m over the site.

Hand augured boreholes, shear vanes, and SPTs were undertaken in correspondence with a 'Level B' calibrated desktop assessment of liquefaction risk, as per the Planning and Engineering Guidance released by EQC, MBIE, and MfE in 2017 (PEG 2017). The assessment was completed to provide a significant reduction in the uncertainty level of liquefaction related risks.

We consider site generally to have a very low liquefaction damage vulnerability occurring at a rate of less than 1% during a 500-year earthquake event. A less concise categorisation of 'liquefaction damage is unlikely to occur' (occurrence at a rate of less than 15%) can apply to areas away from where subsoil investigation has been completed.

Groundwater was not encountered in any HA borehole and is inferred to be deeper than 2.0m below ground level (bgl) during wet seasonal fluctuations. No groundwater was encountered during earthworks.

No numerical analysis has been undertaken.

7.1. Lateral Spreading

Lateral spreading normally occurs along an open slope face such as a riverbank or steep coastal slopes, where loose, saturated sandy soils are commonly encountered at shallow depths. The effect of lateral spreading generally decreases with increased distance from the slope face.

The subject property has been earthwork to gentle to moderate slopes. There are no soils with high percentages of sand present, therefore it is considered highly unlikely to be at risk of lateral spreading.

8. Retaining Walls

The MagnumStone retaining walls over the property were designed and inspected by HGEA. The locality of the walls are illustrated on Sheets 02 and 03 of the R&B Earthworks As-Built, with wall details illustrated on Sheet 04.

The MagnumStone retaining walls have been designed to support a surcharge of 8kPa from either a dwelling, or driveway, and have an effective retained height of no more than 0.9m. The walls are designed to support a backslope sloping at no more than 1V:3.5H for the horizontal distance between 0.75m to 2.25m.

Future residential development over the subject property, specifically that undertaken within lots containing these retaining walls shall comply with the setbacks from the front face of the wall shall comply with those specified on Sheet 04 of the R&B Earthworks As-Built drawings. Consent conditions shall be placed on lots supported by these walls to ensure compliance with the above-mentioned setback requirements.

HGEA has undertaken inspections of the walls during the earthwork operations. These inspections comprised verification of founding soil conditions, retained soils conditions, verification of the effective retained height, placement of drain coils, placement of blocks (including extenders), and verification of the slope batters above and below the retaining wall, and backfill within magnum stone blocks. Inspections of the wall were undertaken between 18/01/2023 and 04/09/2023.

A Producer Statement Construction Review (PS4) has been prepared and will be provided to comply with the Building Consent Exemption condition issued by FNDC.

A copy of the PS4 and associated schedule are attached to this report, see Appendix E.

9. Recommendations and Conclusions

9.1. Stability

All lots have been formed at stable gradients, with engineered fill and excavation either battered to suitable grades or supported by Magnum Stone retaining walls.

All retaining walls over the property have been constructed in accordance with the design provided by HGEA. The walls have been designed to resist the lateral earth pressures from soils, and to support an 8kPa surcharge load from any future residential development.

Development over the site is considered isolated from, and not subject to, any instability.

We conclude the building platforms over each Lot are considered stable and suitable for residential development.

9.2. Earthworks

Earthworks over the development subject of this report were monitored by HGEA over the period October 2022 to September 2023.

All fill placed during this period was placed in accordance with NZS4431:2022 and achieved the engineering specification as set by HGEA. The fill is therefore considered suitable for light weight, residential development.

A copy of the “Schedule 2a, NZS4431:2022, statement of professional option on land suitability” is attached to this report, see Appendix F.

9.3. Foundations

The property is underlain by both in-situ soils and site-won engineered fill, comprised of very stiff to hard silts/clayey silts.

The undrained shear strength measured within the in-situ soils and engineered fill were all greater than 140kPa, yielding the ultimate geotechnical bearing capacity of 300kPa.

Site soils are considered suitable for residential development supported over shallow-type foundations. Site soils are assessed as moderately expansive, class M, therefore foundation design shall account for the potential shrink/swell of these soils.

Should specific engineering design be adopted, the following parameters are suitable:

- Unit Weight (γ) = 18kN/m³
- Cohesion (C) = 4kPa
- Internal friction angle (ϕ’) = 28°
- Ultimate geotechnical bearing capacity = 300kPa
- Ultimate limit state soil strength reduction factor = 0.5

The design of foundations shall adhere to the consent notice conditions, as specified in Section 8.0 of this report, and detailed on the R&B Earthworks As-Built drawings.

9.4. RMA Section 106(1)

Based on the conclusions drawn in this report and subject to our recommendations on earthworks, retaining, and foundations, we consider that the risk of future hazards including subsidence and slippage affecting the property is low, and in terms of Section 106(1) of the RMA:

a) the land in respect of which a consent is sought, or any structure on the land, is not, and is not likely to be, subject to material damage by slippage or subsidence from any source; and

b) repealed,

c) that sufficient provision has been made for stable physical access to each allotment to be created by the subdivision.

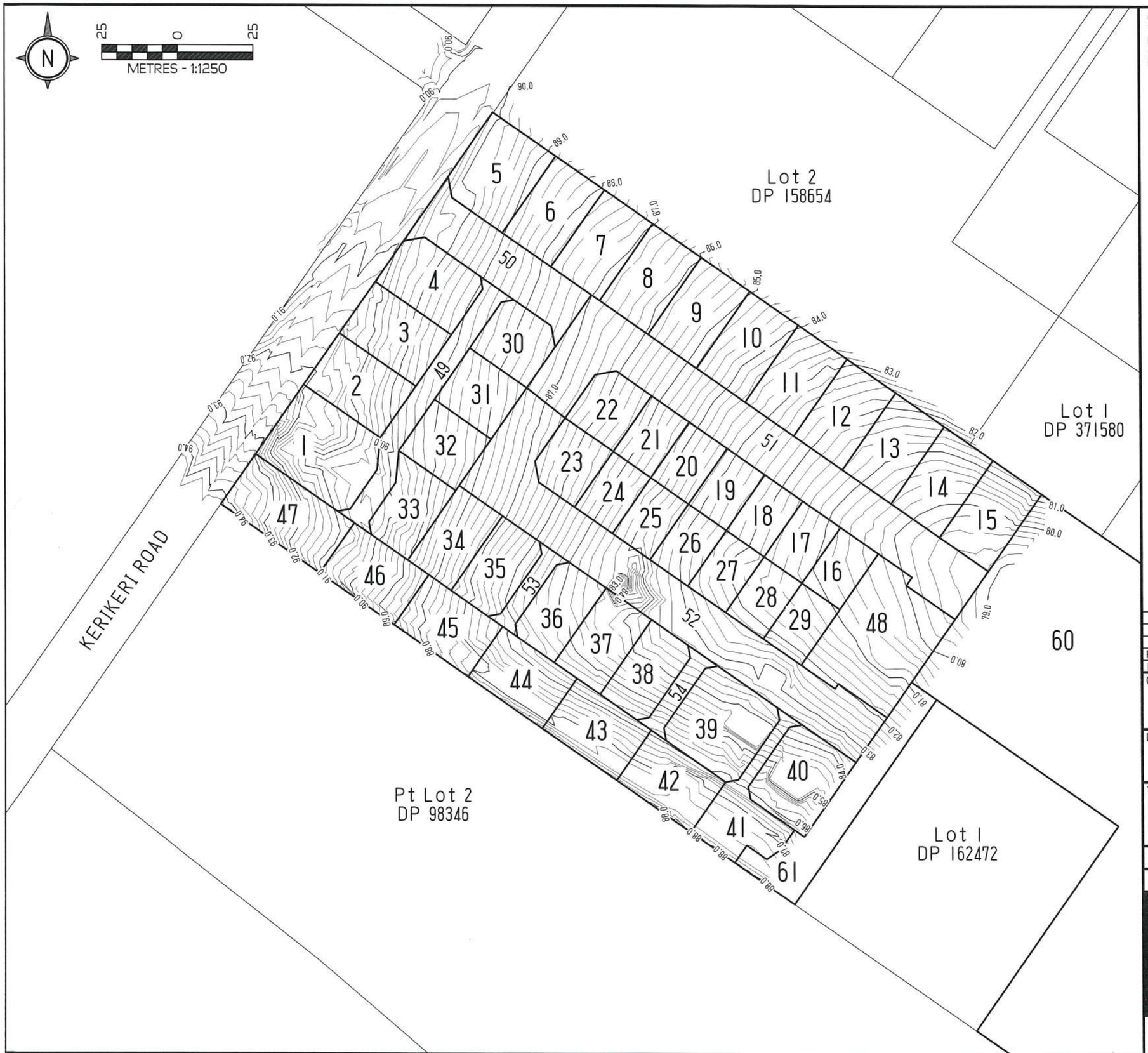
10. Limitation

Recommendations and opinions in this report are based on data from the investigation described herein. The nature and continuity of subsoil conditions away from the boreholes is inferred and it is possible that actual conditions could vary from those assumed. Should subsoil conditions vary from those described in this report, it is essential that Hawthorn Geddes engineers and architects ltd be contacted to confirm the applicability of the recommendations.

This report has been prepared solely for the benefit of our client Traverse Ltd and the Far North District Council for which this report has been prepared.

The comments in it are limited to the purpose stated in this report. No liability is accepted by Hawthorn Geddes engineers & architects ltd in respect of its use by any other person, and any other person who relies upon any matter contained in this report does so entirely at their own risk.

Appendix A – Reyburn and Bryant As-built drawings



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LEVELS IN TERMS OF: ONE TREE POINT (1964) DATUM

Approved by
Hawthorn Geddes Engineers & Architects Ltd
in relation to Earthworks completion
HG Ref. 12546
Signed ..... Dated 12/4/24
Hawthorn Geddes
engineers & architects ltd

SHEET SCHEDULE

ORIGINAL CONTOURS	-	SHEET 1
FINAL CONTOURS	-	SHEET 2
CUT/FILL PLAN	-	SHEET 3
RETAINING WALL DETAILS	-	SHEET 4

REV	DATE	AMENDMENTS
A	26-03-24	FIRST ISSUE - CK/SB

REF. DATA:

CLIENT
TRAVERSE DEVELOPMENT LTD
373 & 377 KERIKERI ROAD, KERIKERI

DESCRIPTION
LOTS 1-52, 60 & 61 BEING A SUBDIVISION OF
LOT 1 DP 25752 & PART LOT 2 DP 86081

TITLE
EARTHWORKS ASBUILT
ORIGINAL CONTOURS

SCALE: 1:1250 @A3

COUNCIL REFERENCE: 2220850-RMACOM

reyburn & bryant
Ph: 09 438 3563
PO Box 191, Whangarei 0140
7 Selwyn Ave, Whangarei
www.reyburnandbryant.co.nz

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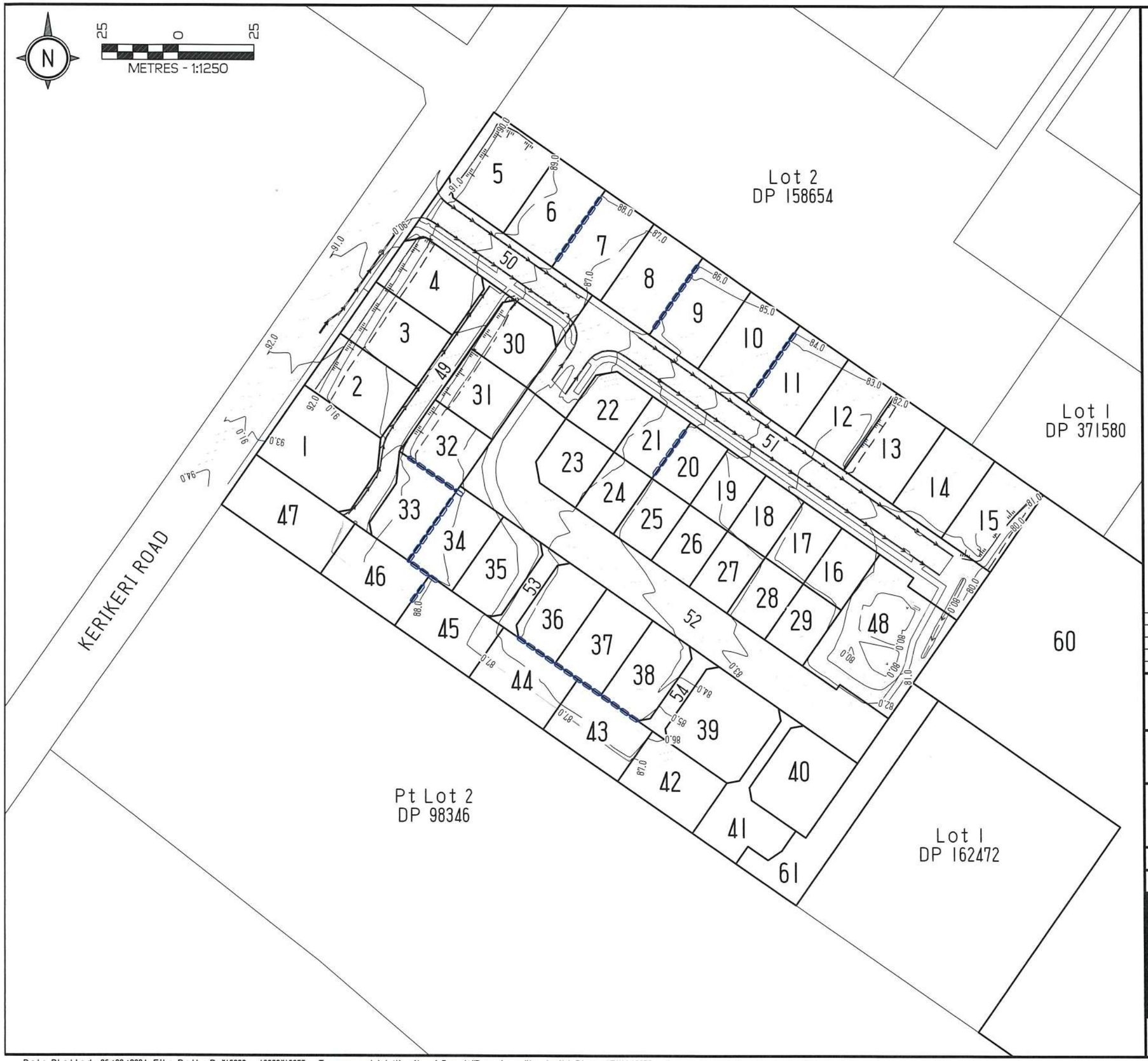

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HG Ref. 12546
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NEW MAGNUMSTONE RETAINING WALL

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SCALE: 1:1250 @A3

COUNCIL REFERENCE: 2220850-RMACOM

reyburn & bryant
Ph: 09 438 3563
7 Selwyn Ave, Whangarei
PO Box 191, Whangarei 0140
www.reyburnandbryant.co.nz

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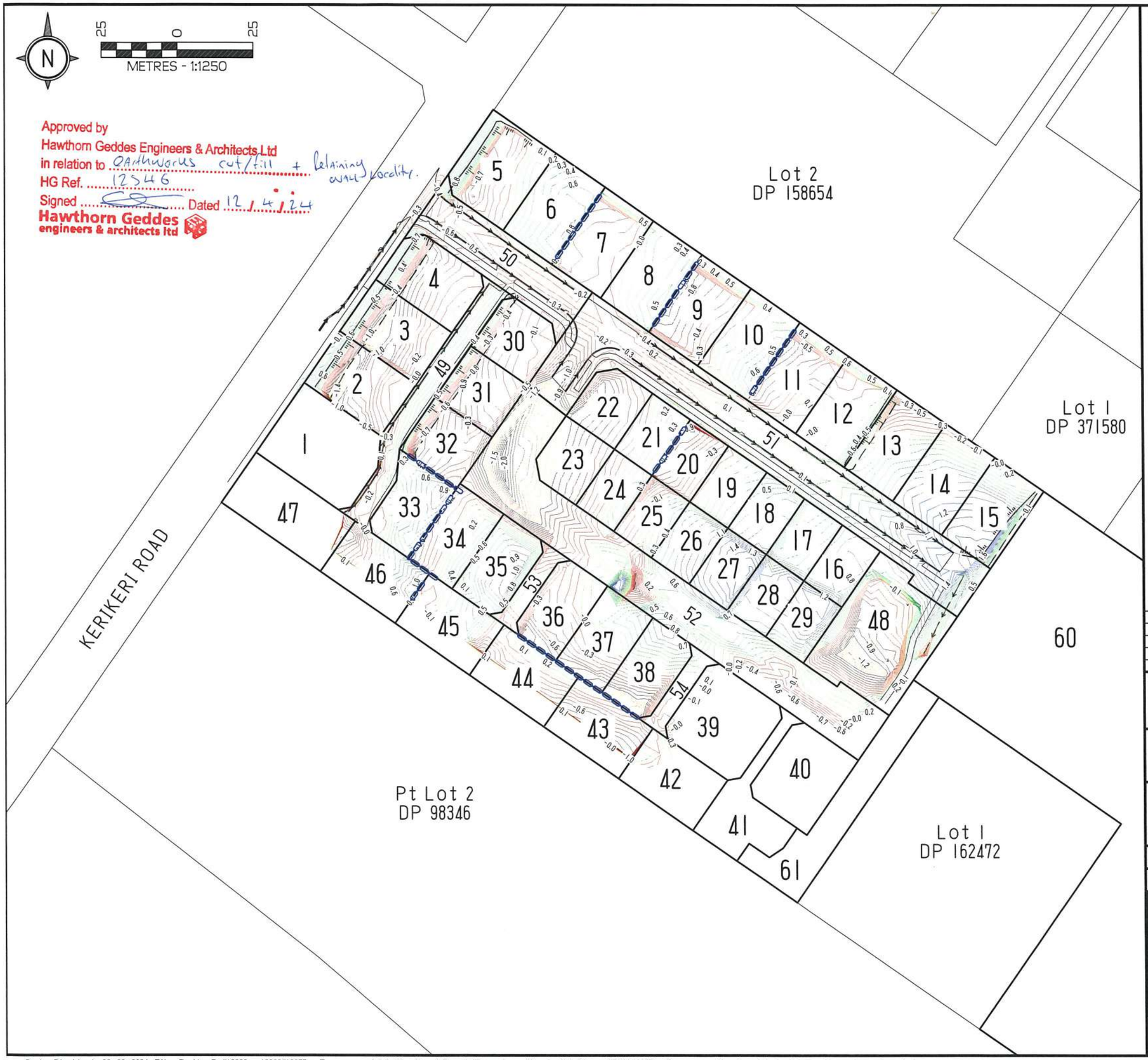
EWA16655	02 OF 04	A



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LEVELS IN TERMS OF: ONE TREE POINT (1964) DATUM

DEPTH OF FILL:

+0.00	+0.10
+0.10	+0.20
+0.20	+0.30
+0.30	+0.40
+0.40	+0.50
+0.50	+0.60
+0.60	+0.70
+0.70	+0.80
+0.80	+0.90
+0.90	+1.00
+1.00	+1.10
+1.10	+1.20
+1.20	+1.30
+1.30	+1.40
+1.40	+1.50
+1.50	+1.60
+1.60	+1.70
+1.70	+1.80

DEPTH OF CUT:

-0.00	-0.10
-0.10	-0.20
-0.20	-0.30
-0.30	-0.40
-0.40	-0.50
-0.50	-0.60
-0.60	-0.70
-0.70	-0.80
-0.80	-0.90
-0.90	-1.00
-1.00	-1.10
-1.10	-1.20
-1.20	-1.30
-1.30	-1.40
-1.40	-1.50
-1.50	-1.60
-1.70	-1.80
-1.80	-1.90
-1.90	-2.00

NEW MAGNUMSTONE RETAINING WALL

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TITLE
EARTHWORKS ASBUILT
FINAL CUT/FILL

SCALE: 1:1250 @A3

COUNCIL REFERENCE: 2220850-RMACOM

reyburn & bryant
Ph: 09 438 3563
7 Selwyn Ave, Whangarei
PO Box 191, Whangarei 0140
www.reyburnandbryant.co.nz

DRAWING REF. EWA16655 | SHEET 03 OF 04 | REV A

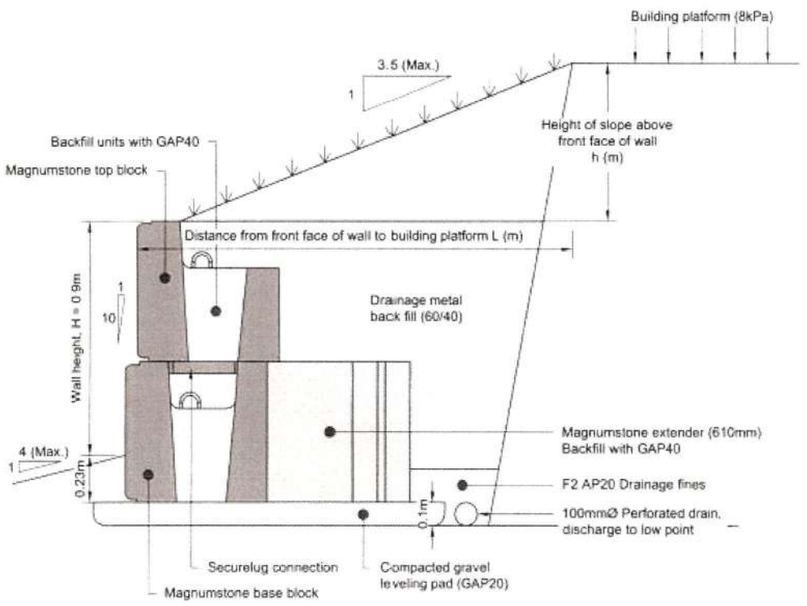
NOTES:

1. THE DIMENSIONING OF THE WALLS SHALL NOT BE MODIFIED DURING FUTURE DEVELOPMENT WITHOUT CONSULTING THE DESIGN ENGINEER, I.E CHANGING THE L (M) DIMENSION OR SHIFTING SURCHARGE LOAD CLOSER TO THE WALL.
2. THE MAGNUMSTONE UNITS ARE MODULAR AND SHOULD FUTURE DEVELOPMENT PROPOSE MODIFYING SITE CONDITIONS, THE WALL WILL ENABLE MODIFICATION (ADDITIONAL BLOCKS/EXTENDERS) TO CATER TO DESIGN LOAD CHANGES. THIS SHALL BE SUBJECT TO SPECIFIC ENGINEERING DESIGN.

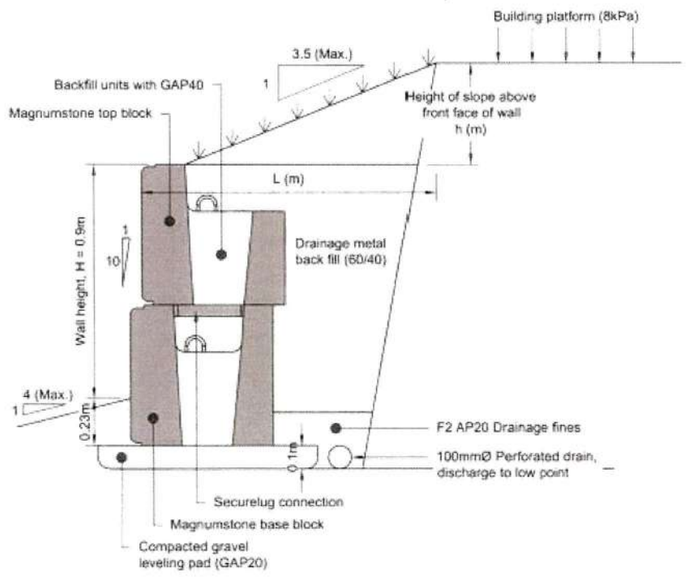
THIS DRAWING WAS PRODUCED IN COLOUR. DO NOT USE FOR CONSTRUCTION PURPOSES IF THIS NOTE IS IN BLACK & WHITE

Wall	L (m)	h (m)
A	0.75	0.2
B	1.25	0.4
C	1.25	0.4
F	1.25	0.4
H	1.5	0.4

Wall	L (m)	h (m)
D	2.0	0.6
E	1.75	0.5
G	2.25	0.65



TYPICAL RETAINING WALL CROSS SECTION - WITH EXTENDER BLOCK
NOT TO SCALE (WALLS A, B, C, F & H)



TYPICAL RETAINING WALL CROSS SECTION - WITHOUT EXTENDER BLOCK
NOT TO SCALE (WALLS D, E & G)

USE WRITTEN DIMENSIONS. DO NOT SCALE FROM DRAWING.

Hawthorn Geddes engineers & architects ltd
7 Selwyn Avenue, Whangarei 0110, Phone 09 438 7139, hg@hgea.co.nz
Unit 21a, The Grange, Warkworth 0910, Phone 09 283 3428, www.hawthorngeddes.co.nz

CLIENT: TRAVERSE DEVELOPMENTS
PROJECT: SUBDIVISION
373 KERIKERI ROAD, KERIKERI
DRAWING: TYPICAL RETAINING WALL CROSS SECTION

C1 ISSUED FOR CONSTRUCTION MS 11/10/22
REV REVISION DETAILS BY DATE

CONSTRUCTION — SCALE @ A1 AS SHOWN
DRAWN MS SEP 2022 — PROJECT No. 12546
CHECK
APPROVED JAMES BLACKBURN — SHEET C02 — REV C1

11/10/2022 2:23:36 PM K:\12546 Traverse Developments - Subdivision Due Diligence - 373 Kerikeri Road, Kerikeri\12546 220923 Retaining Wall Details - For Construction.dwg

CAUTION:
THIS DRAWING SHOULD NOT BE AMENDED MANUALLY AND IS COPYRIGHT TO REYBURN & BRYANT (1999) LIMITED. DO NOT SCALE OFF DRAWINGS.
COORDINATES IN TERMS OF: NZ TRANSVERSE MERCATOR 2000
LEVELS IN TERMS OF: ONE TREE POINT (1964) DATUM

Approved by
Hawthorn Geddes Engineers & Architects Ltd
in relation to Retaining WALLS
HG Ref. 12546
Signed ..... Dated 11/4/24
Hawthorn Geddes engineers & architects ltd
future development to comply with setbacks

REV	DATE	AMENDMENTS
A	26-03-24	FIRST ISSUE - CK/SB

REF. DATA:

CLIENT: TRAVERSE DEVELOPMENT LTD
373 & 377 KERIKERI ROAD, KERIKERI

DESCRIPTION: LOTS 1-52, 60 & 61 BEING A SUBDIVISION OF LOT 1 DP 25752 & PART LOT 2 DP 86081

TITLE: EARTHWORKS ASBUILT
RETAINING WALL DETAILS

NOT TO SCALE

COUNCIL REFERENCE: 2220850-RMACOM

reyburn & bryant
Ph: 09 438 3563
PO Box 191, Whangarei 0140
7 Selwyn Ave, Whangarei
www.reyburnandbryant.co.nz

DRAWING REF. EWA16655 — SHEET 04 OF 04 — REV A

Date Plotted: 26/03/2024 File Path: P:¥16000 - 16999¥16655 - Traverse Ltd (Kerikeri Road)¥Drawings¥As-built Plans¥EWA16655 - Traverse Kerikeri Asbuilt Earthworks - Rev A.dwg

Appendix B – Babbage Laboratory Test Results

Babbage Geotechnical Laboratory
Level 4
68 Beach Road
Auckland 1010
Telephone
E-mail

P O Box 2027
New Zealand
64-9-367 4954
wec@babbage.co.nz

Please reply to: W.E. Campton

Hawthorn Geddes
PO Box 575
Whangarei 0140

Job Number: 65171#L
BGL Registration Number: 2959
Checked by: WEC

Attention: **CALLUM SANDS**

20th October 2022

DRY DENSITY / WATER CONTENT RELATIONSHIP (COMPACTION CURVE) TESTING

Dear Sir,

Re: TRAVERSE, KERIKERI

Your Reference: 12546
Report Number: 65171#L/CC Traverse, Kerikeri

The following report presents the results of compaction curve testing at BGL of a bulk soil sample delivered to this laboratory on the 14th of October 2022. Test results are summarised below, with page 3 showing a graph and detailed results.

A single shear vane test was carried out on each compacted sample while it was still in the proctor mould, and these results are included on the results table and water content / density graph. The shear vane results are included for your information only, and are not included in the IANZ endorsement for this report.

Test standards used were:

Water Content:	NZS4402:1986:Test 2.1
NZ Standard Compaction:	NZS4402:1986:Test 4.1.1
Vane Shear Strength:	NZ Geotechnical Society Guideline 2001

Sample Details	Maximum Dry Density (t/m^3)	Optimum Water Content (%)	Natural Water Content (%)
BULK	**1.23**	**41**	**41.2**
	SILT, clayey, moderately plastic, dark brown, moist.		

Note that sample descriptions are not part of BGL IANZ Accreditation.

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. As per the reporting requirements of NZS4402: 1986: Test 4.1.1: New Zealand Standard Compaction Test, maximum dry density is reported to the nearest 0.01t/m^3, optimum water content is reported to the nearest 0.2% for values below 5%, to the nearest 0.5% for values from 5 to 10%, and to the nearest whole number for values greater than 10%.

For calculating the air voids percentages a solid density of 2.68t/m^3 was assumed for this test. Note that this assumed value is not part of the IANZ endorsement for this report.

Please note that the test results relate only to the sample as-received, and relate only to the sample under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
Key Technical Person
Assistant Laboratory Manager
Babbage Geotechnical Laboratory

ACCREDITED
IANZ
TESTING LABORATORY
№ 126

BGL Babbage Geotechnical Laboratory	Job No:	65171#L	Reg. No:	2959	Page 3 of 3
					Version No: 4
	Report No:	65171#L/CC Traverse, Kerikeri			Issue Date: July 2022
	PROJECT:	TRAVERSE, KERIKERI			

Determination of the Dry Density / Water Content Relationship by Standard Compaction	Tested By:	WEC	October 2022
	Compiled By:	WEC	20/10/2022
Test Method: NZS4402: 1986: Test 4.1.1	Checked By:	JF	20/10/2022

Sample No: BULK **Sample Depth: -**

Sample History:	Air-dried and wetted from natural water content
Compaction Used:	New Zealand Standard Compaction
Test Performed On:	Whole Soil / ~~Fraction Passing the 19mm Sieve~~
Solid Density of Soil Particles:	2.68 t/m^3 (~~measured~~ / assumed)

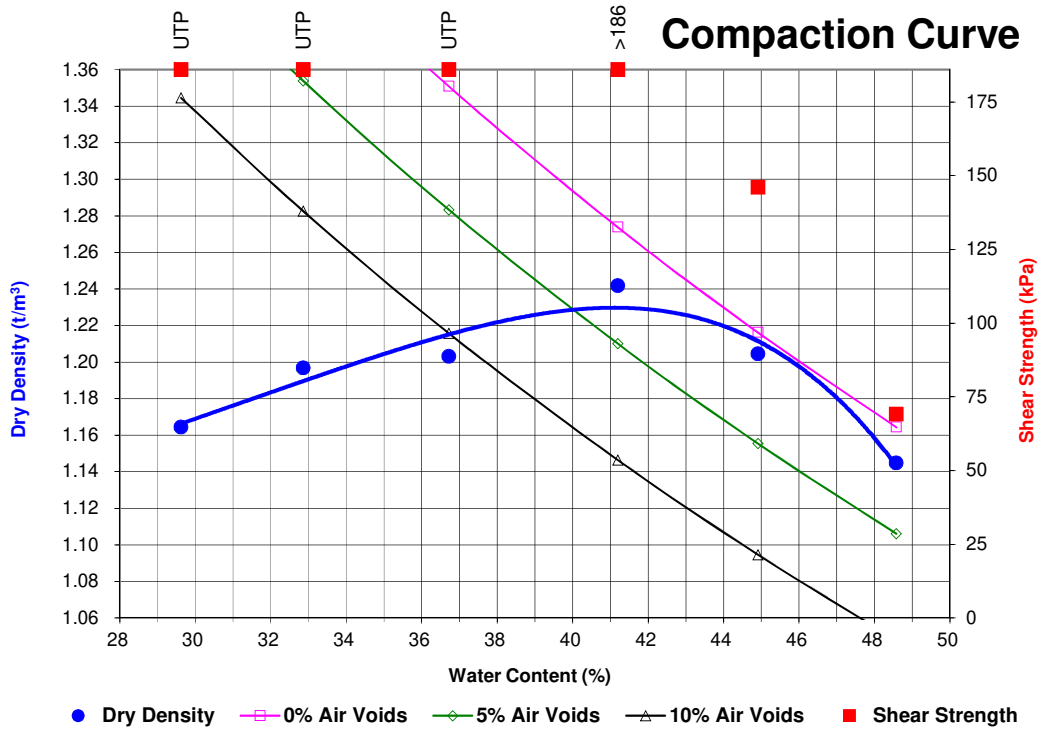
Natural Water Content (%): 41.2

TEST RESULTS

Water Content (%)	29.6	32.9	36.7	41.2	44.9	48.6
Bulk Density (t/m^3)	1.51	1.59	1.64	1.75	1.75	1.70
Dry Density (t/m^3)	1.16	1.20	1.20	1.24	1.20	1.14
Air Voids (%)	22.1	16.0	10.9	2.5	1.0	1.7
Shear Strength (kPa)	UTP*	UTP*	UTP*	>186	146	69

**UTP = unable to penetrate sample with the shear vane.*

Maximum Dry Density:	1.23 t/m^3	Optimum Water Content:	41 %



Appendix C – Site Inspection Reports, and NDM Test Results

Date: 12.04.2024
HG ref.:12546

Hawthorn Geddes
engineers & architects ltd

Inspection Report

Date: 20/10/22

Project: Traverse Ltd - Subdivision

Project Number: 12546

Client: Traverse Ltd

Contractor: Mason Construction

Inspector: GS

Inspection Number: (1)

Time on site: 2:20 pm

Time off site: 3:30 pm

Weather: SUNNY

Ground conditions: Moist

Description of works in progress:

~~Ma~~ Excavating stormwater retention pond.

Inspecting:

Fill ~~sand~~ around stormwater retention Pond.

Instructions to contractor:

Test results were pass with air voids less than 8%. therefore. OK to proceed.

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

Date: 20/6/22

Job Name: Travers
Job Number: 12546

Tested By: GS
Checked By:

Sample Ref	TS1	TS2	TS3	
Container #	D	K	B	
Mass Container (kg) (M_1)	87.9	89.5	84.4	
Mass Container and Wet Soil (M_2)	194.5	899.3	1005.1	
Mass Container and Dry Soil (M_3)	819.0	677.6	740.0	
Moisture Content (%)	37.6%	37.7%	40.2%	

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 20/10/22
Project: TRAVERSE
Client:
Contractor's Rep:

Project Number: 12546
Contractor:
Plant:

Inspector: GS
Time on site: 2:25
Weather: SUNNY

Inspection Number: ①
Time off site:
Ground condition: moist

Density Standard Count

Moisture Standard Count

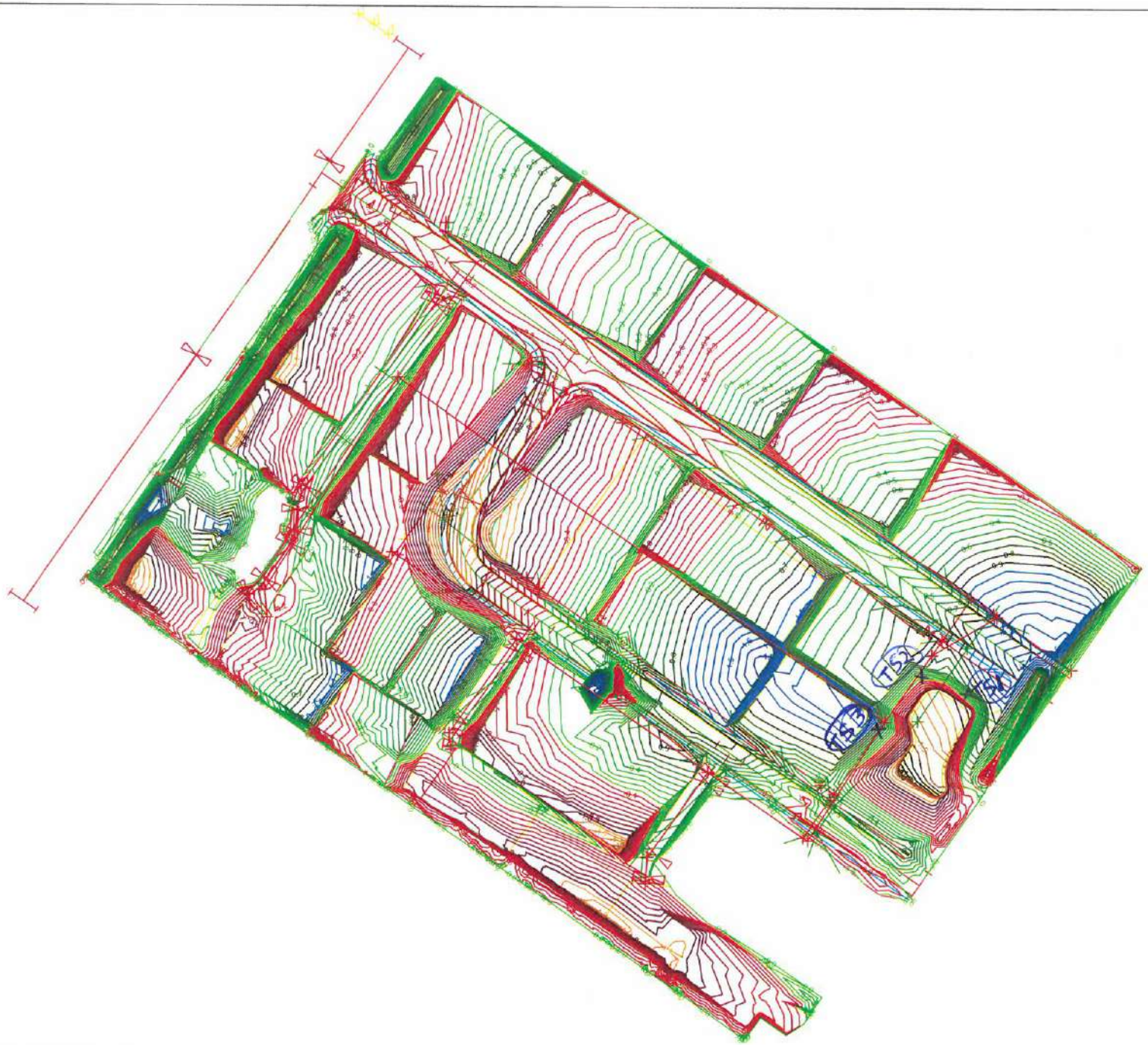
Shear Vane DR 4604

Solid Density 2.68 Bulk density 1.75t/m3

Test Reference	TS1	TS2	TS3	
Depth of Probe (mm)	300mm	–	–	
Level (m)	1st lift	–	–	
Material Description	clayey SILT	–	–	
Wet Density (t/m³)	1906.7	1901.2	1882.9	
Moisture Content (%)	42.5/37.66%	40.9/37.7%	42.0/40.2%	
Dry Density (t/m³)	1338.0	1349.6	1325.8	
Air Voids (%)	-7.43/-3.3%	-6.2/-3.5%	-5.86/-4.1%	
Shear Vane (kPa)	140+, 140+ UTP	UTP / 140+	140+, UTP	
Location of Test				

-1.0m 76.5 77.1 75.8

Instructions to contractor:



16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022

Hawthorn Geddes
engineers & architects ltd

Inspection Report

Date: 26/10/22

Project: 373 Kosi Kosi Rd, Kosi Kosi

Project Number: 12546

Client: Traverse Ltd.

Contractor: Mason Construction

Inspector: GS

Inspection Number: (2)

Time on site: 12:45 pm

Time off site: 1:45pm

Weather: Sunny

Ground conditions: moist

Description of works in progress:

Compacting fill north west of retention pond.

Inspecting:

Compaction of fill

Instructions to contractor:

Tests were pass.

Contractors discussed about natural tree roots in ground, Considering the size, and numbers of roots, we consider decomposition of these roots will likely have an insignificant effect on foundations.

Attached site plan shows the location of NDM testing.

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

Date: 26/10/22

Job Name: Traverse
Job Number: 12546

Tested By: GS
Checked By:

Sample Ref	TS1	TS3	TS4	
Container #	J	L	C	
Mass Container (kg) (M_1)	84.7	86.9	87.4	
Mass Container and Wet Soil (M_2)	1250.0	959.4	835.2	
Mass Container and Dry Soil (M_3)	928.8	724.3	640.8	
Moisture Content (%)	38.0%	36.88%	35.2%	

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 26/10/22

Project:

Project Number: 12546

Client:

Contractor:

Contractor's Rep:

Plant:

Inspector: GS

Inspection Number:

Time on site: 12:30

Time off site:

Weather: SUNNY

Ground condition:

Density Standard Count

Shear Vane

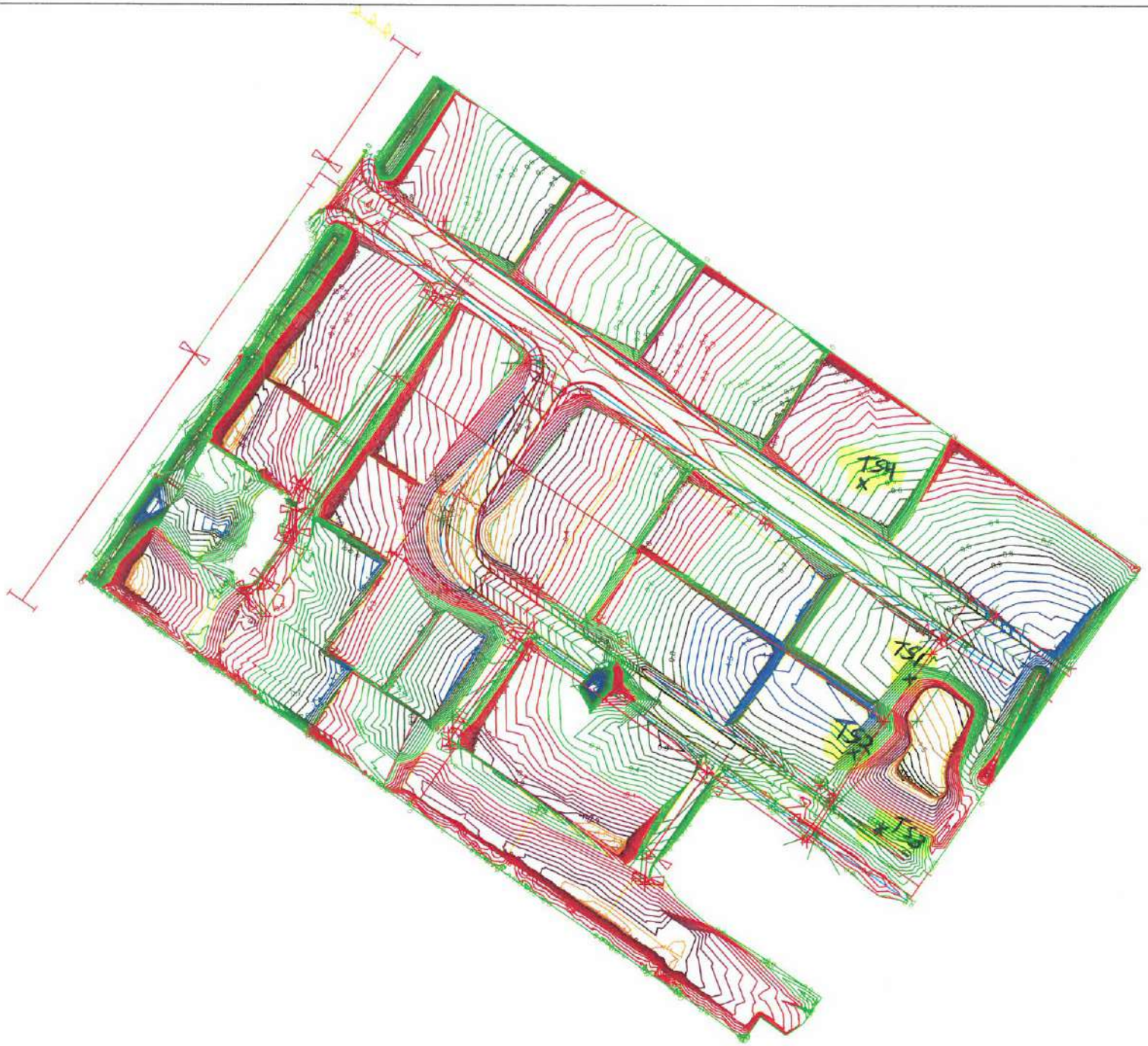
Moisture Standard Count

Solid Density

Test Reference	TS1	TS2	TS3	TS4
Depth of Probe (mm)	300 mm	–	–	–
Level (m)	Retention pond bund some 0.8-1.0m high	–	First lift	– poor lot
Material Description	SILT, some clay, wet	–	–	–
Wet Density (t/m³)	1796.7	1803.0	1700.4	1828.6
Moisture Content (%)	39.5/38.0%	42.9	43.9/36.9%	41.0/35.2%
Dry Density (t/m³)	1287.6/1302	1261.4	1185.3	1297.3/1.352
Air Voids (%)	0.98/1.95%	-1.34/1.60	4.15/7.79%	-1.66/1.96
Shear Vane (kPa)	UTP	120, 140+ UTP	UTP	UTP
Location of Test				

Instructions to contractor:

RL 73.6 72.1 67.7 74.6



16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022


CASE
COOPER


HITACHI


figure showing

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 3/11/2022
Project: Traverse
Client:
Contractor's Rep: Mason Contractors

Project Number: 12546
Contractor:
Plant:

Inspector: KB
Time on site: 12.20pm
Weather: Drizzle

Inspection Number: 3
Time off site: 1.15pm
Ground condition: Wet

Density Standard Count

Shear Vane 287

Moisture Standard Count 1750

Solid Density 2.68

Test Reference	1	2	3	4
Depth of Probe (mm)	300 →	→	→	→
Level (m)			Final level →	→
Material Description	Fill →	→	→	→
Wet Density (t/m^3)	1884.4	1810.8	1896.8	1832.4
Moisture Content (%)	44.7 / 45.28	46.5 / 42.07	40.7 / 36.73	45.7 / 39.55
Dry Density (t/m^3)	1502.4	1235.8	1348.3	1257.3
Air Voids (%)	-6.78 / -7.11	-3.61 / -1.19	-5.18 / -2.73	-4.38 / -0.91
Shear Vane (kPa)	80-100	80-100	UTP	UTP
Location of Test Check plan attached	× 1	× 2	× 3	× 4
%. PR	72.4	68.7	74.9	69.8

Instructions to contractor:

Inspection Report

Hawthorn Geddes
engineers & architects ltd

Date: 3/11/2022
Project: Traverse
Client:

Project Number: 12546
Contractor: Mason Contractors

Inspector: KB
Time on site: 12.20pm
Weather: Drizzle

Inspection Number: 3
Time off site: 1.15pm
Ground condition: Wet.

Description of works in progress:

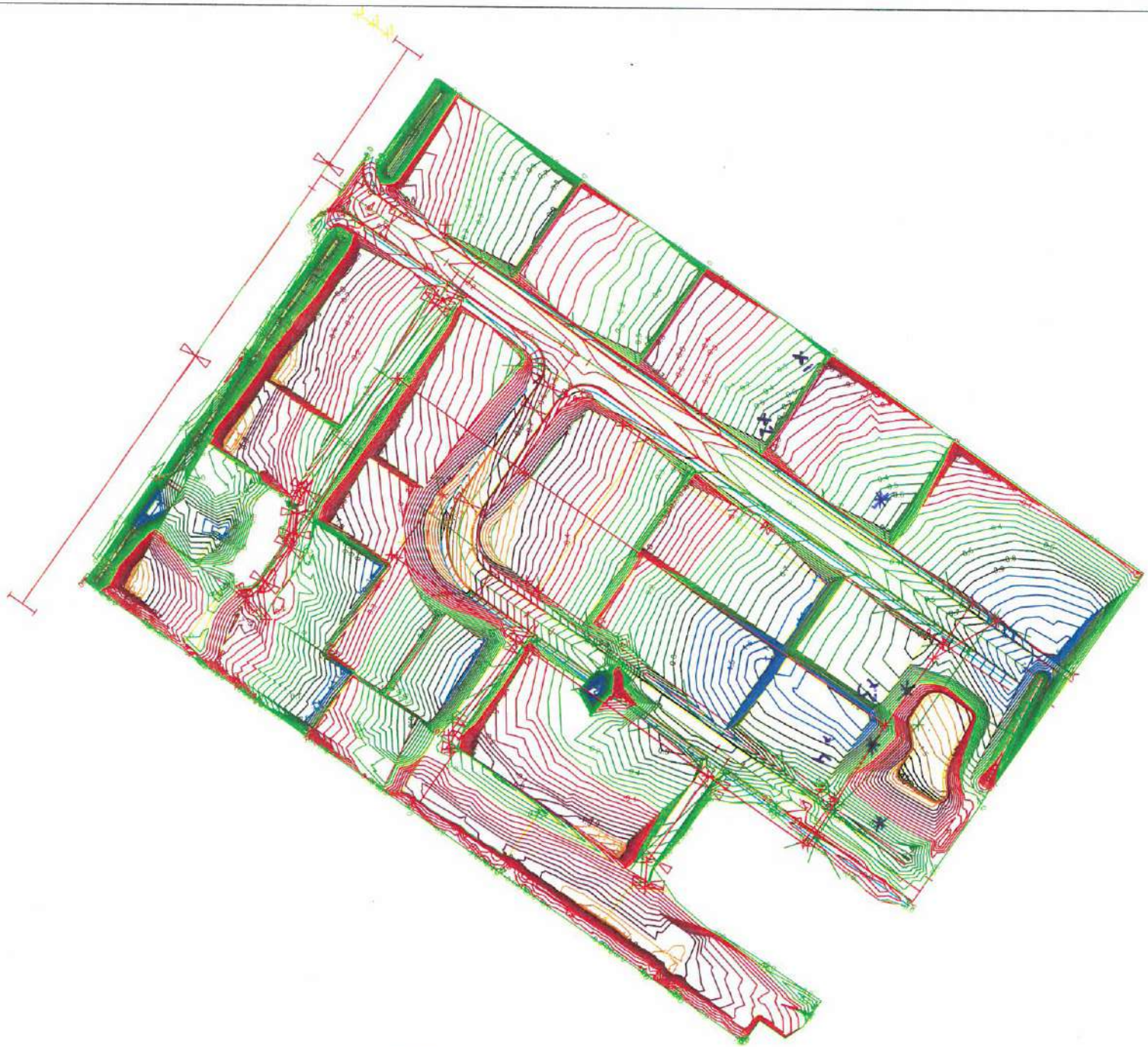
Compaction of fill

Inspecting:

NDM testing areas.
- Require air voids to be <8%.

Instructions to contractor:

All areas pass, good to go with next stage.



16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 18:59:24 2022

Hawthorn Geddes
engineers & architects ltd

Inspection Report

Date: 10/11/22

Project: Traverse Ltd - 373 Kaikerifd.

Project Number: 12546

Client: Traverse Ltd.

Contractor:

Inspector: GS

Inspection Number: (9)

Time on site: 1:00 pm

Time off site: 1:50 pm

Weather: Cloudy

Ground conditions: Moist

Description of works in progress:

Filling over the lot close to Kaikeri Rd.

Inspecting:

Fill compaction, see attached plan for location.

Instructions to contractor:

All tests were pass with air voids less than 2%.

OK to proceed.

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

Date: 10/11/22

Job Name: Taurus
Job Number: 12546

Tested By: GS
Checked By:

Sample Ref	TS1	TS2	TS3	
Container #	C	J	f	
Mass Container (kg) (M_1)	87.4	84.6	86.2	
Mass Container and Wet Soil (M_2)	990.0	940.3	856.3	
Mass Container and Dry Soil (M_3)	734.9	698.8	641.2	
Moisture Content (%)	39.40%	39.3%	38.8%	

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 10/11/22
Project: Transit
Client:
Contractor's Rep:

Project Number: 12546
Contractor: Matsons Construction
Plant:

Inspector: GS
Time on site: 1:00pm
Weather:

Inspection Number:
Time off site:
Ground condition:

Density Standard Count

Moisture Standard Count

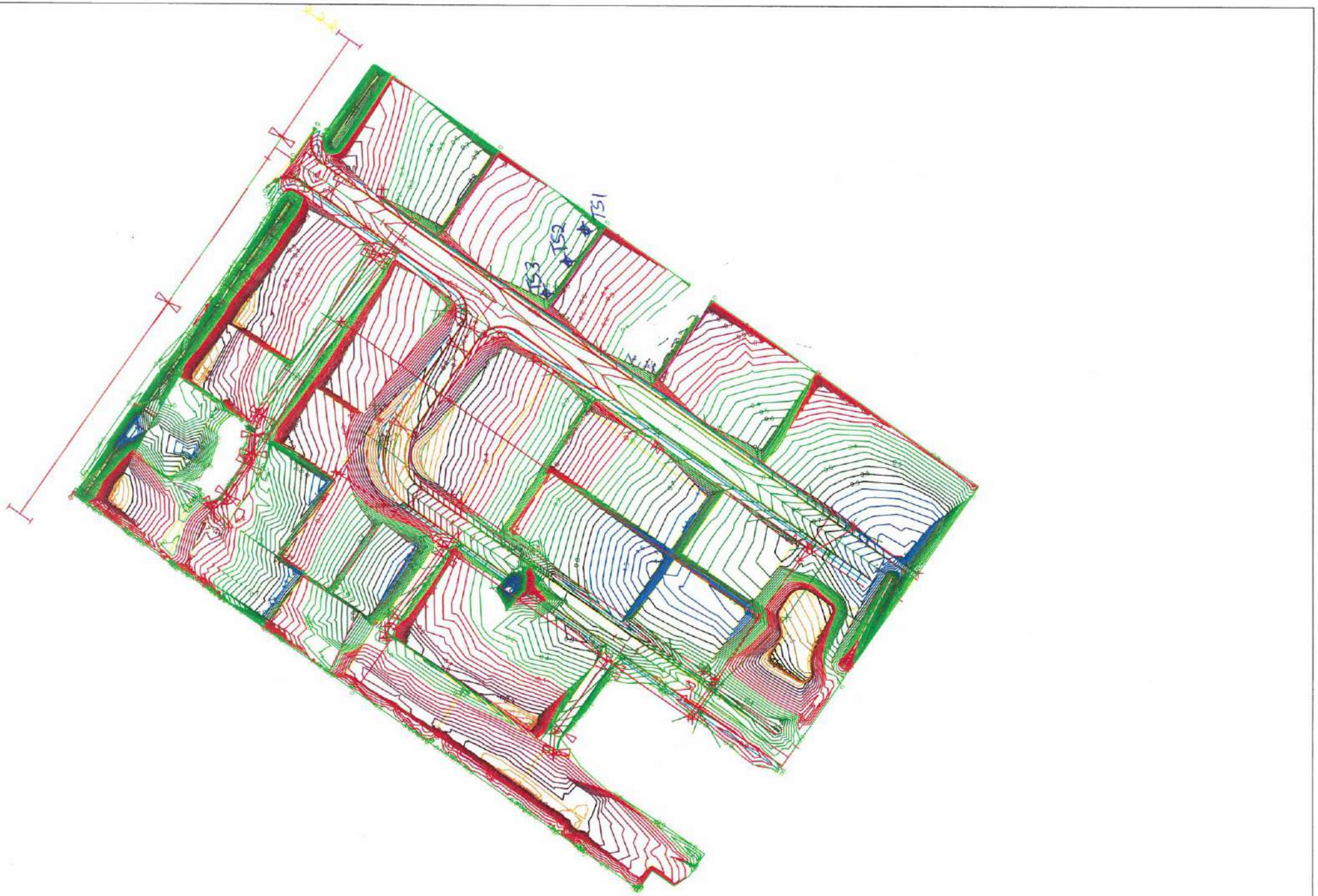
Shear Vane

Solid Density

Test Reference	TS1	TS2	TS3	
Depth of Probe (mm)	300mm	–	–	
Level (m)	Finish level	–	–	
Material Description	GLCT, Sand, w Fines	–	–	
Wet Density (t/m³)	1839.7	1888.8	1904.4	
Moisture Content (%)	40.1 / 39.4	41.5 / 39.3	47.3 / 38.8%	
Dry Density (t/m³)	1313.4	1334.5	1292.6	
Air Voids (%)	-1.76% / -1%	-5.35 / -3.5%	-9.54 / -4.43	
Shear Vane (kPa)				
Location of Test				

J.R 75.1 73.9

Instructions to contractor:



16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022


TS1
TS2
TS3

Hawthorn Geddes
engineers & architects ltd

Inspection Report

Date: 18/11/22

Project: Traverse Ltd - 373 Kesikesi Rd, Kesikesi

Project Number: 12546

Client: Traverse Ltd

Contractor: Mason Constructions

Inspector: GS

Inspection Number:

Time on site: 10:00 a.m.

Time off site: 11:00 a.m.

Weather: Cloudy / Showers

Ground conditions: Wet

Description of works in progress:

Finished compaction along western portion of site.

Inspecting:

Fill compaction over lot 5 (northwestern lot close to Kesikesi road)

Instructions to contractor:

Test pas pass with air voids of 0%

OK to proceed.

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 18/11/22

Project: | Project Number: 12546

Client: | Contractor:

Contractor's Rep: | Plant:

Inspector: GS | Inspection Number:

Time on site: | Time off site:

Weather: | Ground condition:

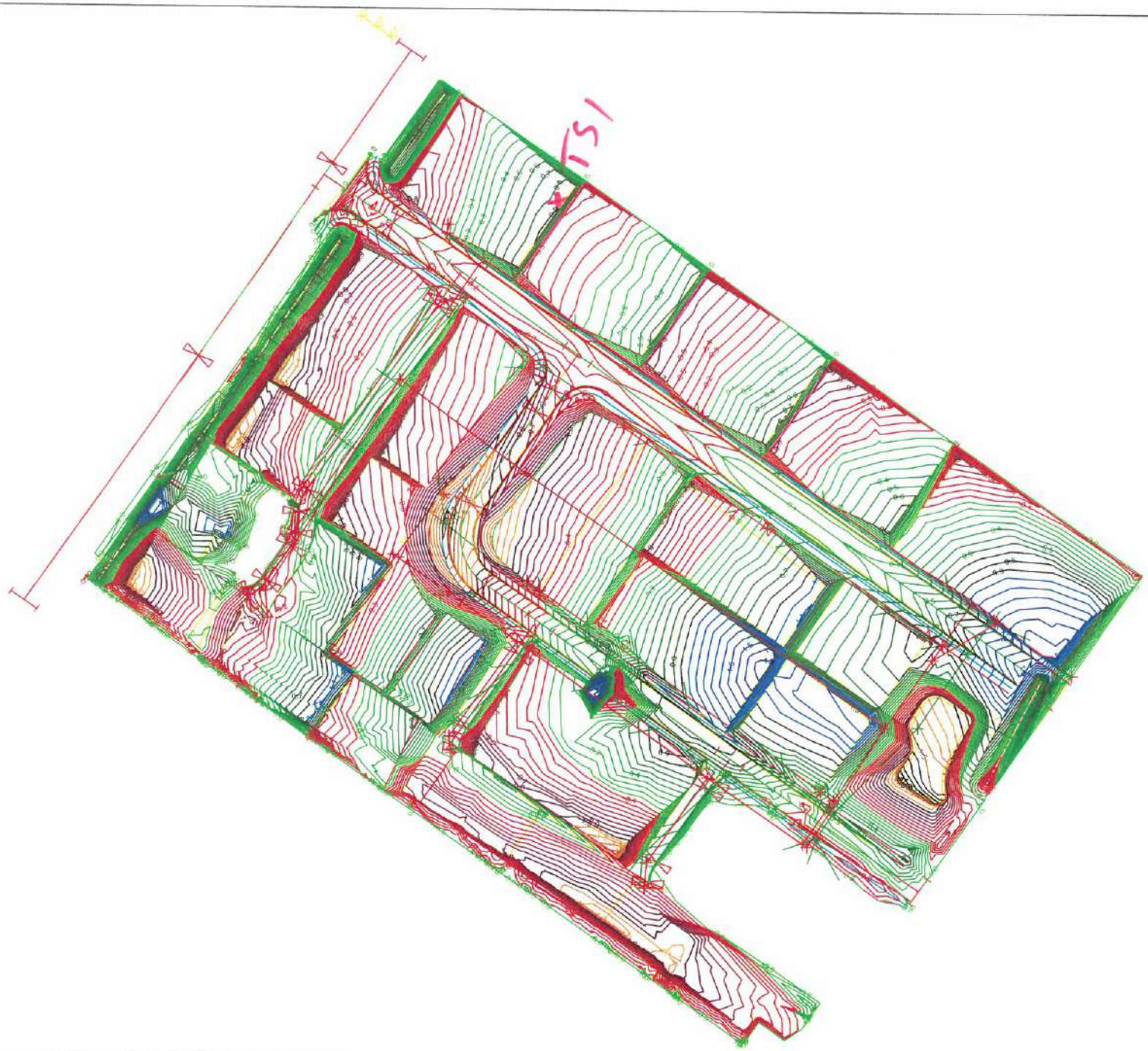
Density Standard Count | Shear Vane

Moisture Standard Count | Solid Density

Test Reference	TS1			
Depth of Probe (mm)	300 mm			
Level (m)	~~Finish level~~ 0.5 above ground level			
Material Description	SILT, sand, mixed			
Wet Density (t/m³)	1843.8			
Moisture Content (%)	40.4			
Dry Density (t/m³)	1312.8			
Air Voids (%)	-220%			
Shear Vane (kPa)	UTP			
Location of Test				

IPR 75.0%

Instructions to contractor:



16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022

Inspection Report
Date: 05/12/22.
Project: Traverse.
Client: Traverse Ltd.

Hawthorn Geddes
engineers & architects ltd

Project Number: 12546
Contractor: Mason.
Inspector: KB.
Inspection Number:
Time on site: 9.15am
Time off site: 11:15am.
Weather: Sunny
Ground condition: Dry.

Description of works in progress:

Stripping & filling.

Inspecting: Lots by pond.

- Compaction testing with NDM of fill.
- CBR testing for road & SCALA.

Instructions to contractor:

- Road CBR values are typically ≥ 10, with the exception of the area highlighted with yellow. This requires compaction. Scala values typically ≥ 5blows/100mm.
- NDM testing has undergone laboratory corrections, this has failed the air void ratio requirement.
- To correct this, the upper 300mm of soil needs to be disturbed, wet, then recompacted to decrease air void ratio.

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 5/12/22
Project: Traverse
Client:
Contractor's Rep: Mark

Project Number: 12546
Contractor: Mason.
Plant:

Inspector: KB
Time on site: 9.15am
Weather: Sunny

Inspection Number:
Time off site: 11.15am
Ground condition: Dry.

Density Standard Count

Moisture Standard Count

Shear Vane 287.
MDD 1750
Solid Density 2.65

Test Reference	1	2	3	4	5		
Depth of Probe (mm)	300						
Level (m)							
Material Description	Volcanics						
Wet Density (t/m^3)	1872.6	1928.0	~~1945.1~~	1877.9	1855.2		
Moisture Content (%)	41.8 18.47	41.7 22.5	40.6 19.3	39.6 17.45	38.0 19.63		
Dry Density (t/m^3)	1320.5	1360.8	12451	1345.7	1344.2		
Air Voids (%)	-5.16 11.16	-8.19 5.20	2.37 11.85	-4.12 11.79	-1.94 11.04		
Shear Vane (kPa)	UTP	UTP	UTP	UTP	UTP		
Location of Test	#1	#2	#3	#4	#5		
%PR	75.5	77.8	71.1	76.9	76.8		

Instructions to contractor:

× CBR - uncorrected *CBR - corrected.

Δ Scale

Main Road

Δ1 : 10
8
9
10

2 : 7
8
7
6

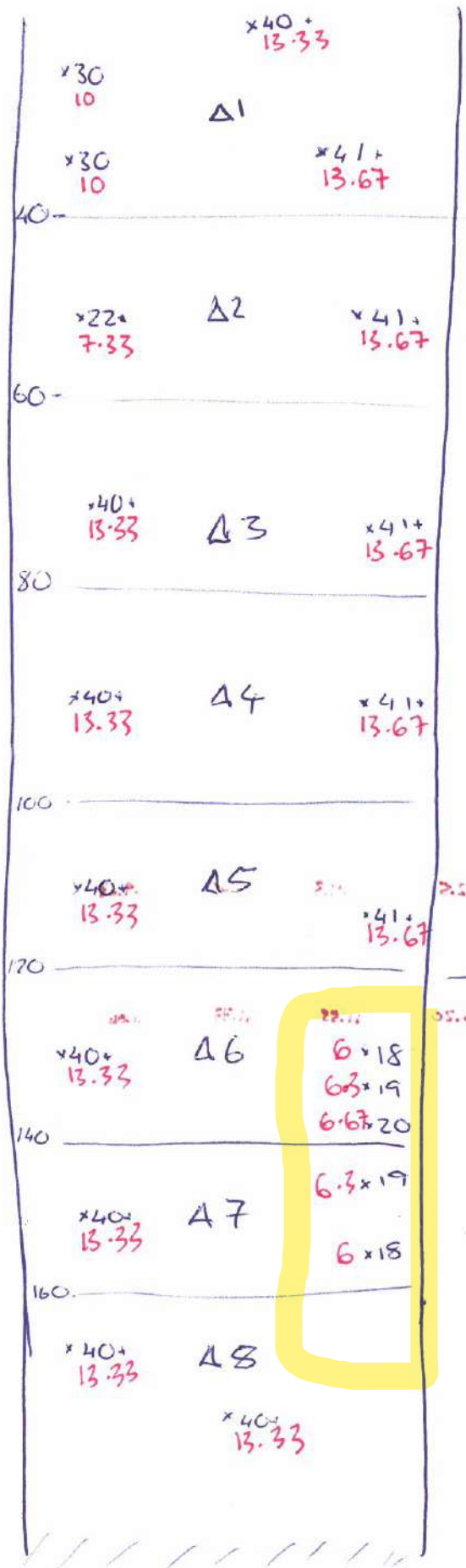
3 = 7
9
5
9

4 = 7
7
6
9

5 = 5
6
5
11

6 = 9
6
8
12

7 = 3
7
5
10



Δ8 = 7
7
8
10

×1

×2

×3

×4

×5

Road

Pond


2
3
NOAA
Inspection
#8


M MASON M


M MASON

Inspection Report
Date: 20/12/22
Project: 12546
Client:

Hawthorn Geddes
engineers & architects ltd

Project Number:
Contractor:

Inspector: BB/SL
Time on site: 10:10
Weather: Sunny

Inspection Number:
Time off site: 12PM
Ground condition: moist

Description of works in progress:

Compaction of fill.

Inspecting:

NDM testing to determine air voids below 8%.
across multiple lots.

Instructions to contractor:

* All test has meet the threshold of required air voids minimum and maximum.

* Good to proceed with next step.

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 20/12/22
Project: ~~125~~ Traverse
Client: — —
Contractor's Rep: Mark

Project Number: 12546
Contractor: Mason
Plant:

Inspector: KB/SL
Time on site: 10.10am
Weather: Overcast

Inspection Number:
Time off site: 12pm
Ground condition: Moist

Density Standard Count
Moisture Standard Count

Shear Vane
MDD - ~~1175~~ 1250
Solid Density 2.65

Test Reference	1	2	3	4	5	6	7	8
Depth of Probe (mm)	600mm →							
Level (m)	Kerikeri Volcanic →							
Material Description	Ash							
Wet Density (t/m³)	1820.6	1852.5	1934.8	1889.4	1929.5	1889.7	1898.0	1859.?
Moisture Content (%)	39.2 (34.6)	41.4 (38.7)	38.6 (33.2)	39.2 (30.4)	39.2 (33.5)	37.6 (36.5)	38.8 (37.1)	39.1 (41.8)
Dry Density (t/m³)	1308	1309.8	1396.0	1357.3	1385.9	1373.5	1367.2	1322.5
Air Voids (%)	-0.78 (5.95)	-3.82 (3.56)	-6.68 (6.8)	-4.55 (8.53)	-6.77 (6.6)	-3.56 (4.85)	-4.79 (4.49)	-1.70 (1.87)
Shear Vane (kPa)	NM →							
Location of Test	x1	x2	x3	x4	x5	x6	x7	x8
%PR	104.6	104.8	111.7	108.6	110.9	109.9	109.4	105.8

Instructions to contractor:

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 20/12/22
Project: Traverse
Client:
Contractor's Rep: Mark

Project Number: 12546
Contractor: Mason
Plant:

Inspector: KB | SL
Time on site: 10.10am
Weather: Overcast

Inspection Number:
Time off site: 12pm.
Ground condition: Moist to dry

Density Standard Count

Moisture Standard Count

Shear Vane
MDD - 1250
Solid Density 2.65

Test Reference	9	10	11	
Depth of Probe (mm)	600 →	→	→	
Level (m)				
Material Description	Kerikeri Volcanics →	→	→	
Wet Density (t/m³)	1838.1	1882.8	1921.6	
Moisture Content (%)	42.4 36.1	43.7 N/A	40.8 33.4	
Dry Density (t/m³)	1289.4	1309.9	1364.9	
Air Voids (%)	-3.15 5.08	-6.84 N/A	-7.30 6.70	
Shear Vane (kPa)				
Location of Test	✱9	X 10	X 11	
% PR	103.1	104.8	109.2	

Instructions to contractor:

16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022


#5
#4
#3
#1
#2


MASON
#6
#7
#8


#9
#10
#11

Inspection Report
Date: 18/01/2023
Project: Traverse
Client:

Hawthorn Geddes
engineers & architects ltd

Project Number: 12546
Contractor:

Inspector: TK/GO
Time on site: 2.30pm
Weather: Sunny

Inspection Number:
Time off site: 5pm
Ground condition: Dry

Description of works in progress:

- Continued compaction of lots 27 to 26.
- Excavations near lot 37

Inspecting:

- "Typical retaining wall" measurements in lots 7, 9 & 11.
- Take soil samples of excavated rubbish hole x 5.
- NDM testing in lots 26 & 27
- Test undrained shear strength in excavated waste pit

Instructions to contractor:

- NDM testing of lot 27 passes. Lot 26 requires a higher moisture rate & further compaction.
- Retaining wall is suitable.
- Shear vane values all > 60 uncorrected = bottom of pit is good ground. - can fill

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 18/01/2023
Project: Traverse
Client:
Contractor's Rep:

Project Number: 12546
Contractor:
Plant:

Inspector: TK/GO
Time on site: 2.30pm
Weather: Sunny

Inspection Number:
Time off site: 5pm
Ground condition: Dry

Density Standard Count

Moisture Standard Count

Shear Vane 287
MDD - 1750
Solid Density - 2.65

Test Reference	1	2	3	
Depth of Probe (mm)	600 →			
Level (m)				
Material Description	Kerikeri Volcanics →			
Wet Density (t/m³)	1971.2	2013.4	1943.5	
Moisture Content (%)	34.1 / 35.71	34.7 / 35.74	35.2 / 26.85	
Dry Density (t/m³)	1469.4	1495.0	1437.1	Rechecked 1.05% by GS
Air Voids (%)	-5.74 / 5.29	-8.37 / 5.27	-4.99 / 10.9	
Shear Vane (kPa)	UTP	UTP	UTP	
Location of Test	South lot 27	North lot 27	Lot 26	
%PR	84.0	85.4	82.1	

Instructions to contractor:

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date:

Project: Project Number:

Client: Contractor:

Contractor's Rep: Plant:

Inspector: Inspection Number:

Time on site: Time off site:

Weather: Ground condition:

Density Standard Count

Moisture Standard Count

Shear Vane
MDD : 1250
Solid Density 2.65

Test Reference	1	2	3	
Depth of Probe (mm)	600 →			
Level (m)				
Material Description	Kerikeri Volcanics			
Wet Density (t/m^3)			1437.1	
Moisture Content (%)	35.7		35.2 / 35.7	
Dry Density (t/m^3)			1943.5	
Air Voids (%)	5.79		-4.99 / 5.29	
Shear Vane (kPa)	VTP	VTP	VTD	
Location of Test				
	84.0	85.4	82.1	

WD
MDD
DD
Next Y. AV
YPR

Instructions to contractor:

* Do standard count. when on site.
AV < 8%. if way high change MDD to 1750
MM
set up
set targets

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

Date:

Job Name:
Job Number:

Tested By:
Checked By:

Sample Ref	T1	T2	T3	
Container #	J	G	A	
Mass Container (kg) (M_1)	84.8g	86.3g	87.9g	
Mass Container and Wet Soil (M_2)	635.9g	447.1g	524.9g	
Mass Container and Dry Soil (M_3)	490.9	352.1	432.4	
Moisture Content (%)	35.7	35.74	26.85	

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$

Hawthorn Geddes
engineers & architects ltd

File Note

Project Number: 12546

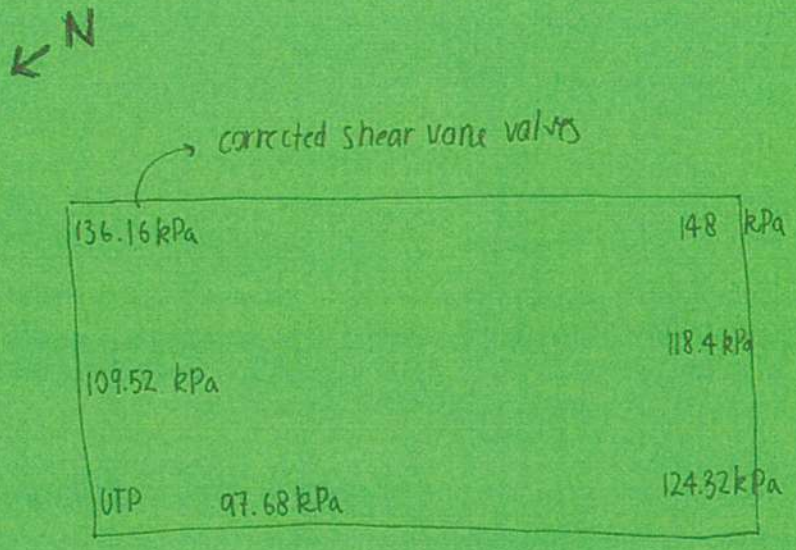
Project Name:

Date: Time:

Author:

Subject:

Shear vane testing of excavated pit.

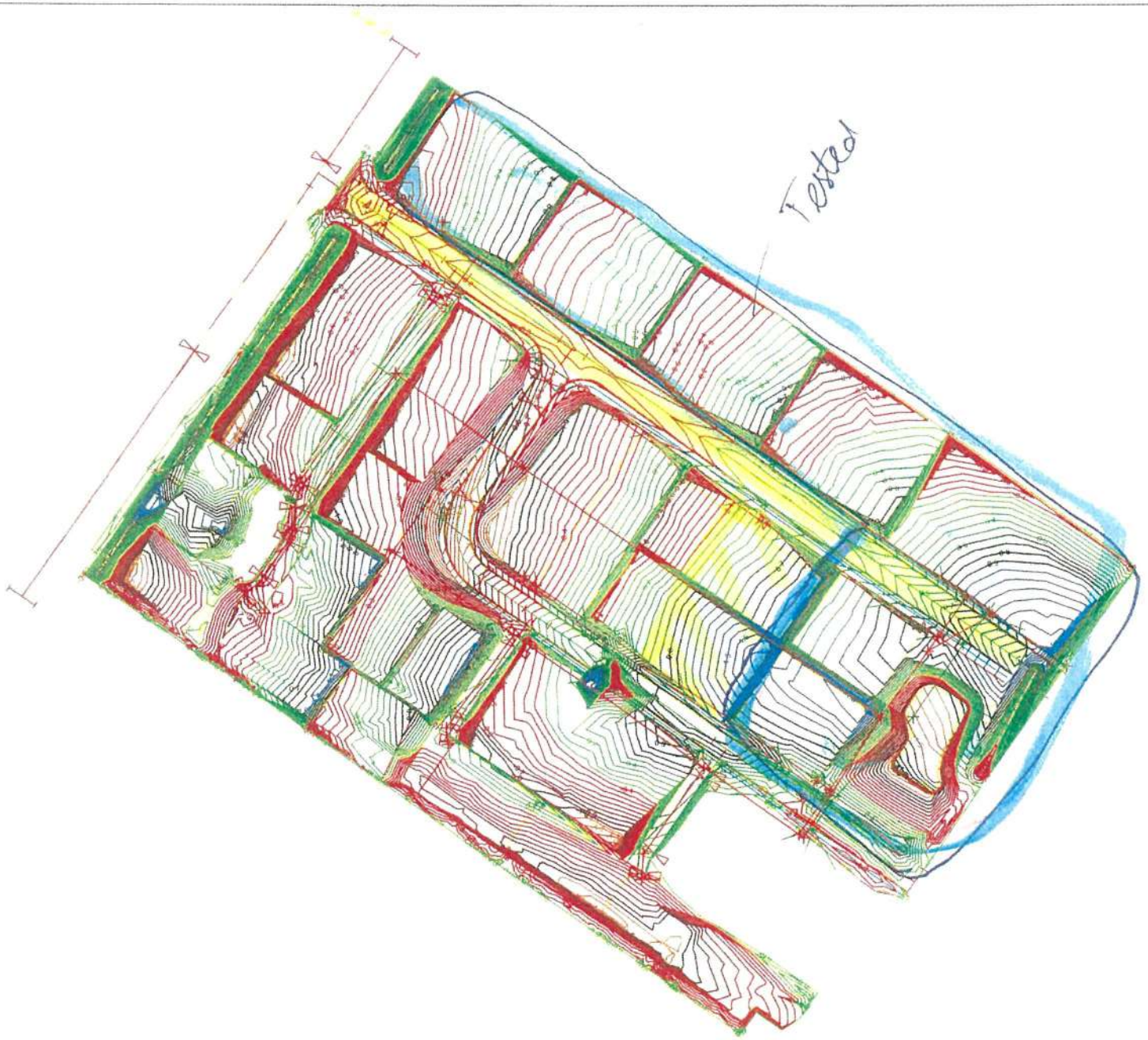


7 Selwyn Avenue
Whangarei 0110
09 438 7139

hg@hgcs.co.nz

21A The Grange
Warkworth 0910
09 283 3428

hawthorngeddes.co.nz



averse Ltd

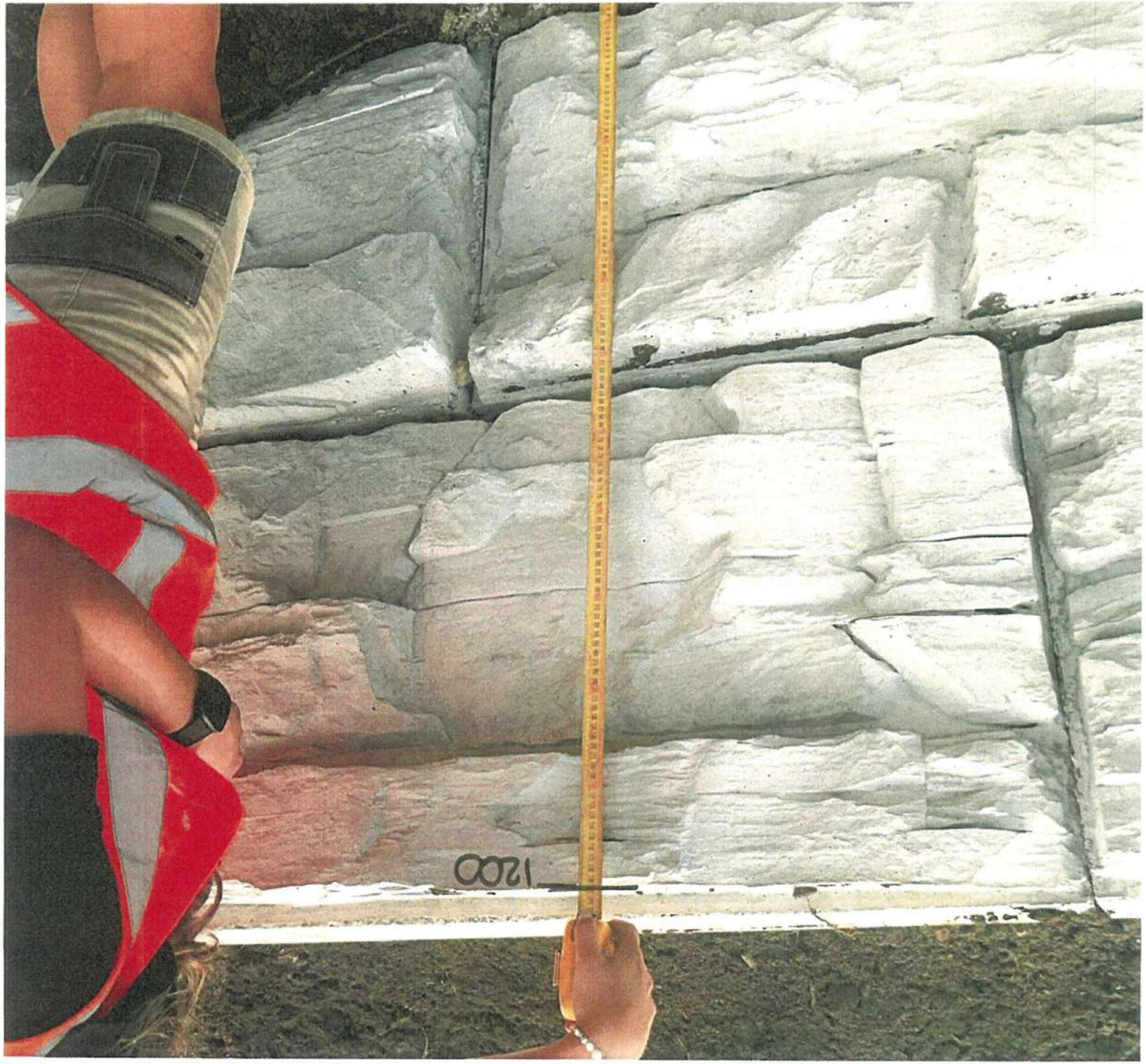
eri Road Design cut fill

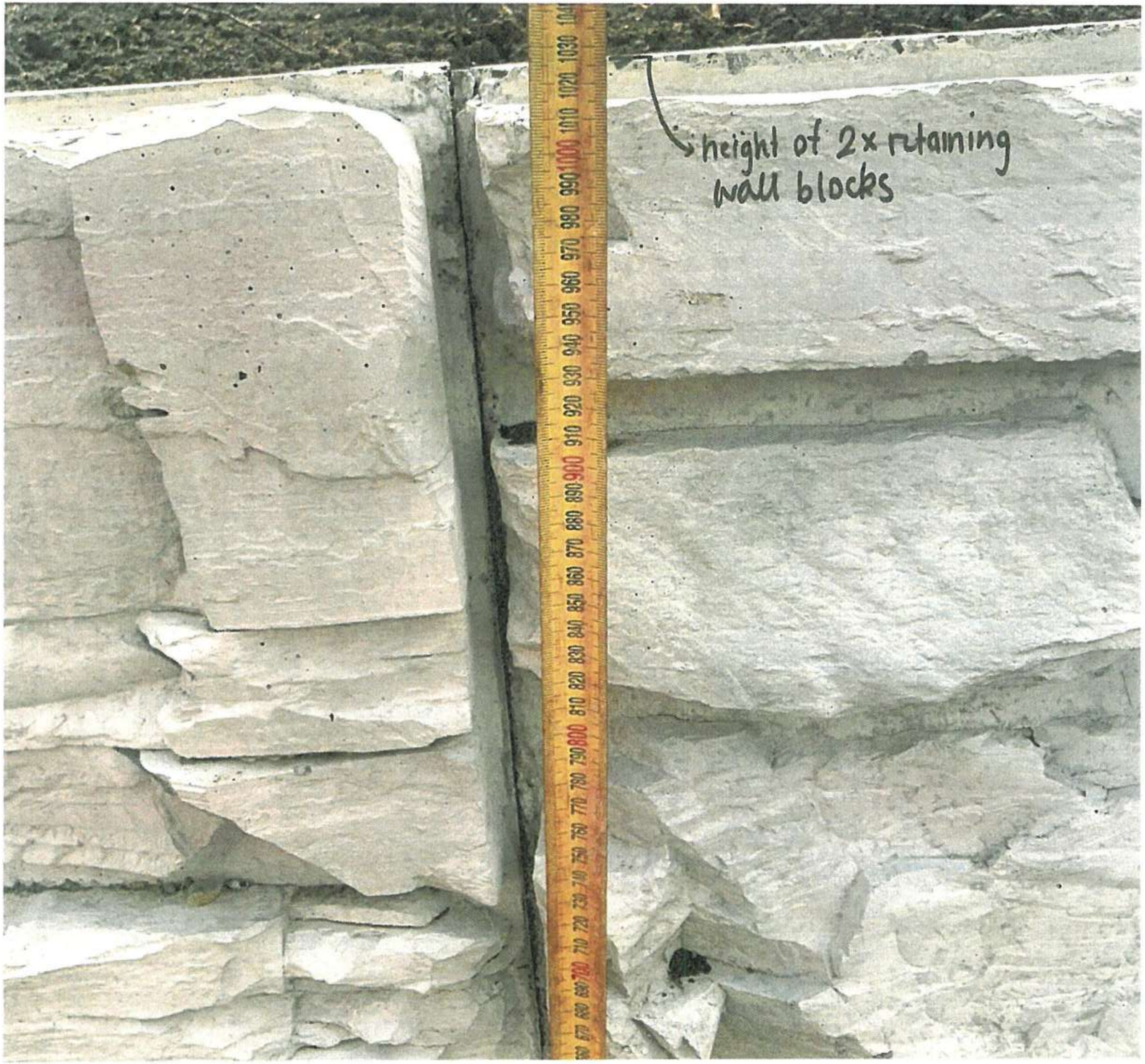
12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022


MASON
NDM 1
NDM2
Lot 27
NDM 3
Lot 26


Shear vane
locations


waste excavated
from pit


1200


height of 2x retaining
wall blocks

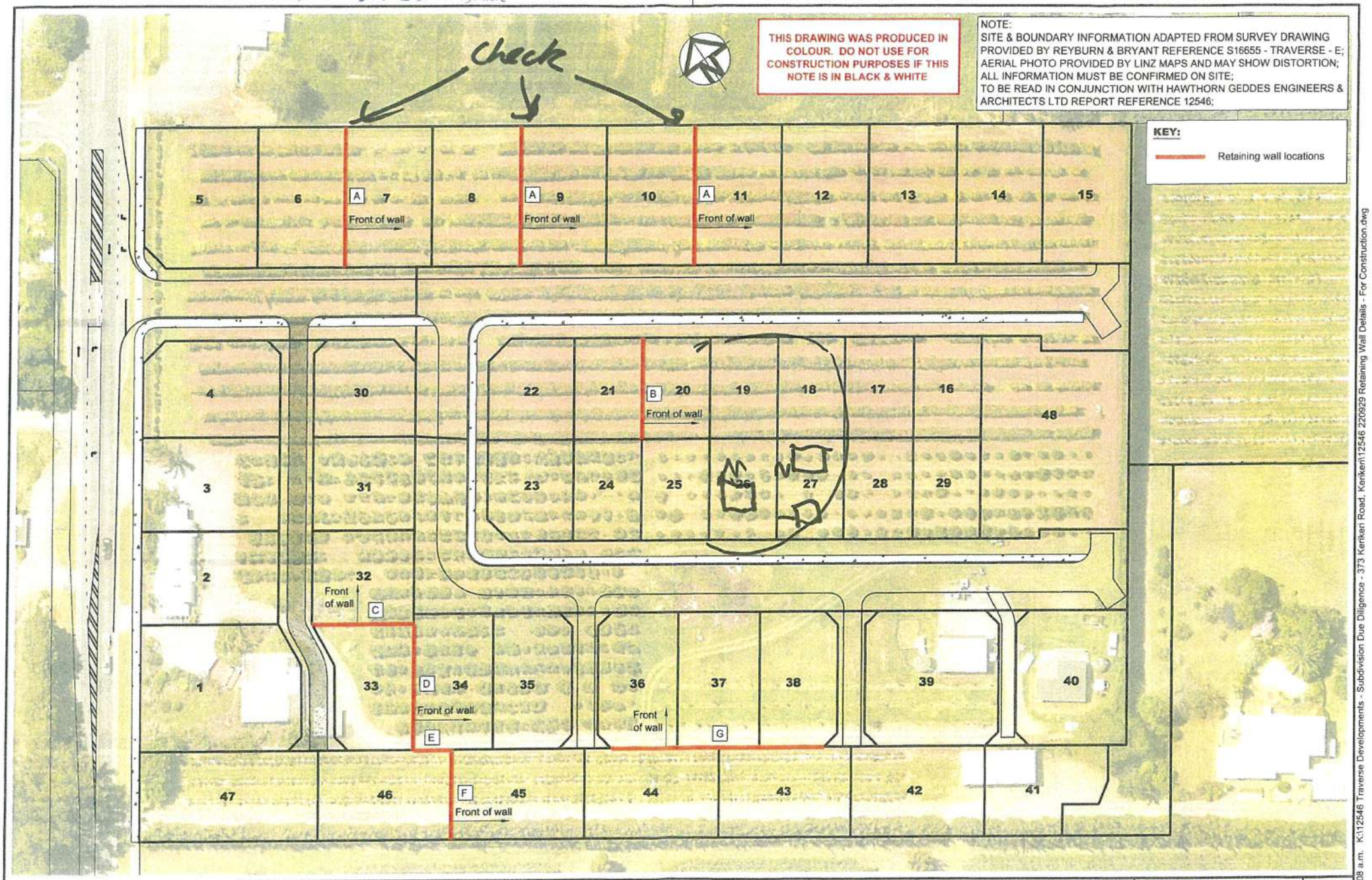
Got to Site 2:30 - finish at

check

THIS DRAWING WAS PRODUCED IN COLOUR. DO NOT USE FOR CONSTRUCTION PURPOSES IF THIS NOTE IS IN BLACK & WHITE

NOTE:
SITE & BOUNDARY INFORMATION ADAPTED FROM SURVEY DRAWING PROVIDED BY REYBURN & BRYANT REFERENCE S16655 - TRAVERSE - E;
AERIAL PHOTO PROVIDED BY LINZ MAPS AND MAY SHOW DISTORTION;
ALL INFORMATION MUST BE CONFIRMED ON SITE;
TO BE READ IN CONJUNCTION WITH HAWTHORN GEDDES ENGINEERS & ARCHITECTS LTD REPORT REFERENCE 12546;

KEY:
Retaining wall locations



USE WRITTEN DIMENSIONS. DO NOT SCALE FROM DRAWING.

Hawthorn Geddes
engineers & architects ltd
7 Selwyn Avenue
Whangarei 0110
Phone: 09 438 7139
hg@hgos.co.nz
Unit 21a, The Grange
Warkworth 0910
Phone 09 283 3428
www.hawthorngeddes.co.nz

CLIENT: TRAVERSE DEVELOPMENTS
PROJECT: SUBDIVISION
373 KERIKERI ROAD, KERIKERI
DRAWING: SITE PLAN - RETAINING WALL LOCATIONS

REV.	REVISION DETAILS	BY	DATE
C2	REMOVED WALL A & AMENDED WALL NAMES	CJ	17/01/23
C1	ISSUED FOR CONSTRUCTION	MS	28/09/22

CONSTRUCTION
SCALE @ A3: 1:750
DRAWN: MS SEP 2022
CHECK:
APPROVED: CALLUM SANDS
PROJECT No: 12546
SHEET: C01
REV: C2

18/01/2023 11:33:08 a.m. K:\12546 Traverse Developments - Subdivision Due Diligence - 373 Kerikeri Road, Kerikeri\12546 220929 Retaining Wall Details - For Construction.dwg

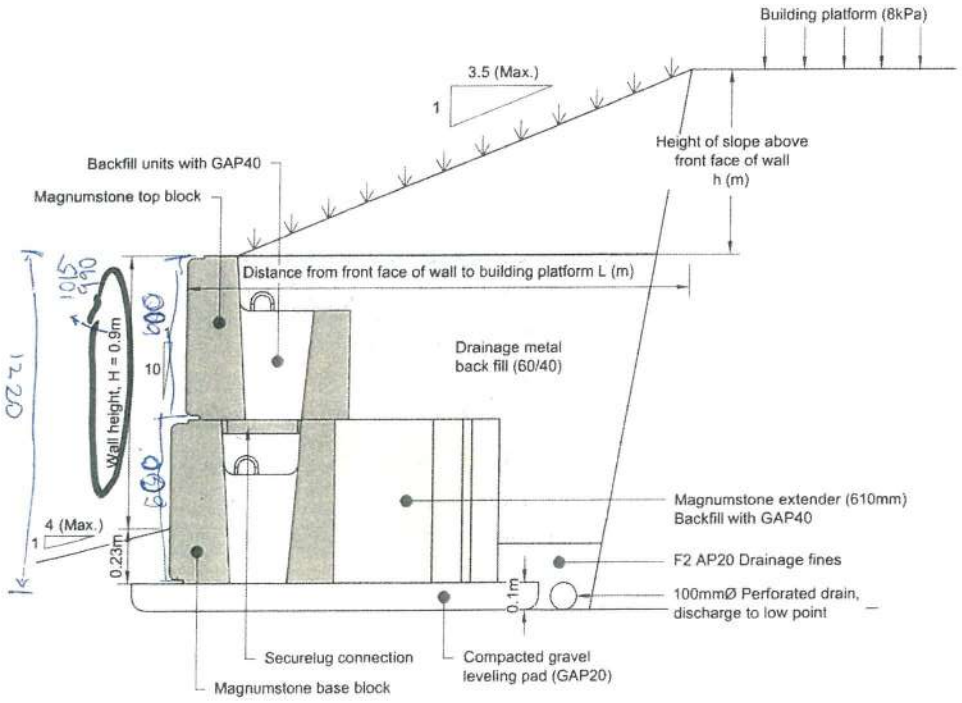
NOTES:

1. THE DIMENSIONING OF THE WALLS SHALL NOT BE MODIFIED DURING FUTURE DEVELOPMENT WITHOUT CONSULTING THE DESIGN ENGINEER, I.E CHANGING THE L (M) DIMENSION OR SHIFTING SURCHARGE LOAD CLOSER TO THE WALL.
2. THE MAGNUMSTONE UNITS ARE MODULAR AND SHOULD FUTURE DEVELOPMENT PROPOSE MODIFYING SITE CONDITIONS, THE WALL WILL ENABLE MODIFICATION (ADDITIONAL BLOCKS/EXTENDERS) TO CATER TO DESIGN LOAD CHANGES. THIS SHALL BE SUBJECT TO SPECIFIC ENGINEERING DESIGN.

THIS DRAWING WAS PRODUCED IN COLOUR. DO NOT USE FOR CONSTRUCTION PURPOSES IF THIS NOTE IS IN BLACK & WHITE

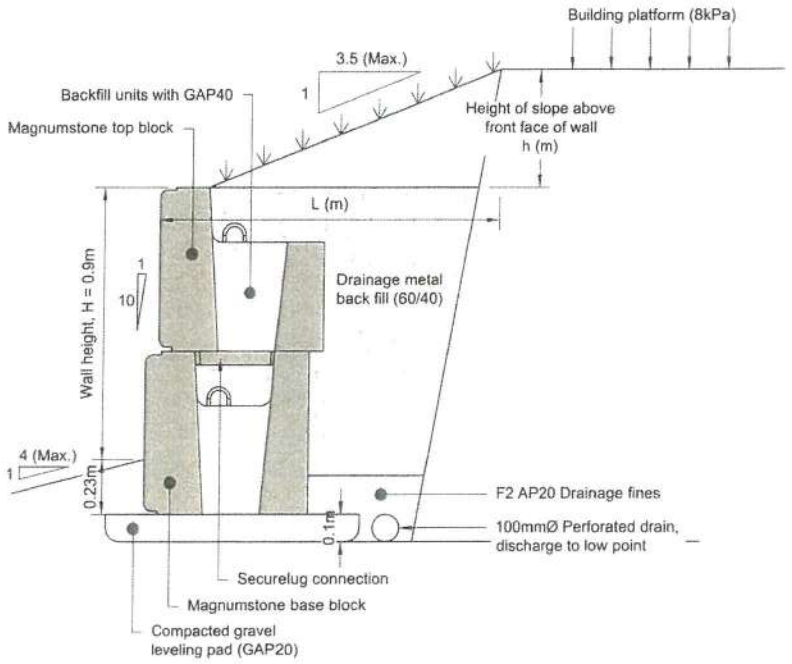
Wall	L (m)	h (m)
A	1.25	0.4
B	1.25	0.4
E	1.25	0.4
G	1.5	0.4

Wall	L (m)	h (m)
C	2.0	0.6
D	1.75	0.5
F	2.25	0.65



TYPICAL RETAINING WALL CROSS SECTION - WITH EXTENDER BLOCK

NOT TO SCALE (WALLS A, B, C, F & H)



TYPICAL RETAINING WALL CROSS SECTION - WITHOUT EXTENDER BLOCK

NOT TO SCALE (WALLS D, E & G)

USE WRITTEN DIMENSIONS. DO NOT SCALE FROM DRAWING.

Hawthorn Geddes engineers & architects ltd
7 Selwyn Avenue, Whangarei 0110, Phone: 09 438 7139, hg@hgcs.co.nz
Unit 21a, The Grange, Warkworth 0910, Phone: 09 283 3428, www.hawthorngeddes.co.nz

CLIENT: TRAVERSE DEVELOPMENTS
PROJECT: SUBDIVISION
373 KERIKERI ROAD, KERIKERI
DRAWING: TYPICAL RETAINING WALL CROSS SECTION

REV	REVISION DETAILS	BY	DATE
C2	REMOVED WALL A & AMENDED WALL NAMES	CJ	17/01/23
C1	ISSUED FOR CONSTRUCTION	MS	11/10/22

CONSTRUCTION
SCALE @ A3: AS SHOWN
DRAWN: MS SEP 2022
CHECK:
APPROVED: CALLUM SANDS
PROJECT No: 12546
SHEET: C02
REV: C2

18/01/2023 11:34:15 a.m. K:\12546 Traverse Developments - Subdivision Due Diligence - 373 Kerikeri Road, Kerikeri\12546 220929 Retaining Wall Details - For Construction.dwg

Hawthorn Geddes
engineers & architects ltd

Inspection Report

Date: 10/02/23.

Project: Traverse Development LTD

Project Number: 12546.

Client: Traverse Development.

Contractor:

Inspector: SL.

Inspection Number:

Time on site: 10:30.

Time off site: 12:10.

Weather: Sunny

Ground conditions: Moist.

Description of works in progress:

Compaction fill.

Inspecting:

- NDM test FIG compaction.
- Soil sample for oven correction.

Instructions to contractor:

All test has meet the threashold of required air voids minimum & maximum.

Tests were pass

OK to proceed.

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 10/02/23

Project: Traverse Development LTD.

Client: Traverse Development.

Contractor's Rep:

Project Number: 12546.

Contractor:

Plant:

Inspector: SL.

Time on site: 10:30

Weather: Sunny

Inspection Number:

Time off site: 12:10.

Ground condition: Moist

Density Standard Count

Moisture Standard Count

Shear Vane

Solid Density

Test Reference	1	2	3	4.02	5
Depth of Probe (mm)	600	600	600	600.	
Level (m)					
Material Description	Full compaction	Full compaction	Full compaction	Full compaction	
Wet Density (t/m³)	1866.7	1828.5	1954.0	1791.2	1721.5
Moisture Content (%)	32.6/34.11	37.3/39.64	33.4/36.97	37.0/42.16	37.4./40.60
Dry Density (t/m³)	1407.4/1.392	1331.6/1.309	1465.1/1.427	1307.8/1.260	1252.7/1.224
Air Voids (%)	-0.86/0%	-0.04/-1.32	-4.29/-6.57	2.20/-0.67	5.74./4.09
Shear Vane (kPa)	UTP.				
Location of Test	1	2	3	4.	5
°/.PR	80.4.	76.1	83.7	74.7.	71.6

Instructions to contractor:

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 10/02/23.
Project: Traverse Developments LTD. Project Number: 12546.
Client: Traverse Developments. Contractor:
Contractor's Rep: Plant:

Inspector: SL. Inspection Number:
Time on site: 10:30. Time off site: 12:10.
Weather: Sunny Ground condition: Moist

Density Standard Count Shear Vane

Moisture Standard Count Solid Density

Test Reference	6	7.		
Depth of Probe (mm)	600	600.		
Level (m)				
Material Description	Fill Compaction	Fill compaction.		
Wet Density (t/m^3)	1799.5	1785.2		
Moisture Content (%)	34.3/40.94	39.4/42.14		
Dry Density (t/m^3)	1339.8/1.277	1280.2/1.25		
Air Voids (%)	3.37/-0.45	1.08/-0.32		
Shear Vane (kPa)	UTP →			
Location of Test	6.	7.		

%PR 76.6. 73.2.

Instructions to contractor:

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

Date: 13/02/23.

Job Name: Traverse Development LTD. Tested By: SL.
Job Number: 12546. Checked By:

Sample Ref	5	6	7.	
Container #	I	L	G	
Mass Container (kg) (M_1)	88.6.	87.3.	86.2.	
Mass Container and Wet Soil (M_2)	1015.9	929.3.	1004.7.	
Mass Container and Dry Soil (M_3)	748.1	684.7	732.9.	
Moisture Content (%)	40.60	40.94.	42.14.	

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

Date: 13/02/23

Job Name: Traverse Development LTD
Job Number: 12546

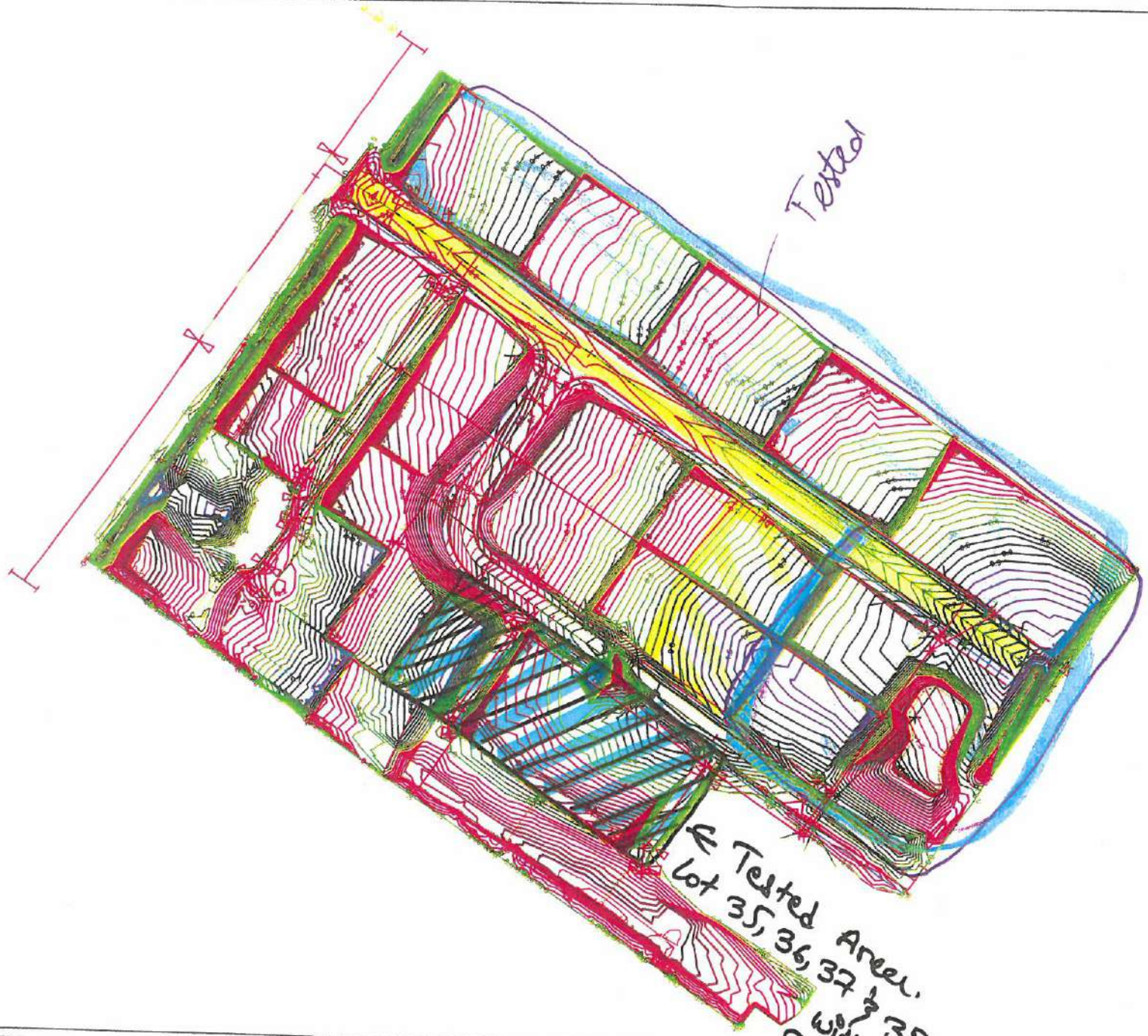
Tested By: SL
Checked By:

Sample Ref	1	2	3	4
Container #	E	C	D	H
Mass Container (kg) (M_1)	85.1	87.4	87.7	87.4
Mass Container and Wet Soil (M_2)	1092.2	1020.6	1001.4	1058.8
Mass Container and Dry Soil (M_3)	836.1	755.7	754.8	770.7
Moisture Content (%)	34.11	39.64	36.97	42.16

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$


NDM testing Area.
DRIVE WAY
HITACHI
MASON CONTRACTORS


Driveway



16655 traverse Ltd
373 Kerikeri Road Design cut fill

12d Model
Scale 1:1000
Wed Oct 19 16:59:24 2022

Hawthorn Geddes
engineers & architects ltd

Inspection Report

Date: 01/03/23

Project: Traverse Development LTD

Project Number: 12546

Client: Traverse Development LTD

Contractor:

Inspector: SL

Inspection Number:

Time on site: 1:00

Time off site: 1:45

Weather: Sunny

Ground conditions: Moist.

Description of works in progress:

fill compaction.

Inspecting:

- NDM test fill compaction. <8% airvoids.
- Soil Sample for oven correction

Instructions to contractor:

- All test has meet the threashold of required airvoids minimum and maximum.
- Can proceed the work

Hawthorn Geddes
engineers & architects ltd

Nuclear Densometer Worksheet

Date: 01/03/23
Project: Traverse Development LTD.
Client: Traverse Development LTD.
Contractor's Rep:

Project Number: 12546
Contractor:
Plant:

Inspector: SL
Time on site: 1:00
Weather: Sunny.

Inspection Number:
Time off site: 1:45
Ground condition: Moist

Density Standard Count

Shear Vane

Moisture Standard Count

Solid Density

Test Reference	1	2		
Depth of Probe (mm)	600	600		
Level (m)				
Material Description	FiU Compaction	FiU Compaction		
Wet Density (t/m^3)	1816.8	1758.6		
Moisture Content (%)	35.5/33.40	38.0/42.18		
Dry Density (t/m^3)	1340.4/1.362	1274.6/1.237		
Air Voids (%)	2.24/3.69	3.94/1.68		
Shear Vane (kPa)	→	→		
Location of Test	1	2		

% PR 76.6 72.8

Instructions to contractor:

Hawthorn Geddes
engineers & architects ltd

MOISTURE CONTENT WORKSHEET

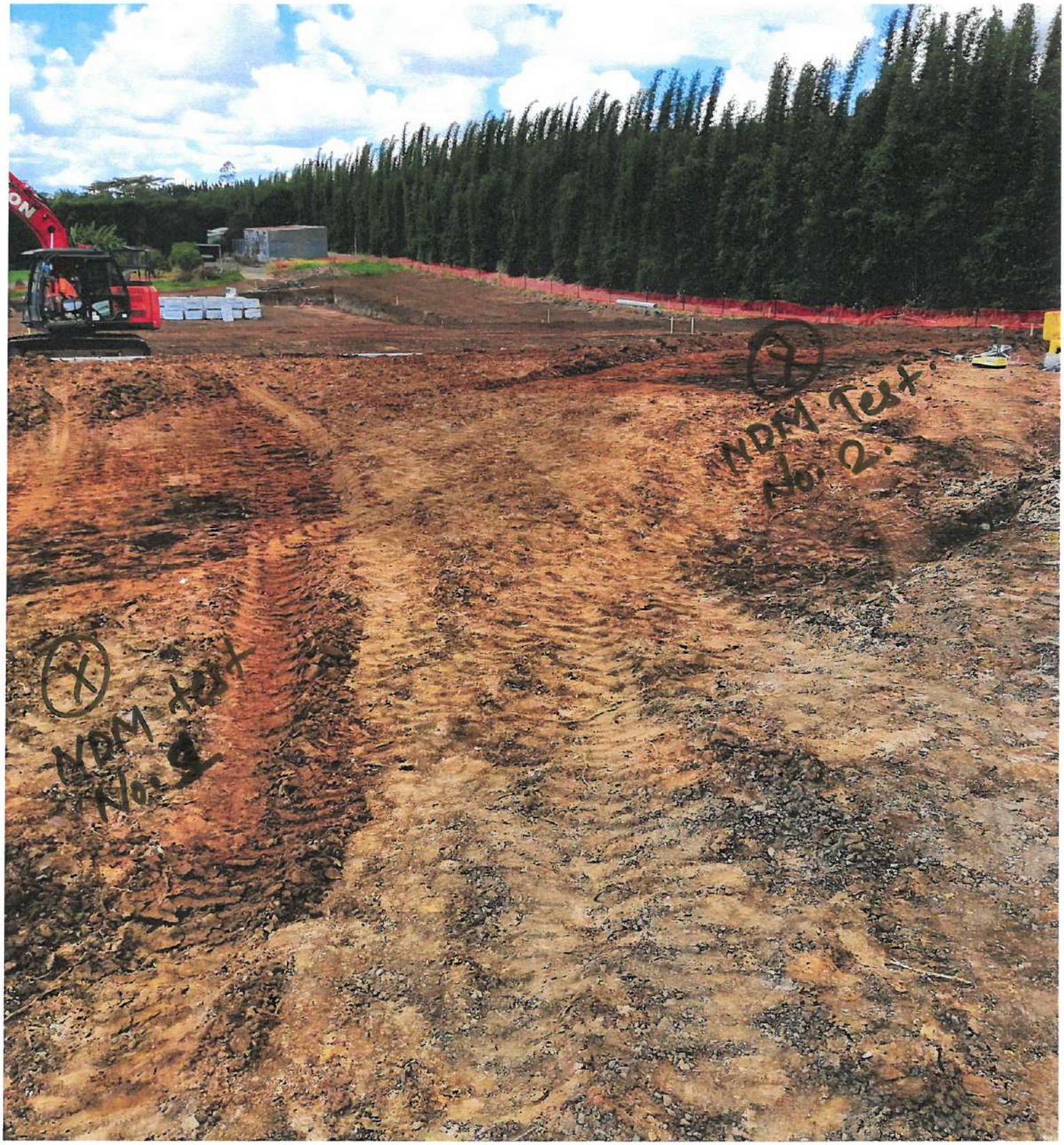
Date: 01/03/23.

Job Name: Traverse Development LTD.
Job Number: 12546.

Tested By: GS.
Checked By:

Sample Ref	1	2		
Container #	J	H.		
Mass Container (kg) (M_1)	84.8	87.4		
Mass Container and Wet Soil (M_2)	1178.4	861.3		
Mass Container and Dry Soil (M_3)	904.6	631.7		
Moisture Content (%)	33.40	42.18		

$$WC = \frac{M_2 - M_3}{M_3 - M_1} \times 100\%$$


NDM Test
No. 2
NDM Test
No. 3