DFH Joint Venture Limited

GEOTECHNICAL COMPLETION REPORT

Hitchen Block Stage 19, Pokeno

Project Reference: J00113
August 1, 2025

DOCUMENT CONTROL

Version	Date	Comments
A	1 August 2025	Issued for 224c

Version	Prepared By	Reviewed & Authorised By
A	 Kyle Meffan **Associate Engineering Geologist** *CMEngNZ (PEngGeol)*	 Chris Edwards **Principal Engineering Geologist** *CMEngNZ (PEngGeol)*

This report presents all supporting geotechnical data and our Suitability Statement in relation to land development works undertaken at the above location.

It has been prepared in accordance with instructions received from DFH Joint Venture Limited and forms part of the documentation required by Waikato District Council to achieve certification under Section 224(c) of the Resource Management Act.

If you have any queries or you require any further clarification on any aspects of this report, please do not hesitate to contact the engineers listed above.

CONTENTS

APPENDICES:

1 INTRODUCTION

This Geotechnical Completion Report (GCR) has been prepared for DFH Joint Venture Limited as part of the documentation required to be submitted to the Waikato District Council following residential subdivisional development.

It contains our Suitability Statement, relevant test data and the CivilPlan Consultants Limited as-built plan set relating to Stage 19 of the Hitchen Block Residential Subdivision as follows:

Table 1: CivilPlan Consultants Limited As Built Plans

Title	Reference No.	Date
As Built Contours	136701-18-AB200	May 2025
As Built Cut-Fill Contours, Undercut & Shear Key	136701-18-AB201	May 2025
As Built Geotech	136701-18-AB202	May 2025
As Built Storm Water	136701-18-AB400	May 2025
As Built Waste Water	136701-18-AB401	May 2025

This report covers the construction period July 2021 to July 2025. It is intended to be used for certification purposes as follows:

- 5 residential lots numbered 980 to 984.
- 1 new road named Hitchen Road (part).
- 1 jointly owned access lot (JOAL) named Lot 2.

This stage of the subdivision is located as shown on the CivilPlan Consultants Limited as-built plans. As can be seen on the cut-fill contours as-built plan (drawing AB201), this subdivision is formed entirely in cut ground (or untouched natural ground), with cut depths of up to 3m being completed. The deepest cuts are located close to Hitchen Road which is the highest point of the subdivision.

2 RELATED REPORTS

In the preparation of this GCR, LDE have reviewed the following Geotechnical Reports for the land encompassed by Stage 19 of the Hitchen Block residential subdivision which are summarised in Table 2 below:

Table 2: Related Geotechnical Reports

Report Title	Reference No.	Issue Date
Geotechnical Investigation Report for Hitchen Road Stage 5, Pokeno	J00741	29 August 2018
Lots 926 and 945 to 947 – Additional Slope Stability Analysis, Hitchen Stage 5, Pokeno	J00741	10 September 2020
Addendum Geotechnical Slope Stability Assessments, Hitchen Block Stage 17 and 19, Pokeno	J00113	29 May 2023

Further, tabulated below is a list of Geotechnical Completion Reports prepared by this Consultancy (some of which were issued formerly trading as Lander Geotechnical) on adjacent recently completed stages of the subdivision.

Table 3: Related Geotechnical Completion Reports

Report Title	Reference No.	Issue Date
Hitchen Block Stage 3A2, 3B and 3C (Residential)	J00113	20 December 2017
Hitchen Block Stage 5A (Residential)	J00113	26 January 2018
Hitchen Block Stage 4A (Residential)	J00113	23 March 2018
Hitchen Block Stage 6A and 6B (Residential)	J00113	23 May 2018
Hitchen Block Stage 4B (Residential)	J00113	28 August 2018
Hitchen Block Stage 7A & 7B (Residential)	J00113	2 November 2018
Hitchen Block Stage 8A & 8B (Residential)	J00113	9 May 2019
Hitchen Block Stage 6D (Residential)	J00113	4 November 2019
Hitchen Block Stages 11, 12 and 14 (Residential)	J00113	13 March 2020
Hitchen Block Stage 9 (Residential)	J00113	24 June 2020
Hitchen Block Stages 6E & 10A to 10D (Residential)	J00113	16 December 2020
Hitchen Block Stages 10E & 10F (Residential)	J00113	11 March 2021
Hitchen Block Stage 12D (Residential)	J00113	20 April 2021
Hitchen Block Stage 13A (Residential)	J00113	16 August 2021
Hitchen Block Stage 13B (Residential)	J00113	17 January 2022
Hitchen Block Stages 15A & 15B (Residential)	J00113	19 May 2022
Hitchen Block Stage 16 (Residential)	J00113	21 October 2022
Hitchen Block Stages 17A, 17B and 17C (Residential)	J00113 - Rev. B	29 November 2023

3 EARTHWORKS OPERATIONS

3.1 Plant

The main items of plant used by the Contractor, Kerry Dines Limited were:

- 7 x bulldozers with scoops;
- 1 x elevating motorscraper;

- 3 x articulated dump trucks;
- 2 x 4WD sheepsfoot compactors;
- 4 x 20T hydraulic excavators;
- 1 x Tractor with disc ploughs.

3.2 Construction Programme

Earthworks operations in July 2021 with topsoil stripping and bulk cuts across Stage 19. A site compound was then formed in the southern portion of the Stage.

Around April 2022, three counterfort drains were installed within Lots 982 and 984. The counterfort drainage trenches extended to maximum depths of 8m and were approximately 0.5m wide. A 160mm perforated drain coil was placed in the base of each trench prior to being backfilled with SAP50 scoria. Following this, civil works were completed across Stage 19.

Between May 2025 and July 2025, the site compound was removed and several stockpiles were shifted from Lots 981 and 983. Outlets were formed for the counterfort drains at this time.

4 QUALITY ASSURANCE AND CONTROLS

During the earthworks engineering inspections were undertaken on a regular basis to assess compliance with NZS 4431 and our project specific recommendations and specifications. Project specific inspections were required on Stage 19 for:

- Topsoil stripping of earthworks areas.
- Counterfort drain excavations to confirm that the appropriate backfill and drainage coils had been installed during construction. A review of as-built depths was also completed as the drains were not inspected by LDE during trench excavation to confirm their depths were in accordance with our construction requirements.

5 LIQUEFACTION SUSCEPTIBILITY

Liquefaction susceptibility has been assessed in our geotechnical investigation report (Ref J00741, dated 29 August 2018). Our assessment concluded this site has a very low risk of seismic liquefaction based on the soil strength and consistency, and expansive soils laboratory testing, in accordance with the requirements of Earthquake Geotechnical Engineering Practice Module 3.

6 PROJECT EVALUATION

6.1 Bearing Capacity and Settlement of Building Foundations

Following the completion of earthworks operations, we returned to the site in My 2025 and drilled a series of hand auger boreholes in order to determine representative finished ground conditions and hence evaluate likely foundation options for future building development.

At current subgrade levels all filled and undisturbed natural ground within residential lots located upslope of the Building Restriction Line referenced in Section 6.3 has a geotechnical ultimate bearing capacity of 300 kPa within the influence of conventional shallow residential building foundation loads.

Where any building platforms have been rutted by heavy machinery subsequent to this report, or softened due to ponded rainwater, engineering advice should be sought with a view to affected areas being trimmed back to competent ground and reinstated with compacted hardfill to design subgrade level prior to the commencement of building construction.

It should be noted that NZS 3604 only allows a maximum backfill depth of 600mm over the building platform of a dwelling unless an Engineering design solution or endorsement is proposed, on account of the risk of induced consolidation of the subsoils caused by the weight of the backfill.

6.2 Expansive Soils

Four Shrink-Swell Index tests were carried out on samples selected from Stage 19 (and adjacent Stage 18) and within the zone of likely influence of shallow building foundations to inform the expansive Site Class for this stage of the subdivision.

The Shrink-Swell Index tests were carried out in accordance with AS 1289, "Methods of Testing Soils for Engineering Purposes" test method 7.1.1. These tests were primarily intended to assess the Expansive Classes of the site materials as defined in AS 2870, "Residential Slabs and Footings – Construction" and MBIE Acceptable Solutions and Verification Methods amendment 19[1].

Based on the laboratory testing and visual tactile assessments of the soils observed in our post-construction boreholes, the assessed AS2870:2011 expansive site class for all residential lots is H1 (high) having a characteristic ground surface movement of up to 60mm (based on the scaling factor of the site being adjusted to a 1/300-year event*).

[1] Ministry of Business, Innovation and Employment. Verification Methods and Acceptable Solutions Amendment 19 for NZ Building Code B1/AS1, Section 3 (as relevant to expansive soils and good ground). Effective 28 November 2019.

**Note: if the foundation designer needs to design the foundation for 500-yr and 1000-year drought return level events, then the y_s of 60mm should be factored by 1.11 and 1.21 respectively in accordance with Table 22 of BRANZ Addendum Study Report No.120A (2008).*

Specific design alternatives for these Site Classes are presented in the Suitability Statement. These classifications may be re-addressed by end users during building consent if site specific laboratory shrink-swell testing is undertaken by end users, as recommended in the MBIE document attached.

For Class H1 soils, if slab on-grade floor slab construction takes place during a long dry summer, exposed building platform soils may dry put and become highly desiccated. Over time the rehydration of the soils below the floor slab can cause swelling and floor slab uplift. Floor slab uplift can cause distress of tile floors and in garages where cracks are more apparent. It may also rack upper storeys and/or rooflines if non-load bearing ground floor walls are lifted and act as struts. It is prudent to place hardfill immediately upon completion of subgrade trimming, followed by thorough soaking of the hardfill prior to concrete placement (e.g. for slab on-grade construction), all of which can help to limit the problem.

6.3 Lot Gradients

The appended as built cut-fill plan (drawing AB201) shows areas of **Lots 980 to 984** having gradients steeper than 1(v) in 4(h) (shaded grey on drawing AB200) or being immediately adjacent to land having such gradients.

The extent of areas steeper than 1(v) in 4(h) has been determined by the surveyed site gradients and our final walkover inspection, but there may be localised areas having such gradients that have not been shown on the plans.

Global slope stability validation (refer related reports presented in Table 2 above) has confirmed that slip circles below the required factors of safety manifest into the majority of the lots that border the bush clad land to the north-east or south-east of the residential lots. Therefore, **Building Line Restrictions** have been imposed on **Lots 980** and **Lots 982 to 984** on account of global slope stability considerations and are shown on the contour as-built plans (dashed olive lines).

Any building or earthworks proposals downslope of the Building Line Restriction are subject to specific site investigation, foundation design and construction inspections.

For the areas upslope of the Building Line Restriction (i.e. the intended building platform areas of the lots), we are satisfied that these areas are not subject to the hazards described in section 71(3) of the Building Act provided that all development restrictions and recommendations provided in this report are followed.

Details of resulting building and earthworks restrictions within the vicinity of these lots are presented in the Suitability Statement.

6.4 Vegetation Cover

Wherever practical on sloping land beyond building platform areas any existing bush and grass cover should be maintained and even supplemented with new plantings. Any vegetation cleared beyond the immediate area of building platforms for temporary construction purposes should be replaced as soon as possible. The contribution of appropriate vegetation cover to overall site stability and erosion control should not be underestimated.

6.5 Stormwater Controls

It is important on all sloping lots that due care is paid to the design and construction of appropriate stormwater disposal systems. These systems should serve to collect all runoff from roofs, decks and paved areas, together with discharges from retaining wall drains and other subsoil drains and should connect directly into the public stormwater drainage network.

Uncontrolled stormwater discharges onto the ground surface or into soakage pits can cause erosion, scour and/or instability on sloping land and should not be permitted under any circumstances where stability could be compromised.

6.6 Service Trenches

As is normal on all subdivisions, building developments involving foundations within a 45-degree zone of influence from pipe inverts will require Engineering input.

6.7 Counterfort Drains

The appended as-built geotechnical drainage plan (drawing AB202) shows the positions of a series of 600mm wide and 7m deep (maximum) counterfort drains which were constructed in the region of **Lots 982 and 984**. These drains were spaced at approximately 15m centres (or less). These drains were provided to help control groundwater levels in the area for the proposed building platform area within Lot 984. Details of resulting building restrictions are presented in the Suitability Statement.

6.8 Topsoil

Topsoil depths in likely building platform areas were checked by the drilling of a borehole in the approximate centre of each lot. Our findings, which are indicative only and subject to variation at other locations, show that likely topsoil depths are between 100mm and 250mm. Site specific findings are presented in the Suitability Statement Summary.

6.9 Contractor's Work

We have relied on the Contractor's work practices and assume that the works have been carried out in accordance with:

i) The approved Contract drawings and design details,
ii) The approved Contract specifications,
iii) Authorised Variations to (i) and (ii) during the execution of the works,
iv) The conditions of Resource, Earthworks and Building Consents where applicable,
v) The relevant LDE Limited reports, recommendations and site instructions,

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

Where counterfort drain construction in Lots 982 an 984 was not sighted by LDE, we have received the as-built data attesting that they were installed to the correct depth and spacing. We have also completed post-construction verification confirming that backfill materials are in accordance with our recommendations.

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

I, C.J. Edwards of LDE Limited, Auckland, hereby confirm that:

1. I am a Professional Engineering Geologist (CMEngNZ (PEngGeol)) experienced in the field of geotechnical engineering as defined in section 1.2.2 of NZS 4404 and was retained by the Owner/Developer as the Geotechnical Engineer on Stage 19 of the Hitchen Block residential subdivision.

2. The extent of preliminary investigations carried out to date are described in the reports summarised in Table 2 and the conclusions and recommendations of those documents have been re-evaluated in the preparation of this report.

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

    a. The completed earthworks give due regard to land slope and foundation stability considerations within the residential lots. However, as shown on the appended as-built contours plan (drawing AB200) areas within residential **Lots 980 to 984** that are shown as having gradients steeper than 1(v) in 4(h) or are adjacent to land having such gradients.

    No building development and/or earthworks should take place within these areas unless endorsed by specific site investigations and/or slope stability assessments undertaken by a chartered professional engineer experienced in geomechanics and familiar with the contents of this report, as such operations may, in certain circumstances, have detrimental effects on overall site stability. Specific commentary for lots containing steeper gradients is provided below:

i. For **Lots 980, 981 and 984**, any building or earthworks proposals in areas shaded in grey (steeper than 1(v) in 4(h)) on the on the as-built contours plan (drawing AB200) are subject to specific site investigation/assessments and/or foundation design on account of having gradients steeper than 1(v) in 4(h) or proximity to land having such gradients.

ii. For **Lots 980, 982, 983 and 984**, a Building Line Restriction (olive dashed lines shown on the as-built contours plan (drawing AB200) has been imposed. Any building or earthworks proposals downslope (to the east and south-east) of the Building Line Restriction are subject to detailed specific site geotechnical investigation (including detailed global slope stability analysis), foundation design and construction inspections on account of global slope stability considerations.

b. A geotechnical ultimate bearing capacity of 300kPa may be assumed for foundation design on all residential lots located upslope of the Building Restriction Line referenced in Section 6.3. Where a geotechnical bearing capacity greater than 300 kPa is required, (i.e. outside the limits of NZS 3604, such as when piling is undertaken), further specific site investigation and design of foundations should be carried out prior to building consent application.

c. The assessed AS2870:2011 expansive Site Class for all residential lots is Class H1 (High) with characteristic ground surface movement of up to 60mm (based on the scaling factor of the site being adjusted to a 1/300 event).

**Note: if the foundation designer needs to design the foundations for 500-yr and 1,000-yr drought return level events, then the y_s of 60mm should be factored by 1.11 and 1.21 respectively in accordance with Table 22 of BRANZ Addendum Study Report No. 120A (2008).*

Site specific laboratory Shrink-Swell testing and calculation of specific y_s values may be undertaken by end-users to re-assess this during building consent stage.

d. The backfilling and compaction of the live stormwater and sanitary sewer trenches on this subdivision has where possible been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.

Nevertheless, no building development should take place within the 45 degree zone of influence of drain inverts unless endorsed by specific site investigations and/or foundation designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed and that building loads are transferred beyond the influence of the pipe and beyond the extent of the trench backfill.

e. The function of the counterfort drains in residential **Lots 982 and 984** should not be impaired by any building development or landscaping works. Any bored or driven piles must be positioned to avoid damaging the counterfort drains.

The counterfort drains have been installed in accordance with good engineering practice and should require no specific maintenance. However, the compaction of the surficial backfill soils may not be to certifiable standards and therefore all buildings having foundations within 7m of a counterfort drain will require Engineering design to ensure foundations appropriately 'bridge' the drains and associated trenches.

f. Subject to the geotechnical limitations, restrictions, recommendations and expansive soil assessments associated with 3(b) to 3(f) above:

   i. The filled and undisturbed original ground within residential lot boundaries is generally suitable for residential buildings constructed in accordance with NZS 3604 and related documents.

   ii. On all residential lots, foundation design may be carried out in accordance with one of the following methods:

      - Class H1 in terms of AS2870:2011; with characteristic ground surface movement of up to 60mm.
      - A specific foundation and structural design may be undertaken by a Chartered Professional Engineer who should allow for expansive soil effects referenced above in the design.
      - For buildings having brittle exterior cladding appropriate control joints should also be specifically designed depending on architectural specifications and structural form.

4. Road Subgrades and lot accessway subgrades have been formed having due regard for slope stability and settlement, although available subgrade strengths are dependent on-site conditions and on construction trafficking and variable results should be expected

5. Drainage reserve areas have been formed to geotechnical standards appropriate for their intended use.

It does not remove the necessity for the normal inspection of ground conditions and the design of foundations as would be made under all normal circumstances, especially in cases where settlement sensitive buildings are sited partly on fill and partly on natural ground, or where they are entirely sited on filling whose depth changes significantly across the building platform.

The appended table summarises the status of each residential lot covered by this Suitability Statement.

8 LIMITATIONS

This report should be read and reproduced in its entirety including the limitations to understand the context of the opinions and recommendations given.

This report has been prepared exclusively for DFH Joint Venture Limited in accordance with the brief given to us or the agreed scope and they will be deemed the exclusive owner on full and final payment of the invoice. Information,

opinions, and recommendations contained within this report can only be used for the purposes with which it was intended. LDE accepts no liability or responsibility whatsoever for any use or reliance on the report by any party other than the owner or parties working for or on behalf of the owner, such as local authorities, and for purposes beyond those for which it was intended.

This report was prepared in general accordance with current standards, codes and best practice at the time of this report. These may be subject to change.

Opinions given in this report are based on visual methods and subsurface investigations at discrete locations designed to the constraints of the project scope to provide the best assessment of the environment. It must be appreciated that the nature and continuity of the subsurface materials between these locations are inferred and that actual conditions could vary from that described herein. We should be contacted immediately if the conditions are found to differ from those described in this report.

Table 4: Suitability Statement Summary

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class	NZS1170.5 Seismic Site Class
980	Within areas shaded grey on the as-built contour drawing and/or downslope (i.e. to the north-east) of the Building Line Restriction (olive dashed line on as-built contour drawing), specific detailed geotechnical site investigation, foundation design and construction inspections due to global slope stability considerations. Elsewhere, foundation design in accordance with AS2870:2011 or engineer approved alternative foundation design. Where cuts and/or fills greater than 600mm are proposed, further specific site investigation and design of foundations and/or geotechnical endorsement should be carried out prior to building consent application.	100	300	H1	C
981	Within areas shaded grey on the as-built contour drawing, specific site investigation, foundation design and construction inspections due to global slope stability considerations. Elsewhere, foundation design in accordance with AS2870:2011 or engineer approved alternative foundation design. Where cuts and/or fills greater than 600mm are proposed, further specific site investigation and design of foundations and/or geotechnical endorsement should be carried out prior to building consent application.	250	300	H1	C
982	Downslope (i.e. to the north-east and south-east) of the Building Line Restriction (olive dashed line on as-built contour drawing), specific detailed geotechnical site investigation, foundation design and construction inspections due to global slope stability considerations. Elsewhere, foundation design in accordance with AS2870:2011 or engineer approved alternative foundation design. Where cuts and/or fills greater than 600mm are proposed, further specific site investigation and design of foundations and/or geotechnical endorsement should be carried out prior to building consent application.	250	300	H1	C
983	Within areas shaded grey on the as-built contour drawing and/or downslope (i.e. to the south-east) of the Building Line Restriction (olive dashed line on as-built contour drawing), specific detailed geotechnical site investigation, foundation design and construction inspections due to global slope stability considerations. Elsewhere, foundation design in accordance with AS2870:2011 or engineer approved alternative foundation design. Where cuts and/or fills greater than 600mm are proposed, further specific site investigation and design of foundations and/or geotechnical endorsement should be carried out prior to building consent application.	250	300	H1	C

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class	NZS1170.5 Seismic Site Class
984	Within areas shaded grey on the as-built contour drawing and/or Downslope (i.e. to the east) of Building Line Restriction (olive dashed line on as-built contour drawing) and/or within 7m of counterfort drains (red dashed line on as-built drawing), specific detailed geotechnical site investigation, foundation design and construction inspections due to global slope stability considerations. Elsewhere, foundation design in accordance with AS2870:2011 or engineer approved alternative foundation design. Where cuts and/or fills greater than 600mm are proposed, further specific site investigation and design of foundations and/or geotechnical endorsement should be carried out prior to building consent application.	250	300	H1	C

APPENDIX A

CIVILPLAN LIMITED AS BUILT DRAWINGS

NOTES
1. ALL LEVELS ARE IN METRES AND IN TERMS OF THE LANDS & SURVEY DATUM (MEAN SEA LEVEL) AUCKLAND 1945.
2. CONTOUR INTERVAL IS 1m
3. CONTOURS ACCURACY IS + OR - 0.5m

LEGEND
MAJOR 5m CONTOUR
MINOR 1m CONTOUR
LAND STEEPER THAN 1:4
4m SETBACK - SUBJECT TO SPECIFIC GEOTECH DESIGN

N

797 798 799 800 801 802 803 804 805 809 947

101
RESERVE TO VEST

EX. BUSH AREA

STAGE 19

STAGE 18

HITCHEN ROAD

JOAL A

CHRIS GATEHOUSE LANE

BUILDING LINE RESTRICTION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

980 981 982 983 984

2 DP 176205

2 DP 199997

1 DP 51064

I, MICHAEL STEPHEN SMITH, CMENGNZ CPENG HEREBY BELIEVE ON ALL REASONABLE GROUNDS THAT THE CONTOURS SHOWN ARE ACCURATELY PLOTTED IN RELATION TO BOUNDARIES AS THIS INFORMATION HAS BEEN PROVIDED BY THE CONTRACTOR OF THE WORKS - KERRY DINES LTD.

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MICHAEL STEPHEN SMITH DATE
CMENGNZ CPENG

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224c	RJP	05-25

PLOTTED: RJP DATE: 05-25
DRAWN: RJP DATE: 05-25
APPROVED: MSS DATE: 05-25

CIVILPLAN CONSULTANTS
Level 9, Laidlaw House, 20 Amersham Way, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGE 18 SUBDIVISION
POKENO

SHEET TITLE:
As Built Contours

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:500 / 1:1000
SCALE BAR 1:1000@A3 0 10 20 30 40 50m
DRAWING NUMBER: 136701-18-AB200 REV: A

Filepath: PARKINSON\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 18\AS BUILT\136701-18-AB200.DWG

NOTES
1. ALL LEVELS ARE IN METRES AND IN TERMS OF THE LANDS & SURVEY DATUM (MEAN SEA LEVEL) AUCKLAND 1945.
2. CONTOUR INTERVAL IS 1m
3. CONTOURS ACCURACY IS + OR - 0.5m

LEGEND
MAJOR 5m CONTOUR
MINOR 1m CONTOUR
FILL AREA

N

797 798 799 800 801 802 803 804 805 809 947 984 980 981 982 983

101
RESERVE TO VEST

EX. BUSH AREA

STAGE 19

STAGE 18

CUT

HITCHEN ROAD

CHRIS GATEHOUSE LANE

JOALA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

2
DP 176205

2
DP 199997

1
DP 51064

I, MICHAEL STEPHEN SMITH, CMENGNZ CPENG HEREBY BELIEVE ON ALL REASONABLE GROUNDS THAT THE CONTOURS SHOWN ARE ACCURATELY PLOTTED IN RELATION TO BOUNDARIES AS THIS INFORMATION HAS BEEN PROVIDED BY THE CONTRACTOR OF THE WORKS - KERRY DINES LTD.

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MICHAEL STEPHEN SMITH DATE
CMENGNZ CPENG

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CIVILPLAN CONSULTANTS
Level 9, Laidlaw House, 20 Amersham Way, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGE 18 SUBDIVISION
POKENO

SHEET TITLE:
As Built Cut-Fill Contours
Undercut & Shear Key

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:500 / 1:1000
SCALE BAR 1:1000@A3 0 10 20 30 40 50m
DRAWING NUMBER: 136701-18-AB201 REV: A

Filepath: PARKINSON\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 18\AS BUILT\136701-18-AB201.DWG

NOTES
1. ALL LEVELS ARE IN METRES AND IN TERMS OF THE LANDS & SURVEY DATUM (MEAN SEA LEVEL) AUCKLAND 1945.
2. CONTOUR INTERVAL IS 1m
3. CONTOURS ACCURACY IS + OR - 0.5m

N

STAGE 19

STAGE 18

101
RESERVE TO VEST

EX. BUSH AREA

COUNTERFORT DRAINS

SHEAR KEY

150Ø NOVACOIL DRAINS

HITCHEN ROAD

REDUNDANT WATERMAIN & POWER TRENCH UNDERCUT

JOAL A

CHRIS GATEHOUSE LANE

KEYCUT

UNDERCUT

2
DP 176205

2
DP 199997

1
DP 51064

797 798 799 800 801 802 803 804 805 809 947 984 980 981 982 983

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

I, MICHAEL STEPHEN SMITH, CMENGNZ CPENG HEREBY BELIEVE ON ALL REASONABLE GROUNDS THAT THE CONTOURS SHOWN ARE ACCURATELY PLOTTED IN RELATION TO BOUNDARIES AS THIS INFORMATION HAS BEEN PROVIDED BY THE CONTRACTOR OF THE WORKS - KERRY DINES LTD.

---------- -----
MICHAEL STEPHEN SMITH DATE
CMENGNZ CPENG

LEGEND
- MAJOR 5m CONTOUR
- MINOR 1m CONTOUR
- UNDERFILL DRAINS
- COUNTERFORT DRAINS

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224c	RJP	05-25

PLOTTED: RJP DATE: 05-25
DRAWN: RJP DATE: 05-25
APPROVED: MSS DATE: 05-25

CIVILPLAN CONSULTANTS
Level 9, Laidlaw House, 20 Amersham Way, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGE 18 SUBDIVISION
POKENO

SHEET TITLE:
As Built Geotech

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:500 / 1:1000
SCALE BAR 1:1000@A3 0 10 20 30 40 50m
DRAWING NUMBER: 136701-18-AB202 REV: A

Filepath: PARKINSON\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 18\AS BUILT\136701-18-AB202.DWG

STORMWATER COORDINATES

CON=LOT CONNECTION

CON1	758330.01	421695.85
CON2	758316.25	421706.11
CON3	758307.62	421710.13
CON4	758299.50	421710.23
CON5	758280.44	421712.91
CON6	758247.57	421635.09
CON7	758242.21	421612.96
CON8	758231.78	421585.89
CON9	758242.54	421556.87
CON10	758228.51	421529.59
CON11	758203.19	421533.36
CON12	758210.86	421565.01
CON13	758180.19	421572.41
CON14	758220.25	421597.11
CON15	758227.78	421619.03
CON16	758233.52	421643.61
CON17	758194.99	421628.66
CON18	758229.14	421676.69
CON19	758239.05	421694.40
CON20	758250.94	421718.11
CON21	758231.48	421719.52
CON22	758213.44	421721.50
CON23	758200.08	421675.63
CON24	758187.38	421731.44
Stage 19		
CON980	758297.88	421764.70
CON981	758244.70	421770.18
CON982	758254.46	421792.26
CON983	758223.42	421772.62

STORMWATER COORDINATES

MH=MANHOLE, BC=BLANK CAP

MH12.7	758334.40	421759.82
MH12.8	758251.96	421768.43
BC12.9	758223.05	421770.97
MH18.2	758342.16	421680.54
MH18.3	758323.27	421695.03
MH18.4	758307.62	421707.46
BC18.5	758280.06	421711.92
MH21.4	758237.44	421534.85
MH21.5	758223.96	421520.98
MH21.6	758191.07	421537.80
BC21.7	758178.88	421572.10
MH22.1	758366.20	421711.44
MH23.1	758242.89	421554.19
MH23.2	758222.81	421561.54
MH23.3	758233.10	421598.07
MH23.4	758240.20	421612.75
MH23.5	758245.77	421634.17
MH23.6	758243.68	421665.31
MH23.7	758244.17	421675.99
MH23.8	758249.16	421689.28
MH23.9	758261.95	421711.15
MH23.10	758252.04	421715.77
MH23.11	758197.29	421721.38
MH24.1	758255.51	421744.51
BC17	758194.24	421626.74
BC23	758200.24	421673.42
BC982	758255.45	421792.14

STORMWATER COORDINATES

CP=CATCHPIT, DCP=DOUBLE CP

SD=STRIP DRAIN

CP1	758253.05	421769.82
CP2	758363.88	421717.74
DCP3	758322.57	421744.73
DCP4	758324.05	421752.67
DCP5	758255.89	421751.93
DCP6	758259.13	421759.66
SD1	758255.69	421712.59
SD2	758237.18	421667.05
SD3	758232.85	421611.94
SD4	758214.74	421556.13

I, MICHAEL STEPHEN SMITH, CMENGNZ CPENG HEREBY BELIEVE ON ALL REASONABLE GROUNDS THAT THE PIPE SIZES, FITTINGS, POSITIONS, COORDINATES AND LEVELS SHOWN ARE ACCURATELY PLOTTED IN RELATION TO BOUNDARIES AND IS CORRECT AS THIS INFORMATION HAS BEEN PROVIDED BY THE CONTRACTOR OF THE WORKS - KERRY DINES LTD.

---------- -----

MICHAEL STEPHEN SMITH DATE

CMENGNZ, CPENG

NOTES

1. ALL COORDINATES ARE IN METRES AND IN TERMS OF GEODETIC 2000 MT. EDEN

2. ALL LEVELS ARE IN METRES AND IN TERMS OF THE LANDS AND SURVEY DATUM (MEAN SEA LEVEL) AUCKLAND 1946

3. ALL LOT CONNECTIONS ARE 150NB PVC UNLESS SHOWN OTHERWISE.

4. MANHOLE INVERT LEVELS ARE LISTED CLOCKWISE FROM THE OUTLET PIPE.

5. ALL MANHOLES ARE 1050NB WITH STANDARD DUTY LIDS AND COVERS UNLESS SHOWN OTHERWISE.
ALL STORMWATER PIPES 225NB AND OVER ARE RCRRJ CLASS 2 UNLESS SHOWN OTHERWISE EXCEPT FOR CATCHPIT LEADS WHICH ARE ALL CLASS 4. ALL CATCHPIT LEADS ARE 225NB UNLESS SHOWN OTHERWISE.

6. ALL CONCRETE PIPES AND STRUCTURES ARE MANUFACTURED BY HYNDS PIPES. ALL PLASTIC PIPES ARE MANUFACTURED BY MARLEY.

LEGEND

MANHOLE
OUTLET
CATCHPIT
SW LINE
EX.MANHOLE
EX.CATCHPIT
EX.SW LINE
STRIP DRAIN

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224c	RJP	05-25

PLOTTED: RJP DATE: 05-25
DRAWN: RJP DATE: 05-25
APPROVED: MSS DATE: 05-25

CIVILPLAN CONSULTANTS
Level 9, Laidlaw House, 20 Amersham Way, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGE 18 SUBDIVISION
POKENO

SHEET TITLE:
AS BUILT
STORM WATER

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:500 / 1:1000
SCALE BAR 1:1000@A3 0 10 20 30 40 50m
DRAWING NUMBER: 136701-18-AB400 REV: A

Filepath: PARKINSON\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 18\AS BUILT\136701-18-AB400.DWG

WASTEWATER COORDINATES

MH=MANHOLE, BC=BLANK CAP
CON=LOT CONNECTION

CON1	758342.50	421686.20
CON2	758327.40	421697.83
CON3	758310.67	421711.37
CON4	758301.32	421710.99
CON5	758263.25	421709.87
CON6	758247.71	421636.11
CON7	758241.95	421613.81
CON8	758231.22	421587.93
CON9	758239.34	421557.65
CON10	758229.72	421531.28
CON11	758204.84	421534.17
CON12	758210.28	421564.14
CON13	758219.24	421589.42
CON14	758221.72	421599.05
CON15	758229.76	421618.65
CON16	758231.21	421643.11
CON17	758198.92	421648.82
CON18	758232.26	421678.88
CON19	758239.98	421696.19
CON20	758249.55	421717.96
CON21	758233.25	421718.98
CON22	758214.58	421720.84
CON23	758194.92	421715.91
CON24	758184.89	421729.17
STAGE 19		
CON980	758299.29	421764.54
CON981	758245.07	421769.84
CON982	758253.47	421792.20
CON983	758222.36	421771.44
CON984	758348.85	421749.60

WASTEWATER COORDINATES

MH=MANHOLE, BC=BLANK CAP
CON=LOT CONNECTION

MHA1	758238.83	421545.18
MHA2	758240.83	421552.04
MHA3	758216.39	421558.84
MHA4	758227.67	421597.27
MHA5	758240.27	421634.96
MHA6	758237.15	421676.90
MHA7	758255.01	421709.56
MHA8	758248.88	421713.02
MHA9	758197.12	421718.11
BCA10	758185.32	421730.25
MHB1	758236.34	421536.68
MHB2	758223.51	421523.28
BCB3	758203.95	421533.43
MHJ7	758249.54	421762.97
BCJ8	758221.33	421766.03
BCJ9	758254.03	421792.35
MHU5	758311.34	421708.46
BCU6	758300.64	421709.78
BC17	758198.28	421647.23
MHZ2	758265.15	421562.69
MHZ3	758244.29	421543.61

I, MICHAEL STEPHEN SMITH, CMENGNZ CPENG HEREBY BELIEVE ON ALL REASONABLE GROUNDS THAT THE PIPE SIZES, FITTINGS, POSITIONS, COORDINATES AND LEVELS SHOWN ARE ACCURATELY PLOTTED IN RELATION TO BOUNDARIES AND IS CORRECT AS THIS INFORMATION HAS BEEN PROVIDED BY THE CONTRACTOR OF THE WORKS - KERRY DINES LTD.

---------- -----
MICHAEL STEPHEN SMITH DATE
CMENGNZ, CPENG

NOTES

1. ALL COORDINATES ARE IN METRES AND IN TERMS OF GEODETIC 2000 MT. EDEN

2. ALL LEVELS ARE IN METRES AND IN TERMS OF THE LANDS AND SURVEY DATUM (MEAN SEA LEVEL) AUCKLAND 1946

3. ALL LOT CONNECTIONS ARE 100NB PVC UNLESS SHOWN OTHERWISE.

4. MANHOLE INVERT LEVELS ARE LISTED CLOCKWISE FROM THE OUTLET PIPE.

5. ALL MANHOLES ARE 1050NB WITH STANDARD DUTY LIDS AND COVERS UNLESS SHOWN OTHERWISE.

6. ALL PIPES ARE MANUFACTURED BY MARLEY AND MANHOLES BY HYNDS PIPES.

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224c	RJP	05-25

PLOTTED: RJP DATE: 05-25
DRAWN: RJP DATE: 05-25
APPROVED: MSS DATE: 05-25

CIVILPLAN CONSULTANTS
Level 9, Laidlaw House, 20 Amersham Way, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGE 18 SUBDIVISION
POKENO

SHEET TITLE:
AS BUILT
WASTE WATER

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:500 / 1:1000
SCALE BAR 1:1000@A3 0 10 20 30 40 50m
DRAWING NUMBER: 136701-18-AB401 REV: A

Filepath: PARKINSON\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 18\AS BUILT\136701-18-AB401.DWG

APPENDIX B

SOIL CLASSIFICATION TEST RESULTS

20 May 2025
Our Ref: 1009479.1227.0.0/Rep1
Customer Ref: J00113

Land Development & Engineering Ltd
Level 1, Wilson James Centre
77 Peel Street
Gisborne 4040

Attention: Kyle Meffan

Dear Kyle

Hitchen - Civil Stage 18 and 19

Laboratory Test Report

The samples we collected from the above-mentioned site have been tested according to your instructions and the results are included in this report. Results apply only to the sample(s) tested. A location plan with sampling locations is also included.

Descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

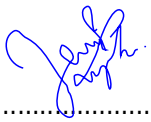
This report has been prepared for the benefit of Land Development & Engineering Ltd, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report approved by:



.....
Jack Singh
Senior Laboratory Technician
Key Technical Person

Authorised for Geotechnics by:

.....
Vic O'Connor
Project Director

ACCREDITED TESTING LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

20-May-25
\\ttgroup.local\corporate\geotechnicsgroup\projects\1009479\1009479.1227\workingmaterial\20250520.jasi.1009479.1227.0.0.rep1.docx

GEOTECHNICS

45A Parkhouse Road
Wigram
Christchurch 8042
New Zealand
p. +64 3 361 0300

Geotechnics Project ID	1009479.1227.0.0
Customer Project ID	J00113

Determination of the Shrink - Swell Index - AS 1289 Test 7.1.1 - 2003

TEST DETAILS

LOCATION	ID	Hitchen - Civil Stage 18 and 19		
	Description	Hitchen - Civil Stage 18 and 19		
SAMPLE	Geotechnics ID	CHCH202521-1	Top Depth	0.5m
	Reference	Lot 20	Bottom Depth	1.0m
	Description	SILT with minor clay and trace sand, brown. Moist.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Applied pressure	25 kPa

Swell Test

Initial water content	30.1 %
Bulk density	1.77 t/m³
Dry density	1.36 t/m³
Final water content	33.5 %
Swelling strain	-0.12 %

Shrinkage Test

Initial water content	33.9 %
Shrinkage strain	7.0 %
Inert material estimate in the soil specimen	None
Soil crumbling during shrinkage	Moderate
Cracking of the shrinkage specimen	Moderate

Shrink - Swell Index	3.9 %

TEST REMARKS

- The material used for testing was natural

Date tested: 15/05/2025

This test result is IANZ accredited.

Approved by KTP	JASI	Date	20/05/2025

GEOTECHNICS

45A Parkhouse Road
Wigram
Christchurch 8042
New Zealand
p. +64 3 361 0300

Geotechnics Project ID	1009479.1227.0.0
Customer Project ID	J00113

Determination of the Shrink - Swell Index - AS 1289 Test 7.1.1 - 2003

TEST DETAILS

LOCATION	ID	Hitchen - Civil Stage 18 and 19		
	Description	Hitchen - Civil Stage 18 and 19		
SAMPLE	Geotechnics ID	CHCH202521-2	Top Depth	0.5m
	Reference	Lot 1	Bottom Depth	1.0m
	Description	SILT with minor clay and trace sand, brown.Moist.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Applied pressure	25 kPa

Swell Test

Initial water content	35.5 %
Bulk density	1.84 t/m³
Dry density	1.36 t/m³
Final water content	37.5 %
Swelling strain	-0.12 %

Shrinkage Test

Initial water content	34.7 %
Shrinkage strain	6.0 %
Inert material estimate in the soil specimen	None
Soil crumbling during shrinkage	Moderate
Cracking of the shrinkage specimen	Moderate

Shrink - Swell Index	3.3 %

TEST REMARKS

- The material used for testing was natural

Date tested: 16/05/2025

This test result is IANZ accredited.

Approved by KTP	JASI	Date	20/05/2025

GEOTECHNICS

45A Parkhouse Road
Wigram
Christchurch 8042
New Zealand
p. +64 3 361 0300

Geotechnics Project ID 1009479.1227.0.0
Customer Project ID J00113

Determination of the Shrink - Swell Index - AS 1289 Test 7.1.1 - 2003

TEST DETAILS

LOCATION	ID	Hitchen - Civil Stage 18 and 19		
	Description	Hitchen - Civil Stage 18 and 19		
SAMPLE	Geotechnics ID	CHCH202521-3	Top Depth	0.5m
	Reference	Lot 983	Bottom Depth	1.0m
	Description	SILT with trace clay and minor sand, brown.Moist.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Applied pressure	25 kPa

Swell Test

Initial water content	18.2 %
Bulk density	2.02 t/m³
Dry density	1.71 t/m³
Final water content	18.9 %
Swelling strain	-0.20 %

Shrinkage Test

Initial water content	21.6 %
Shrinkage strain	1.5 %
Inert material estimate in the soil specimen	None
Soil crumbling during shrinkage	Moderate
Cracking of the shrinkage specimen	Moderate

Shrink - Swell Index	0.9 %

TEST REMARKS

- The material used for testing was natural

Date tested: 15/05/2025

This test result is IANZ accredited.

Approved by KTP	JASI	Date	20/05/2025

GEOTECHNICS
45A Parkhouse Road
Wigram
Christchurch 8042
New Zealand
p. +64 3 361 0300

Geotechnics Project ID	1009479.1227.0.0
Customer Project ID	J00113

Determination of the Shrink - Swell Index - AS 1289 Test 7.1.1 - 2003

TEST DETAILS

LOCATION	ID	Hitchen - Civil Stage 18 and 19		
	Description	Hitchen - Civil Stage 18 and 19		
SAMPLE	Geotechnics ID	CHCH202521-4	Top Depth	0.5m
	Reference	Lot 11	Bottom Depth	1.0m
	Description	SILT with minor clay and trace sand and trace gravel, brown.Moist.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Applied pressure	25 kPa

Swell Test

Initial water content	33.8 %
Bulk density	1.86 t/m³
Dry density	1.39 t/m³
Final water content	34.8 %
Swelling strain	-0.24 %

Shrinkage Test

Initial water content	34.9 %
Shrinkage strain	5.7 %
Inert material estimate in the soil specimen	<5 %
Soil crumbling during shrinkage	Moderate
Cracking of the shrinkage specimen	Moderate

Shrink - Swell Index	3.2 %

TEST REMARKS

- The material used for testing was natural

Date tested: 15/05/2025

This test result is IANZ accredited.

Approved by KTP	JASI	Date	20/05/2025

APPENDIX C

POST-CONSTRUCTION BOREHOLE RECORDS

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**Lot 980**		
Project ID:	J00113		
Sheet:	1 of 1		
Client:	DFH JOINT VENTURE LIMITED	**Coordinates:**	
Project:	Geotechnical Investigation for Subdivision	**System:**	NZTM
Location:	Stage 17	**Elevation:**	Ground
Test Site:	Refer to site plan	**Located By:**	Site plan/map
Test Date:	13/05/2025		
Logged By:	ZS		
Checked By:	ZS		
Vane ID:	835		

Depth (m)	Material Description	Geology
0.0	TOPSOIL.	Topsoil
	Clayey SILT, with trace sand; orange streaked light grey. Very stiff; moist; sand, fine; medium plasticity; moderately sensitive.	South Auckland Volcanic Field
0.5	0.8m: becoming light grey/white mottled orange	
1.0	1.2m: becoming light brown streaked red; with minor fine to medium sand	
1.5	1.5m: becoming insensitive	
2.0		
2.5		

Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8

Shear Vane, Su (kPa) 50 100 150 200

Depth (m)	Test Values (peak / remoulded (sensitivity))
0.5	191 / 83 (2.3)
1.0	162 / 80 (2)
1.5	143 / 80 (1.8)
2.0	143 / 96 (1.5)

-1.0

-2.0

Hole Depth: 2.00m

Termination: Reached target depth

Remarks:

Materials described in general accordance with NZGS Field Description of Soil and Rock (2005) . No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**Lot 981**		
Project ID:	J00113		
Sheet:	1 of 1		
Client:	DFH JOINT VENTURE LIMITED	**Coordinates:**	
Project:	Geotechnical Investigation for Subdivision	**System:**	NZTM
Location:	Stage 17	**Elevation:**	Ground
Test Site:	Refer to site plan	**Located By:**	Site plan/map
Test Date:	13/05/2025		
Logged By:	BS		
Checked By:	ZS		
Vane ID:	2784		

Depth (m)	Material Description	Geology
0.0	TOPSOIL.	Topsoil
0.5	Silty CLAY, with trace sand; orange mottled brown. Very stiff; moist; high plasticity; sand, fine.	South Auckland Volcanic Field
1.5	Clayey SILT, with trace sand; light grey mottled red/orange. Very stiff; moist; high plasticity; sand, fine; insensitive.	
2.0		
2.5		

Water: Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm): 2, 4, 6, 8

Shear Vane, Su (kPa): 50, 100, 150, 200

Depth (m)	Test Values (peak / remoulded (sensitivity))
0.5	192+
1.0	192+
1.5	157 / 114 (1.4)
2.0	129 / 102 (1.3)

-1.0

-2.0

Hole Depth: 2.00m

Termination: Reached target depth

Remarks:

Materials described in general accordance with NZGS Field Description of Soil and Rock (2005) . No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**Lot 983**		
Project ID:	J00113		
Sheet:	1 of 1		
Client:	DFH JOINT VENTURE LIMITED	**Coordinates:**	
Project:	Geotechnical Investigation for Subdivision	**System:**	NZTM
Location:	Stage 17	**Elevation:**	Ground
Test Site:	Refer to site plan	**Located By:**	Site plan/map
Test Date:	13/05/2025		
Logged By:	BS		
Checked By:	ZS		
Vane ID:	2784		

Depth (m)	Material Description	Geology
0.0	TOPSOIL.	Topsoil
	Silty CLAY, with trace sand; orange mottled brown. Very stiff; moist; high plasticity; sand, fine; moderately sensitive.	South Auckland Volcanic Field
0.5	0.6m: becoming light brown/grey mottled orange	
1.0	1.0m: becoming insensitive	
1.5	Clayey SILT, with trace sand; light grey mottled red/orange. Very stiff; moist; sand, fine; medium plasticity.	
2.0		
2.5		

Water: Groundwater Not Encountered

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm): 2, 4, 6, 8

Shear Vane, Su (kPa): 50, 100, 150, 200

Depth (m)	Test Values (peak / remoulded (sensitivity))
0.5	140 / 71 (2)
1.0	170 / 103 (1.7)
1.5	192+
2.0	192+

Hole Depth: 2.00m

Termination: Reached target depth

Remarks:

Materials described in general accordance with NZGS Field Description of Soil and Rock (2005) . No correlation is implied between shear vane and DCP values.

- Vane peak
- Vane residual
- Vane UTP
- Standing water level
- Groundwater inflow
- Groundwater outflow

UTP = Unable to Penetrate

APPENDIX D

CONSTRUCTION OBSERVATION RECORDS

29/09/21 - Stage 6 begins

Wednesday, 29 September 2021 3:40 PM

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	29/09/21 - 9:30am
Author:	KM
Plant Operating:	
Weather:	

Site Observations and Instructions:

- Visited site to discuss Stage 6 earthworks with Trevor and Simon (new foreman for Dines). Items discussed were:
    - Nominal toe keys required at toe of proposed fills. 1m depth minimum into very stiff soils.
    - Nominal underfill drains will be required, must keep 2m of fill cover wherever possible. Some drains will likely need to be trenched in 0.5m. Drains will outlet over the top of the toe keys into the gullies.
    - Counterfort drains: 4x required below proposed retaining wall. Will discuss flush point with Chris. Dines may have to bench the slope to get the drains in as the slopes are very steep.
    - Retaining walls will be constructed by Dines as part of the civil works. Drain outlets will be directed to the public reticulation network.


HITACHI

06/10/21 - Site Walkover

Wednesday, 6 October 2021 2:25 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	06/10/21 - 11:00am
Author:	RG
Plant Operating:	
Weather:	Sunny

Site Observations and Instructions:

Attended site for a site walkover/ handover from KM to RG. Observed the beginning of works (forming of drainage) within Stage 6. The beginning site strip was occurring within stiff to very stiff natural Ash soils.

11/10/21

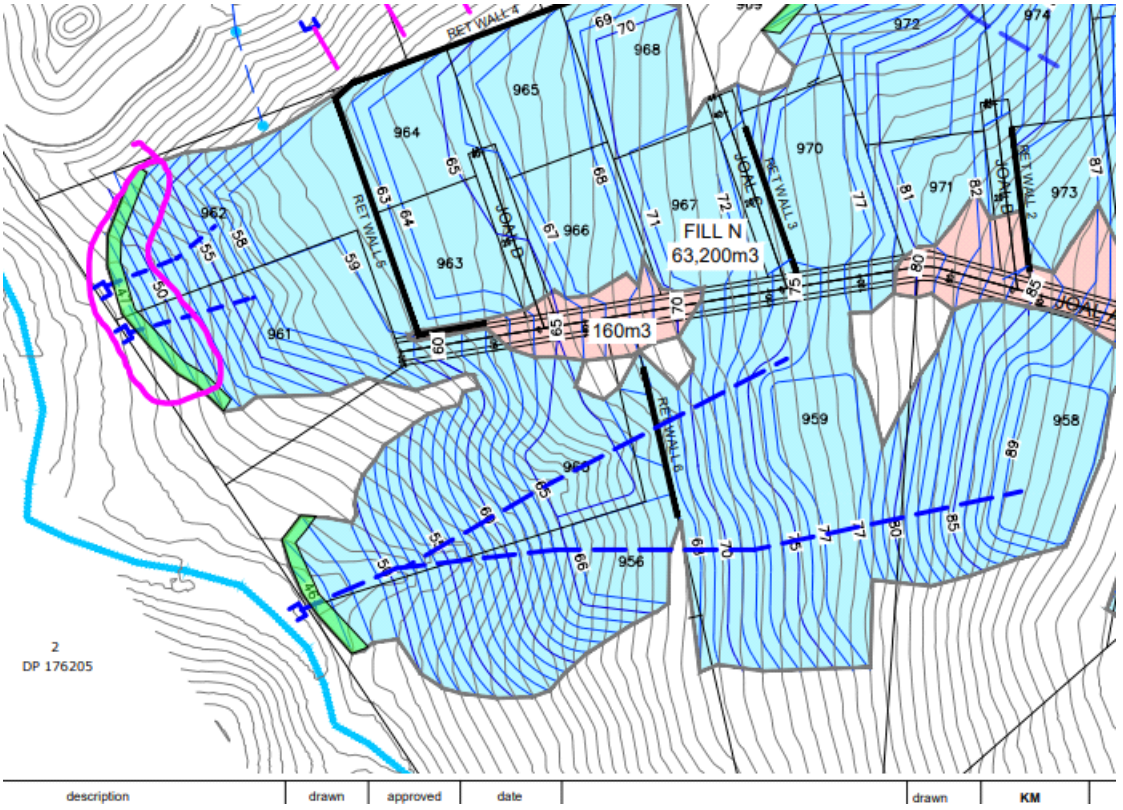
Monday, 11 October 2021 2:45 PM

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	11/10/21 - 12:15pm
Author:	KM
Plant Operating:	
Weather:	

Site Observations and Instructions:

Observed excavation of toe key at least 1m below original ground level as per purple outline on the annotated plan below. Advised contractor to bench the sides and then fill compaction with clay can commence. Also advised that the underfill drains be installed as per our detail and should not extend beyond the lower retaining wall.



30/11/21

Tuesday, 30 November 2021 1:09 PM

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	30/11/21 - 10am
Author:	KM
Plant Operating:	
Weather:	

Site Observations and Instructions:

Earthworks continuing in Stage 6.

Counterfort drains in are mostly complete, the final drain is still being constructed - loose materials have been undercut, benched out and clay fill placed. Drain depth to digger reach.

05/11/21

Friday, 5 November 2021 3:45 p.m.

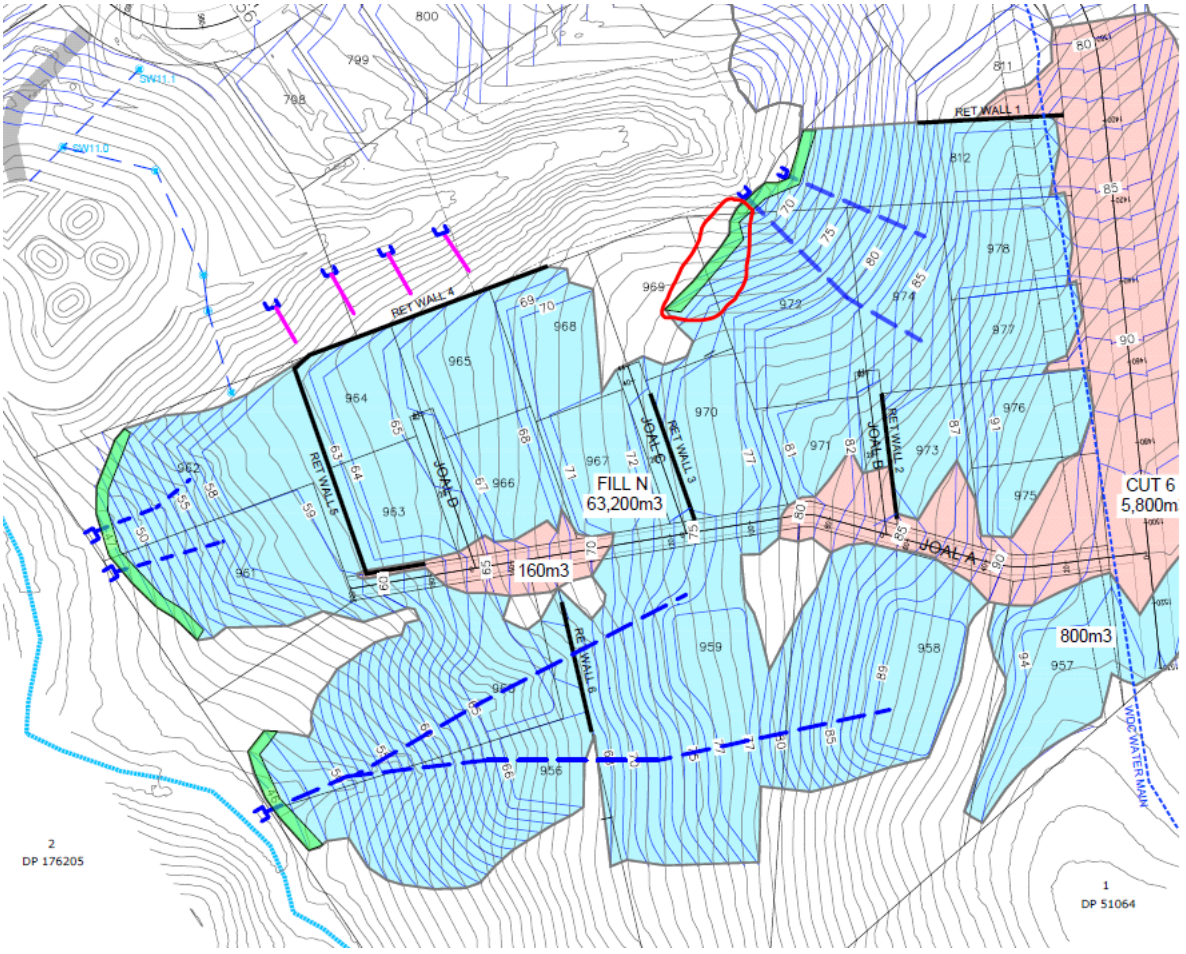
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	05/11/21 - 1pm
Author:	RG
Plant Operating:	Digger
Weather:	Overcast

Site Observations and Instructions:

Observed excavation of toe key at least 1m below original ground level as per purple outline on the annotated plan below.

- Base of the toes key returned shear vanes of greater than 217kPa, with the vane blade unable to penetrate the soil in some instances.
- Discussed with contractor that they would bench the sides and then fill compaction with clay can commence.



08/11/21

Monday, 8 November 2021 8:51 p.m.

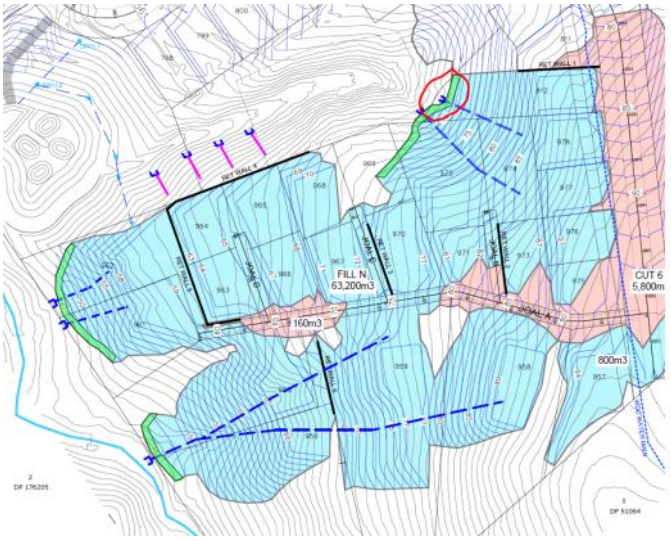
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	08/11/21 - 10am
Author:	RG
Plant Operating:	Digger
Weather:	Overcast

Site Observations and Instructions:

Observed excavation of toe key at least 1m below original ground level as per red and blue outline on the annotated plan below.

- Base of the red circled toe key returned shear vanes of greater than 217kPa, with the vane blade unable to penetrate the soil in several instances.
- Base of the blue circled toe key was into tuff and the shear vane blade was unable to penetrate.
- Discussed with contractor that they would bench the sides and then fill compaction with clay can commence. Drain outlet to be placed once filling completed.



09/11/21

Wednesday, 10 November 2021 4:34 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	08/11/21 - 10am
Author:	RG
Plant Operating:	Digger
Weather:	Sun

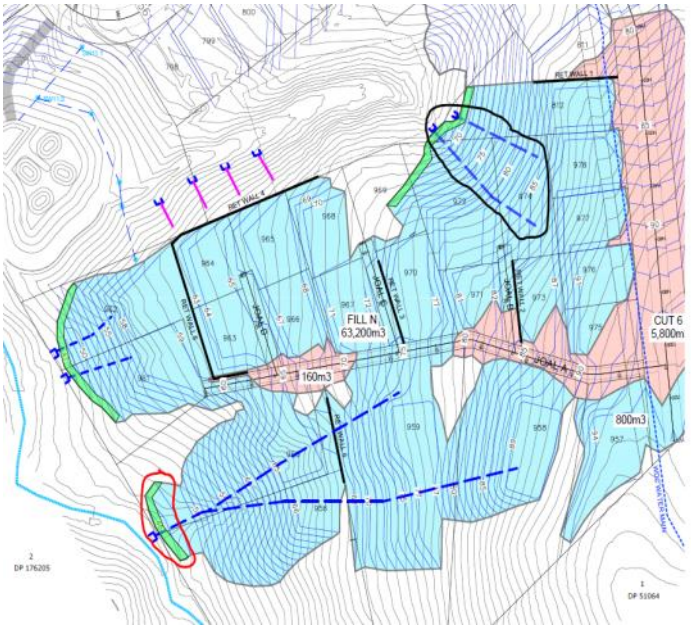
Site Observations and Instructions:

Observed toe key circled in red on the below site plan:

- Toe key was around 3m deep, founding on stiff to very stiff natural clays.
- Some water seepage from the creek was noted within the base of the toe key, this was scraped off by the digger and then capped with compacted clay. We will return tomorrow to check the fill.

Also observed the underfill drains circled in black below:

- Drains consisted of cloth wrapping around 160mm heavy duty novocoil, covered by hardfill and were in the positions indicated on the below plan.



10/11/21

Wednesday, 10 November 2021 4:45 p.m.

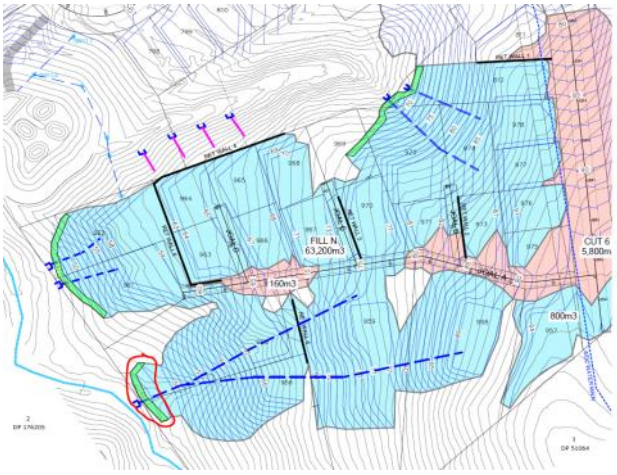
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	10/11/21 - 8:30am
Author:	RG
Plant Operating:	Digger
Weather:	Sun

Site Observations and Instructions:

Attended site to observe the first lift of fill placed within the toe key circled red on the below site plan.

- Fill consisted of hard, highly plastic clays.
- A 1m deep hand auger was drilled and found no wet or saturated soils. Satisfactory to continue placing fills.



11/11/21

Thursday, 11 November 2021 3:29 p.m.

Site Inspection Record

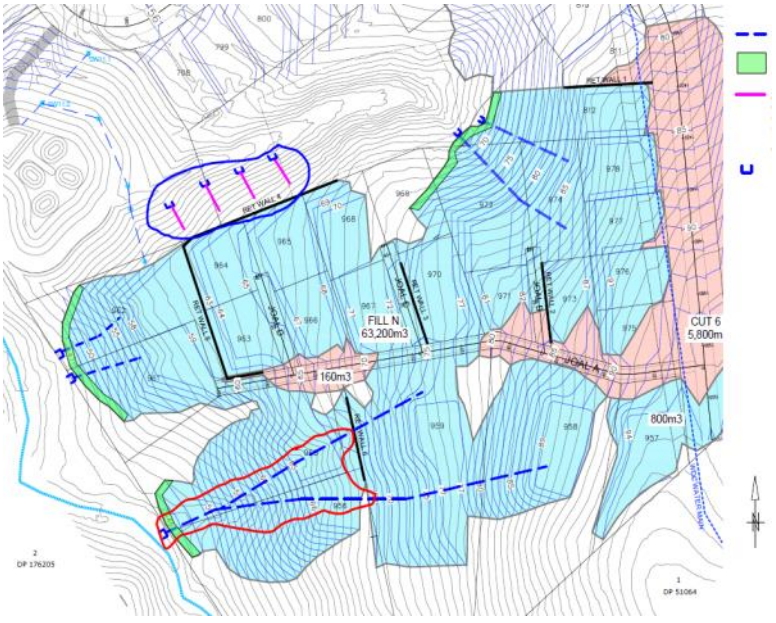
Project # & Name:	J00113 - Hitchen Block
Date & Time:	11/11/21 - 8:30AM
Author:	RG
Plant Operating:	Diggers and Moxys
Weather:	Sun

Site Observations and Instructions:

Attended site to observe to underfill drains (circled red) and counterfort drain locations (circled blue).

- Underfill drains were located within the low points of the slope and consisted of 160mm heavy duty novocoil, covered with 20/7 fill and wrapped with bidim cloth.
- The drains will be continued further up the slope once filling near the toe of the slope has been completed.

- The location of the counterfort drains had been pegged out. The counterfort on the west end is to be moved around 1m to the east to be located within a natural low point in the slope.
- From the top of the slope, these were set around 1.5m away from the approximate retaining wall location.
- Each counterfort was spaced by 15m.
- Contractor brining in scoria backfill today, drain construction to start next week.



19/11/21 - AM

Friday, 19 November 2021 5:08 p.m.

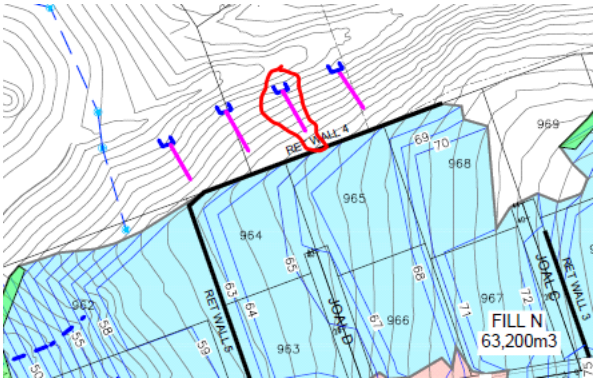
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	19/11/21 - 8:30AM
Author:	RG
Plant Operating:	Digger and moxies
Weather:	Sun

Site Observations and Instructions:

Attended site with KM to observe the construction of the first counterfort drain, circled red below.

- A 160mm heavy duty novocoil drain had been placed at the base of the trench and backfilled already with scoria.
- Contractor advised that trench was 6m deep and the base of the trench has been as-built.
- Construction of the eastern most drain to begin today, will return later to observe.



19/11/21 - PM

Friday, 19 November 2021 5:55 p.m.

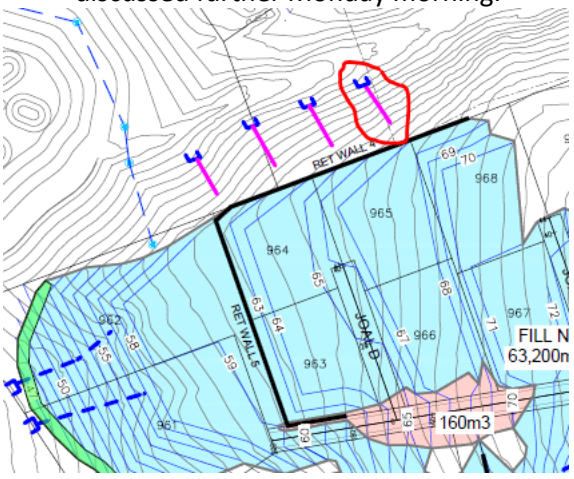
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	19/11/21 - 2PM
Author:	RG
Plant Operating:	Digger, moxies, dump truck, padfoot
Weather:	Sun

Site Observations and Instructions:

Attended site to observe construction of counterfort drain circled red below.

- Drain was constructed to approximately halfway up the slope and was 6m deep, in accordance with our design.
- Contacted by contractor around 1.5 hrs later to say the drain had collapsed. This is to be discussed further Monday morning.



22/11/21

Wednesday, 24 November 2021 9:03 a.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	22/11/21 - 10:30AM
Author:	RG
Plant Operating:	
Weather:	Light rain/sun

Site Observations and Instructions:

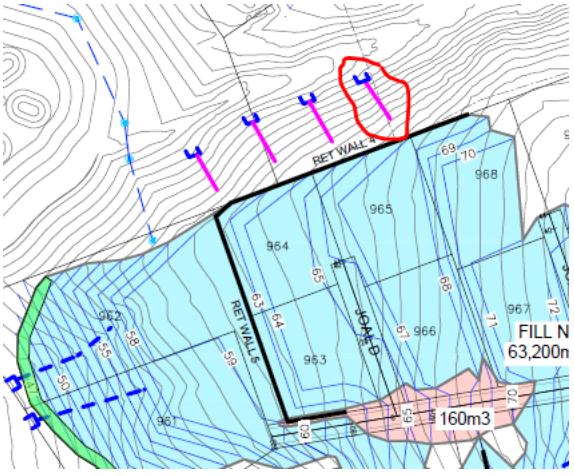
Attended site with KM to observe the collapsed drain excavation (circled red below) and discuss with contractor the next steps.

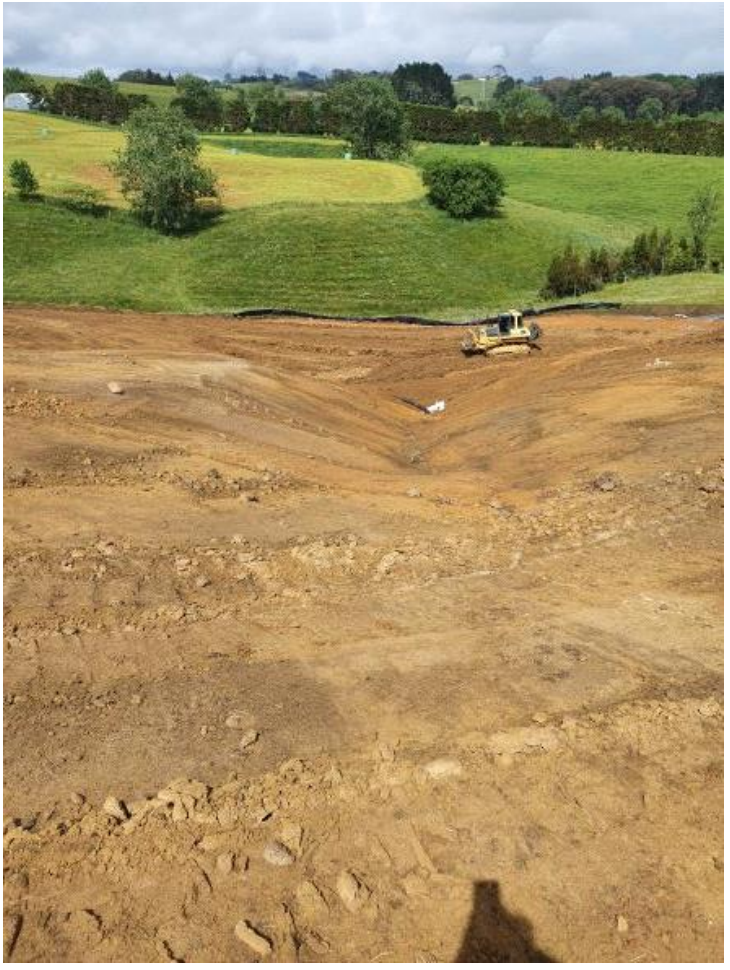
A block of material has failed along a plane on the eastern wall of the excavations. Decided that:

- Collapsed excavation to be cleared (inspected by us) and then backfilled and compacted (too dangerous for compaction testing).
- Re-excavate drain approx. 1m to the west in sections using trench shields.
- If space allows batter out the edges.

CAN to follow.

Also observed construction of underfill drains and discussed with contractor where the drains are to extend up to (approx. pink pegs in final image below).





13/01/22 PM

Monday, 17 January 2022 5:39 p.m.

Site Inspection Record

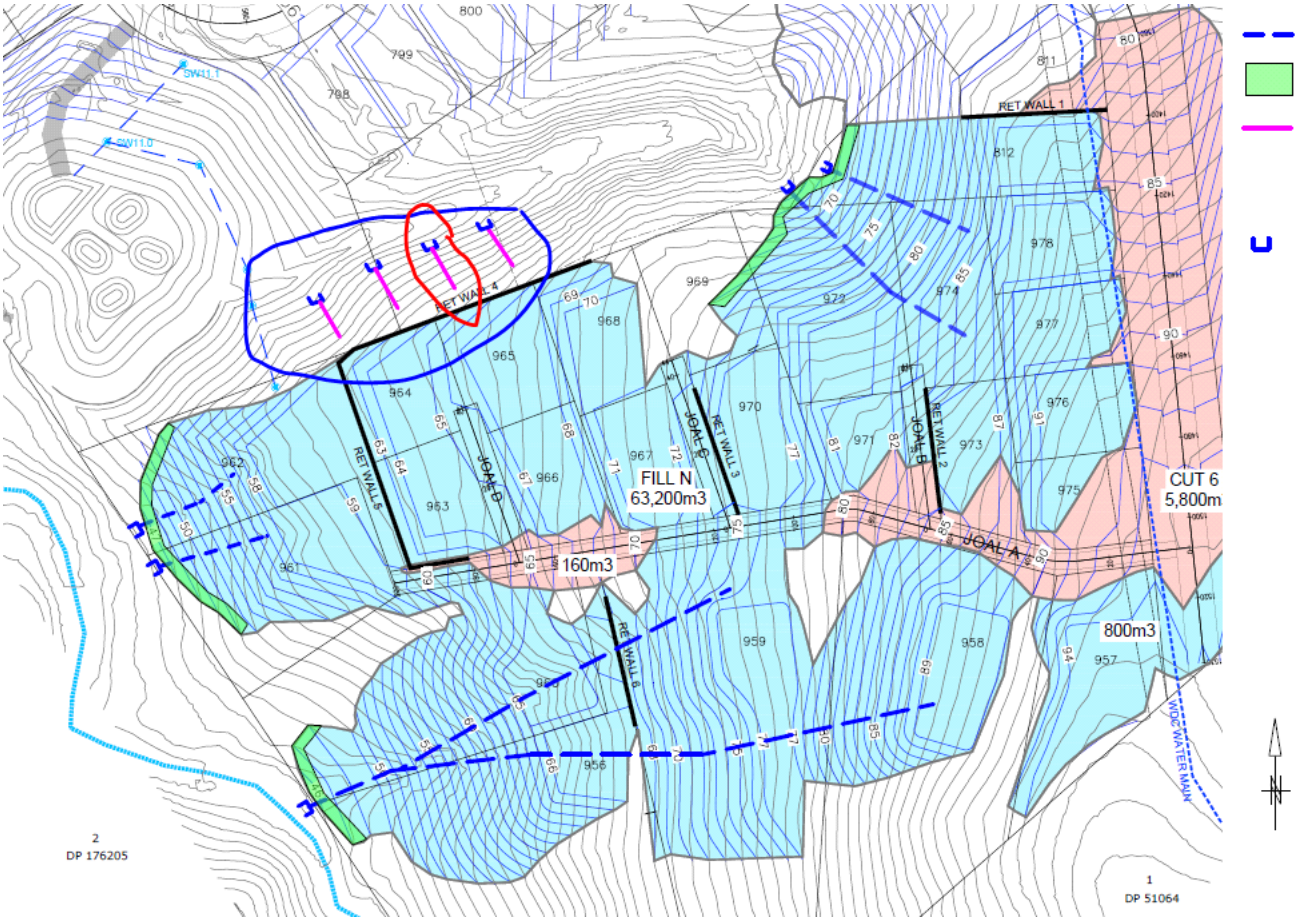
Project # & Name:	J00113 - Hitchen Block
Date & Time:	13/01/22
Author:	RG
Plant Operating:	Digger, water truck
Weather:	Sun

Site Observations and Instructions:

Attended site with KM to observe the placement of the geogrid within the Meadows shear key and flushing of the 4x counterfort drains circled below.

Grid was not yet ready to be placed.

Observed flushing of 1 x drain (circled red below) - remaining drains to be flushed tomorrow following pre-soaking.



14/01/22

Monday, 17 January 2022 8:35 p.m.

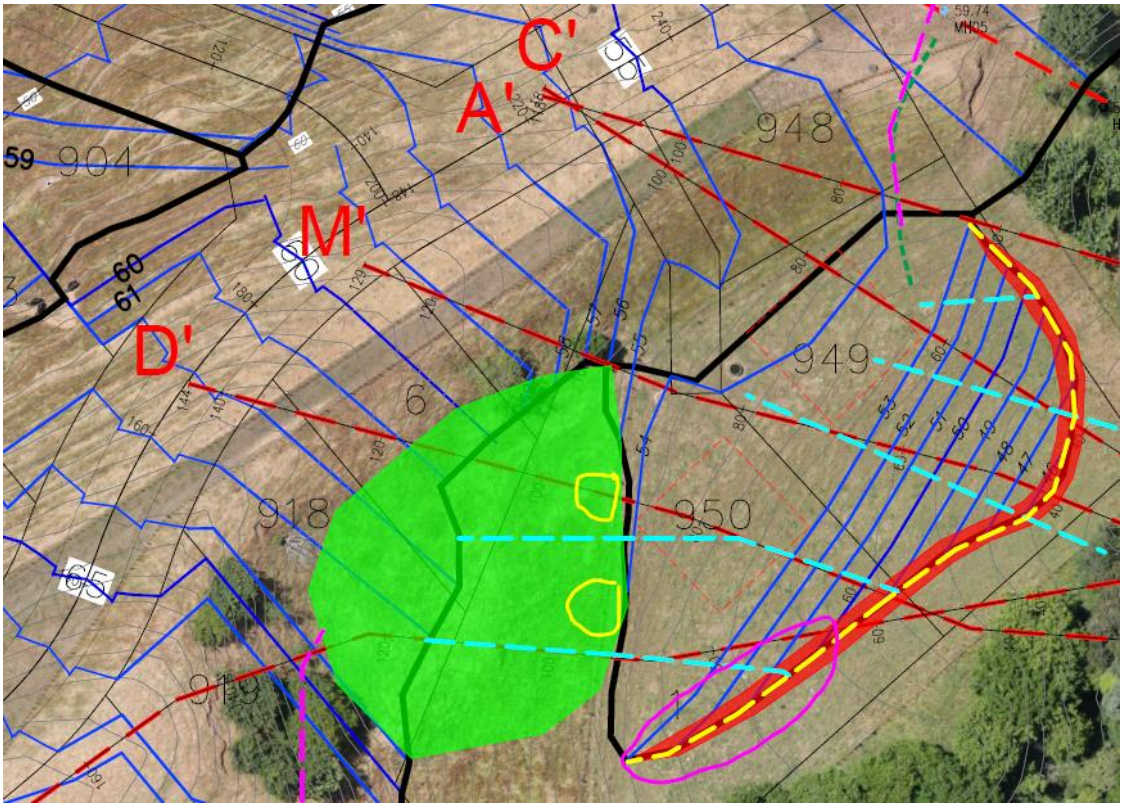
Site Inspection Record

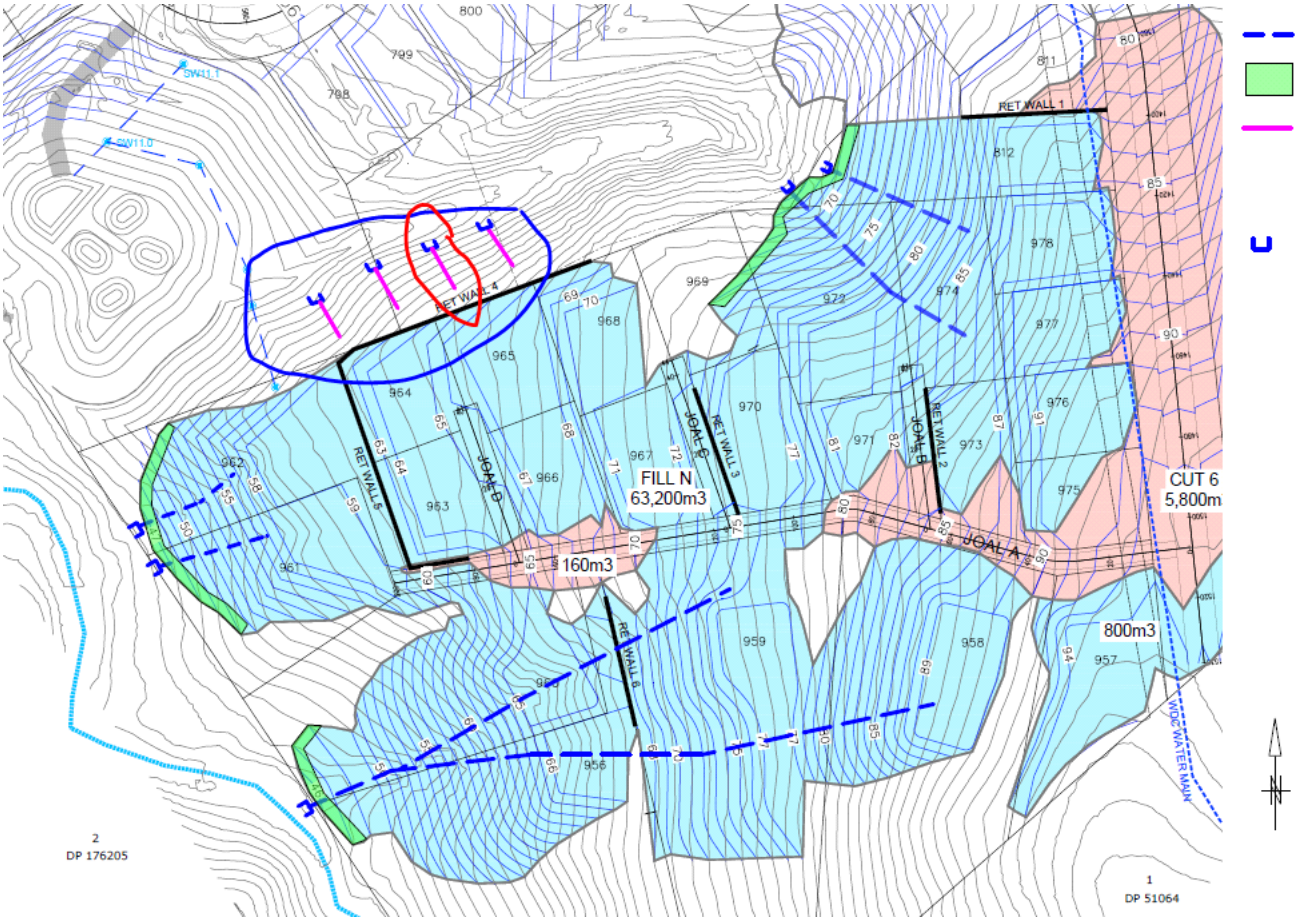
Project # & Name:	J00113 - Hitchen Block
Date & Time:	14/01/22 - 2PM
Author:	RG
Plant Operating:	Digger
Weather:	Sun

Site Observations and Instructions:

Attended site with CE and KM to observe the shear key within the meadows (circled pink) area, trial pits (approx locations circled yellow)within the future batter locations and future Stage 5 counterfort drain locations. Also completed flushing of remaining 3 x counterfort within Stage 6 (not circled red below).

Observed hardfill placed within the shear key to half height.
Trial pits within the batter area showed tuff at around 1.5m to 2m depth below the current surface levels. Discussed with Simon (Dines) that this is the layer which the batters should be founded.
Walked over the counterfort drain alignments. All drains were spaced at approximately 15m spacings.
Stage 6 counterforts all flushed, with clear water observed coming out of the outlet.




FILL N
63,200m3
CUT 6
5,800m
160m3
800m3
RET WALL 1
RET WALL 2
RET WALL 3
RET WALL 4
RET WALL 5
RET WALL 6
JOAL A
JOAL B
JOAL C
JOAL D
WDC WATER MAIN
2
DP 176205
1
DP 51064

15/02/22

Tuesday, 15 February 2022 3:46 pm

Site Inspection Record

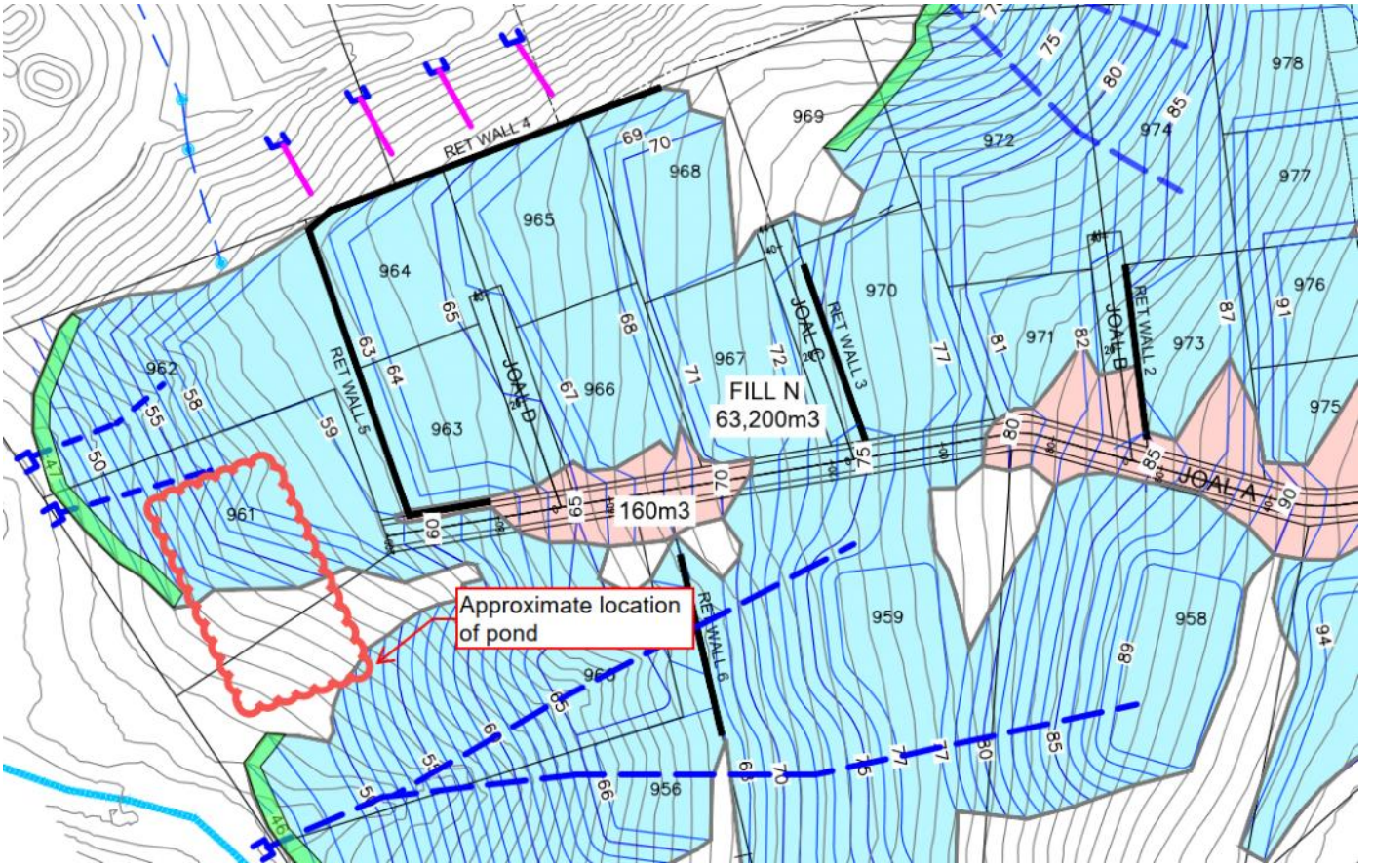
Project # & Name:	J00113 - Hitchen Block
Date & Time:	15/02/22 - 1:30PM
Author:	AT
Plant Operating:	
Weather:	Sun

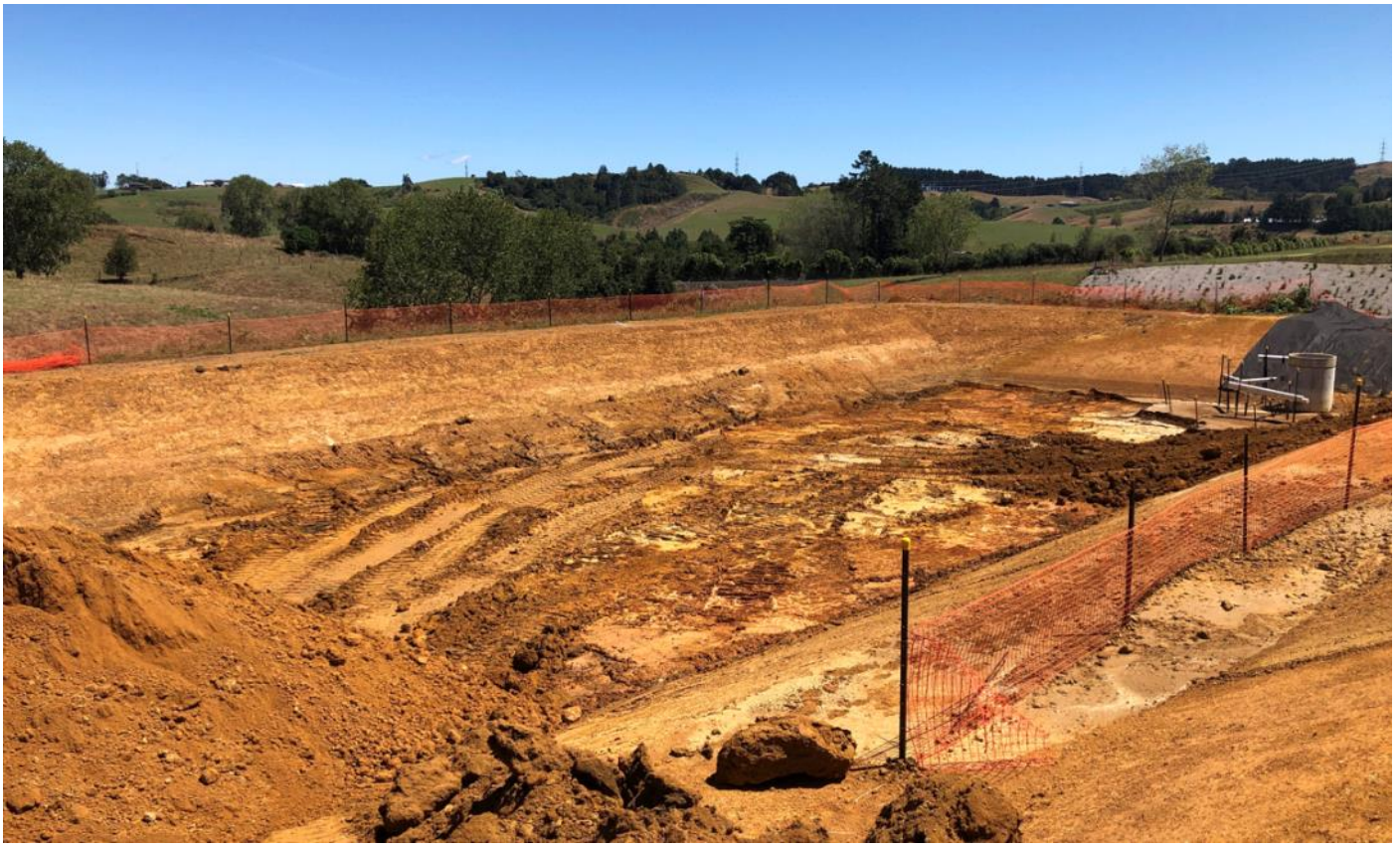
Site Observations and Instructions:

Attended site to inspect pond muck out (Circled red below).

- Base of pond consisted of natural, inorganic material.
- Shear strengths greater than 100 kPa
- Satisfactory to place fill
- Minor vegetation was noted on pond batters. Recommended to remove prior to fill.

Visual Inspection of meadows shear key construction. Hardfill at final height (observed being rolled). Drainage to be placed tomorrow.






HITACHI
DINES

16/02/22

Wednesday, 16 February 2022 3:59 pm

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	16/02/22 - 11AM
Author:	AT
Plant Operating:	
Weather:	Sun

Site Observations and Instructions:

Attended site with KM to inspect stage 17 shear key progress and counterfort drains 1-7 mark outs.

Inspected shear key collector drain (shown in images below). Drain is compliant with drainage detail. Spoke to contractor about achieving full coverage of drains by either overlaying an additional lift of aggregate or trenching into the existing level.

Inspected Counterfort drain mark outs. Compliant with 15m spacing detail. CFD5 course change detail marked out.


CF DRAIN

Site Inspection Record

Date:	16/03/2022	**Time:**	10AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒** **No☐**	**Weather**	**Sun**

Inspection Notes:

Attended site to observe beginning of meadows shear key underfill drain trenching. Observed stripping of topsoil for Counterfort Drain 01. Drainage aggregate stockpiled near Counterfort Drains is SAP50.

Recommendations to Contractor:

NA

Site Photos:

Site Inspection Record

Date:	17/03/2022	**Time:**	1PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**Weather**	**Sun**

Inspection Notes:

Attended site to observe underfill drain excavations in stage 17.

- Drainage trenches have been excavated in accordance with the design discussed on 15/03/22.
- Connection points along rear shear key collector drain have been exposed.

Recommendations to Contractor:

N/A

Site Photos:

Site Inspection Record

Date:	18/03/2022	**Time:**	1PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner, Kyle Meffan, Chris Edwards
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**Weather**	**Overcast**

Inspection Notes:

Attended site with KM and CE for a site walkover.

- Observed construction of underfill drainage installation in stage 17 meadows.
- Observed collector drain outlet point from stage 17.
- Observed outlet drains on REB walls.
- Observed rain garden geotextile materials.

Recommendations to Contractor:

N/A

Site Photos:


CIRTEX
GAIN MORE GROUND
55861
PW-PROD/21/19068-1
56007
Roll Gross Weight:
1029kg
5m
Roll Length:
40m

Site Inspection Record

Date:	1/04/2022	**Time:**	11AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒** **No☐**	**Weather**	**Sun**

Inspection Notes:

Attended site to observe installation of underfill drains within stage 17.

- Upper bench underfill drain has been installed and backfilled.
- Lower bench underfill drain trench has been excavated and Geocloth has been laid along its extent.

Recommendations to Contractor:

N/A.

Site Photos:

Site Inspection Record

Date:	20/04/2022	**Time:**	11AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**Weather**	**Overcast / Showers**

Inspection Notes:

Attended site to observe construction of counterfort drains.

- Contractor advised that trench collapse was occurring once the trench reached 6 metres below existing ground level.
- Single 160mm nova coil placed in base of trench, backfilled with SAP50, compliant with design.
- Observed Stage 17 Meadows shear key completion. Underfill drainage has been backfilled and connected into collector drains.

Recommendations to Contractor:

Counterfort trench progress to be inspected frequently. Contractor advised that alternate excavation methodology (ie benching) may be required to address trench collapse issues.

Site Photos:

Site Inspection Record

Date:	21/04/2022	**Time:**	1PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒** **No☐**	**BC Drawings on site and sighted:**	**Yes ☒** **No☐**

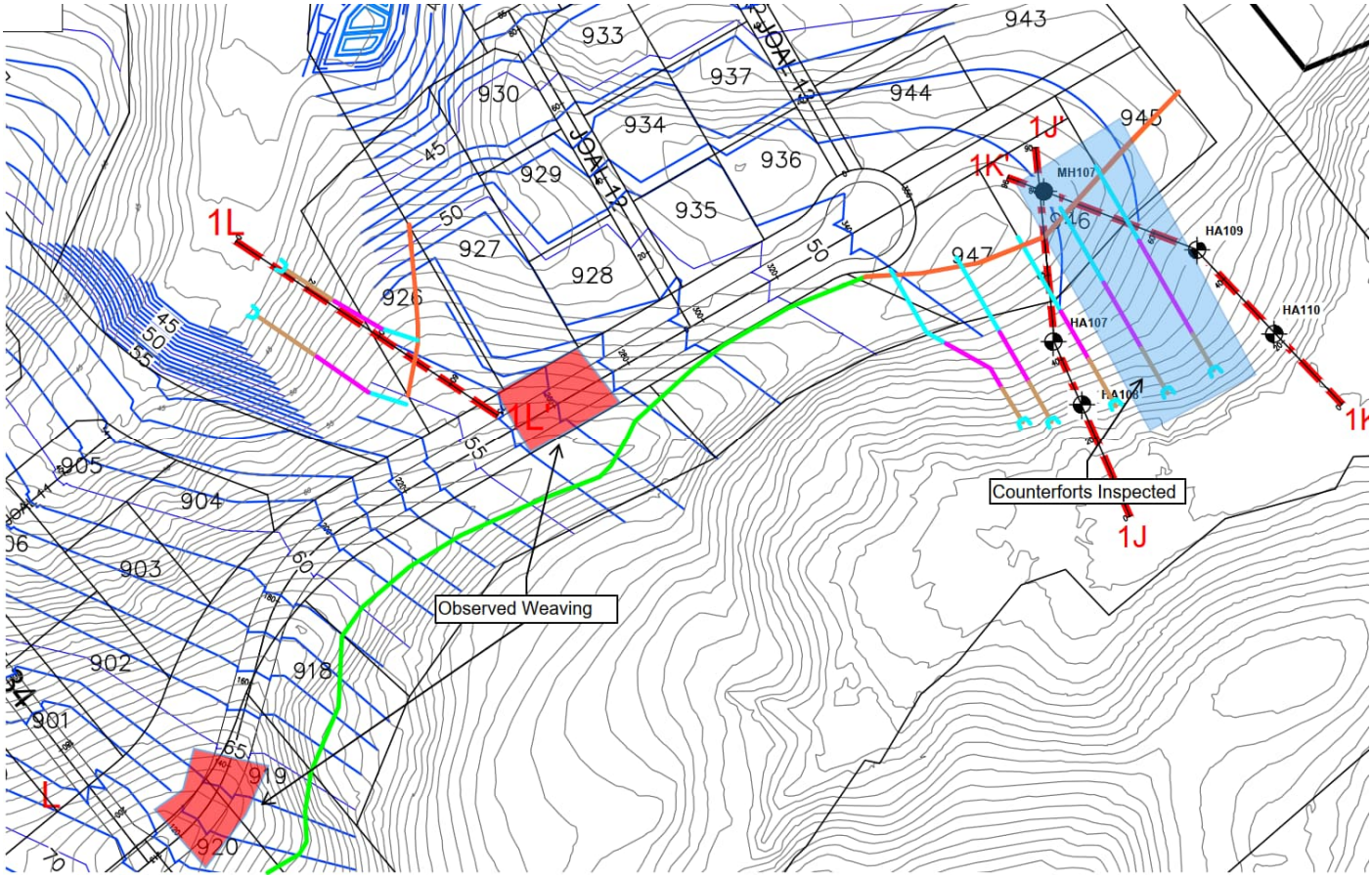
Inspection Notes:

Attended site to observe construction of counterfort drains highlighted in plan below. Additionally observed two areas of weaving along Road 30 with Ali (Dines).

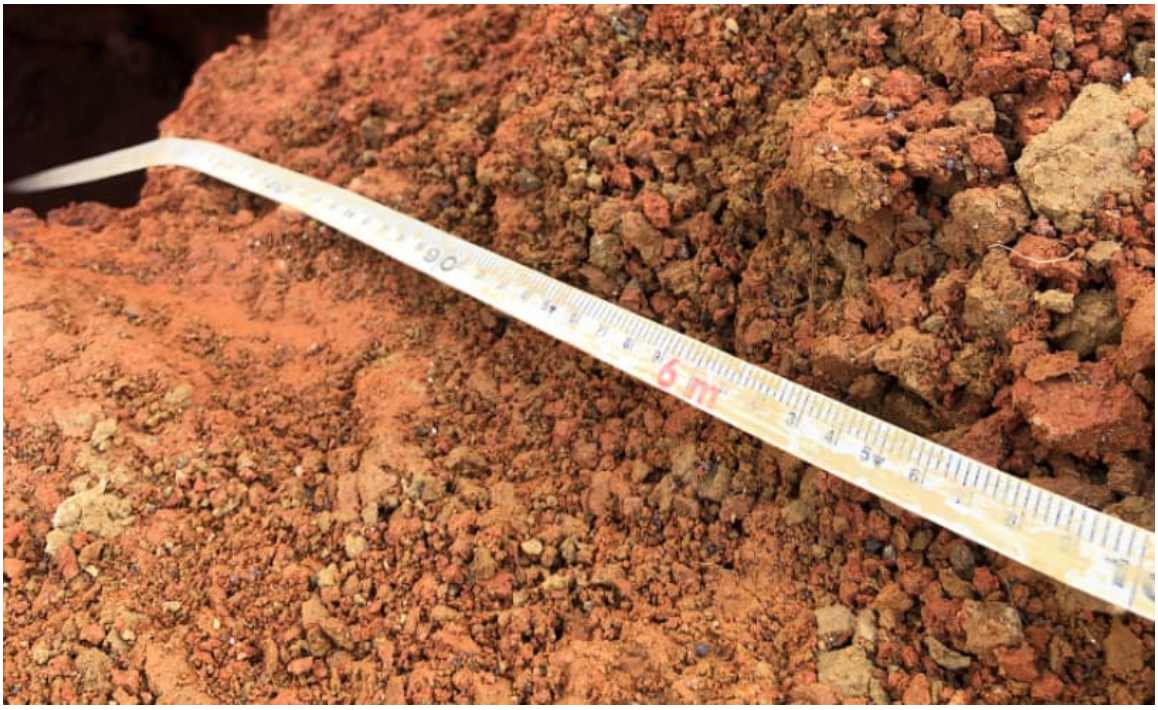
- Counterfort drains appear compliant with design.
- Two areas of weaving/soft material were observed between chainage 120-140, and 250-270. Test pits revealed very stiff, natural material at a depth of approximately 0.3m below current ground level. CAN to follow regarding remediation recommendations.

Recommendations to Contractor:

Counterforts to be inspected regularly until completed. CAN to follow regarding road subgrade.



Site Photos:



Site Inspection Record

Date:	26/04/2022	**Time:**	12PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**BC Drawings on site and sighted:**	**Yes ☒ No☐**

Inspection Notes:

Attended site to observe construction of counterfort drains. Construction appears to be compliant with design.

Recommendations to Contractor:

N/A.

Site Photos:

Site Inspection Record

Date:	28/04/2022	**Time:**	12PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**BC Drawings on site and sighted:**	**Yes ☒ No☐**

Inspection Notes:

Attended site to observe continuation of counterfort drain installation.

- Contractor advised that excavations were going well with no trench stability issues on the current trench.
- Contractor advised that additional scoria required for backfill is expected to be delivered to site in 5-7 days time.
- Observed topsoil being spread across stage 17 meadows.

Recommendations to Contractor:

N/A. Counterforts to be inspected once additional scoria is delivered.

Site Photos:


HITACHI

Site Inspection Record

Date:	10/05/2022	**Time:**	11AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**Weather**	**Overcast / Showers**

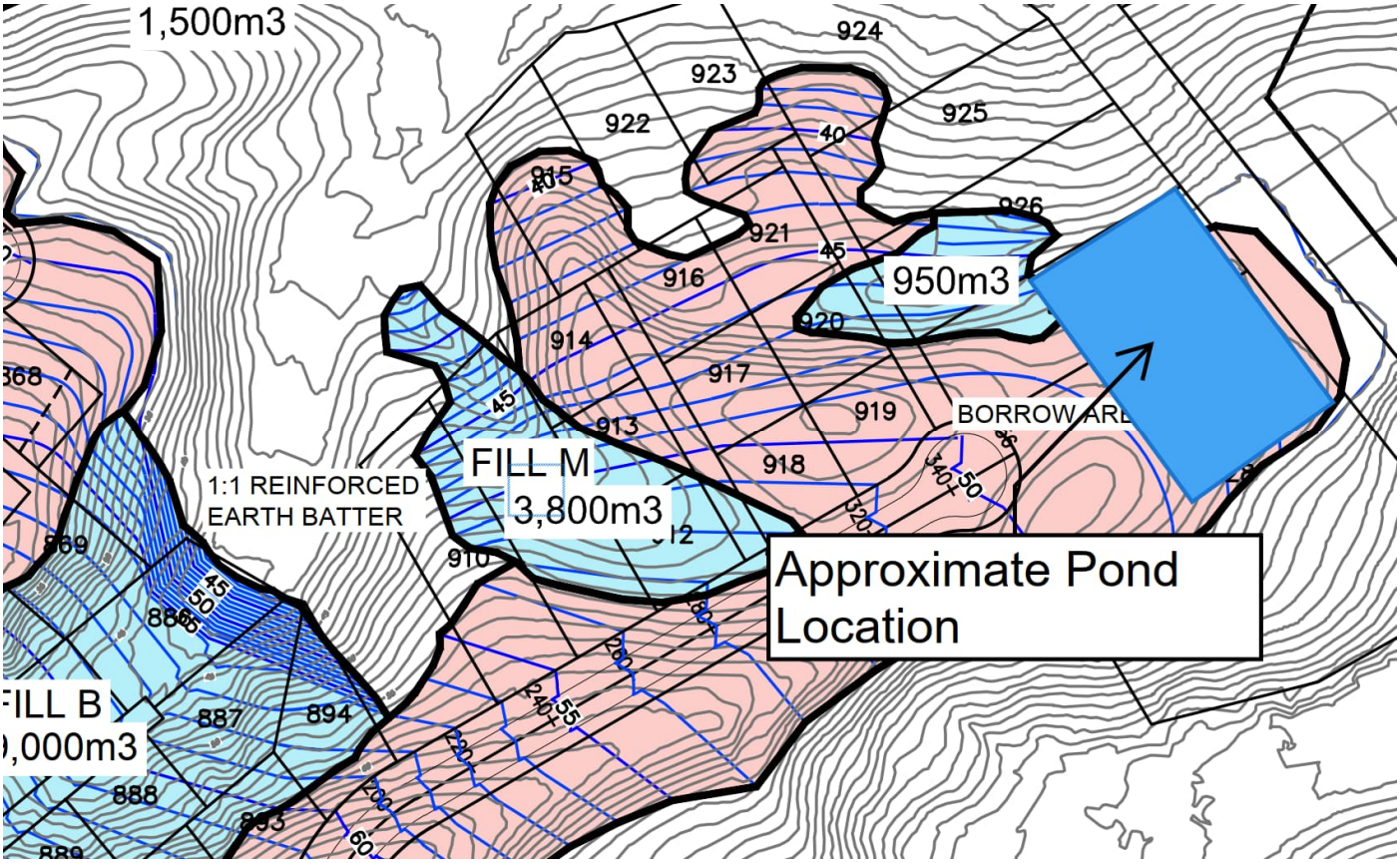
Inspection Notes:

Attended site to observe pond muck out highlighted in annotation below. Additionally observed construction of counterfort drains.

- Pond base comprised very stiff, inorganic, natural material, with the shear vane unable to penetrate across the base.
- Minor vegetation was observed on north-western batter.
- Counterforts 4 & 5 Intersection point observed.

Recommendations to Contractor:

Recommended to Contractor (Ali) to trim off vegetation on north-western batter. Otherwise, pond satisfactory for backfill.



Site Photos:

Site Inspection Record

Date:	23/05/2022	**Time:**	1PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project Address:	Hitchen Block Stage 2, Pokeno		
Site Hazard Form Completed:	**Yes ☒ No☐**	**BC Drawings on site and sighted:**	**Yes ☒ No☐**

Inspection Notes:

Attended site with Kyle Meffan for a walkover to observe current state of works.

- Counterfort Drains 2-5 completed, counterfort drain 1 yet to be fully excavated.
- Observed topsoil spread over meadows area.

Site Photos:

Site Inspection Record

Date:	16/11/2022	**Time:**	2PM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

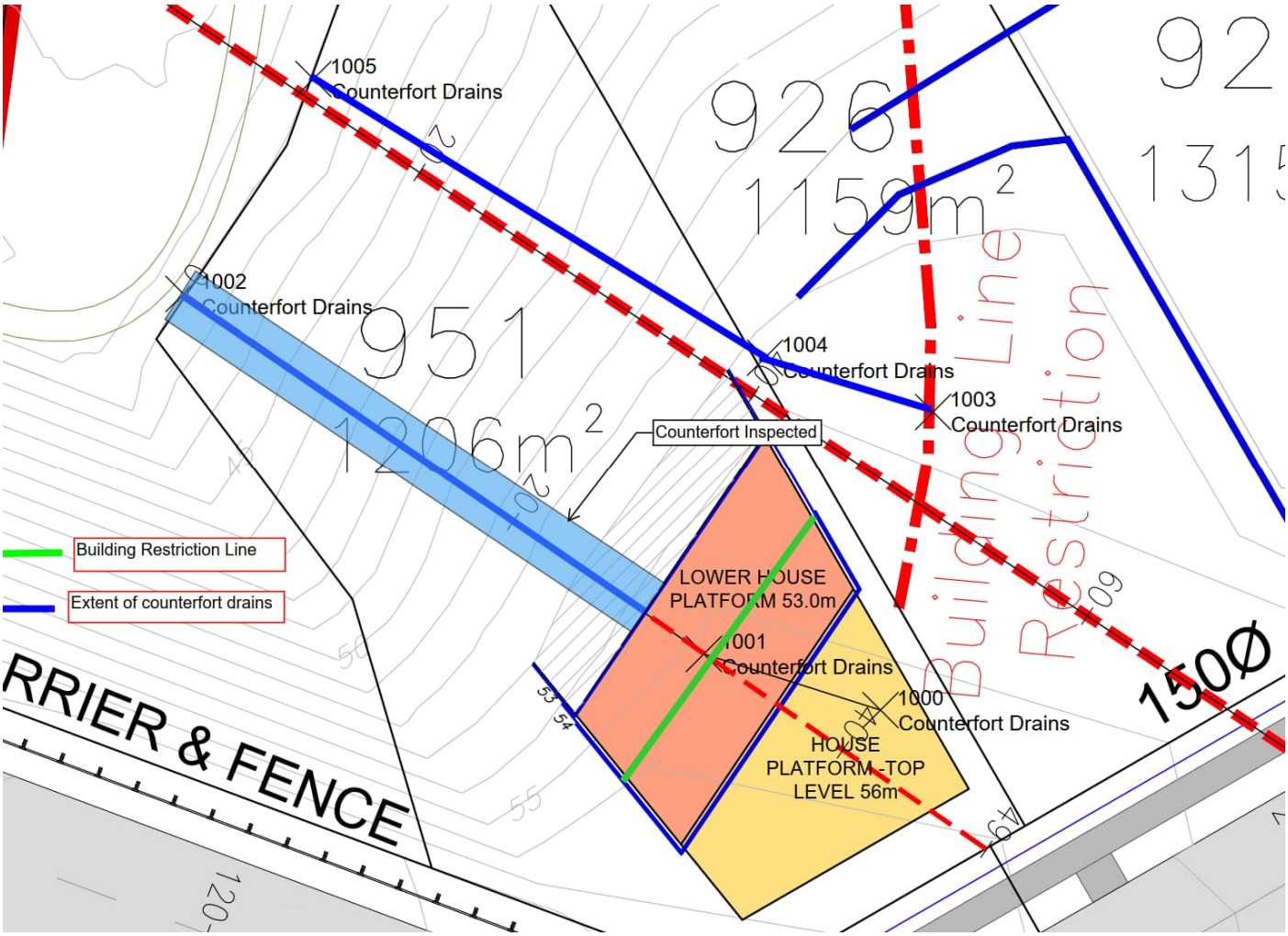
Inspection Notes:

Attended site to observe the counterfort drain installation within Lot 951 as highlighted in the site plan below.

- Counterfort drain was excavated to approximately chainage 35 (edge of lower house platform) with a maximum depth of 6 meters below cleared ground level.
- Discussed construction methodology with Dines and Kyle Meffan.
- Additionally inspected further sections of WWN1. Subgrade was very stiff, natural materials.
- Backfill of counterfort trench comprised SAP 50 Scoria.

Recommendations to Contractor:

Recommended that contractor should cut building platform and temporary batters first before continuing counterfort trenching to achieve the maximum counterfort depth beneath the building platform. Counterfort trench completed thus far in accordance with our design.




HITACHI
DINES
ZAXIS200Lc


HITACHI

Site Inspection Record

Date:	28/11/2022	**Time:**	9AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner, Kyle Meffan
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:

Attended site with Kyle Meffan for a walkover, details are as follows:

- REB 1 appears to have new vegetation growth within the face of the slope. Contractor advised that the face will be hydroseeded during the next fine weather window. They are aiming for today or tomorrow.
- Inspected the existing slip behind Lot 945. No additional movement appears to have happened since this was originally observed and assessed in September 2022. Groundwater was noted to be seeping from several points within the exposed transition materials.
- Contractor awaiting fine weather window to continue work on cutting the building platform within Lot 951.
- Inspected backfill along WWN1, which returned shear vanes in excess of 150kPa.
- Observed set out of 3x counterfort drains below Lot 925 with set out in accordance with our recommendations. Contractor advised a maximum distance between these drains of 7.5m applies at the upslope extent of the drains.

Site Inspection Record

Date:	6/12/2022	**Time:**	8AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

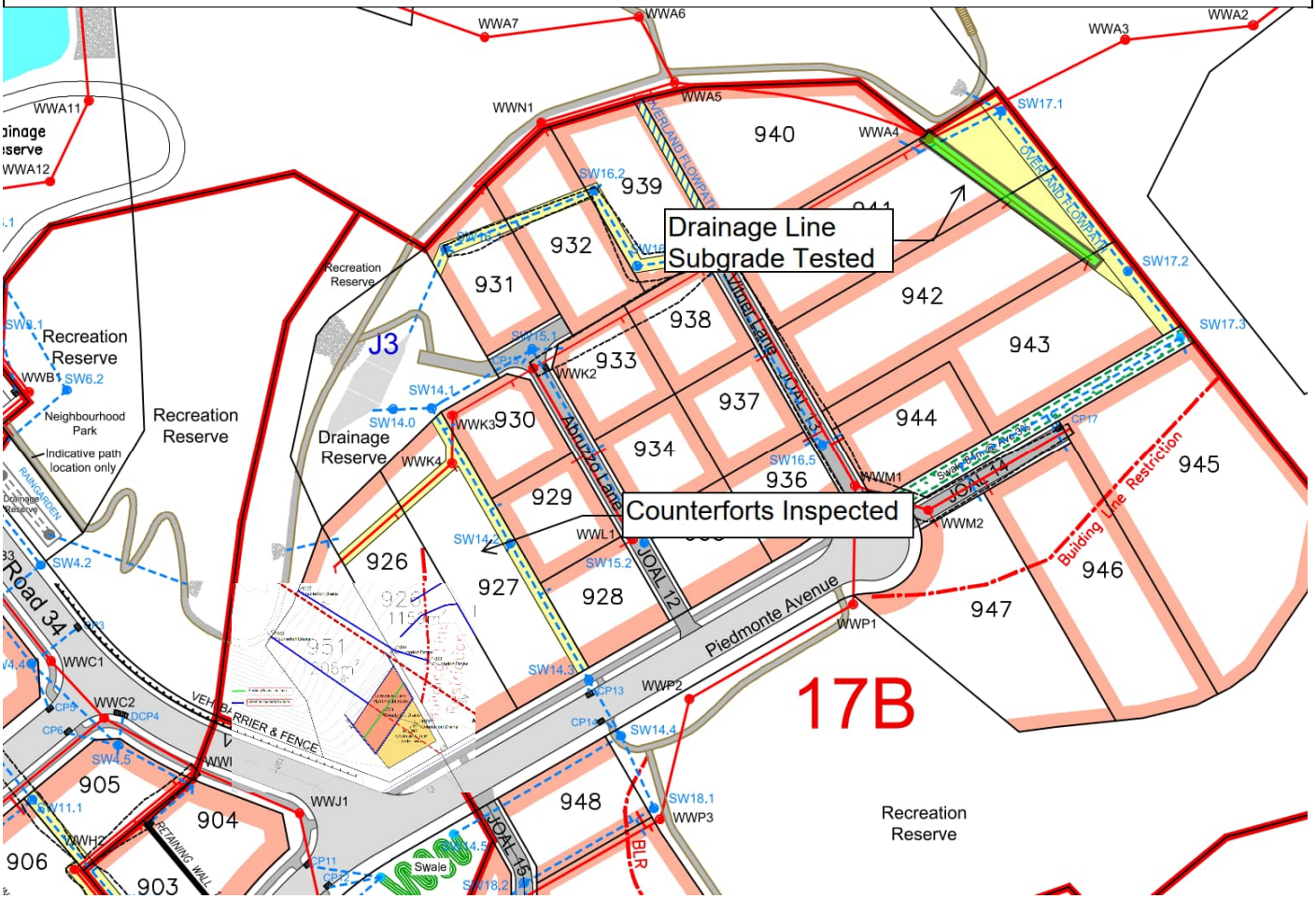
Inspection Notes:

Attended site to inspect the construction progression of the counterfort drain shown in the diagram below. Contractor additionally provided photos of section of counterfort drain not yet excavated during the time of our inspection. Additionally inspected the drainage line highlighted on the site plan below.

- Counterfort inspected appear in accordance with our design detail.
- Drainage line inspected comprised hard, inorganic, natural materials, with the shear vane unable to penetrate along the base of the trench.
- Contractor advised that counterfort flushing will be completed once roading construction begins to allow for easy access for a water cart.

Recommendations to Contractor:

Counterfort construction in accordance with our design. Drainage line subgrade suitable for pipe placement.



Site Inspection Record

Date:	7/12/2022	**Time:**	4pm
LDE Project Ref:	J00113	**Inspected by:**	Chris Edwards
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:

Attended site, details are as follows:

- REB 1 has been hydroseeded again. There has been some slumping beneath the matting again (but is minor visually).
- The side check dams appear ok, but there is erosion occurring along the edge of the matting where the water is getting beneath the matt. Need to fix this and plan out the sides in due course.
- Counterfort drains appear to be being installed. See photos.

Site Inspection Record

Date:	8/12/2022	**Time:**	10AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:

Attended site to inspect several items as listed below:

Counterfort Drain within Lot 926:

- Inspected current excavation progression for counterfort drain. Depth of drain was approximately 6 metres below cleared ground level. Contractor advised that the side walls of the trench were stiff, with no instability / failures during excavation progress. Drain appears in accordance with our design.

Drainage Line Subgrade and backfill:

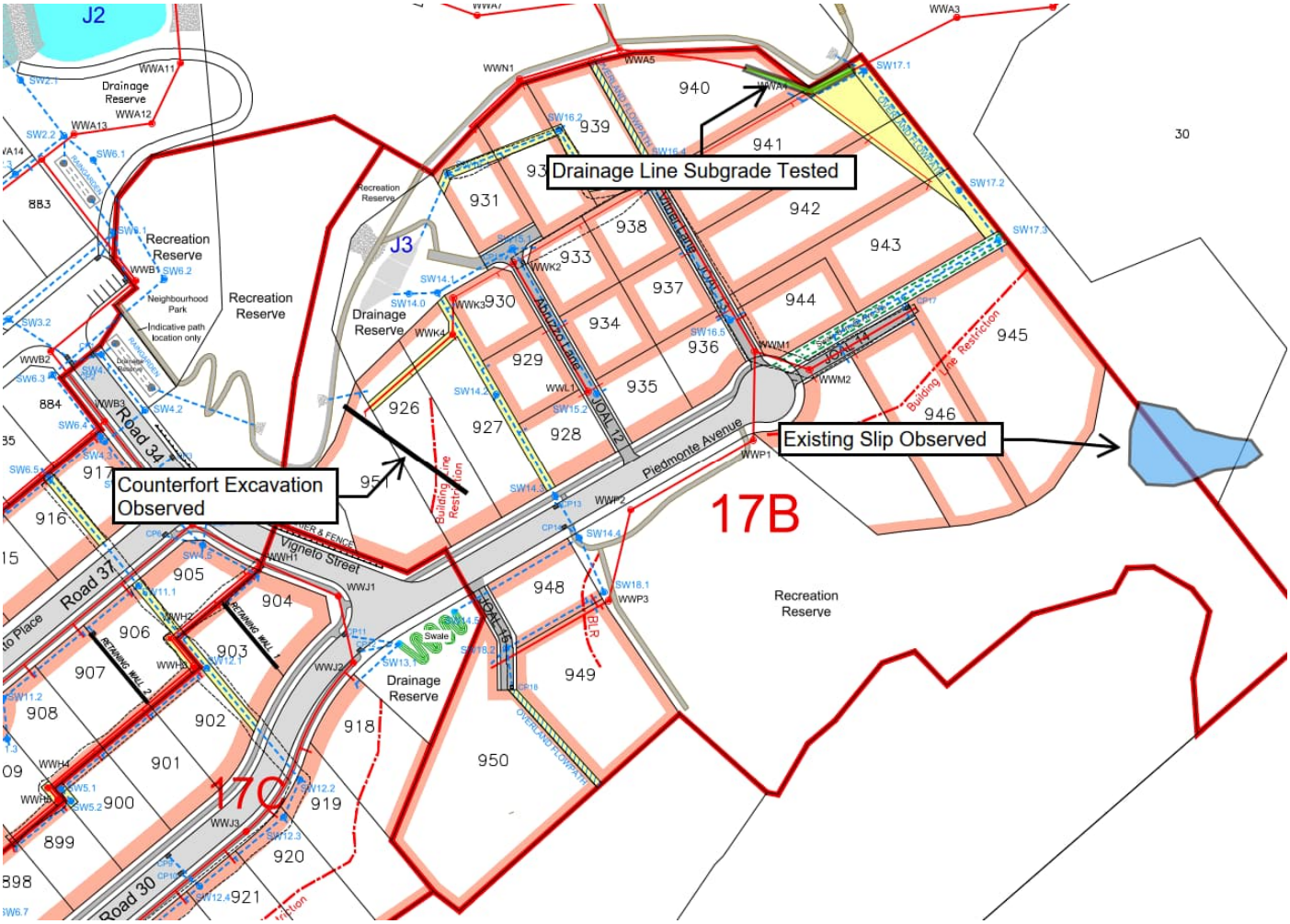
- Inspected drainage line surrounding WWA4. Subgrade within trench comprised very stiff, inorganic, natural materials. Backfill of other section of lines appeared very stiff to hard, with measured shear vanes in excess of 150kPa.

Existing Slip behind Lot 945:

- Slip behind Lot 945 appears to remain unchanged since our last inspection (28/11/22). Recommended to contractor to monitor the face for movement. Recommended to hold meeting between LDE and Dines to confirm remediation methodology during earthworks season.

REB1 Inspection

- Observed topsoil slumping beneath matting at base of REB. Inspection beneath matting revealed an area (roughly 2x2m in size) where recently placed topsoil has slipped, exposing the geogrid and fill behind. Recommended to contractor to bury long edge of check dam matting into the slope to prevent overland flows from eroding beneath the matting. Recommended to remediate topsoil slumping and re-hydroseed during the next fine weather window.

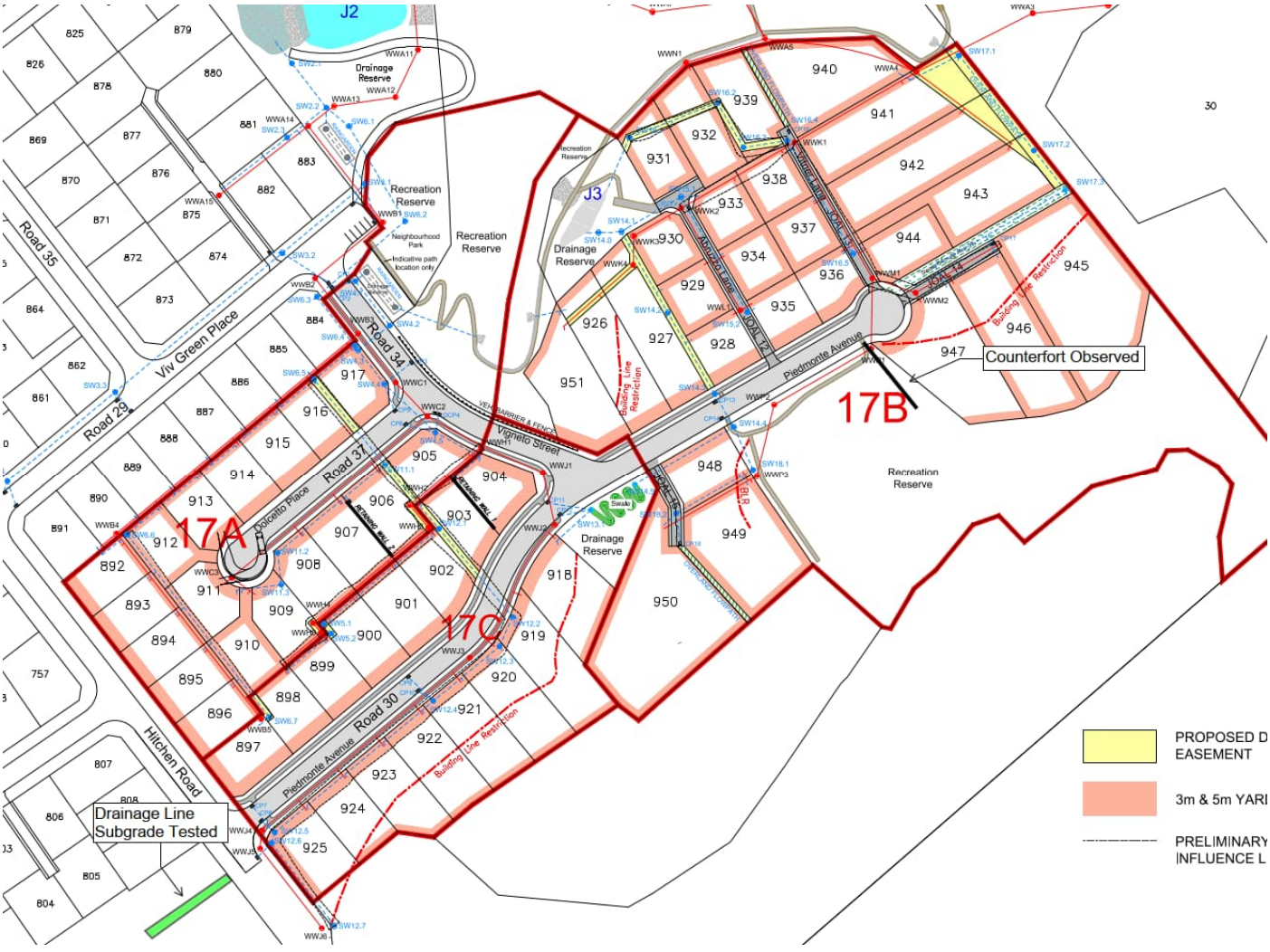


Site Inspection Record

Date:	13/12/2022	**Time:**	11AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:
Attended site to observe the continuation of the counterfort excavation as highlighted in the site plan below. Additionally inspected a section of Wastewater line 22 with Stage 18. - Counterfort excavation was approximately 6 metres in depth, and was founded in natural materials. Drainage coil and backfill material in accordance with our design. - Drainage line inspected was founded in very stiff, inorganic, natural materials with measured shear vanes in excess of 100kPa.

Recommendations to Contractor:
Counterfort in accordance with design. Drainage subgrade satisfactory for pipe placement.



Site Inspection Record

Date:	16/01/2023	**Time:**	10AM
LDE Project Ref:	J00113	**Inspected by:**	Alex Tanner
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:

Attended site for a walkover with Kyle Meffan.

- Observed that contractor has completed Counterfort Drain 8. Contractor to provide photos for us to review.
- Observed that permanent outlets have not yet been formed for the counterfort drains, not solid pipes installed at the outlet position. Contractor advised these will be completed nearer to completion of the stage.

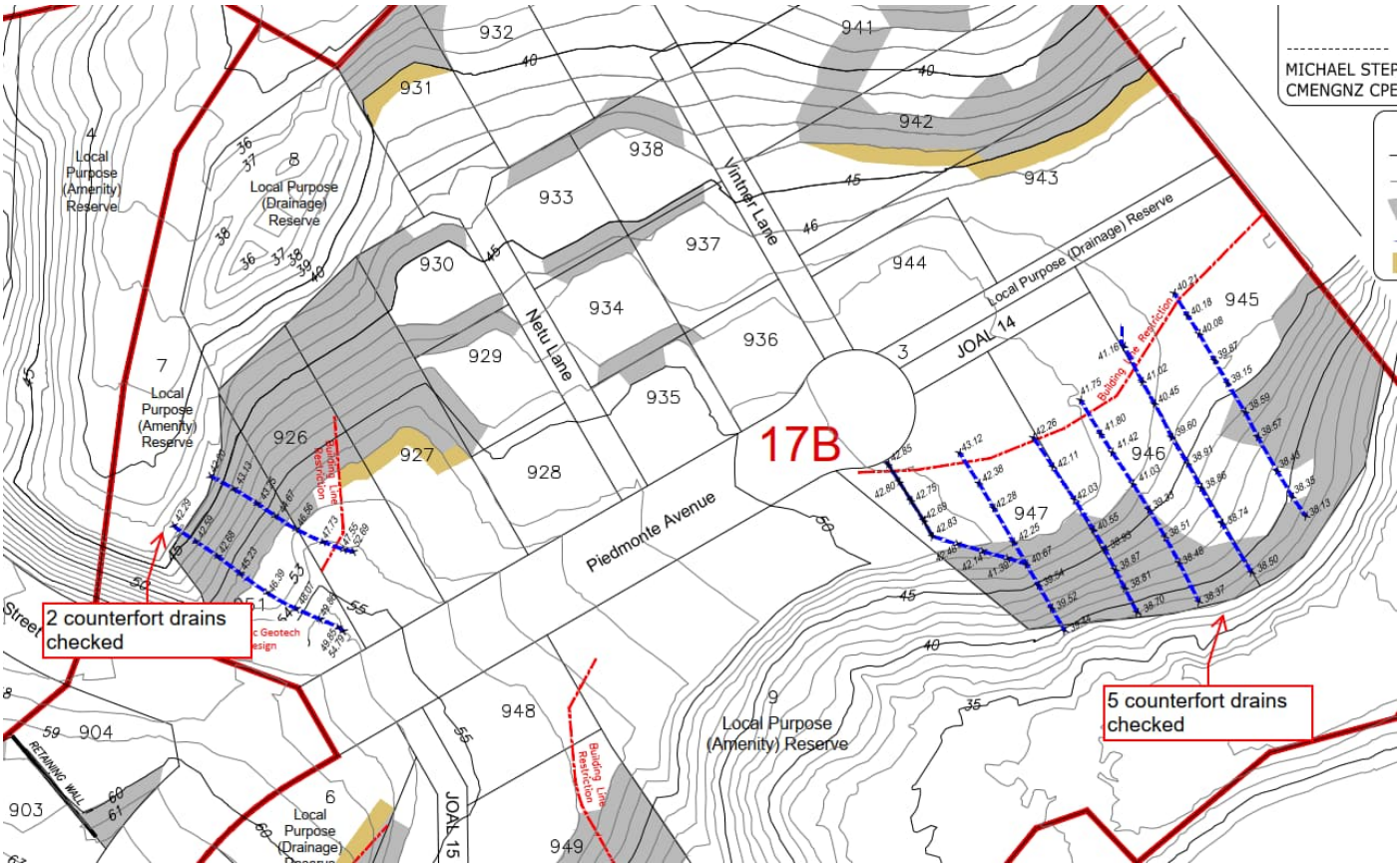
Site Inspection Record

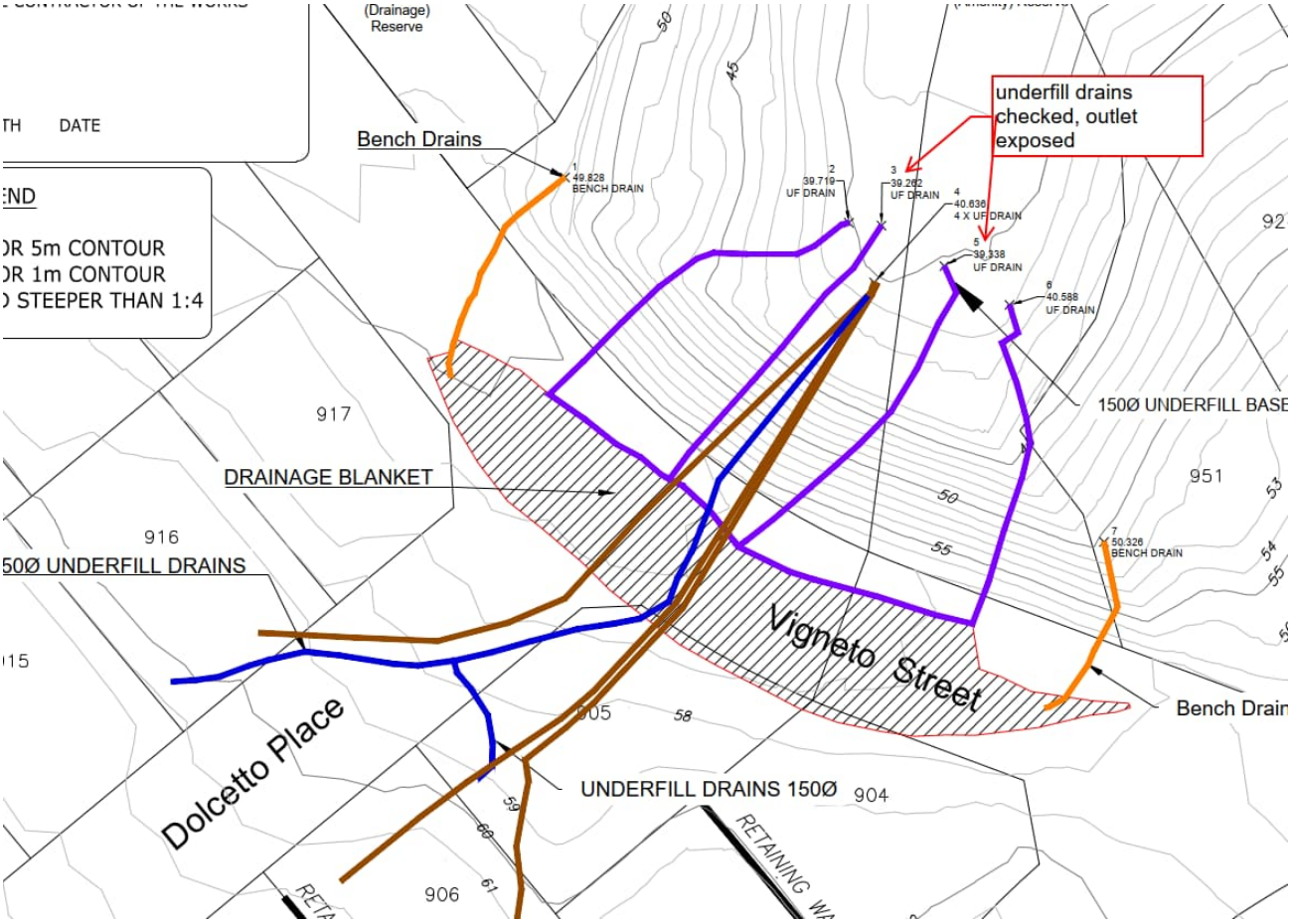
Date:	13/06/2023	**Time:**	10.30am
LDE Project Ref:	J00113	**Inspected by:**	Alan Huang
Project:	J00113 - Hitchen Block Stage 2, Pokeno		
Weather:	fine		
Contactor:	Dines		

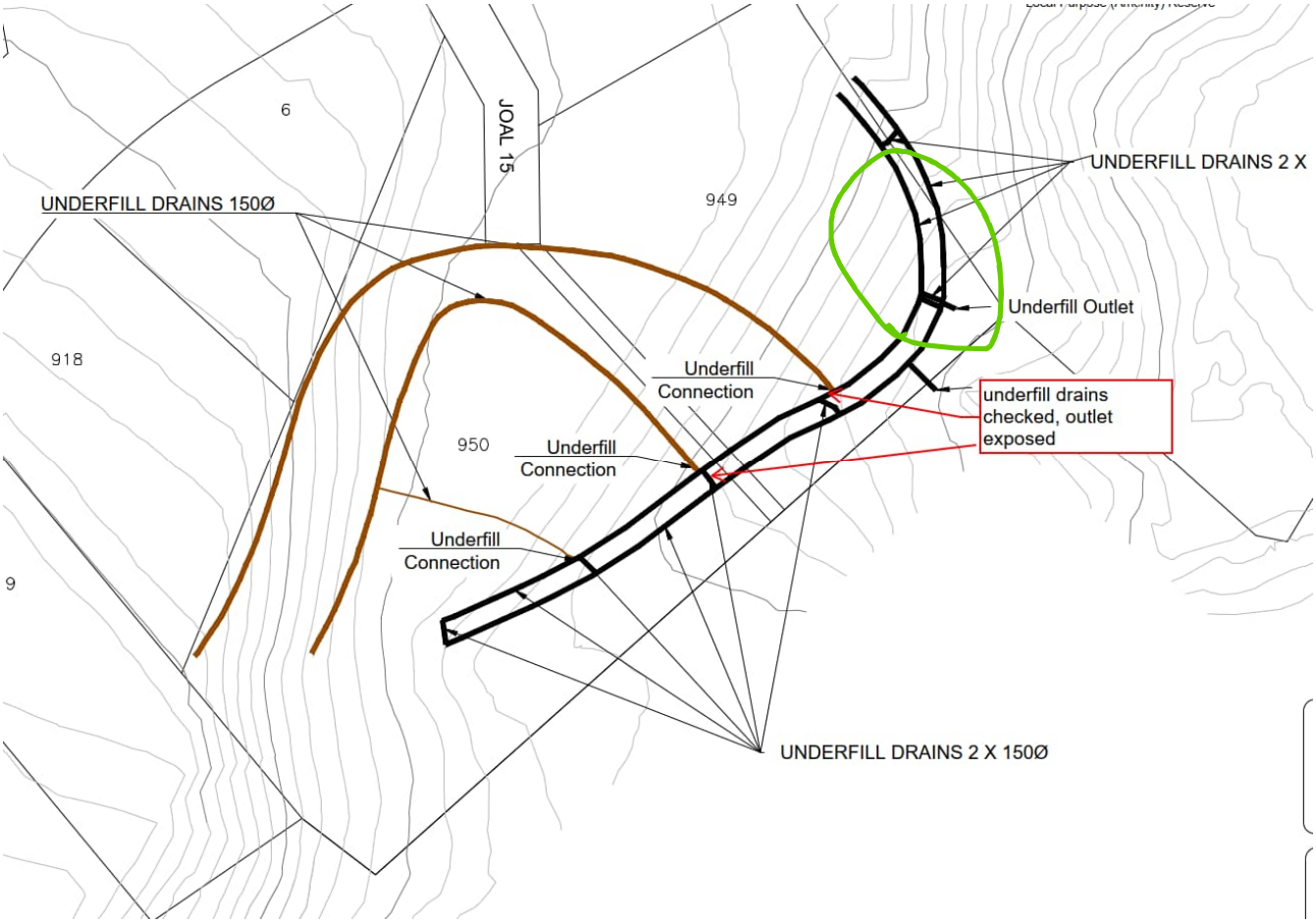
Inspection Notes:

Inspected 7 counterfort drains flushing at above site (refer to plan below).

- All counterfort drains function properly as per design. Water outlet observed at the end of the drains.
- Checked underfill drain at the toe of REB1, contractor exposed the outlets and cleared debris
- Checked underfill drain in lots 949 and 950, contractor exposed the outlets and placed boulders at the outlet.




(Drainage)
Reserve
TH DATE
END
OR 5m CONTOUR
OR 1m CONTOUR
O STEEPER THAN 1:4
Bench Drains
underfill drains
checked, outlet
exposed
1
49.828
BENCH DRAIN
2
39.719
UF DRAIN
3
39.262
UF DRAIN
4
40.636
4 X UF DRAIN
5
39.338
UF DRAIN
6
40.588
UF DRAIN
7
50.326
BENCH DRAIN
150Ø UNDERFILL BASE
DRAINAGE BLANKET
50Ø UNDERFILL DRAINS
Vigneto Street
Dolcetto Place
Bench Drain
UNDERFILL DRAINS 150Ø
RETAINING WA
917
916
915
905
906
904
951
92
50
55
58
59
60
61
53
54


6
JOAL 15
949
UNDERFILL DRAINS 150Ø
UNDERFILL DRAINS 2 X
Underfill Outlet
Underfill
Connection
underfill drains
checked, outlet
exposed
950
Underfill
Connection
Underfill
Connection
918
9
UNDERFILL DRAINS 2 X 150Ø

The 5 counterdrain fort drains along lots 945-947

2 counterfort drains adjacent to lot 926

Contractor exposed underfill drain (toe of REB1) that was previously covered in vege mat

Underfill drain outlets at Lot 950 and 949

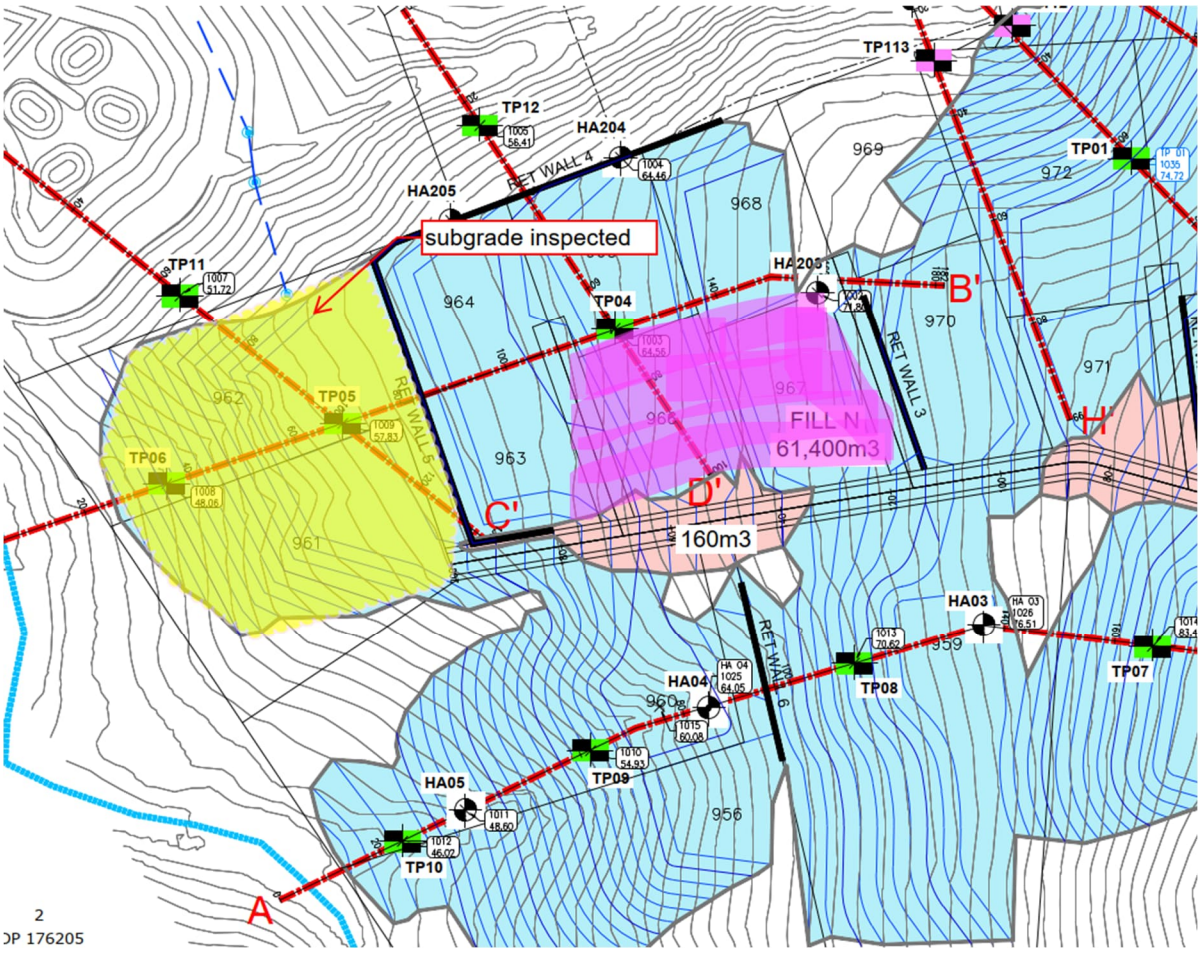
Site Inspection Record

Date:	24/10/2024	**Time:**	10am
LDE Project Ref:	J00113	**Inspected by:**	Alan Huang
Project:	J00113 - Hitchen Block Stage 2, Pokeno		
Weather:	fine		
Contactor:	Dines		

Inspection Notes:

Visited site to inspect subgrade prior to fill placement and topsoil placement.

- Area highlighted in pink:
  - Ground revealed engineered fill. Contractor noted this area is near finished level and will be ready for topsoil placement once the minor trimming is completed. We consider the ground conditions are suitable for topsoil placement.
- Area highlighted in yellow:
  - Contractor has placed clay fill prior to our stripped subgrade inspection.
  - Several shallow hand augers were conducted, the ground revealed 400-500mm of clay fill and competent natural ground is found below.
  - Shear vane readings within the natural ground were in excess of 100kPa.
  - We consider the clay fill is suitable to remain. Recommended the contractor to contact us prior to bulk filling.



Subgrade near finished level

Clay fill area

Contractor provided photos: prior to filling

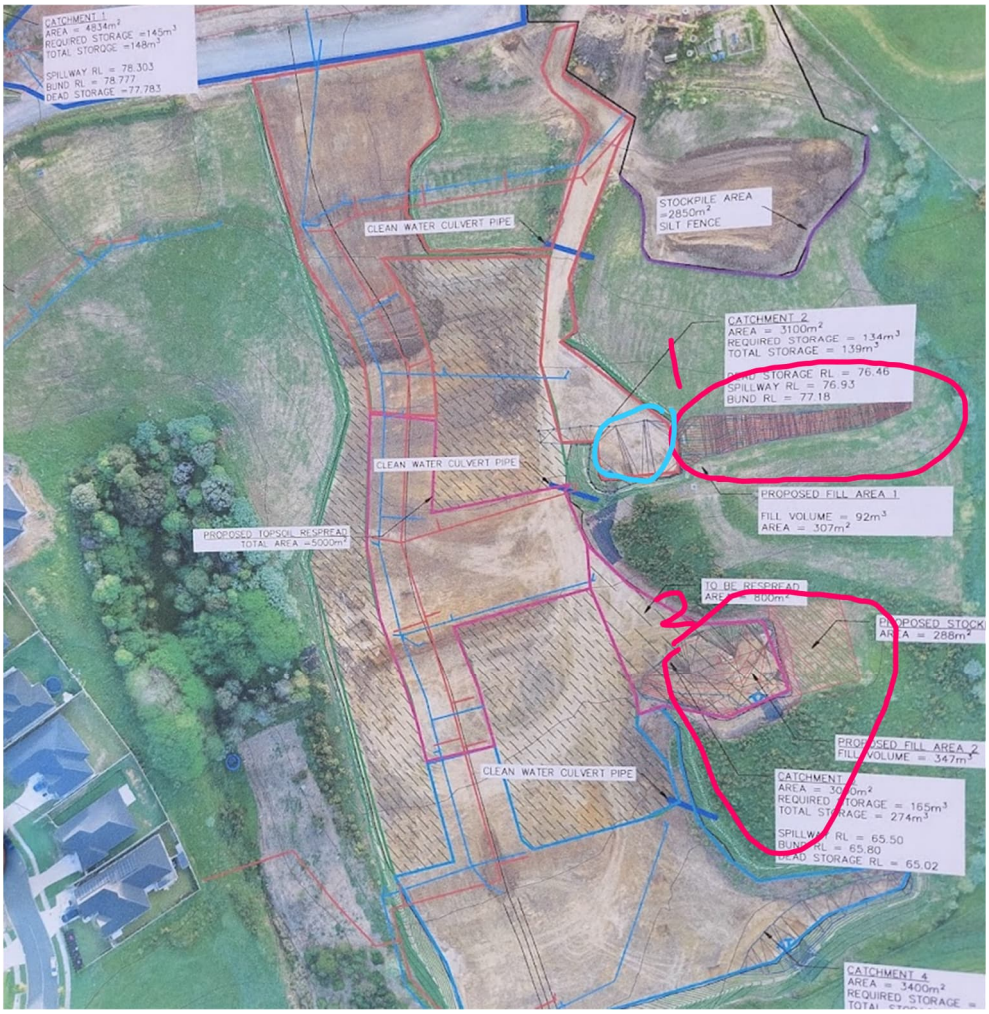
Site Inspection Record

Date:	6/11/2024	**Time:**	
LDE Project Ref:	J00113	**Inspected by:**	Alan Huang
Project:	J00113 - Hitchen Block Stage 2, Pokeno		
Weather:	fine		
Contactor:	Dines		

Inspection Notes:

Visited site as requested by Cole (Dines) to inspect finished subgrade ground conditions and discuss about future work areas (circled in red on below plan).

- Finished subgrade
  - Ground revealed engineered fill. Shear vane readings were mostly in excess of 200+kPa or UTP. Contractor noted they are planning to place minor fill to shape and extend the batter. We understand it will be less than 600mm high and consider the ground is suitable to place fill upon.
- Proposed earthwork areas (circled in red on below plan)
  - Contractor noted they have excess fill and propose to lose the fill in these areas.
  - The site profile is steep (greater than 1v in 4h), we requested the contractor to provide the proposed long section of the area for our stability check.
  - Update 8 Nov 24: Contractor noted they do not plan to open up the area at this stage. The only filling involved will be within the area circled in blue. This is to make the ground level with the adjacent area. The fill depth is no more than 300mm. We consider this area is appropriate to place fill upon.



Finished subgrade

Proposed earthwork areas:

Area 1 – up to 300mm of fill proposed to be placed in this corner, we consider is it appropriate.

Area 2 – contractor put the work on hold.

Site Inspection Record

Date:	12/11/2024	**Time:**	1pm
LDE Project Ref:	J00113	**Inspected by:**	Kyle Meffan
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:

- Inspected fills being placed in the lower portions of Stage 18 where a permanent bund in being formed.
- Fill compaction and contractors operations appear suitable. Contractor advised that fills have been benched in and some of the batter will be trimmed back to final proposed grade.
- Requested compaction control testing be completed on the existing surface and also on the finished bund once formed.

Site Inspection Record

Date:	31/01/2025	**Time:**	10:20AM
LDE Project Ref:	J00113	**Inspected by:**	Marina Houston
Project:	J00113 - Hitchen Block Stage 2, Pokeno		
Weather:	Fine, sunny		
Contractor:	Dines / ICB		

Inspection Notes:

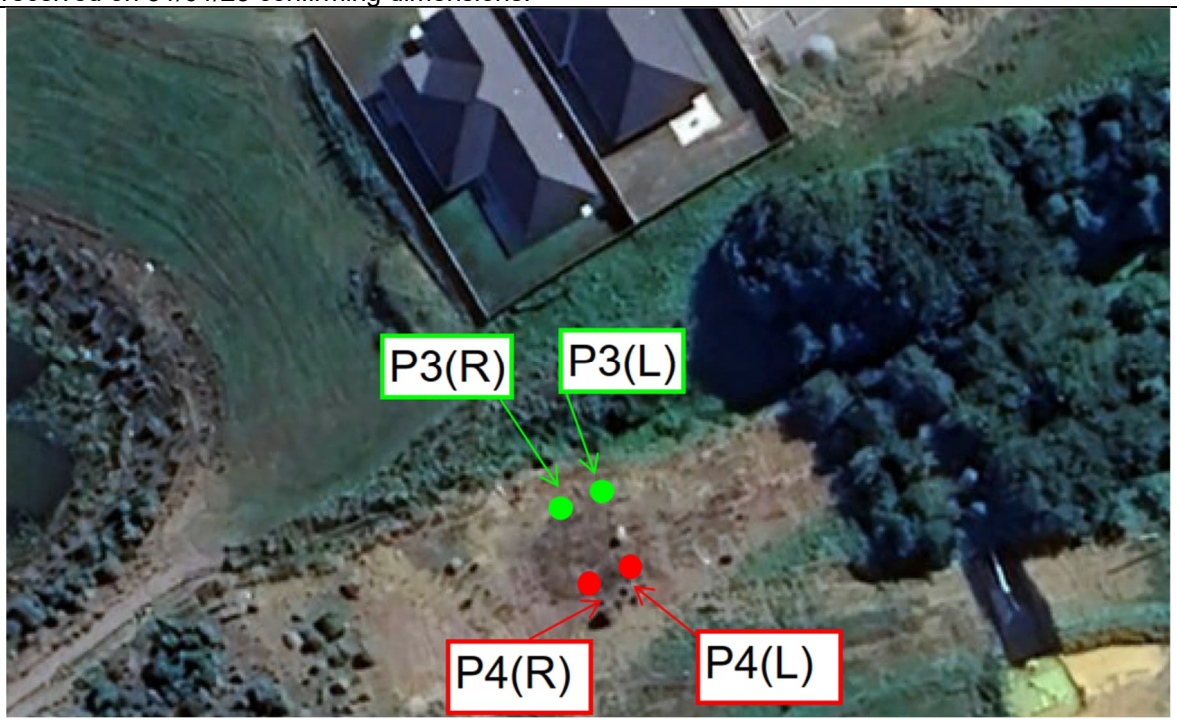
Visited the site at the request of the contractor to inspect two sets of pipe bridging pile holes (approx. locations marked up in green and red in inset below).

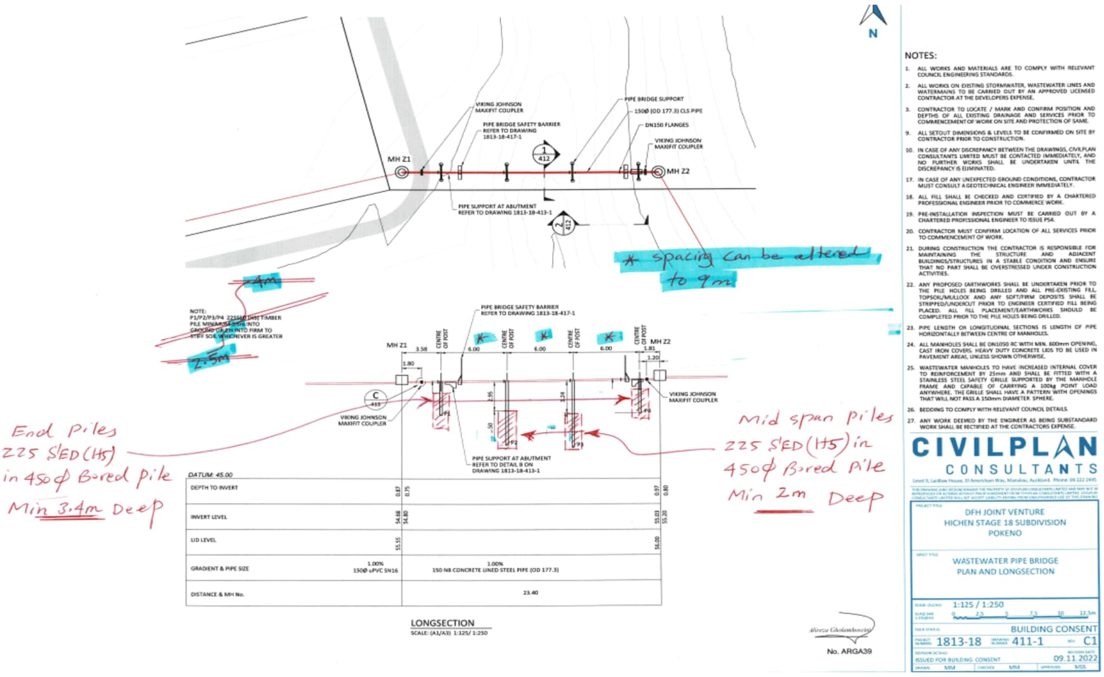
Our observations follow:

- The spoil observed and ground within the pile holes confirmed the presence of natural volcanic ash and weathered tuff deposits. The ground comprised of hard brown/orange and grey clayey silts and sandy silts with traces of gravel consistent with ash to approximately 1.5m to 2.0m depth and transitioned to sandy silt with trace fine gravel consistent with tuff deposits to the end of the hole. The contractor advised that during drilling, the ground generally became harder at approx. 1.5m depth, continuing to the bottom of the holes and this was confirmed with spoil observed from the base of pile hole 'P4(L)'. The shear vane was unable to penetrate the base of sides of the holes (UTP).
- Pile holes were drilled using a 450mm auger and pile holes were approx. 500mm dia.
- The P3 pile holes were between 2.1m and 2.2m depth with a centre to centre span of approx. 1.6m
- The P4(L) pile hole was measured at 3.4m depth.
- Due to machinery break down, P4(R) was partially drilled to approx. 1m depth. Centre to centre span was approx. 1.6m
- Contractor requested inspection for the remaining pile holes on other side of gully on Monday.

Recommendation to contractor:

- Ground conditions are satisfactory.
- Advised contractor (ICB) to send photo of pile hole P3(R) confirming depth when drilled is completed. Photo received on 31/01/25 confirming dimensions.




NOTES:
1. ALL WORKS AND MATERIALS ARE TO COMPLY WITH RELEVANT COUNCIL ENGINEERING STANDARDS.
2. ALL WORKS ON EXISTING STORMWATER, WASTEWATER LINES AND WATERMAINS TO BE CARRIED OUT BY AN APPROVED LICENSED CONTRACTOR AT THE DEVELOPERS EXPENSE.
3. CONTRACTOR TO LOCATE / MARK AND CONFIRM POSITION AND DEPTHS OF ALL EXISTING DRAINAGE AND SERVICES PRIOR TO COMMENCEMENT OF WORK ON SITE AND PROTECTION OF SAME.
9. ALL SETOUT DIMENSIONS & LEVELS TO BE CONFIRMED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION.
10. IN CASE OF ANY DISCREPANCY BETWEEN THE DRAWINGS, CIVILPLAN CONSULTANTS LIMITED MUST BE CONTACTED IMMEDIATELY, AND NO FURTHER WORKS SHALL BE UNDERTAKEN UNTIL THE DISCREPANCY IS ELIMINATED.
17. IN CASE OF ANY UNEXPECTED GROUND CONDITIONS, CONTRACTOR MUST CONSULT A GEOTECHNICAL ENGINEER IMMEDIATELY.
18. ALL FILL SHALL BE CHECKED AND CERTIFIED BY A CHARTERED PROFESSIONAL ENGINEER PRIOR TO COMMENCE WORK.
19. PRE-INSTALLATION INSPECTION MUST BE CARRIED OUT BY A CHARTERED PROFESSIONAL ENGINEER TO ISSUE PS4.
20. CONTRACTOR MUST CONFIRM LOCATION OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORK.
21. DURING CONSTRUCTION THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING THE STRUCTURE AND ADJACENT BUILDINGS/STRUCTURES IN A STABLE CONDITION AND ENSURE THAT NO PART SHALL BE OVERSTRESSED UNDER CONSTRUCTION ACTIVITIES.
22. ANY PROPOSED EARTHWORKS SHALL BE UNDERTAKEN PRIOR TO THE PILE HOLES BEING DRILLED AND ALL PRE-EXISTING FILL, TOPSOIL/MULLOCK AND ANY SOFT/FIRM DEPOSITS SHALL BE STRIPPED/UNDERCUT PRIOR TO ENGINEER CERTIFIED FILL BEING PLACED. ALL FILL PLACEMENT/EARTHWORKS SHOULD BE COMPLETED PRIOR TO THE PILE HOLES BEING DRILLED.
23. PIPE LENGTH ON LONGITUDINAL SECTIONS IS LENGTH OF PIPE HORIZONTALLY BETWEEN CENTRE OF MANHOLES.
24. ALL MANHOLES SHALL BE DN1050 RC WITH MIN. 600mm OPENING, CAST IRON COVERS. HEAVY DUTY CONCRETE LIDS TO BE USED IN PAVEMENT AREAS, UNLESS SHOWN OTHERWISE.
25. WASTEWATER MANHOLES TO HAVE INCREASED INTERNAL COVER TO REINFORCEMENT BY 25mm AND SHALL BE FITTED WITH A STAINLESS STEEL SAFETY GRILLE SUPPORTED BY THE MANHOLE FRAME AND CAPABLE OF CARRYING A 100kg POINT LOAD ANYWHERE. THE GRILLE SHALL HAVE A PATTERN WITH OPENINGS THAT WILL NOT PASS A 150mm DIAMETER SPHERE.
26. BEDDING TO COMPLY WITH RELEVANT COUNCIL DETAILS.
27. ANY WORK DEEMED BY THE ENGINEER AS BEING SUBSTANDARD WORK SHALL BE RECTIFIED AT THE CONTRACTORS EXPENSE.
CIVILPLAN
CONSULTANTS
DFH JOINT VENTURE
HICHEN STAGE 18 SUBDIVISION
POKENO
WASTEWATER PIPE BRIDGE
PLAN AND LONGSECTION
1:125 / 1:250
BUILDING CONSENT
1813-18
411-1
C1
ISSUED FOR BUILDING CONSENT
09.11.2022
MH Z1
MH Z2
VIKING JOHNSON MAXIFIT COUPLER
PIPE BRIDGE SAFETY BARRIER REFER TO DRAWING 1813-18-417-1
PIPE BRIDGE SUPPORT
150Ø (OD 177.3) CL5 PIPE
DN150 FLANGES
PIPE SUPPORT AT ABUTMENT REFER TO DRAWING 1813-18-413-1
* spacing can be altered to 9m
4m
2.5m
End Piles
225 S'ED (H5)
in 450ϕ Bored pile
Min 3.4m Deep
Mid span piles
225 S'ED (H5) in
450ϕ Bored pile
Min 2m Deep
DATUM 45.00
DEPTH TO INVERT
INVERT LEVEL
LID LEVEL
GRADIENT & PIPE SIZE
DISTANCE & MH No.
1.00%
150Ø uPVC SN16
1.00%
150 NB CONCRETE LINED STEEL PIPE (OD 177.3)
23.40
LONGSECTION
SCALE: (A1/A3) 1:125/ 1:250
No. ARGA39

Photos below received from contractor confirming pile hole depth and dimensions (31/01/2025):

LDE
engineers • scientists

Site Inspection Record

Date:	03/02/2025	**Time:**	10:00AM
LDE Project Ref:	J00113	**Inspected by:**	Marina Houston
Project:	J00113 - Hitchen Block Stage 2, Pokeno		
Weather:	Fine		
Contractor:	Dines / ICB		

Inspection Notes:

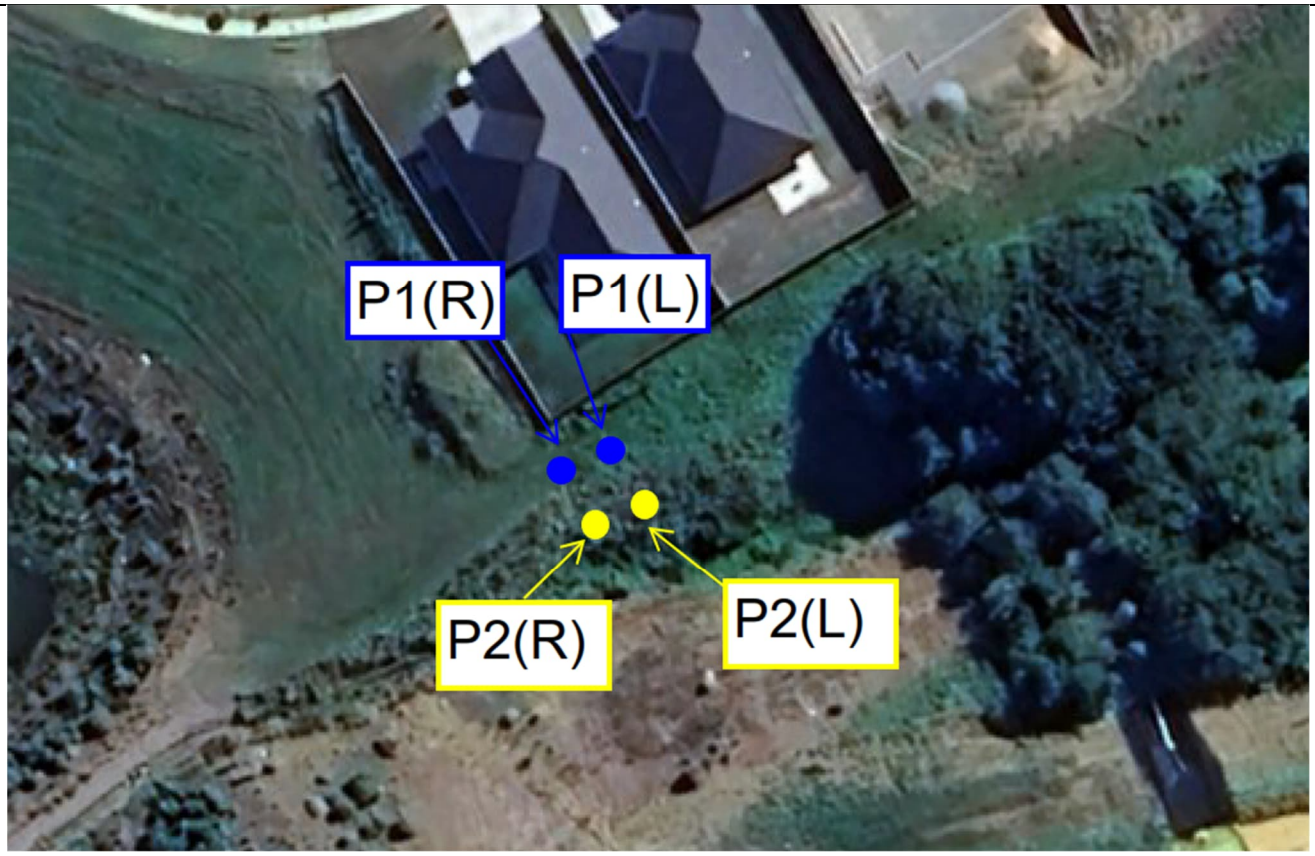
Visited the site at the request of Dines to inspect ground conditions in pipe bridging pile holes (approx. locations marked up in blue and yellow in inset below).

Our observations follow:

- Only P1 (blue) pile holes were inspected.
- The ground within the pile holes confirmed the presence of natural volcanic ash and weathered tuff deposits. The ground comprised of 200mm to 300mm topsoil overlying hard brown/orange clay clayey silts consistent with ash to approx. 1.5m depth and this was underlain by brown/grey sandy silts with traces of fine gravel fragments consistent with weathered tuff deposits. The shear vane was unable to penetrate the sides and base of the holes (UTP).
- Pile holes were drilled using a 450mm auger and pile holes were approx. 500mm dia.
- The pile holes were between 3.6 and 3.7m deep with a centre to centre span of approx. 1.6m.
- Minor spoil was seen at the base of the holes. Contractor advised to remove spoil prior to pouring concrete.
- On site, Ali (structural engineer) advised P2 (yellow) piles to be drilled at least another 2m depth, currently approx. 2m depth. Zeph (Dines) confirmed that these pile holes would be drilled an additional 3m depth and inspection required at 12:30PM.

Recommendations to contractor:

- Ground conditions are satisfactory, providing spoil is removed from base of holes.



Site Inspection Record

Date:	03/02/2025	**Time:**	12:30PM
LDE Project Ref:	J00113	**Inspected by:**	Marina Houston
Project:	J00113 - Hitchen Block Stage 2, Pokeno		
Weather:	Overcast		
Contactor:	Dines / ICB		

Inspection Notes:

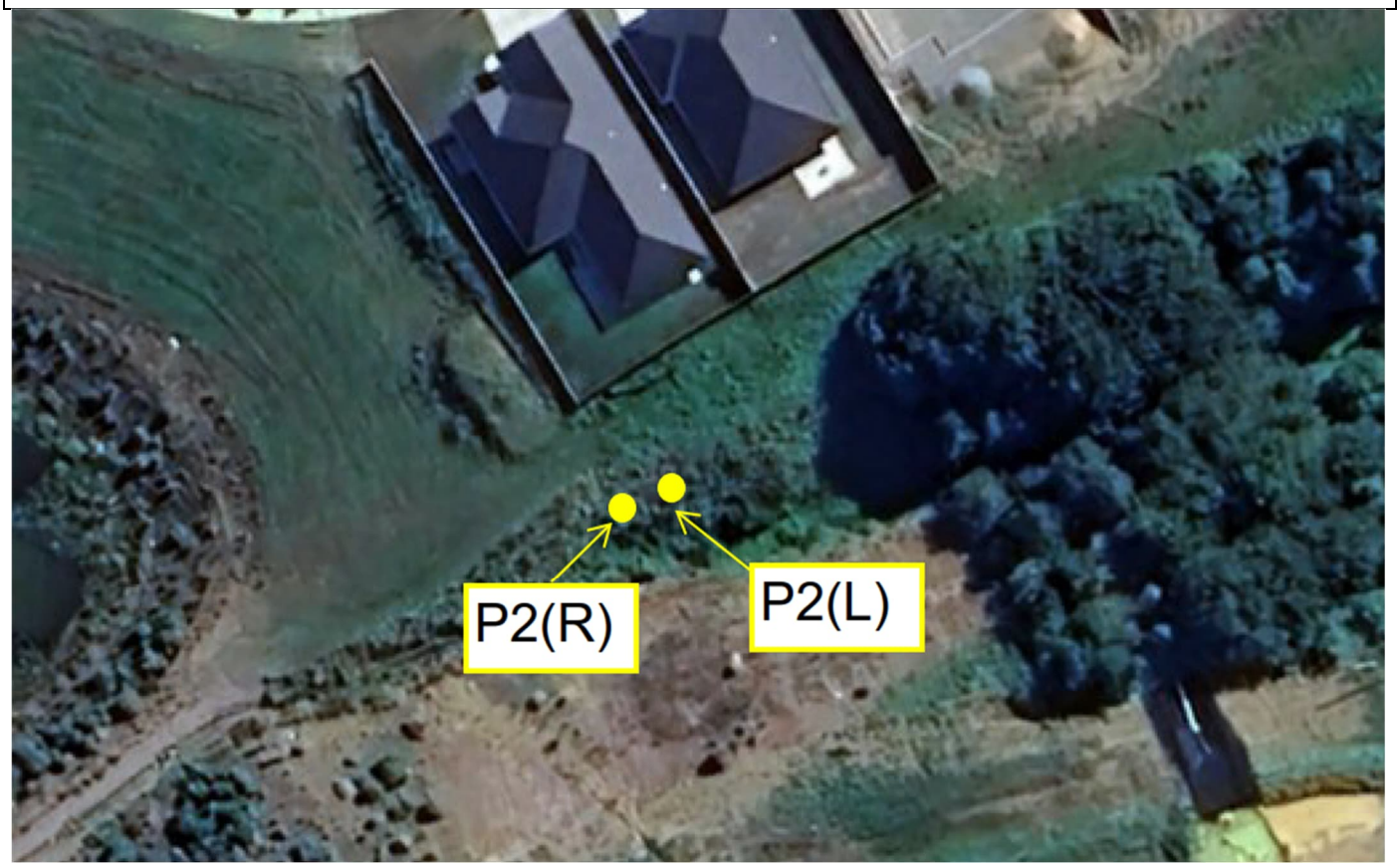
Visited the site at the request of Dines to inspect ground conditions in pipe bridging pile holes (approx. locations marked in yellow in inset below).

Our observations follow:

- Only P2 pile holes were inspected.
- The ground within the pile holes and observations of spoil confirmed the presence of natural volcanic ash and weathered tuff deposits. The ground comprised of 200mm to 300mm topsoil overlying hard brown/orange clay clayey silts consistent with ash to approx. 1.5m depth and this was underlain by grey/brown sandy silts with traces of fine gravel fragments consistent with weathered tuff deposits. The shear vane was unable to penetrate the sides and base of the holes (UTP).
- Pile holes were drilled using a 450mm auger and pile holes were approx. 500mm dia.
- The pile holes were between 5.1 and 5.4m deep with a centre to centre span of approx. 1.6m.
- Minor water had pooled at the base of the holes. Contractor advised to pump out prior to pouring concrete.

Recommendations to contractor:

- Ground conditions are satisfactory.



Kyle Meffan

From: Kyle Meffan
Sent: Tuesday, 27 May 2025 11:51 am
To: Russell Parkinson; Zeph Patterson
Subject: Stages 18 and 19 - outstanding GCR items
Attachments: Page 105 from J00113-GEO-Assessment Report-Stage 6 Earthworks {2} Stage 18 Civils-260663 (ID 260663).pdf

Hi Russell and Zeph,

We attended site last week to walk over Stages 18 and 19 and have the following items to discuss with you across these stages. Please let us know your comments once you have reviewed.

Stockpiles:

There are various stockpiles present in Stage 19 and we will just need to sight the area once those are removed in due course.

Drain outlets:

There should be some underfill drain outlets in Stage 18, however, we could not site these (approximately as per the attached plan; dashed blue lines). We also observed the counterfort drain outlets which look in good condition. We recommend the following, for discussion with you:

- Can you please check your as-built records to see if there are as-builts for the drains shown on the attached plan? We have only sighted the outlets for the counterfort drains.

- Underfill drain outlets should be exposed so we can site these and confirm they are suitable prior to geotechnical sign-off.

- We also recommend some large rocks be placed below the outlets to the counterfort drains to avoid any scour that may develop here (similar to what was done in Stage 17). An example of where these would go is outlined in red below – just below the pipe outlet.

Slope gradients:

Below the topsoil bund in Stage 18 there is a vertical face of soil that looks to be held up with a silt fence currently (just below the red line shown below, near the farm fence). This should be trimmed back to the design gradient if possible to avoid long-term failure?

There is also a section of slope above this which appears to be steeper than 1(v) in 3(h) – marked in green below. We will check this as part of our slope stability verification, but just wanted to double check this was the proposed profile through this area?

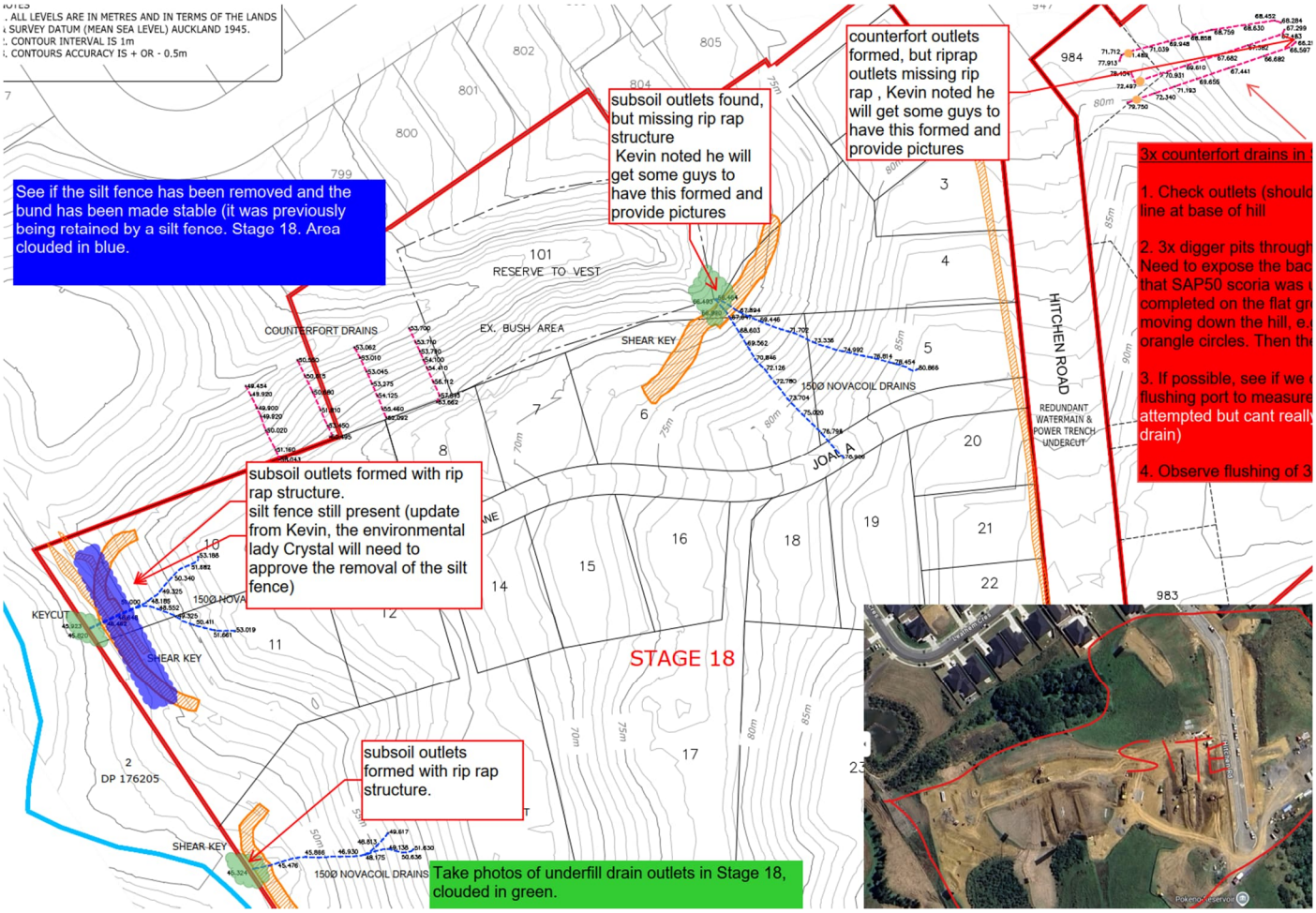
Site Inspection Record

Date:	24/07/2025	**Time:**	11am
LDE Project Ref:	J00113	**Inspected by:**	Alan Huang
Project:	J00113 - Hitchen Block Stage 2, Pokeno		

Inspection Notes:

Visited site with Kevin to inspect the counterfort flushing and identifying the subsoil drain outlets. Refer to below site plan annotation.

- Three pits were conducted to expose the caps. Scoria was present below the cloth.
- All three counterforts flushed.
- Riprap structures are required at the outlets for all counterfort drains and the subsoil within lot 4.
- Contractor advised the silt fence installed will require environmental engineer approval prior to removal.



Most southern subsoil outlet (lot 13 subsoil outlet): located behind the silt fence with riprap formed. The outlet is currently sitting behind the silt fence. Kevin noted the outlet may need to be reformed once the silt fence is removed.

3 Pits opened up to locate the capping of the 3 counterfort drains.

Scoria present below the cloth

3x Counterfort drain flushing

Stage 18 & 19 drain outlets, provided by the contractor on 23/07/25: