Geotechnical Completion Report

HITCHEN BLOCK STAGES 6E AND 10A TO 10D

For

DFH JOINT VENTURE LIMITED

J00113 | Lander Geotechnical Consultants Limited | 16 December 2020

16 December 2020 Ref No: J00113

DFH Joint Venture Limited
PO Box 302 877
North Harbour 1330

Attention: Mr R Parkinson

Dear Russell

RE: Geotechnical Completion Report for Hitchen Block Stages 6E & 10A to 10D, Pokeno

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 undersigned.

For and on behalf of Lander Geotechnical Consultants Limited

Shane Lander

Principal Geotechnical Engineer
CMEngNZ, CPEng., IntPE(NZ)

Lander Geotechnical Consultants Limited
Level 3, 3 Osterley Way, P O Box 97 385, Manukau, Auckland 2241
Phone: (09) 262 1528; (09) 262 1526
Email: contactus@landergeotechnical.co.nz www.landergeotechnical.co.nz

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1 INTRODUCTION AND DESCRIPTION OF SUBDIVISION

This Geotechnical Completion Report 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 Stages 6E and 10A to 10D of the Hitchen Block Residential Subdivision as follows:

Table 1: CivilPlan Consultants Limited As-Built Plans

Title	Reference No.	Date
As Built Contours	136701-10-AB200	November 2020
As Built Cut-Fill Contours	136701-10-AB201	November 2020
Retaining Wall As Built	136701-10-AB202	November 2020
Roading As Built	136701-10-AB300	November 2020
Stormwater As Built	136701-10-AB400	November 2020
Wastewater As Built	136701-10-AB401	November 2020

This report covers the construction period October 2016 to December 2020. It is intended to be used for certification purposes as follows:

- 66 residential lots numbered 6, 15 to 18 and 486 to 546;
- 4 new roads named Harriet Johnston Drive (part), Frankfield Road (part), Lathem Crescent (part) and Hale Court;
- 3 jointly owned access lots that provide vehicle access to lots 496-497, 501-502 and 523-525;
- 1 stormwater reserve located in the south-western portion of Stage 10A, containing a permanent stormwater pond

This stage of the subdivision is located as shown on the attached CivilPlan Consultants Limited as-built plan. As can be seen on the As Built Cut-Fill Contours plan, approximately half of the residential lots have been partly or totally affected by filling, to a maximum depth of approximately 4m.

2 RELATED REPORTS

A Geotechnical Investigation Report on the subject land was prepared by this Consultancy, reference J00323 (Earthworks Stage 3), dated 30 June 2016. The conclusions and recommendations of that report have been reviewed during the preparation of this document, along with the following Geotechnical Completion Reports (prepared by Lander Geotechnical Consultants Limited) on adjacent recently completed stages of the subdivision which are tabulated below:

Table 2: Lander Geotechnical Consultants Geotechnical Completion Reports

Subdivision Title	Reference No.	Issue Date
Hitchen Block Stage 1 (Residential)	J00113	23 December 2016
Gateway Industrial Part Stage 5 (Lots 28 and 29)	J00022	27 February 2017
Hitchen Block Stage 2A and 2B (Residential)	J00113	14 July 2017
Hitchen Block Stage 2C and 3A (Residential)	J00113	27 October 2017
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

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 for this stage commenced in November 2016 with the topsoil stripping and bulk cuts over the lots and within the permanent stormwater pond which are formed in cut ground. These works continued until January 2018 concurrently with earthworks occurring in adjacent stages of the subdivision.

In December 2017, gully muckout operations commenced through the main gully in this stage (located beneath Harriet Johnston Drive and Hale Court). These muckout operations continued until March 2018. Following this, underfill drainage (comprising of 160mm perforated drain coils, covered with

drainage aggregate and fully wrapped with geotextile cloth) was installed along the gully invert and fill placement commenced. In locations where deep firm alluvial materials or groundwater seepages were encountered, additional underfill drainage and/or a mattress of SPR hardfill was placed to facilitate fill placement.

Bulk filling operations and subsequent topsoiling of the lots continued until September 2018. Following this civil construction (services and roading) progressed and was completed by late 2020.

4 QUALITY ASSURANCE AND CONTROLS

4.1 Inspections

During earthworks construction, engineering observations were undertaken on a near regular basis to assess compliance with NZS 4431 and our project specific recommendations and specifications. Project specific inspections were required on this stage of the development for:

- Topsoil stripping of earthworks areas;
- Removal of soft sediments in the gully inverts;
- Placement of the underfill drains;
- Fill placement and plant performance upon the subgrade periodically throughout the bulk filling works.

4.2 Quality Control

4.2.1 Compaction Criteria

Due to the varying soil types being used as filling, the compaction control criteria of minimum allowable shear strength and maximum allowable air voids were mainly used for quality assurance purposes.

Specification details were as follows for general fills:

Minimum Shear Strength and Maximum Air Voids Method

(a)	Air Voids Percentage	
	(As defined in NZS 4402)	
	Average value less than	10%
	Maximum single value	12%
(b)	Undrained Shear Strength	
	(Measured by Pilcon shear vane - calibrated using NZGS 2001 method)	
	Average value not less than	140 kPa
	Minimum single value	120 kPa
Note:	The average value shall be determined over any ten consecutive tests	

4.2.2 Compaction Assurance Testing

Regular insitu density, strength and water content tests were carried out on all areas of the filling at or in excess of the frequency recommended by NZS 4431, and a series of hand auger boreholes were also

drilled at selected locations as an added check on quality control. The results of this testing (including testing some testing undertaken on adjacent stages of the subdivision) are appended in Appendix 2.

5 PROJECT EVALUATION

5.1 Bearing Capacity and Settlement of Building Foundations

Following the completion of earthworks operations, we returned to the site in November 2020 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 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 affected areas be 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.

5.2 Expansive Soils

Two sets of Atterberg Limit expansive soil tests and four Shrink-Swell Index tests were carried out on samples selected from around the site and within the zone of likely influence of shallow building foundations to inform the expansive Site Class for this stage of the subdivision. Our assessment has taken into account both the Atterberg Limit and Shrink-Swell laboratory test results.

The Atterberg Limit tests were carried out in accordance with NZS 4402, "Methods of Testing Soils for Civil Engineering Purposes" test section 2 and were primarily intended to assess the Expansive Classes of the site materials as defined in AS 2870, "Residential Slabs and Footings – Construction".

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 and were primarily intended to assess the Expansive Classes of the site materials as defined in AS 2870, "Residential Slabs and Footings – Construction".

Based on the laboratory testing and visual tactile assessments of the soils observed in our post-construction boreholes, the Expansive Site Classes for this stage of the subdivision are M (moderate) for residential lots 6, 15, 18, 492 to 503, 508 to 536, 538 to 540, 545 and 546, and H (high) for residential lots 16, 17, 486 to 491, 504 to 507, 537 and 541 to 544, as defined in MBIE Acceptable Solutions and Verification Methods amendment 19[1].

[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.

The characteristic surface ground movement (y_s) for Expansive Site Classes M and H is up to 44mm and 78mm, respectively. Details relating to these Expansive Site Classes are provided in Appendix 3, and 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, as recommended in the MBIE document attached.

For Class H 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.

5.3 Lot Gradients

The appended as built contours plan shows areas having gradients steeper than 1(v) in 4(h) or being immediately adjacent to land having such gradients. The extent of these areas 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.

We are satisfied that these lots are not subject to the hazards described in section 71(3) of the Building Act.

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

5.4 Fill Induced Settlement

As a result of our pre-fill inspections, the installation of subsoil drainage, quality control testing and the elapsed time since the placement of the majority of the filling (i.e. in excess of 12 months), we are of the opinion that induced differential settlements beneath or within the certified filling due to its imposed weight should be insignificant with respect to conventional NZS 3604 residential building development.

5.5 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 can cause erosion, scour and/or instability on sloping land and should not be permitted under any circumstances where stability could be compromised.

5.6 Service Trenches

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

5.7 Underfill Drains

The appended fill as-built cut-fill contour plans show the alignments of perforated underfill drains that were placed in mucked out gully inverts prior to filling to tap groundwater seepages. These drains run beneath portions of residential Lots 490, 491, and 537.

These drains were intended to intercept localised groundwater seepages during earthworks and/or allow engineered fill placement as required by the project specifications. The drains were installed as a precautionary measure, not as remedial works for any existing instability, and they need no specific maintenance.

Notwithstanding, it is recommended that future foundations or site development works preserve these drains. In the event that they are compromised by any future development in any of the lots they should be reinstated under geotechnical engineering observational guidance.

5.8 Retaining Walls

At the south-eastern boundary of lot 6 and the northern boundary of lots 521 to 523, the site has been stabilised within adjacent lot 7 by the construction of a boundary timber pole retaining wall. This work was completed as part of the adjacent Stage 9 residential subdivision, with the wall construction being completed between July and August 2019. This wall reaches a maximum height of approximately 2.4m metres and was designed and inspected by this Consultancy. For completeness, a copy of our Producer Statement - Construction Review (PS4) is appended.

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

5.9 Stormwater Detention Pond

A stormwater detention pond has been constructed in within the south-west portion of Stage 10A. We were not involved in the design or construction supervision of this pond or its outlet structures/conduits. The clay fill placed within the pond area has been compacted to the compaction criteria outlined in Section 4.2.1.

5.10 Topsoil

Topsoil depths in likely building platform areas were checked by the drilling of a borehole in the approximate centre of lot. Our findings, which are indicative only and subject to variation at other locations, show that likely topsoil depths are between 50 mm and 300 mm, with lot 537 recording a topsoil reading of 400mm.

Site specific findings are presented in the Suitability Statement Summary.

5.11 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 Lander Geotechnical Consultants Limited reports, recommendations and site instructions,

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

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

I, S.G. Lander, of Lander Geotechnical Consultants Limited, Auckland, hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering as defined in section 1.2.3 of NZS 4404 and was retained by the Owner/Developer as the Geotechnical Engineer on Stages 6E and 10A to 10D of the Hitchen Block residential subdivision.
2. The extent of preliminary investigations carried out to date are described in Geotechnical Investigation Report reference J00323, dated 30 June 2016, and the conclusions and recommendations of that document have been re-evaluated in the preparation of this report. The results of all tests carried out under Lander Geotechnical Consultants Limited direction are appended.
3. In my professional opinion, not to be construed as a guarantee, I consider that:

   (a) The earth fills shown on the appended fill as-built plan have been placed in compliance with NZS 4431 and related documents.

   (b) The completed earthworks give due regard to land slope and foundation stability considerations within the residential lots, however, as shown on the appended contour as-built plan, lots 521 to 524 and 537 have gradients steeper than 1(v) in 4(h).

   Any building development and/or earthworks proposals within the areas shown to be steeper than 1(v) in 4(h) on the as-built contours plan are subject to specific geotechnical investigations and/or foundation design.

   (c) The function of the underfill drains should not be impaired by any building development or landscaping works. In particular, any bored or driven piles must be positioned to avoid damaging the underfill drains. The drains are shown pass under portions of residential Lots 490, 491 and 537 at depths typically greater than 1m below existing ground level and therefore should not adversely affect shallow foundation systems (dependant on final earthworks proposals). Further comments relating to these drains is provided in the suitability statement summary.

   (d) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for foundation design on all lots (except where specific geotechnical endorsement is required on account of sloping land greater than 1(v in 4(h)).

   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.

(e) The backfilling and compaction of the 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.

(f) The assessed Expansive Site Class in terms of MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure, effective 28 November 2019, is M (moderate) for lots 6, 15, 18, 492 to 503, 508 to 536, 538 to 540, 545 and 546, and H (high) for lots 16, 17, 486 to 491, 504 to 507, 537 and 541 to 544. The characteristic surface ground movement for these Site Classes is up to 44mm (Class M) and 78mm (Class H), respectively in regards to the above standard. Site specific laboratory testing may be undertaken by end-users to re-assess the expansive site class during building consent stage.

(g) For lots 6 and 521 to 523, no building construction, including the construction of additional retaining walls and no additional earthworks should take place should take below the existing retaining wall situated at the northern boundary (Lots 521 to 523) and eastern boundary (lot 6) within a distance of 1.5x times the wall face height) without engineering endorsement/ assessment. Specific distances from the retaining wall are provided in the Suitability Statement Summary.

(h) Subject to the geotechnical limitations, restrictions, recommendations and expansive soil assessments associated with 3(b), 3(c), 3(d), 3(e), 3(f) and 3(g) 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 residential lots 6, 15, 18, 492 to 503, 508 to 536, 538 to 540, 545 and 546 foundation design may be carried out in accordance with Class M (in terms of MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure, effective 28 November 2019) or alternatively, 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.

(ii) On residential lots 16, 17, 486 to 491, 504 to 507, 537 and 541 to 544 foundation design may be carried out in accordance with Class H (in terms of MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure, effective 28 November 2019) or alternatively, 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, available subgrade strengths are dependent on-site conditions and on construction trafficking and variable results should be expected.

5. The permanent stormwater pond within stage 10A has been formed to standards appropriate for its intended use.

The professional opinion contained within this report is furnished to the Waikato District Council and DFH Joint Venture Limited for their purposes alone, with respect to the particular brief given to us. It may not be relied upon in any other context of for any other purpose without our prior review and agreement. It does not remove the necessity for the normal inspection of site conditions at the time of erection of any dwelling.

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

For and on behalf of Lander Geotechnical Consultants Limited

Prepared by:	Reviewed By:	Authorised by:
K. Meffan Engineering Geologist MEngNZ	**C.J. Edwards** Senior Engineering Geologist CMEngNZ (PEngGeol)	**S.G. Lander** Principal Geotechnical Engineer CMEngNZ, CPeng, IntPE(NZ)

Table 3: Suitability Statement Summary

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
6	No building construction, including the construction of additional retaining walls and no earthworks below the timber pole cantilever retaining wall within a horizontal distance of 3.6m from the toe of the retaining wall situated on the eastern boundary (i.e. 1.5x the wall face height), unless endorsed by specific designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics. Elsewhere, foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
15	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
16	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
17	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	H
18	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
486	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
487	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	H
488	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	H
489	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	H

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
490	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design. Function of underfill drains to be maintained (refer Section 5.7 and 6(3c) for further details. Any cuts deeper than 1m to be assessed by geotechnical engineer as underfill drain may be intercepted and require re-alignment under engineering direction, dependant on final development/earthworks proposals.	100	300	H
491	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design. Function of underfill drains to be maintained (refer Section 5.7 and 6(3c) for further details. Any cuts deeper than 1m to be assessed by geotechnical engineer as underfill drain may be intercepted and require re-alignment under engineering direction, dependant on final development/earthworks proposals.	200	300	H
492	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
493	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	50	300	M
494	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
495	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
496	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	150	300	M
497	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
498	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
499	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
500	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
501	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
502	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
503	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	150	300	M
504	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	50	300	H
505	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	H
506	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
507	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
508	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
509	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
510	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
511	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
512	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
513	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
514	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
515	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
516	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
517	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
518	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
519	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
520	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
521	Specific site investigation, foundation design and construction inspections required in areas shown hatched on gradient as-built plan due to 1(v) in 4(h) gradient restrictions. No building construction, including the construction of additional retaining walls and no earthworks below the timber pole cantilever retaining wall on the northern boundary within a distance of 1.8m from the toe of the wall (i.e. 1.5x the wall face height), unless endorsed by specific designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics. Elsewhere, foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	150	300	M
522	Specific site investigation, foundation design and construction inspections required in areas shown hatched on gradient as-built plan due to 1(v) in 4(h) gradient restrictions. No building construction, including the construction of additional retaining walls and no earthworks below the timber pole cantilever retaining wall on the northern boundary within a distance of 1.35m from the toe of the wall (i.e. 1.5x the wall face height), unless endorsed by specific designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics. Elsewhere, foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M

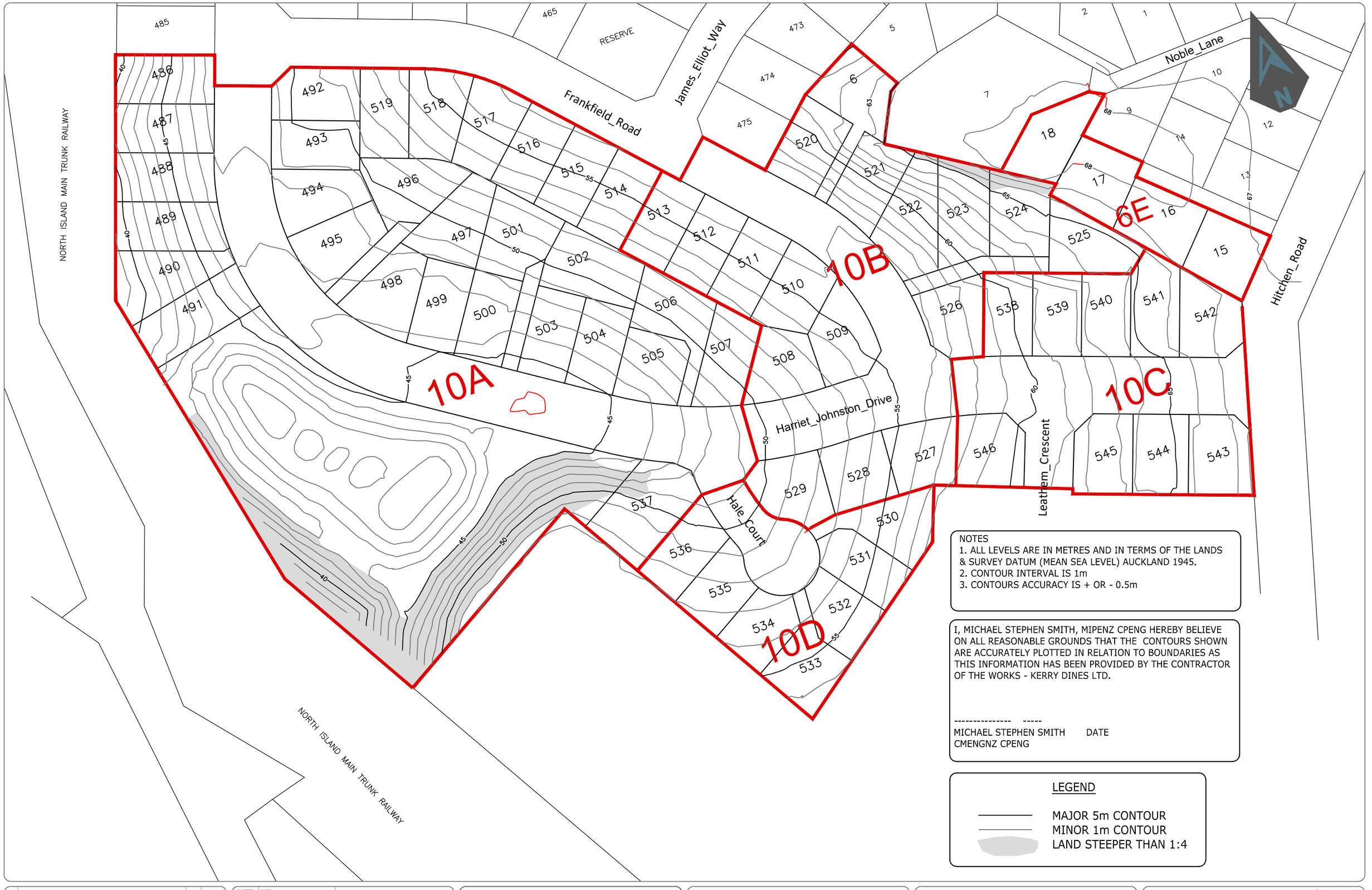
Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
523	Specific site investigation, foundation design and construction inspections required in areas shown hatched on gradient as-built plan due to 1(v) in 4(h) gradient restrictions. No building construction, including the construction of additional retaining walls and no earthworks below the timber pole cantilever retaining wall on the northern boundary within a distance of 0.9m from the toe of the wall (i.e. 1.5x the wall face height), unless endorsed by specific designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics. Elsewhere, foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	150	300	M
524	Specific site investigation, foundation design and construction inspections required in areas shown hatched on gradient as-built plan due to 1(v) in 4(h) gradient restrictions. Elsewhere, foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	50	300	M
525	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	300	300	M
526	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
527	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
528	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	150	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
529	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	50	300	M
530	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
531	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
532	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	150	300	M
533	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	50	300	M
534	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
535	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
536	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
537	Specific site investigation, foundation design and construction inspections required in areas shown hatched on gradient as-built plan due to 1(v) in 4(h) gradient restrictions. Elsewhere, foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design. Function of underfill drains to be maintained (refer Section 5.7 and 6(3c) for further details. Any cuts deeper than 1m to be assessed by geotechnical engineer as underfill drain may be intercepted and require re-alignment under engineering direction, dependant on final development/earthworks proposals.	400	300	H

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	Expansive Site Class (B1/AS1)
538	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
539	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	200	300	M
540	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	300	300	M
541	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
542	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	50	300	H
543	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
544	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	H
545	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M
546	Foundation design in accordance with MBIE Acceptable Solutions and Verifications Methods for NZ Building Code Clause B1 Structure or engineer approved alternative foundation design.	100	300	M

Appendix 1

CivilPlan Consultants Limited As-Built Plans



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

I, MICHAEL STEPHEN SMITH, MIPENZ 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
LAND STEEPER THAN 1:4

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224C	RJP	11-20

PLOTTED: RJP	DATE: 11-20	THIS DRAWING AND DESIGN REMAINS THE PROPERTY OF, AND MAY NOT BE REPRODUCED OR ALTERED, WITHOUT THE WRITTEN PERMISSION OF CIVILPLAN CONSULTANTS LIMITED. NO LIABILITY SHALL BE ACCEPTED FOR UNAUTHORISED USE OF THIS DRAWING.
DRAWN: RJP	DATE: 11-20	
APPROVED: MSS	DATE: 11-20	

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

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGES 6E, 10A,10B,10C,10D
POKENO

SHEET TITLE:
AS BUILT CONTOURS

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:1250 A3
SCALE BAR N.T.S.
DRAWING NUMBER: 136701-10-AB200 REV: A

Filepath: P:\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 10\AS BUILTS\136701-10-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

I, MICHAEL STEPHEN SMITH, MIPENZ 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
UNDERFILL DRAIN
MAJOR 5m CONTOUR
MINOR 1m CONTOUR
FILL AREAS

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224C	RJP	11-20

PLOTTED: RJP DATE: 11-20
DRAWN: RJP DATE: 11-20
APPROVED: MSS DATE: 11-20

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

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGES 6E, 10A,10B,10C,10D
POKENO

SHEET TITLE:
AS BUILT CUT-FILL CONTOURS

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:1250 A3
SCALE BAR N.T.S.
DRAWING NUMBER: 136701-10-AB201 REV: A

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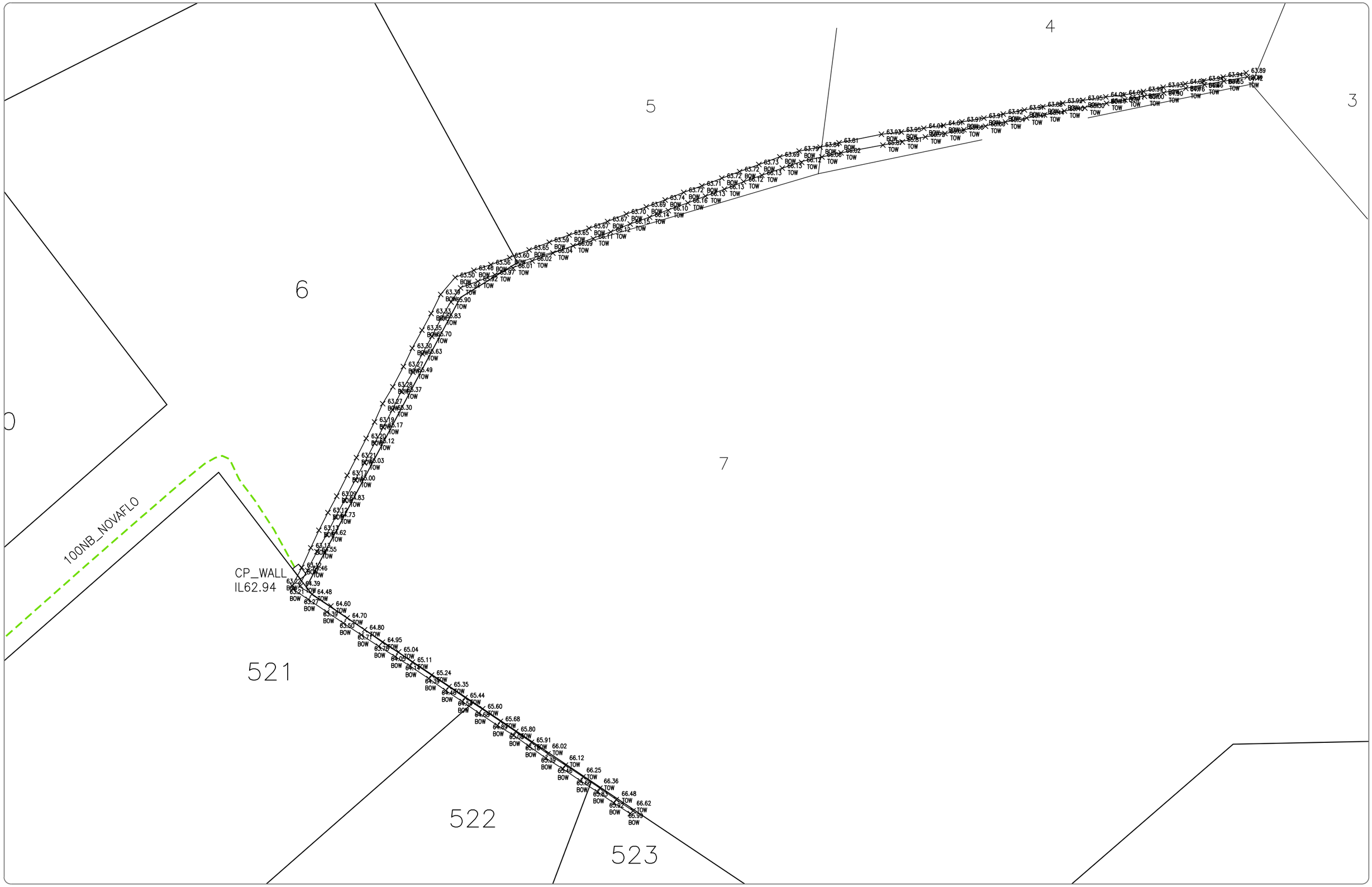


A	ISSUED FOR 224C	RJP	11-20
REV	REVISION DETAILS	BY	DATE

PLOTTED: RJP	DATE: 11-20	THIS DRAWING AND DESIGN REMAINS THE PROPERTY OF, AND MAY NOT BE REPRODUCED OR ALTERED, WITHOUT THE WRITTEN PERMISSION OF CIVILPLAN CONSULTANTS LIMITED. NO LIABILITY SHALL BE ACCEPTED FOR UNAUTHORISED USE OF THIS DRAWING.
DRAWN: RJP	DATE: 11-20	
APPROVED: MSS	DATE: 11-20	

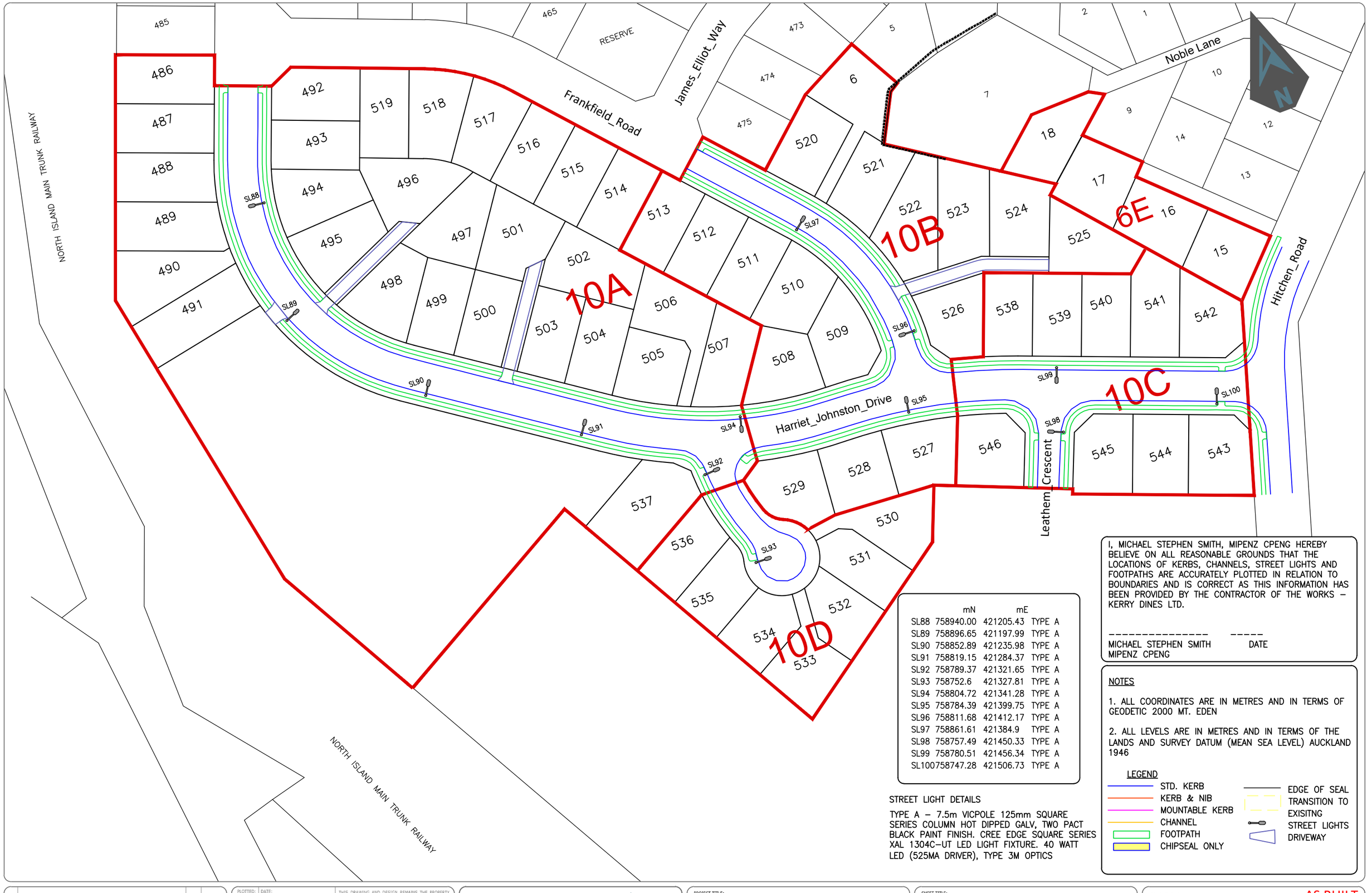
CIVILPLAN CONSULTANTS
Level 9, Laidlaw House, 20 Amersham Way, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGES 6E, 10A,10B,10C,10D
POKENO

SHEET TITLE:
RETAINING WALL AS BUILT

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:100 / 1:200
SCALE BAR 1:200@A3 0 2 4 6 8 10m
DRAWING NUMBER: 136701-10-AB202 REV: A

Filepath: P:\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 10\AS BUILTS\136701-10-AB202.DWG



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SL90	758852.89	421235.98	TYPE A
SL91	758819.15	421284.37	TYPE A
SL92	758789.37	421321.65	TYPE A
SL93	758752.6	421327.81	TYPE A
SL94	758804.72	421341.28	TYPE A
SL95	758784.39	421399.75	TYPE A
SL96	758811.68	421412.17	TYPE A
SL97	758861.61	421384.9	TYPE A
SL98	758757.49	421450.33	TYPE A
SL99	758780.51	421456.34	TYPE A
SL100	758747.28	421506.73	TYPE A

STREET LIGHT DETAILS

TYPE A – 7.5m VICPOLE 125mm SQUARE SERIES COLUMN HOT DIPPED GALV, TWO PACT BLACK PAINT FINISH. CREE EDGE SQUARE SERIES XAL 1304C–UT LED LIGHT FIXTURE. 40 WATT LED (525MA DRIVER), TYPE 3M OPTICS

I, MICHAEL STEPHEN SMITH, MIPENZ CPENG HEREBY BELIEVE ON ALL REASONABLE GROUNDS THAT THE LOCATIONS OF KERBS, CHANNELS, STREET LIGHTS AND FOOTPATHS 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 MIPENZ CPENG — DATE

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

LEGEND

- STD. KERB
- KERB & NIB
- MOUNTABLE KERB
- CHANNEL
- FOOTPATH
- CHIPSEAL ONLY
- EDGE OF SEAL
- TRANSITION TO EXISITNG
- STREET LIGHTS
- DRIVEWAY

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224C	RJP	11-20

PLOTTED: RJP DATE: 11-20
DRAWN: RJP DATE: 11-20
APPROVED: MSS DATE: 11-20

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

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGES 6E, 10A,10B,10C,10D
POKENO

SHEET TITLE:
ROADING AS BUILT

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:1250 A3
SCALE BAR N.T.S.
DRAWING NUMBER: 136701-10-AB300 REV: A

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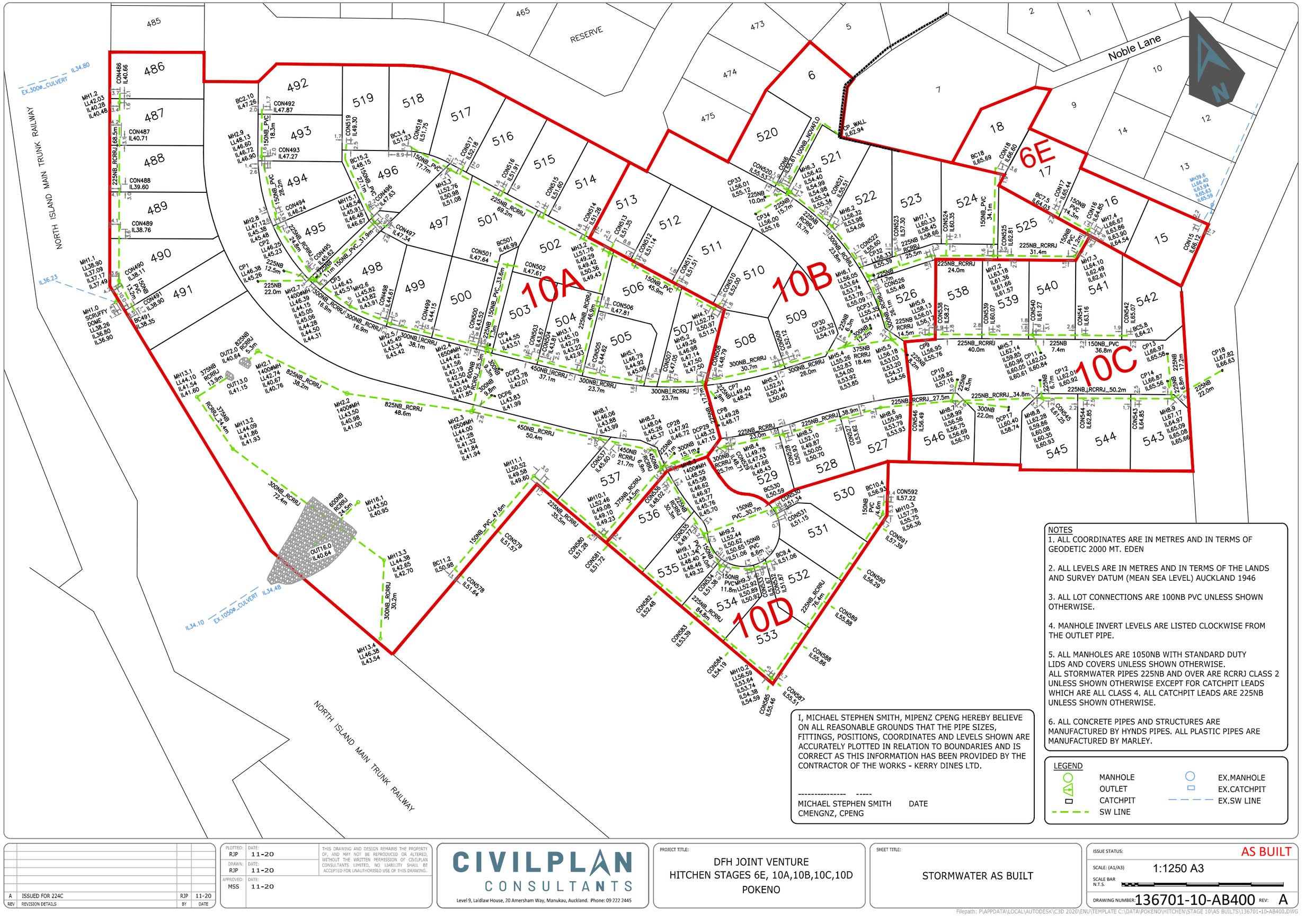


NOTES

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. 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.

I, MICHAEL STEPHEN SMITH, MIPENZ 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

LEGEND

○	MANHOLE	○	EX.MANHOLE
△	OUTLET	▭	EX.CATCHPIT
▭	CATCHPIT	– – –	EX.SW LINE
- - -	SW LINE		

REV	REVISION DETAILS	BY	DATE
A	ISSUED FOR 224C	RJP	11-20

PLOTTED: RJP DATE: 11-20
DRAWN: RJP DATE: 11-20
APPROVED: MSS DATE: 11-20

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

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGES 6E, 10A,10B,10C,10D
POKENO

SHEET TITLE:
STORMWATER AS BUILT

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:1250 A3
SCALE BAR N.T.S.
DRAWING NUMBER: 136701-10-AB400 REV: A

I, MICHAEL STEPHEN SMITH, MIPENZ 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	11-20

PLOTTED: RJP DATE: 11-20
DRAWN: RJP DATE: 11-20
APPROVED: MSS DATE: 11-20

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

PROJECT TITLE:
DFH JOINT VENTURE
HITCHEN STAGES 6E, 10A,10B,10C,10D
POKENO

SHEET TITLE:
WASTEWATER AS BUILT

ISSUE STATUS: AS BUILT
SCALE: (A1/A3) 1:1250 A3
SCALE BAR N.T.S.
DRAWING NUMBER: 136701-10-AB401 REV: A

Filepath: P\APPDATA\LOCAL\AUTODESK\C3D 2020\ENU\TEMPLATE C:\DATA\POKENO\HITCHEN\STAGE 10\AS BUILTS\136701-10-AB401.DWG

Appendix 2

Field Density Test Summary Sheets

Coffey Services NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103
PO Box 58877, Botany, Manukau, Auckland 2163
t +64 92723375 f +92723378
www.coffey.com

Client:	Lander Geotechnical Consultants Limited	**PROJECT CODE:**	GENZETAM01177AA
Address	PO Box 97 385, Manukau 2241	Page:	1 of 2
Attention:	Chris Edwards		
c.c:	-		
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno		
Location:	Pokeno	Approved Signatory:	Cesar Pura
		Issue date:	15/12/2017

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

Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Density Calculations (in accordance with NZS 4402:1986 Tests 4.1.1.5(b)). Please note that Air Void calculations are not IANZ endorsed as part of this report.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Probe Depth (mm)	Comments (FL = Finished level)	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density	Air Voids (%)
8/12/2017	ETAM17W04529	AB	**264**	Fill	Silty CLAY	Fill K	1777652	5875462	-	150	~5.0m to Subgrade Level	UTP	UTP	UTP	UTP	1.87	32.7	1.41	2.7	1.6
8/12/2017	ETAM17W04529	AB	**265**	Fill	Silty CLAY	Fill K	1777637	5875428	-	150	~6.0m to Subgrade Level	UTP	UTP	UTP	UTP	1.82	34.1	1.36	2.7	3.4

Coffey Geotechnics NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
t+64 9 272 3375 f+64 9 272 3378 www.coffey.com

SITE PLAN

NOT TO SCALE

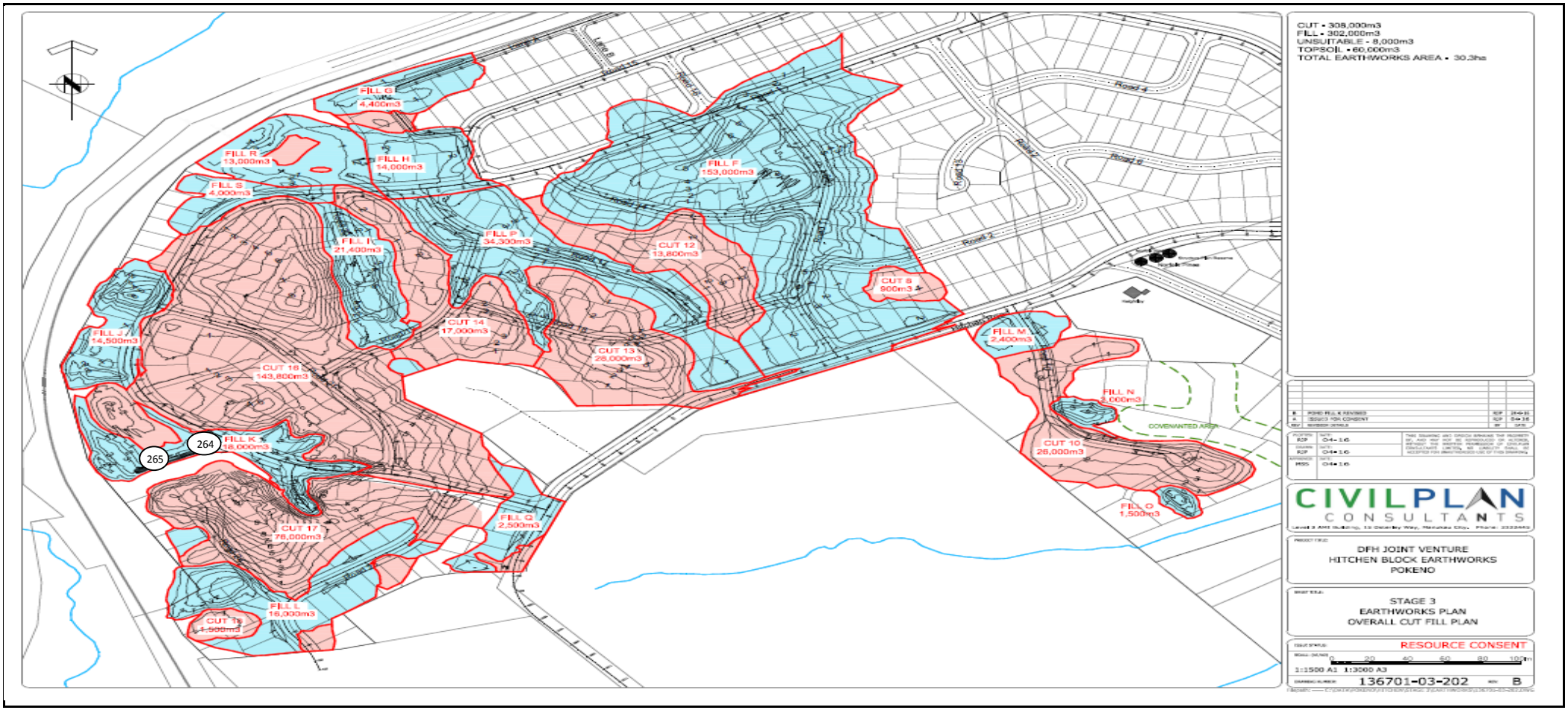
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM17W04529
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: As below

Tested by: AB

Date tested: 8/12/2017



Coffey Services NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103
PO Box 58877, Botany, Manukau, Auckland 2163
t +64 92723375 f +92723378
www.coffey.com

Client:	Lander Geotechnical Consultants Limited	**PROJECT CODE:**	GENZETAM01177AA
Address	PO Box 97 385, Manukau 2241	Page:	1 of 2
Attention:	Chris Edwards		
c.c:	-		
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno		
Location:	Pokeno	Approved Signatory:	Cesar Pura
		Issue date:	15/12/2017

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

Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densimeter Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Density Calculations (in accordance with NZS 4402:1986 Tests 4.1.1.5(b)). Please note that Air Void calculations are not IANZ endorsed as part of this report.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Probe Depth (mm)	Comments (FL = Finished level)	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density	Air Voids (%)
11/12/2017	ETAM17W04581	AB	**266**	Fill	Silty CLAY	Fill H	1777897	5875795	-	150	0.3m to Subgrade Level	170	142	183	196	1.86	31.3	1.41	2.7	3.3
11/12/2017	ETAM17W04581	AB	**267**	Fill	Silty CLAY	Fill K	1777637	5875435	-	150	~4.0m to Subgrade Level	196	170	189	149	1.79	35.9	1.32	2.7	4.0

Coffey Geotechnics NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
t+64 9 272 3375 f+64 9 272 3378 www.coffey.com

SITE PLAN

NOT TO SCALE

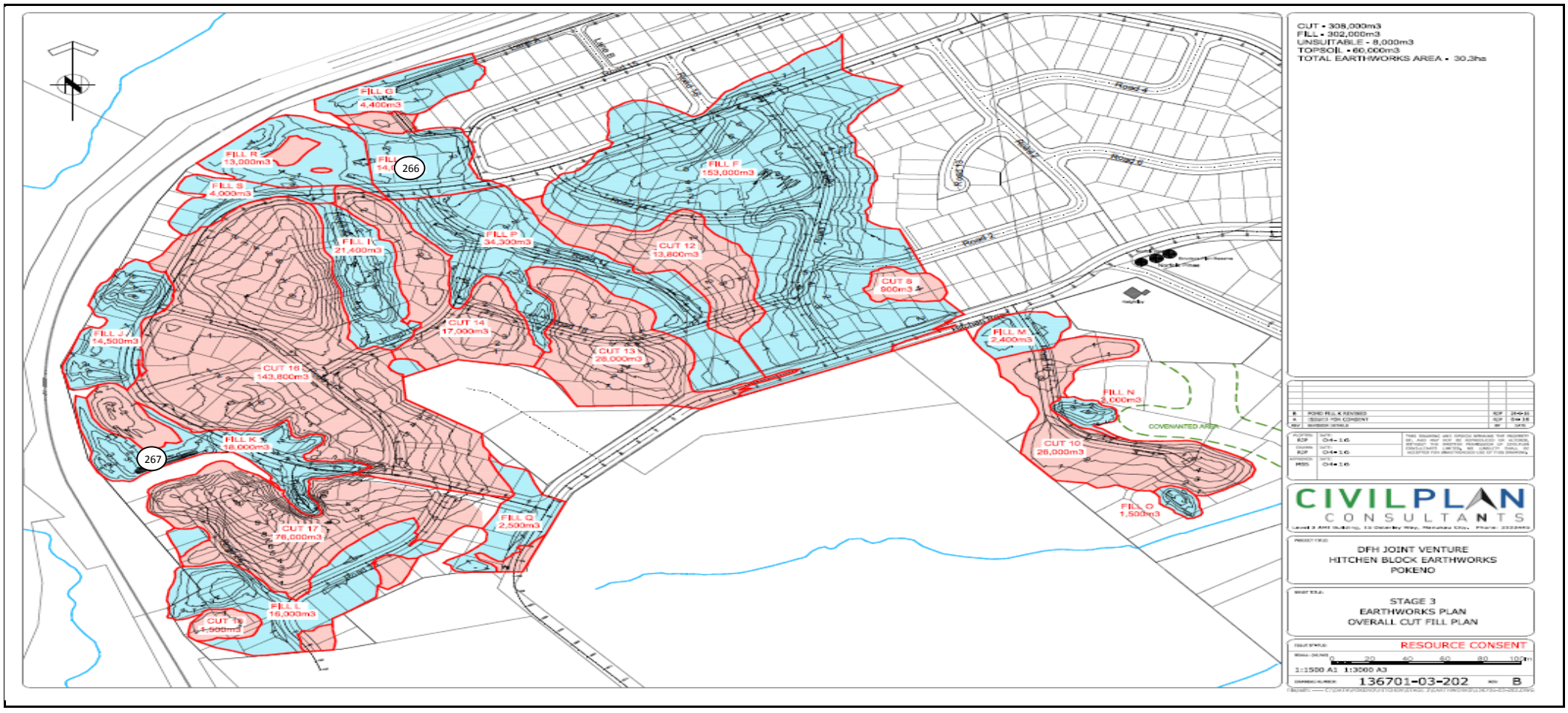
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM17W04581
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: As below

Tested by: AB

Date tested: 11/12/2017



Coffey Services NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103
PO Box 58877, Botany, Manukau, Auckland 2163
t +64 92723375 f +92723378
www.coffey.com

Client:	Lander Geotechnical Consultants Limited	**PROJECT CODE:**	GENZETAM01177AA
Address	PO Box 97 385, Manukau 2241	Page:	1 of 2
Attention:	Chris Edwards		
c.c:	-		
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno		
Location:	Pokeno	Approved Signatory:	Eric Paton
		Issue date:	18/12/2017

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

Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Density Calculations (in accordance with NZS 4402:1986 Tests 4.1.1.5(b)). Please note that Air Void calculations are not IANZ endorsed as part of this report.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Probe Depth (mm)	Comments (FL = Finished level)	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density	Air Voids (%)
13/12/2017	ETAM17W04631	AB	**268**	Fill	Sandy CLAY	Fill I	1777856	5875602	-	150	~1.0m to S/G	170	142	156	156	1.99	19.3	1.67	2.7	6.1
13/12/2017	ETAM17W04631	AB	**269**	Fill	Silty CLAY	Fill K	1777648	5875455	-	150	~2.0m to S/G	142	176	163	170	1.76	39.1	1.27	2.7	3.6

Coffey Geotechnics NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
t+64 9 272 3375 f+64 9 272 3378 www.coffey.com

SITE PLAN

NOT TO SCALE

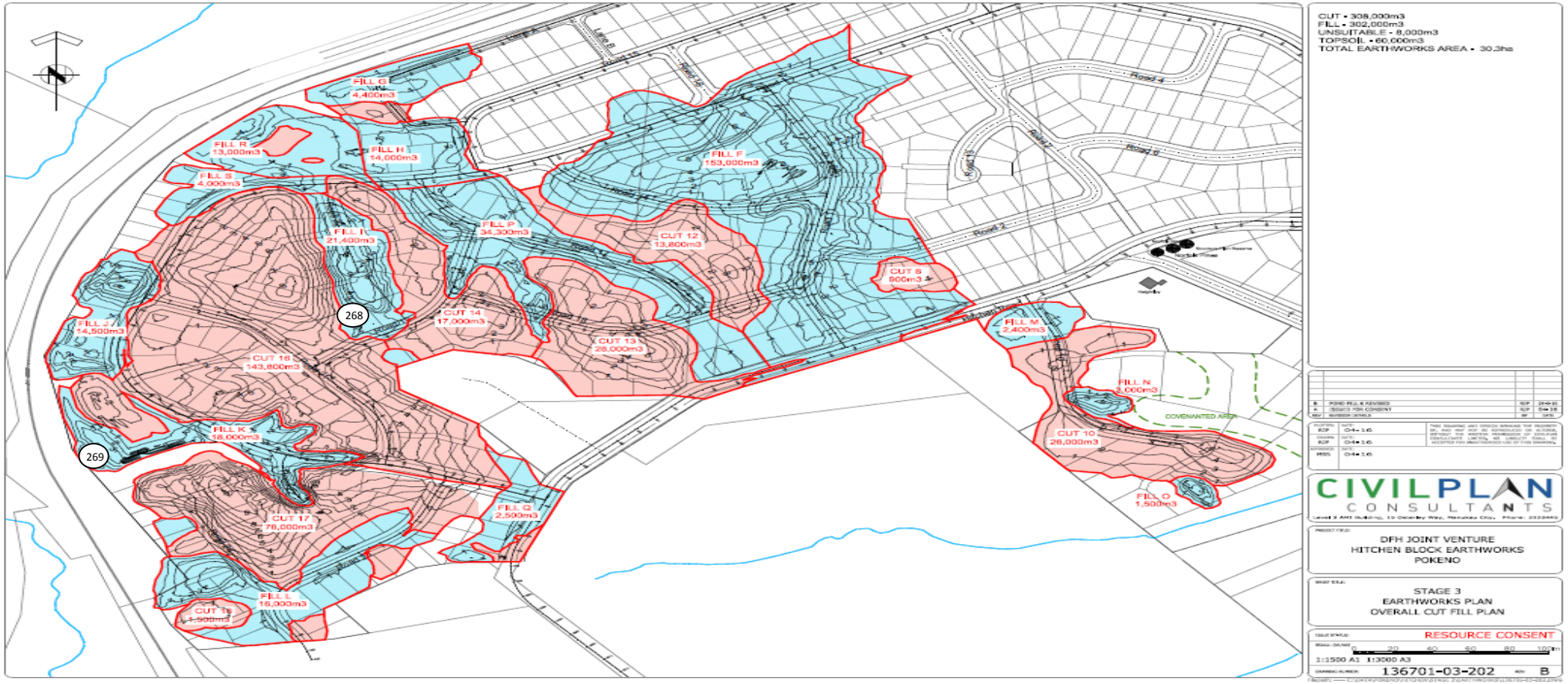
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM17W04631
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: Fill I and Fill K

Tested by: AB

Date tested: 13/12/2017



Coffey Services NZ Ltd
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PO Box 58877, Botany, Manukau, Auckland 2163
t +64 92723375 f +92723378
www.coffey.com

Client:	Lander Geotechnical Consultants Limited	**PROJECT CODE:**	GENZETAM01177AA
Address	PO Box 97 385, Manukau 2241	Page:	1 of 2
Attention:	Chris Edwards		
c.c:	-		
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno		
Location:	Pokeno	Approved Signatory:	Eric Paton
		Issue date:	19/12/2017

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

Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Density Calculations (in accordance with NZS 4402:1986 Tests 4.1.1.5(b)). Please note that Air Void calculations are not IANZ endorsed as part of this report.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Probe Depth (mm)	Comments (FL = Finished level)	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density	Air Voids (%)
15/12/2017	ETAM17W04700	AB	**270**	Fill	Sandy CLAY	Fill I	177857	5875650	-	150	~1.5m to S/G	170	156	163	163	2.01	23.5	1.62	2.7	1.6
15/12/2017	ETAM17W04700	AB	**271**	Fil	Silty CLAY	Fill K	1777639	5875462	-	150	~1.5m to S/G	170	149	142	149	1.73	40.7	1.23	2.7	4.2

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144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
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SITE PLAN

NOT TO SCALE

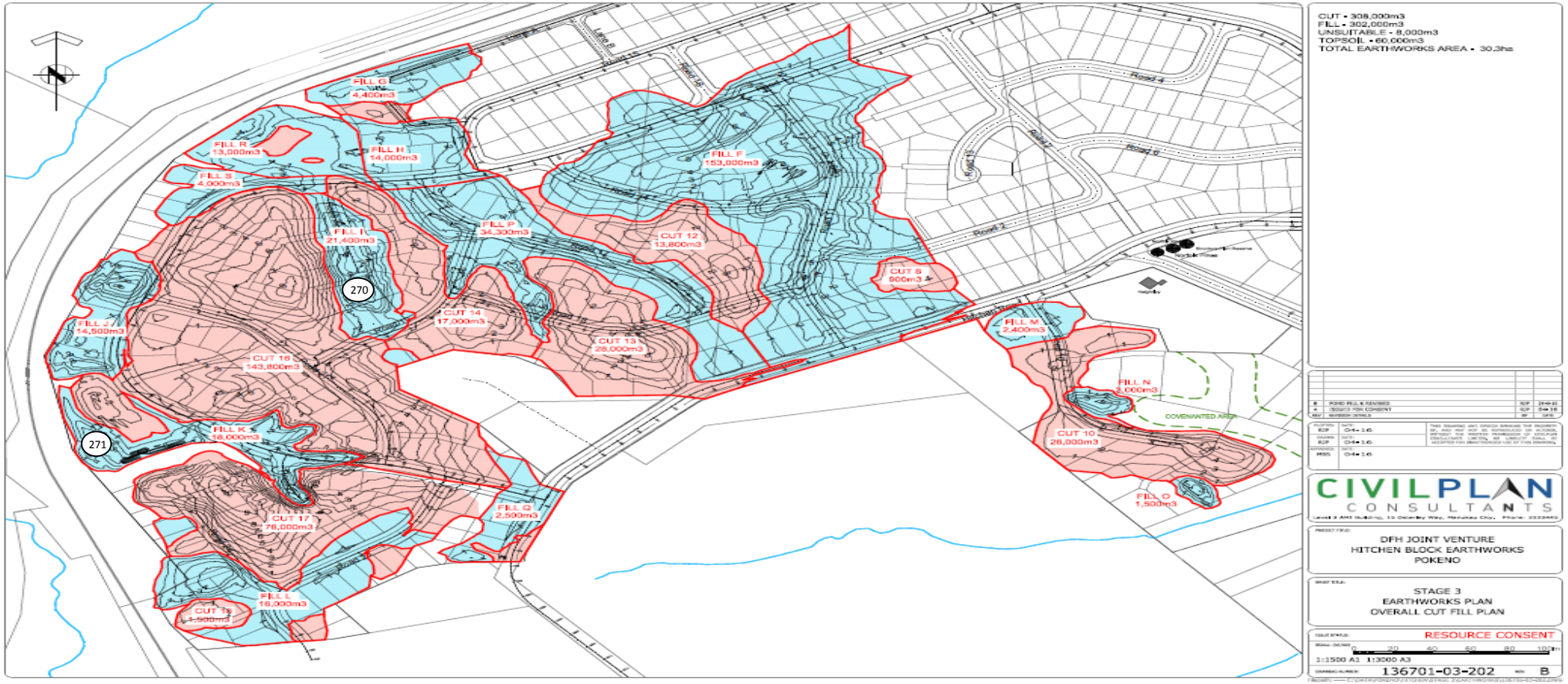
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM17W04700
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: Fill I and Fill K

Tested by: AB

Date tested: 15/12/2017



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144A Cryers Road, East Tamaki, Auckland 2103

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t +64 92723375 f +92723378

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Client:	Lander Geotechnical Consultants Limited	**PROJECT CODE:**	GENZETAM01177AA
Address	PO Box 97 385, Manukau 2241	Page:	1 of 2
Attention:	Chris Edwards		
c.c:	-		
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno		
Location:	Pokeno	Approved Signatory:	Cesar Pura
		Issue date:	18/01/2018

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Type equation here.

Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Density Calculations (in accordance with NZS 4402:1986 Tests 4.1.1.5(b)). Please note that Air Void calculations are not IANZ endorsed as part of this report.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Probe Depth (mm)	Comments (FL = Finished level)	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density	Air Voids (%)
15/01/2018	ETAM18W00125	BS	**278**	Fill	Clayey SILT	Refer to Plan	1777664	5875643	-	150	1.5m to Subgrade Level	UTP	UTP	UTP	UTP	1.84	30.8	1.40	2.7	4.8
15/01/2018	ETAM18W00125	BS	**279**	Fill	Clayey SILT	Refer to Plan	1777641	5875579	-	150	1.5m to Subgrade Level	217	217	217	217	1.76	32.5	1.33	2.7	7.5

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PO Box 58 877, Botany, Manukau 2163, New Zealand
t+64 9 272 3375 f+64 9 272 3378 www.coffey.com

SITE PLAN

NOT TO SCALE

Project No:	**GENZETAM01177AA**
Work Order No:	ETAM18W00125
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: Gully, As below

Tested by: BS

Date tested: 15/01/2018

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144A Cryers Road, East Tamaki, Auckland 2103

PO Box 58877, Botany, Manukau, Auckland 2163

t +64 92723375 f +92723378

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Client:	Lander Geotechnical Consultants Limited
Address	PO Box 97 385, Manukau 2241
Attention:	Chris Edwards
c.c:	Michael Chan
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno
Location:	Pokeno

PROJECT CODE: GENZETAM01177AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 23/05/2018

Test method: Test Methods in accordance with: *Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL (m)	Test Probe Depth (mm)	Comments	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m3) Assumed	Air Voids (%)
9/05/2018	ETAM18W02085	BS	**296**	Fill	Silty CLAY	Fill K	1777764	5875435	45.39	150	-	158	158	158	178	1.91	30.1	1.47	2.7	1
9/05/2018	ETAM18W02085	BS	**297**	Fill	Silty CLAY	Fill K	1777795	5875426	47.50	150	-	140	140	140	140	1.85	25.0	1.48	2.7	8

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144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
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SITE PLAN

NOT TO SCALE

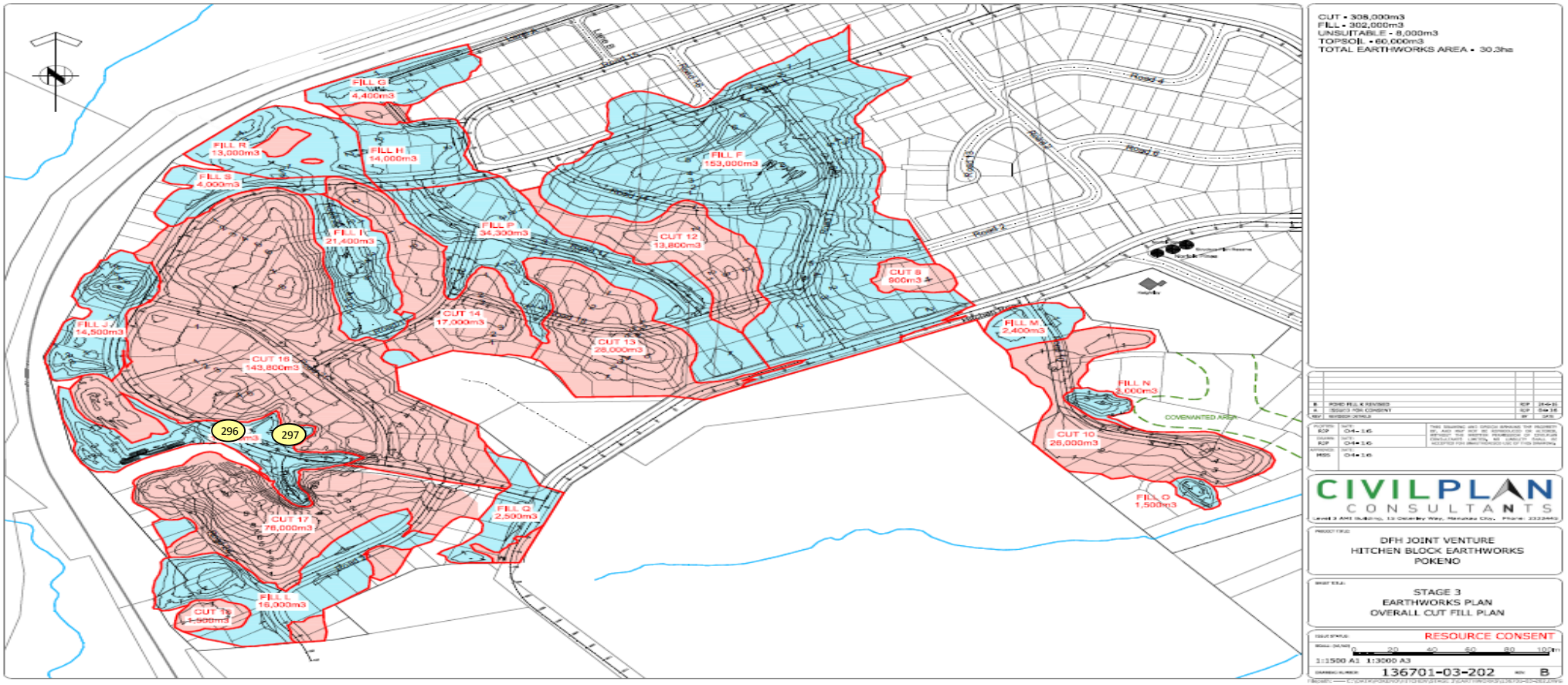
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM18W02085
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: Fill K, As below

Tested by: BS

Date tested: 9/05/2018



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PO Box 58877, Botany, Manukau, Auckland 2163

t +64 92723375 f +92723378

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Client:	Lander Geotechnical Consultants Limited
Address	PO Box 97 385, Manukau 2241
Attention:	Chris Edwards
c.c:	Michael Chan
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno
Location:	Pokeno

PROJECT CODE: GENZETAM01177AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 23/05/2018

Test method: Test Methods in accordance with: *Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL (m)	Test Probe Depth (mm)	Comments	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m3) Assumed	Air Voids (%)
11/05/2018	ETAM18W02091	BS	**298**	Fill	Silty CLAY	Fill K	1777762	5875439	45.30	150	-	140	140	140	140	1.96	24.6	1.57	2.7	3
11/05/2018	ETAM18W02091	BS	**299**	Fill	Silty CLAY	Fill K	1777762	5875465	44.82	150	-	140	140	158	158	1.84	27.8	1.44	2.7	7

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144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
t+64 9 272 3375 f+64 9 272 3378 www.coffey.com

SITE PLAN

NOT TO SCALE

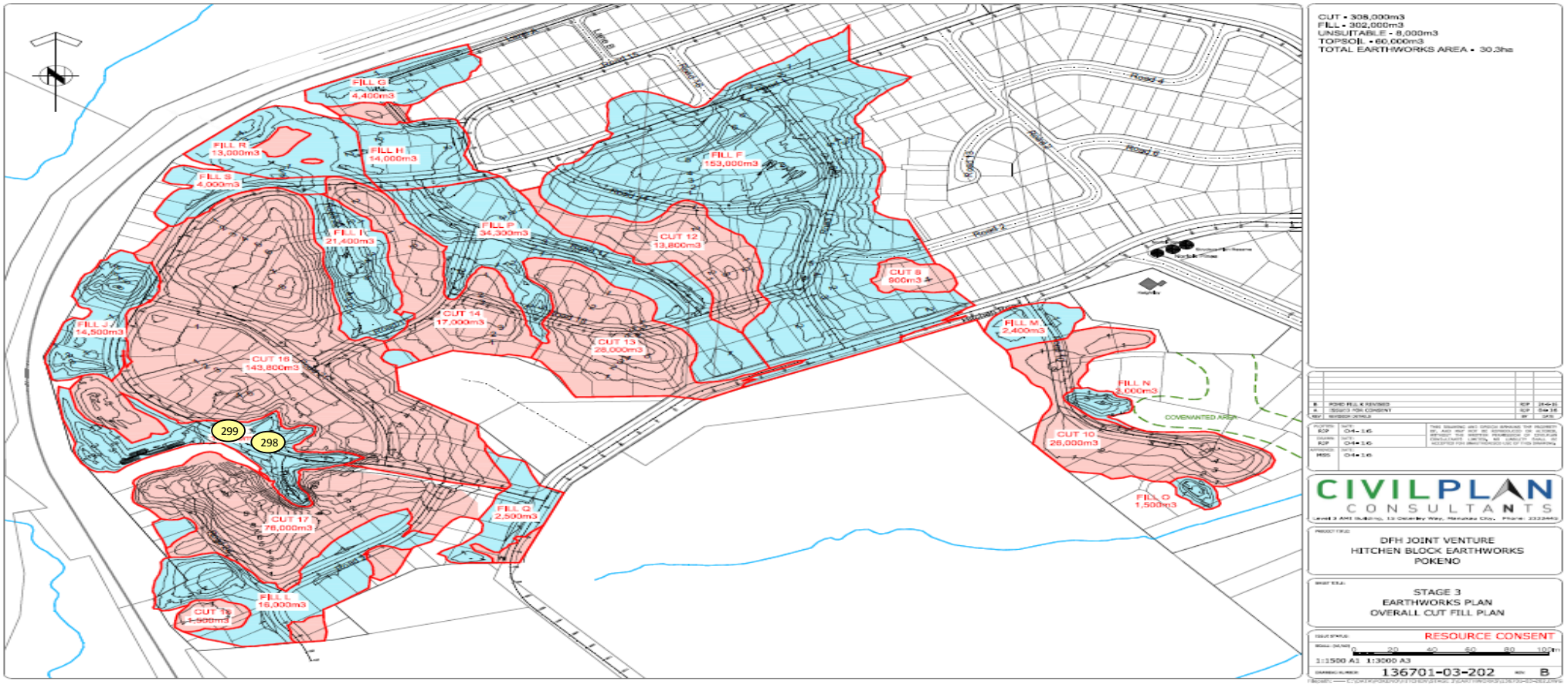
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM18W02091
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: Fill K, As below

Tested by: BS

Date tested: 11/05/2018



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144A Cryers Road, East Tamaki, Auckland 2103

PO Box 58877, Botany, Manukau, Auckland 2163

t +64 92723375 f +92723378

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Client:	Lander Geotechnical Consultants Limited
Address	PO Box 97 385, Manukau 2241
Attention:	Chris Edwards
c.c:	Michael Chan
Project:	J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno
Location:	Pokeno

PROJECT CODE: GENZETAM01177AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 3/10/2018

Test method: Test Methods in accordance with: *Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL (m)	Test Probe Depth (mm)	Comments	Field Shear Strength in kPa (UTP = Unable to penetrate)				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m3) Assumed	Air Voids (%)
28/09/2018	ETAM18W04207	BS	**300**	Fill	Silty CLAY	Fill G	1777895	5875888	37.08	150		140	198	198	UTP	1.80	30.8	1.37	2.7	7
28/09/2018	ETAM18W04207	BS	**301**	Fill	Silty CLAY	Fill G	1777905	5875897	36.45	150		140	170	170	177	1.82	33.4	1.36	2.7	4
28/09/2018	ETAM18W04207	BS	**302**	Fill	Silty CLAY	Fill G	1777922	5875907	36.07	150		177	170	193	188	1.81	34.1	1.35	2.7	4
28/09/2018	ETAM18W04207	BS	**303**	Fill	Silty CLAY	Fill Q	1777955	5875345	-	150	At Finished Level	170	UTP	UTP	177	1.92	26.1	1.52	2.7	4

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144A Cryers Road, East Tamaki, Auckland 2103, New Zealand
PO Box 58 877, Botany, Manukau 2163, New Zealand
t+64 9 272 3375 f+64 9 272 3378 www.coffey.com

SITE PLAN

NOT TO SCALE

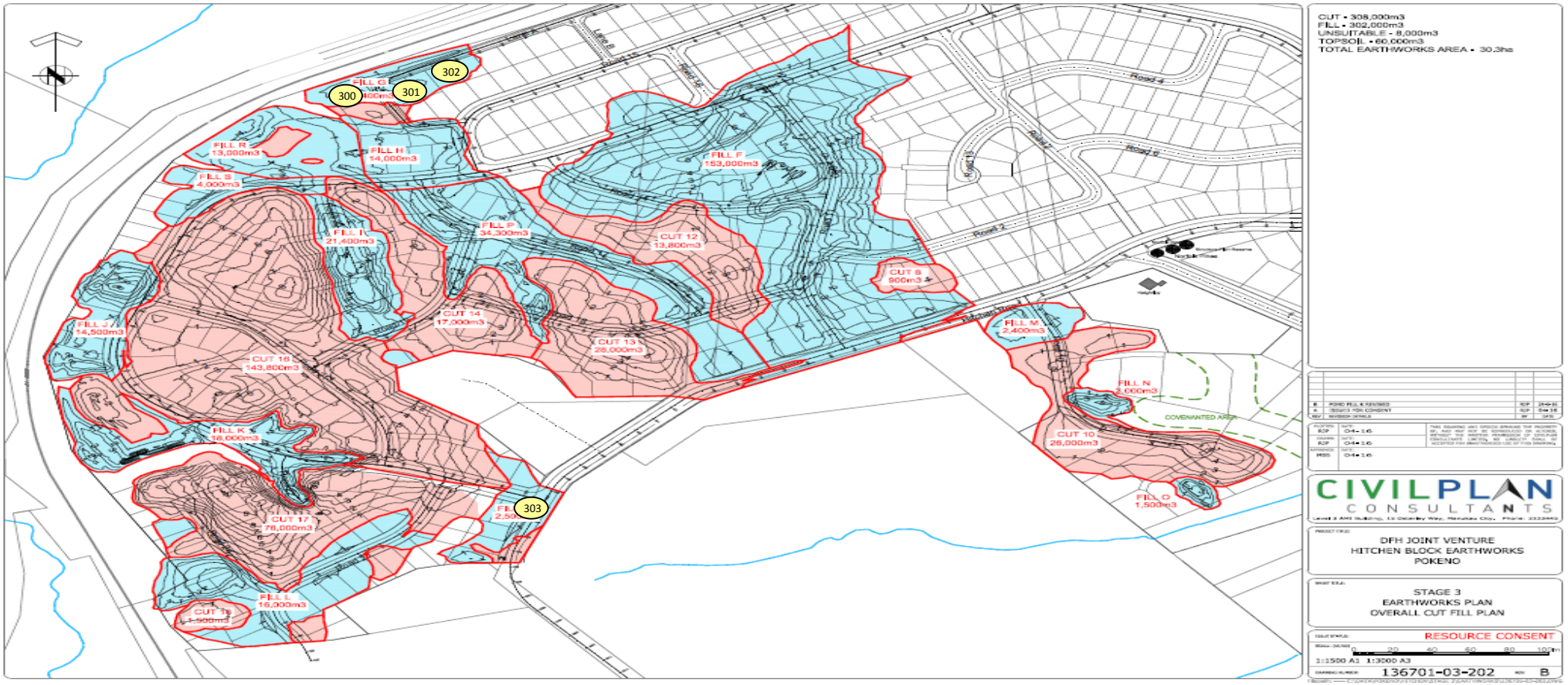
Project No:	**GENZETAM01177AA**
Work Order No:	ETAM18W04207
Page:	2 of 2

Project: J00113 - Hitchen Block - Stages 1, 2 and 3, Pokeno

Location: As below

Tested by: BS

Date tested: 28/09/2018



Appendix 3

Soil Classification Test Results

GEOTECHNICS

Our Ref: 1100674.0.0.0/REP1
Customer Ref: J00113
15 December 2020

Lander Geotechnical Ltd.
PO Box 97 385,
Auckland

Attention: Kyle Meffan

Dear Kyle

Hitchen Block Stages 6E & 10A-E

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.

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 Lander Geotechnical 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 prepared by:

.....
Jack Singh
Laboratory Technician
Approved Signatory

Authorised for Geotechnics by:

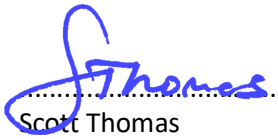
Digitally signed by Paul Burton
DN: cn=Paul Burton, c=NZ, o=Geotechnics, email=pburton@geotechnics.co.nz
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2020.12.16 05:52:42 +13'00'

.....
Paul Burton
Project Director

ACCREDITED IANZ TESTING LABORATORY

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

Report checked by:



.....

Scott Thomas
Project Manager

15-Dec-20
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GEOTECHNICS

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

Geotechnics Project Number	**1100674.0.0.0**
QESTLab Work Order ID	**W20CH-0101**
Customer Project ID	**J00113**

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

TEST DETAILS

LOCATION	**Description**	Hitchen Block - Stage 6E & 10A-E, Pokeno		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20CH000513	**BH No**	Lot 502
	Reference	Lot 502	**Top Depth**	0.6m
	Sampled By	Geotechnics	**Bottom Depth**	
	Description	SILT with minor clay and minor to some sand, orange brown, mottled black. Moist.		
SPECIMEN	**Reference**		**Depth**	
	Description			

TEST RESULTS

	Applied Pressure	(kPa)	25
SWELL TEST	Initial Water Content	(%)	15.7
	Bulk Density	(t/m³)	1.91
	Dry Density	(t/m³)	1.65
	Final Water Content	(%)	25.5
	Swelling Strain	(%)	-0.36
SHRINKAGE TEST	Initial Water Content	(%)	14.6
	Shrinkage Strain	(%)	2.2
	Inert Material Estimate in the Soil Specimen	(%)	None
	Soil Crumbling During Shrinkage		Moderate
	Cracking of the Shrinkage Specimen		Major
	SHRINK - SWELL INDEX	(%)	1.2

TEST REMARKS

• Estimates of inert material, soil cracking and soil crumbling are enclosed for your information, but are not covered under the IANZ endorsement of this report. • This test result is IANZ accredited.•Date tested 08/12/2020

Approved Signatory Jack Singh
Date 15/12/2020

GEOTECHNICS

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

Geotechnics Project Number	**1100674.0.0.0**
QESTLab Work Order ID	**W20CH-0101**
Customer Project ID	**J00113**

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

TEST DETAILS

LOCATION	**Description**	Hitchen Block - Stage 6E & 10A-E, Pokeno		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20CH000514	**BH No**	Lot 505
	Reference	Lot 505	**Top Depth**	0.6m
	Sampled By	Geotechnics	**Bottom Depth**	
	Description	SILT with minor clay and minor sand, yellowish brown. Moist.		
SPECIMEN	**Reference**		**Depth**	
	Description			

TEST RESULTS

	Applied Pressure	(kPa)	25
SWELL TEST	Initial Water Content	(%)	24.6
	Bulk Density	(t/m³)	1.95
	Dry Density	(t/m³)	1.57
	Final Water Content	(%)	25.9
	Swelling Strain	(%)	-0.08
SHRINKAGE TEST	Initial Water Content	(%)	25.8
	Shrinkage Strain	(%)	3.7
	Inert Material Estimate in the Soil Specimen	(%)	None
	Soil Crumbling During Shrinkage		Minor
	Cracking of the Shrinkage Specimen		Major
	SHRINK - SWELL INDEX	(%)	2.1

TEST REMARKS

• Estimates of inert material, soil cracking and soil crumbling are enclosed for your information, but are not covered under the IANZ endorsement of this report. • This test result is IANZ accredited.•Date tested 08/12/2020

Approved Signatory Jack Singh
Date 15/12/2020

GEOTECHNICS

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

Geotechnics Project Number	**1100674.0.0.0**
QESTLab Work Order ID	**W20CH-0101**
Customer Project ID	**J00113**

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

TEST DETAILS

LOCATION	**Description**	Hitchen Block - Stage 6E & 10A-E, Pokeno		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20CH000515	**BH No**	Lot 526
	Reference	Lot 526	**Top Depth**	0.6m
	Sampled By	Geotechnics	**Bottom Depth**	
	Description	SILT with minor clay and minor sand, grey. Moist.		
SPECIMEN	**Reference**		**Depth**	
	Description			

TEST RESULTS

	Applied Pressure	(kPa)	25
SWELL TEST	Initial Water Content	(%)	39.6
	Bulk Density	(t/m³)	1.69
	Dry Density	(t/m³)	1.21
	Final Water Content	(%)	44.9
	Swelling Strain	(%)	-0.04
SHRINKAGE TEST	Initial Water Content	(%)	39.6
	Shrinkage Strain	(%)	3.6
	Inert Material Estimate in the Soil Specimen	(%)	None
	Soil Crumbling During Shrinkage		None
	Cracking of the Shrinkage Specimen		Moderate
	SHRINK - SWELL INDEX	(%)	2.0

TEST REMARKS

• Estimates of inert material, soil cracking and soil crumbling are enclosed for your information, but are not covered under the IANZ endorsement of this report. • This test result is IANZ accredited.•Date tested 08/12/2020

Approved Signatory Jack Singh
Date 15/12/2020

GEOTECHNICS

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

Geotechnics Project Number	**1100674.0.0.0**
QESTLab Work Order ID	**W20CH-0101**
Customer Project ID	**J00113**

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

TEST DETAILS

LOCATION	**Description**	Hitchen Block - Stage 6E & 10A-E, Pokeno		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20CH000516	**BH No**	Lot 536
	Reference	Lot 536	**Top Depth**	0.6m
	Sampled By	Geotechnics	**Bottom Depth**	
	Description	SILT with some sand and trace clay, yellowish brown. Moist.		
SPECIMEN	**Reference**		**Depth**	
	Description			

TEST RESULTS

	Applied Pressure	(kPa)	25
SWELL TEST	Initial Water Content	(%)	20.7
	Bulk Density	(t/m³)	1.89
	Dry Density	(t/m³)	1.57
	Final Water Content	(%)	25.3
	Swelling Strain	(%)	-0.20
SHRINKAGE TEST	Initial Water Content	(%)	21.9
	Shrinkage Strain	(%)	2.0
	Inert Material Estimate in the Soil Specimen	(%)	None
	Soil Crumbling During Shrinkage		Minor
	Cracking of the Shrinkage Specimen		Minor
	SHRINK - SWELL INDEX	(%)	1.1

TEST REMARKS

• Estimates of inert material, soil cracking and soil crumbling are enclosed for your information, but are not covered under the IANZ endorsement of this report. • This test result is IANZ accredited.•Date tested 08/12/2020

Approved Signatory Jack Singh
Date 15/12/2020

GEOTECHNICS

Our Ref: 1009521.1105.0.0/Rep1
Customer Ref: J00113
3 December 2020

Lander Geotechnical Consultants Limited
Level 3, 3 Osterley way
Manukau
Auckland 2104

Attention: Kyle Meffan

Dear Kyle

Stages 6E & 10 A-E Hitchen Subdivision

Laboratory Test Report

Samples from the above mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.

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 Lander Geotechnical Consultants Limited , 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 prepared by:

.....
Tylah Wardrope
Laboratory Technician

Authorised for Geotechnics by:

Digitally signed by Paul Burton
DN: cn=Paul Burton, c=NZ, o=Geotechnics, email=pburton@geotechnics.co.nz
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2020.12.08 11:24:30 +13'00'

.....
Paul Burton
Project Director

Report checked by:

.....
Ryan Milligan
Project Manager
Approved Signatory

ACCREDITED IANZ TESTING LABORATORY

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

3-Dec-20
t:\geotechnicsgroup\projects\1009521\1009521.1105\workingmaterial\20201203.stages 6e & 10 a-e hitchen subdivision.tywa.docx

GEOTECHNICS
15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

Geotechnics Project Number	1009521.1105.0.0
QESTLab Work Order ID	W20TG-0176
Customer Project ID	J00113

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4

TEST DETAILS

LOCATION	**Description**	Stages 6E & 10A-H Hitchen Subdivision		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20TG000408		
	Reference	502	**Top Depth**	0.5m
	Sampled By	Others, Tested As Received	**Bottom Depth**	1.0m
	Description	silty SAND with some clay; light brown. Moist, non-plastic.		
SPECIMEN	**Reference**	N/A	**Depth**	N/A
	Description	N/A		

TEST RESULTS

Liquid Limit	**Not Suitable**
Plastic Limit	**Not Suitable**
Plasticity Index	**Not Obtainable**

TEST REMARKS

• The material was unsuitable for testing both the Liquid Limit and the Plastic Limit. • This test result is IANZ accredited.•Date tested 03/12/2020

Approved Signatory	Ryan Milligan
Date	3/12/2020

GEOTECHNICS

15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

Geotechnics Project Number	1009521.1105.0.0
QESTLab Work Order ID	W20TG-0176
Customer Project ID	J00113

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	**Description**	Stages 6E & 10A-H Hitchen Subdivision		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20TG000408		
	Reference	502	**Top Depth**	0.5m
	Sampled By	Others, Tested As Received	**Bottom Depth**	1.0m
	Description	silty SAND with some clay; light brown. Moist, non-plastic.		
SPECIMEN	**Reference**		**Depth**	
	Description			

Linear Shrinkage **5%**

TEST REMARKS

• This test result is IANZ accredited.•Date tested 03/12/2020

Approved Signatory Ryan Milligan

Date 3/12/2020

GEOTECHNICS

Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Material Test Report

Report No: MAT:S20TG000408
Issue No: 1

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Stages 6E & 10A-H Hitchen Subdivision
Project No.: 1009521.1105.0.0
Customer Reference No.: J00113
Report Authorised By : Ryan Milligan

Approved By:
Ryan Milligan
(Development Manager)
Date of Issue: 3/12/2020

Sample Details

Location	Stages 6E & 10A-H Hitchen Subdivision
Geotechnics ID	S20TG000408
Sample Reference	502
Sample Description	silty SAND with some clay; light brown. Moist, non-plastic.
Sample Depth	0.5m
Bottom Depth	1.0m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		18.4	
Date Tested		2/12/2020	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.

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Geotechnics Project Number	1009521.1105.0.0
QESTLab Work Order ID	W20TG-0176
Customer Project ID	J00113

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4

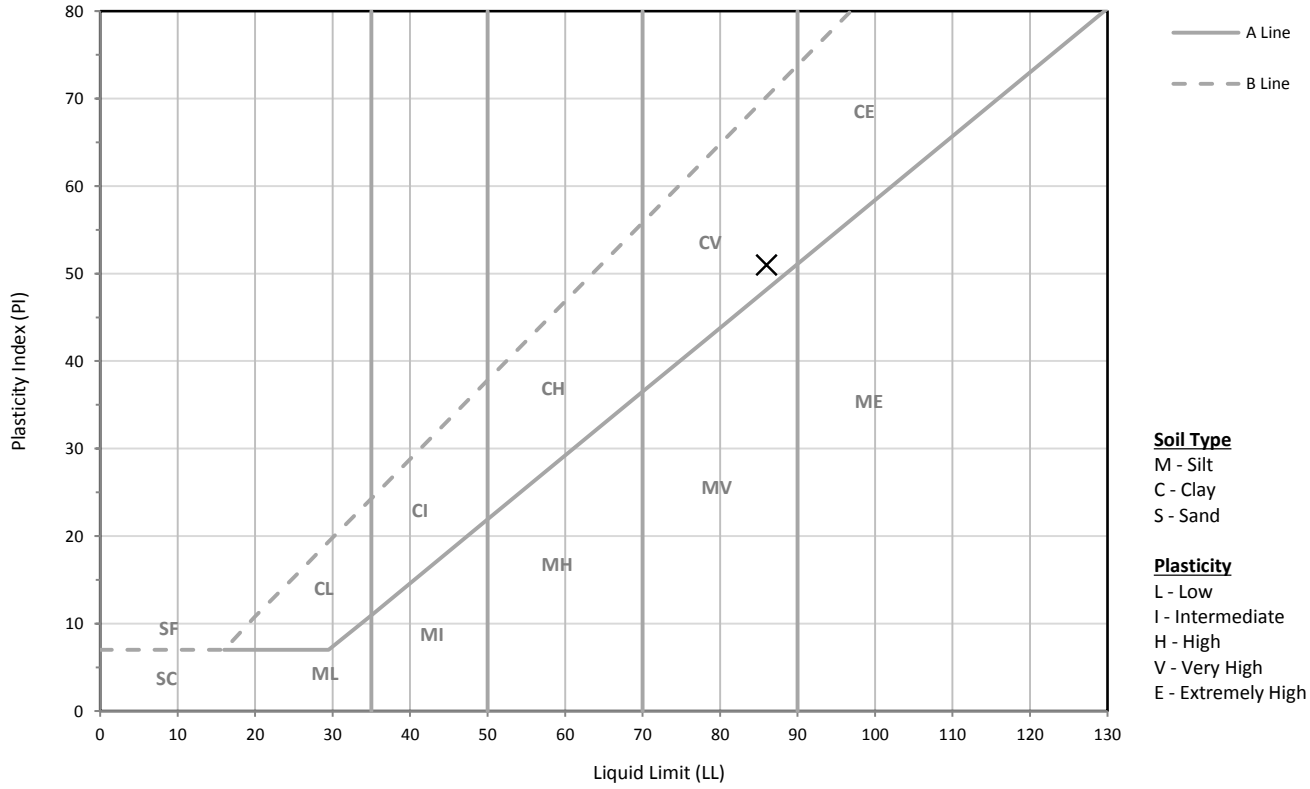
TEST DETAILS

LOCATION	**Description**	Stages 6E & 10A-H Hitchen Subdivision		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20TG000409		
	Reference	544	**Top Depth**	0.5m
	Sampled By	Others, Tested As Received	**Bottom Depth**	1.0m
	Description	Sandy SILT with some clay; Brown, moist. very high plasticity		
SPECIMEN	**Reference**	N/A	**Depth**	N/A
	Description	N/A		

TEST RESULTS

Liquid Limit	**86**
Plastic Limit	**35**
Plasticity Index	**51**

Plasticity Chart - BS 5930:1999



TEST REMARKS

• The material used for testing was natural, fraction passing a 425um sieve. • This test result is IANZ accredited.•Date tested 02/12/2020

Approved Signatory	Ryan Milligan
Date	3/12/2020

GEOTECHNICS

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Geotechnics Project Number	1009521.1105.0.0
QESTLab Work Order ID	W20TG-0176
Customer Project ID	J00113

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	**Description**	Stages 6E & 10A-H Hitchen Subdivision		
	Data	N/A		
SAMPLE	**Geotechnics ID**	S20TG000409		
	Reference	544	**Top Depth**	0.5m
	Sampled By	Others, Tested As Received	**Bottom Depth**	1.0m
	Description	Sandy SILT with some clay; Brown, moist. very high plasticity		
SPECIMEN	**Reference**		**Depth**	
	Description			

Linear Shrinkage **23%**

TEST REMARKS

• This test result is IANZ accredited.•Date tested 03/12/2020

Approved Signatory Ryan Milligan

Date 3/12/2020

GEOTECHNICS

Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Material Test Report

Report No: MAT:S20TG000409
Issue No: 1

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Stages 6E & 10A-H Hitchen Subdivision
Project No.: 1009521.1105.0.0
Customer Reference No.: J00113
Report Authorised By : Ryan Milligan

Approved By:
Ryan Milligan
(Development Manager)
Date of Issue: 3/12/2020

Sample Details

Location	Stages 6E & 10A-H Hitchen Subdivision
Geotechnics ID	S20TG000409
Sample Reference	544
Sample Description	Sandy SILT with some clay; Brown, moist. very high plasticity
Sample Depth	0.5m
Bottom Depth	1.0m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		33.1	
Date Tested		3/12/2020	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.

3.2 Slab-on-ground in expansive soils

3.2.1 NZS 3604 Clause 1.1.2 Buildings covered by this Standard

Amend 1.1.2(a) to read:

"Buildings founded on good ground or on expansive soils where the requirements of 1.1.5 are met"

3.2.2 NZS 3604 New Clause

Add new: "**Clause 1.1.5 Buildings on expansive soils**

Buildings on expansive soils shall be supported on slab-on-ground foundations complying with 7.5.13 and in addition to 1.1.2 shall be limited as follows:

(a) single storey, stand-alone household unit, and

(b) maximum length or width of floor of 24.0 m including any attached garage, and

(c) simple plan shapes such as rectangular, L, T or boomerang, and

(d) concrete slab-on-ground with a minimum thickness of 100 mm and a minimum concrete compressive strength of 20 MPa, and

(e) simple roof forms, incorporating hips, valleys, gables or mono pitches, and

(f) maximum overall height of 7.0 m to roof apex from lowest cleared ground level, and

(g) maximum roof height of 3.0 m, and

(h) roof slope between 10° and 35° from the horizontal, and

(i) maximum span of roof truss 12.0 m, and

(j) external walls maximum of 2.4 m height studs, other than gable end walls and walls to mono-pitched roofs, which shall not exceed 4.0 m.

COMMENT:

Floor plans

Where floor plans incorporate re-entrant corners then continuity of the exterior ground beam shall be maintained by continuing it as an internal beam, with the exterior beam details continued for a length of at least 1.0 m into the internal beam. This is only applicable where internal beams are specified in Tables 7.4A and 7.4B. This is aimed to bring the solution in NZS 3604 in line with Clause 5.3.8 of AS 2870:2011.

Amend 19
Nov 2019

Ground movement

Provision for the additional ground movement effects from trees near to foundations in expansive soils should be considered. Trees remove moisture from the soil for a radius equal to the height of the tree. This causes expansive soils to shrink to varying degrees, and when near houses leads to differential settlement occurring under foundations. Movement of the foundations may lead to cracks in the building and door jamming.

Where existing trees (including trees that have been recently removed) are located closer to the foundations than 1.5 times the mature height of a tree, then additional geotechnical advice should be obtained. Planting of new trees should be avoided near foundations of new buildings or neighbouring buildings on sites with expansive soils.

3.2.3 NZS 3604 Clause 7.5.1

Add the following paragraph at the end of Clause 7.5.1:

"Slabs on expansive soils for buildings meeting the requirements of 1.1.5 shall, in addition to meeting the requirements of 7.5.1 to 7.5.12, meet the requirements of 7.5.13. Where there is conflict the requirements of 7.5.13 shall apply."

3.2.4 NZS 3604 New clause, tables and figures

Add new: **Clause 7.5.13 Slab-on-ground in expansive soils**

7.5.13.1 Identification of expansive soils

7.5.13.1.1 Should reasonable enquiry as outlined in 3.1.3 show any signs of expansive soils, the expansive soil class, as defined in AS 2870, shall be established by one or all of:

(a) enquiry to the local territorial authority, and/or

(b) reference to the certificate of suitability issued in terms of NZS 4431, and/or

(c) a soil test undertaken by a suitably qualified soils engineer.

7.5.13.1.2 Expansive soil class shall be defined as:

(a) Slightly 'S', having an I_{SS} range of 0–1.9%, and a 500 year design characteristic surface movement return (y_S) of 22 mm, or

(b) Moderately 'M', having an I_{SS} range of 2.0–3.7% and a 500 year design characteristic surface movement return (y_S) of 44 mm, or

Amend 19
Nov 2019

(c) Highly 'H', having an I_{SS} range of 3.8–6.5%and a 500 year design characteristic surface movement return (y_S) of 78 mm, or

(d) Extremely 'E', having an I_{SS} range of 6.6–7.5% and a 500 year design characteristic surface movement return (y_S) of 90 mm.

7.5.13.2 Maximum aspect ratio of concrete slabs

The aspect ratio of the concrete slabs or bays of concrete slabs, such as in the case of L, T or boomerang concrete slab shapes, shall not exceed 5 to 1 (length to width).

7.5.13.3 Foundation details

7.5.13.3.1 For the identified expansive soil class the foundation details, external and internal thickenings shall be as follows.

(a) For light wall claddings refer to Table 7.4A and Figure 7.22.

(b) For medium wall or heavy wall claddings refer to Table 7.4B and Figure 7.23.

7.5.13.3.2 Situations where no internal thickenings shall be required are limited to a rectangular slab with long side not exceeding 17.0 m. Where this limit is exceeded, add additional internal thickenings across the slab with the same cross section dimensions and reinforcing as the external footing, so that the centre to centre spacing of thickenings is always less than 17.0 m.

COMMENT:

Design constraints:

a) The characteristic surface movements and the corresponding expansivity classifications have been calculated based on design for ultimate limit state (ULS) conditions for a 1 in 1000 year "extreme" drought event, and the serviceability limit state (SLS) conditions for a 1 in 500 year drought event.

b) Maximum soil movements are calculated to be based on a 500 year return period for SLS, and a 1000 year return period for ULS*;

(*NB: *This differed from the recommendations contained within BRANZ Study Report 120A (BSR120A) which used a 300 year return period for the design level drought conditions)*

Amend 19
Nov 2019

c) Climate parameters adopted from BSR120A of Δu = 1.2 pF, Hs = 1.5 m, and a crack depth of 0.5 Hs

d) The I_{SS} (soil stability index) ranges attributed to the expansivity classifications as defined in 3.2.4 above have been calculated using the parameters presented in BSR120A and Equation 2.3.1 of AS 2870:2011.

e) Sites subject to parameters that differ from those mentioned above, in particular sites where the crack depth is less than 0.75 m, such as cut natural ground or clay backfill, require specific engineering assessment to confirm their appropriate site classification.

f) The effects of nearby trees (whether existing, recently removed, or future planting) are not considered in these solutions. It is recommended that specific geotechnical engineering advice is obtained where a tree is within a lateral distance of 1.5 times its mature height of the foundations.

Maintenance of foundations in expansive soils

Normal maintenance is that work generally recognised as necessary to achieve the expected performance over time of the foundation located on expansive soils. Unless otherwise specified by the designer and noted on the drawings, basic normal maintenance tasks should ensure that:

a) the drainage and wetting of the site is controlled so that extremes of wetting and drying of the soils are prevented, and

b) the position and operation of gardens adjacent to the dwelling are controlled, and the planting of trees near to foundations is suitably restricted, and

c) any leaks which develop in plumbing, storm water or sanitary sewage systems are repaired promptly.

Amend 19
Nov 2019

Table 7.4A **Reinforced concrete foundations in expansive soils for light wall claddings**
Clause 7.5.13 and Figure 7.22

Expansive soil class	Slightly 'S'	Moderately 'M'	Highly 'H'	Extremely 'E'
Soil embedment (De)	375 mm	525 mm	575 mm	625 mm
Top steel (A_S top)	2/D 16	2/ D16	2/ D16	2/ D16
Bottom steel (A_S bottom)	1/ D16	1/ D25	1/ D20	1/ D25
Stirrups	R6/ 125 crs.	R6/ 125 crs.	R6/ 300 crs.	R6/ 300 crs.
Maximum spacing of internal thickenings	no internal thickening	no internal thickening	2.5 m crs.	2.5 m crs.
Depth of thickening (D1)	–	–	400 mm	450 mm
Base width (B1)	–	–	300 mm	350 mm
Top steel (A_S top)	–	–	2/ D20	2/ D20
Bottom steel (A_S bottom)	–	–	2/ D16	2/ D20
Stirrups	–	–	R6/ 150 crs.	R6/ 150 crs.

Table 7.4B **Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings**
Clause 7.5.13 and Figure 7.23

Expansive soil class	Slightly 'S'	Moderately 'M'	Highly 'H'	Extremely 'E'
Soil embedment (De)	500 mm	550 mm	775 mm	800 mm
Top steel (A_S top)	2/ D16	2/ D20	2/ D20	3/ D20
Bottom steel (A_S bottom)	2/ D16	2/ D16	2/ D20	2/ D20
Stirrups	R6/ 125 crs.	R6/ 250 crs.	R6/ 300 crs.	R6/ 300 crs.
Maximum spacing of internal thickenings	–	2.5 m crs.	2.5 m crs.	2.5 m crs.
Depth of thickening (D1)	–	350 mm	450 mm	500 mm
Base width (B1)	–	300 mm	300 mm	350 mm
Top steel (A_S top)	–	2/ D16	3/ D20	3/ D20
Bottom steel (A_S bottom)	–	2/ D16	2/ D16	2/ D20
Stirrups	–	R6/ 125 crs.	R6/ 150 crs.	R6/ 150 crs.

Amend 19
Nov 2019

Appendix 4

Producer Statement (PS4)

LANDER
geotechnical

18 February 2020 Ref No: J00113

DFH Joint Venture Limited

Attention: Mr K Dines

Dear Kerry,

RE: Construction Observations for Noble Retaining Wall at Hitchen Subdivision, Stage 9

This letter is to confirm that we visited the above site on six occasions between 26 July 2019 and 17 February 2020 to observe the ground conditions within the retaining wall pile holes, and also to confirm that all elements of our retaining wall design had been adhered to (i.e. pile diameters, spacings, depths, SED's, wall railings and drainage outlets).

We confirm that we sighted all retaining wall pile holes prior to concreting and these had been drilled to depths of up to 3.5m. Shear vane testing at the sides and bases of the holes were all in excess of 70kPa as per our design. Likewise, all the above mentioned elements of the walls were constructed as per the recommendations of our Geotechnical Design Report (Ref. J00113, dated 16 April 2018).

Our Producer Statement – Construction Review (PS4) is attached.

For and on behalf of Lander Geotechnical Consultants Limited

Prepared by:

K. Meffan
Engineering Geologist

Reviewed and Authorised by:

S.G. Lander
Principal Geotechnical Engineer
CMEngNZ, CPEng, IntPE(NZ)

Attachments: Construction Review PS4

Lander Geotechnical Consultants Limited
Level 3, 3 Osterley Way, P O Box 97 385, Manukau, Auckland 2241
Phone: (09) 262 1528; (09) 262 1526
Email: contactus@landergeotechnical.co.nz www.landergeotechnical.co.nz

Building Code Clause(s) B1

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance on use of Producer Statements (formerly page 2) is available at www.engineeringnz.org)

ISSUED BY: Lander Geotechnical Consultants Limited
(Construction Review Firm)

TO: DFH Joint Venture Limited
(Owner/Developer)

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

IN RESPECT OF: Timber pole cantilever retaining wall construction observations
(Description of Building Work)

AT: Hitchen Block, Stage 9, Hitchen Road, Pokeno
(Address)

Town/City: Auckland **LOT** 1011 **DP** 534284 **SO**
(Address)

We Lander Geotechnical Consultants Limited have been engaged by DFH Joint Venture Limited
(Construction Review Firm)

To provide ☐ CM1 ☐ CM2 ☒ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ observation as per agreement with owner/developer DFH Joint Venture Limited

or ☐ other .....services
(Extent of Engagement)

in respect of clause(s) B1 of the Building Code for the building work described in documents relating to Building Consent No. BLD1543/18 and those relating to Building Consent Amendment(s) Nos. ..... issued during the course of the works. We have sighted these Building Consents and the conditions of attached to them.

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

On the basis of ☐ this review ☒ these review(s) and information supplied by the contractor during the course of the works and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that ☐ All or ☒ Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) B1 of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review have the necessary competency to do so.

I, Shane Lander am: ☒ CPEng 219353 # ☐ Reg Arch ..... #
(Name of Construction Review Professional)

I am a member of: ☒ Engineering New Zealand ☐ NZIA and hold the following qualifications BE(Hons), NZCE
The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Construction Review Firm is a member of ACENZ: ☐

SIGNED BY Shane Lander (Signature) 
(Name of Construction Review Professional)

ON BEHALF OF Lander Geotechnical Consultants Limited Date 19/2/20
(Construction Review Firm)

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

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

Appendix 5

Post-Construction Borehole Records

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 15 & 19

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 15					
TOPSOIL	0.0				
silty CLAY, light grey mottled red. Very stiff, moist, medium to high plasticity [NATURAL]					
becoming moderately sensitive	0.5		135/60	2.2	
becoming insensitive	1.0		115/60	1.9	
becoming light grey mottled red/orange					
becoming orange/brown	1.5		158/83	1.9	
becoming light grey mottled red/orange					
at 2.0m, becoming hard	2.0		201+		
E.O.B. at 2.0m. Target Depth.					
Lot 19					
TOPSOIL	0.0				
silty CLAY, with trace fine sand, light grey mottled red and orange. Very stiff, moist, medium plasticity, insensitive [NATURAL]	0.5		138/98	1.4	
	1.0		130/83	1.6	
	1.5		132/89	1.5	
	2.0		147/98	1.5	
E.O.B. at 2.0m. Target Depth.					

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 486 & 490

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION

Depth (m)	Legend	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 486					
0.0					
TOPSOIL					
clayey SILT, orange, red streaked orange/brown. Very stiff, moist, low plasticity, with some fine sand [FILL]					
0.5			188+		Sample 1 Disturbed 0.5-1.0m
becoming red, light grey, orange, streaked orange/brown					
1.0			188+		
1.5			188+		
silty CLAY, dark grey streaked orange/brown. Very stiff, moist, high plasticity, with some fine sand [NATURAL]					
at 1.9m, becoming red, light grey streaked orange/brown					
2.0			188+		
E.O.B. at 2.0m. Target Depth.					
Lot 490					
0.0					
TOPSOIL					
clayey SAND, red and brown mottled orange. Loose, moist, low plasticity [FILL]					
0.5			201+		
1.0			201+		
1.5			201+		
clayey SILT, light brown. Very stiff, moist, low to medium plasticity [NATURAL]					
2.0			201+		
E.O.B. at 2.0m. Target Depth.					

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 492 & 494

Vane Head:	Logged By:	Processor :	Date:
2784/307	PL/RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 492						
TOPSOIL		0.0				
clayey SILT, trace fine sand, orange streaked orange/brown. Very stiff, moist, low plasticity [FILL]						
becoming sensitive		0.5		158/40	4.0	
becoming grey, red streaked orange/brown, trace fine gravel						
silty CLAY, light brown, red, white streaked red/pink. Very stiff, moist, medium to low plasticity [NATURAL]						
		1.0		188+		
becoming insensitive		1.5		145/94	1.5	
clayey SILT, red, brown streaked orange. Very stiff, moist, low plasticity						
E.O.B. at 2.0m. Target Depth.		2.0		188+		
Lot 494						
TOPSOIL		0.0				
silty CLAY, light grey, orange streaked light brown. Very stiff, moist, medium plasticity [NATURAL]						
clayey SILT, orange. Very stiff, moist, low plasticity		0.5		188+		
at 0.5m, becoming orange streaked orange/brown						
silty CLAY, red, white, black streaked brown/red. Very stiff, moist, medium to low plasticity, trace fine sand						
		1.0		188+		
becoming insensitive		1.5		134/94	1.4	
E.O.B. at 2.0m. Target Depth.		2.0		132/83	1.6	

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 497 & 499

Vane Head:	Logged By:	Processor :	Date:
2784	PL	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 497						
TOPSOIL		0.0				
clayey SILT, grey, red, orange streaked brown. Very stiff, moist, low plasticity, with trace fine gravel [FILL]						
clayey SILT, orange/light grey streaked orange. Very stiff, moist, low plasticity, with some fine sand [NATURAL]		0.5		UTP		
becoming orange streaked orange/light grey		1.0		188+		
becoming moderately sensitive		1.5		177/86	2.1	
E.O.B. at 2.0m. Target Depth.		2.0		188+		
Lot 499						
TOPSOIL		0.0				
clayey SILT, light grey/orange streaked orange. Very stiff, moist, low plasticity, with some fine sand [NATURAL] at 0.3m, becoming red streaked grey/orange		0.5		188+		
becoming orange streaked light grey						
becoming red, orange streaked light grey/orange		1.0		188+		
becoming orange streaked orange/grey		1.5		188+		
E.O.B. at 2.0m. Target Depth.		2.0		188+		

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 502 & 505

Vane Head:	Logged By:	Processor :	Date:
2784	PL	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 502						
TOPSOIL		0.0				
clayey SILT, with some fine sand, orange, light grey streaked brown. Very stiff, moist, low plasticity, moderately sensitive [NATURAL]						
becoming red/orange streaked brown/orange		0.5		158/67	2.4	Sample 1 Disturbed 0.5-1.0m
		1.0		156/51	3.1	
		1.5		UTP		
		2.0		UTP		
E.O.B. at 2.0m. Target Depth.						
Lot 505						
TOPSOIL		0.0				
silty CLAY, light grey, orange, red streaked brown. Very stiff, moist, medium plasticity, with trace fine gravel [FILL]		0.5		188+		
clayey SILT, orange/grey streaked orange. Very stiff, moist, low plasticity, moderately sensitive [NATURAL]		1.0		164/73	2.2	
becoming insensitive		1.5		148/78	1.9	
at 2.0m, becoming moderately sensitive		2.0		158/67	2.4	
E.O.B. at 2.0m. Target Depth.						

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic
Fill	Gravel	Siltstone	No Core
Clay	Organic	Limestone	
Silt	Pumice	Volcanic	

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 508 & 510

Vane Head:	Logged By:	Processor :	Date:
2784	PL	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 508						
TOPSOIL		0.0				
clayey SILT, with trace fine sand, orange/brown streaked light grey. Very stiff, moist, low plasticity [NATURAL]						
becoming light grey/orange streaked orange		0.5		188+		
becoming orange streaked light brown/orange		1.0		UTP		
becoming light brown/orange streaked light grey/orange		1.5		UTP		
becoming orange streaked light grey/orange						
at 2.0m, becoming light grey/orange streaked pink/red		2.0		UTP		
E.O.B. at 2.0m. Target Depth.						
Lot 510						
TOPSOIL		0.0				
silty CLAY, red and white mottled orange/brown. Hard, moist, medium plasticity [FILL]		0.5		201+		
sandy CLAY, white/light grey mottled orange. Very stiff, moist, medium plasticity [NATURAL]						
becoming very stiff, high plasticity, insensitive		1.0		118/68	1.7	
becoming medium plasticity, with some fine sand		1.5		147/92	1.6	
E.O.B. at 2.0m. Target Depth.		2.0		193/170	1.1	

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic
Fill	Gravel	Siltstone	No Core
Clay	Organic	Limestone	
Silt	Pumice	Volcanic	

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 512 & 515

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 512						
TOPSOIL		0.0				
silty CLAY, red, white, brown mottled orange. Hard, moist, medium plasticity [FILL]						
sandy CLAY, red mottled orange/brown. Hard, moist, low to medium plasticity [NATURAL]		0.5		201+		
		1.0		201+		
CLAY, light brown. Stiff, moist, high plasticity, moderately sensitive		1.5		69/29	2.4	
clayey fine SAND, light grey and yellow mottled. Loose, wet, low to medium plasticity, insensitive		2.0		173/101	1.7	
E.O.B. at 2.0m. Target Depth.						
Lot 515						
TOPSOIL		0.0				
clayey SILT, with trace fine sand, orange, black, light grey, light brown/orange and red mottled. Hard, moist, medium plasticity [FILL]						
becoming slightly clayey SILT, with minor fine sand, low plasticity		0.5		UTP		
becoming clayey SILT, with trace fine sand, medium plasticity		1.0		UTP		
clayey SILT, orange mottled red/brown. Very stiff, moist, medium plasticity [NATURAL]		1.5		UTP		
		2.0		UTP		
E.O.B. at 2.0m. Target Depth.						

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 517

Sheet 8 of 14

Vane Head:	Logged By:	Processor :	Date:
1900	RG	PL	07.12.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 517						
TOPSOIL		0.0				
clayey SILT, orange, brown, pink, light grey and light red/brown streaked. Very stiff, moist, medium plasticity, with occasional fine gravel [FILL]						
becoming orange mottled red, with trace fine sand		0.5		UTP		
		1.0		UTP		
clayey SILT, orange mottled orange/red. Hard, moist, low plasticity [NATURAL]		1.5		UTP		
E.O.B. at 2.0m. Target Depth.		2.0		UTP		

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 520 & 522

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 520						
TOPSOIL		0.0				
silty CLAY, red mottled orange and brown. Hard, moist, medium plasticity [FILL]		0.5		201+		
silty CLAY, with some fine sand, light grey mottled orange/brown. Hard, moist, low to medium plasticity [NATURAL]		1.0		201+		
		1.5		201+		
E.O.B. at 2.0m. Target Depth.		2.0		201+		
Lot 522						
TOPSOIL		0.0				
silty CLAY, orange, red mottled orange/brown. Very stiff, moist, medium to high plasticity [NATURAL]						
silty CLAY, with some fine sand, orange mottled grey/brown. Very stiff, moist, low to medium plasticity, insensitive		0.5		161/86	1.9	
becoming light brown, hard		1.0		201+		
		1.5		201+		
E.O.B. at 2.0m. Target Depth.		2.0		201+		

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic
Fill	Gravel	Siltstone	No Core
Clay	Organic	Limestone	
Silt	Pumice	Volcanic	

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 526 & 539

Sheet 10 of 14

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 526						
TOPSOIL		0.0				
silty CLAY, with trace fine sand, light yellow. Hard, moist, low to medium plasticity [NATURAL]		0.5		201+		Sample 1 Disturbed 0.5-1.0m
		1.0		201+		
becoming medium plasticity, without sand, with fine gravel						
becoming very stiff, moderately sensitive		1.5		173/83	2.1	
E.O.B. at 2.0m. Target Depth.		2.0		176/86	2.0	
Lot 539						
TOPSOIL		0.0				
silty CLAY, with some fine sand, orange mottled light brown. Very stiff, moist, low to medium plasticity, moderately sensitive [NATURAL]						
at 0.3m, moderately thin bed of black fine to medium sand		0.5		176/52	3.4	
becoming light brown, with trace black streaks						
becoming hard		1.0		201+		
		1.5		201+		
E.O.B. at 2.0m. Target Depth.		2.0		201+		

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic				
Fill	Gravel	Siltstone	No Core				
Clay	Organic	Limestone					
Silt	Pumice	Volcanic					

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 529 & 530

Vane Head:	Logged By:	Processor :	Date:
2784	PL	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 529						
TOPSOIL		0.0				
clayey SILT, with trace fine sand, orange streaked orange/grey. Medium dense, moist, low plasticity, sensitive						
with some fine sand		0.5		145/32	4.5	
becoming moderately sensitive		1.0		148/38	3.9	
becoming light grey/orange streaked orange		1.5		UTP		
E.O.B. at 2.0m. Target Depth.		2.0		188+		
Lot 530						
TOPSOIL		0.0				
clayey SILT, orange, brown streaked light grey. Very stiff, moist, low plasticity [NATURAL]						
0.2m, becoming orange/brown streaked orange, with trace fine sand		0.5		188+		
becoming orange streaked white, with some fine sand						
becoming sensitive		1.0		177/32	5.5	
becoming light grey, dark orange, black streaked orange/brown						
becoming grey/orange streaked orange		1.5		188+		
E.O.B. at 2.0m. Target Depth.		2.0		188+		

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic		
Fill	Gravel	Siltstone	No Core		
Clay	Organic	Limestone			
Silt	Pumice	Volcanic			

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. Lot 533 & 535

Vane Head:	Logged By:	Processor :	Date:
2784	PL	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Lot 533						
TOPSOIL		0.0				
clayey SILT, light grey/brown, orange streaked orange/brown. Very stiff, moist, low plasticity [NATURAL]						
at 0.1m, slightly clayey SILT, light brown streaked orange. Medium dense, moist, no plasticity, with some fine sand		0.5		188+		
becoming orange/red streaked orange/brown		1.0		UTP		
		1.5		UTP		
E.O.B. at 2.0m. Target Depth.		2.0		UTP		
Lot 535						
TOPSOIL		0.0				
slightly clayey SILT, brown streaked grey/orange. Medium dense, moist, low to no plasticity, with some fine sand [NATURAL]		0.5		188+		
with trace black carbonaceous inculsions		1.0		UTP		
		1.5		188+		
becoming light grey/orange streaked orange		2.0		UTP		
E.O.B. at 2.0m. Target Depth.						

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic
Fill	Gravel	Siltstone	No Core
Clay	Organic	Limestone	
Silt	Pumice	Volcanic	

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. 536 & 537

Sheet 12 of 13

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Borehole 536						
TOPSOIL		0.0				
clayey SILT, trace fine sand, light grey streaked orange. Medium dense, moist, low plasticity, moderately sensitive, with trace fine sand, with black carbonaceous mottling [NATURAL]						
becoming orange streaked orange/light grey		0.5		148/48	3.1	Sample 1 Disturbed 0.5-1.0m
becoming light grey/orange streaked orange		1.0		UTP		
becoming red streaked orange		1.5		158/67	2.4	
becoming red/orange streaked light grey/orange		2.0		153/51	3.0	
E.O.B. at 2.0m. Target Depth.						
Borehole 537						
TOPSOIL		0.0				
clayey SILT with trace fine sand, pink, light grey streaked orange/brown. Very stiff, moist, low plasticity, moderately sensitive [NATURAL]		0.5		172/67	2.6	
becoming light grey/orange streaked orange		1.0		153/54	2.8	
becoming orange, light grey streaked pink		1.5		158/70	2.3	
E.O.B. at 2.0m. Target Depth.		2.0		153/60	2.6	

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic		
Fill	Gravel	Siltstone	No Core		
Clay	Organic	Limestone			
Silt	Pumice	Volcanic			

Client : DFH JOINT VENTURE LIMITED

Project Location : HITCHEN BLOCK STAGE 2, POKENO

Job Number: J00113

Auger Borehole Nos. 544 & 546

Sheet 13 of 13

Vane Head:	Logged By:	Processor :	Date:
307	RZ	PL	26.11.20

Borehole Location: mN | mE | Ground R.L.

Description: Refer to site plan

SOIL DESCRIPTION	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/ residual	Soil Sensitivity	Sample and Laboratory / Other Test Details
Borehole 544						
TOPSOIL		0.0				
silty CLAY, with trace fine sand, grey and red mottled orange and brown. Hard, moist, medium plasticity [FILL]						
		0.5		201+		Sample 1 Disturbed 0.5-1.0m
with some medium gravel						
		1.0		201+		
		1.5		201+		
E.O.B. at 2.0m. Target Depth.		2.0		201+		
Borehole 546						
TOPSOIL		0.0				
sandy CLAY, red and white mottled orange/brown. Very stiff, moist, low plasticity, insensitive [FILL]						
		0.5		144/86	1.7	
becoming hard		1.0		201+		
silty CLAY, light grey. Hard, moist, medium plasticity [NATURAL]						
becoming very stiff, moderately sensitive		1.5		115/52	2.2	
E.O.B. at 2.0m. Target Depth.		2.0		132/58	2.3	

LANDER geotechnical

Comments:
Groundwater not encountered. (unless noted)
UTP = unable to penetrate.
EOB = end of borehole.

Borehole Diameter: 50mm

Checked: RZ

Topsoil	Sand	Sandstone	Plutonic
Fill	Gravel	Siltstone	No Core
Clay	Organic	Limestone	
Silt	Pumice	Volcanic	

Appendix 6

Construction Observation Records

18/10/16 - Stage 3 Begins

Tuesday, 18 October 2016 6:13 p.m.

Site Inspection Record

Date & Time:	18/10/16
Author:	CE+MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Meeting with Trevor (New foreman for Dines).
Drove over site and discussed earthworks for the new season within stages 2 and 3.
They have started stripping topsoil from a number of areas and started drying fill out with Fill area F.
Fill compaction to recommence later this week.

31/10/16

Monday, 31 October 2016 1:57 p.m.

Site Inspection Record

Date & Time:	31/10/16 8am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Courtesy visit of site. Observed that topsoil is being stripped from proposed fill areas for this season and fill materials are being conditioned in the centre of the site to dry them out. Bulk works will be starting this week and Mike is to go out to observe topsoil stripping from first areas tomorrow morning.

Conditioning materials

Conditioning materials

04/11/16

07 November 2016 11:01

Site Inspection Record

Date & Time:	04/11/16 - 10am
Author:	MVC
Plant Operating:	2x scrapers, 2x bulldozers w/ carts, 2x excavators
Weather:	

Site Observations and Instructions:

Visited above site at request of Trevor (Dines) to inspect topsoil stripping of Cut Areas 10 and 12, observe gully muckout.

Topsoil at Cut Area 10 had been stripped adequately and may be used for Fill Area M and Fill Area F as soon as weather permits.

Cut 12 was approximately 70% complete, but requires finer weather to cart the rest of the unsuitable materials off the area.

There was a stockpile of slightly clayey silt which Trevor wishes to use and mix with Cut Area 12 ash materials so that he can continue to fill Fill Area F. Following a phone conversation with Chris, we considered it would be OK, however Trevor will need to send us a Topo plan of the area he intends to cut from in Cut Area 12. There is also a portion in Fill Area F where topsoil has not been stripped near the gully invert and will need to be remediated prior to filling this area.

Gully muckout at Fill R was undertaken so that their silt pond and clearwater diversion could be constructed. Gully was mucked out to inorganic, alluvial clays however VSS of these materials were approx. 28kPa - 42kPa, indicating firm subsoils. Also, the underfill drainage in this gully has a lower invert level of the stormwater connection that crosses the train tracks, meaning that a bubble up chamber/manhole/cesspit with non-perforated pipes may be required to discharge groundwater into.

As for the firm soils in the gully, we will decide whether to lay SPR down to fill upon or whether to continue undercutting until stiffer subsoils are reached.

Will need to discuss with Chris.

09/11/16

10 November 2016 09:32

Site Inspection Record

Date & Time:	09/11/16 - 3pm
Author:	MVC
Plant Operating:	Several bulldozers with scoops, scrapers, tractors with discs, excavators
Weather:	Fine

Site Observations and Instructions:

Visited site with Chris to discuss with Trevor a method for the underfill drainage at Fill R. Considered running hiway grade perforated novaflos (160mm) in the inverts of gullies and under the pond area, assuming a clay capping of at least 1m would be achievable to not allow groundwater to flow through the pond and into the underfills. The underfills should be tapped to the stormwater culvert which runs beneath the railway, with a seepage collar on the northern side of the pond that embeds 300mm vertically into the clay fill. Underfills need to placed in fully wrapped drainage metal. We will complete CAN#01 for this.

Looked at Fill F, there is an area of dark grey material that should be removed. Also some areas that need tidying up upslope towards the existing road.

Fill F Gully has been mucked out and shear strengths in the base were all over 80kPa, we are satisfied this is undercut down to competent ground. Discussed underfills in the main gully of fill F. Several springs will need to be tapped with novaflos in trenches and run down the invert of the gullies.

Gullies at Fill O and Fill N were being mucked out and looked to be into inorganic materials, however the rain over the last couple of days has caused minor slips. Will test these gullies on Friday.

Fill O Gully

Fill O Gully

Dark patch of Fill F

11/11/16

Friday, 11 November 2016 1:07 PM

Site Inspection Record

Date & Time:	11/11/16 12pm
Author:	Mvc
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Brett (Dines) to inspect subgrade of Fill O gully and Fill f contaminated area undercut.

Upper reaches of fill O gully has been mucked out sufficiently with subgrade testing shear vane dial readings above 80kPa in most areas. Further down the alignment, soft ground was still intact towards the silt decant. This will need to be inspected next week. Since access to this area would be difficult, Brett has considered laying fully wrapped hiway grade perforated underfills in drainage metal along the toe of the cut batter and tapping any springs, and backfilling before accessing the lower reaches of the gully where the soft material is.

The contaminated area undercut was mostly above 80kPa with occasional soft soft spots where some slurry was but over 4m of proposed fill will overly this. Advised Brett to lay fully wrapped underfills in this area too, hardfill i.e. gap65 will need to be used below this in the bottom of the pit to allow the water table to rise up to the underfill to alleviate groundwater pressures.

Will visit site on Monday or Tuesday if weather permits.

4m deep pit at contaminated area undercut

Looking up contaminated area undercut

14/11/16

15 November 2016 16:48

Site Inspection Record

Date & Time:	14/11/16 - 5pm
Author:	MVC
Plant Operating:	Scrapers, Bulldozers w/ Scoops, Excavators, Tractors with discs
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to inspect underfill drainage in Fill R and Fill F gullies.

Underfills were installed as per our recommendations. However, in Fill R, they could not continue as the waterlevel in the invert of the gully was too high to place the gravel. In Fill F, the contaminated area had not been backfilled with hardfill yet so they couldn't extend the drain coil across the pit.

Fill O gully had been mucked out again and had been benched on the western side, however they are yet to bench it on the eastern side.

21/11/16

Monday, 21 November 2016 2:12 PM

Visited Hitchen block at the request of the contractor to inspect Fill O and N gully muck outs and confirm underfill alignments. Haul road strip, and pond 8 strip.

Satisfied with fill N, all shear strengths were above 90kPA. Recommended that an underfill drain coil is run up the invert fully wrapped in drainage and SPR is placed for a flat base to compact on.

Fill O still needs a small amount of organic clay mucked out near the decant, but aside from that it is satisfactory. Shear strengths were <30kPa and organics are about 600-800mm deep.

Satisfied with haul road strip at cut 16 and cut 14.

Satisfied with topsoil strip at pond 8. Although still need to see under topsoil stockpiles.

Trevor wants another visit Wednesday lunch time.

Fill N gully mucked out

Fill N - Proposed Underfill

!
Fill O SPR down

TheThe
Fill O organic area

Haul road stripped

Pond 8 stripped with topsoil needing removal

23/11/16

Wednesday, 23 November 2016 12:37 PM

Site Inspection Record

Date & Time:	23/11/16
Author:	MVC
Plant Operating:	2x scrapers, 2x bullies n scoops, several excavators
Weather:	Fine

Site Observations and Instructions:
Visited site at request of contractor to observe fill O and N gully underfills and pond 8 area.

Gully underfills were placed where requested, and fully wrapped in cloth and drainage metal.

Inspected topsoil stripping at Pond 8 and lower reaches of cut 16. They are cutting from cut 16 for Pond 8 and it is all good ash clay going down well. Natural subgrade shear strengths in fill areas of pond 8 were all over 120kPa.

Fill M has begun being striped now that it has dried up. Should look at this next visit on Tuesday/Wednesday.

Pictures below.

Fill O

Fill N

Fill N

Pond 8

Pond 8

Pond 8 topsoil stockpile being moved

Fill M

Fill M

29/11/16

Tuesday, 29 November 2016 11:05 AM

Site Inspection Record

Date & Time:	29/11/16
Author:	MVC
Plant Operating:	Bully and scoop, grader bully, scrapers, compactors etc.
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor (Dines) to inspect topsoil strip inspection at Fill M which was to wet to open up earlier due to perched groundwater.

Topsoil was stripped adequately down to the haul road. Downslope of this is a silt control decant. Exposed materials were very silty clays with shear strengths of approximately 40kPa. Conducted several shallow boreholes and found that 50-100mm below these Materials were much stiffer silty clays. Advised Trevor to strip the surface of these materials and mix them into the more plastic ashy clays from cut 10.

Also looked at the construction of pond 8.
Trevor has needed to use a uPVC 160mm, thick walled non perforated pipe connecting to a 100mm dia manhole instead of the 600mm in the detail so that it is accessible to work inside it. 600mm would be too confined.

Looked at Fill N and O gullies. These have come up well.

Action: Discuss with chris of where to position an underfill at fill M for any winter seepage.

Fill M topsoil strip

Fill M topsoil strip

Fill N gully being filled

Fill N materials being dropped

Fill N

Fill O

Fill O

Silt pond 8 preparation

Silt Pond 8

06/12/16

Tuesday, 6 December 2016 12:11 PM

Site Inspection Record

Date & Time:	06/12/16
Author:	MVC
Plant Operating:	Elevated scraper at Fill M
Weather:	Fine

Site Observations and Instructions:

Fill M subsoils

Fill M subsoils

Fill N

Fill O

Fill O steep batter

Fill F gullies filled over

Cut 16 full bore

12/12/16

Monday, 12 December 2016 10:55 AM

Site Inspection Record

Date & Time:	12/12/2016 10am
Author:	Mvc
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to undertake Fill G and H topsoil stripping inspection.

Topsoil was stripped adequately over most areas (about 80%). Some areas needed more scraping and tidying up.
Stripping exposed natural ash deposits comprising inorganic, very stiff silty clays. Vane shear strengths ranged from 135kPa to over 200 kPa, averaging over 150kPa.
Advised Trevor to send pics.

Also observed fill placement across Fill M. Fill materials were mostly red and orange inorganic silty clays. Shear strengths were UTP in most places.

Trevor instructed us to consider whether the bubble up manhole needed to be filled with drainage chip or not.

Pond 8

Fill g and h

Fill G and H needs minor tidy up

Fill M looking to road

Cut 0.85m

Cut 10

Fill M looking east downslope to gully

10/01/17

Tuesday, 10 January 2017 11:13 AM

Site Inspection Record

Date & Time:	10/01/17
Author:	MVC
Plant Operating:	
Weather:	Light showers

Site Observations and Instructions:

Visited site at request of Trevor (Dines) to inspect earthworks progress across the site. Fill M and Cut 10 are near to grade and will be stabilised before opening up Fill I and P gullies

Top of fill F looking down

Fill M to Cut 10

Fill M to Cut 10

Toploading at cut 10, almost completed

Fill P easternmost main gully

Fill P tributary gully

Fill P tributary gully

Fill I gully

Cut 16

Cut 16 being top loaded

07/02/17

Tuesday, 7 February 2017 4:23 p.m.

Site Inspection Record

Date & Time:	07/02/17
Author:	MVC
Plant Operating:	1x digger, 1x moxie stripping
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to inspect gully muckouts at I and P. Council has only allowed them to muck out approx. half way up the gullies, for silt control reasons. Mullock had been mucked out in most places, except for the upper reaches in gully I which Trevor has been advised to do. Trevor will contact when to revisit to see underfill drainage placement.

In centres of gully, VSS of 10-20 on dial 2007. On shoulders of gully, 70 on dial 2007.

Fill M, N, O and Cut 10 have been stabilised.

Looking upslope at fill I

Looking upslope fill P

Fill P

Fill I

Fill I

Fill M

Fill M

Fill M

Cut 10

10/02/17

Friday, 10 February 2017 2:44 p.m.

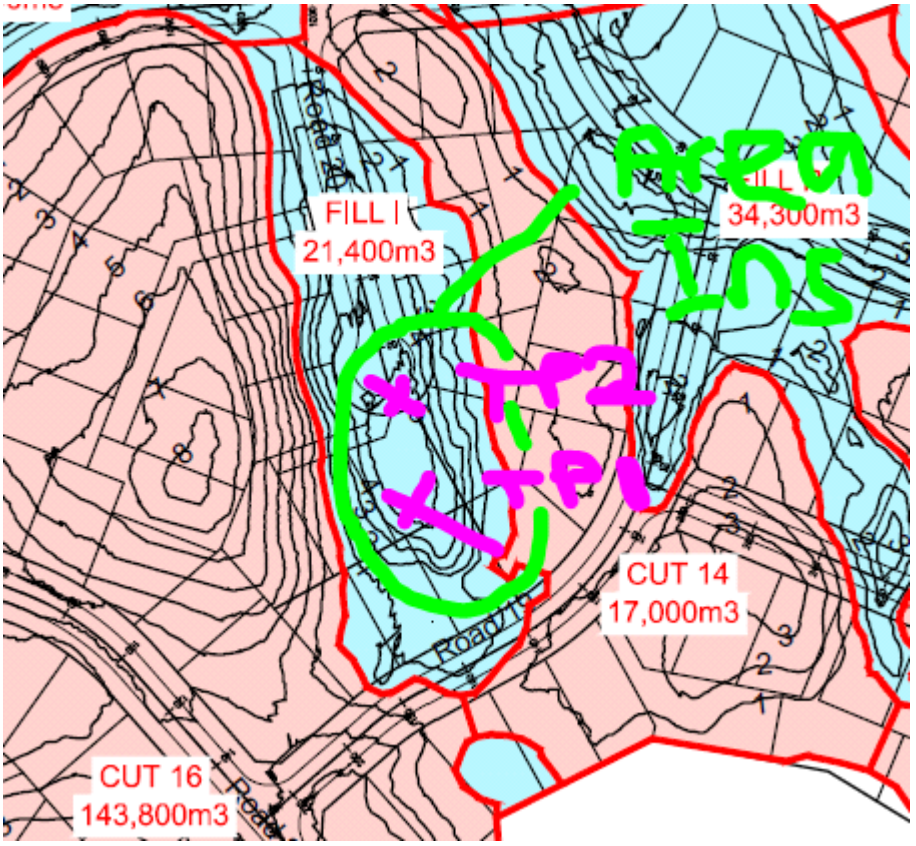
Site Inspection Record

Date & Time:	10/02/17 10am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
In Mike Chan's absence called to site by Trevor to inspect the upper portion of the Fill I gully muckout. Mike has already inspected and signed off the lower half of Fill I gully muckout.

Noted that the upper portion of fill I gully contains an approx. 25m wide by 100m long area of very soft material (ie. very hard to walk on).

Dug two trial pits through the material, which confirmed that it comprised of saturated pumiceous clayey silt with shears around 10kPa to 15kPa. The depth of the material is unknown as could only dig to between 2 and 2.8m due to pit cave in. Appears that this material will need to be undercut, but will check with Shane to check if any other options (ie. settlement monitoring before instructing Dines. Fill over this area is around 3 to 5m.



TP 1 - shit stuff to at least 2m

Gully inspected

TP2 - shit stuff to at least 2 to 3m

TP1

TP1

14/02/17

Tuesday, 14 February 2017 4:36 p.m.

Site Inspection Record

Date & Time:	14/02/17
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site at request of Trevor Moir to observe underfill drainage placement in Gully I and P. Gully P

Underfills have been installed as per our recommendations, up to the soft spot in Gully P.

02/03/17

Friday, 3 March 2017 12:10 p.m.

Site Inspection Record

Date & Time:	02/03/17
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to inspect rotten rock and underfill drainage placement at gully I, and fill placement at gully I and P. Underfills have been placed as per our recommendations. Trevor has asked the underfill to terminate at where it is now (natural stripped ground, above the gully head), and no seepages are noted at that area. Confirmed with Chris.

The clay fill appears to be going down well across the lower reaches of these gullies, with shear strengths all over 140kPa.

An area on the ridgeline is pumping (likely due to groundwater pressures) and a trial pit investigation is planned for next Monday. Possible that this area should be undercut and tapped with a drain coil and wrapped drainage media, running into the underfill in Fill I, then backfilled with compacted clay.

06/03/17

Monday, 6 March 2017 4:02 p.m.

Site Inspection Record

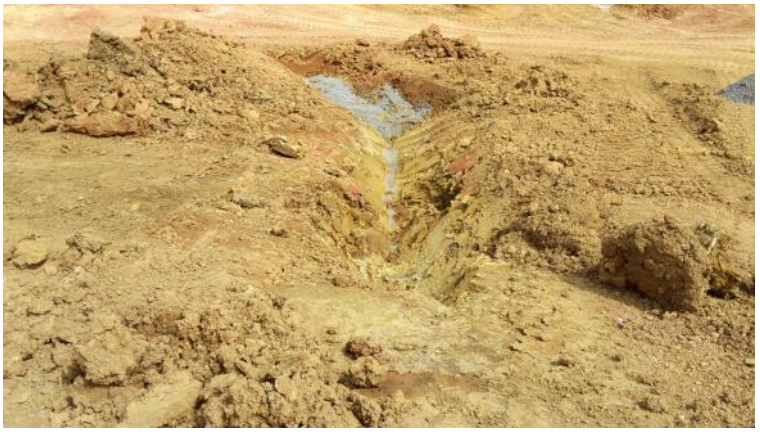
Date & Time:	06/03/17
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site at request of Trevor to inspect subgrade pumping between Gully I and P, and topsoil strip and muckout at gully P. The subgrade pumping seems to be localised to roughly a 20m x 20m area. A V-drain was trenched up toward the area, and wet sediments were exposed on the sides to approximately 1m depth.

Since the subgrade has been sheared, undercutting will be necessary in this area sometime later in the week or next week (weather dependent) and advise when it is exposed so a method of drainage can be confirmed.

Gully P had been stripped another 30-40m upslope. Strip had gotten rid of most unsuitables. Told operator to continue this through and continue placing at least half a meter of rotten rock in the invert of the gully where it is wet to elevate clay from wetting.



13/03/17

Monday, 13 March 2017 2:03 p.m.

Site Inspection Record

Date & Time:	13/03/17 12pm
Author:	CE
Plant Operating:	
Weather:	Wet

Site Observations and Instructions:
Drive over of site with MVC to check on progress. There are two small gullies left to fill to complete the bulk works for the season (approx. 50,000m3 of fill still to place. Areas are being progressively topsoiled as they are completed in stage 3.

Site is very wet after last week's 1:100 storm events so works won't re-commence until later this week.

20/03/17

Monday, 20 March 2017 2:30 p.m.

Site Inspection Record

Date & Time:	20/03/17 12pm
Author:	CE
Plant Operating:	
Weather:	Fine

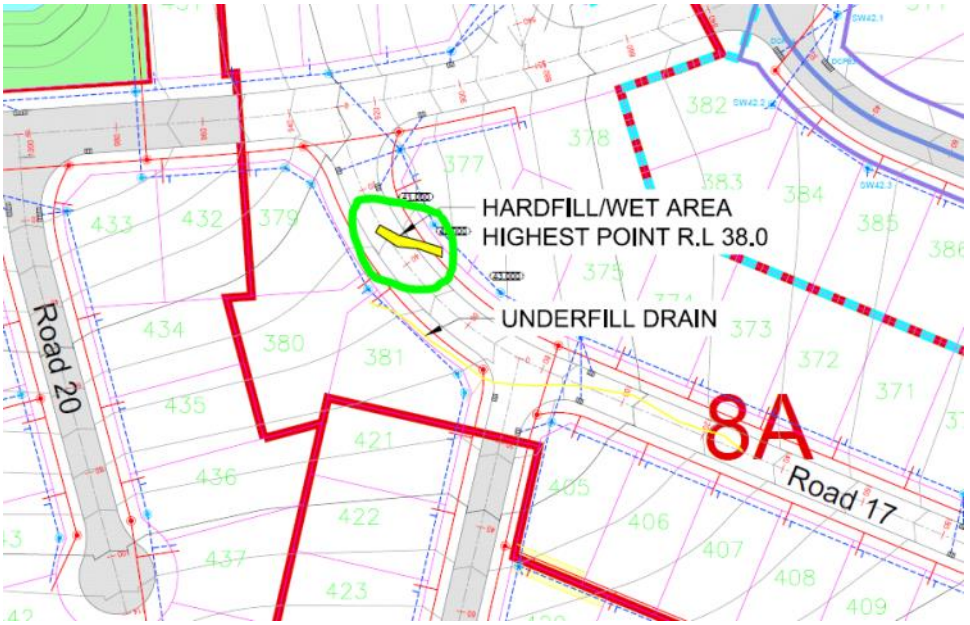
Site Observations and Instructions:
Walkover of site with SGL. Observe the pumping/spring area at the base of gully area (as per plan). This area is beneath the road so they are going to tap the spring into the exisitng underfill drain, undercut the pumping ground and then backfill with compacted clay. Trevor to get in contact once area is undercut for us to inspect.

Also looked at the top of this gully. There is a spring here also which will likely need tapping with a 2m deep chimney drain subject to observations once cut to grade in this area.

Top of gully - needs drain run up as chimney drain once fill cover less than 2m to tap spring and ensure adequate coverage over drain is maintained

Underfill drain being installed

Spring area at base of gully (near subgrade level). This area is under road and just needs to be treated as necessary to build road.



Area of spring (base of gully) circled with green pen.

22/03/17

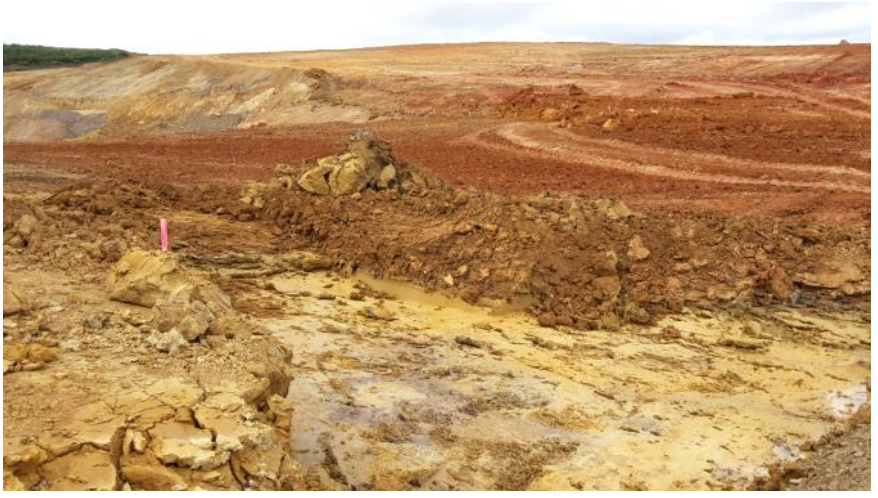
Wednesday, 22 March 2017 4:43 p.m.

Site Inspection Record

Date & Time:	22/03/17
Author:	CE+MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Observed there is a spring still coming through the area at the base of gully to the side of the metal placed yesterday. Spring will need to be tapped with novacoil and run to underfill drain before filling over area with clay.



10/04/17

Monday, 10 April 2017 12:50 p.m.

Site Inspection Record

Date & Time:	10/04/17 10am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Visit to observe progress on site. Noted that it looks like contractors have started earthmoving again following bad weather last week. Works focusing on fill near top of slope by site offices. Lower portions of site still too wet.

18/04/17

Thursday, 20 April 2017 4:30 p.m.

Site Inspection Record

Date & Time:	
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site at request of Trevor. Looked at seepages coming from south-eastern corner of Cut 13. Looks to still be seeping on the surface. Discussed drainage. Will get Trevor to send through a surveyed plan of areas affected by the seepage.

Looked at middle tributary gully strip (middle gully) of Fill P. This strip has began at the elevated portions and has not yet connected to the gully junction. Drain coil, cloth and rock all look good and to normal standards.

26/04/17

Monday, 24 April 2017 4:21 p.m.

Site Inspection Record

Date & Time:	
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site at request of Trevor Moir to check westernmost tributary gully within Fill P. Drain coil extending to the head of the gully with approx. 400mm drainage metal, fully wrapped, and 0.5m SPR blanket should be required up to the head of this gully. More mucking out is required.

Trevor thinks that the seepage at the Cut 13 southern portions is due to perched GW table above a hard pan of silts/clays.

15/05/17

Monday, 15 May 2017 5:48 p.m.

Site Inspection Record

Date & Time:	15/05/17 10am
Author:	CE
Plant Operating:	
Weather:	

Site Observations and Instructions:
Inspected the Slip that has formed near Fill O. Looks like has formed due to overland flow. Shane is going to meet with Russell tomorrow to discuss options. Will get repaired as part of works next season.

Walked over rest of site with Shane. Plant is parked and site is wet. Trevor advised that they may give it one more go before winter to undertake earthworks and then will shut down for winter.

14/09/17

Thursday, 14 September 2017 3:01 p.m.

Site Inspection Record

Date & Time:	14/09/17 1.30pm
Author:	MVC
Plant Operating:	
Weather:	Overcast but dry

Site Observations and Instructions:

Visited site at request of Trevor Moir to inspect topsoil stripping for lots 60-61 where the overland flowpath is. Lot 60 is getting cut down and Lot 61 is getting elevated, with minimal cut and fills up to approx. 0.5m.

Topsoil appeared to be stripped adequately, with minor pockets although very shallow (i.e. less than 50mm in most places) but the operator will run the padfoot over the subgrade prior to filling anyway to mix this in and punch it through.

19/09/17

Wednesday, 20 September 2017 9:21 a.m.

Site Inspection Record

Date & Time:	19/09/17
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site to inspect fill placement over lots 60-61 where minor cut to fill had occurred late last week.

The lots had already been topsoiled. Drilled 5 boreholes into the topsoil to expose the fill and vane shear strengths were all off the dial (140+) or UTP. Soil appeared well compacted and moist.

26/10/17

Thursday, 26 October 2017 3:35 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	26/10/17 12pm
Author:	CE+SL
Plant Operating:	2 x scrapper, 6 x digger
Weather:	Showers

Site Observations and Instructions:
Met Trevor on site to check on progress. He advised that they have just recommenced in fill areas P and I. Not much work occurring so far due to wetness of the site.

Fill P

1/11/17

Wednesday, 1 November 2017 1:30 p.m.

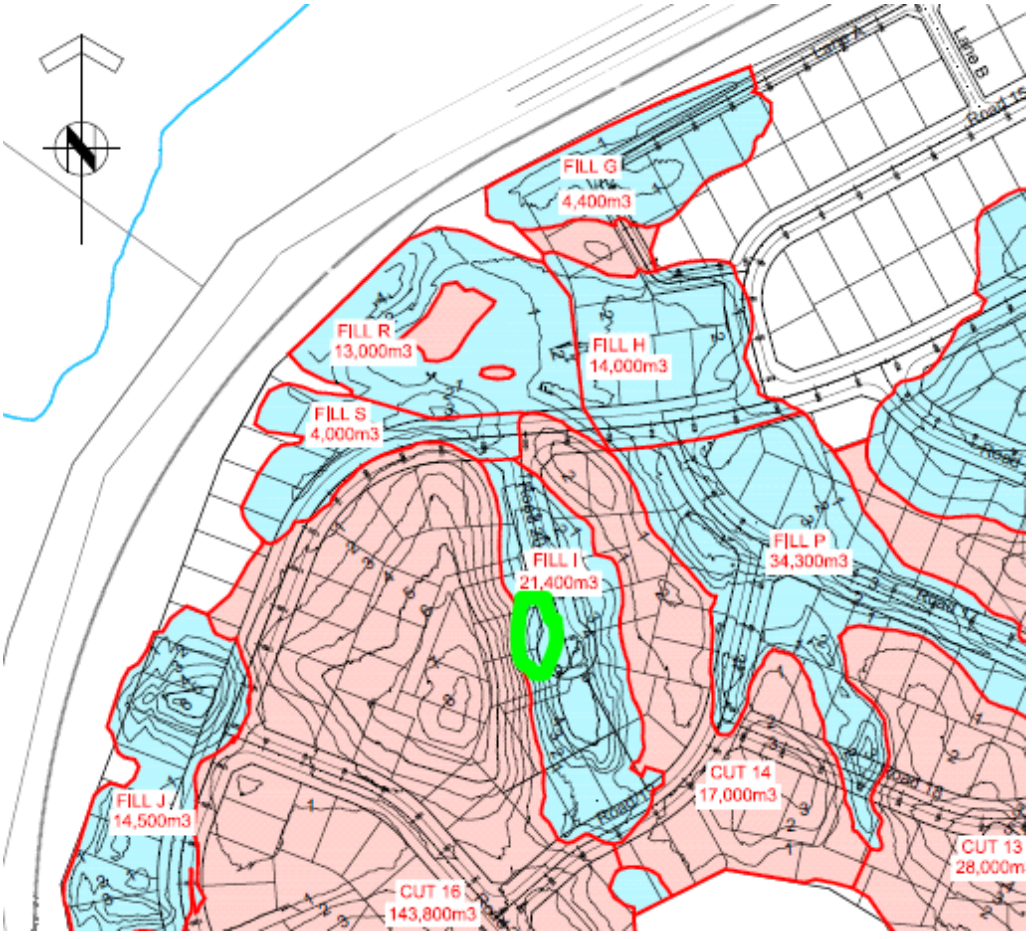
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	1/11/17 10:30am
Author:	CE
Plant Operating:	4 x dozer with scraper, 2 x 4wd compactor, 4 x digger
Weather:	Fine

Site Observations and Instructions:

Met with Trevor and inspected the following:

- Observed digout of new section of fill I. Observed they had excavated all mullock and were onto a loose sand. They are going to backfill over this with 1m of SPR100 prior to filling with clay. Fill over this area is 3m to 4m deep.

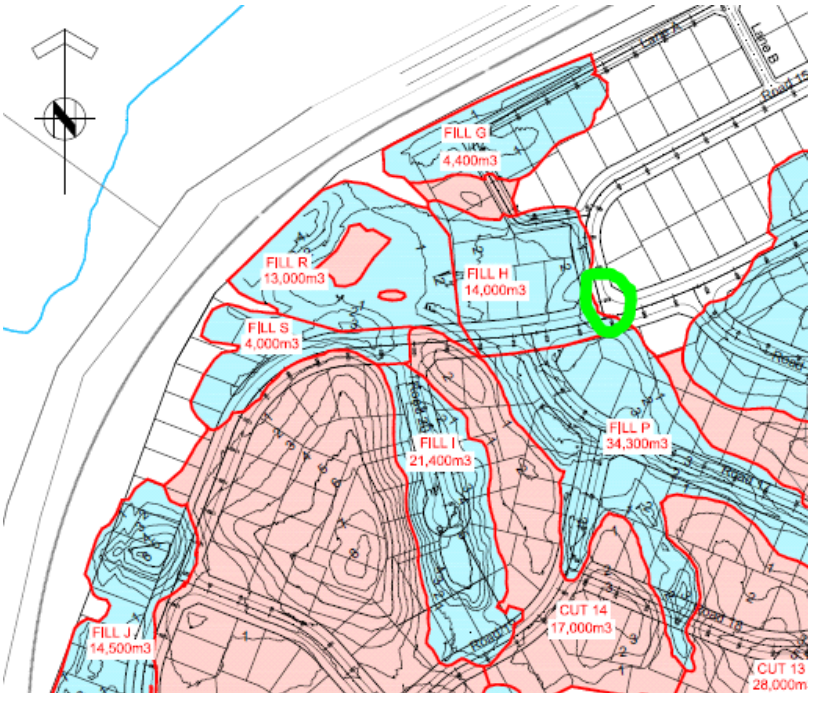


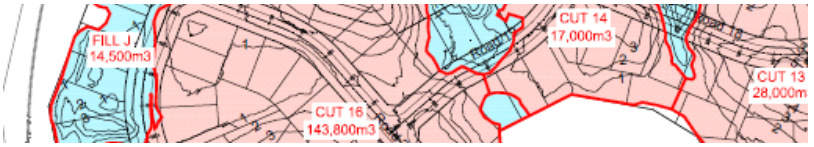
Area mucked out circled green.

Muckout picture

Muckout picture

- Also investigated a soft spot on the edge of Fill H. The soft ground is about 1.5m to 1m deep (shearing 20 on the dial), below the soft ground is stiff clayey silt (shearing above 70 to 100 on the dial). Advised trevor that we will need to chase out this soft area, will send through CAN for this.





Soft area approx. circled TP1 through the soft ground

Area of soft ground


TP2 through the soft ground


TP2 through the soft ground

TP1 through the soft ground

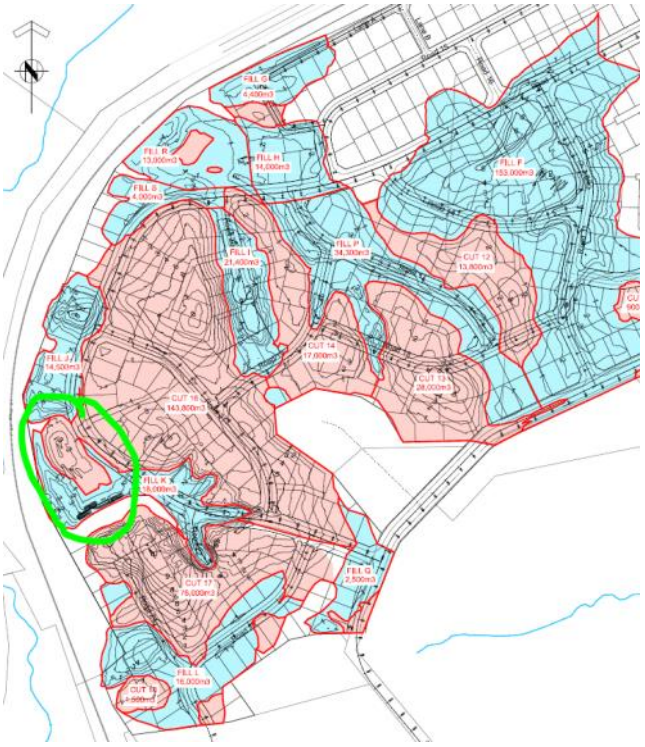
TP1 through the soft ground

TP1 through the soft ground

TP1 through the soft ground

Area of soft ground

- Also did general walkover of site. They are cutting from Cut area 16 and 14 and filling in Fill P and I currently.
- The pond circled green below will commence shortly.



Pond circled green to commence shortly.

Below are general pictures of site.

10/11/17

Friday, 10 November 2017 2:45 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	10/11/17 11am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Observed the progress of the digout of the soft area as circled below. They have chased 70% of area, and will have it completed for inspection early next week.

A layer of SPR will be placed in the base of the area in the deepest portion, however there is nowhere to outlet a drain (it is lower than everywhere else) so a drain won't be installed. Did not note any groundwater seepages.

Other photo's from site as per below:

Fill I - there is an area of seeping groundwater on the right face of the gully - Trevor is going to extend the SPR blanket up this face and tap into the underfill drain in the area.

13/11/17

Monday, 13 November 2017 11:02 a.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	13/11/17 9am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Observed the completion of the undercut. They have cut down to firm ground and the extents of the undercut either have a 2m to 2.5m capping over the softer material or extends under the road. Advised Trevor that we are happy to backfill area, however a base of SPR should be placed to deal with areas of seeping water.

Also inspected up in area where we had recommended a chimney drain due to springing water - the water seepages have stopped since they cut the area around the site shed. They are therefore not going to install the chimney drain and we will keep an eye on the area, noting that underchannels and stormwater lines with likely pick up any seeping water in the area.

They have also installed the SPR rock blanket in Fill I where some water seepage was noted in gully face.

Fill P

Undercut area

Undercut area

Undercut area

Fill I - SPR blanket located near where compactor is.

17/11/17

Friday, 17 November 2017 2:12 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	17/11/17
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site to catch up with Trevor about earthworks operations. Undercut was being extended to road boundary upslope. They will not undercut the road yet as the subgrade will be subject to Scala results anyway.

Silt pond at southwest of stage 3 will commence construction next week and Trevor expects an inspection for the gully muckout (that intercepts the pond) around early week after next.

Also looked at SPR blanket on west of Fill I.

28/11/17

Tuesday, 28 November 2017 2:23 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	
Author:	
Plant Operating:	
Weather:	

Site Observations and Instructions:

04/12/17

Monday, 4 December 2017 4:12 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	04/12/17
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to inspect Fill K easternmost gully strip. Wasn't completed in all areas but they will continue. Upslope looks relatively dry so SPR may not be required but an underfill still will need to feed up to it.

Also inspected fill J gullies. Topsoil was stripped adequately where it had been stripped. Southern one was completely stripped but northern one was half stripped. Advised Trevor we would send a can through to put underfill drains in
these areas, although they were dry, it is likely that springing will occur during winter months.

Elsewhere, Hitchen Stage 3A pond was being finished but underfill outlets still need to be formed. Some lots were not topsoiled yet.

11/12/17

Monday, 11 December 2017 3:06 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	11/12/17
Author:	MVC
Plant Operating:	20T digger
Weather:	Fine

Site Observations and Instructions:

Visited site at request of trevor to inspect the muckout operations of the southernmost gully in Fill K. In most places, they had stripped down to something firm to place their SPR mattress upon, however, some organic material was still present and this was advised to be undercut (only by 500mm to something decent).

Advised trevor to use the same methodology on the easternmost gully.

12/12/17

Tuesday, 12 December 2017 3:55 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	12/12/17
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site to investigation slip at the southern side of Fill M into the gully. Photos are on server.

Inspected Fill K gully muckout just upslope of proposed pond. Trevor was considering leaving some of the organic materials in, provided we have enough cover of good materials above. It appears to be 2.5m from the top of the mucked out organics to the finished level of the road*. Chris will send a CAN.

*Some of the muckout will be within a lot.

20/12/17

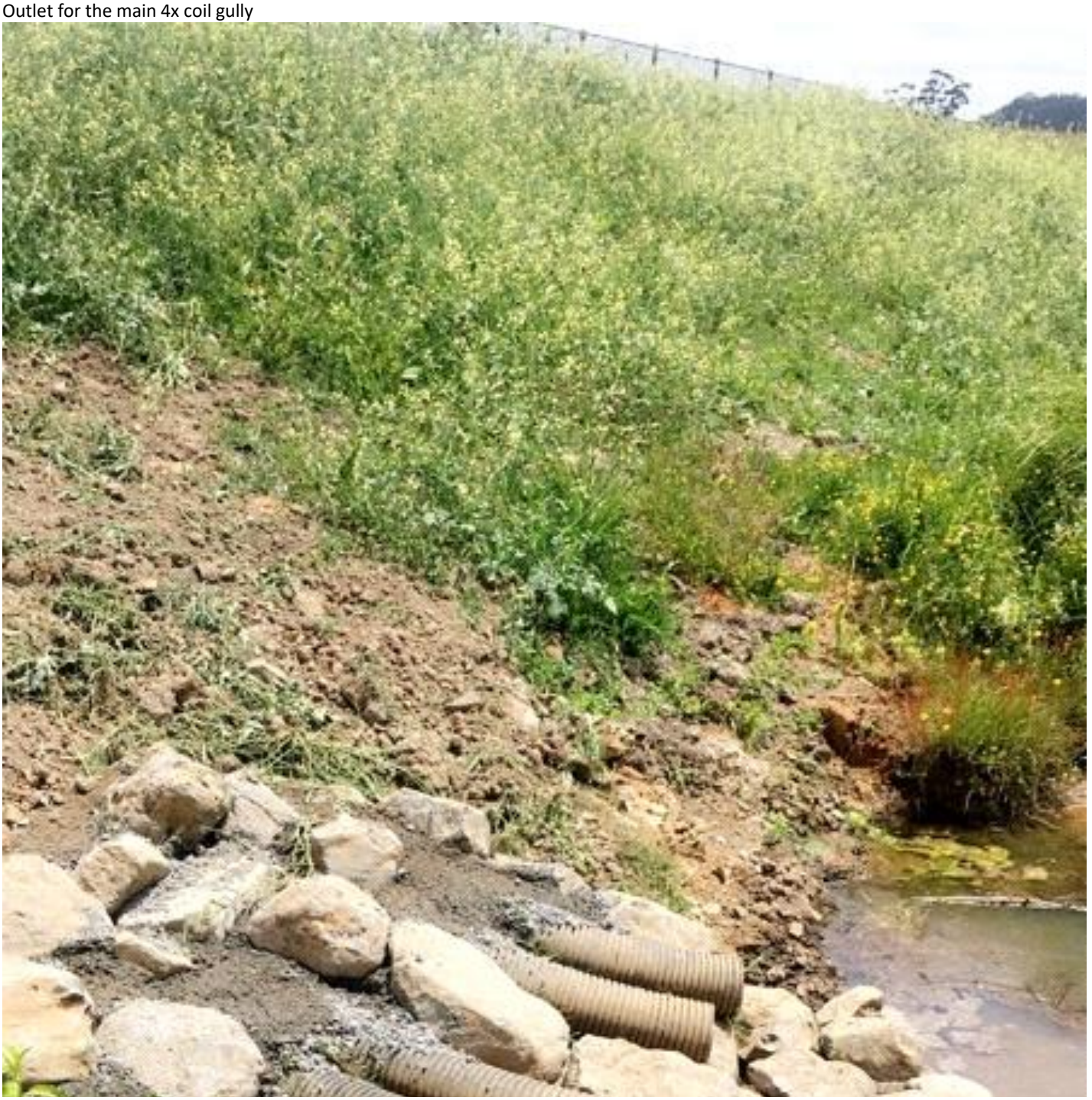
Wednesday, 20 December 2017 8:41 a.m.

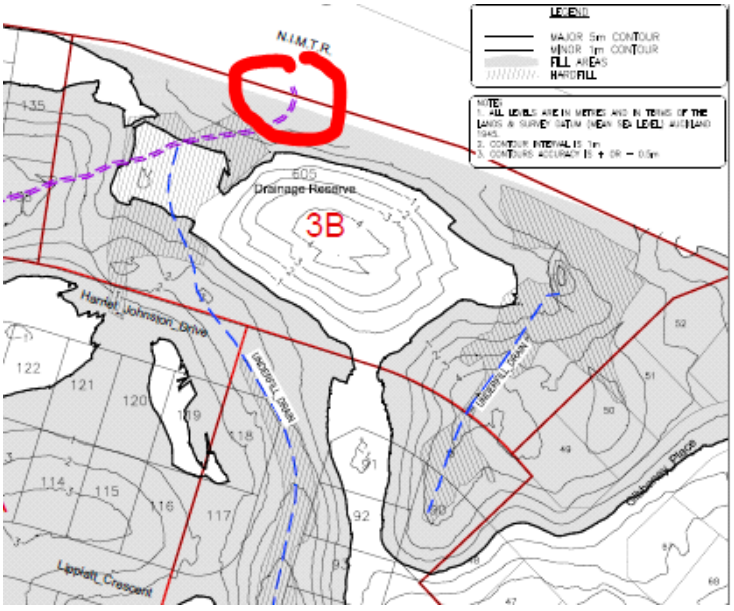
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	20/12/17
Author:	CE
Plant Operating:	
Weather:	

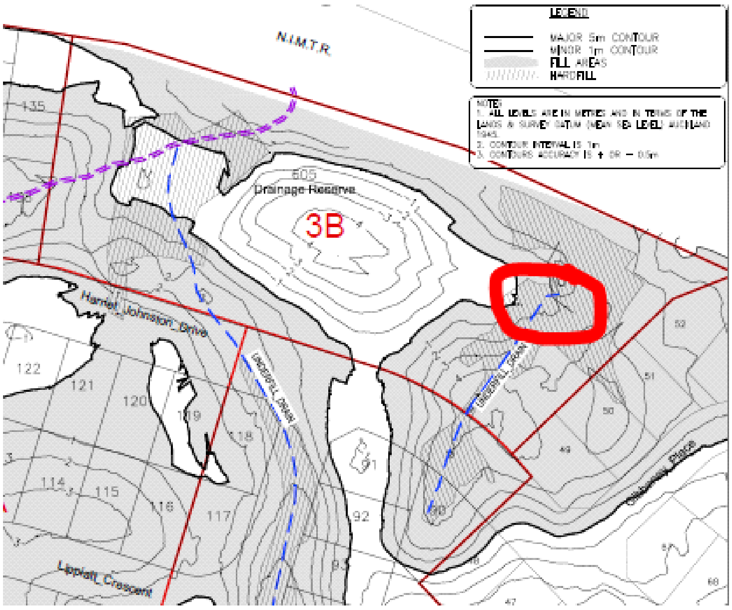
Site Observations and Instructions:
Russell sent through the underfill drain outlets pictures for the Stage 3B pond as per below.

Outlet for the main 4x coil gully





Outlet for the other underfill drain through the stage 3B Pond weir


LEGEND
MAJOR 5m CONTOUR
MINOR 1m CONTOUR
FILL AREAS
HARDFILL
NOTES
1. ALL LEVELS ARE IN METRES AND IN TERMS OF THE LANDS & SURVEY DATUM (MEAN SEA LEVEL) AUCKLAND 1946.
2. CONTOUR INTERVAL IS 1m
3. CONTOURS ACCURACY IS + OR − 0.5m
N.I.M.T.R.
Drainage Reserve
505
3B
Harriet Johnston Drive
Lippiatt Crescent
135
122
121
120
119
118
117
116
115
114
92
91
90
93
52
51
50
49

8/01/18

Monday, 8 January 2018 4:52 p.m.

Site Inspection Record

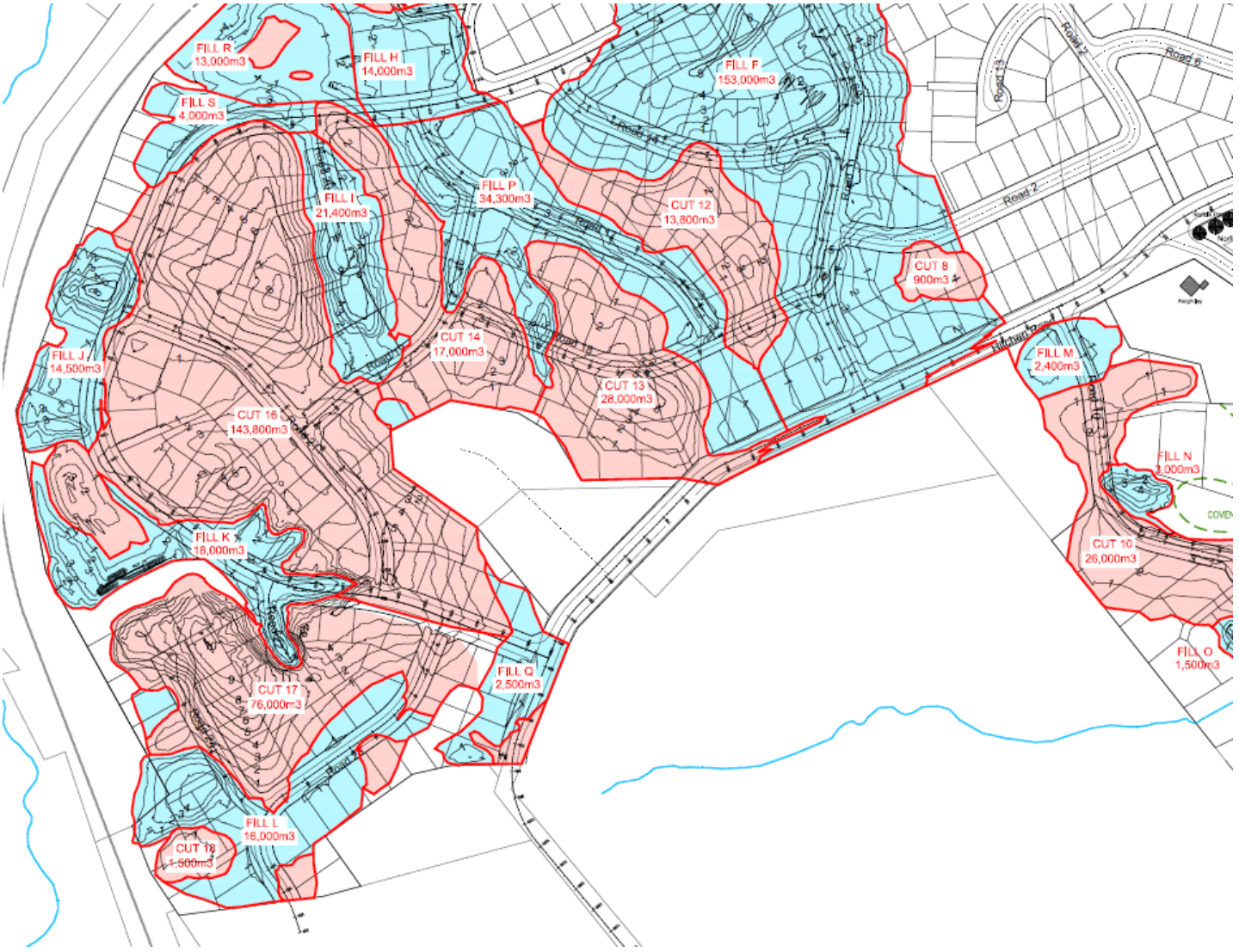
Project # & Name:	J00113 - Hitchen Block
Date & Time:	8/01/18 9am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
General visit of site following summer break.

They are continuing to construct the pond within the Fill K area, pond is predominately in fill with a bit of cut ground within the northern portion. All the soils are clayey and the pond appears to be holding water.

Works are continuing with cuts and fills within the Cut 17 and Cut 18 and Fills K, L area. Topsoiling is occuring within the Cut 14/16 area.

There is a lot of gully mullock material from the Fill K pond muckout. This material will be dried out, root raked and then mixed with clean clay and placed in the deeper fills.



10/01/18

Thursday, 11 January 2018 1:13 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	10/01/18
Author:	mvc
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to catch up following christmas/new year break. Underfills and SPR have been placed in Fill J, pond has been completed to grade, and the easternmost gully in fill K has been mucked out. Northernmost Tributary gullies still to be mucked out.

Trevor's photo below:


HITACHI

12/01/18

Friday, 12 January 2018 3:48 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	12/01/18
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to observe gully muckout procedures. He has sent photos through and they are consistently undercutting down to the green/grey silts before placing SPR.

16/02/18

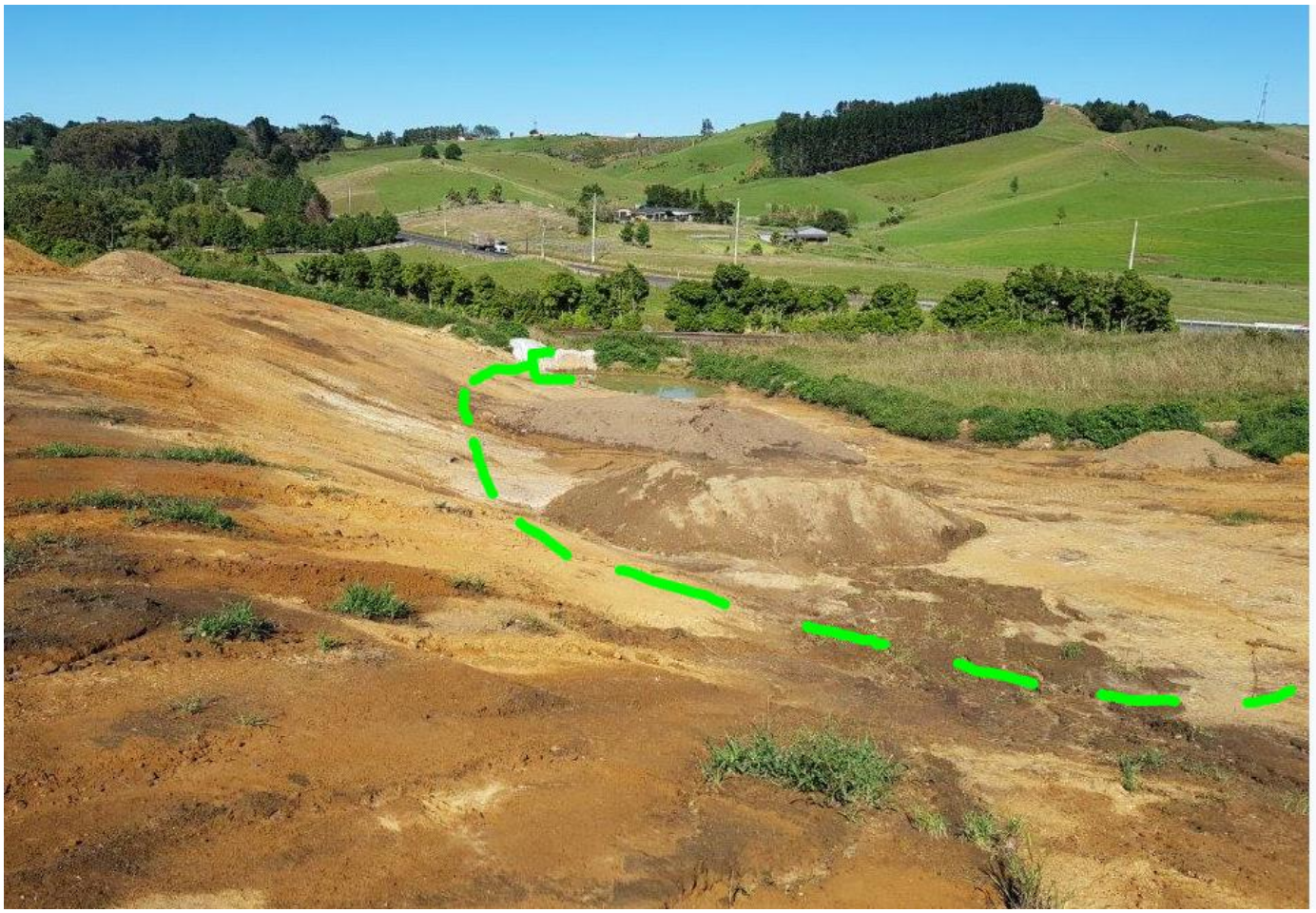
Friday, 16 February 2018 12:27 p.m.

Site Inspection Record

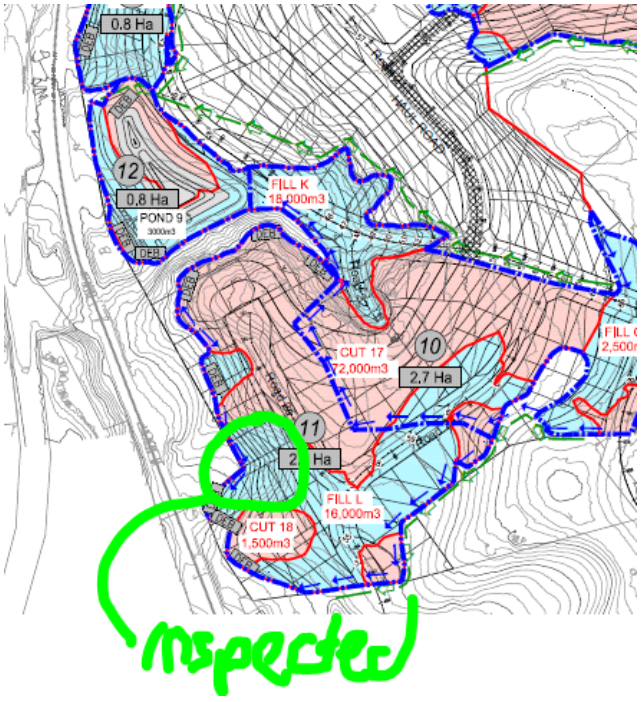
Project # & Name:	J00113 - Hitchen Block
Date & Time:	16/02/18 10am
Author:	CE
Plant Operating:	
Weather:	

Site Observations and Instructions:
Requested to site by Trevor to inspect topsoil strip of Fill area L.

Noted that the topsoil had been stripped adequately to expose stiff natural ground. Requested that an underfill drain is installed as per the picture below, the slope still needs to be benched.



Requested underfill drain in green.


0.8 Ha
12
0.8 Ha
POND 9
FILL K
18,000m3
CUT 17
72,000m3
10
2.7 Ha
11
2 Ha
FILL L
16,000m3
CUT 18
1,500m3
Inspected

19/02/18

Monday, 19 February 2018 9:28 a.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	19/02/18 9am
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Photos from Trevor of Fill L drainage installation. Installation appears to have occurred as per CAN that we issued on the matter.

19/03/18

Tuesday, 20 March 2018 3:02 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	19/03/18 1pm
Author:	CE
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:
Observation of progress of works on site. They have only 2 scrapers and 1 compactor working (as rest of plant is on the Bridge and Hynds).

Cut to fill around the pond area in the western part of stage 3 is the focus currently. Have asked Mike to get in contact with Trevor to ensure the appropriate level of fill testing is taking place.

21/03/18

Wednesday, 21 March 2018 2:03 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	
Author:	
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site at request of Trevor to inspect gully muckout above permanent pond. Looks to be going well. Still some material to come out on the north-eastern branch of the gully before putting their drain coil through.

29/03/18

Thursday, 29 March 2018 2:30 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	
Author:	
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site to catch up with Trevor. Gully continues to be mucked out. He will send us photos.

Hitchen 4B is still not ready for GCR fieldwork.

03/04/18

Tuesday, 3 April 2018 2:02 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block Stage 3
Date & Time:	
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site to inspect retaining wall 1 above wall.

From CH27 and CH43, there is an existing timber pole retaining wall approximately 0.5m in height. The proposed wall cross-section indicates that the existing retaining wall height is included in the total retained height.

From CH0 to Ch58, the top half of the retained materials will be existing non-engineered fill (buried topsoil beneath).

At CH58, there is an underfill drain trench outletting at the proposed wall cut face.

Elsewhere, they have two gully underfills to place upslope of the permanent pond in the northern portions of Stage 3

09/04/18

Monday, 9 April 2018 3:37 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	
Author:	
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site to inspect Stage 5B, 4A & 4B, Stage 6A&6B

Stage 4A and 4B
Still large stockpiles across the site. May be ready in two months.

Stage 5B
All but one small stockpile on Lot 247 had been removed.

Stage 6A & 6B
Lots 277 had 250mm of topsoil following re-spread.
Lots 296 and 297 were still bare of topsoil.

11/04/18

Wednesday, 11 April 2018 4:23 p.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	11/04/18
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site to recheck topsoil for lots in Stage 5B. These topsoil depths are entered into the GCR draft.

01/08/18

Thursday, 2 August 2018 11:29 a.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	01/08/18
Author:	MVC
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site for final walkover of Stage 4B prior to GCR report drafting.
No stockpiles or bare ground except for the berms where the services will be installed and associated windrows.

11/09/18

Wednesday, 12 September 2018 9:12 a.m.

Site Inspection Record

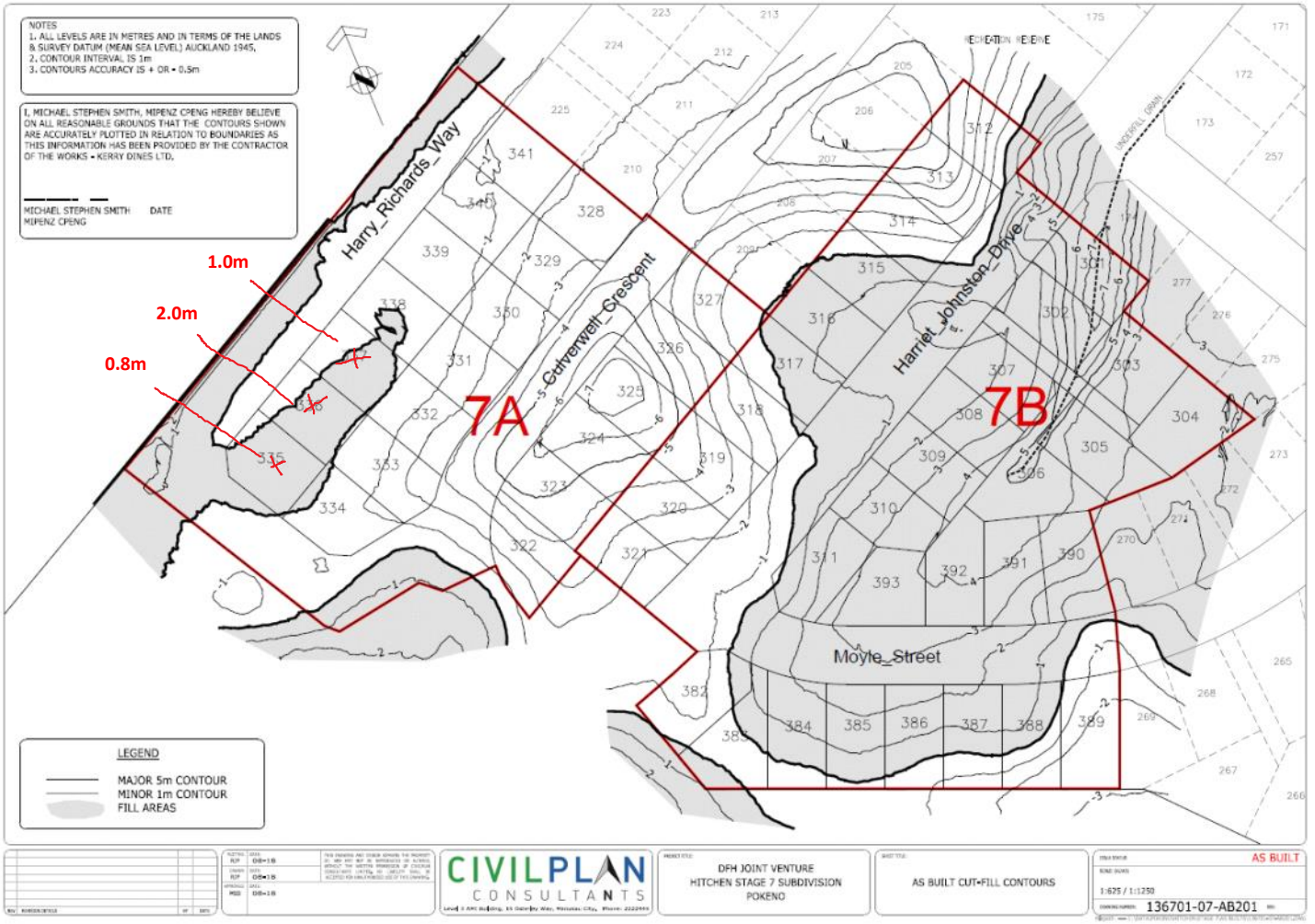
Project # & Name:	J00113 - Hitchen Block
Date & Time:	11/09/18
Author:	MVC
Plant Operating:	
Weather:	fine

Site Observations and Instructions:

Visited site to investigate extent of non-engineered fill area over lots 335-337 where the GCR borehole for lot 336 found firm and wet clay fill at depths of up to 1.8m.

Drilled 2m HA boreholes in lots 335 and 337 and found at least 2m of mostly clay fill (depths of less than 1m fills are shown on as-built plans).
In lot 335, clay fill with firm to stiff vane shear strengths was encountered up to 0.8m where it became consistently very stiff.
In lot 337, a similar material was found up to 1.0m. Moisture contents to these depths appeared wet of optimum.

Drilled a borehole in lot 333 and found cut ground.



18/09/18

Tuesday, 18 September 2018 3:10 p.m.

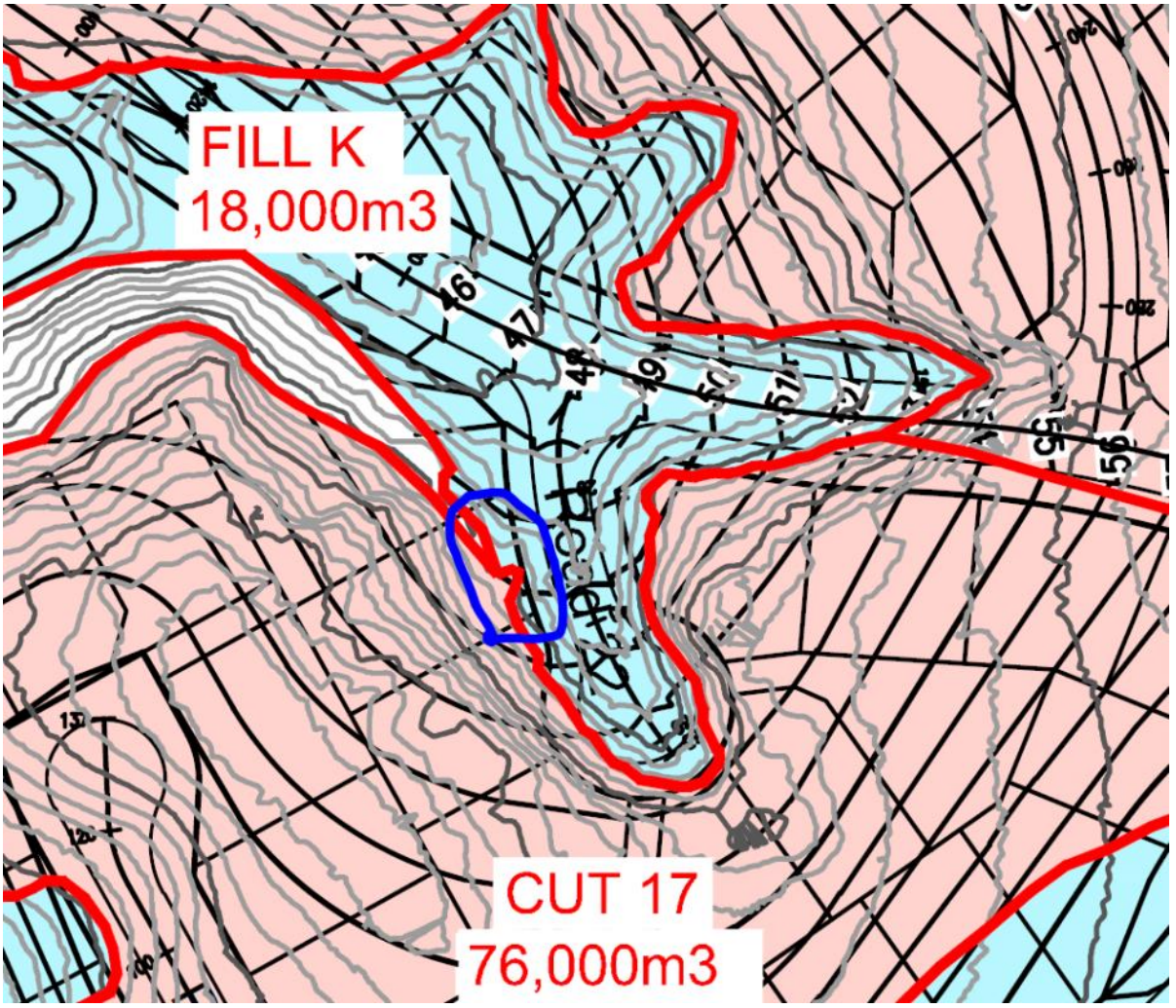
Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	18/09/18
Author:	MVC
Plant Operating:	
Weather:	Fine

Site Observations and Instructions:

Visited site at request of Trevor to inspect a groundwater spring at the cut/fill line between Fill K and Cut 17, to the west of Road 22 cul-de-sac. Groundwater effects appeared to be localised to the area and no surface weaving was observed that could indicate excess porewater pressures beneath the fill here.

See CAN09 recommendations for this groundwater spring.



20/09/18

Wednesday, 12 September 2018 9:12 a.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	20/09/18
Author:	MVC
Plant Operating:	
Weather:	fine

Site Observations and Instructions:

Visited site to carry out trial pits with Trevor over lots 335-337 where the GCR borehole for lot 336 found firm and wet clay fill at depths of up to 1.8m.

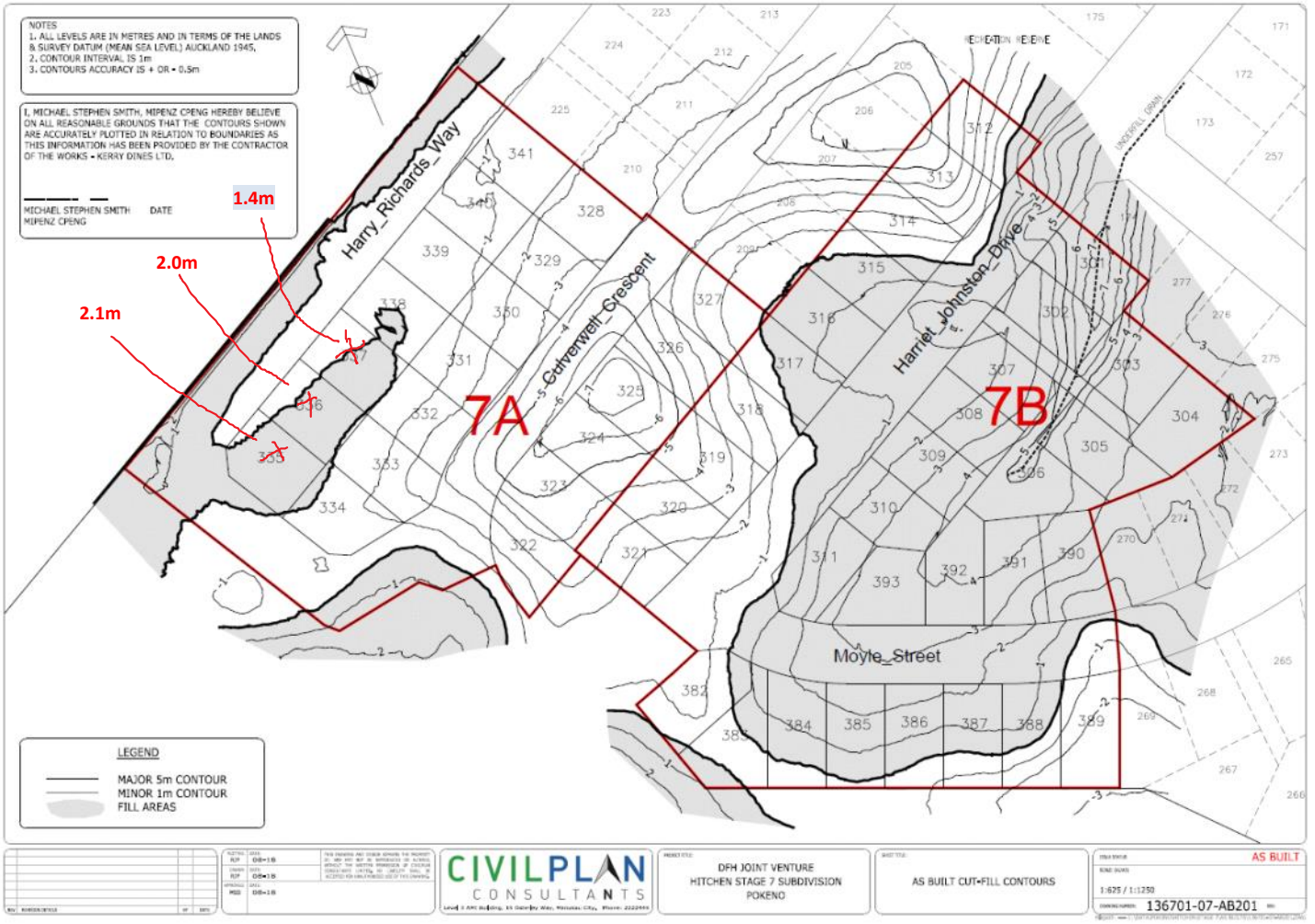
Lot 337 found natural ground at 1.4m. Groundwater was seeping out at 1m depth, less than 140kPa shear strengths around that depth.
Likely due to the upper layer of fill being placed while wet. Fill underneath was hard.

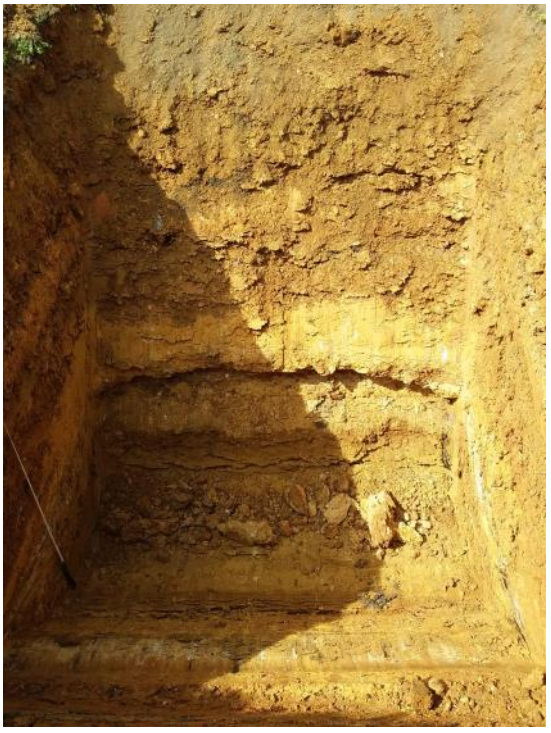
Lot 336 found natural ground at 2.0m. Groundwater seepages were noted between the fill and natural interface, less than 140kPa shear strengths from approx. 1.5 - 2.0m depth bgl.

Lot 335 found natural ground at 2.1m. Top half metre of fill appeared wet of optimum and was failing in shear strength. Fill beneath this up to 2.1m appeared very stiff to hard.

Natural ground was consistently yellow/brown silt that was impenetrable with shear vane tests.

Advised contractor to remove fill down to natural ground in lots 337 and 336 and get in touch with us to inspect.
Difficult to determine whether all the fill needs to be removed in lot 335 as only the top 0.5m was below 140kPa (non-engineered). Will be subject to inspections once undercutting commences.





27/09/18

Friday, 28 September 2018 10:15 a.m.

Site Inspection Record

Project # & Name:	J00113 - Hitchen Block
Date & Time:	
Author:	
Plant Operating:	
Weather:	

Site Observations and Instructions:

Visited site at request of Trevor and Stephen to inspect Lots 336 and 337 undercut down to natural ground as requested in CAN08.

Lot 335 had not been undercut yet. Advised Trevor to undercut towards the trial pit in Lot 335. Only the top 0.5m required undercutting apparent from the trial pit, and the contractor was also advised to chase the seam of wet fill til it runs out. Trevor will take photographs and Lander to confirm the undercut is to its satisfaction.