Wilton Joubert Limited
T/A Geotek Solutions

GEOTECHNICAL COMPLETION REPORT

FOR

10-LOT

LIGHT-INDUSTRIAL SUBDIVISION

AT

86 & 88 HOBSONVILLE ROAD,
HOBSONVILLE

FOR
AUSTINO HOBSONVILLE 2 LIMITED

Ref No. 94185.1 GCR **11 November 2021**

DOCUMENT RECORD

CLIENT Austino Hobsonville 2 Limited

PROJECT 10-Lot Light-Industrial Subdivision,
86 & 88 Hobsonville Road, Hobsonville

PROJECT NO. 94185.1 GCR

DOCUMENT FINAL Geotechnical Completion Report

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Geotechnical Investigation Report
"Geotechnical Site Investigation for the Proposed 10-Lot Light Industrial Subdivision at 86 and 88 Hobsonville Road, Hobsonville" dated 27 May 2019 (reference 7273) (81 sheets)

1. Introduction

This Geotechnical Completion Report (GCR) covers the earthworks construction for the light-industrial subdivision at 86 and 88 Hobsonville Road in Hobsonville, comprising 10 (no.) light-industrial lots, as shown on the appended Benchmark Survey Group Limited "As Built" plans, which are listed in the preceding Table of Contents.

The 10 (no.) light industrial lots are identified as Lots 1 through 10 (inclusive) with Lots 1 through 5 being accessed from Hobsonville Road and Lots 6 through 10 accessed from the new public road called Westpoint Drive.

Please note, this GCR does not include the bulk earthworks construction to the south of Westpoint Drive as the earthworks are incomplete and are currently covered with stockpiles. We understand that this block of land will be subject to future residential subdivision earthworks and will require a separate GCR.

2. Geotechnical Investigation Report and Earthworks Design

Geotek Solutions Limited prepared the following Geotechnical Investigation Report (GIR) for the light-industrial subdivision:

> *"Geotechnical Site Investigation for the Proposed 10-Lot Light Industrial Subdivision at 86 and 88 Hobsonville Road, Hobsonville" dated 27 May 2019 (reference 7273)"*

During earthworks construction, as well as in preparing this Completion Report, we have revisited the Conclusions and Recommendations made in that report, and duly reconsidered these in light of the recent earthworks operations.

With reference to the engineering drawings, by Harrison Grierson (we initially confirmed they were largely in keeping with the expectations of the GIR), which included:

- Cuts of up to 5.5 metres depth through the northern-central portion of the site,
- Placing the resulting cut spoil as engineered filling to raise the low-lying north-western, north-eastern, and south-eastern areas surrounding the cut down area by up to 5.0 metres depth.
- The construction of a new public road along the southern boundary of the subdivision,

The bulk of the earthworks undertaken were largely in keeping with the design with no significant geotechnical challenges, apart from during the final stages of the earthworks that were carried out through the winter months, as discussed in greater detail below.

3. Earthworks Specification and Control

General earthworks procedures and compaction testing were carried out in accordance with NZS4404:2004 part 2 and NZS4431:1989, where appropriate. Monitoring and testing of fill compaction was undertaken using a combination of the following:

- Frequent and regular measurements of undrained shear strength in the surface of recently compacted fill and
- Testing of clay fill density and moisture content using a nuclear densometer as well as in-situ sampling for water content verification.

Undrained shear strength testing was undertaken generally in accordance with the method specified in the NZ Geotechnical Society 2001 document entitled “Guideline for Hand Held Shear Vane Test” which involves correction to BS1377 standard.

Nuclear Densometer Testing (NDT) of Field Dry Density was undertaken in accordance with NZS 4407:1991, Test 4.2.1, and Field Water Content in accordance with NZS 4402:1986; Test 2.1.

In order to provide the most flexibility for variations in soil types, the earthworks compaction criteria used for control were the maximum allowable air voids/minimum allowable shear strength figures, as follows: -

Air Voids and Shear Vane (for cohesive soils only)

	Air Voids Percentage (as defined IN NZS4402:1986)		Undrained Shear Strength (Measured insitu by IANZ calibrated vane)	
	Maximum Average Value %	Maximum Single Value %	Minimum Average Value kPa	Minimum Single Value kPa
General Fill	10	12	140	110

Note: The average value was to be determined over any four consecutive tests.

Please note, as per Section 2.B.5 of Auckland Council’s Code of Practice for Land Development & Subdivision, this report does not detail any of the pavement construction.

4. Earthworks Operations and Construction

Bulk earthworks commenced during January 2020 and was completed by August 2021. The project civil contractor was M3 Civil with Bob Hick Earthmoving being sub-contracted to undertake the bulk earthworks operations from the start of the works until late 2020. Thereafter, M3 Civil assumed responsibility for completion of the civil works including the finalisation of earthworks.

The bulk earthworks were generally in keeping with expectations with the deepest cuts of up to 5.5 metres through the central portion of the site, and filling up to 3 metres depth in the north-western corner, 1.5 metres depth in the north-eastern corner, and up to 5 metres depth underlying the road to the south of Lot 5/6. Elsewhere cuts and fills were typically no more than 1.0 metres depth.

Bob Hick Earthmoving undertook topsoil stripping and undercutting of pre-existing fill along with the removal of unsuitables in the gullies immediately to the south of Westpoint Drive before installing underfill drains. Bulk excavations through the central portion of the lots resulted in spoil being used to fill the gullies to the south.

Pre-existing unsuitable fill which was identified in earlier investigations with some degree of contamination, was removed as part of stripping excavations, and described in the Geosciences Limited "Works Completion Report Following Development Earthworks at 86 – 90 Hobsonville Road" dated 29 January 2021 (reference Ltr-1328b/WCR/Jan21). From review of that report, we understand that the majority of the contaminated material was removed from the site, apart from some of the topsoil material that was placed on the batter below the fill area to the south of the subdivision road, and on the road reserve batter to the west of the subdivision road. These areas have been shown on the appended As-Built drawing number AB07/005. We are of the understanding that no contaminated material was placed within Lots 1 to 10.

Earthworks construction was carried out generally in accordance with part 2 of NZS4404:2004, "Land Development and Subdivision Engineering" and its companion document, NZS4431:1989, "Code of Practice for Earth Fill for Residential Development."

Site inspections and fill testing were performed by Geotek Solutions (GS) generally at the request of the earthwork's contractor, as well as our own spot checks.

The primary purpose of the inspections was to confirm the suitability of stripping, with the removal of all topsoil as well as any pre-existing fill deemed to be unsuitable (i.e. intermixed with excessive topsoil), and to confirm the presence of competent natural ground.

The bulk earthworks which were undertaken by Bob Hick Earthmoving were relatively straight-forward apart from interruptions during periods of wet weather, and COVID-19 lockdowns.

However, once M3 Civil took over the final earthworks, the works became sporadic, in some part due to inclement weather with much of the work not geotechnically supervised by ourselves resulting in deviations from what should have been earthworks completed to engineered standards. We are aware of the following deviations which we either discovered through the drilling of an extensive array of post-construction hand auger boreholes or we were informed of, generally after the fact, by M3 Civil.

1. We encountered an area of recent fill in one of our check boreholes (HAJ3) located in the north—eastern portion of Lots 1 and 2. When we queried M3 Civil, we were told that under their own direction, they undercut a weak area of soil and replaced it with fill. The fill we drilled through comprised shear strength readings below the required specification to a depth of 1.3 metres. Following our initial assessment, we have undertaken additional investigation around HAJ3 to further define this zone, by drilling 8 (no.) hand auger boreholes. We encountered layers with similar shear strength readings below the required specification in the majority of the holes, to depths of 1.4 metres as detailed in SIR 42 as appended. We have shown the approximate area on Drawing GS101. To account for this zone located at the boundary of Lots 1 and 2, where some of the fill encountered comprised shear strength readings below the required specification, we recommend adopting a reduced ultimate bearing capacity of 200kPa as discussed later herein.
2. A temporary sediment control pond, constructed largely within Lot 10, but also partially intersecting the north-western corner of Lot 8 and the accessway to Lot 9, was only partly inspected by ourselves, when the southern approximately two-thirds of the pond was appropriately stripped prior and backfilled with engineered clay fill. However, we were never called to inspect the stripping or filling of the remaining northern portion of the pond. We subsequently drilled hand auger boreholes (P1 & P2) through the northern end of the pond and encountered weak fill, with shear strength readings below the required specification to a depth of 2 metres. We understand that the pond was around 3 metres deep, and we would expect the weak fill to extend to the base of the old pond. We have shown the approximate area of the northern portion of the pond on Drawing GS101, located in Lot 10, which will require investigation at the time of future lot development.
3. Following the backfilling of the pond, a large stockpile on Lots 8, 9 and 10 was gradually removed and stockpiled to the south of the subdivision road. No haul road was formed and the loaded machinery movements resulted in deep rutting and surface disturbance across the majority of Lot 10, and across the accessway to Lot 9 and through the western portion of Lot 8. We understand that these ruts were undercut and backfilled with clay fill, without our supervision. Subsequent check boreholes through this area identified weak fill, with shear strength readings below the required specification to a depth of up to 1.0 metres. Following our initial assessment, we have undertaken additional investigation, involving the excavation of digger pits on Lots 8 and hand auger boreholes on Lot 9 to refine the zone, however no additional investigation was undertaken on Lot 10 (refer to SIR 43 as appended). We have shown these approximate “Disturbed Areas” on Drawing GS101 which will require investigation/design at the time of future lot development
4. Following the completion of the earthworks, a gravel haul road along the eastern ends of Lots 3, 4 and 5 was stripped to expose competent natural ground. During the stripping inspection, a thick seam of topsoil was noted in the sidewalls of the cuts, extending to the west, into the subdivision and back towards Hobsonville Road. We were only given the opportunity to inspect portions of the stripped topsoil, and we understand that the contractor chased out the rest of the material before covering the area with clay fill under their own direction. We subsequently returned to site to test the compaction,

however the majority of the shear strength readings were below the required specification across the finished surface. We drilled hand auger boreholes through the fill and excavated two pits, with similar weak strengths noted. Following our initial assessment, we have undertaken additional investigation, involving the excavation of 5 (no.) digger pits to refine the zone (refer to SIR 42 as appended). To the best of our knowledge, the weak fill is confined to Lots 4 and 5 and is around 0.5 metres depth at the northern end and approaching 2 metres depth towards the southern end. We have shown the approximate area of weak fill on Drawing GS101 which will require investigation at the time of future lot development.

The areas described above have been "tagged" as requiring further specific investigation and foundation design as discussed in section 13 below.

5. Earthworks Construction Summary

The following is a month-by-month summary of the inspections made by us between February 2020 and August 2021.

Please refer to the appended site inspection notes and fill summary sheet for greater detail. Please note that we have only included inspection site notes for the earthworks on Lots 1 to 10 and under the Subdivision Road. The fill tests for the future residential subdivision have been removed from our site plan and blanked out on the fill summary sheet to avoid confusion.

February 2020

- Work began by stripping the southern gully underlying the subdivision road, to the south of Lot 5/6.

March 2020

- Work continued stripping the southern gully underlying the subdivision road, to the south of Lot 5/6.
- A subsoil drain was installed through the southern gully prior to bulk filling with cut material from the central portion of the subdivision.
- Stripping of the north-western portion and south-western portions of the subdivision continued through to the middle of the month.
- The Northern sediment pond was then constructed across the stripped north-western area.
- A total of 16 (no.) clay fill tests were undertaken during this month with all tests passing.

The site was shut down in March due to the COVID-19 Lockdown and was only re-opened in late April.

April 2020

- Following lockdown, the site was reopened in late April, with clay filling around the south-eastern area.

- A total of 4 (no.) clay fill tests were undertaken during this month with all tests passing.

May 2020

- Heavy rain through the Auckland area left the site too wet to undertake significant works in the first two weeks of the month.
- Site-work recommenced with clay filling in the south-eastern portion of the site.
- Cutting continued through the central-western area of the site to the approximate finished level.
- The majority of the north-eastern area near the subdivision road was stripped, in addition to the south-western bank of the northern pond.
- Clay filling was completed in the north-western area of site.
- Topsoiling commenced in the south-eastern area of the site.
- A total of 20 (no.) clay fill tests were undertaken during this month with all tests passing.

June 2020

- Minor cutting and filling continued along the western side of the subdivision road.
- Large cuts commenced around the central and northern area of the site.
- A total of 2 (no.) clay fill tests were undertaken during this month with all tests passing.
- The site was put on hold for the winter.

July to August 2020

- No earthwork inspections.

September 2020

- Earthworks commenced after winter.
- Bulk cutting continued through the central-northern portion of the site.
- Topsoiling completed in areas at finished cut/fill heights.

October to December 2020

- No earthwork inspections were undertaken for this stage.

January 2021

- M3 Civil took over from Bob Hick Earthmoving to complete the earthworks operations.
- The southern section of the Northern sediment pond was mucked out, with the northern section of the pond used as a decant pond.
- Fill was progressively placed across the southern section of the pond over the month with vegetation around sidewalls stripped in conjunction with the fill placement.
- A total of 8 (no.) clay fill tests were undertaken during this month with all tests passing.

February to May 2021

- No earthwork inspections were undertaken.
- We understand that during this time the remaining section of the northern pond was backfilled with clay fill without being monitored by Geotek.

June 2021

- Following several months since our last site visit, site works were focused on moving the large stockpile on Lot 10 across to the large stockpile on the southern side of the subdivision road. Given the time of year the site was water-logged and deep rutting and surface disturbance was evident from the machinery tracking across Lots 8, 9 and 10.
- The haul road along the eastern ends of Lots 3, 4 and 5 was stripped, but buried topsoil was evident in the sidewalls of the cuts, extending to the west and back towards Hobsonville Road.

Figure 1. Photo taken 23.6.21 of the deep rutted area running form Lot 10 towards Lot 8.

July 2021

- Buried topsoil beside the haul road was stripped with fill placed and compacted up to a finished level.
- Fill testing with a shear vane revealed weak fill that was wet of optimum.
- Given the weather and the condition of the site it was decided to leave the fill in place and cover with topsoil and mulch to seal up the site.
- We understand that the rutting and disturbed ground over Lots 8, 9 and 10 was undercut and replaced with clay fill, however we were not called to inspect the undercutting nor test the compaction of the fill.

- We also understand that the yard in the eastern portion of Lot 2 and 3 was stripped back to remove the gravel hardstand before being covered with topsoil, however we were not notified of these works and therefore did not have the opportunity to inspect the area prior to topsoiling.

August 2021

- No earthworks were undertaken

The site was shut down midway through August until towards the end of September due to the COVID-19 Lockdown.

September 2021

- We undertook a walkover on the 29th of September 2021 and noted that grass growth was well established across the lots.
- We noted the surface across the majority of Lot 10 was waterlogged and soggy, with evidence of rutting in isolated areas.
- Significant rutting and ponded water was also noted on Lots 4 and 5.

Figure 2. Photo taken of Lot 5 looking towards Hobsonville Road in the background. Note the ponded water and deep rutting evident

Figure 3. Photo taken looking towards Lot 4 with similar rutting evident.

6. Service Trench Backfill

All stormwater and sewer line trenches were backfilled without engineering supervision. As such, these trenches should be considered as comprising "uncertified" fill. Therefore, any future proposed foundations and/or structures within a 45° envelope rising from 0.5 metres below pipe inverts will require specific foundation design.

7. Underfill Subsoil Drains

We understand that an underfill drain was installed in each of the forked tributaries of the southern gully, under Westpoint Drive and extending for a short distance under Lot 5. The drains comprise 150mm diameter drainage coil, wrapped in filtersock in turn surrounded with drainage metal.

The surveyed position of the underfill subsoil drain is shown on the appended As-Built Survey: Cut/Fill Isopach (ref AB07/002). The drawing shows an approximately 5 metres section of drain that just enters the south-western corner of Lot 5 covered with around 4 metres of engineered fill.

We consider future excavations for foundations should not encounter these drains, provided the sites are not excavated beyond the limitations stated later in this report. In the unlikely event these drains are encountered, advice from a Geo-Professional familiar with the contents of this report should be sought so that the function of this drain is not impaired.

8. Timber Pole Retaining Wall

A timber pole retaining wall was constructed along the western boundary supporting engineered fill which in turn supports the public road reserve. We were engaged to inspect the soils exposed in the holes drilled for this retaining wall as well as the structural components. Our construction inspections are documented in a Producer Statement that has been supplied to Council as part of the certification for the retaining wall.

9. Overland Flow Path

Overland flow paths (OLFP) were formed along the western boundaries of Lots 1 through 4 (OLFP1), connecting into OLFP2 and along the northern boundaries of Lot 1, 9 and 10 as shown on the appended As-Built Survey: Overland Flow Path (ref AB07/003). We understand that easements have been formed over the OLFP to ensure that their function is not impaired by future development.

10. Topsoil Depths & Post Construction Hand Augers

As part of our GCR assessment, we undertook the drilling of hand augers across the site in a grid formation, spacing the boreholes in approximate 25 metre intervals, to provide an indication of the depth of topsoil which had been placed, as well as confirmation on the strength and consistency of the underlying natural and/or man-made fill material to provide further evidence and quality control of satisfactory engineered fill placement. We have appended the borehole logs which were drilled, to between 0.5 to 2.0 metres depth. We stress that we have measured topsoil at isolated locations and there could be variation in the reported depths between each location.

11. Expansive Soils Site Classification

Due to the August/September 2021 Auckland Level 4 Lockdown, we were unable to return to the site to undertake soil sampling across the site.

Based on knowledge of similar soil types and knowledge of previous sites in the area, we have adopted the visual-tactile method to estimate the level of soil expansivity of the site.

On the basis of our observation and experience with similar soils as well as acknowledging that it is the differential effects of soil moisture and volume changes (shrink/swell) across a building footprint that can cause damage to buildings, we have set the primary expansive soil classifications as defined in clause 7.5.13.1.2, as introduced to NZS3604 by Amendment 19 of NZBC Structure B1/AS1 as follows:

- Class H (Highly) Expansive Soils, with a value of y_s of 78mm for ALL lots.

These expansive soils will require mitigation by deepened perimeter footings and specifically designed concrete slab. Foundation design recommendations are given in the appropriate Conclusions and Recommendations section 15 below.

Lot-specific testing can be undertaken for each individual development at Building Consent stage.

12. Settlement of Engineered Fill

Given the depth of fill placed through the north-western gully that underlies the western portions of Lots 8 and 10, and the accessway for Lot 9, 2 (no.) settlement markers, comprising concrete barriers, were placed in the westernmost, and deepest point of the filled area on Lot 10. The survey marker at each location comprised two survey points on opposite sides of the concrete block.

The markers were first measured on 23rd April 2021 with the last measurement taken 3 months later on 29th July 2021. We have taken an average of the two readings and plotted these trends below.

The results of the surveyed data are shown in the table below supplied by Benchmark Survey Group Limited:

Table below with settlement results for concrete barriers.

NAME	POSITION		SURVEYED LEVELS			
			23-Apr-21	7-Jul-21	29-Jul-21	TOTAL SETTLEMENT
MARK 1	807676.33	388070.05	42.73	42.72	42.72	-0.01
MARK 2	807673.08	388071.54	42.84	42.82	42.82	-0.02
MARK 3	807659.64	388077.48	43.31	43.31	43.31	0.00
MARK 4	807656.15	388078.92	43.40	43.40	43.40	0.00

Regards

Adam Geck
Director
Project Surveyor

Figure 4. Settlement Results sent by Benchmark Survey Group Limited via email dated 30.9.2021

The results show that there was no settlement measured on Marker 3 and 4 over the 3-month period. A total of 10mm and 20mm of total settlement was recorded on Marker 1 and 2 respectively, with no movement from the 7th of July 2021 to the 29th of July 2021. We therefore consider that the risk of differential settlement affecting future structures resulting from fill induced settlement to be significantly low.

13. Specific Investigation and Design Zones (SIDZ)

As described in Section 4 above, we have identified 4 no. zones across the subdivision which will require site specific investigation and/or design recommendations by a Geo-Professional familiar with the contents of this report, to determine the "at-risk" foundations and/or structures (including structures such as retaining walls and pavements) and provide specific design/remediation recommendations and soils parameters at the time of future lot development. We have identified the approximate extent of these zones on the appended Drawing GS101.

13.1 Reduced Bearing Capacity – Lots 1 & 2 Specific Investigation Design Zone 1 (SIDZ1) is intended to highlight the extent of where some of the fill encountered comprised shear strength readings below the required specification along the common boundary of Lots 1 and 2, in the eastern portion of the site. We recommend adopting a reduced ultimate bearing capacity of 200kPa as discussed later herein.

13.2 Weak Backfill - Northern Pond on Lot 10 - Specific Investigation Design Zone 2 (SIDZ2) is intended to highlight the weak fill that was placed to backfill the northern portion of the pond within the north-western corner of Lot 10.

13.3 Disturbed Ground/Weak Fill Lots 8, 9 & 10 Specific Investigation Design Zone 3 (SIDZ3) is intended to highlight the extent of weak fill that was placed following the undercutting and backfilling of the disturbed areas over the majority of Lot 10, accessway of Lot 9 and through the eastern portion of Lot 8. We have also highlighted a narrow strip that runs across the eastern boundary of Lot 10 and around 10 metres into Lot 9.

13.4 Weak Fill– Old Haul Road Lots 4 & 5 - Specific Investigation Design Zone 4 (SIDZ4) is intended to highlight the extent of recent fill that was placed following the undercutting and backfilling of the haul road where shear strengths below the required specification for engineered fill were measured, along the eastern ends of Lots 4 and 5.

14. Site Stability

As shown on the appended As-Built Survey: Finished Contour Plan (ref AB07/001), the overall finished gradients across the lots surface are very gently sloping, with gradients typically not exceeding 1V:25H. We are therefore satisfied the risk of slope instability affecting the subject lots in their current form to be satisfactorily low.

There are however steep batter gradients formed at around 18° (1V:3H) as shown on Drawing GS102, affecting the following lots:

- North-western corner of Lot 8
- Western end of Lot 9 accessway
- Western boundary of Lot 10
- Western boundaries of Lots 1 through 4
- Eastern boundaries of Lots 6 through 9
- Northern boundary swale of Lots 1, 9 and 10.

Any future foundations and/or structures situated on or within 5 metres of slopes greater than 14° (1V:4H) will require specific foundation design by a Structural Engineer familiar with the contents of this report.

In similar fashion, any excavation into the toe slope below a batter should not be undertaken, unless endorsed by specific assessment by a Geo-Professional and/or Structural Engineer, as such excavations could result in the batter becoming undermined and in turn any structures, foundations or the OLFP.

We recommend that at the time of formulating individual lot development proposals, these sites should be subject to a review by a Geo-Professional to more accurately determine the “at-risk” foundations and/or structures (including structures such as retaining walls) along with the depth of soil creep risk as well as specific design recommendations and soils parameters.

We stress that the extent and details of such specifically designed foundations and/or retaining walls will need to be addressed for each individual development at Building Consent stage.

15. Conclusions and Recommendations

On the basis of our geotechnical investigation, our inspections, observations, laboratory and insitu testing as described herein, it is our Professional Opinion that all lots within the 10 Lot Light-Industrial subdivision at 86 and 88 Hobsonville Road, as covered under this report, and indicated on the appended drawings, are generally suitable in terms of section 2 “Earthworks & Geotechnical Requirements” of NZS4404:2010 “Land Development and Subdivision Infrastructure”, as well as section 2 “Earthworks and Geotechnical Requirements” of the Auckland Council Code of Practice for Land Development & Subdivision (Version 1.6 dated 24 September 2013), for the development of Light-Industrial Buildings to be constructed with foundation loads not exceeding Ultimate Limit State Pressures of 150 kPa (i.e. 300 kPa Geotechnical Ultimate Bearing Capacity, subject to the following recommendations:

15.1 Land Stability

We generally consider that the completed works give due regard to land slope and foundation stability considerations given the very gently graded lots with the exception of localised batters formed at gradients of around 18° (1V:3H), as shown on Drawing GS102, affecting the following lots:

- North-western corner of Lot 8
- Western end of Lot 9 accessway
- Western boundary of Lot 10
- Western boundaries of Lots 1 through 4
- Eastern boundaries of Lots 6 through 9
- Northern boundary swale of Lots 1, 9 and 10.

Any future foundations and/or structures situated on or within 5 metres of slopes greater than 14° (1V:4H) will require specific foundation design by a Structural Engineer familiar with the contents of this report.

In similar fashion, any excavation into the toe slope below a batter should not be undertaken, unless endorsed by specific assessment by a Geo-Professional and/or Structural Engineer, as such excavations could result in the batter becoming undermined and in turn any structures or foundations.

We recommend that at the time of formulating individual lot development proposals, these sites should be subject to a review by a Geo-Professional to more accurately determine the “at-risk” foundations and/or structures (including structures such as retaining walls) along with the depth of soil creep risk as well as specific design recommendations and soils parameters.

We stress that the extent and details of such specifically designed foundations and/or retaining walls will need to be addressed for each individual development at Building Consent stage.

15.2 Specific Investigation and Design Zones

As described in Section 4 above, we have identified 4 (no.) zones across the subdivision which will require site specific investigation and design recommendations by a Geo-Professional familiar with the contents of this report, to determine the “at-risk” foundations and/or structures (including structures such as retaining walls and pavements) and provide specific design/remediation recommendations and soils parameters at the time of future lot development. We have identified the approximate extent of these zones on the appended Drawing GS101.

15.2.1 Reduced Bearing Capacity – Lots 1 & 2 Specific Investigation Design Zone 1 (SIDZ1) is intended to highlight the extent of where some of the fill encountered comprised shear strength readings below the required specification along the common boundary of Lots 1 and 2, in the eastern portion of the site. We recommend adopting a reduced ultimate bearing capacity of 200kPa as discussed later herein.

15.2.2 Weak Backfill - Northern Pond on Lot 10 - Specific Investigation Design Zone 2 (SIDZ2) is intended to highlight the weak fill that was placed to backfill the northern portion of the pond within the north-western corner of Lot 10.

15.2.3 Disturbed Ground/Weak Fill Lots 8, 9 & 10 Specific Investigation Design Zone 3 (SIDZ3) is intended to highlight the extent of weak fill that was placed following the undercutting and backfilling of the disturbed areas over the majority of Lot 10, accessway of Lot 9 and through the eastern portion of Lot 8. We have also highlighted a narrow strip that runs across the eastern boundary of Lot 10 and around 10 metres into Lot 9.

15.2.4 Weak Fill– Old Haul Road Lots 4 & 5 - Specific Investigation Design Zone 4 (SIDZ4) is intended to highlight the extent of recent fill that was placed following the undercutting and backfilling of the haul road where shear strengths below the required specification for engineered fill were measured, along the eastern ends of Lots 4 and 5.

15.3 Foundation Bearing Recommendations

Subject to the clauses herein, we recommend limiting applied building loads from shallow footings, pads and ground beams so that a Geotechnical Ultimate Bearing Capacity (GUBC) of 300kPa is not exceeded, with the exception of Lot 1 and 2 (SIDZ1) where we recommend adopting a reduced ultimate bearing capacity of 200kPa, due to the presence of weaker fill materials provided that:

- topsoil and any other deleterious material is removed and or penetrated,
- founding on or within competent natural soils and or competent engineered fill,
- careful inspections of the exposed subgrade are undertaken,
- there is no weakening or deterioration of the subgrade, as well as
- taking into account the expansive soil classification described in Section 15.4 below,

To the above GUBC should be applied an appropriate factor of safety, such as 2.0 for Factored Load Design to calculate the Dependable Load Capacity, or 3.0 for Working Strength Design to calculate the Allowable Load Capacity.

15.4 Specific Foundation Design for Mitigation of Expansive Soils

As described earlier in this report, we have estimated a classification of:

Class H (Highly) expansive soils, with a value of y_s of 78mm.

Lots 1 through 10 inclusive.

All conventional footings as well as foundation piers/piles should be fully founded within competent engineered fill or natural ground and extend to a minimum depth of **900 mm below finished ground level for Class H (Highly) expansive soils.**

15.5 Floor Loads for Light-Industrial Buildings

We recommend limitations on future UDL Floor Loads of no greater than 15 kPa (Dead + Live Loads) to mitigate the risk of consolidation of the subsoils which could result in settlement of the building/s as well as differential settlement effects UNLESS future lot-specific investigation and settlement analyses are undertaken which prove otherwise.

15.6 Foundations in Proximity to Buried Service Lines

When finalising individual lot development proposals, it should be checked that all foundations lie outside 45º envelopes rising from 0.5 metres below the invert of (particularly paralleling) service trenches, unless such foundation details are found by specific design, to be satisfactory.

Piled foundations should not only extend below that envelope, but to sufficient embedment below that, to be able to generate enough cantilever action to structurally withstand lateral earth pressures acting on them over a width of three pile diameters and extending down to the top of the passive wedge defining the start of that cantilever action.

It is our understanding that service trenches have not typically been backfilled to any engineered standard. As a general 'rule of thumb' it may be considered that soil within close proximity of such service trenches, could be prone to a soil creep-like loss of lateral support, as trench backfill consolidates.

We recommended specific investigation to target the areas where piles are required to provide accurate undrained soil shear strength (Su) for calculating embedment using Broms theory.

15.7 NZS1170.5:2004 Site Subsoil Classification

We consider the Lots to be underlain with a Class C – Shallow Soil stratigraphy.

15.8 Subgrade Preparation/Protection

Because of the importance of the issue of expansive soils, once the exposed subgrade has been inspected by a Geo-Professional, it should be covered with 100mm of granular fill such as GAP40 basecourse as soon as possible. The granular layer will not only provide protection from the drying effects of wind and sun, but the voids within it will also serve as a reservoir of additional moisture to recharge the subgrade, being careful to form a cross-fall on the subgrade to minimise undue ponding.

Likewise footing inverts should be poured as soon as possible once inspected by a Geo-Professional or covered with a protective layer of site concrete.

If subgrade degradation occurs by:

- excessive drying out resulting in desiccation shrinkage cracking or
- subgrade softening after a period of wet weather,

it is likely to be more practical and will be more immediate and have greater surety, to undercut the depth of the degraded zone and replace that material immediately with granular fill.

While it is accepted that “all concrete slabs crack” (most often due to shrinkage as they cure), failure to take sufficient care of the underlying subgrade before pouring the concrete slab, could result in:

- swelling of extensively cracked and/or desiccated subgrade beneath the slab, in turn causing a “hogging” of the slab or
- shrinkage of significantly wet and/or weakened subgrade in turn causing a settlement of the ground supporting the slab.

Although minor movement within the slab may be of little structural significance, it can still have adverse aesthetic effects on exposed floors, or areas of “brittle” floor tiling. Excessive “hogging” of the slab has been known to also lift footings, leading to structural distortions in walls.

15.9 Foundation Care & Maintenance

The recommendations given above to mitigate the risk of expansive soils do not necessarily remove the risk of external influences affecting the moisture in the subgrade supporting the foundations and floors.

All owners should also be aware of the detrimental effects that significant trees can have on building foundation soils, viz

i. their presence can induce differential consolidation settlements beneath foundations through localised soil water deprivation, or conversely

ii. foundation construction too soon after their removal can result in soil swelling and raising foundations and/or slabs as the soils rehydrate.

To this end, care should be taken to avoid

(a) having significant trees positioned where their roots could migrate beneath the house foundations, and

(b) constructing foundations on soils that have been differentially excessively desiccated by nearby trees, whether still existing, or recently removed.

15.10 Future Cuts/Fills Limitations

Given the potential sensitivity of the underlying subsoils to increase in surcharge pressures which could result in consolidation resulting in settlement, we stress that future fills greater than 0.5 metres depth (~10 kPa) should not be undertaken on the future lots without further review by a Geo-Professional who is familiar with the contents of this report and express approval in writing of the Council.

In a like fashion, cuts in excess of 0.5 metres that could remove the “crust” of competent soils and/or support to adjacent slopes and/or structures should also be restricted unless specifically reviewed by a Geo-Professional.

Given that the sites are predominantly gently sloping and with the limitations of cutting and filling, we anticipate that each lot will require a site-specific geotechnical assessment at the time of formulating development proposals. We will however also need to limit such cuts to a maximum height of 2.5 metres, with all cuts in excess of 1 metre requiring support by engineer designed retaining walls unless they can be safely battered back to no steeper than 1V:4H.

15.11 Stormwater Control

All stormwater runoff from roofs and paved areas, plus any water tank overflows, should be collected in sealed pipes and be disposed of into Council's reticulation system. Likewise, overland flows should be directed away from the building footprint.

Uncontrolled stormwater flows must not be allowed to run onto or over site slopes, or to saturate the ground, so as to adversely affect slope stability or foundation conditions.

Under no circumstances should concentrated overflows from any source discharge into or onto the ground in an uncontrolled fashion.

15.12 Construction Monitoring for Building Consent

The foregoing statements are Professional Opinion, based on a limited collection of information, some of which is factual, and some of which is inferred. Generally, any investigation is deemed less complete until the applicability of its inferences and the Professional Opinions arising out of those are checked and confirmed during the construction phase, to an appropriate level.

Because soils are not a homogeneous, manufactured building component, there always exists a level of risk that inferences about soil conditions across the greater site, which have been drawn from isolated “pin-prick” locations, may be subject to significant variations. As a result, deciding whether or not the foundation excavation inspections are a critical element to the integrity of a building and the health and safety of its occupants, and what is an appropriate level of monitoring, becomes a subjective consideration that must be evaluated by a suitably qualified and experienced “Licensed Building Practitioner”, with due consideration to, inter alia, the likelihood, significance and consequence of possible variations in ground conditions from those inferred.

Therefore we recommend that all excavations, including those for bulk earthworks, shallow foundations and any piles, be inspected during construction by a Geo-Professional to check that the conditions encountered are consistent with those expected from the investigations and adopted for the design as discussed herein. If anomalies or uncertainties are identified, then further Professional advice should be sought.

It should be noted that a further requirement under the Building Act 2004, is the seeking and obtaining of a modification to the Building Consent when there are construction variations, so that when Council issue the Consent Compliance Certificate (CCC) under section 92, the construction actually ties in with the Consent.

This underlines the importance of carrying out these construction inspections. Furthermore, where Building Consents are issued with conditions requiring a Producer Statement – Construction Review (PS4), it is necessary for those inspections to have been carried out, in order for the PS4 to be able to be issued.

16. Statement of Professional Opinion as to Suitability of Land for Building Development

Owner/Developer: **AUSTINO HOBSONVILLE 2 LIMITED**

Location: **86 & 88 Hobsonville Road, Hobsonville**

Development **Light-Industrial Lots 1 to 10 (inclusive)**

I, Damir Soric of Wilton Joubert Limited trading as Geotek Solutions (Geotek), hereby confirm that:

1. I am a Geo-Professional experienced in the field of geotechnical engineering (as defined in clause 1.2.2 of NZS4404:2010) and that Geotek Solutions was retained by the Owner/Developer as the Geo-Professional on the above development.

   The extent of preliminary investigations are described in the Geotechnical Investigation Report (GIR) prepared by Geotek Services Limited entitled *"Geotechnical Site Investigation for the Proposed 10-Lot Light Industrial Subdivision at 86 and 88 Hobsonville Road, Hobsonville" dated 27 May 2019 (reference 7273)".* Geotek Solutions have subsequently undertaken inspections and observations during earthworks construction and have revisited the Conclusions and Recommendations made in the GIR, and duly reconsidered these in preparation of this statement and the enclosing Geotechnical Completion Report (GCR).

2. In my Professional Opinion, not to be construed as a guarantee, I consider that:

   (a) The appended Cut/Fill As-Built Plan by Benchmark Survey Group Limited shows the approximate extent of bulk earthworks undertaken on the subject site.

   (b) The earth fills shown within each of the subject lots, as indicated on the appended Cut/Fill As-Built Plan, (Drawing No. AB07/002) have been placed in compliance with the requirements of the aforementioned GIR as well as the requirements NZS4431:1989 and those of Auckland Council.

(c) The completed works within each lot take into account land slope and foundation stability considerations, subject to adherence to the foundation design recommendations and future lot development restrictions and Specific Investigation and Design Zones as described in the GCR, all of which should be read in conjunction with the appended Specific Investigation and Design Zone Plans GS101 & GS102 which include the following Specific Investigation and Design Zones:

1. SIDZ1 – Reduced Bearing Capacity Lots 1 & 2
2. SIDZ2 – Weak Fill – Northern Pond on Lot 10
3. SIDZ3 – Disturbed Ground/Weak Fill on Lots 8, 9 & 10
4. SIDZ4 – Weak Fill – Old Haul Road on Lots 4 & 5
5. Batter Slope SDZ – Lots 1, 2, 3, 4, 6, 7, 8, 9 & 10

3. Both the original ground, and the engineered filled ground within each lot, are generally suitable for the erection thereon of Light-Industrial Buildings, subject to the following recommendations

i) Foundations for all future developments within the subdivision are subject to specific engineering design by a Chartered Professional Engineer who is familiar with the findings and recommendations of this Geotechnical Completion report.

ii) Careful inspections by a Geo-Professional of the exposed subgrade should be undertaken to confirm the underlying ground conditions comprise either competent natural soils and/or engineered fill subgrade which has not undergone deterioration, and to check that all topsoil, non-engineered fill, mulch, vegetation and any other deleterious material have been removed.

iii) Geotechnical Ultimate Bearing Capacity (GUBC) for shallow foundations is limited to a 300 kPa, with the exception of the SDZ1 within Lots 1 and 2 which should be limited to a GUBC of 200kPa.

iv) All structures have their floors and foundations designed and built to mitigate the effects expansive soils defined as follows:

Lots 1 through 10 inclusive designed to mitigate Class H (Highly) expansive soils as defined in B1 Amendment 19, with an upper bound y_s value of 78mm.

v) Future UDL Floor Loads restricted to no greater than 15 kPa (Dead + Live Loads) to mitigate the risk of consolidation of the subsoils which could result in settlement of the building/s as well as differential settlement effects UNLESS future lot-specific investigation and settlement analyses are undertaken which prove otherwise.

vi) Unless subject to assessment by a Geo-Professional familiar with this report, future cuts and/or fills across all lots should be limited to no more than 0.5 metres depth. Given that the sites are predominantly gently sloping and with the limitations of cutting and filling, we anticipate that each lot will require a site-specific geotechnical assessment at the time of formulating development proposals. We will however also need to limit such cuts to a maximum height of 2.5 metres, with all cuts in excess of 1 metre requiring support by engineer designed retaining walls unless they can be safely battered back to no steeper than 1V:4H.

4. All foundations and/or structures not located outside of the 45-degree envelope of influence rising from 0.5 metres BELOW the invert of the adjacent service trenches, must be specially designed to avoid surcharging pipes and/or loss of lateral soil support on account of consolidation of non-engineered trench backfill material.

5. This Professional Opinion is furnished to the local Territorial Authority and the current owner/developer, for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any structure.

6. This statement shall be read in conjunction with the enclosing GCR which provides more detailed foundation design recommendations and shall not be copied nor reproduced except in conjunction with a full copy of this report as well as its associated enclosures.

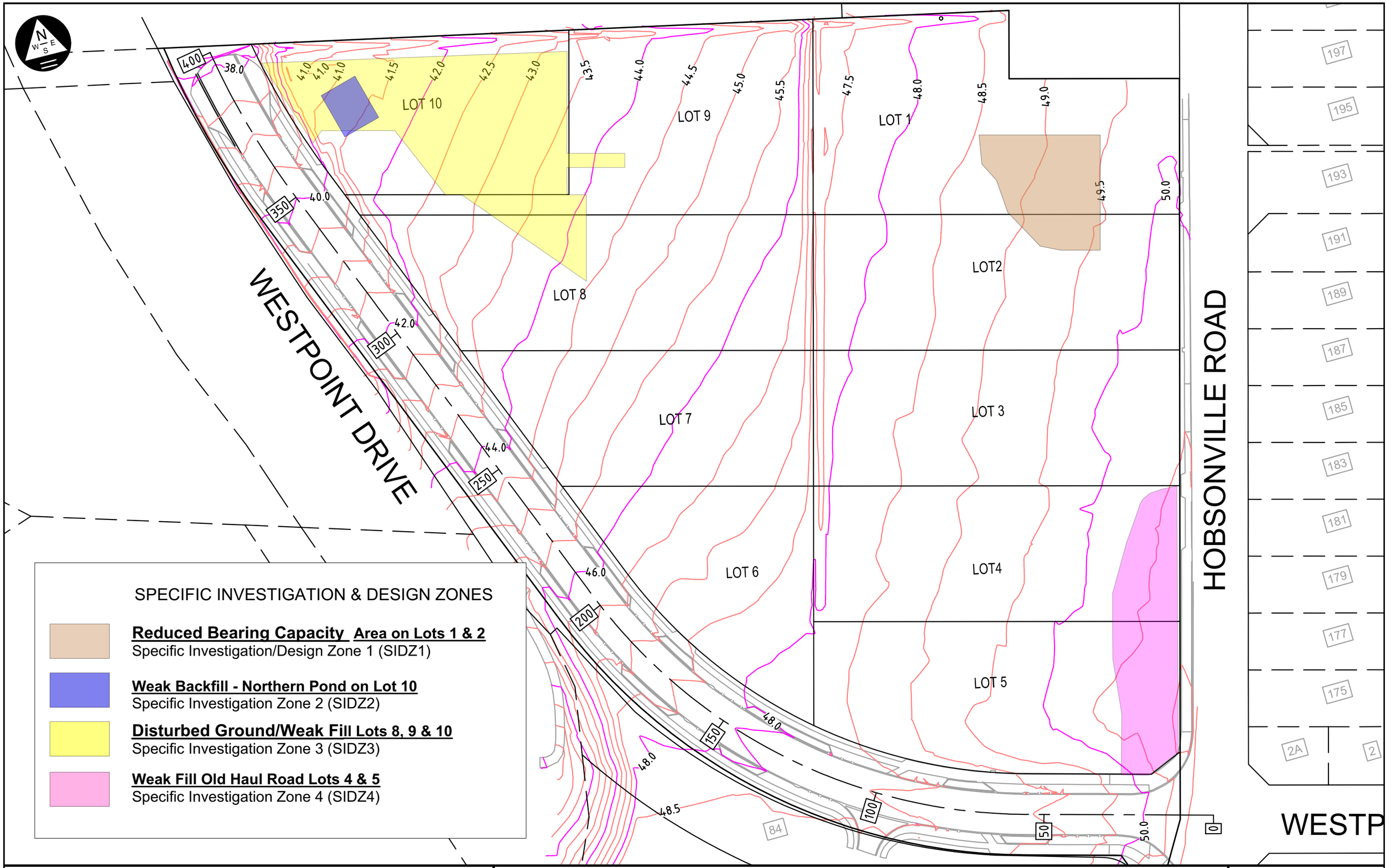
17. Limitations

Except to the extent that Council may rely on it in order to issue an associated Consent, this report and Statement of Professional Opinion has been commissioned solely for the benefit of our client, **AUSTINO HOBSONVILLE 2 LIMITED** specifically in relation to the project as described herein, and to the limits of our engagement. Any variations from the development proposals as described herein as forming the basis of our appraisal should be referred back to us for further evaluation. Copyright of Intellectual Property remains with Geotek Solutions, and this report may NOT be used by any other entity, or for any other proposals, without our written consent. Therefore, no liability is accepted by this firm or any of its directors, servants or agents, in respect of any other geotechnical aspects of this site, nor for its use by any other person or entity, and any other person or entity who relies upon any information contained herein does so entirely at their own risk, with the exception that the local Territorial Authority may rely on it to the extent of its appropriateness, conditions and limitations, when issuing the subject consent. Where other parties may wish to rely on it, whether for the same or different proposals, this permission may be extended, subject to our satisfactory review of their interpretation of the report. Although this report and Statement of Professional Opinion may be submitted to a

local authority in connection with an application for a consent, permission, approval, or pursuant to any other requirement of law, this disclaimer shall still apply and require all other parties to use due diligence where necessary, and does not remove the necessity for the normal inspection of site conditions and the design of foundations as would be made under all normal circumstances.

Although regular site visits have been undertaken for observation, for providing guidance and instruction and for testing purposes, the geotechnical services scope did not include full time site presence. To this end, our report and Statement of Professional Opinion also relies on the Contractors' work practices and assumes that when we have not been present to observe the work, it has been completed to high standards and in accordance with the drawings, instructions and consent conditions provided to them. Similarly, it assumes that all as-built information and other details provided to the Client and/or Geotek Solutions by other members of the project team are accurate and correct in all respects.

WILTON JOUBERT LIMITED TRADING AS GEOTEK SOLUTIONS



SPECIFIC INVESTIGATION & DESIGN ZONES

Reduced Bearing Capacity **Area on Lots 1 & 2**
Specific Investigation/Design Zone 1 (SIDZ1)

Weak Backfill - Northern Pond on Lot 10
Specific Investigation Zone 2 (SIDZ2)

Disturbed Ground/Weak Fill Lots 8, 9 & 10
Specific Investigation Zone 3 (SIDZ3)

Weak Fill Old Haul Road Lots 4 & 5
Specific Investigation Zone 4 (SIDZ4)

GEOTEK SOLUTIONS
1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz
THOROUGH ANALYSIS • DEPENDABLE ADVICE

DRAWING TITLE:	Specific Investigation & Design Zones over As-Built Finished Contour Plan
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2

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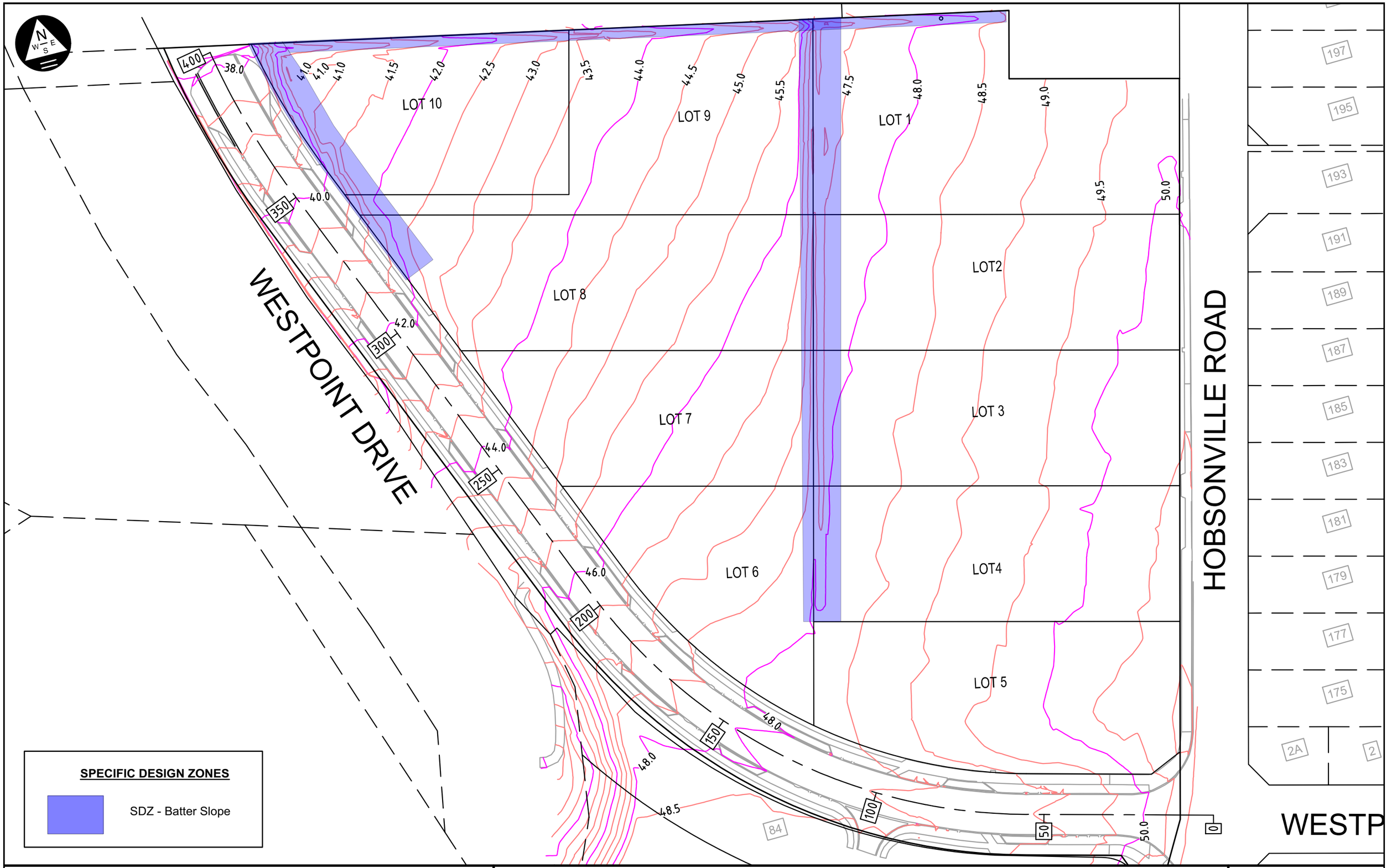
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS101 REV 02



SPECIFIC DESIGN ZONES

SDZ - Batter Slope

GEOTEK SOLUTIONS

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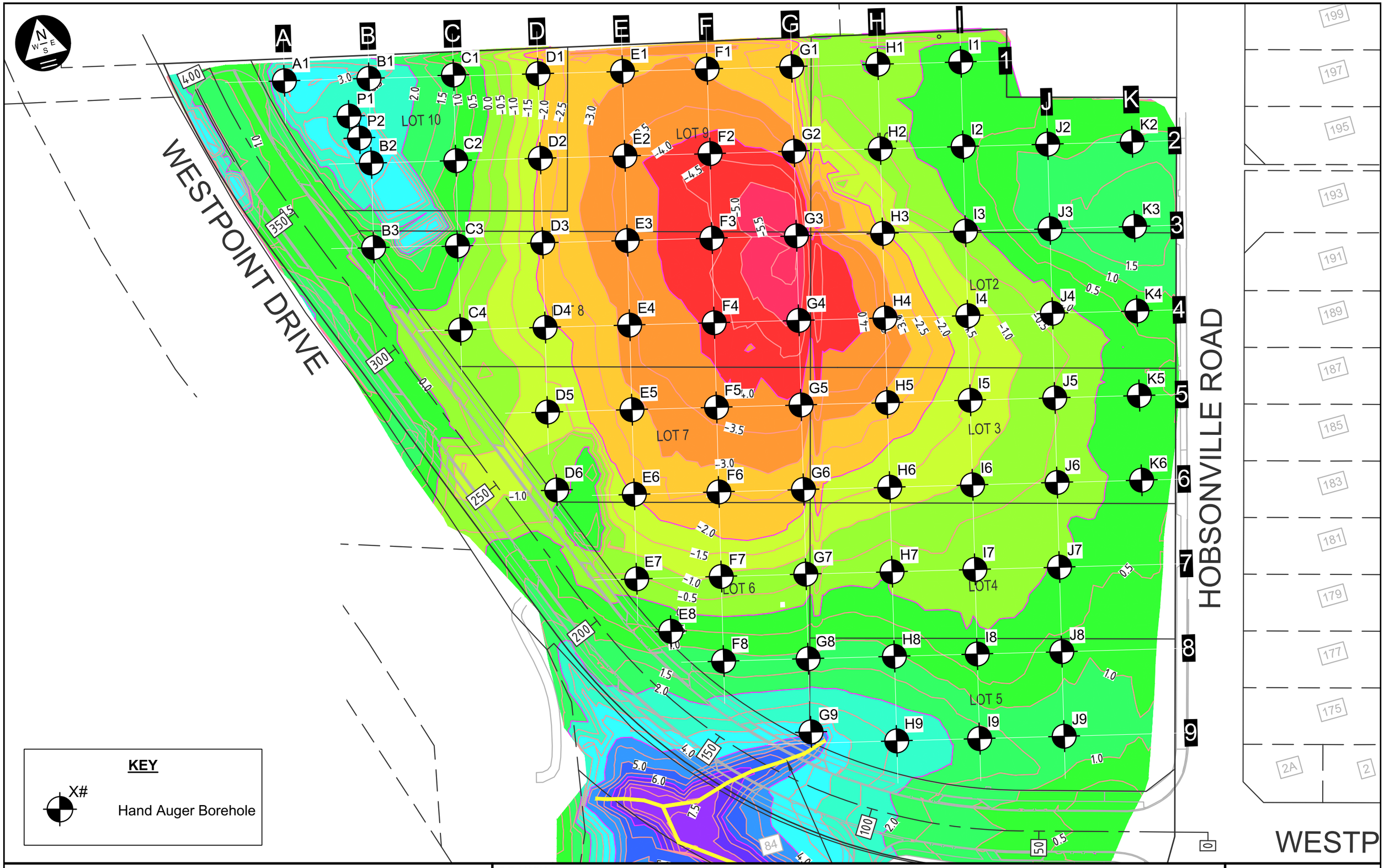
Website: www.geotek.co.nz

THOROUGH ANALYSIS • DEPENDABLE ADVICE

DRAWING TITLE:	Site Stability Design Zones over As-Built Finished Contour Plan
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2

SCALE	1:1000 @ A3
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS102 REV02



KEY

X# Hand Auger Borehole

GEOTEK SOLUTIONS

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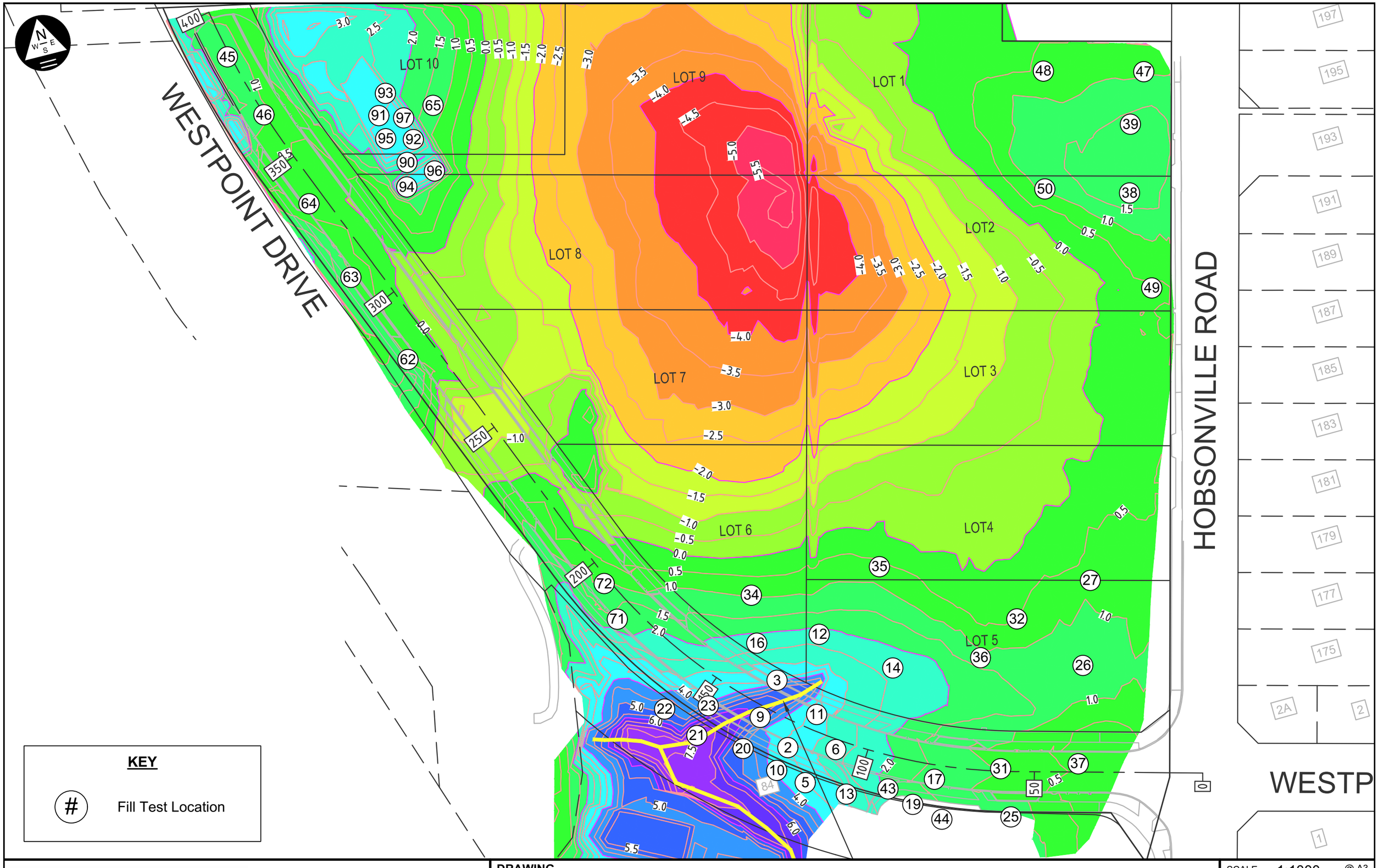
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

THOROUGH ANALYSIS • DEPENDABLE ADVICE

DRAWING TITLE:	Check Borehole Locations over As-Built Cut/Fill Plan
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2

SCALE	1:1000 @ A3
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS103 REV02



KEY

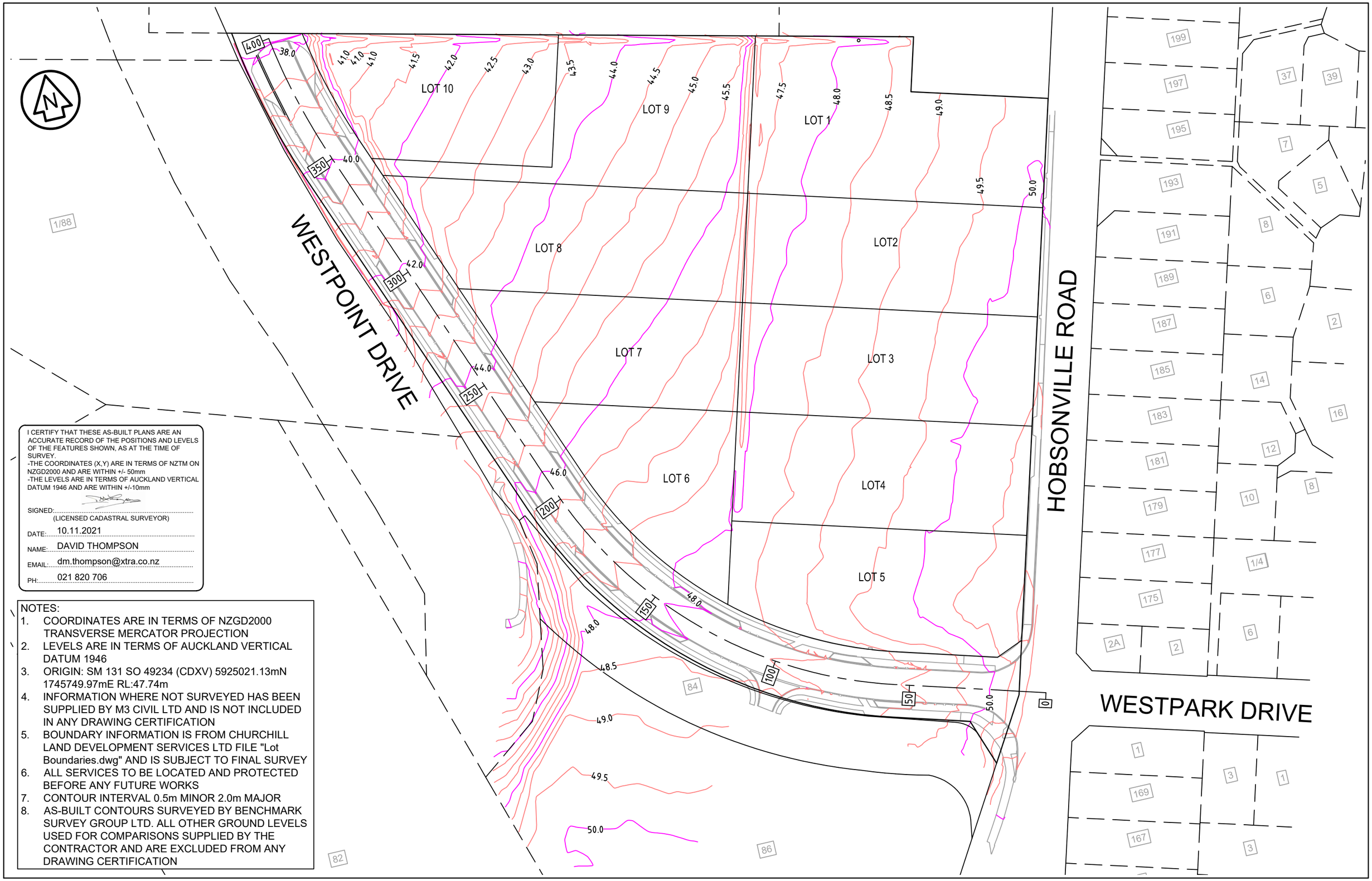
(#) Fill Test Location

GEOTEK SOLUTIONS

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

THOROUGH ANALYSIS • DEPENDABLE ADVICE

DRAWING TITLE:	Fill Test Locations over As-Built Cut/Fill Plan
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2
SCALE	1:1000 @ A3
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS104 REV 02



I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE POSITIONS AND LEVELS OF THE FEATURES SHOWN, AS AT THE TIME OF SURVEY.
-THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD2000 AND ARE WITHIN +/- 50mm
-THE LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946 AND ARE WITHIN +/-10mm

SIGNED:
(LICENSED CADASTRAL SURVEYOR)
DATE: 10.11.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

NOTES:
1. COORDINATES ARE IN TERMS OF NZGD2000 TRANSVERSE MERCATOR PROJECTION
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946
3. ORIGIN: SM 131 SO 49234 (CDXV) 5925021.13mN 1745749.97mE RL:47.74m
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8. AS-BUILT CONTOURS SURVEYED BY BENCHMARK SURVEY GROUP LTD. ALL OTHER GROUND LEVELS USED FOR COMPARISONS SUPPLIED BY THE CONTRACTOR AND ARE EXCLUDED FROM ANY DRAWING CERTIFICATION

ISSUE	DATE	AMENDMENT	BY	APPD.
–	08.21	ISSUED TO CLIENT	AG	AG

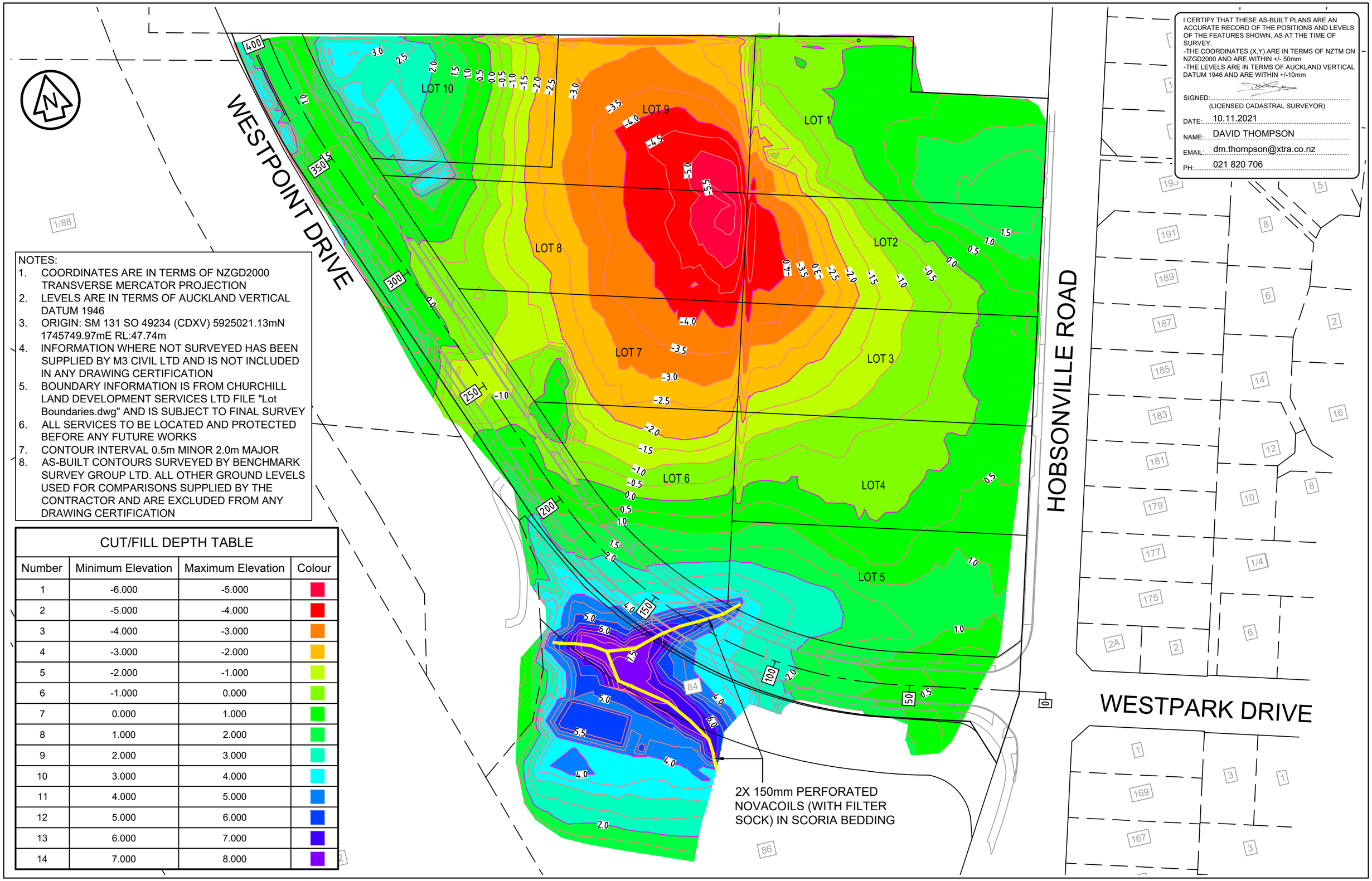
SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE

AS-BUILT SURVEY: FINISHED CONTOUR PLAN

CAD FILE AB07.DWG
DATE 10.08.2021
SCALE (A3) 1:1250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB07/001
ISSUE –



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CUT/FILL DEPTH TABLE

Number	Minimum Elevation	Maximum Elevation	Colour
1	-6.000	-5.000	
2	-5.000	-4.000	
3	-4.000	-3.000	
4	-3.000	-2.000	
5	-2.000	-1.000	
6	-1.000	0.000	
7	0.000	1.000	
8	1.000	2.000	
9	2.000	3.000	
10	3.000	4.000	
11	4.000	5.000	
12	5.000	6.000	
13	6.000	7.000	
14	7.000	8.000	

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SIGNED: .....
(LICENSED CADASTRAL SURVEYOR)
DATE: 10.11.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

ISSUE	DATE	AMENDMENT	BY	APPD.
–	08.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
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PAPAKURA
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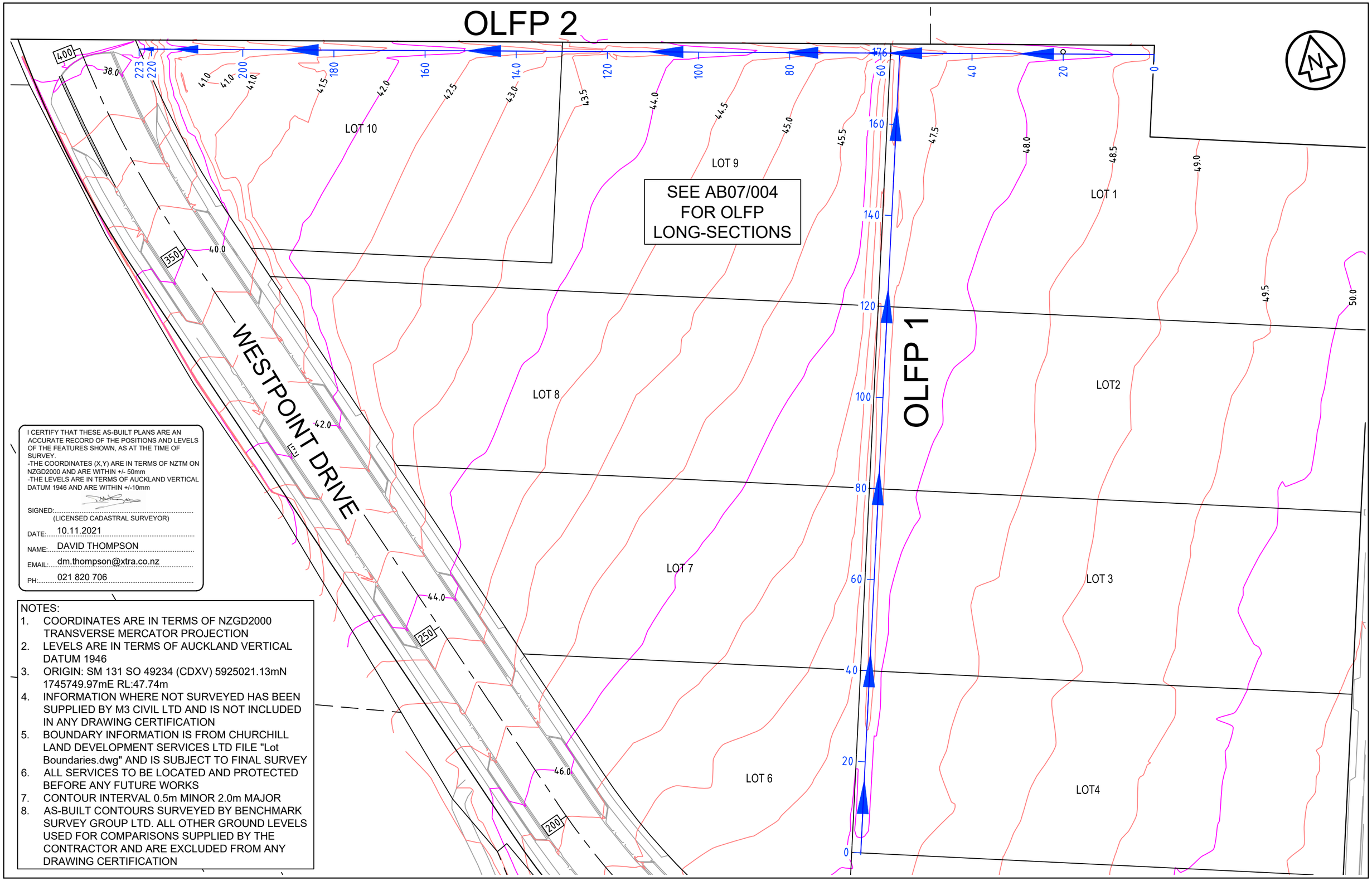
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE

AS-BUILT SURVEY: CUT/FILL ISOPACH

CAD FILE AB07.DWG
DATE 10.08.2021
SCALE (A3) 1:1250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB07/002
ISSUE –



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SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
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MOB: (021)640772
Email: info@bmsurvey.co.nz

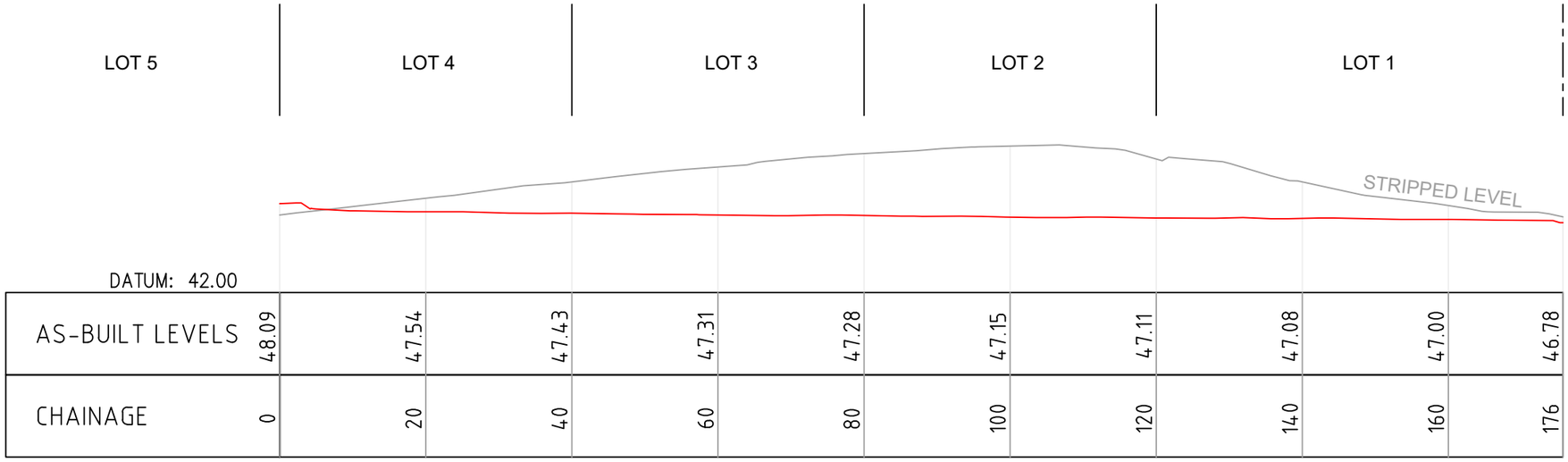
CLIENT NAME: m3 Civil Limited

DRAWING TITLE:

86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE

AS-BUILT SURVEY: OVERLAND FLOW PATH

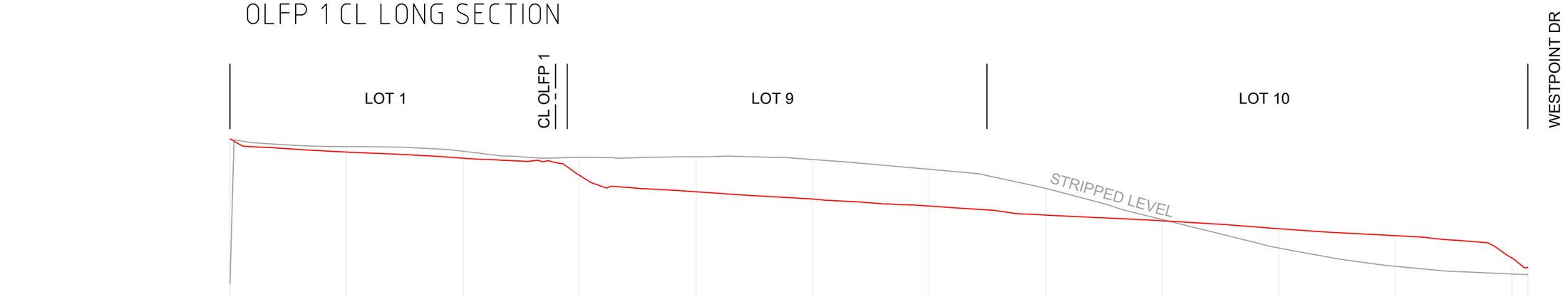
CAD FILE AB07.DWG		DATE 10.08.2021	
SCALE (A3) 1:750		CONTRACT No.	
BMG REF. No. 011–A20–001		ISSUE	
DWG. No. AB07/003		–	



DATUM: 42.00

AS-BUILT LEVELS	48.09	47.54	47.43	47.31	47.28	47.15	47.11	47.08	47.00	46.78
CHAINAGE	0	20	40	60	80	100	120	140	160	176

OLFP 1 CL LONG SECTION



DATUM: 32.00

AS-BUILT LEVELS	48.79	47.69	47.16	45.68	44.27	43.65	43.05	42.28	41.79	41.09	40.51	38.59	37.79
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	223

OLFP 2 CL LONG SECTION

NOTES:
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6. ALL SERVICES TO BE LOCATED AND PROTECTED BEFORE ANY FUTURE WORKS
7. CONTOUR INTERVAL 0.5m MINOR 2.0m MAJOR
8. AS-BUILT CONTOURS SURVEYED BY BENCHMARK SURVEY GROUP LTD. ALL OTHER GROUND LEVELS USED FOR COMPARISONS SUPPLIED BY THE CONTRACTOR AND ARE EXCLUDED FROM ANY DRAWING CERTIFICATION

I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE POSITIONS AND LEVELS OF THE FEATURES SHOWN, AS AT THE TIME OF SURVEY.
-THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD2000 AND ARE WITHIN +/- 50mm
-THE LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946 AND ARE WITHIN +/-10mm

SIGNED:.....
(LICENSED CADASTRAL SURVEYOR)
DATE: 10.11.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

ISSUE	DATE	AMENDMENT	BY	APPD.
–	08.21	ISSUED TO CLIENT	AG	AG

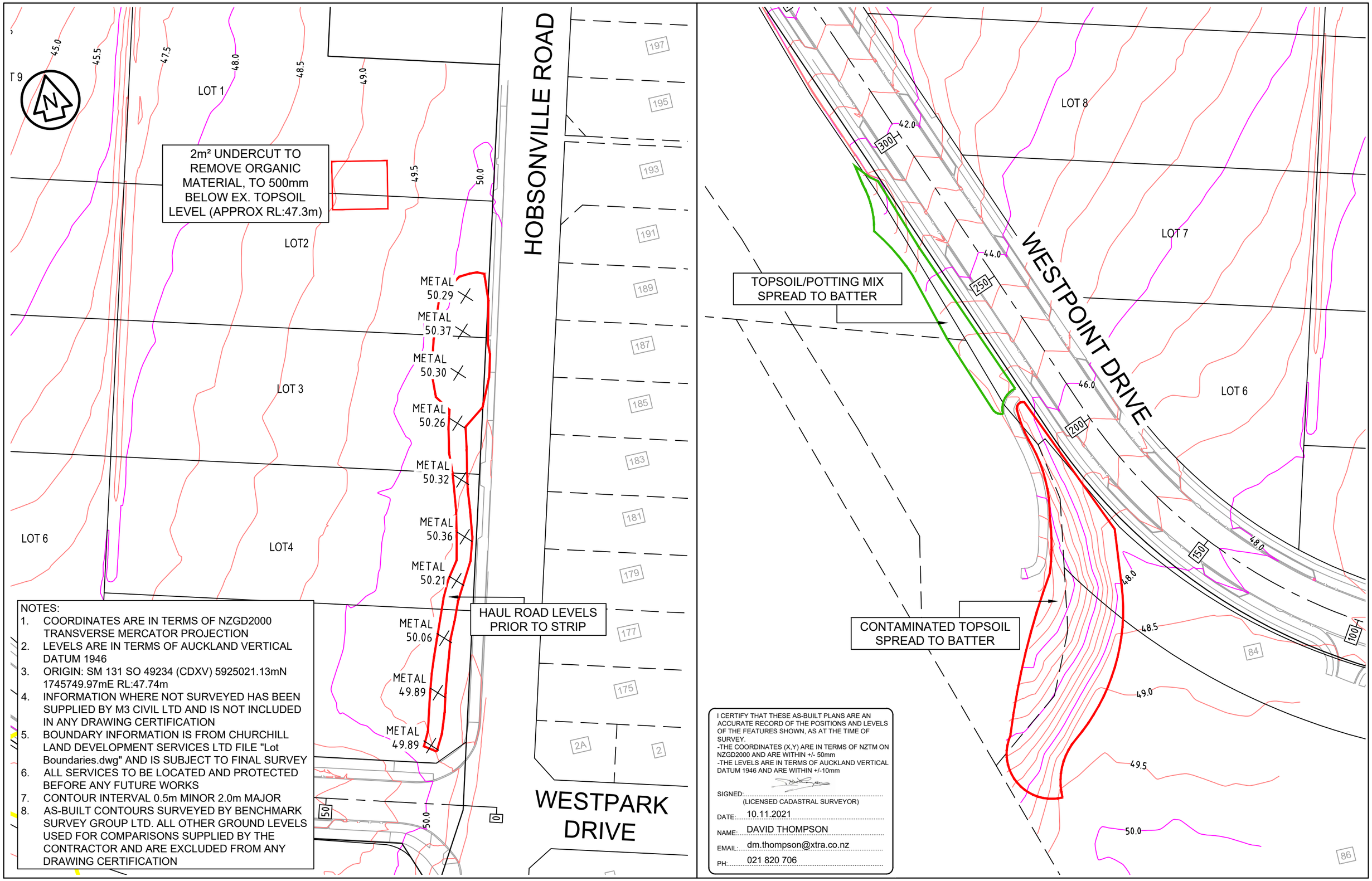
SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE

AS-BUILT SURVEY: OVERLAND FLOW PATH

CAD FILE AB07.DWG
DATE 10.08.2021
SCALE (A3) 1:750
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB07/004
ISSUE –



NOTES:
1. COORDINATES ARE IN TERMS OF NZGD2000 TRANSVERSE MERCATOR PROJECTION
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946
3. ORIGIN: SM 131 SO 49234 (CDXV) 5925021.13mN 1745749.97mE RL:47.74m
4. INFORMATION WHERE NOT SURVEYED HAS BEEN SUPPLIED BY M3 CIVIL LTD AND IS NOT INCLUDED IN ANY DRAWING CERTIFICATION
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CLIENT NAME: m³ Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE

AS-BUILT SURVEY: EARTHWORKS REFERENCE

CAD FILE	AB07.DWG
DATE	10.08.2021
SCALE (A3)	1:1000
CONTRACT No.	
BMG REF. No.	011–A20–001
ISSUE	–
DWG. No.	AB07/005

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EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

WWMH A-2
WWMH GA
WWMH GB
WWMH GC
WWMH GD
WWMH GE
WWMH GF
WWMH BG
WWMH BF
WWMH BH
WWMH BI
WWMH BJ
WWMH BK
WWMH BL
WWMH BM
WWMH BN
WWMH BO
WWMH BP
WWMH BQ
WWMH BR
WWMH BS
WWMH BT
WWMH BU
WWMH CA
WWMH CB
WWMH CC
WWMH CD
WWMH CE
WWMH DA
WWMH FA

AB02/002
AB02/003
AB02/004
AB02/005
AB02/006

SEC 1 SO 511858
SEC 2 SO 511858
SEC 3 SO 511858
SEC 6 SO 511858
SEC 2 SO 490597
PT LOT 1 DP 56849
LOT 2 DP 531542
LOT 1
LOT2
LOT 3
LOT4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10

HOBSONVILLE ROAD
WESTPARK DRIVE
WESTPOINT DRIVE

LOCATION

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

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1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: WW DRAINAGE - LOCATION AND OVERVIEW

CAD FILE AB02.DWG DATE 26.05.2021
SCALE (A3) 1:2250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE –
DWG. No. AB02/001

Schedule of Coordinates Wastewater		
Shown	mN	mE
WWMH A2	5925314.03	1745483.82
WWMH GA	5925284.36	1745476.53
WWMH GB	5925204.44	1745420.23
WWMH GC	5925191.10	1745415.87

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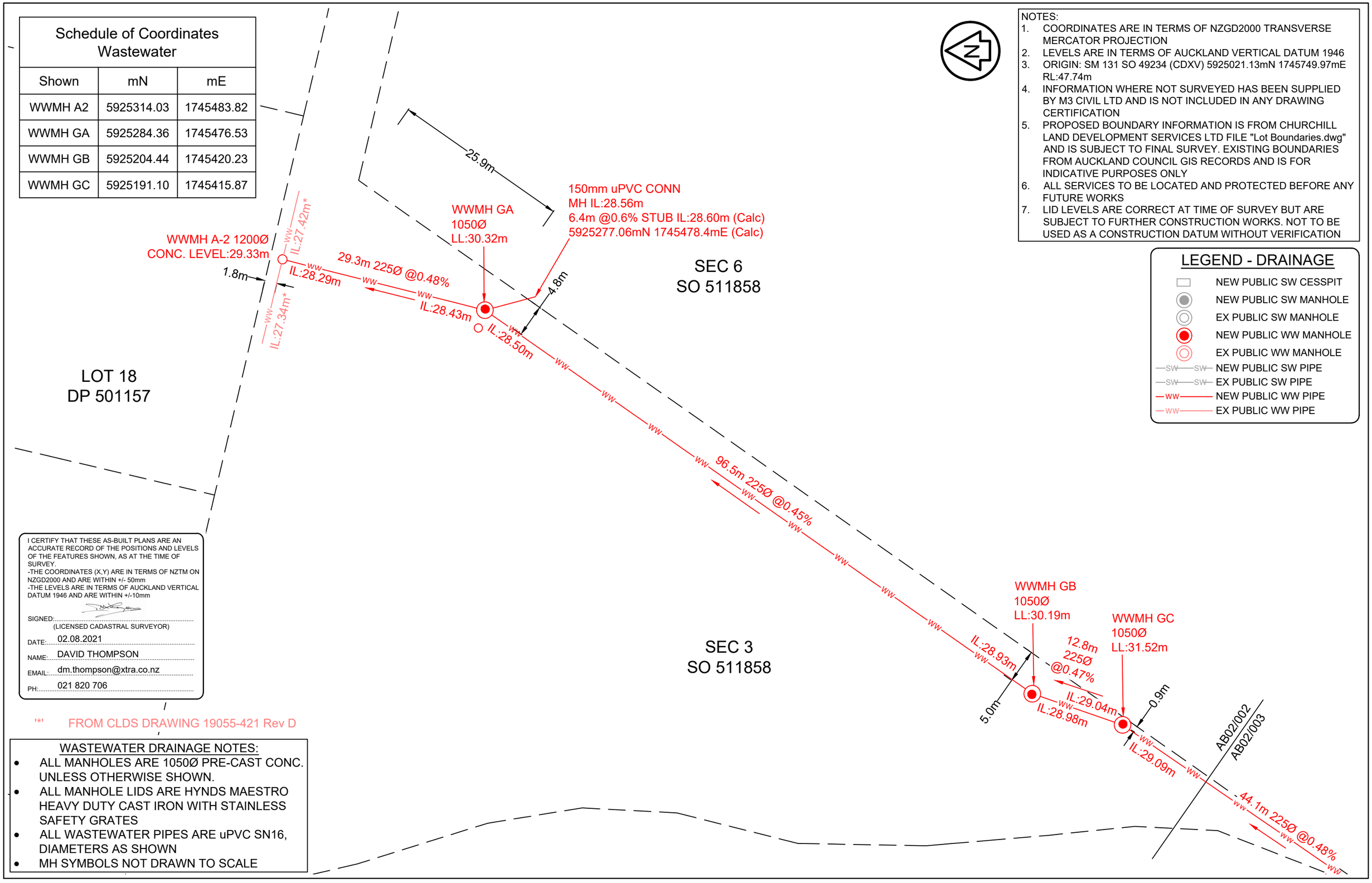
LEGEND - DRAINAGE
- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE



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DATE: 02.08.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

'*' FROM CLDS DRAWING 19055-421 Rev D

WASTEWATER DRAINAGE NOTES:
- ALL MANHOLES ARE 1050Ø PRE-CAST CONC. UNLESS OTHERWISE SHOWN.
- ALL MANHOLE LIDS ARE HYNDS MAESTRO HEAVY DUTY CAST IRON WITH STAINLESS SAFETY GRATES
- ALL WASTEWATER PIPES ARE uPVC SN16, DIAMETERS AS SHOWN
- MH SYMBOLS NOT DRAWN TO SCALE

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD PAPAKURA AUCKLAND 2110
TEL: (09)283 8495 MOB: (021)640772 Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: WASTEWATER DRAINAGE

CAD FILE AB02.DWG DATE 26.05.2021
SCALE (A3) 1:500 CONTRACT No.
BMG REF. No. 011–A20–001 ISSUE
DWG. No. AB02/002 –

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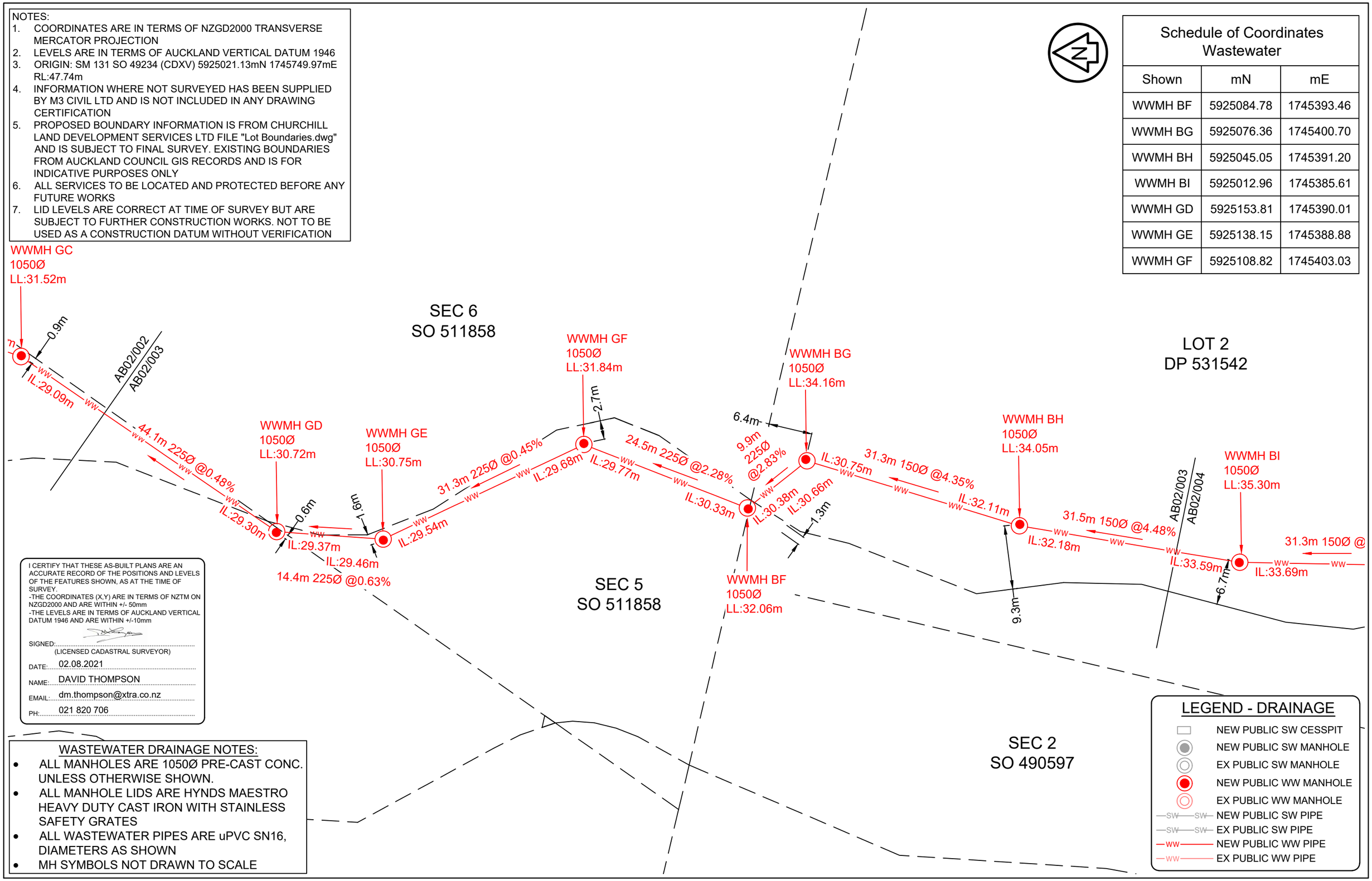
Schedule of Coordinates Wastewater		
Shown	mN	mE
WWMH BF	5925084.78	1745393.46
WWMH BG	5925076.36	1745400.70
WWMH BH	5925045.05	1745391.20
WWMH BI	5925012.96	1745385.61
WWMH GD	5925153.81	1745390.01
WWMH GE	5925138.15	1745388.88
WWMH GF	5925108.82	1745403.03



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WASTEWATER DRAINAGE NOTES:

- ALL MANHOLES ARE 1050Ø PRE-CAST CONC. UNLESS OTHERWISE SHOWN.
- ALL MANHOLE LIDS ARE HYNDS MAESTRO HEAVY DUTY CAST IRON WITH STAINLESS SAFETY GRATES
- ALL WASTEWATER PIPES ARE uPVC SN16, DIAMETERS AS SHOWN
- MH SYMBOLS NOT DRAWN TO SCALE

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- SW SW NEW PUBLIC SW PIPE
- SW SW EX PUBLIC SW PIPE
- WW NEW PUBLIC WW PIPE
- WW EX PUBLIC WW PIPE

ISSUE	DATE	AMENDMENT	BY	APPD
–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: WASTEWATER DRAINAGE

CAD FILE AB02.DWG
DATE 26.05.2021
SCALE (A3) 1:500
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB02/003
ISSUE –

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- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE

LOT 2
DP 531542

LOT 10

LOT 8

AB02/005
AB02/004

AB02/003
AB02/004

AB02/006
AB02/004

WESTPOINT DRIVE
(SPINE ROAD)

WWMH BI
1050Ø
LL:35.30m

WWMH BJ
1050Ø
LL:36.66m

WWMH CA
1050Ø
LL:38.72m

WWMH BK
1050Ø
LL:38.17m

WWMH BL
1050Ø
LL:39.22m

WWMH DA
1050Ø
LL:42.83m

WWMH BM
1050Ø
LL:42.59m

150Ø uPVC CONN
MH IL:41.05m
9.0m @9.9%
STUB IL:41.94m
5924849.23mN
1745448.11mE

150Ø uPVC CONN
IL:41.04m

IL:40.99m
1.6m

22.5m 150Ø
@1.07%
IL:40.75m

IL:40.71m

IL:40.66m
.9m

75.8m 150Ø @4.14%

IL:37.52m

25.1m 150Ø @4.26%
IL:37.47m
2.0m

IL:36.76m
150Ø uPVC CONN

90.3m 150Ø @5.36%
IL:36.75m
1.8m
3.9m

IL:36.70m
22.5m 150Ø
@1.20%

IL:36.43m
IL:36.40m
IL:36.35m
2.0m

8%
IL:33.59m
6.7m
31.3m 150Ø @4.57%
IL:33.69m
IL:35.12m
5.9m
31.3m 150Ø @3.77%
IL:35.17m

WASTEWATER DRAINAGE NOTES:
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- MH SYMBOLS NOT DRAWN TO SCALE

Schedule of Coordinates Wastewater

Shown	mN	mE
WWMH BI	5925012.96	1745385.61
WWMH BJ	5924980.33	1745384.98
WWMH BK	5924947.90	1745388.51
WWMH BL	5924922.41	1745394.56
WWMH BM	5924850.05	1745421.39
WWMH CA	5924950.12	1745412.24
WWMH DA	5924858.44	1745443.56

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

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1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
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CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: WASTEWATER DRAINAGE

CAD FILE AB02.DWG
DATE 26.05.2021
SCALE (A3) 1:500
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB02/004
ISSUE –

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Schedule of Coordinates Wastewater

Shown	mN	mE
WWMH CB	5924928.92	1745501.31
WWMH CC	5924911.84	1745575.66
WWMH CD	5924839.60	1745554.84
WWMH CE	5924784.72	1745539.26

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
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- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
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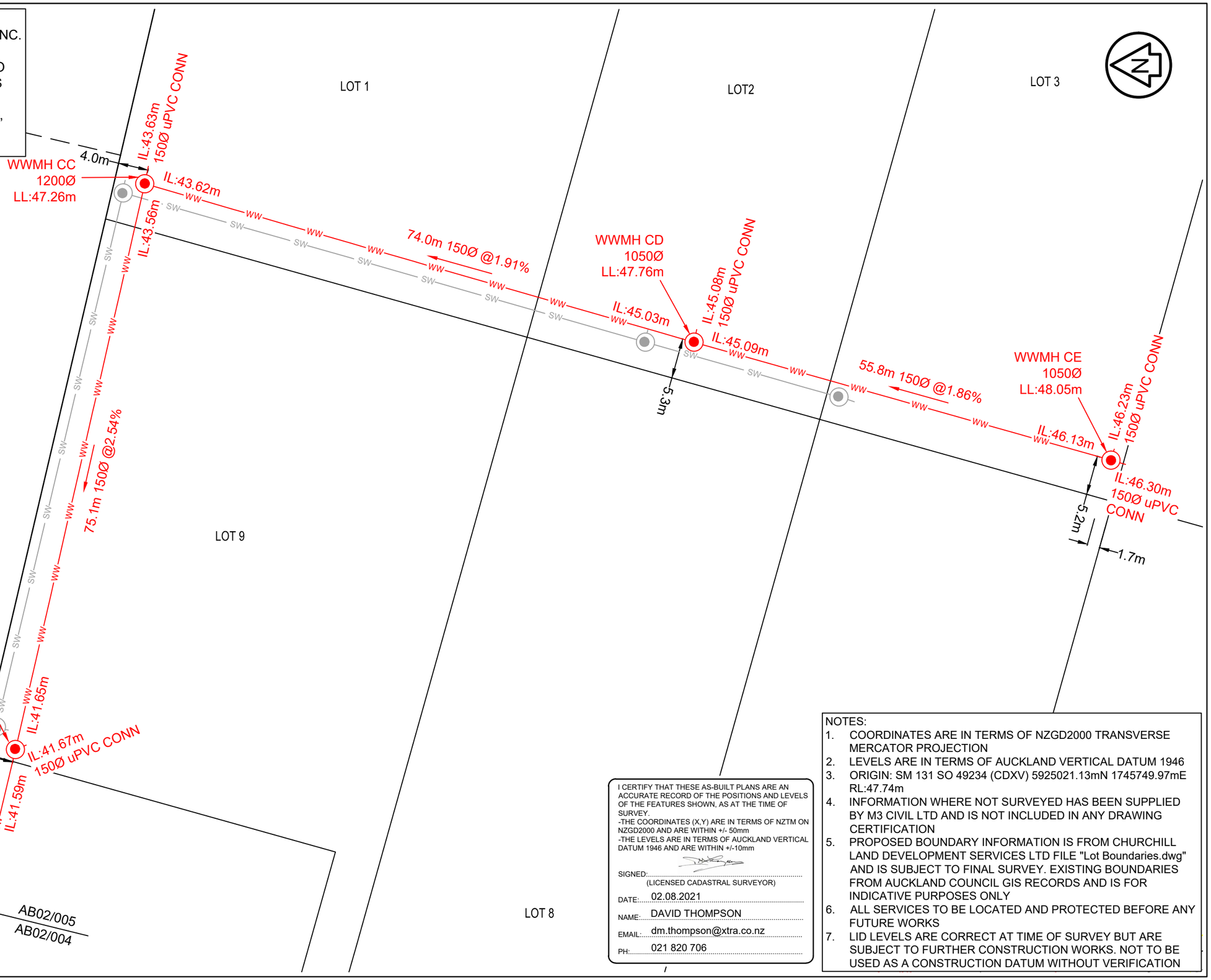

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CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: WASTEWATER DRAINAGE

CAD FILE AB02.DWG DATE 26.05.2021
SCALE (A3) 1:500 CONTRACT No.
BMG REF. No. 011–A20–001 ISSUE
DWG. No. AB02/005 –

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PH: 021 820 706

LOT 7
LOT 6
LOT 5
AB02/006
AB02/004

WWMH FA
1050Ø
LL:45.06m
IL:43.84m
150Ø uPVC CONN
IL:43.79m
22.3m 150Ø @2.60%
IL:43.21m
55.2m 150Ø @4.29%
IL:43.08m
IL:43.13m
34.1m 150Ø @2.76%
IL:44.07m
IL:44.12m
27.9m 150Ø @3.51%
IL:45.10m
IL:45.15m
27.8m 150Ø @1.98%
IL:45.70m
21.6m 150Ø @1.20%
IL:45.75m
IL:46.01m
12.6m 150Ø @2.06%
IL:46.32m
IL:46.06m
25.8m 150Ø @1.16%
IL:46.38m
IL:46.68m
WWMH BU
1050Ø
LL:48.95m
150Ø uPVC CONN
IL:47.04m
1.1m
IL:46.99m
23.4m 150Ø @1.11%
IL:46.73m
2.1m
WWMH BT
1050Ø
LL:48.64m
WWMH BN
1050Ø
LL:45.04m
WWMH BO
1050Ø
LL:46.55m
WWMH BP
1050Ø
LL:47.52m
WWMH BQ
1050Ø
LL:48.07m
WWMH BR
1050Ø
LL:48.33m
WWMH BS
1050Ø
LL:48.43m
2.1m
2.0m
2.1m
2.0m
2.0m
2.4m
84

WESTPOINT DRIVE
(SPINE ROAD)

Schedule of Coordinates Wastewater

Shown	mN	mE
WWMH BN	5924797.44	1745441.71
WWMH BO	5924764.43	1745454.26
WWMH BP	5924738.49	1745467.62
WWMH BQ	5924715.13	1745484.96
WWMH BR	5924699.10	1745501.29
WWMH BS	5924690.90	1745512.43
WWMH BT	5924676.31	1745535.62
WWMH BU	5924693.56	1745553.26
WWMH FA	5924805.95	1745463.72

WASTEWATER DRAINAGE NOTES:
- ALL MANHOLES ARE 1050Ø PRE-CAST CONC. UNLESS OTHERWISE SHOWN.
- ALL MANHOLE LIDS ARE HYNDS MAESTRO HEAVY DUTY CAST IRON WITH STAINLESS SAFETY GRATES
- ALL WASTEWATER PIPES ARE uPVC SN16, DIAMETERS AS SHOWN
- MH SYMBOLS NOT DRAWN TO SCALE

LEGEND - DRAINAGE
- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: WASTEWATER DRAINAGE

CAD FILE AB02.DWG
DATE 26.05.2021
SCALE (A3) 1:500
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB02/006
–

NOTES:
1. COORDINATES ARE IN TERMS OF NZGD2000 TRANSVERSE MERCATOR PROJECTION
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946
3. ORIGIN: SM 131 SO 49234 (CDXV) 5925021.13mN 1745749.97mE RL:47.74m
4. INFORMATION WHERE NOT SURVEYED HAS BEEN SUPPLIED BY M3 CIVIL LTD AND IS NOT INCLUDED IN ANY DRAWING CERTIFICATION
5. PROPOSED BOUNDARY INFORMATION IS FROM CHURCHILL LAND DEVELOPMENT SERVICES LTD FILE "Lot Boundaries.dwg" AND IS SUBJECT TO FINAL SURVEY. EXISTING BOUNDARIES FROM AUCKLAND COUNCIL GIS RECORDS AND IS FOR INDICATIVE PURPOSES ONLY
6. ALL SERVICES TO BE LOCATED AND PROTECTED BEFORE ANY FUTURE WORKS
7. LID LEVELS ARE CORRECT AT TIME OF SURVEY BUT ARE SUBJECT TO FURTHER CONSTRUCTION WORKS. NOT TO BE USED AS A CONSTRUCTION DATUM WITHOUT VERIFICATION

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE
- PUBLIC SW PIPE REMOVED
- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN

LOT 2
DP 531542

SEC 1
SO 490597

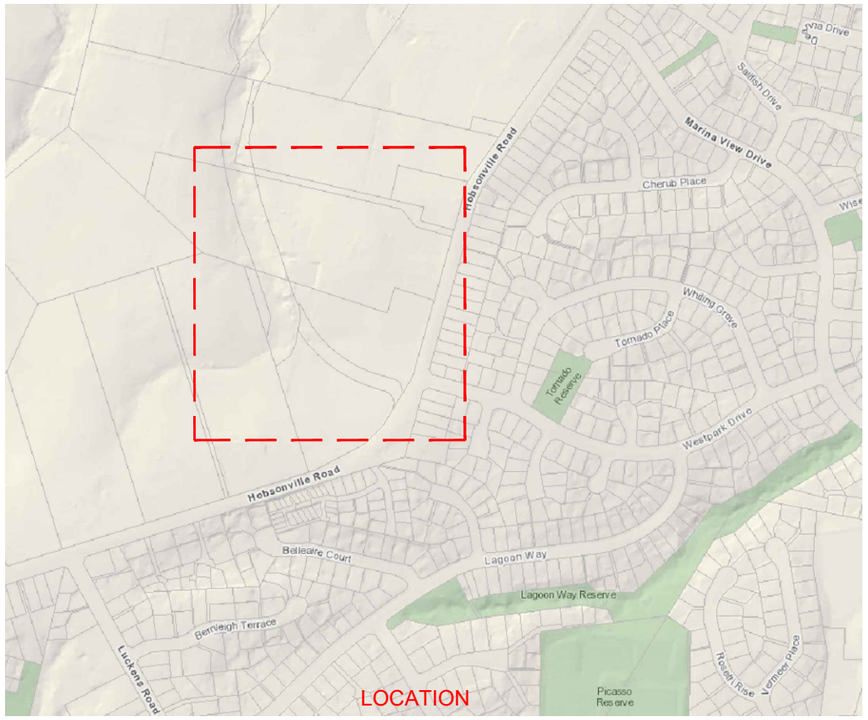
LOT 1
LOT2
LOT 3
LOT4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10

HOBSONVILLE ROAD
WESTPARK DRIVE
WESTPOINT DRIVE

AB03/002
AB03/003
AB03/004
AB03/005
AB03/006
AB03/007
AB03/008

SWMH A1 (SWOT A1)
SWMH A2
SWMH A3
SWMH A4
SWMH A5
SWMH A6
SWMH B1
SWMH B2
SWMH B3
SWMH B4
SWMH C1 (SWOT C1)
SWMH C2
SWMH C3
SWMH C4
SWMH C5
SWMH C6
SWMH C7
SWMH C8
SWMH C9
SWMH C10
SWMH C11
SWMH C12
SWMH C13
SWMH C14
SWMH D1
SWMH W1

EX SW ASSETS REMOVED. SEE AB03/005-007 FOR ASSETS ID'S



I CERTIFY THAT THESE AS-BUILT PLANS ARE AN ACCURATE RECORD OF THE POSITIONS AND LEVELS OF THE FEATURES SHOWN, AS AT THE TIME OF SURVEY.
-THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD2000 AND ARE WITHIN +/- 50mm
-THE LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946 AND ARE WITHIN +/-10mm

SIGNED:.....
(LICENSED CADASTRAL SURVEYOR)
DATE: 06.08.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: SW DRAINAGE - LOCATION AND OVERVIEW

CAD FILE AB03.DWG		DATE 26.05.2021	
SCALE (A3) 1:1500		CONTRACT No.	
BMG REF. No. 011–A20–001		ISSUE	
DWG. No. AB03/001		–	

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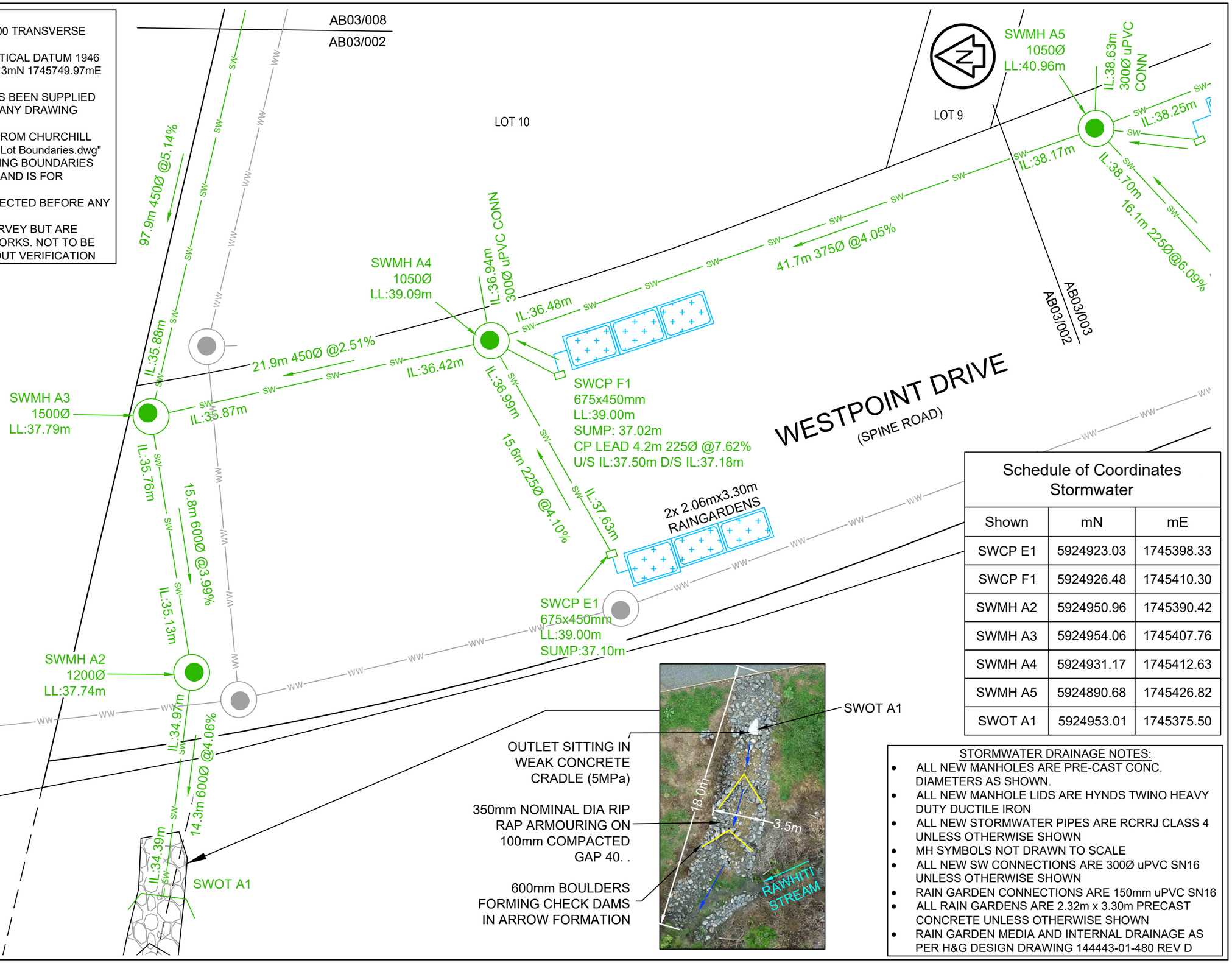
PH: 021 820 706



LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE
- PUBLIC SW PIPE REMOVED
- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN

Schedule of Coordinates Stormwater

Shown	mN	mE
SWCP E1	5924923.03	1745398.33
SWCP F1	5924926.48	1745410.30
SWMH A2	5924950.96	1745390.42
SWMH A3	5924954.06	1745407.76
SWMH A4	5924931.17	1745412.63
SWMH A5	5924890.68	1745426.82
SWOT A1	5924953.01	1745375.50

STORMWATER DRAINAGE NOTES:
- ALL NEW MANHOLES ARE PRE-CAST CONC. DIAMETERS AS SHOWN.
- ALL NEW MANHOLE LIDS ARE HYNDS TWINO HEAVY DUTY DUCTILE IRON
- ALL NEW STORMWATER PIPES ARE RCRRJ CLASS 4 UNLESS OTHERWISE SHOWN
- MH SYMBOLS NOT DRAWN TO SCALE
- ALL NEW SW CONNECTIONS ARE 300Ø uPVC SN16 UNLESS OTHERWISE SHOWN
- RAIN GARDEN CONNECTIONS ARE 150mm uPVC SN16
- ALL RAIN GARDENS ARE 2.32m x 3.30m PRECAST CONCRETE UNLESS OTHERWISE SHOWN
- RAIN GARDEN MEDIA AND INTERNAL DRAINAGE AS PER H&G DESIGN DRAWING 144443-01-480 REV D

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD PAPAKURA AUCKLAND 2110
TEL: (09)283 8495 MOB: (021)640772 Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: STORMWATER DRAINAGE

CAD FILE AB03.DWG DATE 26.05.2021
SCALE (A3) 1:250 CONTRACT No.
BMG REF. No. 011–A20–001 ISSUE
DWG. No. AB03/002 –

NOTES:
1. COORDINATES ARE IN TERMS OF NZGD2000 TRANSVERSE MERCATOR PROJECTION
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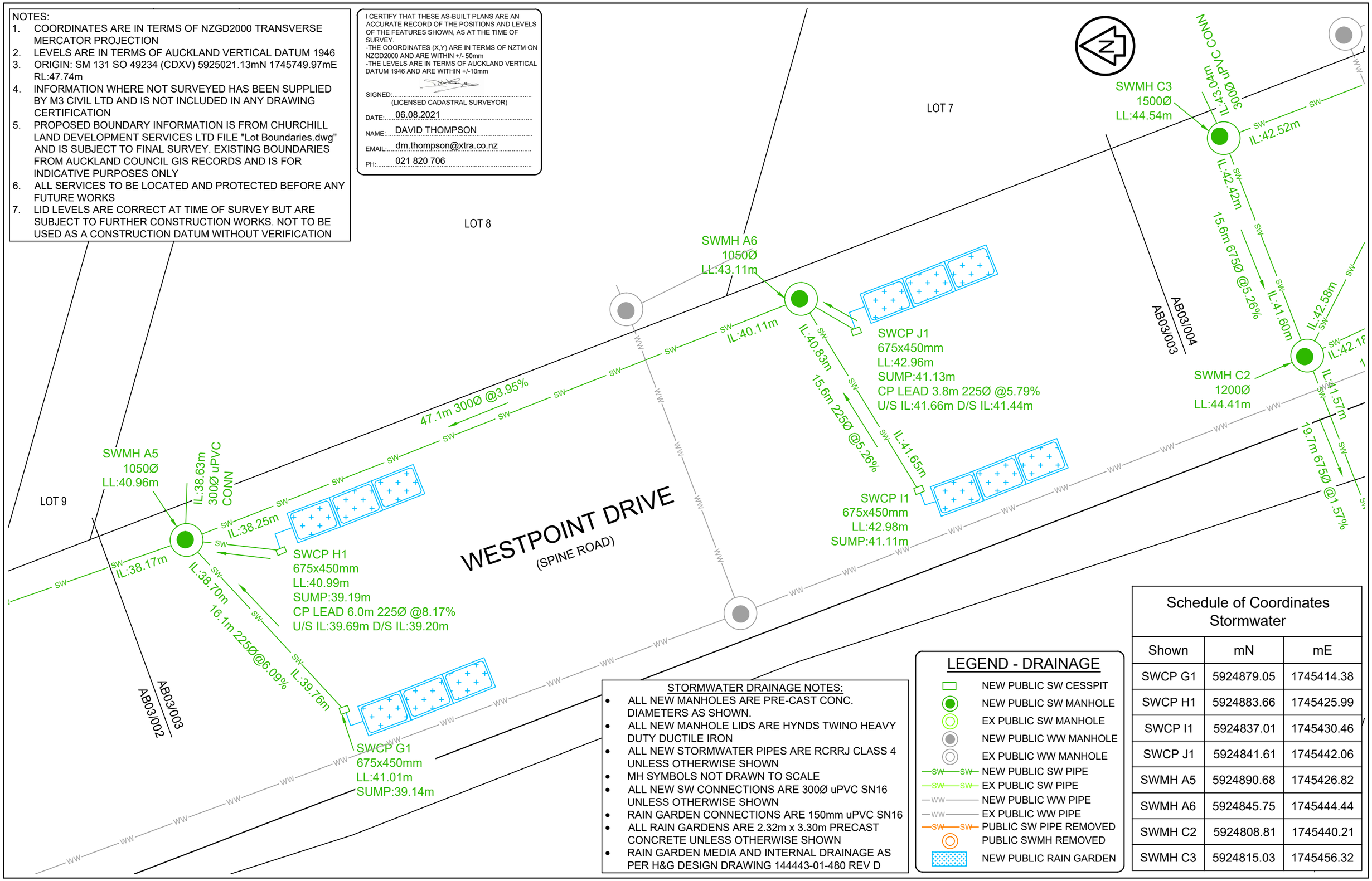
PH: 021 820 706



STORMWATER DRAINAGE NOTES:
- ALL NEW MANHOLES ARE PRE-CAST CONC. DIAMETERS AS SHOWN.
- ALL NEW MANHOLE LIDS ARE HYNDS TWINO HEAVY DUTY DUCTILE IRON
- ALL NEW STORMWATER PIPES ARE RCRRJ CLASS 4 UNLESS OTHERWISE SHOWN
- MH SYMBOLS NOT DRAWN TO SCALE
- ALL NEW SW CONNECTIONS ARE 300Ø uPVC SN16 UNLESS OTHERWISE SHOWN
- RAIN GARDEN CONNECTIONS ARE 150mm uPVC SN16
- ALL RAIN GARDENS ARE 2.32m x 3.30m PRECAST CONCRETE UNLESS OTHERWISE SHOWN
- RAIN GARDEN MEDIA AND INTERNAL DRAINAGE AS PER H&G DESIGN DRAWING 144443-01-480 REV D

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE
- PUBLIC SW PIPE REMOVED
- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN

Schedule of Coordinates Stormwater

Shown	mN	mE
SWCP G1	5924879.05	1745414.38
SWCP H1	5924883.66	1745425.99
SWCP I1	5924837.01	1745430.46
SWCP J1	5924841.61	1745442.06
SWMH A5	5924890.68	1745426.82
SWMH A6	5924845.75	1745444.44
SWMH C2	5924808.81	1745440.21
SWMH C3	5924815.03	1745456.32

ISSUE	DATE	AMENDMENT	BY	APPD.
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SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: STORMWATER DRAINAGE

CAD FILE AB03.DWG
DATE 26.05.2021
SCALE (A3) 1:250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE –
DWG. No. AB03/003

STORMWATER DRAINAGE NOTES:

- ALL NEW MANHOLES ARE PRE-CAST CONC. DIAMETERS AS SHOWN.
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- ALL NEW STORMWATER PIPES ARE RCRRJ CLASS 4 UNLESS OTHERWISE SHOWN
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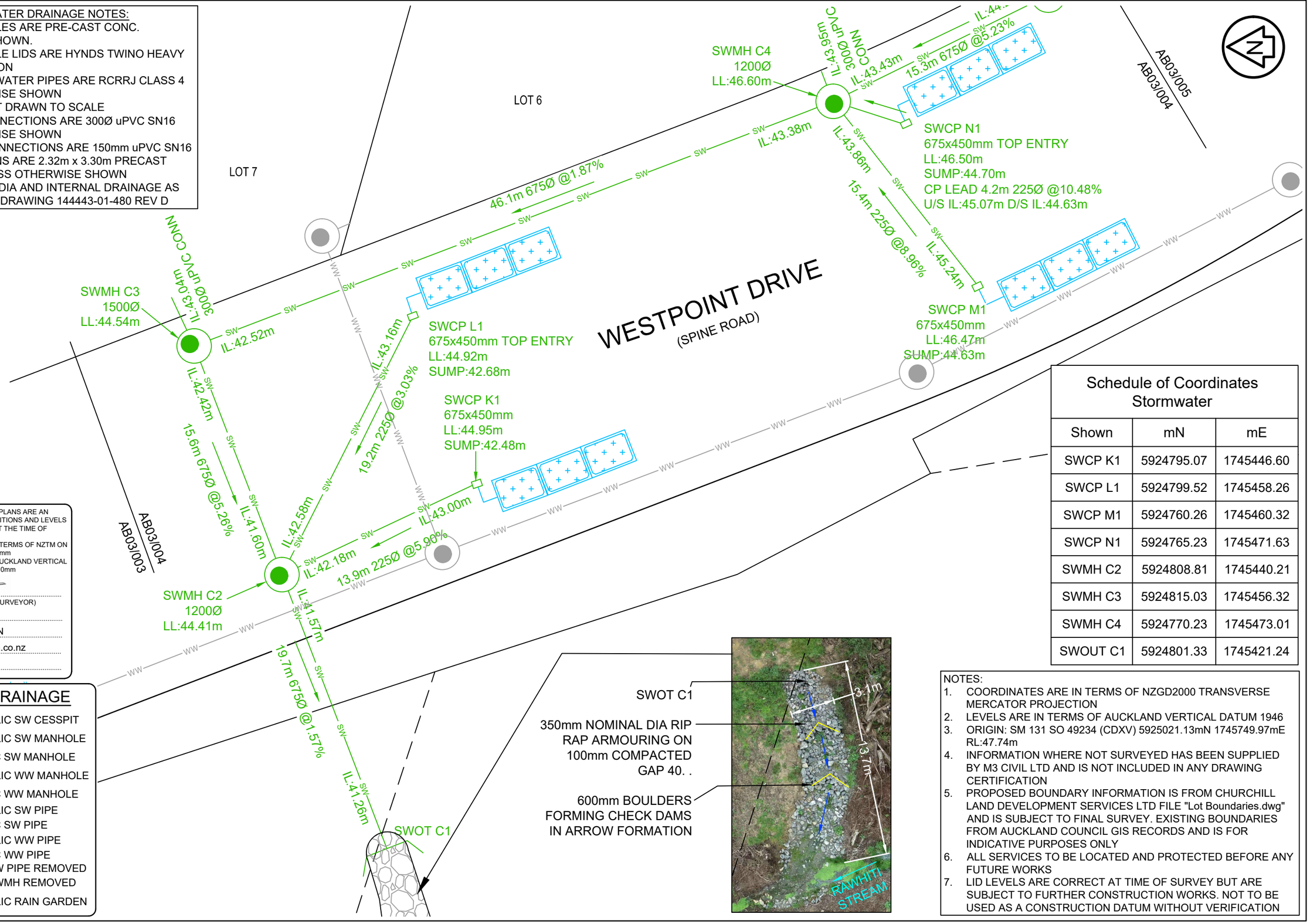
- ALL RAIN GARDENS ARE 2.32m x 3.30m PRECAST CONCRETE UNLESS OTHERWISE SHOWN
- RAIN GARDEN MEDIA AND INTERNAL DRAINAGE AS PER H&G DESIGN DRAWING 144443-01-480 REV D



Schedule of Coordinates Stormwater

Shown	mN	mE
SWCP K1	5924795.07	1745446.60
SWCP L1	5924799.52	1745458.26
SWCP M1	5924760.26	1745460.32
SWCP N1	5924765.23	1745471.63
SWMH C2	5924808.81	1745440.21
SWMH C3	5924815.03	1745456.32
SWMH C4	5924770.23	1745473.01
SWOUT C1	5924801.33	1745421.24

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SIGNED: .....
(LICENSED CADASTRAL SURVEYOR)
DATE: 06.08.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE
- PUBLIC SW PIPE REMOVED
- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN

SWOT C1

350mm NOMINAL DIA RIP RAP ARMOURING ON 100mm COMPACTED GAP 40. .

600mm BOULDERS FORMING CHECK DAMS IN ARROW FORMATION

NOTES:
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–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: STORMWATER DRAINAGE

CAD FILE AB03.DWG
DATE 26.05.2021
SCALE (A3) 1:250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB03/004
–

NOTES:
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STORMWATER DRAINAGE NOTES:
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- RAIN GARDEN MEDIA AND INTERNAL DRAINAGE AS PER H&G DESIGN DRAWING 144443-01-480 REV D

Schedule of Coordinates Stormwater

Shown	mN	mE
SWCP O1	5924728.22	1745479.13
SWCP P1	5924735.68	1745489.06
SWCP Q1	5924700.78	1745505.14
SWMH C5	5924755.43	1745480.71
SWMH C6	5924740.96	1745489.76
SWMH C7	5924730.66	1745497.91
SWMH C8	5924713.24	1745515.46
SWMH C9	5924701.49	1745531.51
SWMH D1	5924747.02	1745526.06

LOT 4
LOT 5
LOT 6

300Ø uPVC CONN
IL:46.51m
SWMH D1
1050Ø
LL:48.17m
IL:46.29m
34.2m 375Ø @2.78%
IL:46.31m
300Ø uPVC CONN
IL:45.34m
SWMH C8
1200Ø
LL:48.38m
SWMH C9
1200Ø
LL:48.55m
12.6m 600Ø @1.27%
IL:45.76m
SWMH
1200Ø
LL:48.6
18.4m 600Ø @1.36%
IL:45.60m
IL:45.55m
IL:47.18m
IL:45.80m
22.8m 375Ø @0.96%
AB03/006
AB03/005
IL:45.30m
SWCP R1
675x450mm
TOP ENTRY
LL:48.15m
SUMP:46.40m
CP LEAD 5.6m 225Ø @8.39%
U/S IL:46.91m D/S IL:46.44m
23.4m 675Ø @1.58%
IL:45.23m
IL:45.73m
15.1m 225Ø @7.02%
IL:46.79m
SWCP Q1
675x450mm
LL:48.10m
SUMP:46.25
SWMH C6
1200Ø
LL:47.72m
11.8m 675Ø
@1.61%
IL:44.62m
IL:44.81m
IL:44.86m
SWCP P1
675x450mm
LL:47.51m
SUMP:45.79m
CP LEAD 4.2m 225Ø @13.33%
U/S IL:46.24m D/S IL:45.68m
IL:45.11m
15.5m 225Ø @7.42%
IL:46.26m
SWCP O1
675x450mm
LL:47.58m
SUMP:45.72m
SWMH C5
1200Ø
LL:47.23m
IL:44.23m
15.3m 675Ø @5.23%
IL:44.30m
15.7m 675Ø @1.65%
IL:44.56m
AB03/004
AB03/005

WESTPOINT DRIVE
(SPINE ROAD)

EX SWMH 2000091713,
EX SWMH 2000157694,
EX SW 2000154282,
EX SW 2000572287 &
EX SW 2000018577 REMOVED

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE
- PUBLIC SW PIPE REMOVED
- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN

ISSUE	DATE	AMENDMENT	BY	APPD.
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SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
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Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: STORMWATER DRAINAGE

CAD FILE AB03.DWG
DATE 26.05.2021
SCALE (A3) 1:250
CONTRACT No.
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ISSUE
DWG. No. AB03/005
ISSUE –

NOTES:
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2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946
3. ORIGIN: SM 131 SO 49234 (CDXV) 5925021.13mN 1745749.97mE RL:47.74m
4. INFORMATION WHERE NOT SURVEYED HAS BEEN SUPPLIED BY M3 CIVIL LTD AND IS NOT INCLUDED IN ANY DRAWING CERTIFICATION
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6. ALL SERVICES TO BE LOCATED AND PROTECTED BEFORE ANY FUTURE WORKS
7. LID LEVELS ARE CORRECT AT TIME OF SURVEY BUT ARE SUBJECT TO FURTHER CONSTRUCTION WORKS. NOT TO BE USED AS A CONSTRUCTION DATUM WITHOUT VERIFICATION

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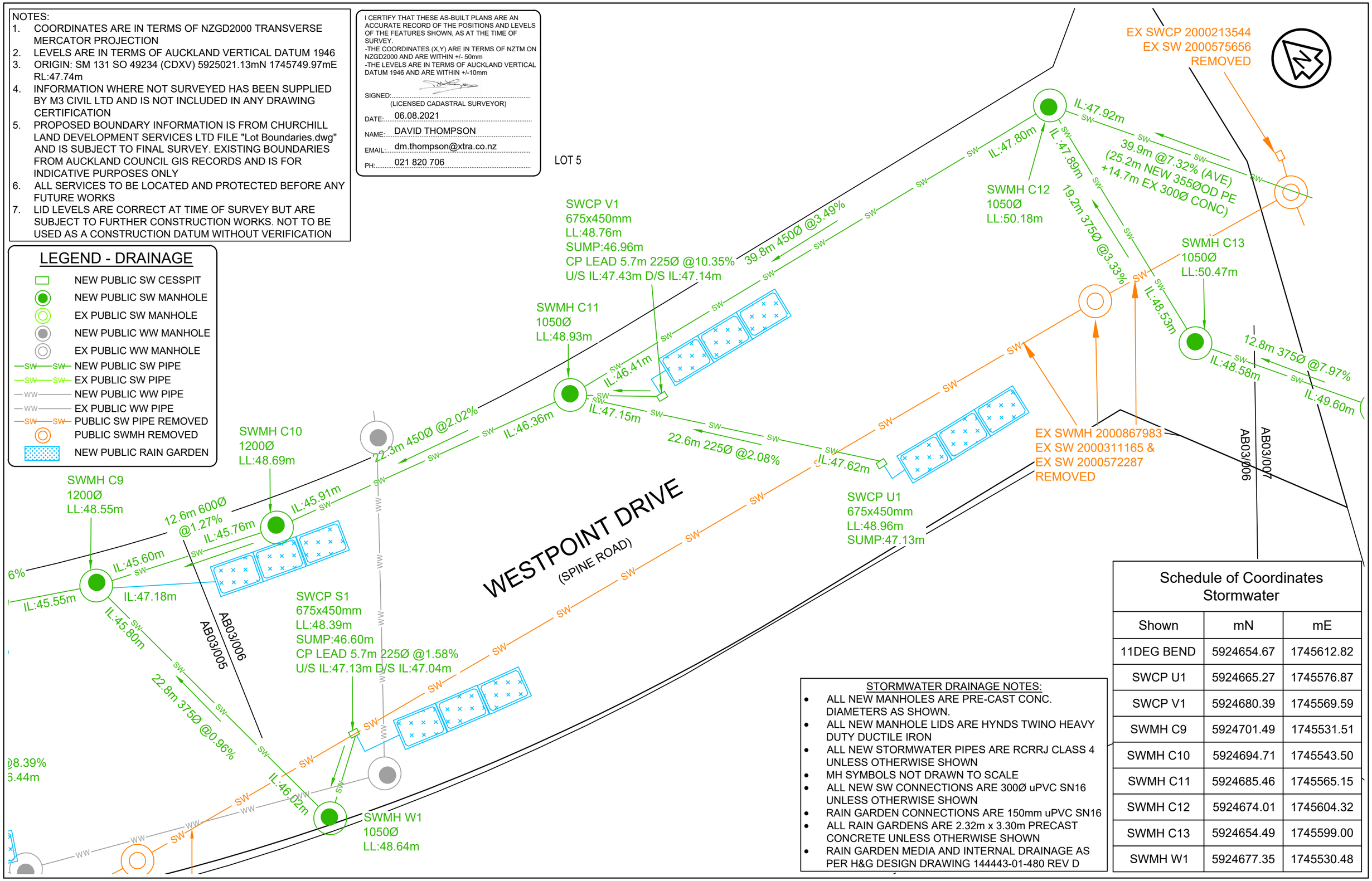
-THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD2000 AND ARE WITHIN +/- 50mm
-THE LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946 AND ARE WITHIN +/-10mm

SIGNED:.....
(LICENSED CADASTRAL SURVEYOR)
DATE: 06.08.2021
NAME: DAVID THOMPSON
EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

LEGEND - DRAINAGE

- NEW PUBLIC SW CESSPIT
- NEW PUBLIC SW MANHOLE
- EX PUBLIC SW MANHOLE
- NEW PUBLIC WW MANHOLE
- EX PUBLIC WW MANHOLE
- NEW PUBLIC SW PIPE
- EX PUBLIC SW PIPE
- NEW PUBLIC WW PIPE
- EX PUBLIC WW PIPE
- PUBLIC SW PIPE REMOVED
- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN



Schedule of Coordinates Stormwater

Shown	mN	mE
11DEG BEND	5924654.67	1745612.82
SWCP U1	5924665.27	1745576.87
SWCP V1	5924680.39	1745569.59
SWMH C9	5924701.49	1745531.51
SWMH C10	5924694.71	1745543.50
SWMH C11	5924685.46	1745565.15
SWMH C12	5924674.01	1745604.32
SWMH C13	5924654.49	1745599.00
SWMH W1	5924677.35	1745530.48

STORMWATER DRAINAGE NOTES:
- ALL NEW MANHOLES ARE PRE-CAST CONC. DIAMETERS AS SHOWN.
- ALL NEW MANHOLE LIDS ARE HYNDS TWINO HEAVY DUTY DUCTILE IRON
- ALL NEW STORMWATER PIPES ARE RCRRJ CLASS 4 UNLESS OTHERWISE SHOWN
- MH SYMBOLS NOT DRAWN TO SCALE
- ALL NEW SW CONNECTIONS ARE 300Ø uPVC SN16 UNLESS OTHERWISE SHOWN
- RAIN GARDEN CONNECTIONS ARE 150mm uPVC SN16
- ALL RAIN GARDENS ARE 2.32m x 3.30m PRECAST CONCRETE UNLESS OTHERWISE SHOWN
- RAIN GARDEN MEDIA AND INTERNAL DRAINAGE AS PER H&G DESIGN DRAWING 144443-01-480 REV D

ISSUE	DATE	AMENDMENT	BY	APPD.
–	05.21	ISSUED TO CLIENT	AG	AG

SETTING THE STANDARD
BMG Benchmark Survey Group Ltd
1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: STORMWATER DRAINAGE

CAD FILE AB03.DWG
DATE 26.05.2021
SCALE (A3) 1:250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE –
DWG. No. AB03/006

LOT 5

WESTPOINT DRIVE
(SPINE ROAD)

HOBSONVILLE ROAD

AB03/006

AB03/007

84

86

169

n 450Ø @3.49%

IL:47.80m

SWMH C12
1050Ø
LL:50.18m

IL:47.89m

19.2m 375Ø @3.33%

39.9m @7.32% (AVE)
(25.2m NEW 355ØOD PE
+14.7m EX 300Ø CONC)

SWMH C13
1050Ø
LL:50.47m

IL:48.53m

12.8m 375Ø @7.97%

IL:48.58m

IL:49.60m

SWMH C14
1050Ø
LL:51.33m

9.5m 225Ø @0.84%

IL:50.09m

IL:50.17m

IL:50.06m

SWCP X1
675x450mm
LL:51.51m
SUMP:49.77m

≈11° BEND
TOP OF PIPE
49.10m

≈11° BEND
TOP OF PIPE
50.90m

4.8m

20.0m

EX SW 2000870704
CUT & JOINED WITH
STAINLESS SHEAR
BAND TO NEW
355ØOD PE SW PIPE
TOP OF PIPE 50.95m
(SEE DIAGRAM 'A')

EX SW 2000870704
300Ø CONC.

IL:50.84m

EX SWMH
2000632499
1050Ø
LL:52.19m

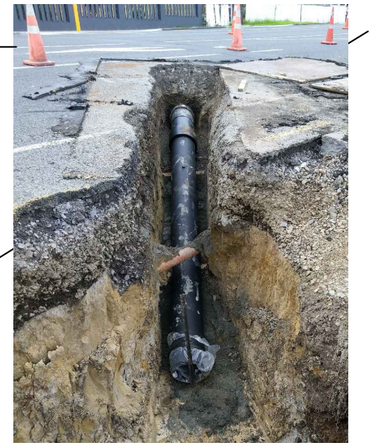
EX SWMH 2000047156
AND ≈15m OF EX
SW2000728839
REMOVED

EX SWMH 2000867983
EX SW 2000311165 &
EX SW 2000572287
REMOVED

IL:47.62m

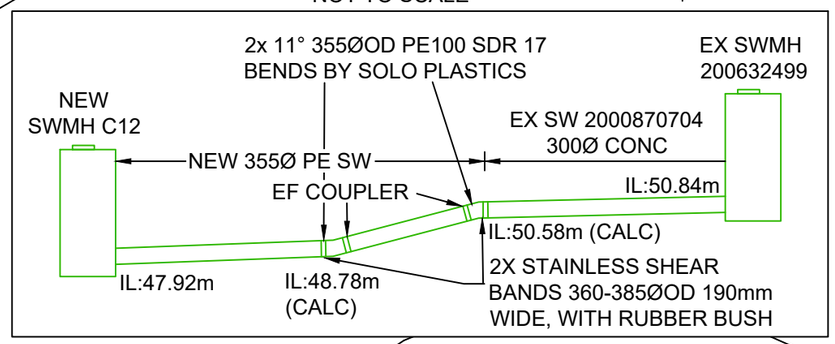
SWCP U1
675x450mm
LL:48.96m
SUMP:47.13m

EX SW 2000728839 375Ø CONC.



NEW 355ØOD PE
CONNECTION TO EX.
300mm CONC SW

DIAGRAM 'A'
NOT TO SCALE



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- EX PUBLIC SW PIPE
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- EX PUBLIC WW PIPE
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- PUBLIC SWMH REMOVED
- NEW PUBLIC RAIN GARDEN

Schedule of Coordinates
Stormwater

Shown	mN	mE
11DEG BEND	5924654.67	1745612.82
11DEG BEND	5924650.29	1745614.75
EX SWMH 2000632499	5924636.10	1745620.36
SWCP U1	5924665.27	1745576.87
SWMH C13	5924654.49	1745599.00
SWMH C14	5924641.60	1745604.40

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EMAIL: dm.thompson@xtra.co.nz
PH: 021 820 706

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–	05.21	ISSUED TO CLIENT	AG	AG

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1/18 CROSKERY ROAD
PAPAKURA
AUCKLAND 2110
TEL: (09)283 8495
MOB: (021)640772
Email: info@bmsurvey.co.nz

CLIENT NAME: m3 Civil Limited

DRAWING TITLE:
86, 88, 90 HOBSONVILLE ROAD
HOBSONVILLE
REF: ENG60351222
AS-BUILT SURVEY: STORMWATER DRAINAGE

CAD FILE AB03.DWG
DATE 26.05.2021
SCALE (A3) 1:250
CONTRACT No.
BMG REF. No. 011–A20–001
ISSUE
DWG. No. AB03/007
ISSUE –

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Schedule of Coordinates Stormwater

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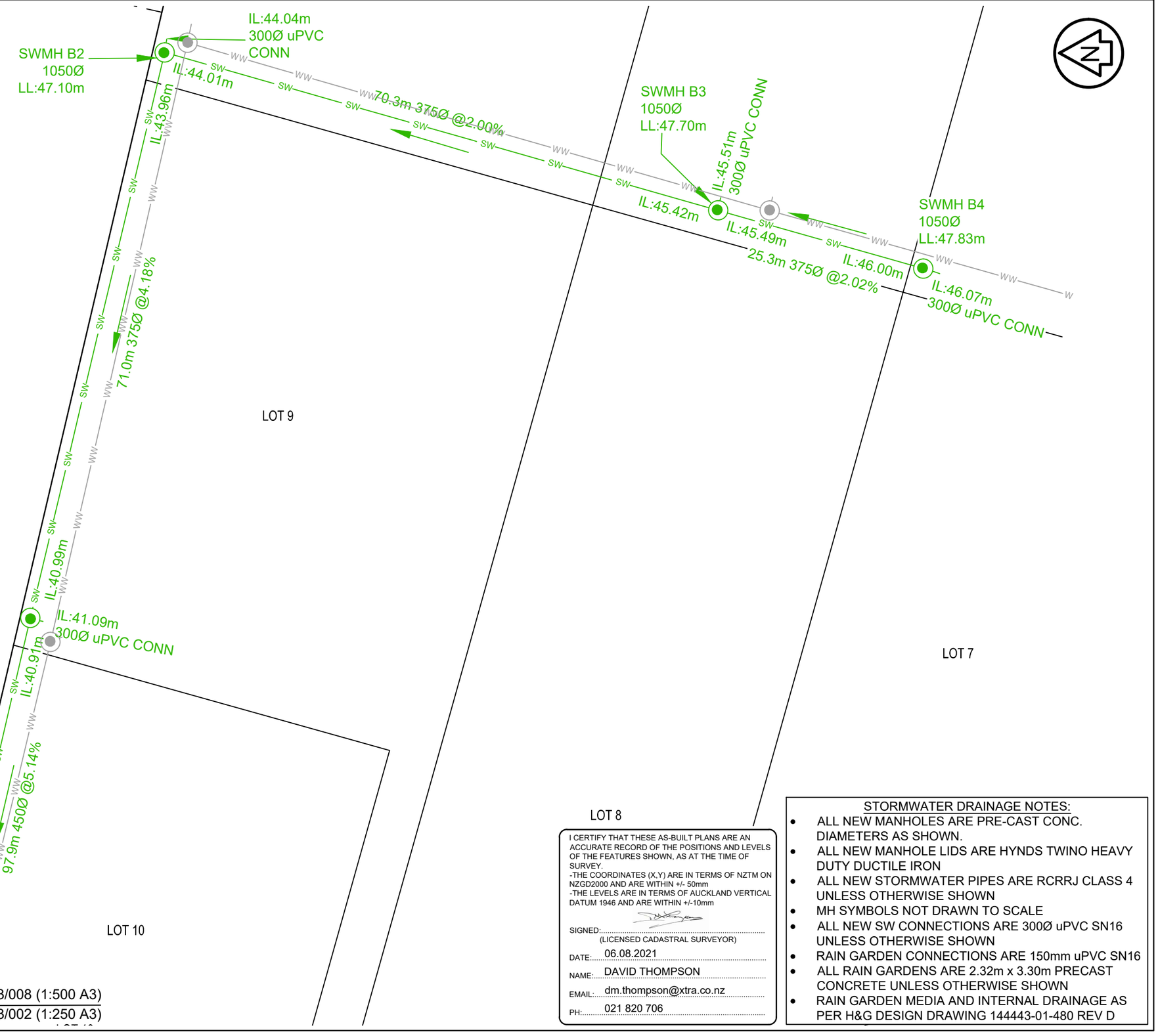
SWMH B1	5924931.35	1745504.09
SWMH B2	5924914.79	1745574.39
SWMH B3	5924846.10	1745554.88
SWMH B4	5924820.61	1745547.66



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AB003/008 (1:500 A3)
AB003/002 (1:250 A3)

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ISSUE –
DWG. No. AB03/008

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

WILTON JOUBERT Consulting Engineers

CLIENT	AT ADDRESS	Fill Tests
Austino Hobsonville 2 Ltd	86 Hobsonville Road, Hobsonville	Page 1 of 5

Air Voids % (calculated using Nuclear Densometer) Average:	10
Air Voids % (calculated using Nuclear Densometer) Maximum:	12
Shear strength kPa (BS1377 Calibrated) Average :	140
Shear strength kPa (BS1377 Calibrated) Minimum :	110

Soil Density & Air Voids Determined by Sampling Tube Method, Test 5.1.3 of NZS 4402:1986. Water Content detemined by Test 2.1 of NZS 4402:1986.

TEST NO.	DATE	LOCATION	Nuc/ Oven	BULK DENSITY (t/m^3)	DRY DENSITY (t/m3)	WATER CONTENT (%)	AIR VOIDS (%)	SHEAR STRENGTHS BS1377 (Kpa)				ENGINEER'S COMMENTS	DATE ASSESSED	PASS/ FAIL
~~1~~	~~03/03/20~~	~~See Plan~~	~~O~~	~~1.778~~	~~1.321~~	~~34.6~~	~~5.37~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~05/03/20~~	~~Pass~~
2	03/03/20	See Plan	O	1.757	1.290	36.2	5.52	200+	200+	200+	200+		05/03/20	Pass
3	03/03/20	See Plan	O	1.754	1.294	35.5	6.10	200+	200+	200+	200+		05/03/20	Pass
~~4~~	~~04/03/20~~	~~See Plan~~	~~O~~	~~1.781~~	~~1.320~~	~~34.9~~	~~5.03~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~05/03/20~~	~~Pass~~
5	04/03/20	See Plan	O	1.778	1.318	34.9	5.19	200+	200+	200+	200+		05/03/20	Pass
6	04/03/20	See Plan	O	1.778	1.314	35.3	4.94	200+	200+	200+	200+		05/03/20	Pass
~~7~~	~~05/03/20~~	~~See Plan~~	~~O~~	~~1.881~~	~~1.430~~	~~31.5~~	~~1.96~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~06/03/20~~	~~Pass~~
~~8~~	~~05/03/20~~	~~See Plan~~	~~O~~	~~1.836~~	~~1.393~~	~~31.8~~	~~4.11~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~06/03/20~~	~~Pass~~
9	05/03/20	See Plan	O	1.901	1.441	31.9	0.64	200+	200+	200+	200+		06/03/20	Pass
10	06/03/20	See Plan	O	1.843	1.392	32.4	3.34	200+	200+	200+	200+		09/03/20	Pass
11	06/03/20	See Plan	O	1.832	1.369	33.8	3.01	200+	200+	200+	200+		09/03/20	Pass
12	06/03/20	See Plan	O	1.867	1.408	32.6	1.95	200+	200+	200+	200+		09/03/20	Pass
13	10/03/20	See Plan	O	1.847	1.349	36.9	0.25	200+	200+	200+	200+		11/03/20	Pass
14	10/03/20	See Plan	O	1.769	1.310	35.0	5.60	200+	200+	200+	200+		11/03/20	Pass
~~15~~	~~10/03/20~~	~~See Plan~~	~~O~~	~~1.835~~	~~1.379~~	~~33.1~~	~~3.30~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~11/03/20~~	~~Pass~~
16	10/03/20	See Plan	O	1.846	1.381	33.7	2.33	200+	200+	200+	200+		11/03/20	Pass
17	12/03/20	See Plan	O	1.838	1.369	34.3	2.37	200+	200+	200+	200+		13/03/20	Pass
~~18~~	~~12/03/20~~	~~See Plan~~	~~O~~	~~1.817~~	~~1.371~~	~~32.5~~	~~4.64~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~13/03/20~~	~~Pass~~
19	16/03/20	See Plan	O	1.826	1.366	33.7	3.39	200+	200+	200+	200+		17/03/20	Pass
20	16/03/20	See Plan	O	1.814	1.370	32.4	4.86	200+	200+	200+	200+		17/03/20	Pass

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

WILTON JOUBERT Consulting Engineers

CLIENT	AT ADDRESS	Fill Tests
Austino Hobsonville 2 Ltd	86 Hobsonville Road, Hobsonville	Page 2 of 5

REQUIRED PASS RESULTS:

Air Voids % (calculated using Nuclear Densometer) Average:	10
Air Voids % (calculated using Nuclear Densometer) Maximum:	12
Shear strength kPa (BS1377 Calibrated) Average :	140
Shear strength kPa (BS1377 Calibrated) Minimum :	110

Soil Density & Air Voids Determined by Sampling Tube Method, Test 5.1.3 of NZS 4402:1986. Water Content detemined by Test 2.1 of NZS 4402:1986.

TEST NO.	DATE	LOCATION	Nuc/ Oven	BULK DENSITY (t/m^3)	DRY DENSITY (t/m3)	WATER CONTENT (%)	AIR VOIDS (%)	SHEAR STRENGTHS BS1377 (Kpa)				ENGINEER'S COMMENTS	DATE ASSESSED	PASS/ FAIL
21	16/03/20	See Plan	O	1.788	1.318	35.7	4.16	200+	200+	200+	200+		17/03/20	Pass
22	16/03/20	See Plan	O	1.792	1.337	34.0	5.00	200+	200+	200+	200+		17/03/20	Pass
23	30/04/20	See Plan	O	1.791	1.293	38.5	2.32	200+	200+	200+	200+		01/05/20	Pass
~~24~~	~~30/04/20~~	~~See Plan~~	~~O~~	~~1.793~~	~~1.305~~	~~37.4~~	~~2.86~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~01/05/20~~	~~Pass~~
25	30/04/20	See Plan	O	1.823	1.350	35.0	2.72	200+	200+	200+	200+		01/05/20	Pass
26	30/04/20	See Plan	O	1.793	1.305	37.4	2.86	200+	200+	200+	200+		01/05/20	Pass
27	30/04/20	See Plan	O	1.801	1.332	35.2	3.77	200+	200+	200+	200+		01/05/20	Pass
~~28~~	~~12/05/20~~	~~See Plan~~	~~O~~	~~1.874~~	~~1.374~~	~~36.4~~	~~-0.90~~	~~185~~	~~192~~	~~200+~~	~~200+~~		~~13/05/20~~	~~Pass~~
~~29~~	~~12/05/20~~	~~See Plan~~	~~O~~	~~1.783~~	~~1.295~~	~~37.7~~	~~3.23~~	~~171~~	~~179~~	~~181~~	~~200+~~		~~13/05/20~~	~~Pass~~
~~30~~	~~12/05/20~~	~~See Plan~~	~~O~~	~~1.847~~	~~1.344~~	~~37.4~~	~~-0.06~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~13/05/20~~	~~Pass~~
31	12/05/20	See Plan	O	1.820	1.337	36.1	2.20	181	181	200+	200+		13/05/20	Pass
32	12/05/20	See Plan	O	1.841	1.374	34.0	2.40	185	200+	200+	200+		13/05/20	Pass
~~33~~	~~15/05/20~~	~~See Plan~~	~~O~~	~~1.832~~	~~1.411~~	~~29.8~~	~~5.67~~	~~172~~	~~180~~	~~180~~	~~180~~		~~18/05/20~~	~~Pass~~
34	15/05/20	See Plan	O	1.851	1.357	36.4	0.34	200+	200+	200+	200+		18/05/20	Pass
35	15/05/20	See Plan	O	1.795	1.313	36.7	3.18	200+	200+	200+	200+		18/05/20	Pass
36	15/05/20	See Plan	O	1.826	1.337	36.6	1.57	200+	200+	200+	200+		18/05/20	Pass
37	15/05/20	See Plan	O	1.830	1.395	31.2	4.82	200+	200+	200+	200+		18/05/20	Pass
38	15/05/20	See Plan	O	1.845	1.379	33.8	2.32	200+	200+	200+	200+		18/05/20	Pass
39	15/05/20	See Plan	O	1.847	1.366	35.2	1.32	200+	200+	200+	200+		18/05/20	Pass
~~40~~	~~18/05/20~~	~~See Plan~~	~~O~~	~~1.801~~	~~1.329~~	~~35.5~~	~~3.59~~	~~165~~	~~168~~	~~170~~	~~178~~		~~19/05/20~~	~~Pass~~

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~~41~~	~~18/05/20~~	~~See Plan~~	~~O~~	~~1.799~~	~~1.321~~	~~36.2~~	~~3.26~~	~~180~~	~~182~~	~~182~~	~~182~~		~~19/05/20~~	~~Pass~~
~~42~~	~~18/05/20~~	~~See Plan~~	~~O~~	~~1.800~~	~~1.320~~	~~36.4~~	~~3.09~~	~~182~~	~~188~~	~~200+~~	~~200+~~		~~19/05/20~~	~~Pass~~
~~43~~	~~18/05/20~~	~~See Plan~~	~~O~~	~~1.765~~	~~1.299~~	~~35.9~~	~~5.27~~	~~168~~	~~180~~	~~184~~	~~184~~		~~19/05/20~~	~~Pass~~
44	18/05/20	See Plan	O	1.806	1.343	34.5	3.94	182	200+	200+	200+		19/05/20	Pass
45	18/05/20	See Plan	O	1.833	1.374	33.4	3.22	200+	200+	200+	200+		19/05/20	Pass
46	18/05/20	See Plan	O	1.851	1.388	33.4	2.26	200+	200+	200+	200+		19/05/20	Pass
47	20/05/20	See Plan	O	1.782	1.319	35.1	4.85	176	180	180	180		19/05/20	Pass
48	20/05/20	See Plan	O	1.822	1.340	36.0	2.15	178	180	180	180		19/05/20	Pass
49	20/05/20	See Plan	O	1.745	1.284	35.9	6.35	155	160	162	162		21/05/20	Pass
50	20/05/20	See Plan	O	1.769	1.289	37.2	4.28	172	172	180	180		21/05/20	Pass
~~51~~	~~20/05/20~~	~~See Plan~~	~~O~~	~~1.737~~	~~1.276~~	~~36.1~~	~~6.66~~	~~160~~	~~164~~	~~164~~	~~168~~		~~21/05/20~~	~~Pass~~
~~52~~	~~20/05/20~~	~~See Plan~~	~~O~~	~~1.756~~	~~1.281~~	~~37.1~~	~~5.04~~	~~182~~	~~182~~	~~190~~	~~192~~		~~21/05/20~~	~~Pass~~
~~53~~	~~20/05/20~~	~~See Plan~~	~~O~~	~~1.790~~	~~1.317~~	~~35.9~~	~~3.93~~	~~176~~	~~178~~	~~182~~	~~200+~~		~~21/05/20~~	~~Pass~~
~~54~~	~~20/05/20~~	~~See Plan~~	~~O~~	~~1.801~~	~~1.324~~	~~36.0~~	~~3.28~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~21/05/20~~	~~Pass~~
~~55~~	~~20/05/20~~	~~See Plan~~	~~O~~	~~1.823~~	~~1.381~~	~~32.0~~	~~4.66~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~21/05/20~~	~~Pass~~
~~56~~	~~22/05/20~~	~~See Plan~~	~~O~~	~~1.811~~	~~1.353~~	~~33.9~~	~~4.06~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~25/05/20~~	~~Pass~~
~~57~~	~~22/05/20~~	~~See Plan~~	~~O~~	~~1.832~~	~~1.401~~	~~30.8~~	~~4.99~~	~~200+~~	~~200+~~	~~200+~~	~~200+~~		~~25/05/20~~	~~Pass~~
~~58~~	~~22/05/20~~	~~See Plan~~	~~O~~	~~1.740~~	~~1.290~~	~~34.9~~	~~7.21~~	~~158~~	~~160~~	~~160~~	~~160~~		~~25/05/20~~	~~Pass~~
~~59~~	~~22/05/20~~	~~See Plan~~	~~O~~	~~1.767~~	~~1.310~~	~~34.9~~	~~5.77~~	~~160~~	~~164~~	~~164~~	~~166~~		~~25/05/20~~	~~Pass~~
~~60~~	~~22/05/20~~	~~See Plan~~	~~O~~	~~1.751~~	~~1.293~~	~~35.4~~	~~6.32~~	~~155~~	~~160~~	~~164~~	~~170~~		~~25/05/20~~	~~Pass~~

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

WILTON JOUBERT Consulting Engineers

CLIENT	AT ADDRESS	Fill Tests
Austino Hobsonville 2 Ltd	86 Hobsonville Road, Hobsonville	Page 4 of 5

REQUIRED PASS RESULTS:

Air Voids % (calculated using Nuclear Densometer) Average:	10
Air Voids % (calculated using Nuclear Densometer) Maximum:	12
Shear strength kPa (BS1377 Calibrated) Average :	140
Shear strength kPa (BS1377 Calibrated) Minimum :	110

Soil Density & Air Voids Determined by Sampling Tube Method, Test 5.1.3 of NZS 4402:1986. Water Content detemined by Test 2.1 of NZS 4402:1986.

TEST NO.	DATE	LOCATION	Nuc/ Oven	BULK DENSITY (t/m^3)	DRY DENSITY (t/m3)	WATER CONTENT (%)	AIR VOIDS (%)	SHEAR STRENGTHS BS1377 (Kpa)				ENGINEER'S COMMENTS	DATE ASSESSED	PASS/ FAIL
~~61~~	~~22/05/20~~	~~See Plan~~	~~O~~	~~1.750~~	~~1.285~~	~~36.2~~	~~5.90~~	~~176~~	~~178~~	~~178~~	~~180~~		~~25/05/20~~	~~Pass~~
62	22/05/20	See Plan	O	1.820	1.348	35.0	2.88	200+	200+	200+	200+		25/05/20	Pass
63	22/05/20	See Plan	O	1.837	1.366	34.5	2.29	200+	200+	200+	200+		25/05/20	Pass
64	22/05/20	See Plan	O	1.835	1.358	35.1	2.02	200+	200+	200+	200+		25/05/20	Pass
65	22/05/20	See Plan	O	1.844	1.390	32.7	3.09	200+	200+	200+	200+		25/05/20	Pass
~~66~~	~~12/06/20~~	~~See Plan~~	~~O~~	~~1.717~~	~~1.239~~	~~38.6~~	~~6.30~~	~~152~~	~~154~~	~~154~~	~~158~~		~~15/06/20~~	~~Pass~~
~~67~~	~~12/06/20~~	~~See Plan~~	~~O~~	~~1.716~~	~~1.227~~	~~39.8~~	~~5.69~~	~~146~~	~~146~~	~~150~~	~~150~~		~~15/06/20~~	~~Pass~~
~~68~~	~~12/06/20~~	~~See Plan~~	~~O~~	~~1.767~~	~~1.295~~	~~36.4~~	~~4.87~~	~~166~~	~~166~~	~~168~~	~~176~~		~~15/06/20~~	~~Pass~~
~~69~~	~~12/06/20~~	~~See Plan~~	~~O~~	~~1.780~~	~~1.301~~	~~36.8~~	~~3.93~~	~~168~~	~~172~~	~~172~~	~~172~~		~~15/06/20~~	~~Pass~~
~~70~~	~~15/06/20~~	~~See Plan~~	~~O~~	~~1.706~~	~~1.196~~	~~42.7~~	~~4.67~~	~~144~~	~~146~~	~~150~~	~~152~~		~~16/06/20~~	~~Pass~~
71	15/06/20	See Plan	O	1.707	1.218	40.2	5.96	140	148	148	148		16/06/20	Pass
72	15/06/20	See Plan	O	1.752	1.267	38.3	4.56	148	150	150	152		16/06/20	Pass
~~73~~	~~17/09/20~~	~~See Plan~~	~~O~~	~~1.809~~	~~1.326~~	~~36.4~~	~~2.60~~	~~165~~	~~170~~	~~170~~	~~172~~		~~18/09/20~~	~~Pass~~
~~74~~	~~17/09/20~~	~~See Plan~~	~~O~~	~~1.841~~	~~1.374~~	~~34.0~~	~~2.40~~	~~180~~	~~180~~	~~180~~	~~182~~		~~18/09/20~~	~~Pass~~
~~75~~	~~17/09/20~~	~~See Plan~~	~~O~~	~~1.799~~	~~1.333~~	~~35.0~~	~~4.00~~	~~162~~	~~165~~	~~165~~	~~170~~		~~18/09/20~~	~~Pass~~
~~76~~	~~22/09/20~~	~~See Plan~~	~~N~~	~~1.814~~	~~1.327~~	~~36.7~~	~~2.15~~	~~98~~	~~100~~	~~100~~	~~108~~	~~Shears low, material too wet~~	~~22/09/20~~	~~Fail~~
~~77~~	~~22/09/20~~	~~See Plan~~	~~N~~	~~1.782~~	~~1.291~~	~~38.0~~	~~3.10~~	~~100~~	~~104~~	~~110~~	~~110~~	~~Shears low, material too wet~~	~~22/09/20~~	~~Fail~~
~~78~~	~~22/09/20~~	~~See Plan~~	~~N~~	~~1.772~~	~~1.276~~	~~38.9~~	~~3.12~~	~~110~~	~~118~~	~~120~~	~~120~~	~~Shears low, material too wet~~	~~22/09/20~~	~~Fail~~
~~79~~	~~02/10/20~~	~~See Plan~~	~~O~~	~~1.758~~	~~1.273~~	~~38.1~~	~~4.35~~	~~150~~	~~152~~	~~152~~	~~168~~	~~Retest of 76~~	~~05/10/20~~	~~Pass~~
~~80~~	~~02/10/20~~	~~See Plan~~	~~O~~	~~1.785~~	~~1.295~~	~~37.8~~	~~3.06~~	~~140~~	~~150~~	~~158~~	~~158~~	~~Retest of 77~~	~~05/10/20~~	~~Pass~~

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WILTON JOUBERT Consulting Engineers

CLIENT	AT ADDRESS	Fill Tests
Austino Hobsonville 2 Ltd	86 Hobsonville Road, Hobsonville	Page 5 of 5

REQUIRED PASS RESULTS:

Air Voids % (calculated using Nuclear Densometer) Average:	10
Air Voids % (calculated using Nuclear Densometer) Maximum:	12
Shear strength kPa (BS1377 Calibrated) Average :	140
Shear strength kPa (BS1377 Calibrated) Minimum :	110

Soil Density & Air Voids Determined by Sampling Tube Method, Test 5.1.3 of NZS 4402:1986. Water Content detemined by Test 2.1 of NZS 4402:1986.

TEST NO.	DATE	LOCATION	Nuc/ Oven	BULK DENSITY (t/m^3)	DRY DENSITY (t/m3)	WATER CONTENT (%)	AIR VOIDS (%)	SHEAR STRENGTHS BS1377 (Kpa)				ENGINEER'S COMMENTS	DATE ASSESSED	PASS/ FAIL
~~81~~	~~02/10/20~~	~~See Plan~~	~~O~~	~~1.805~~	~~1.309~~	~~37.9~~	~~1.91~~	~~162~~	~~162~~	~~170~~	~~170~~	~~Retest of 78~~	~~05/10/20~~	~~Pass~~
~~82~~	~~06/10/20~~	~~See Plan~~	~~O~~	~~1.769~~	~~1.278~~	~~38.4~~	~~3.58~~	~~158~~	~~162~~	~~162~~	~~164~~		~~07/10/20~~	~~Pass~~
~~83~~	~~06/10/20~~	~~See Plan~~	~~O~~	~~1.780~~	~~1.330~~	~~33.8~~	~~5.76~~	~~150~~	~~150~~	~~162~~	~~164~~		~~07/10/20~~	~~Pass~~
~~84~~	~~06/10/20~~	~~See Plan~~	~~O~~	~~1.817~~	~~1.361~~	~~33.5~~	~~4.00~~	~~162~~	~~164~~	~~166~~	~~166~~		~~07/10/20~~	~~Pass~~
~~85~~	~~06/10/20~~	~~See Plan~~	~~O~~	~~1.753~~	~~1.281~~	~~36.8~~	~~5.38~~	~~174~~	~~186~~	~~186~~	~~186~~		~~07/10/20~~	~~Pass~~
~~86~~	~~06/10/20~~	~~See Plan~~	~~O~~	~~1.751~~	~~1.284~~	~~36.4~~	~~5.73~~	~~186~~	~~188~~	~~190~~	~~190~~		~~07/10/20~~	~~Pass~~
~~87~~	~~12/10/20~~	~~See Plan~~	~~O~~	~~1.847~~	~~1.401~~	~~31.8~~	~~3.56~~	~~200+~~	~~200+~~	~~144~~	~~158~~		~~12/10/20~~	~~Pass~~
~~88~~	~~12/10/20~~	~~See Plan~~	~~O~~	~~1.865~~	~~1.456~~	~~28.1~~	~~5.16~~	~~200+~~	~~164~~	~~200+~~	~~200+~~		~~12/10/20~~	~~Pass~~
~~89~~	~~12/10/20~~	~~See Plan~~	~~O~~	~~1.886~~	~~1.449~~	~~30.2~~	~~2.57~~	~~200+~~	~~160~~	~~156~~	~~200+~~		~~12/10/20~~	~~Pass~~
90	15/01/21	See Plan	O	1.771	1.300	36.2	4.77	125	142	146	152		18/01/21	Pass
91	15/01/21	See Plan	O	1.752	1.285	36.3	5.73	136	148	152	154		18/01/21	Pass
92	18/01/21	See Plan	O	1.774	1.280	38.6	3.19	200+	200+	200+	200+		19/01/21	Pass
93	18/01/21	See Plan	O	1.828	1.334	37.0	1.21	200+	200+	200+	200+		19/01/21	Pass
94	19/01/21	See Plan	O	1.858	1.393	33.4	1.90	140	146	150	150		20/01/21	Pass
95	19/01/21	See Plan	O	1.799	1.343	34.0	4.63	152	152	158	166		20/01/21	Pass
96	20/01/21	See Plan	O	1.753	1.262	38.9	4.16	152	154	154	162		21/01/21	Pass
97	20/01/21	See Plan	O	1.816	1.328	36.7	2.04	160	162	162	162		21/01/21	Pass

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THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Email Inspection (#1) Record

From: Eugene Crestanello
Sent: Friday 28/02/2020 4:29 PM
To: David Churchill <David.Churchill@clds.co.nz>
Cc: Russel Strahle <russel@austino.com.au>; Adam Churchill <Adam.Churchill@clds.co.nz>; markfg@m3civil.co.nz; chris@geosciences.co.nz; jake@bobhick.co.nz
Subject: RE: Westpoint Site Items

Hi David

I met with Jake (Bob Hick) this afternoon and inspected the gully stripping to the south of the proposed roadway. Approximate area as indicated in the screenshot below.

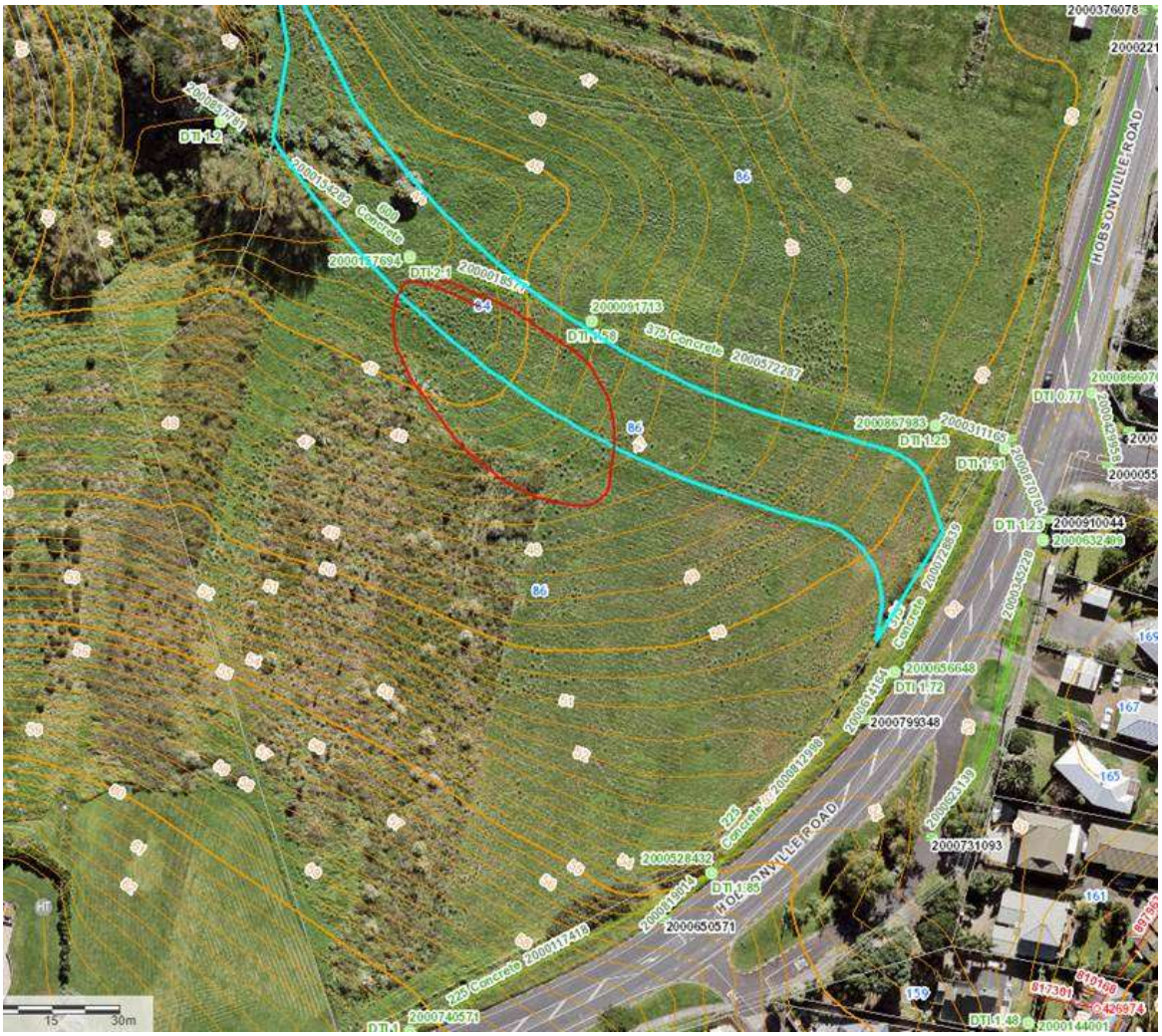
There was a layer of around 0.5m thick marginal strength material which still needs to be removed so that stiff competent soils are exposed – these materials can be conditioned and blended back into the general fill.

Although the "gully" did not show any seepages, it would be prudent to install an underfill drain along the invert.

A defined trench measuring say 1m wide and 0.6m deep should be excavated along the invert and backfilled comprising 160mm punched coil wrapped in filtersock and surrounded with scoria (or GAP40).

I will inspect further subgrade stripping at 8am on Monday.

Cheers
Eugene



Eugene Crestanello

Mobile: 0275 436 835
DD: 09 261 0533
Email: eugene@geotek.co.nz

1/55 Druces Road, Manukau Central
P O Box 217-172 Botany Junction Auckland 2164
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

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THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

Client: Austino Hobsonville 2 Ltd **Ref: 94185**

Site Address: 86 Hobsonville Road, Hobsonville **Time/Date: 15:00 03/03/20**

Inspection of: Clay Fill Compaction **INSPECTION LOG #: 03**

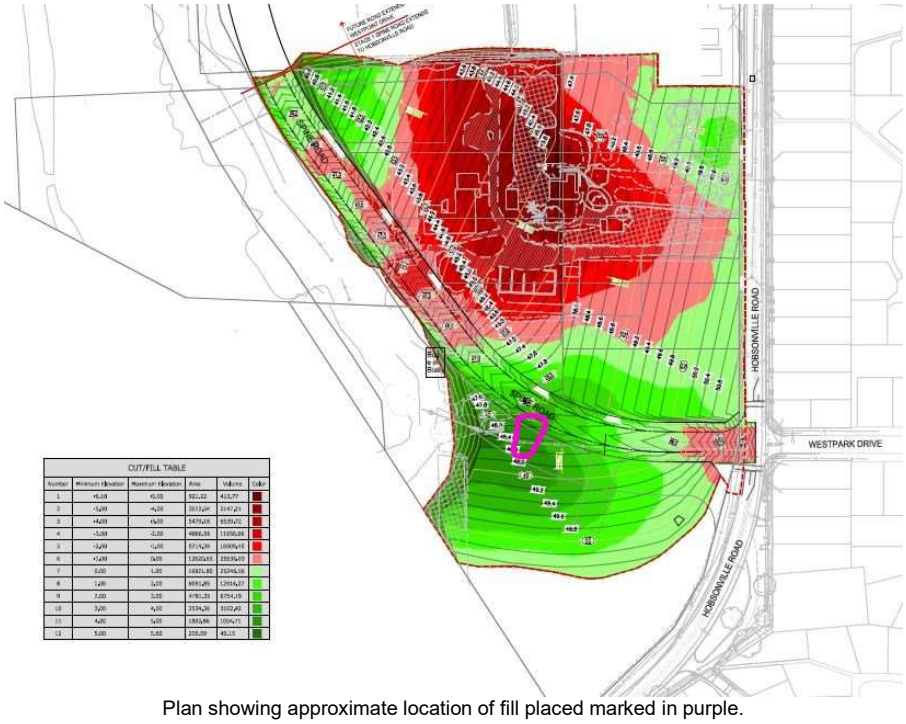
In presence of: Jake – Bob Hick Earthmoving **Weather: Overcast**

1. Purpose of Visit:

Test compaction of recently placed clay fill.

2. Excavations & Ground Conditions Observed

- Clay filling has commenced in the base of the recently stripped gully, just north of the southern pond & under future Spine Road0.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <7% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 2 & 3.



Plan showing approximate location of fill placed marked in purple.

Inspection by: C BURNET Reviewing Senior Geo-Professional: E CRESTANELLO

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

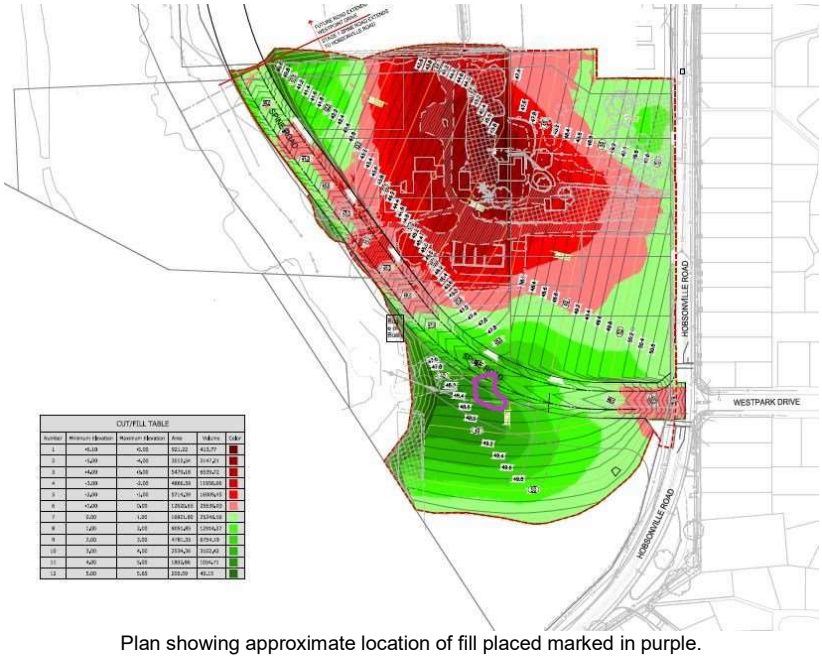
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 11:30 04/03/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 04**
In presence of: Jake – Bob Hick Earthmoving	**Weather: Overcast**

3. Purpose of Visit:

Test compaction of recently placed clay fill.

4. Excavations & Ground Conditions Observed

- Further lifts of clay fill placed in base of southern gully & under future Spine Road.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <6% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 5-6.



Plan showing approximate location of fill placed marked in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Photo of site showing site conditions at time of inspection.

Inspection by: T JACKSON

Reviewing Senior Geo-Professional: E CRESTANELLO

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

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Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

Client: Austino Hobsonville 2 Ltd **Ref: 94185**

Site Address: 86 Hobsonville Road, Hobsonville **Time/Date: 15:00 05/03/20**

Inspection of: Clay Fill Compaction **INSPECTION LOG #: 05**

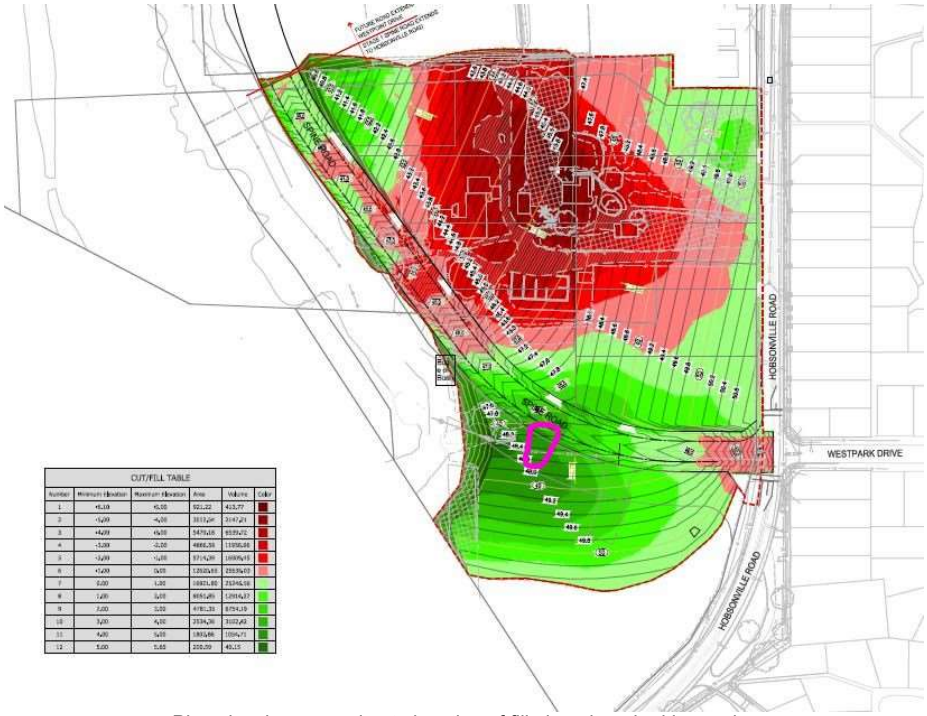
In presence of: Jake – Bob Hick Earthmoving **Weather: Clear**

5. Purpose of Visit:

Test compaction of recently placed clay fill.

6. Excavations & Ground Conditions Observed

- Filling continues, moving north from the southern gully & under future Spine Road.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <5% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Test 9.



Plan showing approximate location of fill placed marked in purple.

Inspection by: C BURNET Reviewing Senior Geo-Professional: E CRESTANELLO

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

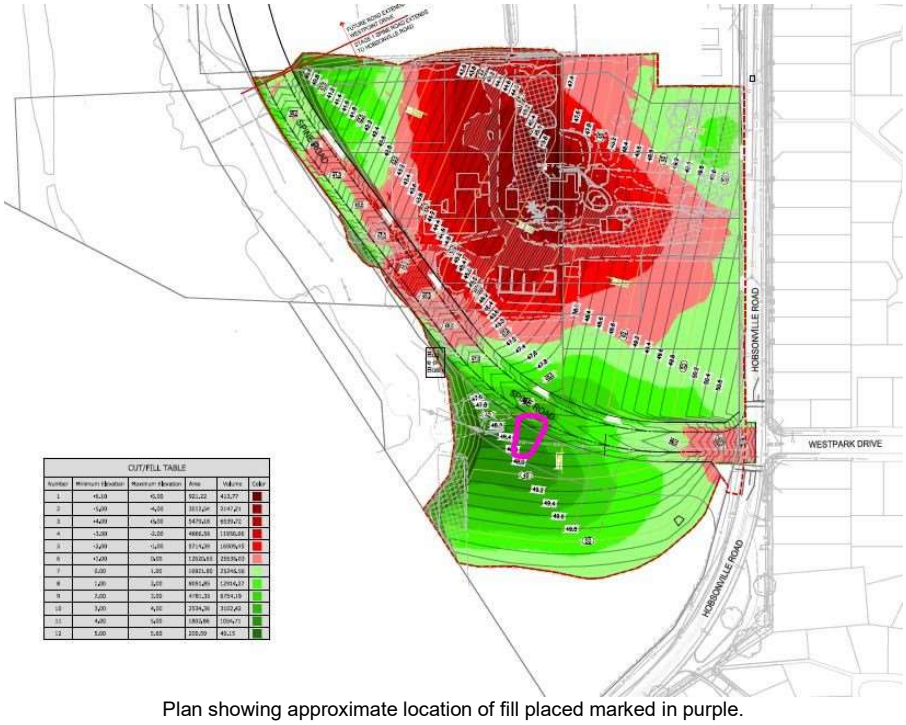
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 12:00 06/03/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 06**
In presence of: Jake – Bob Hick Earthmoving	**Weather: Clear**

7. Purpose of Visit:

Test compaction of recently placed clay fill.

8. Excavations & Ground Conditions Observed

- Clay filling continues on area north of the southern gully.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <4% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 10-12.



Plan showing approximate location of fill placed marked in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Photo of site showing site conditions at time of inspection.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Email Inspection (#7) Record

From: Eugene Crestanello
Sent: Tuesday 10/03/2020 10:54 AM
To: David Churchill <David.Churchill@clds.co.nz>; markfg@m3civil.co.nz
Cc: Russel Strahle <russel@austino.com.au>; Adam Churchill <Adam.Churchill@clds.co.nz>; jake@bobhick.co.nz; Chris Burnet <chrisburnet@geotek.co.nz>
Subject: RE: Westpoint Site Items

Hi David/Mark

I inspected the site yesterday just as the rain began – I noted that there had been some recent filling further up the hill over a dusty topsoil layer in turn overlying what looks to be older fill which had been exposed when the contractor dug a temporary cut-off swale – more-or-less around the stormwater manhole which has yet to be removed.

This will need to be stripped back and the buried topsoil removed as well as the underlying older fill which can be re-used – see marked photo below.

I also noted some odds and ends exposed along the downslope of the fill batter – concrete and pipework – we will also need to see this batter face stripped back and the engineered fill exposed - see photo.

I also noted that around to the northern side of the gully, there has been more topsoil/fill exposed which will need to be further explored.

My colleague Chris is heading out today – are you happy for us to issue instructions directly to the contractor to remedy the situation/s? We will follow up with a file note and site sketch.

Jake – can you please send through your photos of the underfill drain installation?

David – can we also please get a copy of the underfill drain survey/stripping prior to filling – this will help is locate ourselves in the file notes.

Any questions or queries please let me know.

Cheers
Eugene

Eugene Crestanello

Mobile: 0275 436 835
DD: 09 261 0533
Email: eugene@geotek.co.nz

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

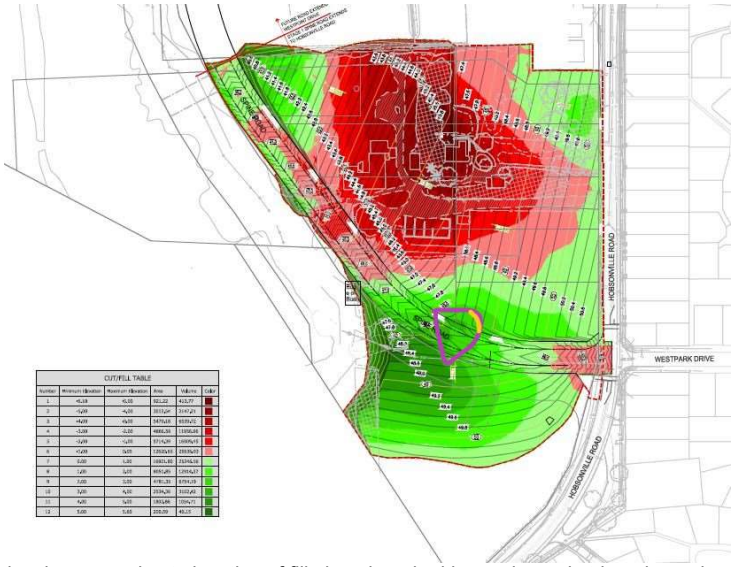
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 15:00 10/03/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 08**
In presence of: Jake – Bob Hick Earthmoving	**Weather: Clear**

9. Purpose of Visit:

Test compaction of recently placed clay fill. Inspect removal of topsoil previously identified in the sides of cut-off swale.

10. Excavations & Ground Conditions Observed

- Majority of topsoil layer below fill previously identified in the sides of a cut-off swale through the southern part of the site had been chased out and the ground stripped to the competent underlying natural subgrade. Small wedge left to strip out on eastern side of cut-off swale.
- Small amount of clay fill placed on area north of the southern gully.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <6% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 13, 14 & 16.



Plan showing approximate location of fill placed marked in purple, and stripped area in yellow.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Photo of site showing area where topsoil previously identified under fill has been stripped out (centre). A small wedge left to remove in the side of cut of swale at right.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELL

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

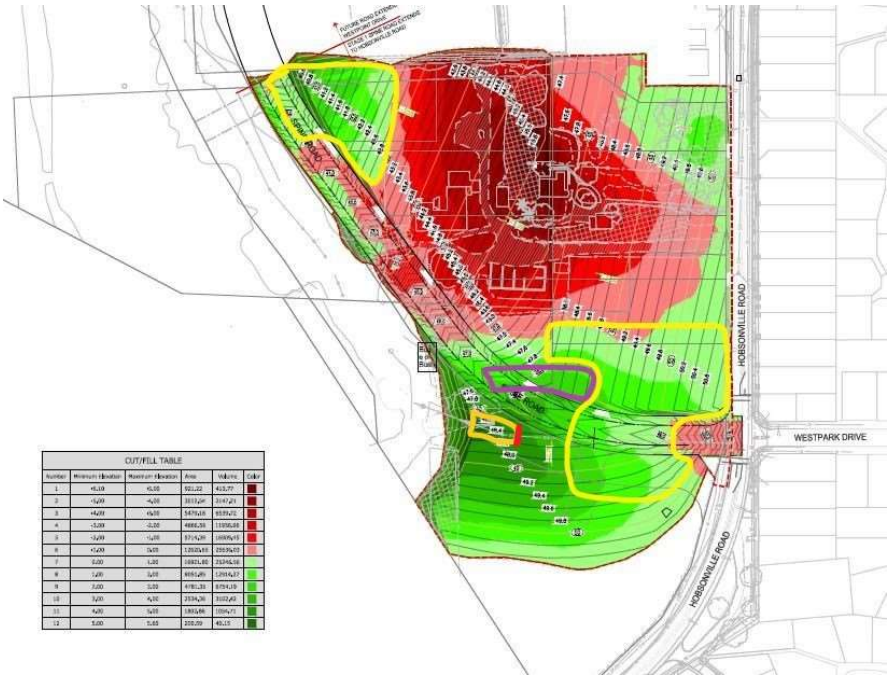
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 14:30 12/03/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 09**
In presence of: Jake – Bob Hick Earthmoving	**Weather: Clear**

11. Purpose of Visit:

Test compaction of recently placed clay fill and inspect subgrade stripping.

12. Excavations & Ground Conditions Observed

- Small amount of clay fill placed on area north of the southern gully.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <5% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Test 17.
- Western part of southern gully stripped out to competent natural and drain coil placed in base.
- Large part of south-eastern area stripped to natural ground. Exposed subgrade across this section very dry, should be scarified / wet before placing any fill.



Plan showing approximate location of fill placed marked in purple, and stripped area in yellow. Red line east of south-western gully stripped area is concrete and pipework in side of fill batter.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Photo of site showing stripped western part of southern gully.

Photo of site showing the dry south-eastern stripped area.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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THOROUGH ANALYSIS • DEPENDABLE ADVICE

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Website: www.geotek.co.nz

Site Inspection Report

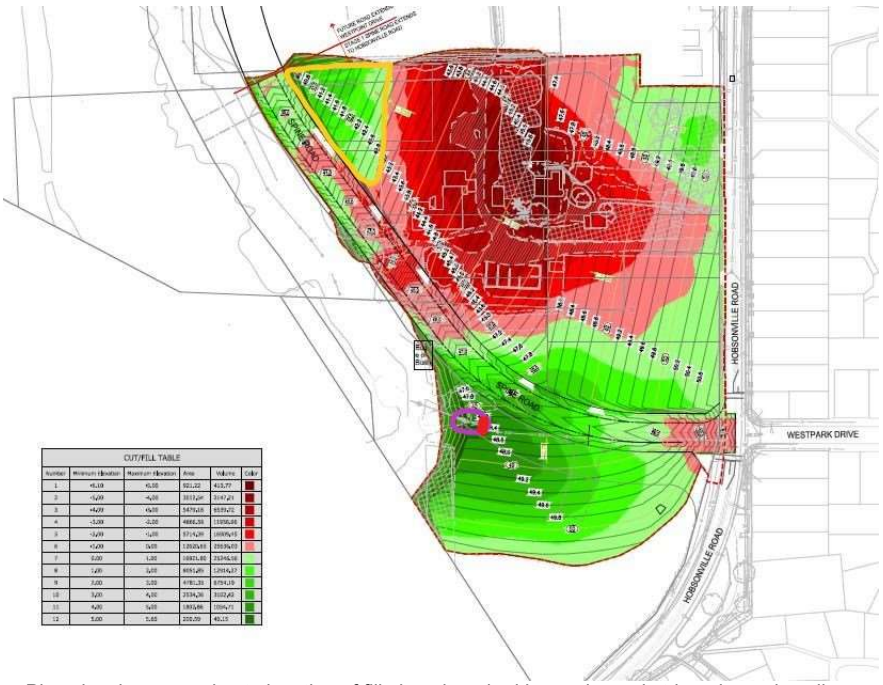
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 15:00 16/03/20**
Inspection of: Clay Fill Compaction, Stripping	**INSPECTION LOG #: 10**
In presence of: Andrew – Bob Hick Earthmoving	**Weather: Overcast**

13. Purpose of Visit:

Test compaction of recently placed clay fill and inspect subgrade stripping.

14. Excavations & Ground Conditions Observed

- Clay fill placed across recently stripped base of western part of southern gully.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <6% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 19-22.
- Future fill area in north-western corner, east of future Spine Road stripped of topsoil and ~1.5m of gully alluvium. All into competent natural ground.
- Several rainy days following this visit led to this being the last inspection before lockdown.



Plan showing approximate location of fill placed marked in purple, and stripped area in yellow.

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Photo of site showing stripped north-western area.

Photo of site showing south-eastern fill area.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

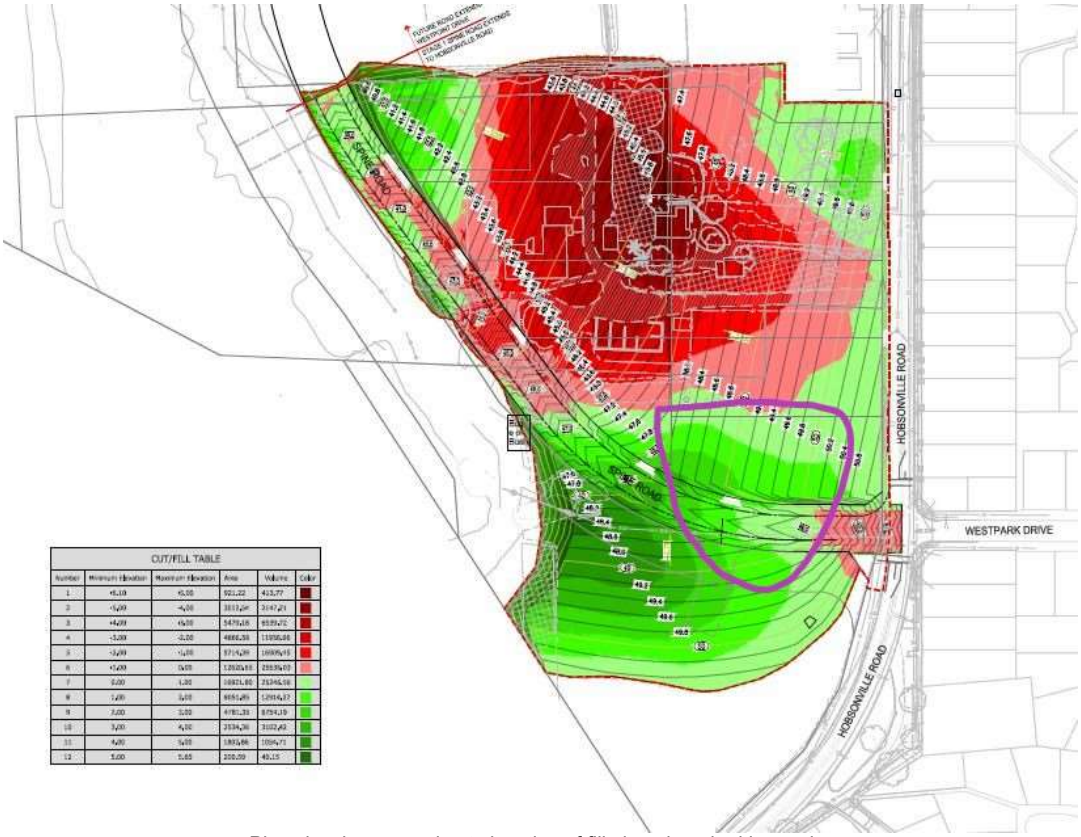
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 09:00 29/04/20**
Inspection of: Clay Fill Compaction, Stripping	**INSPECTION LOG #: 11**
In presence of: Andrew – Bob Hick Earthmoving	**Weather: Clear**

15. Purpose of Visit:

Walkover of site after lockdown to check ground conditions.

16. Excavations & Ground Conditions Observed

- Roughly a month and a half since previous inspection.
- Appeared as though fill had been sealed up over lockdown, no degradation of the fill areas evident.
- Shallow lift of clay fill placed across large south-eastern area. Drilled through and confirmed that there was no soft / degraded material below.
- No NDM tests on this fill but Cu's measured at >200kPa across fill surface.
- Northern sediment pond built across previously stripped north-western area.



Plan showing approximate location of fill placed marked in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Photo of site showing new sediment pond in north-western corner.

Photo of site showing south-eastern fill area.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

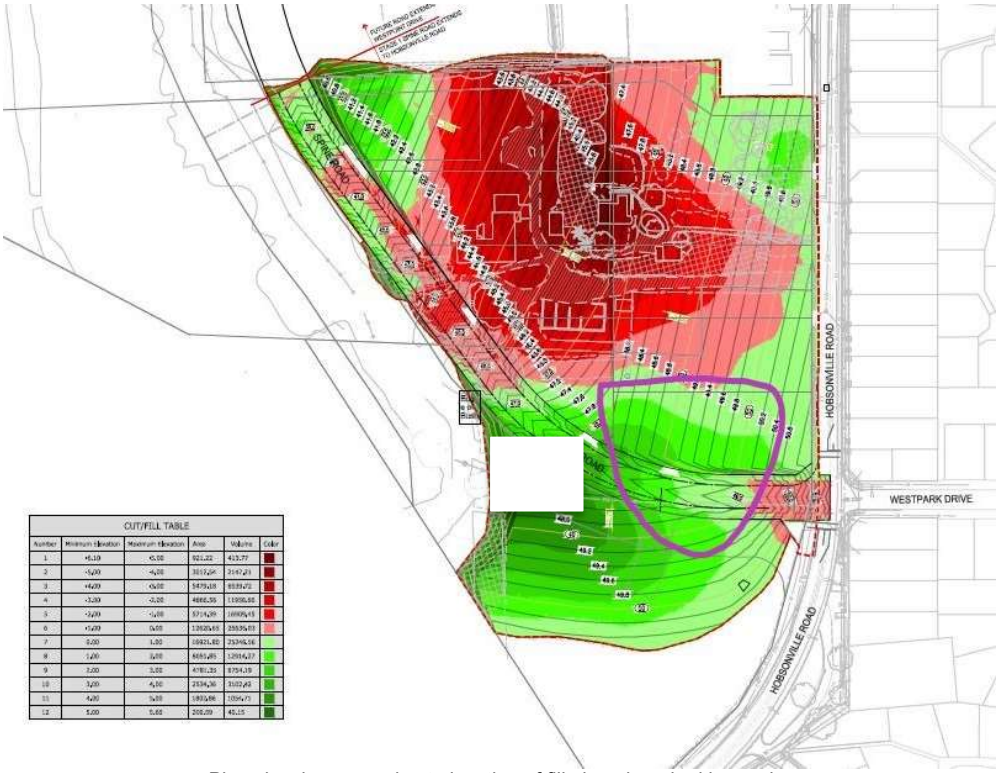
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 12:45 30/04/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 12**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

17. Purpose of Visit:

Test compaction of recently placed clay fill.

18. Excavations & Ground Conditions Observed

- Clay filling continues across large south-eastern area.
- Scraped several flat pads to NDM test compaction of fill.
- Air voids calculated at <4% for this round of testing.
- Cu's measured at >200kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 23, 25, 26 & 27.



Plan showing approximate location of fill placed marked in purple.

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Photo of site showing site conditions at time of inspection.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

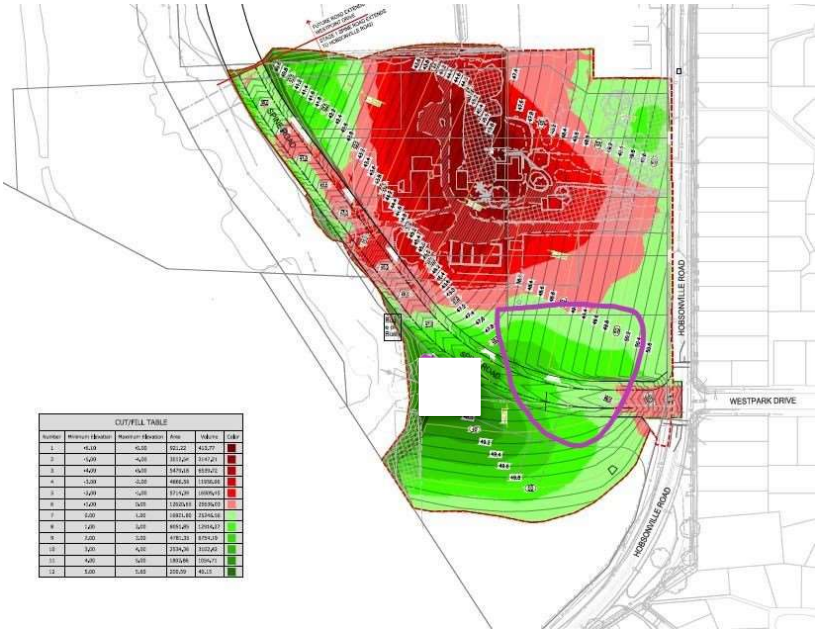
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 12:45 12/5/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 13**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

19. Purpose of Visit:

Test compaction of recently placed clay fill.

20. Excavations & Ground Conditions Observed

- ~2 weeks of rain since last inspection. Appeared as though fill had been sealed up well, no soft or wet spots evident when on site.
- Clay filling continues across large south-eastern area.
- Scraped several flat pads to NDM test compaction of fill. Drilled through fill in places and confirmed that no wet material remained after the rainy period.
- Air voids calculated at <4% for this round of testing.
- Cu's measured at >171kPa across fill surface.
- See Fill Test Summary Table for more details. Tests 31 & 32.
- Cut has started through the centre-western portion of site, a few pockets of buried rubbish had been removed and placed in unsuitables piles.



Plan showing approximate location of fill placed marked in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Photo of site showing start of cut area where rubbish had been removed.

Photo of site showing south-eastern fill area.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 08:00 13/05/20**
Inspection of: Subgrade Stripping	**INSPECTION LOG #: 14**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

21. Purpose of Visit:

Inspect stripping through central-western and north-eastern parts of site.

22. Excavations & Ground Conditions Observed

- Central western area has been cut down to approx finished level, all of the old rubbish seen yesterday has been removed with the cut. All into competent natural subgrade.
- Stripping mostly completed near north-eastern corner of site, with a small area in the process of being stripped back while on site. Excavated several test pits through the topsoil in the area that had not yet been fully stripped. Where exposed, all into competent natural ground, OK to proceed, later received photos of this area fully stripped from the contractors.

Plan showing approximate location of stripped areas marked in yellow.

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Photo of site showing cut area after additional stripping since yesterday.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

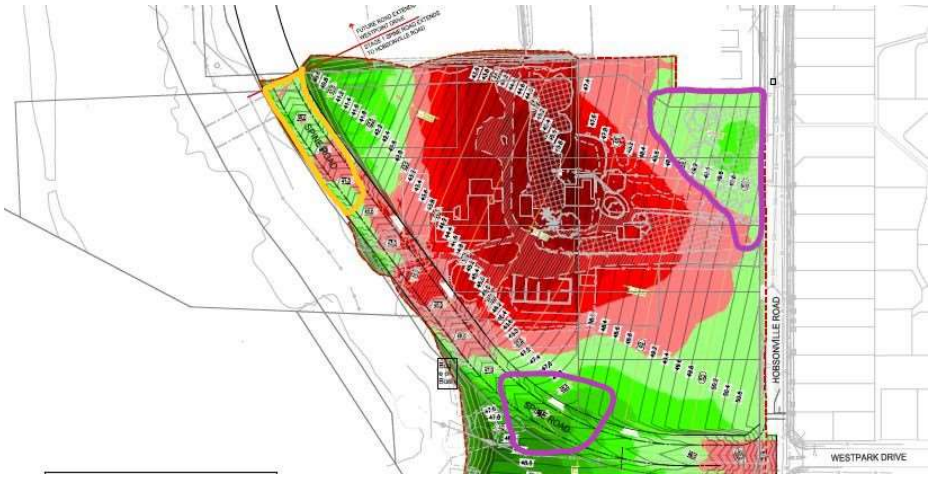
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 09:00 15/05/20**
Inspection of: Clay Fill Compaction	**INSPECTION LOG #: 15**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

23. Purpose of Visit:

Inspect stripping in southern part of site, test compaction of recently placed clay fill.

24. Excavations & Ground Conditions Observed

- Clay filling continues across large southern area and commenced in the north-eastern corner.
- Cu's all >200kPa, air voids all <5%.
- See Fill Test Summary Table for more details. Tests 34-39.
- Area under the far north-western section of the future Spine Road stripped back to competent natural ground.



Plan showing approximate location of fill placed marked in purple, stripped area in yellow.

Photo of site showing start of fill being placed in north-eastern corner.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Website: www.geotek.co.nz

Site Inspection Report

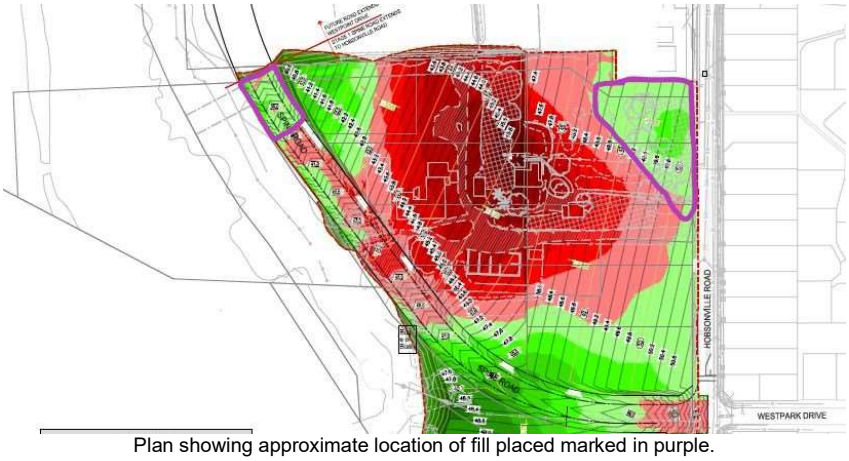
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 13:00 18/05/20**
Inspection of: Stripping / Clay Fill Compaction	**INSPECTION LOG #: 16**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

25. Purpose of Visit:

Test compaction of recently placed clay fill.

26. Excavations & Ground Conditions Observed

- Clay filling continues across large north-eastern area and commenced in the north-western corner.
- In the fill areas, Cu's all >168kPa, air voids all <6%.
- See Fill Test Summary Table for more details. Tests 43-46.
- Area under the far north-western section of the future Spine Road stripped back to competent natural ground.



Plan showing approximate location of fill placed marked in purple.

Fill progress in north-eastern corner.

Fill batter being formed in north-western part of site under future Spine Road.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Website: www.geotek.co.nz

Site Inspection Report

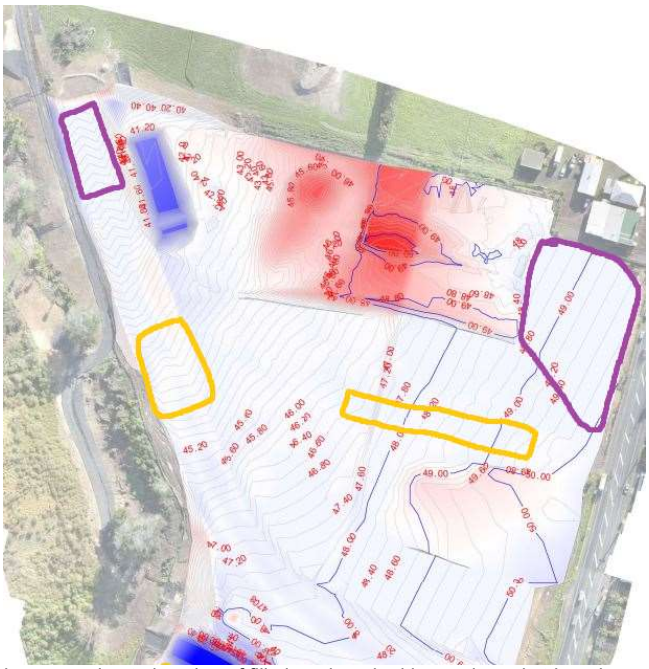
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 09:30 20/05/20**
Inspection of: Stripping / Clay Fill Compaction	**INSPECTION LOG #: 17**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

27. Purpose of Visit:

Inspect stripping through centre of site, test compaction of recently placed clay fill.

28. Excavations & Ground Conditions Observed

- Access road being decommissioned, stripped, and the underlying clay cut. Stripping of bank south-west of northern pond. Small stripped area along western boundary.
- Clay fill to finished level in north-eastern corner behind future western retaining wall. Filling finishes in north-eastern corner.
- In the fill areas, Cu's all >155kPa, air voids all <7%.
- See Fill Test Summary Table for more details. Tests 47-50.



Plan showing approximate location of fill placed marked in purple and stripped area in yellow.

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Fill progress in north-eastern corner.

Stripping along western boundary under approx. edge of Spine Rd carriageway.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

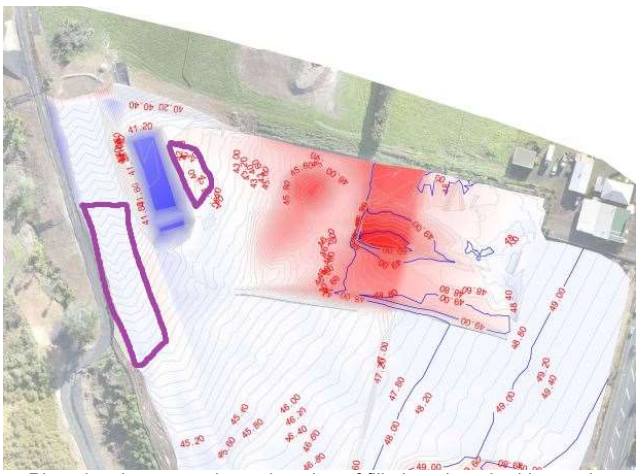
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 12:30 22/05/20**
Inspection of: Stripping / Clay Fill Compaction	**INSPECTION LOG #: 18**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

29. Purpose of Visit:

Inspect stripping in southern part of site, test compaction of recently placed clay fill.

30. Excavations & Ground Conditions Observed

- Clay fill placed to finished level south-west of northern pond, and a thin layer to the east of the pond as well.
- In the fill areas, Cu's all >200kPa, air voids all <4%.
- See Fill Test Summary Table for more details. Tests 62-65.



Plan showing approximate location of fill placed marked in purple.

Filling along western boundary under approx. future Spine Rd carriageway.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

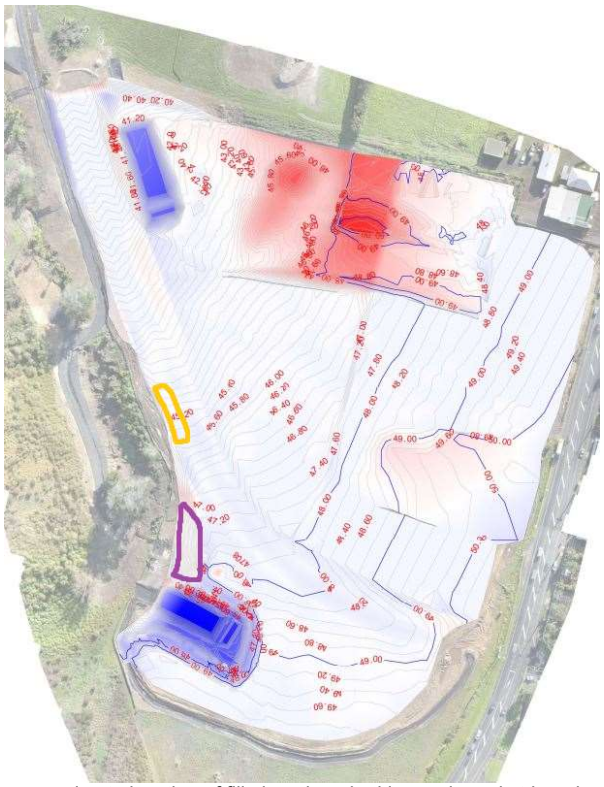
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 15:00 15/06/20**
Inspection of: Stripping / Clay Fill Compaction	**INSPECTION LOG #: 20**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

31. Purpose of Visit:

Inspect stripping along western boundary, test compaction of recently placed clay fill.

32. Excavations & Ground Conditions Observed

- Stripping along western boundary around half-way between the northern and southern ponds. Some water pooling from recent rain along boundary cut, instructed contractors to shape base of cut so that water drains down towards the natural gully.
- Clay filling along western boundary just north of southern pond to finished level, battered down towards boundary. Fill Test results still passing but shears / bulk density trending lower & air voids & moisture trending higher than previously.
- In the fill areas, Cu's all >140kPa, air voids all <7%.
- See Fill Test Summary Table for more details. Tests 71 & 72.



Plan showing approximate location of fill placed marked in purple and stripped area in yellow.

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Fill progress near the western boundary, north of the southern pond.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

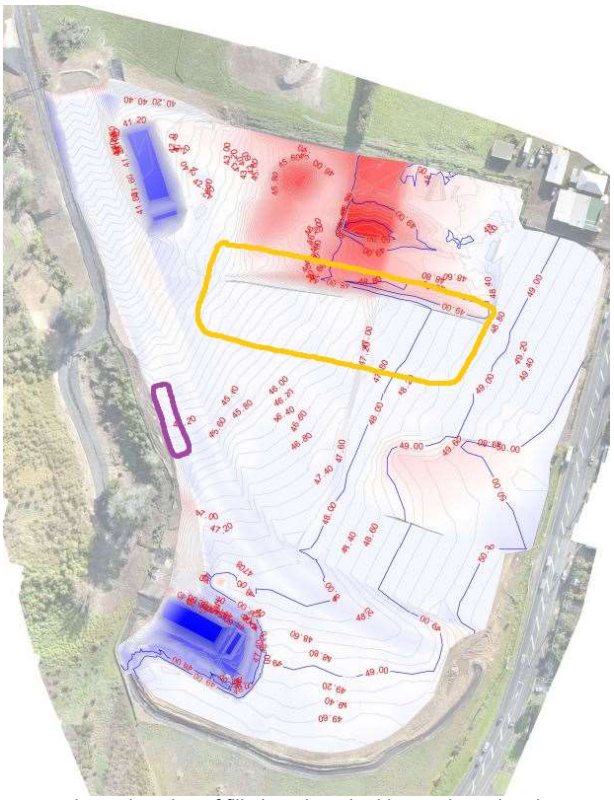
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 15:00 17/06/20**
Inspection of: Stripping / Clay Fill Compaction	**INSPECTION LOG #: 21**
In presence of: Damian – Bob Hick Earthmoving	**Weather: Clear**

33. Purpose of Visit:

Inspect areas of bulk cutting, test compaction of recently placed clay fill.

34. Excavations & Ground Conditions Observed

- Final walkover before earthworks being put on hold until warmer weather. Large bulk cut being undertaken towards the central / northern area of site. Some at finished level but still significant cuts to go in other parts. All into competent natural material already.
- Shallow wedge of fill placed along previously stripped area along western boundary. Shear vane tests all >140kPa.



Plan showing approximate location of fill placed marked in purple and major cut area in yellow.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Extent of fill placed near western boundary.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Website: www.geotek.co.nz

Site Inspection Report

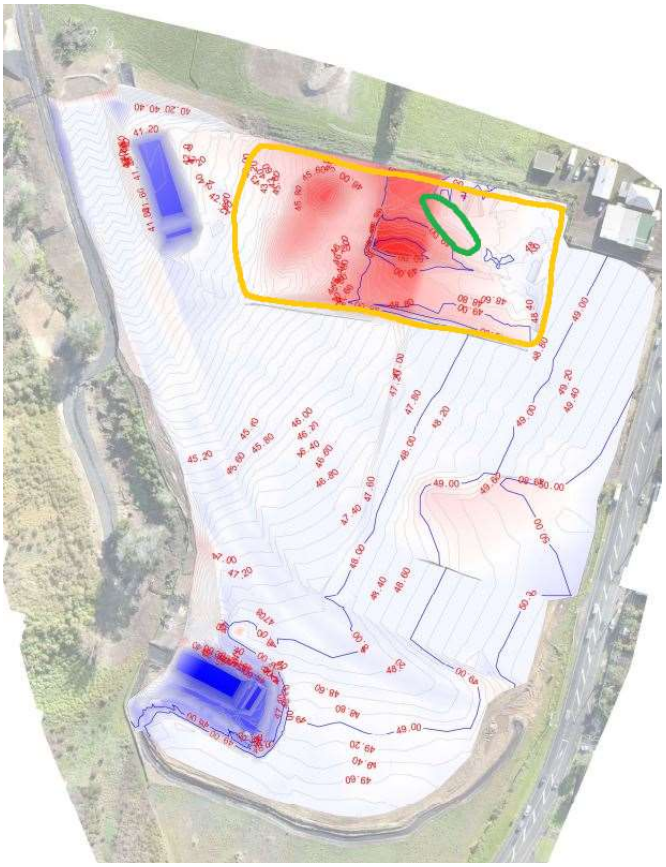
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 12:30 24/09/20**
Inspection of: Bulk Cutting	**INSPECTION LOG #: 27**
In presence of: Jordan – Bob Hick Earthmoving	**Weather: Overcast**

35. Purpose of Visit:

Walkover of northern bulk cut area.

36. Excavations & Ground Conditions Observed

- Filling on hold for the day due to weather. Walkover inspecting the bulk cut area in the central-northern part of site.
- Much of this area almost at finished cut height, generally into an orange, very stiff residual material. Large strip of what appears to be a grey alluvial soil evident in current cut surface approx 10m wide by 30m long. Cu's in the surface of this area all >60kPa.



Plan showing approximate location of the bulk cut taking place, with the approx. extent of the alluvial material in green.

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Bulk cut area in the northern part of site with grey alluvial material visible at centre left

Another part of the bulk cut area with the more typical orange clay exposed

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

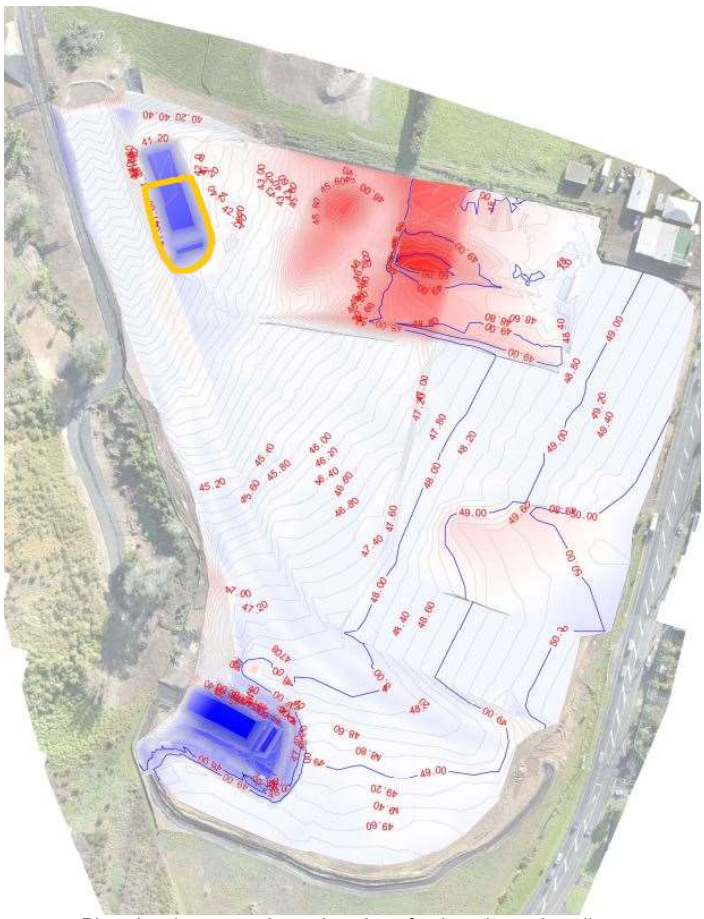
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 10:45 14/01/21**
Inspection of: Sediment Pond Stripping	**INSPECTION LOG #: 33**
In presence of: Dom – M3 Civil	**Weather: Clear**

37. Purpose of Visit:

Inspect stripping of northern sediment pond.

38. Excavations & Ground Conditions Observed

- Southern 2/3 of northern sediment pond (including forebay area) mucked out, exposing the underlying natural subgrade.
- Cu's across stripped surface measured at >95kPa.
- OK to begin backfilling across this area. Remaining northern third of the pond to remain in use as a decant for now.



Plan showing approximate location of stripped area in yellow.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Part of southern part of pond stripped.

Forebay area stripped - the loose bits tracked in by roller visible at rear were cleaned up while on site.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

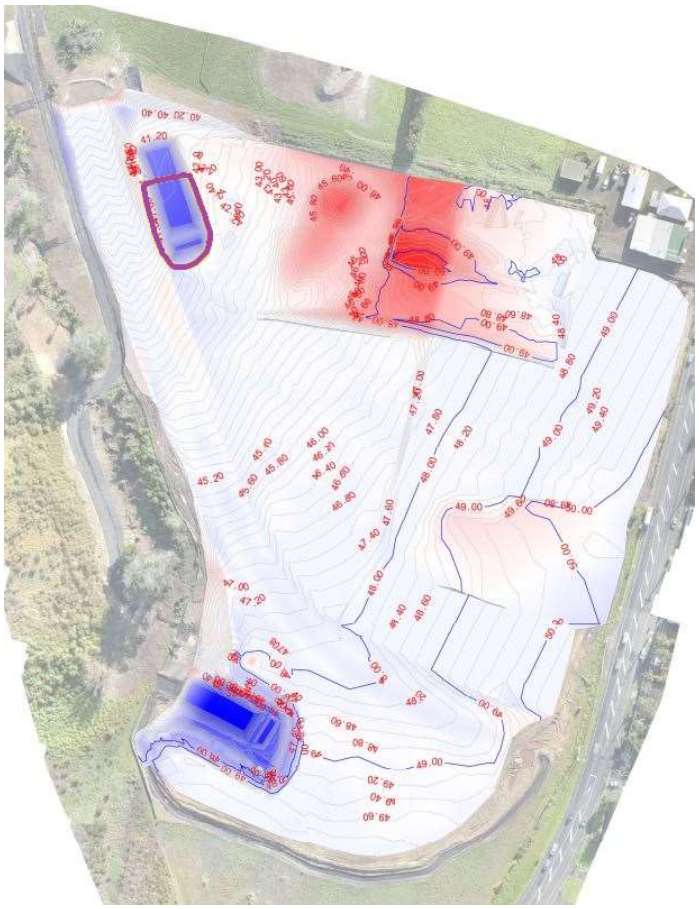
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 10:45 15/01/21**
Inspection of: North Pond Filling	**INSPECTION LOG #: 34**
In presence of: Dom – M3 Civil	**Weather: Clear**

39. Purpose of Visit:

Test clay fill compaction in northern pond fill area.

40. Excavations & Ground Conditions Observed

- First lift of fill placed across the southern end of the pond.
- Sidewalls being stripped of vegetation progressively as the fill height rises. Sidewall bunds all either natural or stabilised engineered fill.
- In the fill areas, Cu's all >125kPa (average >140kPa), air voids all <6%.
- See Fill Test Summary Table for more details. Tests 90-91.



Plan showing approximate location of fill area in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

First lift of fill in the southern end of the pond.

First lift of fill in the southern end of the pond.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

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Website: www.geotek.co.nz

Site Inspection Report

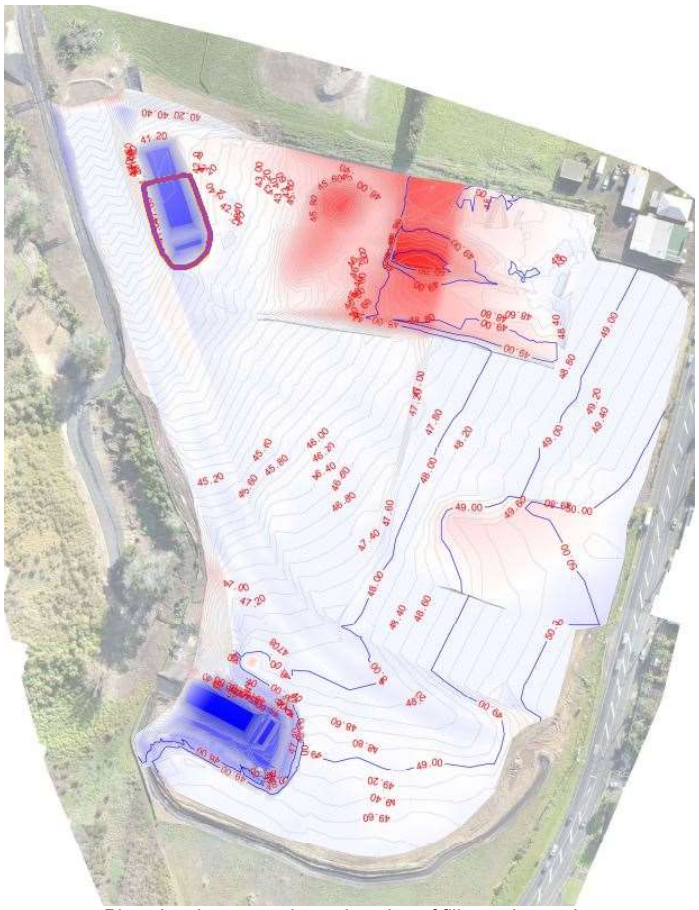
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 10:45 18/01/21**
Inspection of: North Pond Filling	**INSPECTION LOG #: 35**
In presence of: Dom – M3 Civil	**Weather: Clear**

41. Purpose of Visit:

Test clay fill compaction in northern pond fill area.

42. Excavations & Ground Conditions Observed

- Next lift of fill placed across the southern end of the pond, roughly 0.5m depth since previous test.
- In the fill areas, Cu's all >200kPa, air voids all <4%.
- See Fill Test Summary Table for more details. Tests 92-93.



Plan showing approximate location of fill area in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Fill placed in the southern end of the pond.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

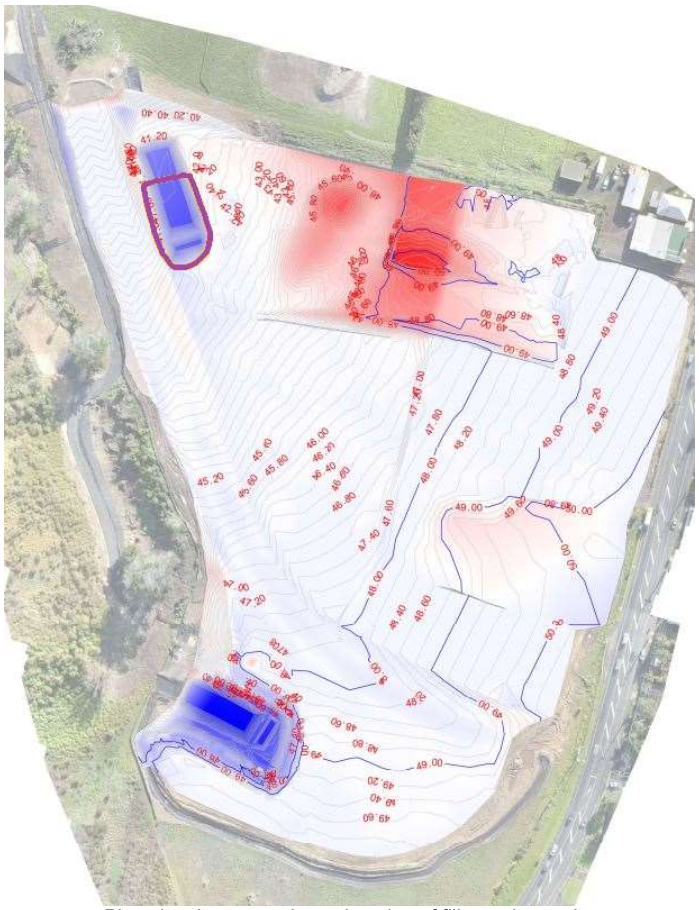
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 12:30 19/01/21**
Inspection of: North Pond Filling	**INSPECTION LOG #: 36**
In presence of: Dom – M3 Civil	**Weather: Clear**

43. Purpose of Visit:

Test clay fill compaction in northern pond fill area.

44. Excavations & Ground Conditions Observed

- Next lift of fill placed across the southern end of the pond, roughly 0.5m depth since previous test.
- In the fill areas, Cu's all >140kPa, air voids all <5%.
- See Fill Test Summary Table for more details. Tests 94-95.



Plan showing approximate location of fill area in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Fill placed in the southern end of the pond.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

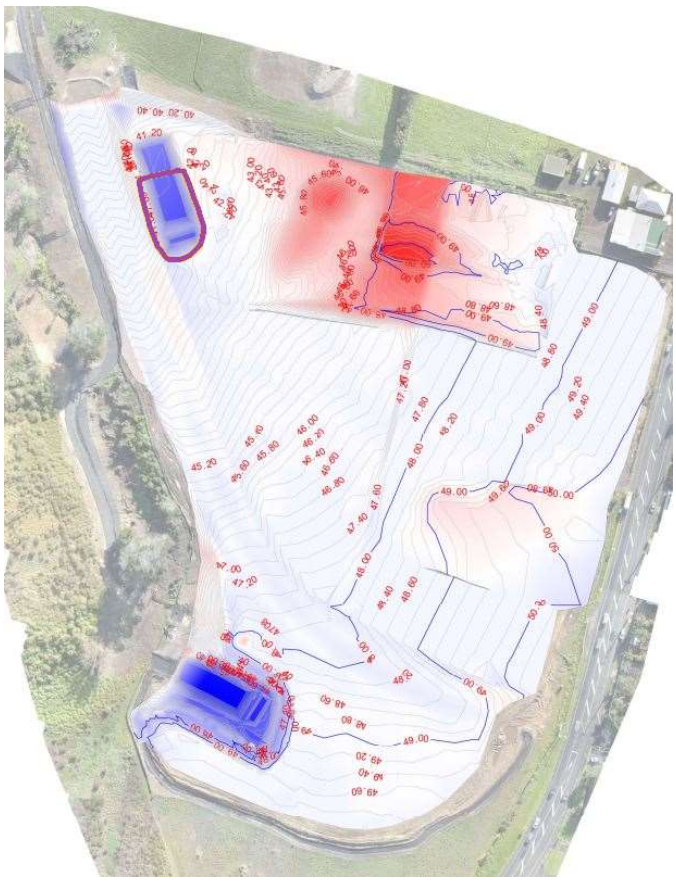
Client: Austino Hobsonville 2 Ltd	**Ref: 94185**
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 14:30 20/01/21**
Inspection of: North Pond Filling	**INSPECTION LOG #: 37**
In presence of: Dom – M3 Civil	**Weather: Overcast**

45. Purpose of Visit:

Test clay fill compaction in northern pond fill area.

46. Excavations & Ground Conditions Observed

- Last lifts of clay fill placed across southern end of the northern pond area. NDM tests performed on 20/01/21, later briefly walked over the site on 27/01/21 to see the area had been trimmed to finished fill height, with just the northern area remaining in use as a decant pond.
- In the fill areas, Cu's all >152kPa, air voids all <5%. Cu's on trimmed surface on 27/01/21 all >200kPa.
- See Fill Test Summary Table for more details. Tests 96-97.



Plan showing approximate location of fill area in purple.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Fill surface on 20/01/21.

Trimmed fill surface on 27/01/21.

Inspection by: C BURNET

Reviewing Senior Geo-Professional: E CRESTANELLO

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Site Inspection Report

Client: Austino Hobsonville 2 Ltd	**Ref: 94185**	
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 11am**	**3/6/21**
Inspection of: Site Walkover	**INSPECTION LOG #: 38**	
In presence of: Dominic – M3 Civil	**Weather: Overcast**	

1. Purpose of Visit:

Site Walkover

2. Excavations & Ground Conditions Observed

- Site work is focussed on stripping large stockpile for Lot 10 and stockpiling it to the south of the road. Significant rutting/disturbed ground noted around the stockpile and into the accessway of Lot 9 and northern portion of Lot 8.
- Small decant pond still present in north-western corner of Lot 10.
- The hardfill surface has been removed from the haul road (Eastern ends of Lots 2 to 5). Buried topsoil and weak fill remains. Further stripping required.
- A stockpile is being removed from the western side of the haul road.
- Yard still present in eastern portion of Lots 2 and 3.

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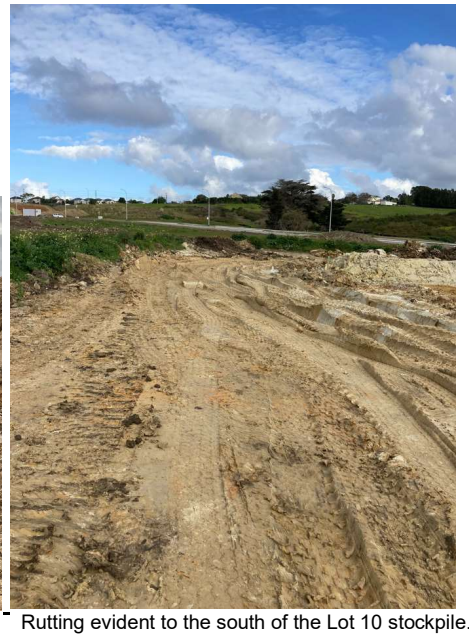
3. Photos

Looking at the stockpile on Lot 10, with the small decant pond in the left-hand side of the frame.



Rutting evident to the south of the Lot 10 stockpile.

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Track from the Lot 10 stockpile across Lots 6 and 7. Note the tracks have only disturbed the topsoil layer.

Yard on Lots 2 and 3.

Photo of haul road on Lot 5 looking to the south

4. Instructions

Strip all topsoil and unsuitable material from the haul road so we can inspect the stripped surface.
Undercut any disturbed material associated with the Lot 10 stockpile so we can inspect the stripped ground.
Strip the yard back so we can inspect the underlying ground.

Inspection by Senior Geo-Professional: M FOSTER

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

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Phone: 09 261 0169
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Website: www.geotek.co.nz

Site Inspection Report

Client: Austino Hobsonville 2 Ltd	**Ref: 94185**	
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 9am**	**23/6/21**
Inspection of: Site Walkover	**INSPECTION LOG #: 39**	
In presence of: Dominic – M3 Civil	**Weather: Sunny**	

5. Purpose of Visit:

Inspect Haul Road

6. Excavations & Ground Conditions Observed

- Large stockpile from Lot 10 has now been fully removed.
- Significant rutting/disturbed ground noted on Lot 10 as well as the accessway of Lot 9 and northern portion of Lot 8.
- Small decant pond still present in north-western corner of Lot 10.
- The haul road has been stripped back to competent natural ground. Buried topsoil underling fill remains along the western and eastern sides of the haul road. Further stripping required to chase out the topsoil.
- The stockpile is still being removed from the western side of the haul road.
- The hardfill hardstand that was placed to form the yard remains in the eastern portion of Lots 2 and 3.

=

7. Photos

Looking at the decant pond in the north-western corner of Lot 10.

Looking from the old stockpile towards Lot 8 at the significant rutting.

Stockpile fully removed from Lot 10.

Yard on Lots 2 and 3 – note the hardfill surface still present.

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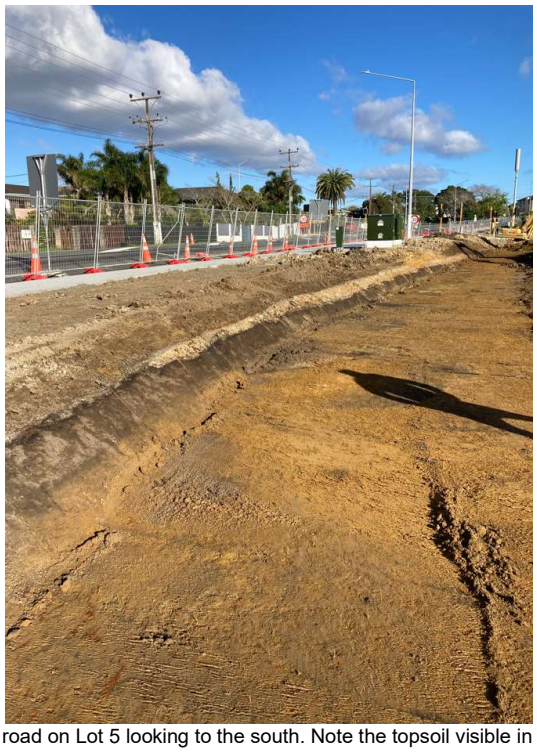

Photo of haul road on Lot 5 looking to the south. Note the topsoil visible in the sidewalls.

8. Instructions

Strip all topsoil and unsuitable material from the sides of the haul road so we can inspect the stripped surface.
Undercut any disturbed material associated with the Lot 10 stockpile so we can inspect the stripped ground.
Strip the yard back so we can inspect the underlying ground.

Inspection by Senior Geo-Professional: M FOSTER

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THOROUGH ANALYSIS • DEPENDABLE ADVICE

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Site Inspection Report

Client: Austino Hobsonville 2 Ltd	**Ref: 94185**	
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 8:30am**	**25/06/21**
Inspection of: Site Stripping	**INSPECTION LOG #: 40**	
In presence of: Dominic – M3 Civil	**Weather: Overcast/Light rain**	

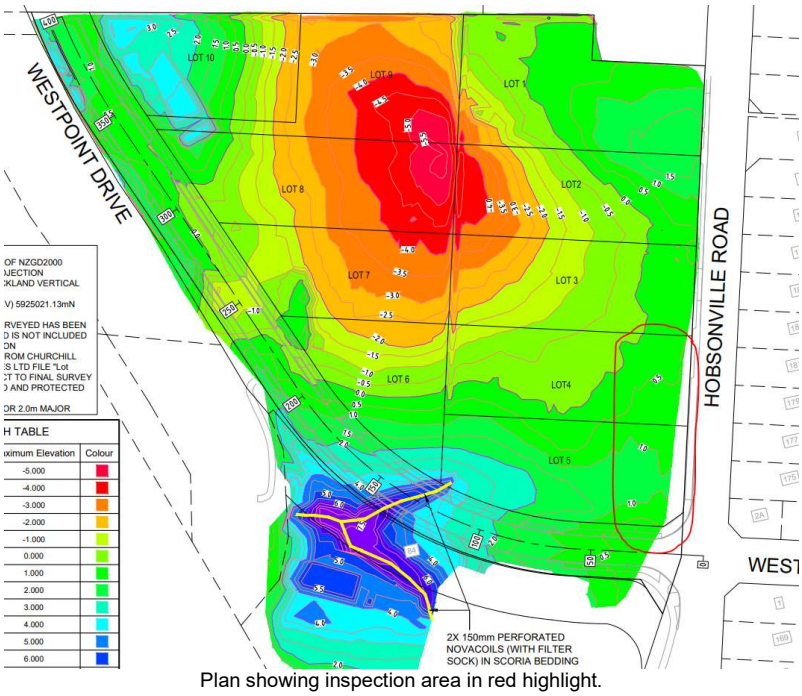
9. Purpose of Visit:

Inspect removal of filled materials & buried topsoil near Hobsonville Road.

10. Excavations & Ground Conditions Observed

- Filled materials & buried topsoil has been cut away in areas as seen on site plan below.
- Exposed material is of natural origin.
- Peak Cu's across the area all measured >80kPa (Direct dial GV2433).
- Some old fencepost holes filled with loose materials found and excavated while on site.
- Some loose materials and topsoil remain across the cut area.

11. Site Plan



Plan showing inspection area in red highlight.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

12. Photos

Photos of cut area, all looking North.

13. Instructions

Ensure all loose materials are removed before commencing clay filling.

Inspection by: J MEEHL

Reviewing Senior Geo-Professional: M FOSTER

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

Client: Austino Hobsonville 2 Ltd **Ref: 94185**

Site Address: 86 Hobsonville Road, Hobsonville **Time/Date: 1:00pm** **15/07/21**

Inspection of: Fill Check **INSPECTION LOG #: 41**

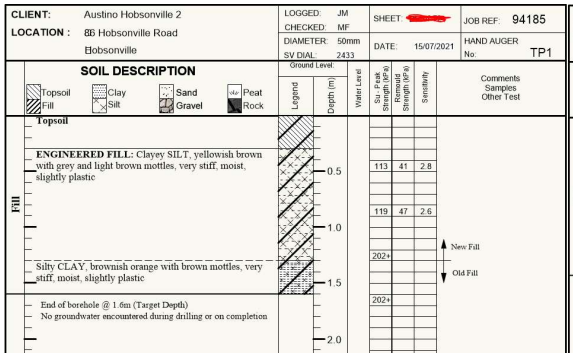
In presence of: Dominic – M3 Civil **Weather: Overcast**

14. Purpose of Visit:

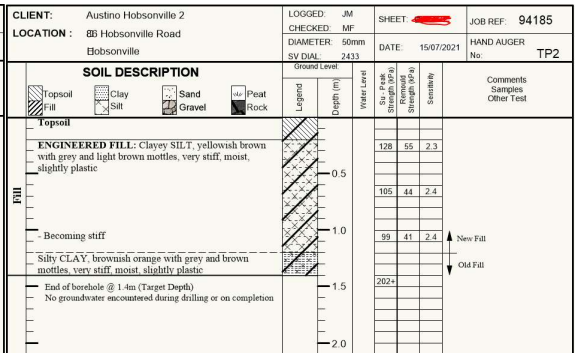
Inspect quality of fill & ensure removal of buried topsoil near Hobsonville Road.

15. Excavations & Ground Conditions Observed

- Buried topsoil has been stripped from Hobsonville road toward fill stockpile and fill placed and compacted up to finished level in area as seen in photos and marked on site plan.
- Some areas where buried topsoil is said to be stripped out was not inspected before placing fill.
- Fill quality is less than satisfactory, appears to have high moisture content.
- Peak Cu's across the area measured consistently below 110kPa.
- Deepest fill (up to 1.7 metres in depth) closest to corner of Spine Road & Hobsonville road, diminishing to the North (~1.0m).
- As discussed with Dominic on site, some of the fill is marginal. Some will be treated with lime stabilisation while other areas may be re-cut & compacted to achieve better results.
- Two test pits dug while on site to ensure topsoil had been removed.



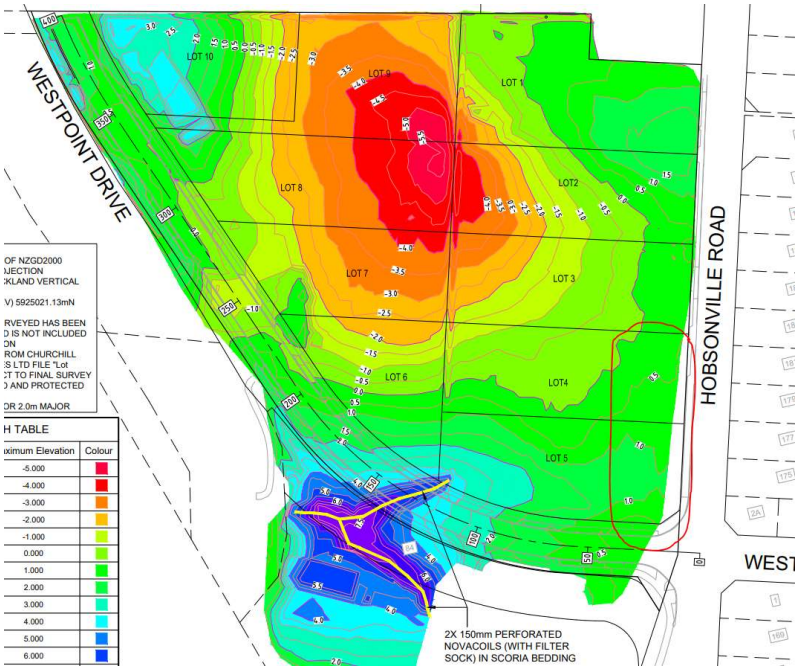
TP1



TP2

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

16. Site Plan



Plan showing inspected area in red highlight.

17. Photos

Photo of fill to the North

Photo of fill to the South toward cnr Spine & Hobsonville, as well as remaining stockpile to the right.

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

18. Instructions

Once the stockpile has been fully removed, we will return to dig pits across the area to ensure all buried topsoil has been removed.

Low quality fill must be remedied and retested.

Inspection by: J MEEHL

Reviewing Senior Geo-Professional: M FOSTER

GEOTEK SOLUTIONS

THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

Site Inspection Report

Client: Austino Hobsonville 2 Ltd	**Ref: 94185**	
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 10:00am**	**21/10/21**
Inspection of: Extent of Weak Fill	**INSPECTION LOG #: 42**	
In presence of: Dominic – M3 Civil	**Weather: Overcast**	

1. Purpose of Visit:

Investigation into extent of weak fill along old haul road & yard area used during construction across lots 3, 4 & 5.
Investigation into extent of weak fill across lots 1 & 2.

2. Excavations & Ground Conditions Observed

- Haul road investigation:
  - 5 deep test pits were excavated along the old haul road through the upper weak fill into the lower competent engineered fill/natural materials.
  - Stiff, weak fill was encountered in Test pits 1 through 4 to depths between 0.7 and 1.0 metres.
  - Competent subdivisional fill was encountered in the western end of each pit.
  - No weak fill was encountered in Test pit 5.
  - A ~250mm thick layer of buried topsoil was encountered in Test pit 3 between 0.6 and 0.8 metres depth.
  - 10 hand augers were drilled surrounding Test Pit 3 to investigate the extent of the buried topsoil. The topsoil was only encountered in two boreholes, indicating the extent of the thick buried topsoil layer does not extend outside of the Test pit 3 area.
  - The approximate extent of the weak fill & buried topsoil along the haul road is highlighted on the appended site plan (GS105).
  - 11 shallow test pits were excavated around the old yard used during construction, stripping the topsoil to expose the fill below.
  - No weak fill was encountered in any of the shallow test pits. All peak shear strengths measured >140kPa.

- Lot 1 & 2 investigation:
  - Weak fill was encountered in our original final investigation around hand auger J3 to 1.3 metres depth.
  - 8 hand augers were drilled radiating out in 7.5 metre intervals to the north, south, east & west of J3 through the weak fill into competent engineered fill/natural materials. Similar strength fill as originally encountered in J3 was encountered in borheoles J3-A, J3-B & J3-C, J3-D, J3-F & J3-H. Refer to appended hand auger logs for results.
  - The extent of the weak fill has been highlighted on the appended site plan (GS106).

3. Photos

Figure 1 - Test Pit 1 (1.0m Weak Fill)

Figure 2 - Test Pit 2 (0.8m Weak Fill)

Figure 3 - Test Pit 3 (Buried Topsoil)

This inspection report is to advise that we have carried out an inspection as required by our client (or client's agent) on this project. It is NOT intended to serve as any form of certificate or producer statement, as that must be signed by a Chartered Professional Engineer once the project is completed.

Figure 4 - Test Pit 4 (0.7m Weak Fill)

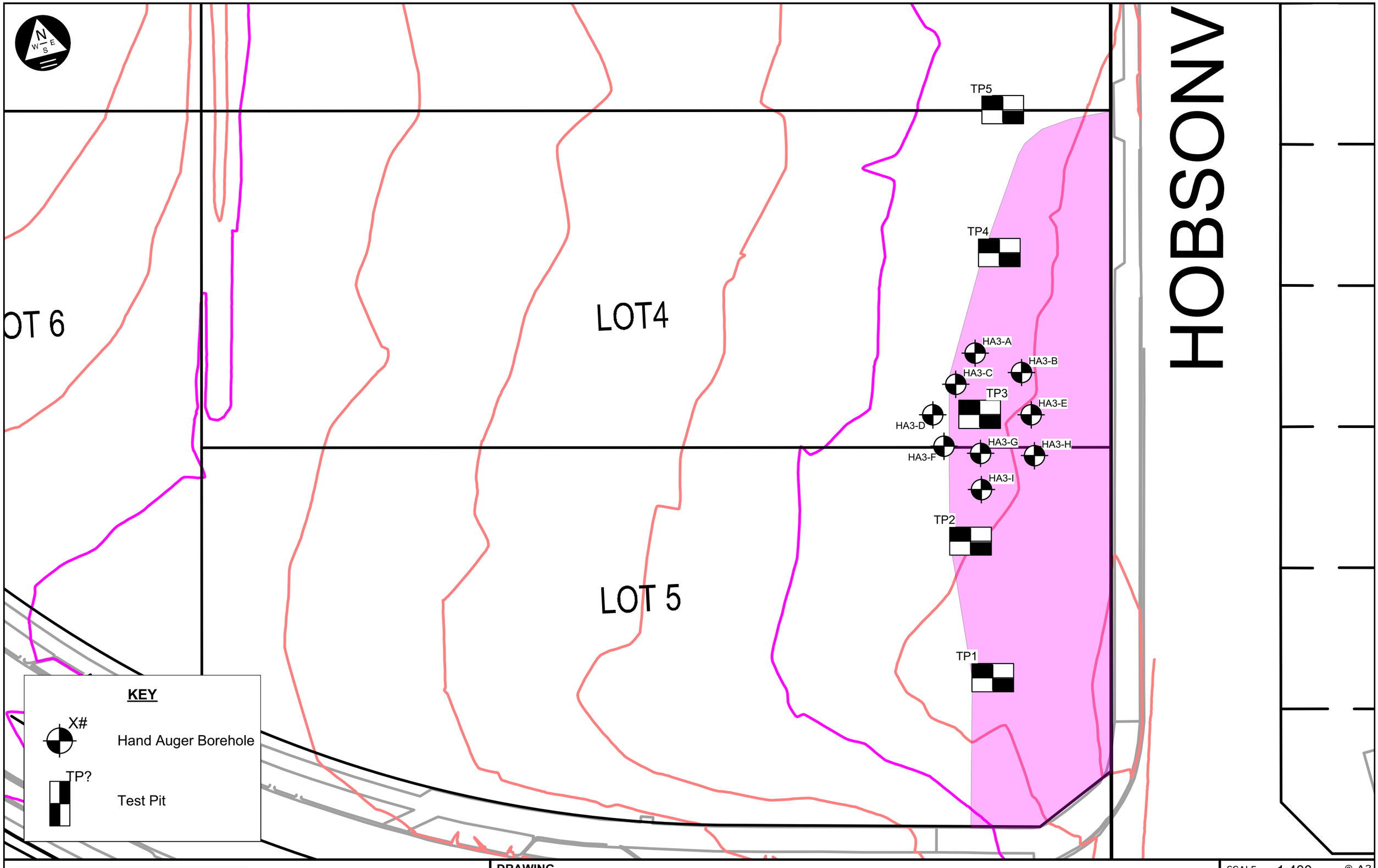
Figure 5 - Test Pit 5 (No Weak Fill)

Figure 6 - Eastern end of test pit 2 (weak fill).

Figure 7 - Western end of test pit 2 (competent fill).

Inspection by: J MEEHL

Reviewing Senior Geo-Professional: M FOSTER



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THOROUGH ANALYSIS • DEPENDABLE ADVICE

1/55 Druces Road, Manukau Central
Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

DRAWING TITLE:	Haul Road Test Pits & Hand Augers over As-Built Contours
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2

SCALE	1:400 @ A3
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS105 REV 02

LOT 1

LOT2

LOT 3

J3-C
J3-B
J3-A
J3-H
J3-D
J3-E
J3-F
J3-G

TP15
TP16
TP13
TP14
TP12
TP8
TP10
TP7
TP9
TP11
TP6

4.95

50.0

ILLE ROAD

KEY

X# Hand Auger Borehole

TP? Test Pit

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Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

THOROUGH ANALYSIS • DEPENDABLE ADVICE

DRAWING TITLE:	Lot 1/2 Borehole & Old Yard Test Pit Locations over As-Built Contours
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2

SCALE	1:400 @ A3
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS106 REV 02

CLIENT:	Austino Hobsonville 2	LOGGED: JM	SHEET: 1 of 13	JOB REF:	94185
LOCATION :	86-88 Hobsonville Road Hobsonville	CHECKED: MF			
		DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER No:	TP1
		SV DIAL: GV2223	VANE FACTOR:		

SOIL DESCRIPTION

Legend: Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Unit	Soil Description	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill	**Topsoil**						
Fill	**WEAK FILL:** Clayey SILT, yellowish brown with dark brown, grey and orange mottles, stiff, very moist, slightly plastic			84			
		0.5		84			
				96			
				116			
Fill	**ENGINEERED-FILL:** Clayey SILT, brownish orange, very stiff, moist, very slightly plastic	1.0		157			
				160			
				174			
	End of test pit @ 1.4m (Target Depth) No groundwater encountered during drilling or on completion	1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 2 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: TP2

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			61			
	0.5		79			
			76			
			202+			
	1.0		202+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

WEAK FILL: Clayey SILT, yellowish brown with dark brown, grey and orange mottles, stiff, very moist, slightly plastic

ENGINEERED FILL: Silty CLAY, orange with grey and yellowish brown mottles, very stiff, moist, slightly plastic

End of test pit @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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THOROUGH ANALYSIS • DEPENDABLE ADVICE

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 3 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: TP3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Soil Description	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill	**WEAK FILL:** Clayey SILT wtih intermixed topsoil, yellowish brown with dark brown mottles, stiff, very moist, slightly plastic				87			
					90			
TGM	**Buried Topsoil**		0.5					
	NATURAL: Clayey SILT, dark orange, very stiff, moist, very slightly plastic		1.0		142			
					157			
	End of test pit @ 1.2m (Target Depth) No groundwater encountered during drilling or on completion		1.5					
	TGM = Tauranga Group Materials		2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 4 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: TP4

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
Fill **WEAK FILL:** Clayey SILT, yellowish brown with dark brown, orange and grey mottles, stiff, very moist, slightly plastic		0.5		58, 61, 84			
TGM **NATURAL:** Clayey SILT, dark orange, very stiff, moist, very slightly plastic		1.0		177, 163			
End of test pit @ 1.0m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 5 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: TP5

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill	**Topsoil**						
	ENGINEERED FILL: Clayey SILT, dark orange, very stiff, moist, very slightly plastic			160			
TGM	**NATURAL:** Clayey SILT, orange, very stiff, moist, very slightly plastic	0.5		148			
				174			
	End of borehole @ 0.6m (Target Depth)						
	No groundwater encountered during drilling or on completion						
	TGM = Tauranga Group Materials	1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 6 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-A

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
FILL — **WEAK FILL:** Clayey SILT, yellowish brown with grey and orange mottles, very stiff, very moist, slightly plastic				157	81	1.9	
- Becoming stiff		0.5		90	58	1.6	
- Becoming very stiff				116	61	1.9	
				131	64	2.0	
		1.0		128	70	1.8	
				113	52	2.2	
TGM — **NATURAL:** Silty CLAY, medium grey with light grey and orange mottles, very stiff, moist, slightly plastic		1.5		169	79	2.1	
				180	96	1.9	
End of borehole @ 1.7m (Target Depth)							
No groundwater encountered during drilling or on completion		2.0					
TGM = Tauranga Group Materials		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 7 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-B

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
FILL — **WEAK FILL:** Clayey SILT, yellowish brown with brown, grey and orange mottles, very stiff, very moist, slightly plastic		0.5		202+			
				134	61	2.2	
		1.0		128	76	1.7	
				163	81	2.0	
				122	70	1.8	
				116	52	2.2	
TGM — **NATURAL:** Silty CLAY, medium grey with light grey and orange mottles, very stiff, moist, slightly plastic		1.5		174	87	2.0	
				166	81	2.0	
End of borehole @ 1.7m (Target Depth)		2.0					
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 8 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-C

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill **WEAK FILL:** Clayey SILT, yellowish brown with dark brown, grey and orange mottles, very stiff, moist, slightly plastic							30mm Topsoil Veneer
				131	64	2.0	
		0.5		125	61	2.0	
				134	70	1.9	
				128	70	1.8	
TGM **NATURAL:** Silty CLAY, medium grey with light grey streaks, very stiff, moist, slightly plastic		1.0		148	70	2.1	
				157	67	2.3	
End of borehole @ 1.2m (Target Depth)							
No groundwater encountered during drilling or on completion		1.5					
TGM = Tauranga Group Materials		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 9 of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-D

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
WEAK FILL: Clayey SILT, yellowish brown with brown, grey and orange mottles, very stiff, moist, slightly plastic	0.5		151	84	1.8	
			113	58	2.0	
- Becoming stiff	1.0		87	44	2.0	
ENGINEERED FILL: Clayey SILT, brownish orange with orange and grey streaks, very stiff, moist, slightly plastic			166	79	2.1	
	1.5		172	67	2.6	
End of borehole @ 1.5m (Target Depth) No groundwater encountered during drilling or on completion	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 10of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-E

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			202+			
	0.5					
			125	64	2.0	
			131	58	2.3	
	1.0					
			142	61	2.3	
			148	70	2.1	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

ENGINEERED FILL: Clayey SILT, yellowish brown with brown, orange and grey mottles, very stiff, moist, slightly plastic

Fill

End of borehole @ 1.3m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 11of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-F

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Soil Description	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
	Ground Level:							
	Topsoil							
Fill	**WEAK FILL:** Clayey SILT, yellowish brown with brown, orange and grey mottles, very stiff, moist, slightly plastic		0.5		131	67	2.0	
					102	52	1.9	
			1.0		113	44	2.6	
					116	76	1.5	
TGM	**NATURAL:** Silty CLAY, medium grey with oragne and light grey streaks, very stiff, moist, slightly plastic				160	90	1.8	
			1.5		202+			
	End of borehole @ 1.5m (Target Depth)							
	No groundwater encountered during drilling or on completion							
	TGM = Tauranga Group Materials		2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 12of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-G

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
Fill — **ENGINEERED FILL:** Clayey SILT, yellowish brown with orange and grey mottles, very stiff, moist, slightly plastic				202+			
		0.5		202+			
TGM — **NATURAL:** Silty CLAY, medium grey with light grey streaks, very stiff, moist, slightly plastic				202+			
				148	73	2.0	
		1.0		169	76	2.2	
End of borehole @ 1.0m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materaials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 13of 13	JOB REF: 94185
LOCATION : 86-88 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 21/10/2021	HAND AUGER
	SV DIAL: GV2223	VANE FACTOR:	No: J3-H

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			160	87	1.8	
	0.5		87	47	1.9	
			148	73	2.0	
			145	67	2.2	
	1.0		177	73	2.4	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

WEAK FILL: Clayey SILT, yellowish brown with light grey and orange mottles, very stiff, moist, slightly plastic

- Becoming stiff

ENGINEERED FILL: Clayey SILT, yellowish brown with medium grey and light grey streaks, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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Site Inspection Report

Client: Austino Hobsonville 2 Ltd	**Ref: 94185**	
Site Address: 86 Hobsonville Road, Hobsonville	**Time/Date: 10:00am**	**27/10/21**
Inspection of: Extent of Weak Fill	**INSPECTION LOG #: 43**	
In presence of: Dominic – M3 Civil	**Weather: Rain**	

1. Purpose of Visit:

Investigation into extent of weak fill across Lot 8 & Lot 9 accessway.

2. Excavations & Ground Conditions Observed

- Long test pits were excavated within lot 8, parallel with the northern boundary, exposing weak fill nestled between competent natural materials. Deep topsoil (>400mm) was often found overlying the weak fill.
- The weak fill is likely to be associated with deep rutting caused by heavy machinery when moving the large stockpile from lot 10.
- Peak shear strengths in the exposed surface weak fill measured between 80 & 110kPa.
- The depth of the weak fill is approximately 1.0 metre below topsoil.
- Test pits excavated to the south (Test pits 19-22) uncovered competent natural material.
- The approximate extent of the weak fill is highlighted on the appended site plan (GS107).

- 8 hand auger boreholes were drilled along the eastern boundary of lot 10, to investigate whether the weak fill from lot 10 extended into lot 9.
- Competent natural materials were encountered in all boreholes, except for HA10-C, where disturbed, weak material was encountered to a depth of 0.7 metres. HA10-C was positioned 10 metres north of the Lot 10 south eastern corner boundary.
- A subsequent 3 boreholes were drilled in 5 metre increments to the east, finding decreasing depths of disturbed material to a minimum of 0.4 metres in HA10-K, 15 metres east of the Lot 10 boundary.
- The extent of the head of disturbed soil is highlighted on the appended site plan (GS107).

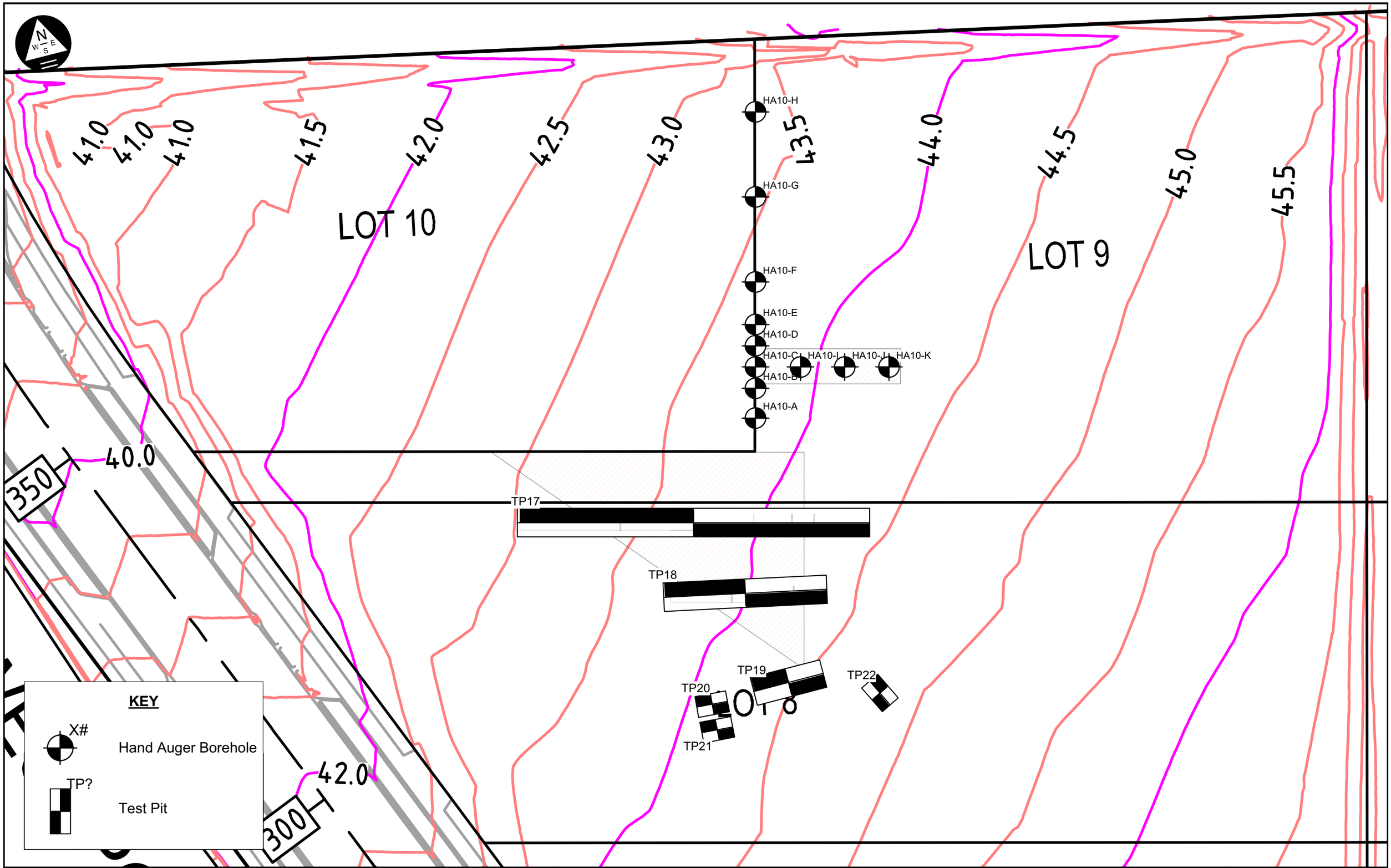
3. Photos

Figure 1 - Test Pit 17.

Figure 2 - Test Pit 18.

Figure 3 - Road cone buried in the side of Test Pit 18.

Inspection by: J MEEHL Reviewing Senior Geo-Professional: M FOSTER



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DRAWING TITLE:	Lot 8 Test Pit & Lot 10 Hand Auger Locations over As-Built Contours
LOCATION :	86-88 Hobsonville Road, Hobsonville
CLIENT:	Austino Hobsonville 2

SCALE	1:400 @ A3
JOB No.	94185
DRAWN BY	JM
DATE	November 2021
SHEET	GS107 REV 02

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 1 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 23/09/2021	HAND AUGER
	SV DIAL: 2433		No: A1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
						Original hole drilled through WW pipe trench 29/06/2021, re-drilled on 23/09/21
Topsoil						
ENGINEERED FILL: Silty CLAY, mottled grey, orange and brown, very stiff, moist, slightly to moderately plastic			157	81	1.9	
	0.5		148	81	1.8	
			145	67	2.2	
			163	81	2.0	
	1.0		195	87	2.2	
			157	87	1.8	
	1.5		142	79	1.8	
	2.0		151	87	1.7	
End of borehole @ 2.0m (Target Depth) No groundwater encountered during drilling or on completion						
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 2 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: B1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			172	44	3.9	
0.5			134	79	1.7	
			145	87	1.7	
			174	81	2.1	
1.0			183	93	2.0	
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

Fill

Topsoil

ENGINEERED FILL: Silty CLAY with frequent fine gravels, light grey with black specks and brownish orange streaks, very stiff, very moist, moderately plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 3 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: B2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Ground Level:					
	Topsoil					
Fill	**ENGINEERED FILL:** Clayey SILT, yellowish brown with orange and light grey mottles, very stiff, moist, slightly plastic		157	79	2.0	
			148	76	2.0	
	0.5					
	Silty CLAY, light grey with orange streaks, very stiff, moist, moderately plastic		142	76	1.9	
	1.0		157	70	2.3	
	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 4 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 29/06/2021	HAND AUGER
	SV DIAL: 2433		No: B3

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
						Borehole further drilled from 1.0 to 1.8m on 28/07/2021
0.5			140	59	2.4	
1.0			145	61	2.4	
			160	79	2.0	
1.5			142	87	1.6	
			142	79	1.8	
			145	81	1.8	
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

Fill

Topsoil

ENGINEERED FILL: Silty CLAY, light grey with black specks and brownish orange/red streaks, very stiff, very moist, moderately plastic

End of borehole @ 1.8m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 5 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: C1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
Topsoil						
Fill						
ENGINEERED FILL: Clayey SILT with trace fine sand, light grey with orange streaks and brown mottles, very stiff, moist, slightly plastic - Occasional fine gravels	0.5		172	52	3.3	
			163	58	2.8	
			202+			
			198	52	3.8	
	1.0		202+			← Becoming natural near end of borehole
End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion						
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 6 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: C2

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Ground Level:					
			87	26	3.3	
	0.5		79	41	1.9	Weak Fill
			49	15	3.4	
			73	26	2.8	
	1.0		202+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

WEAK FILL: Clayey SILT with occasional fine gravels, brown, orange and light brown, stiff, moist, slightly plastic

TGM

NATURAL: Silty CLAY, orange and light grey, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: **www.geotek.co.nz**

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 7 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 20828		No: C3

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			183	99	1.9	
	0.5		172	93	1.8	
			174	87	2.0	
			160	87	1.8	
	1.0		166	81	2.0	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

ENGINEERED FILL: Clayey SILT, light brown with light grey streaks, very stiff, moist, slightly plastic

- Becoming light grey with brown and orange mottles

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 8 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 29/06/2021	HAND AUGER
	SV DIAL: 2433		No: C4

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
Fill — **ENGINEERED FILL:** Silty CLAY, mottled brown, grey, orange, very stiff, moist, slightly plastic				177+			
		0.5					
TGM — **NATURAL:** Silty CLAY, light grey with orange streaks, very stiff, moist, moderately plastic				152	81	1.9	
		1.0		124	68	1.8	
End of borehole @ 1.0m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Website: **www.geotek.co.nz**

CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 9 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: D1

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Clayey SILT, yellowish brown with orange mottles and light grey streaks, stiff, very moist, slightly plastic				85	41	2.1	
		0.5		88	35	2.5	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 10 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: D2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Clayey SILT with trace fine to medium sand, light grey, very stiff, very moist, slightly plastic				131	56	2.3	
		0.5		91	56	1.6	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 11 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: D3

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
			109	56	1.9	
	0.5		71	47	1.5	
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

NATURAL: Clayey SILT with trace fine to medium sand, light grey with orange mottles, very stiff, moist, slightly plastic

End of borehole @ 0.5m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 12 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 29/06/2021	HAND AUGER
	SV DIAL: 2433		No: D4

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
							Hole deepened from 1.0 to 1.6m on 28/07/2021
Topsoil							
Fill — **WEAK FILL:** Clayey SILT, mottled brown, orange, grey, stiff, moist, very slightly plastic				87	26	3.3	Weak Fill
Silty CLAY with minor fine sand fraction, light bluish grey with orange streaks and brown mottles, stiff, moist, slightly plastic		0.5		105	38	2.8	
- Becoming brownish grey with grey and orange mottles, occasional gravels				96	29	3.3	
TGM — **NATURAL:** Silty CLAY with trace fine sand, light grey with orange mottles, stiff, moist, slightly to moderately plastic		1.0		84	35	2.4	
- Becoming very stiff				90	44	2.0	
		1.5		105	47	2.3	
				125	58	2.2	
End of borehole @ 1.6m (Target Depth)				113	52	2.2	
No groundwater encountered during drilling or on completion		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 13 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 29/06/2021	HAND AUGER
	SV DIAL: 20828		No: D5

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			UTP			
	0.5					
			UTP			
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

Fill — **ENGINEERED FILL:** Clayey SILT, dark grey with blackish brown streaks, inferred very stiff, moist, slightly plastic

End of borehole @ 0.6m (Target Depth 1.0m)
Unable to penetrate through hard obstruction
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: JL	SHEET: 14 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 29/06/2021	HAND AUGER
	SV DIAL: 1990		No: D6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			217+			
	0.5					
			189	93	2.0	
	1.0		149	78	1.9	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Tauranga Group Materials

Topsoil

Fill

ENGINEERED FILL: Silty CLAY, light grey with black specks and brownish orange streaks, very stiff, moist, moderately plastic

NATURAL: Silty CLAY, whitish grey with orange mottles, very stiff, moist, moderately plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 15 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: E1

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.0					
	0.5		105	49	2.1	
	1.0		99	57	1.7	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

NATURAL: Clayey SILT with minor sand fraction, light grey and orange, very stiff, moist, very slightly plastic

TGM

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 16 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: E2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.5		162	49	3.3	
	1.0		120	45	2.7	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

TGM

Topsoil

NATURAL: Clayey SILT with minor sand fraction, orange with light grey specks, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 17 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: E3

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill							
Topsoil							
Topsoil intermixed with fill							
TGM **NATURAL:** Fine sandy clayey SILT, orange and grey, stiff, wet, very slightly plastic							
Clayey SILT with minor sand fraction, orange and grey, stiff, moist, very slightly plastic		0.5		90	43	2.1	
		1.0		102	45	2.3	
End of borehole @ 1.0m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 18 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: E4

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
Fill — **ENGINEERED FILL:** Clayey SILT, brownish orange, very stiff, moist, very slightly plastic				142	79	1.8	
TGM — **NATURAL:** Fine sandy clayey SILT, orange and light grey, very stiff, moist, very slightly plastic - Becoming pink, orange and light grey		0.5		150	73	2.0	
End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion		1.0		162	49	3.3	
TGM = Tauranga Group Materials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 19 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: E5

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	NATURAL: Fine sandy clayey SILT, orange, light grey and dark orange, very stiff, moist, very slightly plastic					
0.5	Clayey SILT with minor sand fraction, orange, light grey and dark orange, very stiff, moist, very slightly plastic		199	73	2.7	
	Fine to medium sandy clayey SILT, orange, light grey and dark orange, very stiff, moist, very slightly plastic					
1.0	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion		210+			
1.5	**TGM = Tauranga Group Materials**					
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

TGM

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 20 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: E6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

TGM

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
Topsoil						
NATURAL: Clayey SILT with minor sand fraction, light grey with orange mottles, very stiff, moist, slightly plastic			104	41	2.6	
0.5			116	55	2.1	
End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion						
1.0						
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 21 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: E7

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
0.5	**NATURAL:** Clayey SILT, light brown with light grey streaks, very stiff, moist, slightly plastic		119	41	2.9	
			134	56	2.4	
	End of borehole @ 0.6m (Target Depth) No groundwater encountered during drilling or on completion					
1.0	**TGM = Tauranga Group Materials**					
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

TGM

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 22 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: E8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Ground Level:					
Topsoil						
Fill	**ENGINEERED FILL:** Clayey SILT, light greyish brown with orange specks, very stiff, moist, slightly plastic					
	0.5		206+			
	1.0		206+			
	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 23 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2433		No: F1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:							
TGM **Topsoil**							
NATURAL: Silty CLAY with minor sand fraction, orangish brown with light grey mottles, stiff, moist, slightly plastic				90	45	2.0	
		0.5		98	47	2.1	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 24 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: F2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Clayey SILT with minor sand fraction, orangish brown with whitish grey streaks, stiff, moist, slightly plastic				88	38	2.3	
		0.5		115	44	2.6	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 25 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: F3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Clayey SILT with minor sand fraction, orangish brown, very stiff, moist, slightly plastic				129	35	3.7	
		0.5		165	47	3.5	
End of borehole @ 0.5m (Target Depth) No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 26 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: F4

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM	**Topsoil**						
	NATURAL: Clayey SILT with minor sand fraction, orangish brown, very stiff, moist, slightly plastic			118	56	2.1	
		0.5		159	40	4.0	
	End of borehole @ 0.5m (Target Depth) No groundwater encountered during drilling or on completion						
	TGM = Tauranga Group Materials	1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 27 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: F5

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.0					
Topsoil						
NATURAL: Clayey SILT, light grey, very stiff, moist, very slightly plastic	0.5		88	44	2.0	
			148	50	3.0	
End of borehole @ 0.6m (Target Depth) No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

TGM

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 28 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2223		No: F6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Ground Level:					
TGM **Topsoil**						
NATURAL: Clayey SILT, light grey with orange streaks, very stiff, moist, slightly plastic	0.5		192	64	3	
			87	23	3.8	
End of borehole @ 0.6m (Target Depth)						
No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 29 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2223		No: F7

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Soil Description	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
Fill	**Topsoil**							
	ENGINEERED FILL: Silty CLAY, light brownish grey, moist, very stiff, moderately plastic				204+			
TGM	**NATURAL:** Clayey SILT, light grey with orange streaks, very stiff, moist, slightly plastic		0.5					
	End of borehole @ 0.7m (Target Depth) No groundwater encountered during drilling or on completion				204+			
			1.0					
			1.5					
			2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 30 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: F8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			171	100	1.7	
	0.5					
			UTP			
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

ENGINEERED FILL: Clayey SILT, light brown with dark brown mottles and red streaks, very stiff, wet, slightly plastic

End of borehole @ 0.7m (Target Depth 1.0m)
Unable to penetrate due to hard obstruction
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 31 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: G1

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Clayey SILT, light grey with orange streaks, stiff, moist, slightly plastic				88	49	1.8	
		0.5		62	50	1.2	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 32 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: G2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**						
NATURAL: Clayey SILT with minor sand fraction, yellowish brown with light grey streaks, stiff, moist, slightly plastic			91	50	1.8	
0.5			94	41	2.3	
End of borehole @ 0.5m (Target Depth)						
No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials						
1.0						
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 33 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: G3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.0					
			206+			
	0.5		206+			
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

TGM

Topsoil

NATURAL: Clayey SILT with minor sand fraction, light orangish brown with pinkish red streaks, very stiff, moist, slightly plastic

End of borehole @ 0.5m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 34 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: G4

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			206+			
	0.5		206+			

TGM

Topsoil

NATURAL: Clayey SILT, grey, very stiff, moist, slightly plastic

End of borehole @ 0.5m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 35 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: G5

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			132	49	2.7	
	0.5		176	56	3.2	
			132	75	1.8	
	1.0		121	47	2.6	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

TGM

Topsoil

NATURAL: Clayey SILT, with minor sand fraction, dark brown with orange mottles, very stiff, moist, slightly plastic

- Becoming brown with black streaks

Clayey SILT, grey, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: JL	SHEET: 36 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 29/06/2021	HAND AUGER
	SV DIAL: 1990		No: G6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Silty CLAY, yellowish brown with light grey streaks, very stiff, very moist, moderately plastic				160	67	2.4	
		0.5		148	48	3.1	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 37 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2223		No: G7

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM	**Topsoil**						
	NATURAL: Silty CLAY, light grey with orange and reddish oranke streaks, very stiff, moist, slightly plastic			204+			
		0.5		204+			
	End of borehole @ 0.5m (Target Depth) No groundwater encountered during drilling or on completion						
	TGM = Tauranga Group Materials	1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JL	SHEET: 38 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 1990		No: G8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.0					
Fill	**Topsoil**					
	ENGINEERED FILL: Clayey SILT, brown with light grey streaks, very stiff, moist, slightly plastic, frequent gravel inclusions		217+			
	0.5		217+			
	1.0		217+			
	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 39 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2223		No: G9

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
Ground Level:						
Fill	0.0					Shear vane values may be inflated due to high gravel content of filled ground.
			204+			
	0.5		204+			
			204+			
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

ENGINEERED FILL: Silty CLAY with very frequent gravels, mottled brown and dark browns, very stiff, very moist, very slightly plastic

End of borehole @ 0.9m (Target Depth 1.0m)
Unable to penetrate due to gravel obstructions
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 40 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: H1

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM		Ground Level:					
Topsoil **NATURAL:** Clayey SILT, light grey and orange, very stiff, moist, slightly plastic				150	58	2.6	
		0.5		180	67	2.7	
End of borehole @ 0.5m (Target Depth) No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 41 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: H2

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	NATURAL: Clayey SILT, orange and light grey, very stiff, moist, slightly plastic					
0.5	Clayey SILT with minor sand fraction, light grey with orange streaks, very stiff, moist, slightly plastic		139	66	2.1	
1.0	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion		165	87	1.9	
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

TGM

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 42 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: H3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil intermixed with fill					
	NATURAL: Clayey SILT with trace fine sand, orange and light grey, very stiff, moist, slightly plastic					
0.5			154	75	2.1	
1.0			120	61	1.9	
	End of borehole @ 1.0m (Target Depth)					
	No groundwater encountered during drilling or on completion					
	TGM = Tauranga Group Materials					
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

TGM

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 43 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: H4

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM		Ground Level:					
Topsoil							
NATURAL: Clayey SILT with trace fine sand, orange and light grey, very stiff, moist, slightly plastic							
- Becoming pink and light grey		0.5		154	75	2.1	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
		1.0					
TGM = Tauranga Group Materials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 44 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: H5

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Clayey SILT with trace fine sand, orange and light grey, very stiff, moist, slightly plastic							
Clayey SILT with minor sand fraction, light grey, pink and orange, very stiff, moist, slightly plastic		0.5		105	49	2.1	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 45 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: H6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Soil Description	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
Fill	**Topsoil intermixed wtih fill**							
TGM	**NATURAL:** Clayey SILT with trace fine sand, light grey, pink and orange, very stiff, moist, slightly plastic		0.5		102	49	2.1	
	Clayey SILT with minor sand fraction, light grey and orange, very stiff, moist, slightly plastic		1.0		117	45	2.6	
	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion							
	TGM = Tauranga Group Materials		1.5					
			2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JL	SHEET: 46 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 1990		No: H7

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM	**Topsoil**						
	NATURAL: Silty CLAY, light grey with orange streaks, very stiff, moist, moderately plastic			140	68	2.0	
		0.5		124	71	1.7	
	End of borehole @ 0.5m (Target Depth)						
	No groundwater encountered during drilling or on completion						
	TGM = Tauranga Group Materials	1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JL	SHEET: 47 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 1990		No: H8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			171	106	1.6	
	0.5		217+			
	1.0		217+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

ENGINEERED FILL: Clayey SILT, yellowish brown with light grey streaks, orange mottles and black specks, very stiff, moist, slightly plastic

- Lense of fine to medium gravels

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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Website: **www.geotek.co.nz**

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 48 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2223		No: H9

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.0					
Fill			204+			
	0.5		204+			
	1.0		204+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

ENGINEERED FILL: Silty CLAY, dark brown with orange and grey mottles, very stiff, moist, moderately plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 49 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: H1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill							
Topsoil							
ENGINEERED FILL: Silty CLAY, mottled browns, very stiff, moist, slightly plastic				202+			
TGM **NATURAL:** Clayey SILT, brownish orange, very stiff, moist, slightly plastic		0.5		145	70	2.1	
- Becoming orange with red streaks, very slightly plastic		1.0		134	38	3.5	
End of borehole @ 1.0m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 50 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: I2

Topsoil / Fill; Clay / Silt; Sand / Gravel; Peat / Rock

SOIL DESCRIPTION	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							
Fill **ENGINEERED FILL:** Clayey SILT, light brown with orange mottles, very stiff, moist, slightly plastic		0.5		135	65	2.1	
				191	91	2.1	
TGM **NATURAL:** Clayey SILT with minor sand fraction, yellowish brown, very stiff, moist, slightly plastic		1.0		115	62	1.9	
				106	56	1.9	
End of borehole @ 1.2m (Target Depth) No groundwater encountered during drilling or on completion		1.5					
TGM = Tauranga Group Materials		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 51 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: I3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**							
NATURAL: Silty CLAY, yellowish brown with grey and orange streaks, very stiff, moist, moderately plastic				206+			
		0.5		166	101	1.6	
End of borehole @ 0.5m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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CLIENT:	Austino Hobsonville 2	LOGGED: AH	SHEET: 52 of 72
LOCATION :	86 Hobsonville Road, Hobsonville	CHECKED: MF	JOB REF: 94185
		DIAMETER: 50mm	DATE: 28/06/2021
		SV DIAL: 20828	HAND AUGER No: I4

SOIL DESCRIPTION

Legend: Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Unit	Soil Description	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM	**Topsoil**						
TGM	**NATURAL:** Silty CLAY, light greyish brown with orange streaks, very stiff, moist, moderately plastic	0.5		101	62	1.6	
				121	87	1.4	

End of borehole @ 0.6m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 53 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: I5

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**						
NATURAL: Silty CLAY, light greyish brown with pinkish red streaks, very stiff, moist, moderately plastic			150	90	1.7	
	0.5		132	75	1.8	
End of borehole @ 1.0m (Target Depth)						
No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 54 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: I6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
TGM **Topsoil**						
NATURAL: Clayey SILT with trace fine sand, light grey, pink and orange, very stiff, moist, slightly plastic						
	0.5		132	64	2.0	
End of borehole @ 0.5m (Target Depth)						
No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JL	SHEET: 55 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 1990		No: I7

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			155	71	2.2	
	0.5		217+			
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

TGM

Topsoil

NATURAL: Silty CLAY, yellowish brown with light grey and orange streaks, very stiff, moist, moderately plastic

End of borehole @ 0.5m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED:	SHEET: 56 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL:		No: I8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill	0.0					
			204+			
	0.5		204+			
	1.0		204+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

ENGINEERED FILL: Silty CLAY, brownish orange, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 57 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2223		No: I9

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.0					
Fill			204+			
	0.5		204+			
	1.0		204+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

ENGINEERED FILL: Silty CLAY, dark brown with mottled brownish orange and grey, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 58 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: J2

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			191	106	1.8	
	0.5					
			134	71	1.9	
	1.0		149	71	2.1	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

ENGINEERED FILL: Clayey SILT, light brown with dark brown and orange mottles, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 59 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/07/2021	HAND AUGER
	SV DIAL: 2433		No: J3

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments / Samples / Other Test
	Ground Level:					
						Hole drilled in location where organic material was undercut during earthworks.
			174	87	2.0	
	0.5		113	67	1.7	
			108	55	1.9	
	1.0		105	52	2.0	Weak Fill
			96	58	1.7	
			99	58	1.7	
	1.5		145	72	2.0	
			192	70	2.8	
	2.0		134	73	1.8	
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

WEAK FILL: Clayey SILT, orange with light grey and dark brown mottles, very stiff, moist, slightly plastic

Fill

- Becoming stiff

ENGINEERED FILL: Clayey SILT, orange with light grey and dark brown mottles, very stiff, moist, slightly plastic

TGM

Clayey SILT with minor fine sand fraction, grey with orange streaks, very stiff, moist, very slightly plastic

End of borehole @ 2.0m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 60 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: J4

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
Fill						
ENGINEERED FILL: Clayey SILT, dark brown with orange mottles, very stiff, moist, slightly plastic	0.5		134	74	1.8	
			UTP			
End of borehole @ 0.6m (Target Depth 1.0m)						
Unable to penetrate due to hard obstruction						
No groundwater encountered during drilling or on completion						
	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 61 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 20828		No: J5

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
Topsoil						
Fill						
ENGINEERED FILL: Silty CLAY, dark brown with with reddish pink streaks, very stiff, moist, moderately plastic	0.5		129	74	1.8	
			206+			
End of borehole @ 0.5m (Target Depth) No groundwater encountered during drilling or on completion	1.0					
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 62 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: J6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
NATURAL: Clayey SILT with trace fine sand, brownish orange, very stiff, moist, slightly plastic	0.5		210+			
Silty CLAY, light grey with orange streaks, very stiff, moist, moderately plastic	1.0		183	87	2.1	
End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

TGM

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 63 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 23/09/2021	HAND AUGER
	SV DIAL: 1335		No: J7

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
Topsoil						
			207	54	3.8	
ENGINEERED FILL: Silty CLAY, light orangish brown, very stiff, moist, slightly to moderately plastic	0.5		155	56	2.8	
- Becoming brownish orange with grey and brown mottles			161	81	2.0	
	1.0		146	84	1.7	
			154	102	1.5	
NATURAL: Soft, moderately plastic, orangey brown, silty CLAY: wet			139	54	2.5	
	1.5		154	90	1.7	
			177	70	2.5	
			161	79	2.0	
	2.0		154	72	2.1	
End of borehole @ 2.0m (Target Depth)						
No groundwater encountered during drilling or on completion						
TGM = Tauranga Group Materials	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

TGM

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CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 64 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 23/09/2021	HAND AUGER
	SV DIAL: 1335		No: J8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:						
Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
ENGINEERED FILL: Silty CLAY, light orangish brown with dark brown mottles and white specks, very stiff, moist, slightly plastic			245+			
	0.5					
			162	70	2.3	
			245+			
	1.0					
			245+			
			245+			
			158	54	2.9	
	1.5					
NATURAL: Clayey SILT, light grey with orange streaks, very stiff, moist, slightly plastic			245+			
			221	119	1.9	
	2.0					
End of borehole @ 2.0m (Target Depth)			207	125	1.7	
No groundwater encountered during drilling or on completion						
	2.5					
TGM = Tauranga Group Materials						
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

TGM

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Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 65 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 23/09/2021	HAND AUGER
	SV DIAL: 2433		No: J9

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			202+			
	0.5		202+			
			174	81	2.1	
			157	87	1.8	
	1.0		202+			
			202+			
			202+			
	1.5		202+			
			180	55	3.3	
	2.0		174	79	2.2	
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Topsoil

Fill

ENGINEERED FILL: Silty CLAY, orange with brownish orange and grey streaks, very stiff, moist, occasional fine to medium gravel inclusions

- Frequent gravel inclusions, dark brown mottles

TGM

NATURAL: Silty CLAY, light grey with orange mottles and black specks, very stiff, moist, slightly plastic

End of borehole @ 2.0m (Target Depth)
No groundwater encountered during drilling or on completion

TGM = Tauranga Group Materials

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 66 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 27/07/2021	HAND AUGER
	SV DIAL: 2433		No: K2

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
			160	73	2.2	
	0.5		131	58	2.3	
			202+			
	1.0		202+			
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

ENGINEERED FILL: Clayey SILT, yellowish brown with orange, grey and dark brown streaks, very stiff, moist, slightly plastic, occasional fine gravels

End of borehole @ 1.0m (Target Depth)
No groundwater encountered during drilling or on completion

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Phone: 09 261 0169
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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 67 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: K3

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	0.5		183	76	2.4	
	1.0		162	66	2.5	
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

Fill

Topsoil

ENGINEERED FILL: Clayey SILT with minor sand fraction, grey and brown with black mottles, very stiff, moist, very slightly plastic

Clayey SILT, light grey and orange, very stiff, moist, slightly plastic

NATURAL: Clayey SILT with trace fine sand, orange and light brownish orange, very stiff, moist, slightly plastic

End of borehole @ 1.0m (Target Depth)

No groundwater encountered during drilling or on completion

Tauranga Group Materials

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Phone: 09 261 0169
Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 68 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: K4

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

	Soil Description	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
	Ground Level:							
Fill	**Topsoil**							
Fill	**ENGINEERED FILL:** Clayey SILT with occasional fine gravels, brown and orange, very stiff, moist, slightly plastic							
TGM	**NATURAL:** Clayey SILT with trace fine sand, pinkish orange, very stiff, moist, slightly plastic		0.5		150	49	3.0	
			1.0		132	61	2.1	
	End of borehole @ 1.0m (Target Depth) No groundwater encountered during drilling or on completion							
	TGM = Tauranga Group Materials		1.5					
			2.0					
			2.5					
			3.0					
			3.5					
			4.0					
			4.5					
			5.0					

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Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: STL	SHEET: 69 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2862		No: K5

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill							
Hardfill/Gravels							
TGM							
NATURAL: Clayey SILT with minor fine sand fraction, light orange and pink, very stiff, moist, slightly plastic		0.5		120	66	1.8	
		1.0		162	64	2.5	
End of borehole @ 1.0m (Target Depth)							
No groundwater encountered during drilling or on completion							
TGM = Tauranga Group Materials		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
		5.0					

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Website: **www.geotek.co.nz**

CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 70 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 28/06/2021	HAND AUGER
	SV DIAL: 2433		No: K6

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Ground Level:						
Fill						
WEAK FILL: Clayey SILT with occasional fine gravels, brownish orange, very stiff, moist, slightly plastic			102	50	2.0	
	0.5		180	69	2.6	
ENGINEERED FILL: Clayey SILT, brownish orange, very stiff, moist, slightly plastic			120	66	1.8	
	1.0		118	60	2.0	
End of borehole @ 1.0m (Target Depth)						
No groundwater encountered during drilling or on completion						
	1.5					
	2.0					
	2.5					
	3.0					
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Austino Hobsonville 2	LOGGED: JM	SHEET: 71 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 23/09/2021	HAND AUGER
	SV DIAL: 2433		No: P1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
0.5			116	52	2.2	
			107	35	3.1	
			116	58	2.0	
1.0			119	55	2.2	
			110	47	2.4	
1.5			119	49	2.4	
			128	61	2.1	
			105	52	2.0	
2.0			102	44	2.3	
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

Topsoil

Fill

WEAK FILL: Clayey SILT, orange with grey and brown mottles, very stiff, moist, slightly plastic

End of borehole @ 2.0m (Target Depth)

No groundwater encountered during drilling or on completion

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Email: geotek@geotek.co.nz
Website: www.geotek.co.nz

CLIENT: Austino Hobsonville 2	LOGGED: AH	SHEET: 72 of 72	JOB REF: 94185
LOCATION : 86 Hobsonville Road	CHECKED: MF		
Hobsonville	DIAMETER: 50mm	DATE: 23/09/2021	HAND AUGER
	SV DIAL: 1335		No: P2

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level:

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
0.5			123	49	2.5	
			133	40	3.3	
			141	49	2.9	
1.0						
			125	46	2.7	
			102	39	2.6	
1.5			112	46	2.5	
			105	44	2.4	
			123	53	2.3	
2.0			105	39	2.7	
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						

Topsoil

WEAK FILL: Clayey SILT, orangish brown with orange, grey and dark brown mottles, very stiff, moist, slightly plastic

Fill

- Becoming orange with grey and brown mottles

End of borehole @ 2.0m (Target Depth)
No groundwater encountered during drilling or on completion

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GEOTEK solutions

GEOTECHNICAL SITE INVESTIGATION

FOR

THE PROPOSED 10-LOT
LIGHT INDUSTRIAL SUBDIVISION

AT

86 & 88 HOBSONVILLE ROAD,

HOBSONVILLE

FOR

AUSTINO HOBSONVILLE 2 LIMITED

GEOTECHNICAL REPORT FOR
PROPOSED
LIGHT INDUSTRIAL SUBDIVISION

Ref No. 7273 **27 May 2019**

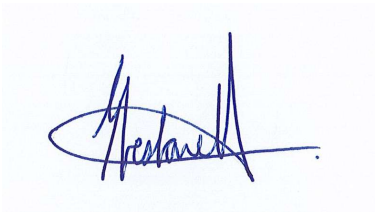
DOCUMENT RECORD

CLIENT	**Austino Hobsonville 2 Limited**
PROJECT	**Proposed Light Industrial Subdivision at 86 – 88 Hobsonville Road, Hobsonville**
PROJECT NO.	**7273**
DOCUMENT	**Geotechnical Investigation Report**

ISSUE AND REVISION RECORD

Status/Revision No.	**Resource Consent - FINAL**
Date of Issue	**27 May 2019**

Authored by



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Eugene Crestanello, BSc. Geol., MEngNZ

Senior Engineering Geologist

1. Introduction

We can confirm that, Geotek Solutions Limited (formerly Geotek Services Limited), previously undertook investigation of the subject site and prepared a Geotechnical Investigation Report dated 15 December 2014 (reference 5123) which comprised the drilling of 21 (no.) Hand Augered Boreholes for the then proposed Motel Development for a previous landowner. We now understand that the current landowner proposes to develop the site using bulk cut and fill earthworks to create 10 (no.) lots for future development of light industrial buildings.

Following the 2014 Goetechnical Investigation Report, we can confirm that we have undertaken further geotechnical investigation within the subject site comprising:

- 5 (no.) Hand Augered Boreholes
- 5 (no.) Cone Penetrometer Tests

We have been provided with Earthworks Development drawings by HG comprising:

- Proposed Earthworks Contours Stage 1 dated 10 May 2019 drawing no. 144443-01-SK#029
- Proposed Earthworks Cut/Fill Plan Stage 1 dated 10 May 2019 drawing no. 144443-01-SK#031

It is our understanding of the overall earthworks proposal that the objective is to create two very gently sloping terrace platforms by cutting down the central high-point of the site by up to 5.5 metres depth and then placing the resulting cut spoil as engineered filling to raise the low-lying north-western corner of the property with up to 5.0 metres depth of engineered as well as bulk filling of broad depression situated beyond the southern limit of the Stage 1 area as well as localized filling in the north-east corner. In addition, a new public road is proposed to be constructed along the southern and western boundaries of Stage 1.

Any variations from the development proposals forming the basis of this investigation should be referred back to us for further evaluation.

2. Limitations

We anticipate that this report is to be submitted to Council in support of a Resource Consent application for land development & earthworks approval and should not be used to support any Building Consent application/s. Following the successful completion of land development & earthworks, a Geotechnical Completion Report confirming

Except to the extent that Council may rely on it in order to issue an associated Consent, this report has been commissioned solely for the benefit of our clients, **Austino Hobsonville 2 Limited**, specifically in relation to the project as described herein, and to the limits of our engagement. Any variations from the development proposals as described herein as forming the basis of our appraisal should be referred back to us for further evaluation. Copyright of Intellectual Property remains with Geotek Solutions Limited, and this report may NOT be used by any other entity, or for any other proposals, without our written consent. Therefore, no liability is accepted by this firm or any of its directors, servants or agents, in respect of any other geotechnical aspects of this site, nor for its use by any other person or entity, and any other person or entity who relies upon any information contained herein does so entirely at their own risk, with the exception that the local Territorial Authority may rely on it to the extent of its appropriateness, conditions and limitations, when issuing the subject consent. Where other parties may wish to rely on it, whether for the same or different proposals, this permission may be extended, subject to our satisfactory review of their interpretation of the report.

Although this report may be submitted to a local authority in connection with an application for a consent, permission, approval, or pursuant to any other requirement of law, this disclaimer shall still apply and require all other parties to use due diligence where necessary, and does not remove the necessity for the normal inspection of site conditions and the design of foundations as would be made under all normal circumstances.

3. Investigation Methodology

This investigation was undertaken generally in accordance with the standards set out in section 2 “Earthworks & Geotechnical Requirements” of NZS4404:2010 “Land Development and Subdivision Infrastructure” as well as section 2 “Earthworks and Geotechnical Requirements” of the Auckland Council Code of Practice for Land Development & Subdivision (Version 1.6 dated 24 September 2013).

4. Geology

Reference to the Institute of Geological & Nuclear Sciences, Geological Map 2 of the Auckland Urban Area, 1:50,000, sheet R11, indicates that the subject site is typical of a significant part of the low lying Auckland Metropolitan area, in that it is superficially underlain by geologically recent “drift” sediments of the Tauranga Group sedimentary lithology (Pliocene to Holocene Epoch) as well as by ancient “solid” Marine Sediments of the East Coast Bays Formation (also known as Waitemata Formation), which are a part of the Waitemata Group sedimentary lithology (Early Miocene Epoch between 16 to 24 million years ago).

According to S.W. Edbrooke, compiler of the "Geology of the Auckland Area" (2001), a companion book to the IG&NS Geological Map 3, tectonic induced subsidence in the Northland and Auckland regions during the Early Miocene Epoch, led to the development of the Waitemata Basin and subsequent deposition of the Waitemata Group.

The depositional process has been described as a sequence of turbidities and interturbidities, which have resulted in variable thicknesses of alternating beds of muddy sandstone and mudstone with varying volcanic content and interbedded volcanoclastic grit beds.

The normally dark-grey bedrock has weathered in most locations, to produce soft to very stiff, residual soils consisting of clays, silts and sands, being predominantly orange brown in colour near the ground surface. Usually associated with an increase in weathering is a decrease in strength, which can be highly variable to depths of up to 10 metres below the ground surface.

Structural defects, thought to be caused by folding and faulting, are known to be widespread in the East Coast Bays Formation, and have been attributed to soft sediment disruption, in part caused by compaction consolidation during deposition and later tectonism. Bedding parallel shear planes are known to occur as a result of folding and flexural slip. Where bedding orientation dips out of a slope or cliff, mass movement failures even at relatively shallow angles can occur. It is not unusual to find bands of hard dark-brown limonite interspersed within both the weathered and unweathered materials.

According to Edbrooke, tectonic uplift, mainly westward tilting, during late Miocene times, produced a significant change in the sedimentary depositional environment of the Auckland region with deep erosion and mainly terrestrial, rather than marine deposition. Fluctuating sea levels brought on by the Ice Ages, brought many changes to the ephemeral islands and channels of the Auckland region and eventually flooded the large valleys to form the Waitemata and Manukau harbours.

Tauranga Group sediments are heterogeneous, including gravels, sands, silts, muds and peats of fluvial, lacustrine and distal ignimbritic origin (both airborne and waterborne pumiceous materials). As a result, these deposits can often contain interbedded layers and/or lenses of muddy peats within the predominantly silty and clayey alluvium.

The most recent deposits (geologically speaking) underlying the site, are the Holocene Epoch deposits of undifferentiated alluvium, consisting of unconsolidated soft muds, sands, gravels and thin peaty lenses, which are commonly encountered above the older more consolidated and generally pumiceous materials.

5. General Site Description

The subject site is currently identified as Numbers 86 & 88 which are both situated on the western side of Hobsonville Road, in the Auckland suburb of Hobsonville. Topographically speaking, the land comprises a central high-point or crown on top of which an existing weatherboard homestead is situated with predominantly gentle slopes falling away from this high-point typically towards the south-west and west and away from Hobsonville Road itself situated along the eastern boundary.

The gradients become more moderately sloping as the land falls into a broad gully situated beyond the western boundary. The site gradients range from around 1V:20H across the majority of the eastern two-thirds of the site before steeper gully slopes around 1V:6H to as steep as 1V:2.5H become dominant in the western-third of the property particularly in the north-western corner as well as the gully slopes situated beyond and below the proposed public road. Known services include a stormwater line which runs from the roadside boundary, through the middle of the gully head before discharging to the existing stream. The southern portion of the property is covered in pasture, whilst with dense vegetation and trees line the steeper gully flanks.

There are numerous buildings and structures scattered across number 88 which can be seen in the aerial photos below along with evidence of historic land disturbance activities.

Whilst we observed evidence of soil creep effecting the steeper localised gully slopes, there was no obvious evidence of historic nor recent slope instability

5.1 Number 88 Hobsonville Road

Figure 1: Aerial photograph showing Number 88 Hobsonville Road which is separated into two land parcels by a central gully Please note, the eastern land parcel of number 88 is subject to this report whilst the western land parcel will be subject to a future geotechnical report. Existing site contours in orange at 0.5m intervals and existing aerial photograph ca. 2017, from the Auckland Council GIS database (ALGGI).

Number 88 comprises two land parcels with the eastern parcel being the subject of this report. The land is comprised of predominantly gently to moderately sloping topography with the eastern two thirds falling from the road at gradients up to 1V:8H, westwards to the gully stream which separates the remaining third of the property on the western side of the stream and generally falls to the north-east, at gradients up to 1V:5H. Steeper gradients of around 1V:2.5H are present around the southern end of the gully. A pronounced, gently sloping crown is located in the eastern third of the property, which is occupied by a weatherboard house surrounded by gardens, trees, hedges and lawns.

The homestead is accessed via an approximately 80 metre long gravel driveway that leads to a turning circle at its eastern side with a garage and carport situated to the south-east. The driveway then runs along the southern side of the house to a gravel yard and a series of buildings and sheds, which are serviced by another metal access way that runs along the southern boundary. The buildings include a large packing shed and twin glass houses at the southern end of the yard, with a garage between the packing shed and house. A concrete toilet block is situated to the west of the packing shed. Another small timber building lies to the east of this

cluster along the southern side of the access way. The yard was used in the past to store and renovate relocatable houses with several of these houses, as well as shipping containers situated in this area. To the west, the property has been used for a motor-bike course with a large track and mounds of soil still in place. To the south of the track is a large gravel hardstand that has been cut into the eastern slope, resulting an approximately 3 metre high batter slope along the eastern end, and what appears to be filled portion of the platform extending out towards the west above the steep gully slopes. From our walkover, it appears that some of the platform is covered with bricks and other concrete construction debris, which may have been used to level the area. A driveway leads over the stream to the northwest of this platform to access the western portion of the property, which is currently in pasture. The crossing itself appears to be supported along its northern edge by stacked plastic bags filled with soil, which we understand may have been left over from the rose growing operations. It appears that no large culvert has been installed for the crossing, with several small pipes, some plastic, some concrete, present at stream invert level. The area was very overgrown but it appears the southern side of the crossing has silted up creating a wide flat swampy area, while the northern side appears to be relatively natural stream channel. We noticed scrap metal and other construction materials littered through the vegetated gully banks.

5.2 Number 86 Hobsonville Road

Figure 2: Aerial photograph showing Number 86 Hobsonville Road which is separated into two land parcels by a central parcel of land identified as number 84. Please note, the northern land parcel of number 86 is subject to this report whilst the southern land parcel will be subject to a future geotechnical report. Existing site contours in orange at 0.5m intervals and existing aerial photograph ca. 2017, from the Auckland Council GIS database (ALGGI).

Number 86 comprises two land parcels with the northern parcel being the subject of this report. The landform comprises a broad, gently sloping gully head that falls towards the west, to a watercourse that runs in a north-westerly direction, that exits the property via its north-western corner. The sites gradient ranges from around 1V:20H across most of the site with steeper gully slopes around 1V:6H to as steep as 1V:2.5H at the north-western corner. Known services include a stormwater line which runs from the roadside through the centre of the property via four manholes before it discharges into the stream. The property is covered in pasture, with dense vegetation and trees in the gully. There is no formalised road entrance.

Figure 3: Aerial photo showing the proposed 10 Lots with the existing site contours and existing aerial photograph ca. 2017, from the Auckland Council GIS database (ALGGI).

6. Aerial Photograph Review

In an effort to identify any significant land disturbance as well as global slope movement, we have reviewed both recent and historical aerial photographs from Council's GIS database.

6.1 1959 Aerial Photograph

Figure 4: 1959 Aerial photo showing the properties and surrounding area covered in pasture with trees along the gully. The main house and existing driveway are present on Number 88, with the driveway also accessing the western neighbour at number 82 Hobsonville Road (Source: Council GIS).

6.2 1996 Aerial Photograph

Figure 5: 1996 Aerial photo showing the properties covered in market gardens, with the area to the east of the road having undergone significant residential development. The sheds and small house are present to the west of the main house, with trees and lawn to the east. (Source: Council GIS).

6.3 2008 Aerial Photograph

Figure 6: 2008 Aerial photo shows the subject properties still covered in market gardens, with a small garage to the east of the sheds and three glasshouses to the south. (Source: Council GIS).

6.4 2012 Aerial Photograph

Figure 1: 2010 Aerial photo showing the properties close to their present day form. The majority number 86 site is covered in pasture. The relocatable houses and containers are evident to the north of the sheds, with the glasshouses now removed. A motocross track is evident to the north-west of the sheds, with the remains of the market garden operation to the west of the small house. (Source: Council GIS).

6.5 2017 Aerial Photograph

Figure 8: 2017 Aerial photo showing the properties in their present day form albeit with overgrowth of grass and weeds. (Source: Council GIS).

7. Subdivision Development Proposals

The proposed development will entail the creation of Lots 1 through 10 (inclusive) being new titles. All proposed Lots will be accessed directly either from Hobsonville Road or the proposed Public Road which is proposed to be constructed along the southern and western boundaries.

The overall earthworks proposal is to create two very gently sloping terrace platforms graded at 1V:40H. The upper terrace comprises Lots 1 thru 5 and the lower terrace comprising Lots 6 thru 10. The two terraces are to be separated by a 1V:3H batter which we understand will be no higher than 2.0 metres vertical height. The lower terrace will also be separated from the Public Road by a similar 1V:3H batter which we understand will be no higher than 2.0 metres.

The earthworks bulk earthworks will comprise cutting down the central crown/high-point of the site by up to 5.5 metres depth and then placing the resulting cut spoil as engineered filling to raise the low-lying north-western and to the southern areas of the site with up to 5.0 metres depth of engineered as well as localized filling in the north-east corner.

In addition, the new public road is proposed along the western gully slope and will require filling of up to 4.0 metres which we are told will be supported by retaining walls, possibly rock-filled gabion baskets, which will be subject to a separate geotechnical assessment and subsequent specific design as part of Engineering Plan Approval (EPA).

We have appended the Earthworks plans supplied by HG as referenced in Section 1 above.

We have not been provided with any stormwater or sewer pipe plans.

As a result, the principal objectives of our work were to investigate the subsoils and to determine the following:

- The occurrence and depth of topsoil.
- The occurrence and depth of pre-existing fill which is likely to be non-engineered
- The nature, depth and extent of any unsuitable (soft and/or compressible) materials that may be found.
- The nature and bearing characteristics of the naturally occurring materials, and the depth of materials suitable for filling.
- The long-term stability of the site including any existing slopes as well as proposed cut and/or fill batters.
- The characteristics of cut spoil to be re-used as engineered fill.
- The occurrence of groundwater.
- The likely stability of deep excavations (e.g. drainage trenches).

8. Investigation Fieldwork

The original fieldwork investigation was undertaken by Geotek Services Limited during October 2013 and comprise the drilling of 21 (no.) hand auger boreholes.

During March 2019, Geotek Solutions Limited undertook the drilling of 5 (no.) hand augered boreholes,

In addition, 5 (no.) Cone Penetrometer Tests (CPT) were performed by a geotechnical investigation sub-contractor.

The approximate locations of the investigation holes are indicated on the appended site plan. Approximate ground levels at each of the investigation hole locations were estimated from survey contour data supplied to us by HG.

8.1 Hand Auger Boreholes (HA)

The drilling of 50mm diameter hand augured boreholes to depths of up to 5.0 metres.

As each excavation progressed, careful inspections were made of the materials observed, and soil shear strength and remould tests were performed insitu, at selected depths, using a hand-held shear vane and reported as direct dial readings corrected only to an “office” Pilcon shear vane. The materials identified are described in detail on the appended records, together with the groundwater conditions encountered during our time on site.

All samples recovered were carefully logged by a geologist, with detailed descriptions and depths of strata encountered, as presented in the appended borehole records.

8.2 Cone Penetrometer Testing (CPT)

A total of 5 (no.) CPT soundings were undertaken to depths of up to 15.4 metres by Prodrill, using a 3 tonne rig able to produce 20kN of force, generally in accordance with the ASTM Standard D 5778-07. We have been supplied with the raw data as well as graphical print-outs of the raw or uncorrected Cone Resistance (qc) and the raw Skin Friction (fs) as well as the Friction Ratio (Rf).

Furthermore, because of its continuous record of inferred strength profile, the CPT is particularly useful in detecting layers or lenses of weakness. However, it must be recognised that the CPT is a “blind” test that does not allow confirmation of material types, and therefore relies on interpretation of the test results.

In our experience, the industry standard CPT correlations for undrained shear strength are not specific to Tauranga Group alluvial deposits, in particular, fine-grained silts with very low cohesion. Our experience is that for stiff to very stiff clayey deposits, the inferred undrained shear strength values (Su) values generally compare well with measured values in similar materials provided by the Pilcon shear vane. However, for very silty sensitive materials of low clay content such as silts and fine-grained sands transitioning to less weathered

material, particularly when wet to saturated, the inferred Su values based on standardised CPT results are often very much lower than readings provided by the Pilcon shear vane. This, we believe, is due to pore water pressure effects generated by the rapid and continuous nature of the testing.

We have therefore applied our own empirical correlation factor to the full depth of Corrected Cone Resistance (qt) and presented a plot of these figures as an "Inferred Peak Undrained Shear Strength" (Su) in kPa on the appended graphs along with the raw measurements of Skin Friction. We have also plotted the equivalent SPT N60 values for each test location.

We have carefully reviewed this data and, using our experience as well as comparative analysis with adjacent hand augers we have made a determination of the likely horizons of soil, based on similarities in the layering of the materials when compared between the various investigation locations.

We discuss the attributes and traits of the various horizons later in this report.

8.3 Cross-Section

In addition, cross-sections were generated by HG, showing profiles of both the existing and proposed topographical model. We have chosen what we consider to be a representative finished profile running from west to east which we identify as Section A-A'

9. Summary of Investigation Findings

Below is a summary of our subsoil findings from the boreholes drilled across the site with a summary table included towards the end of this section. Please refer to the appended borehole records for greater detail.

9.1 Topsoil

Surficial topsoil was encountered across the majority of the site ranging from 0.1 to 0.5 metres depth. In several boreholes (HA1, HA8, HA9 and HA11) we encountered a transition zone of topsoil intermixed with the underlying natural ground, which we have conservatively logged as being all topsoil. In some locations (HA12, HA16, HA17, HA18 & HA19) we encountered no topsoil but instead clayey silt soil from the ground surface.

9.2 Man-Made Filled Ground

We encountered both shallow and deep deposits of man-made filling.

We encountered deep deposits of filled ground ranging between 1.0 to 2.4 metres depth (HA14, HA17 & HA18) all positioned along the western margins of the proposed earthworks area, on land which becomes moderately sloping.

In HA14, positioned in the head of the southern gully, we encountered firm, gravelly silty CLAY to a depth of 1.0 metres. It is likely that this fill was placed when the gully was filled. HA17 was positioned at the crest of the

gravel hardstand that appears to have been pushed out over the steep gully slopes, and encountered what appeared to be highly variable fill to a depth of 2.4 metres. The fill was found to comprise loose topsoil intermixed with gravel and wood fragments and some clayey layers, with topsoil stained, silty CLAY with brick fragments encountered towards the base of the fill. From our walkover and review of aerial photos, we consider that this hardstand area may be underlain with significant deposits of "uncontrolled" fill. In HA18, which was drilled in the area of the motocross course we encountered firm to stiff, silty CLAYS and clayey SILTS ranging in depth from 0.3 to 1.3 metres depth, with a piece of plastic bag encountered near the base of HA18. We consider that the fill was placed to form the motocross course and is likely to have originated from nearby cut areas.

Elsewhere, seemingly shallow, superficial deposits of man-made filling were encountered in six locations, which were typically no deeper than 0.6 metres. The fill was found to comprise firm to stiff silty CLAYS and clayey SILTS with gravel and some topsoil inclusions, which we largely consider as non-engineered material.

In summary, we consider the pre-existing fill deposits across the site have been placed without engineering supervision and must be considered as non-engineered material, and unreliable to support future foundations either directly or indirectly.

9.3 Natural Ground

The underlying natural deposits predominantly comprised alluvially deposited soils ranging in strength from firm to very stiff, and from slightly to highly plastic, silty CLAYS and clayey SILTS, consistent with our expectations of Tauranga Group Materials (TGM).

We typically found the soils to be stiff to very stiff in the upper two metres of the soil profile forming a surface "crust" with strengths typically decreasing and plasticity increasing from around 2 to 3 metres depth as the materials became wetter with depth. Apart from HA21, which was drilled in a gully invert, we did not encounter soils with an undrained shear strength of less than 49 kPa (direct dial reading) although we did identify marginally firm material in the following locations (direct dial undrained shear strengths of <60 kPa):

- HA1 around 2.8 metres depth (Proposed filling 0.8m depth)
- HA2 around 3.4 metres depth (Proposed filling 1.1m depth)
- HA4 below 3.8 metres depth (Proposed cut 0.4m depth)
- HA10 around 3.4 metres depth (Proposed cut 0.1m depth)
- HA14 between 1.2 to 2.0 metres depth (gully invert)
- HA18 around 3.8 metres depth
- HA21 between 0.7 to 2.2 metres depth (gully invert)

In 7 (no.) hand auger locations we appear to have penetrated through the alluvial deposits and into weathered Waitemata Group Materials (WGM) which were typically stiff to very stiff, and slightly to moderately plastic

sandy clayey SILTS from depths as shallow as 2.2 metres in HA14 and HA21, which were drilled in the gully inverts, but typically between 3.4 to 4.7 metres depth in the remaining 5 hand augers.

9.4 Stratigraphic Summary Table (2019)

Hand Auger # (Depth Drilled)	Existing RL (m)	Proposed RL (m)	Proposed Cut/Fill (m)	Topsoil Depth (m)	Existing Non-Engineered Fill (m)	Natural Stratigraphy TGM?/ WGM?	Cu Range In Natural Ground (kPa)	Average Cu (kPa)	Groundwater Encountered (m) March 2013	Standing Groundwater Measured (m) March 2013
AH1 (5.0m)	48.5	49.4	Fill 0.9m	0.5	-	TGM	82 – 110	97	4.2	4.4
AH2 (5.0m)	51.8	47.8	Cut 4.0m	0.1	-	TGM	110+	110+	None	None
AH3 (5.0m)	45.5	44.4	Cut 1.1m	0.4	-	TGM	72 – 110+	97	None	None
AH4 (5.0m)	50.0	49.0	Cut 1.0m	0.1	-	TGM	76 – 110+	104	4.1	4.0
AH5 (5.0m)	46.0	46.0	Nil Cut/Fill	0.1	-	TGM	86 – 110+	101	5.0	5.0

Table 1: Stratigraphic Summary of 2019 Hand Auger Boreholes

Please note that, standpipes were installed in these hand auger boreholes to allow ongoing groundwater level measurement which is discussed in Section 10. below.

9.5 Stratigraphic Summary Table (2013)

Hand Auger # (Depth Drilled)	Existing RL (m)	Proposed RL (m)	Proposed Cut/Fill (m)	Topsoil Depth (m)	Existing Non-Engineered Fill (m)	Natural Stratigraphy TGM?/ WGM?	Cu Range In Natural Ground (kPa)	Average Cu (kPa)	Groundwater Encountered (m) October 2013	Standing Groundwater Measured (m) October 2013
HA1 (5.0m)	48.8	49.6	Fill 0.8m	0.3	0.3 - 0.6	TGM	56 – 104	82	2.8	1.0
HA2 (5.0m)	48.5	49.6	Fill 1.1m	0.3	-	TGM	49 – 138+	83	Not Encountered	1.0
HA3 (3.0m)	50.2	49.7	Cut 0.5m	0.4	-	TGM	87 – 138+	102	2.2	1.2
HA4 (5.0m)	50.2	49.8	Cut 0.4m	0.2	0.2 - 0.4	TGM	51 – 134	76	Not Encountered	1.5
HA5 (3.0m)	48.9	49.5	Fill 0.6m	0.3	-	TGM	83 – 138+	113	Not Encountered	2.5
HA6 (3.0m)	48.5	48.7	Fill 0.2m	0.2	0.2 - 0.5	TGM	84 – 125	103	2.6	1.1
HA7 (3.0m)	49.5	48.8	Cut 0.7m	0.2	-	TGM	89 – 138+	122	Not Encountered	0.9
HA8 (3.0m)	50.9	48.7	Cut 2.2m	0.4	-	TGM	106 – 138+	124	Not Encountered	1.5
HA9 (3.0m)	49.8	48.4	Cut 1.4m	0.5	-	TGM	84 – 125	106	Not Encountered	1.7
HA10 (5.0m)	48.3	48.2	Cut 0.1m	0.4	-	TGM	55 – 138+	95	Not Encountered	1.3
HA11 (3.0m)	49.5	48.3	Cut 1.2m	0.4	-	TGM	84 – 138+	102	2.9	0.9
HA12 (3.0m)	51.6	46.1	Cut 5.5m	-	0 - 0.5	TGM	94 – 115	103	Not Encountered	1.6
HA13 (4.0m)	48.0	47.3	Cut 0.7m	0.3	-	TGM, WGM from 3.4m	62 – 138+	104	Not Encountered	2.2
HA14 (3.0m)	43.8	48.1	Fill 4.3m	0.3	0.3 - 1.0	TGM, WGM from 2.2m	50 – 138+	94	1.6	0.9
HA15 (3.0m)	46.2	44.2	Cut 2.0m	0.2	-	TGM	89 – 120	102	Not Encountered	1.0
HA16 (3.0m)	47.0	44.8	Cut 2.2m	-	0 - 0.3	TGM	84 – 107	99	2.8	0.8
HA17 (5.0m)	44.8	Outside of Proposed Earthworks	Outside of Proposed Earthworks	-	0 - 2.4	TGM	91 – 138+	110	Not Encountered	Not Encountered
HA18 (5.0m)	40.4	43.3	Fill 2.9m	-	0 - 1.3	TGM	73 – 114	93	3.4	1.9
HA19 (5.0m)	41.3	42.6	Fill 1.3m	-	-	TGM, WGM from 3.9m	72 – 138+	105	4.2	3.4
HA20 (5.0m)	38.4	40.6	Fill 2.2m	0.2	0.2 - 0.5	TGM, WGM from 4.2m	72 – 138+	103	1.0	0.7
HA21 (3.0m)	40.0	Outside of Proposed Earthworks	Outside of Proposed Earthworks	0.1	-	TGM, WGM from 2.2m	36 – 137	78	1.0	Not Encountered

Table 2: Stratigraphic Summary of 2013 Hand Auger Boreholes

Please note that, there is a significant discrepancy between the depths at which groundwater was encountered during drilling versus the subsequent standing groundwater levels measured AFTER drilling as given in Table 2. We believe these differences were as result of the hand auger holes having filled with surface water run-off as the holes were drilled during a wet winter. Also several wet days passed between the drilled date and

the standing groundwater measured date and the holes were not lined with standpipes. We therefore consider that the standing groundwater level depths are unreliable whilst the depths at which groundwater was encountered during drilling is much representative of actual seepages which could be expected during winter months. We therefore do not consider there to be any obvious evidence of locations where groundwater seepages could be encountered by the proposed earthworks excavations.

9.6 Cone Penetrometer Tests (CPT)

CPT # (Refusal Depth)	Existing RL (m)	Proposed RL (m)	Proposed Cut/Fill (m)	Inferred TGM/WGM Stratigraphic Boundary	Minimum Inferred Cu (kPa) (Depth)	Average Inferred Cu in TGM (kPa)	Average Inferred Cu in WGM (kPa)
CPT1 (15.37m)	48.5	49.3	Fill 1.0m	7.0m RL41.5	90 (3.8m)	140	400
CPT2 (8.38m)	48.5	46.3	Cut 2.2m	6.3m RL42.2	80 (2.8m)	220	700
CPT3 (11.0m)	50.0	49.3	Cut 0.7m	8.0m RL32.0	65 (3.5m)	150	600
CPT4 (11.35m)	49.5	45.4	Cut 4.1m	7.0m RL42.5	80 (3.5m)	140	500
CPT5 (15.01m)	40.5	43.5	Fill 2.9m	8.0m RL32.5	65 (3.5m)	101	5.0

Table 3: Stratigraphic Summary of 2019 Cone Penetrometer Tests

Please refer to the appended CPT graphs of both raw data as well as inferred undrained shear strengths as well as SPT N60 densities.

From these CPT tests we have been able to confirm a similar trend as we identified in the hand auger boreholes whereby the site comprises a stiff to very stiff dessicated crust with the underlying soils becoming wetter and relatively weaker with depth. The lowest strengths are typically around 3.5 metres depth before the soil strength/density begins to gradually increase. We infer the presence of the Tauranga Group Materials/Waitemata Group Material boundary around the depth where the inferred undrained shear strength exceeds 200 kPa which ranges in depth from 6.3 to 8.0 metres below existing ground level.

Most importantly, the CPT tests confirm the presence of generally competent soils with no obvious evidence of significantly weak deposists and, once below 3.5 metres, strengths typically increase with depth.

10. Groundwater Level Monitoring

The following table is a summary of the groundwater levels we have measured in our recent hand auger boreholes which had standpipes installed:

	AH1	AH2	AH3	AH4	AH5
Ground Surface RL (m)	48.5	51.8	45.5	50.0	46.0
Hole Invert Depth (m)	-5m	-5m	-5m	-5m	-5m
Proposed Ground RL (m)	49.4 Fill (0.9m)	47.8 Cut (4.0m)	44.4 Cut (1.1m)	49.0 Cut (1.0m)	46.0 Nil Cut/Fill
DATE (D/M/Y)					
Drilled 7/3/2019 (m)	4.2	None	None	4.0	5.0
29/3/2019 (m)	3.1	None	4.2	3.7	4.1
9/5/2019 (m)	1.3	None	2.2	2.5	3.5

Table 4: Groundwater Level Monitoring

We have encountered an increase in groundwater levels from the time the holes were drilled during March 2019 until more recently in May 2019. Such an increase in groundwater levels is to be expected given the transition from summer to winter along with increased rainfall.

Importantly, there is no evidence that the proposed area of greatest cut depth around AH2, comprises a groundwater table.

On this basis, we do not anticipate encountering groundwater within the proposed area of cut. Where we have encountered an elevated groundwater presence around AH1, coincides with a localised depression which is proposed to be filled.

11. Slope Stability

11.1 Qualitative Slope Stability Assessment

Considering a visual assessment of the site during our walkover inspections as well as review of the site contours and a slope profiles as provided to us by HG, together with the generally good underlying ground conditions, and our experience from similar sites in the area, on the basis of qualitative assessment, we consider the risk of deep seated widespread slope instability impacting on the development, to be satisfactorily low.

We have however undertaken a global slope stability analyses of a representative finished slope profile which we describe in Section 11.2 below.

However, slopes steeper than 1V:4H (14°) are considered susceptible to surface soil creep, typically extending to depths of between 1.0 to 1.5 metres. We therefore recommend that road development in the area of the gully slopes should be subject to further carefully assessment as part of the EPA process to ensure that batter fills as well as any proposed retaining walls are adequately keyed into competent natural ground, to limit the creep effects impacting on the road. This will include the removal of any pre-existing fill and/or unsuitable natural soils. At this stage, we consider that, provided the batter slopes below the road are carefully constructed with engineered fill and stabilised with topsoil and vegetation, they can be safely formed at 1V:3H.

For the proposed lot terrace platforms, we generally anticipate that cuts and/or fills with 1V:3H batters and vertical batter heights not exceeding 2.2 metres height are proposed which will be at risk of soil creep, which will require any future structures in close proximity to these batters to be specifically designed, to mitigate the risk of such loss of lateral soil support unless the batters are supported by specifically designed retaining walls at the time of specific lot development.

11.2 Quantitative Slope Stability Analyses

Cross-Section A-A' was selected as being representative of the finished slope profile, as illustrated in the appended cross section.

Overall stability was assessed for selected groundwater conditions using the computer program SLIDE (version 6). This program incorporates an automatic slope search routine for both traditional circular failure surfaces as well as composite circular failure surfaces, combining both circular and planar geometry. We have also undertaken planar or block failure analyses. We utilised the GLE/Morgenstern-Price Method for multi-layered strata, to calculate the factors of safety of potential failure surfaces, so that the positions of those surfaces with the minimum factors of safety can be reliably determined.

The factor of safety, which is the ratio of the forces resisting failure to the driving forces causing instability, describes a slope's degree of stability. A slope is considered to be in equilibrium when the factor is 1.0, while increasing values above 1.0 indicate improving stability. The Auckland Council's Code of Practice for Land Development & Subdivision "Earthworks and Geotechnical Requirements", Table 2.C.1 "Factors of Safety Guideline" states that a factor of safety against instability of no less than 1.5 under normal groundwater conditions is required, whilst under extreme or "worst credible" groundwater conditions the minimum factor of safety required is 1.3. The explanatory notes go on to say:

> *"It should be noted when using the guidelines, it does not absolve the geo-professional from any responsibility in respect to the modelling of the slope or analysis. However, if the FOS chosen is radically different from the guidelines, the variance from the guidelines should be explained, and Council has the right and discretion to have the analysis peer reviewed."*

The appendices to this report contain computer stability result sheets giving full graphical details of the slope geometry, the material properties, the various groundwater conditions, and to give a visual indication of the thoroughness of the search, we have shown the centres of the theoretical failure surfaces, colour coded according to the factor of safety computed. The program also allows a filtering of these surfaces, to permit focus on critical factors of safety (FoS).

We have adopted the following effective stress soil parameters for use in our stability model:

Material Type	Bulk Density (kN/m^3)	Effective Angle of Shearing Resistance (°)	Effective Cohesion (kPa)	Groundwater Co-Efficient (Hu)	Undrained Cohesion (kPa)
Tauranga Group Materials	18	28	5	Automatic	50
Completely Weathered Very Stiff to Hard WGM	18	32	10	Automatic	200
Engineered Fill	18	30	5	Automatic	100

Please note that we have conservatively allowed for a 20 kPa distributed surcharges across the future building areas and 12 kPa for the proposed public road.

In our experience, the potential for slope failures occurring on this site will more than likely coincide with periods of heavy and persistent rainfall, whereby the surface soils are unable to drain fast enough and become heavy and saturated.

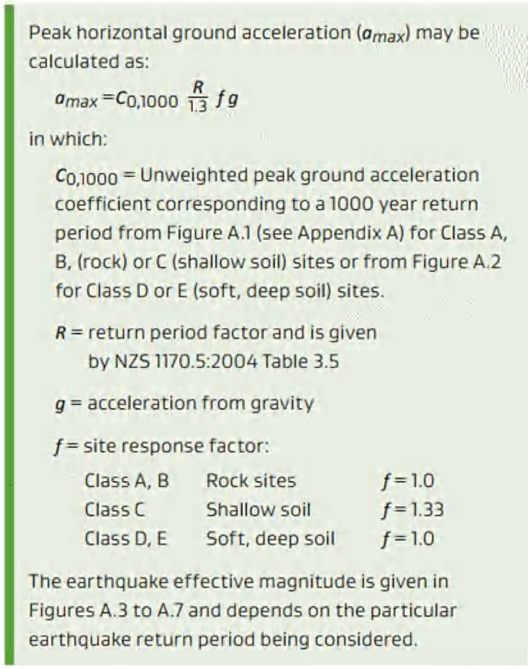
We have undertaken the following groundwater modelling scenarios:

1. Under moderate, long term conditions we have assumed a groundwater level within 2.0 metres of the finished ground surface (FoS required >1.5).

2. Under extreme, transient groundwater conditions we have assumed a groundwater level within 0.5 metre of the ground surface (FoS required >1.3).

We have also undertaken a pseudo-seismic analyses in which we adopted a Peak Ground Acceleration factor (or PGA) of 0.096g. This figure has been calculated assuming a building importance level of 2 and then using "Method 1: Risk-based method using earthquake estimates presented in the NZTA Bridge Manual" which is described in Section 5.1 of the NZGS/MBIE Module 1 for Earthquake Geotechnical Engineering Practice and adjusted for the recommended 150-year return period as stated in "Table 2.C.1 Factors of Safety" of the Auckland Council Code of Practice For Land Development & Subdivision (ACCoP) with a corresponding minimum factor of safety of 1.2.

The following is a break-down of how we derived this PGA using Method 1:



Peak horizontal ground acceleration (a_{max}) may be calculated as:

$$a_{max} = C_{0,1000} \frac{R}{1.3} f g$$

in which:

$C_{0,1000}$ = Unweighted peak ground acceleration coefficient corresponding to a 1000 year return period from Figure A.1 (see Appendix A) for Class A, B, (rock) or C (shallow soil) sites or from Figure A.2 for Class D or E (soft, deep soil) sites.

R = return period factor and is given by NZS 1170.5:2004 Table 3.5

g = acceleration from gravity

f = site response factor:

Class A, B	Rock sites	$f = 1.0$
Class C	Shallow soil	$f = 1.33$
Class D, E	Soft, deep soil	$f = 1.0$

The earthquake effective magnitude is given in Figures A.3 to A.7 and depends on the particular earthquake return period being considered.

Figure 2 – Page 13 Section 5.1 of the NZGS/MBIE Module 1 for Earthquake Geotechnical Engineering Practice

$C_{0,1000}$ = 0.17

(Figure A.1 NZGS/MBIE Module 1)

R = 0.55 *(1 in 150 year probability of exceedance)*

(Table 3.5 NZS1170.5:2004)

f = 1.33

(Class C Shallow Soil)

a_{max} = 0.17 x (0.55/1.3) x 1.33 g

= 0.096g

The aforementioned ACCoP does not provide any description of the groundwater level or scenario which should be assumed under pseudo-seismic loading which we assume is because such instantaneous loading should occur rapidly and drainage is unlikely to occur, therefore Total Stress or Undrained Soil Shear Strength is assumed to be mobilised, which is unaffected by the presence of a groundwater table. We have therefore adopted total stress or undrained cohesion (undrained shear strength) given seismic acceleration should occur rapidly, and drainage within the cohesive soils would unlikely occur.

Under moderate groundwater conditions we have calculated a critical factor of safety of 1.70 whilst under elevated extreme groundwater conditions the critical factor of safety drops only marginally to 1.68. Under pseudo-seismic loading the critical factor of safety again drops only marginally to 1.64.

We are therefore generally satisfied that the proposed developed surface profile should not result in any unsatisfactory risk of moderate to deep-seated global slope instability.

Please refer to the appended slope stability print-outs for further details.

12. Conclusions and Recommendations

On the basis of our site walkovers, aerial photograph review, site observations, record research, intrusive ground investigation comprising Hand Augered Boreholes and Cone Penetrometer Testing, as well as insitu testing and slope stability analyses as described herein, we can confirm that we have considered both the foundation and land stability risks with respect to the earthworks proposals provided, and are of the opinion that the proposed development should be generally suitable in terms of section 2 "Earthworks & Geotechnical Requirements" of NZS4404:2010 "Land Development and Subdivision Infrastructure" and section 2.B.2 of the Auckland Council Code of Practice for Land Development & Subdivision and should not be exposed to unsatisfactory Geotechnical risk, subject to satisfactory land development as generally discussed below, and also, specific and/or overall general recommendations to be presented in a Geotechnical Completion Report (GCR), once the earthworks have been completed:

12.1 General Earthworks Operations

Generally speaking, all debris as well as vegetation, including tree stumps and the root balls themselves, should be removed from site. Any areas comprising pre-existing fill deposits should be cut open by hydraulic excavator and assessed by ourselves, to determine whether the material is suitable to be used as fill, or otherwise removed to waste. Again, we caution that as the property has been used as a farm in the past, it is possible that buried offal or other rubbish pits may be present, which will need to be removed from the site, and the excavations backfilled to engineered standards.

All topsoil and other unsuitables should be stripped from all cut and fill areas and stockpiled well clear of the works on suitable areas of natural ground. Although we did not identify any obvious evidence of swampy ground, nor small drains/shallow ephemeral watercourses and localized surface seepages, we caution that topsoil stripping and site cutting may expose seepages needing tapping drainage, which should comprise perforated underfill drainage coil wrapped in a filter sock and contained within AP20 drainage chip and where widespread, drainage blankets, prior to the placing and compaction of filling. Subsoil drains will need to be connected to the stormwater reticulation. Such subsoil drainage will need to be surveyed and as-built so that future lot-specific development does not compromise the drains.

12.1.1 Fill Compaction & Control

We caution that beneath the generally drier and dessicated cohesive soil crust which comprises clays and silts, the materials become wetter and less cohesive making reconstitution of the material difficult, in our experience. For this reason, we recommend that blending the cohesive soils with the deeper non-cohesive silts be undertaken. If significant volumes of wet and silty soils are excavated, and conditioning by conventional drying methods are not successful, then it may become necessary to lime and/or cement stabilise the materials to achieve the required undrained shear strength.

As a general guide, we recommend placing cohesive clay and silt fill in loose lift thicknesses of around 200 to 300mm, and compacting using a suitably sized pad-foot roller. It is important that the moisture content of the material is at close to an optimum level, in order to achieve successful compaction. On the basis of our experience on surrounding sites with similar materials, we anticipate the optimum moisture content for effective compaction to be between 30 to 40%. Although materials can still be compacted if wet or dry of this value, the results may not be acceptable and could require additional conditioning by drying or wetting as appropriate.

In order to provide the most flexibility for likely variations in soil types, it is recommended that earthworks compaction control use the maximum allowable air voids/ minimum allowable shear strength criteria, as follows:-

Air Voids and Shear Vane (for cohesive soils only)

	Air Voids Percentage (as defined in NZS 4402:1986)		Undrained Shear Strength (Measured insitu by IANZ calibrated vane)	
	Maximum Average Value %	Maximum Single Value %	Minimum Average Value kPa	Minimum Single Value kPa
General Fill	10	12	140	110
Road Fill (top 0.5m)	8	10	150	120

Note: The average value shall be determined over any ten consecutive tests

However, the need could arise to cross check results in terms of 95% of the maximum dry density, within the appropriate water content range, as follows:-

	Percentage of Dry Density by N.Z. Standard Compaction Test NZ 4402:1986, test 4.1.1 or equivalent		Allowable Variations From Optimum Water Content	
	General fill	Within 500mm of carriageway subgrade	All classes of fill	All classes of fill
Cohesive soil	95%	100%	-2%	4%
Highly plastic cohesive soil	92%	97%	-2%	5%
Non-cohesive soil	100%	102%	-2%	2%

In all cases, the specification gives the minimum average result of any ten consecutive test sites, while that at any single test site should not be more than 5% below the minimum.

Relaxation of the upper limits of the variations from optimum water content may be made by the Certifying Engineer to restrict post-construction swelling of the fill, especially if the natural water contents of cohesive soils are well in excess of their optimum values.

12.1.2 Long-Term Batter Slopes – Proposed Lots

We understand that the proposed batter slopes within the 10-Lot subdivison, (be they cut and/or fill) are designed to be no steeper than 18° (1V:3H). We further understand that the overall batter heights will not exceed 2.0 metres. We therefore consider that such batter slopes should not pose any significant risk of slope instability.

However, where batter slopes typically exceed 14° (1V:4H), any structures situated above such batters could be at risk from loss from lateral soil support on account of long-term soil creep ranging in depth from 1.0 to 1.5 metres below finished ground level. This will require specific foundation design which will be clearly identified in the Geotechnical Completion Report. Alternatively, specifically designed retaining walls could be utilized.

Once the batter slopes have reached finished geometry they should be stabilized with topsoil and covered with short-term biodegradable matting such as coir or coconut to allow the establishment of grass and/or plants and/or other root binding vegetation.

12.1.3 Retaining Walls Supporting Fill – Proposed Public Road

We understand that the proposed filing required to support the public road will be supported by specifically designed retaining walls which will be subject to a future Geotechnical Addendum Report addressing the founding and stability of the chosen retaining wall structure which at this stage is proposed to be a Gabion Basket structure.

12.1.4 Road Design Subgrade

We anticipate that subgrade strengths within the filled ground should be predominantly in excess of an equivalent CBR of 4 to 5%. However, those in the natural ground will likely be highly variable and we recommend adopting a conservative design value of 2 to 3%. We recommend a programme of scala penetrometer testing is undertaken at the time of subgrade inspection to confirm or otherwise revise these design assumptions.

Please be aware that CBR's in natural ground will fluctuate quite significantly depending on soil moisture content. Near-surface desiccated soils will be drier and therefore denser versus the deeper wetter soils, particularly where wet silty layers are exposed in cuttings, the soils will perform poorly and will either require additional subgrade undercutting or alternatively lime and/or cement drying/stabilisation.

Furthermore, in our experience, when bulk fill is placed for roading, lime and/or cement drying/stabilisation of the top 0.5m of subgrade fill should be considered to avoid the risk of the fill

either not achieving specification or deteriorating from the elements if there is a lag time between filling pavement formation.

12.1.5 Erosion and Sediment Control

All erosion and sediment control should be undertaken in accordance with Auckland Council Guideline Document GD05 dated June 2016 "Erosion & Sediment Control Guide for Land Disturbing Activities in the Auckland Region".

Stormwater runoff must be intercepted from all adjoining upslope areas and from areas of the site not affected by the earthworks, by means of appropriately positioned cutoff drains and bunds. Discharges from these drains and bunds should then be routed to suitable watercourses. Any sediment bunds should not need any further geotechnical engineering input at this stage but should be inspected during construction to confirm the stability of the batter slopes.

We further highlight that decommissioning of sediment decants and/or ponds are often the last bulk filling task and poor quality soils can lead to poor backfilling and compaction. This can be avoided if a stockpile of suitable material is kept to one side.

12.1.6 Service Pipes and Trenches

All construction work involving trenches must comply with the Construction Act and Regulations, and the Department of Labour publication "Approved Code of Practice for Safety in Excavation & Shafts for Foundations". A leaflet and further information are available via http://www.worksafe.govt.nz/worksafe/information-guidance/all-guidance-items/acop-excavation-and-shafts-for-foundations/excavation-acop.pdf

Notwithstanding the minimum requirements set by the Department of Labour, the further need for such measures should be carefully assessed during construction of these services. As far as practicable, reticulation work should be confined to the summer earthworks season. No construction difficulties are anticipated through having to excavate bedrock.

We strongly recommend that trench backfill be compacted using a compaction-wheel or a remote pad-foot compactor, so that the infiltration of surface water is reduced.

As is standard industry practice, backfilling of trenches will unlikely be done under engineering supervision, unless instructed otherwise. Therefore the quality of backfilling will be categorised as non-engineered and will need to be "tagged" as such in the Geotechnical Completion Report, where any future building development within the 45° influence rising from the invert of trenches will require specific investigation and/or design, with the exception of those backfilled with engineered hardfill or clayfill which is monitored, tested and certified as such by the supervising Geo-Professional.

12.2 Site Stability

We generally consider that the proposed finished ground profiles will result in a low-risk of moderate to deep-seated instability subject to appropriate land development which will be confirmed in a GCR.

12.3 Ground Consolidation & Settlement

We generally consider that bulk fills of up to 2.0 metres depth should not result in any significant consolidation of the subsoils. Where bulk filling in excess of these depths is proposed, we recommend the installation of settlement markers/survey monuments on the finished surface with survey of these monuments undertaken for a period of no less than 6 months to confirm the rate of ground settlement until such time that the rate abates to a level which is not at risk of causing differential settlement to future structures. The area where such filling in excess of 2.0 metres could result in ground settlement and/or differential settlement effects appears to be confined to the western half of Lot 10 subject to appropriate land development which will be confirmed in a GCR.

There are other areas with filling in excess of 2.0 metres such as the Public Road as well as the southern land parcel of number 86 which will be subject further geotechnical assessment at a later date.

12.4 General Recommendations for Future Lot Development

Once the subdivisional works have been completed, we anticipate preparing a Geotechnical Completion Report (GCR) confirming (or otherwise) all the above works have been completed. In addition, the GCR will provide broad-brush recommendations for the development of light-industrial buildings.

General recommendations will most likely be as follows:

12.4.1 Existing Fill

Although we anticipate that all areas of the proposed Lots will eb subject to earthworks, given that the land has been used for farming, we caution that there may be unknown areas of pre-existing fill deposits, as well as areas of disturbed ground from various activities over the years. **We therefore stress the importance of inspections prior to foundation construction**. Any existing non-engineered fill on the site should not be relied upon for the direct nor indirect support of foundations or floors, and we recommend that it be removed and, if necessary replaced with engineered fill, where it lies beneath any proposed foundations or building footprints.

12.4.2 Soil Creep

Generally speaking, soil creep is considered to be a risk to any foundations situated on or within 5 metres of slopes steeper than 1V:4H or 14°.

To reduce the risk of soil creep affecting future foundations we will be recommending such foundations be designed to resist a loss of support ranging from 1.0 to 1.5 metres depth below finished ground levels existing ground levels.

The extent and details of such foundations will need to be addressed for each individual development at Building Consent stage.

12.4.3 Foundations for Light-Industrial Buildings

Subject to the above recommendations, and provided that the earthworks construction and drainage works are carried out in accordance with NZS4404:2004, "Land Development and Subdivision Engineering", related documents, and Council's standard specifications where appropriate, then the completed development should be generally suitable for the support of structures with building loads not exceeding Ultimate Limit State Pressures of 150 kPa (i.e. 300 kPa Geotechnical Ultimate Bearing Capacity

Much of the clayey silt and silty clay subsoil encountered during this investigation was slightly to highly plastic, this being a phenomenon common to soils in Auckland. The resulting effects of possible shrinkage and swelling in relation to brittle building construction should be considered at the time of preparation of the relevant Geotechnical Completion Report which will require representative sampling of soils and subsequent testing of the magnitude of possible shrinkage and swelling generally in accordance of AS2870:2011 which will require specific soil characterisation by laboratory testing.

Usual solutions to these risks include:

- specifically designed or proprietary stiffened foundation systems
- deepening and/or piling of foundations
- undercutting and replacing reactive soil subgrade with non-reactive hardfill
- controls on planting of certain tree species close to buildings

In terms of site subsoil classification for seismic design actions in accordance with NZS1170.5 we consider the subsoils to fall into Class C – Shallow Soil.

12.4.4 Floor Loads for Light-Industrial Buildings

We consider that limitations on future UDL Floor Loads of no greater than 15 kPa (Dead + Live Loads) will be imposed to mitigate the risk of consolidation of the subsoils which could result in settlement of the building/s as well as differential settlement effects UNLESS future lot-specific investigation and settlement analyses are undertaken which prove otherwise.

12.4.5 Future Cut/Fill Limitations

Given the potential sensitivity of the underlying subsoils to increase in surcharge pressures which could result in consolidation resulting in settlement, we stress that future fills greater than 0.5 metres depth (~10 kPa) should not be undertaken on the future lots without further review by a Geo-Professional who is familiar with the contents of this report and express approval in writing of the Council.

In like fashion, future cut excavations in excess of 0.5 metres depth Given that the sites are predominantly gently sloping (as much as 1V:4H) and with the limitations of cutting and filling, we anticipate that each lot will require a site-specific geotechnical assessment at the time of formulating development proposals. We will however also need to limit such cuts to a maximum height of 2.5 metres, with all cuts in excess of 1 metre requiring support by engineer designed retaining walls unless they can be safely battered back to no steeper than 1V:3H. We anticipate providing retaining wall design recommendations in the GCR.

12.5.6 Stormwater Disposal

All stormwater runoff from roofs and paved areas, plus any water tank overflows, should be collected in sealed pipes and be disposed of to the reticulated stormwater line. Likewise, overland flows should be directed away from future building footprints.

Under no circumstances should concentrated overflows from any source discharge into or onto the ground in an uncontrolled fashion.

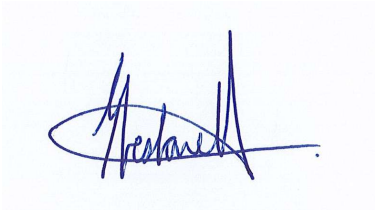
12.6 Statutory Issues and Construction Monitoring

Because soils are not a homogeneous, manufactured building component, there always exists a level of risk that inferences about soil conditions across the greater site, which have been drawn from isolated ‘pin-prick’ locations, may be subject to localized variations. Therefore the foregoing statements are Professional Opinion, based on a limited collection of information, some of which is factual, and some of which is inferred. For these reasons, it must be appreciated that the investigation is not deemed complete until the construction works enable confirmation of design assumptions. Given that the primary purpose of this report is to support an application for approval of a subdivision, together with enabling earthworks, we anticipate that Council will likely set a condition of the Resource Consent requiring a suitable Geotechnical Completion Report (GCR) be supplied by a suitably experienced Geo-Professional who is familiar with the contents of this report, endorsing the enabling works, prior to release of the titles. In the usual course of that process, the GCR would revisit many of the foregoing Conclusions and Recommendations and revise them as appropriate.

Thank you for the opportunity to provide our service on this project, and if we can be of further assistance, please do not hesitate to contact us.

Yours faithfully,

GEOTEK SOLUTIONS LIMITED



E. Crestanello (BSc. Geol.)

Senior Engineering Geologist

Enclosures:

Site Plans (3 sheets)

Cross-section (1 sheet)

Hand Auger Borehole Records – 2019 (5 sheets)

Hand Auger Borehole Records – 2013 (21 sheets)

CPT Graphs (15 sheets)

Slope Stability Results (3 sheets)

Drawing for Information Only

Must be read in conjunction with
Geotek Solutions Ltd Report Dated May 2019

Base Drawing by HG no. 144443-01

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1/55 Druces Road, Manukau Central
Phone: 09 261 0169
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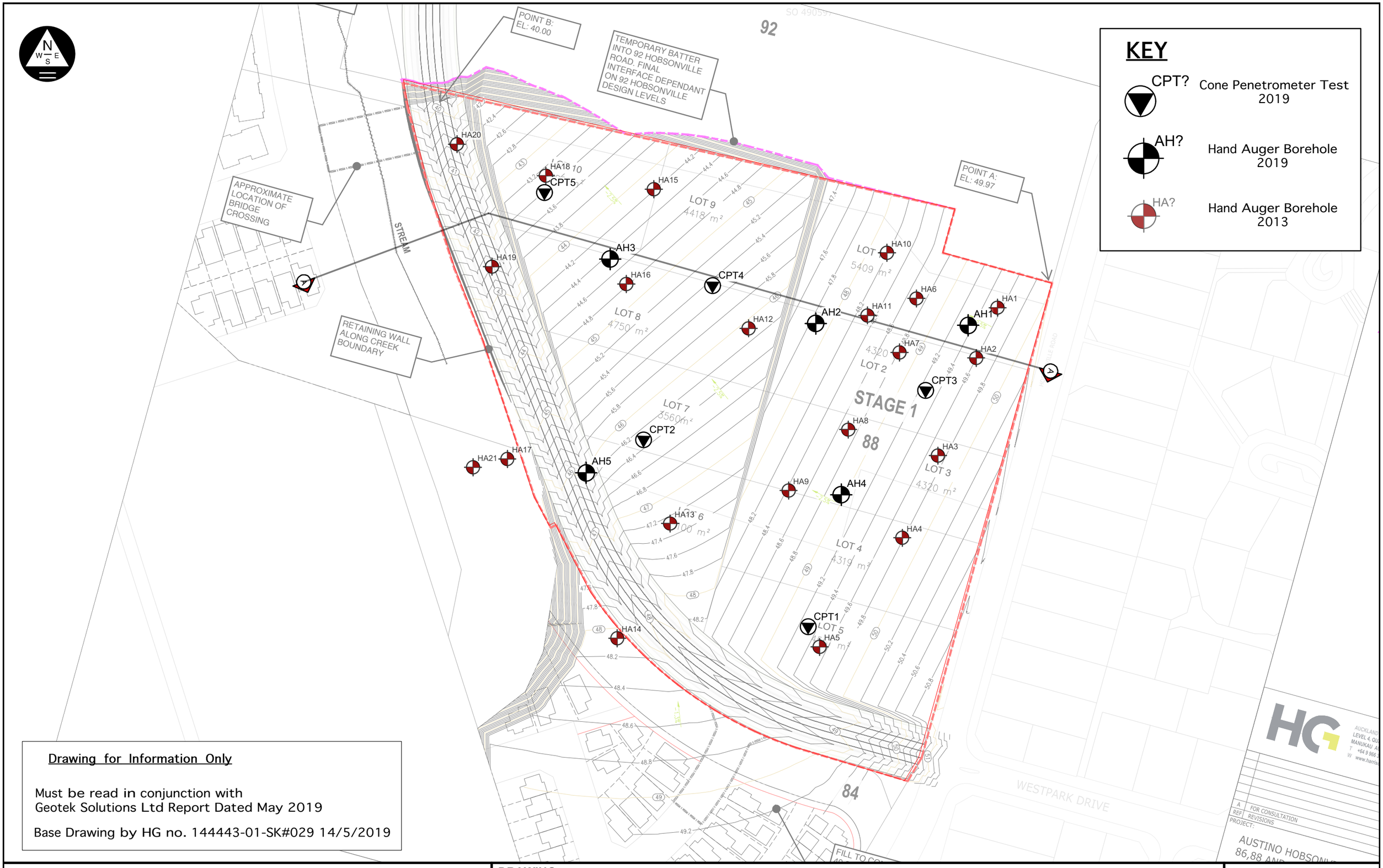
Website: www.geotek.co.nz

DRAWING TITLE:	SITE PLAN - EXISTING
LOCATION :	86 - 88 Hobsonville Road
CLIENT:	Austino Hobsonville 2 Ltd

SCALE	1:1500 @ A3
JOB No.	7273
DRAWN BY	CB
DATE	MAY 2019
SHEET	1 OF 3



Drawing for Information Only

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Geotek Solutions Ltd Report Dated May 2019

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DRAWING TITLE:	SITE PLAN - PROPOSED FINISHED LEVELS
LOCATION :	86 - 88 Hobsonville Road
CLIENT:	Austino Hobsonville 2 Ltd

SCALE	1:1000 @ A3
JOB No.	7273
DRAWN BY	CB
DATE	MAY 2019
SHEET	2 OF 3

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REF REVISIONS
PROJECT:
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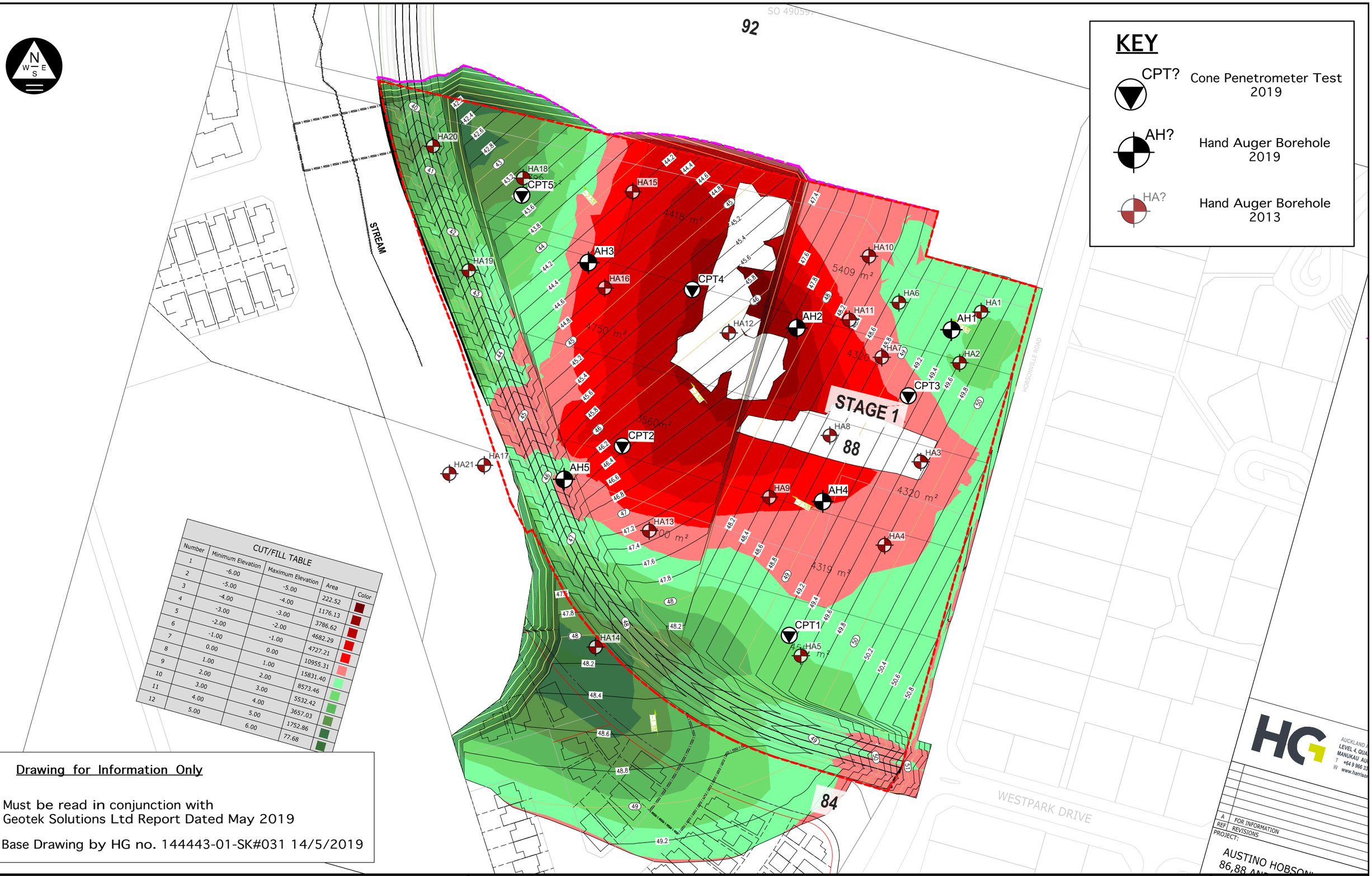
86,88 AND



KEY

- CPT? — Cone Penetrometer Test 2019
- AH? — Hand Auger Borehole 2019
- HA? — Hand Auger Borehole 2013

CUT/FILL TABLE

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	-6.00	-5.00	222.52	
2	-5.00	-4.00	1176.13	
3	-4.00	-3.00	3786.62	
4	-3.00	-2.00	4682.29	
5	-2.00	-1.00	4727.21	
6	-1.00	0.00	10955.31	
7	0.00	1.00	15831.40	
8	1.00	2.00	8573.46	
9	2.00	3.00	5532.42	
10	3.00	4.00	3657.03	
11	4.00	5.00	1752.86	
12	5.00	6.00	77.68	

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REF	REVISIONS
A	FOR INFORMATION

PROJECT: AUSTINO HOBSONVILLE 86,88 AND

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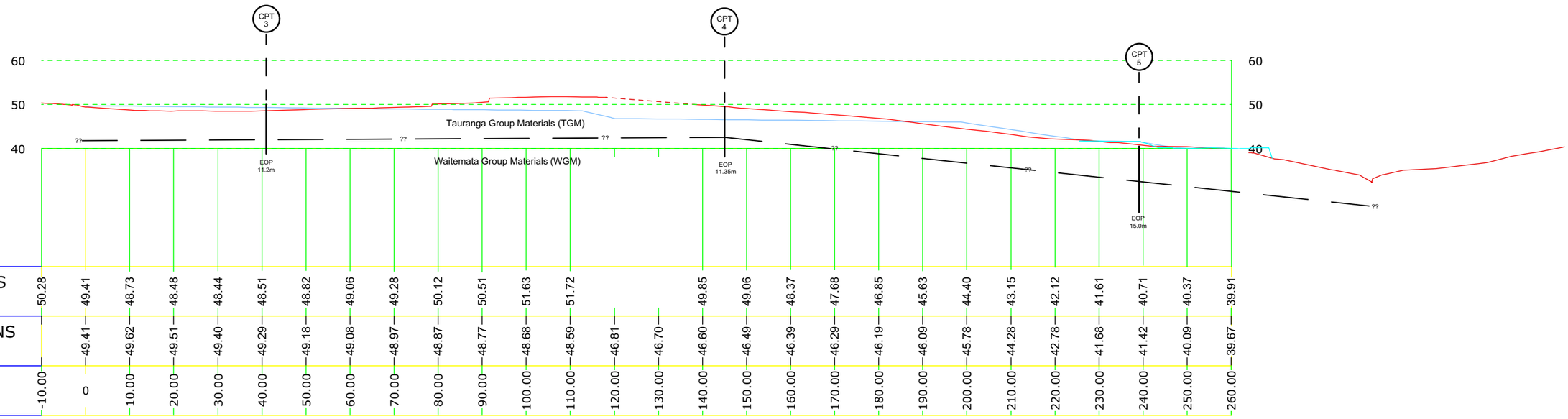
DRAWING TITLE:	SITE PLAN - PROPOSED CUT/FILL EARTHWORKS
LOCATION :	86 - 88 Hobsonville Road
CLIENT:	Austino Hobsonville 2 Ltd

SCALE	1:1500 @ A3
JOB No.	7273
DRAWN BY	CB
DATE	MAY 2019
SHEET	3 OF 3



EXISTING ELEVATIONS (Red Line)	50.28	49.41	48.73	48.48	48.44	48.51	48.82	49.06	49.28	50.12	50.51	51.63	51.72			49.85	49.06	48.37	47.68	46.85	45.63	44.40	43.15	42.12	41.61	40.71	40.37	39.91
PROPOSED ELEVATIONS (Blue Line)		49.41	49.62	49.51	49.40	49.29	49.18	49.08	48.97	48.87	48.77	48.68	48.59	46.81	46.70	46.60	46.49	46.39	46.29	46.19	46.09	45.78	44.28	42.78	41.68	41.42	40.09	39.67
OFFSET	-10.00	0	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00	230.00	240.00	250.00	260.00

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DRAWING TITLE:	CROSS SECTION A-A
LOCATION :	86 - 88 Hobsonville Road
CLIENT:	Austino Hobsonville 2 Ltd

SCALE	1:1000 @ A3
JOB No.	7273
DRAWN BY	CB
DATE	MAY 2019
SHEET	1 OF 1

CLIENT: Austino Hobsonville 2 Ltd	LOGGED: LC	SHEET: 1 of 5	JOB REF: 7273
LOCATION : 84-90 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 7/3/19	HAND AUGER No: AH1
	SV DIAL: DR 4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: RL 48.5

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
						Proposed RL 49.4 Fill +0.9 m
	Topsoil					
0.5	**NATURAL:** Stiff, very slightly plastic, orange with brownish grey streaks, silty CLAY: damp		110+			
1.0	- becoming medium grey with orange streaks					
	- slightly plastic, without orange streaks		100	48	2.1	
1.5			100	63	1.6	
2.0			99	69	1.4	
2.5	Stiff, very slightly plastic, light grey with orange streaks, sandy clayey SILT: moist		87	74	1.2	
3.0			82	49	1.7	
3.5	- becoming medium grey with occasional black streaks		89	63	1.4	
4.0		▽	107	68	1.6	
4.5	- becoming wet	7/3/19	110+			
5.0			110+			
			110+			

Tauranga Group Materials

End of borehole @ 5.0 m (Target Depth)
Groundwater encountered @ 4.2 m during drilling
Standing groundwater on completion measured @ 4.4 m

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CLIENT:	Austino Hobsonville 2 Ltd	LOGGED: LC	SHEET: 2 of 5	JOB REF:	7273
LOCATION :	84-90 Hobsonville Road	CHECKED:			
	Hobsonville	DIAMETER: 50mm	DATE: 7/3/19	HAND AUGER No:	AH2
		SV DIAL: DR 4802			

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: RL 51.8

Depth (m)	Soil Description	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity
	Topsoil			
	NATURAL: Stiff, non plastic, brownish orange, sandy SILT: dry	110+		
0.5	Stiff, very slightly plastic, orange, clayey SILT: damp	110+		
1.0	- with red and grey mottles	110+		
	Stiff, very slightly plastic, orange with red and grey mottles, silty CLAY: moist			
1.5	Stiff, non plastic, orange with grey and red mottles, clayey SILT: moist	110+		
2.0	Stiff, very slightly plastic, grey with red streaks, silty CLAY: moist	110+		
	Stiff, non plastic, orange with light grey streaks, sandy clayey SILT: moist			
2.5	Stiff, slightly plastic, pink with grey streaks, silty CLAY: moist	110+		
3.0		UTP		
3.5	Very Stiff, non plastic, orange with grey streaks, clayey SILT: moist	UTP		
4.0	- becoming pink with white streaks,	UTP		
4.5	- becoming stiff	110+		
	- with minor sand fraction	110+		
5.0	- becoming medium to dark grey	110+		
	End of borehole @ 5.0 m (Target Depth)			
	No groundwater encountered during drilling or on completion			

Water Level

Comments / Samples / Other Test

Proposed RL 47.8
Cut - 4.0 m

Tauranga Group Materials

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CLIENT: Austino Hobsonville 2 Ltd	LOGGED: LC	SHEET: 3 of 5	JOB REF: 7273
LOCATION : 84-90 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 7/3/19	HAND AUGER No: AH3
	SV DIAL: DR 4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: RL 45.5

Tauranga Group Materials

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
	Topsoil					
0.5	**NATURAL:** Stiff, very slightly plastic, orange with grey streaks, silty CLAY: moist		110+			
			110+			
1.0						Proposed RL 44.4 Cut 1.1 m
			105	31	3.4	
1.5						
			104	72	1.4	
2.0						
			92	68	1.4	
2.5			94	40	2.4	
			94	72	1.3	
3.0	Stiff, slightly plastic, light grey, sandy clayey SILT: moist					
			89	66	1.4	
3.5						
	- becoming firm		72	56	1.3	
4.0	- becoming stiff		86	64	1.3	
4.5			110+			
			99	81	1.2	
5.0						
			89	82	1.1	
	End of borehole @ 5.0 m (Target Depth) No groundwater encountered during drilling or on completion					

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CLIENT:	Austino Hobsonville 2 Ltd	LOGGED: LC	SHEET: 4 of 5	JOB REF:	7273
LOCATION :	84-90 Hobsonville Road	CHECKED:			
	Hobsonville	DIAMETER: 50mm	DATE: 8/3/2019	HAND AUGER No:	AH4
		SV DIAL: DR 4802			

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: RL 50.0

Depth (m)	Soil Description	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments / Samples / Other Test
	Topsoil				
	NATURAL: Stiff, non plastic, orange, clayey SILT: damp				
0.5		110+			
	- becoming very slightly plastic				
		110+			
1.0	Stiff, non plastic, light grey, sandy clayey SILT: moist				Proposed RL 49.0
		110+			Cut - 1.0 m
	Stiff, very slightly plastic, light grey with orange streaks, sandy silty CLAY: moist				
1.5		110+			
2.0		110+			
	Stiff, slightly plastic, light grey with orange streaks, silty CLAY: moist				
2.5		97	76	1.3	
	- becoming firm				
		76	51	1.5	
3.0					
	- becoming stiff	96	76	1.3	
	- becoming red with white streaks				
3.5	Stiff, very slightly plastic, orange with light grey streaks, clayey SILT: moist	110	92	1.2	
	- becoming very stiff				
4.0	- becoming wet	110+			
	- with streaks of limonite sand				
	Stiff, slightly plastic, light grey with orange streaks, silty CLAY: moist	110+			
4.5					
	Stiff, very slightly plastic, dark grey, clayey SILT: moist	110+			
5.0		110+			

Water Level: 8/3/19

Tauranga Group Materials

End of borehole @ 5.0 m (Targt Depth)
Groundwater encountered @ 4.1 m during drilling
Standing groundwater on completion measured @ 4.0 m

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THOROUGH ANALYSIS • DEPENDABLE ADVICE

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CLIENT: Austino Hobsonville 2 Ltd	LOGGED: LC	SHEET: 5 of 5	JOB REF: 7273
LOCATION : 84-90 Hobsonville Road	CHECKED:		
Hobsonville	DIAMETER: 50mm	DATE: 7/3/19	HAND AUGER No: AH5
	SV DIAL: DR 4802		

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: RL 46.0

Depth (m)	Soil Description	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
	Topsoil				Proposd RL 46.0
	NATURAL: Stiff, non plastic, orange, sandy SILT: dry				No Cut/Fill
0.5		110+			
	Stiff, very slightly plastic, orange with grey streaks, silty CLAY: moist				
1.0	- becoming brownish grey	110+			
		110+			
1.5	- becoming light grey with orange and red streaks	110+			
2.0		104	46	2.2	
2.5		107	72	1.5	
3.0		89	66	1.4	
		97	72	1.3	
3.5	- becoming redish orange with grey streaks	87	76	1.2	
4.0		86	64	1.3	
4.5		102	92	1.1	
	- with minor sand fraction	105	82	1.3	
5.0		102	58	1.8	

Water Level: 7/3/19

Tauranga Group Materials

End of borehole @ 5.0 m (Target Depth)
Groundwater encountered @ 5.0 m during drilling
Standing groundwater on completion measured @ 5.0 m

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CLIENT:	Bell Rose Trust	LOGGED: ZM/JB CHECKED: MF	SHEET: 1 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA1

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 48.8

	Soil Description	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
	Topsoil							Proposed RL 49.6. Fill +0.8m.
Fill	**FILL (Non-Engineered?):** Topsoil intermixed with grey, slightly plastic, silty CLAY: damp -becoming orange and grey with topsoil		0.5		81	31	2.6	
Tauranga Group Materials	**NATURAL:** Stiff, moderately plastic, orange and grey, silty CLAY: moist				81	32	2.5	
			1.0	23/10/13				
	Stiff, highly plastic, light - medium grey, silty CLAY: moist		1.5		104	32	3.3	
					100	70	1.4	
	-becoming moderately plastic, light grey with some orange streaks		2.0		81	56	1.4	
	-becoming slightly plastic, more silt rich							
	-becoming firm		2.5		64	35	1.8	
	-becoming saturated				56	34	1.6	Deepened by JB on 23/10/13
	Firm, highly plastic, light grey with minor orange streaks, very silty CLAY: saturated		3.0					
			3.5		64	30	2.1	
					71	34	2.1	
	-becoming light brown		4.0					
	Firm, highly plastic, orange with light grey streaks, very clayey SILT: saturated -becoming uniform grey		4.5		79	39	2.0	
	-becoming stiff				95	41	2.3	
			5.0					
	End of borehole @ 5.0 m Target Depth 3.0m - deepened to 5.0m on 23/10/13 Groundwater encountered @ 2.8m during drilling Standing groundwater on 23/10/13 measured @ 1.0m				103	32	3.2	

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CLIENT:	Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 2 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 18/10/13	HAND AUGER No: HA2

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 48.5

Tauranga Group Materials

Depth (m)	Soil Description	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
	Topsoil					Proposed RL 49.6. Fill + 1.1m.
0.5	**NATURAL:** Firm, moderately plastic, grey with browny grey streaks and occasional orange specks, silty CLAY: moist		69	26	2.7	
	-becoming highly plastic with orange streaks -becoming stiff		93	32	2.9	
1.0		23/10/13				
			111	39	2.8	
1.5	-becoming moderately to highly plastic, more silty with more orange streaks					
			101	55	1.8	
	-becoming moderately plastic, less silty with some brownish orange streaks					
2.0			83	47	1.8	
	-becoming firm, highly plastic, more silty, slightly sticky and wet		75	41	1.8	
2.5						
			77	43	1.8	Deepened by JB on 23/10/13
3.0	Firm, highly plastic, grey with orange streaks, silty CLAY: wet to saturated		71	30	2.4	
			49	30	1.6	
3.5						
	Stiff, slightly to moderately plastic, brownish orange, slightly sandy clayey SILT: saturated		83	36	2.3	
4.0						
	-becoming orange with some brownish orange streaks, wet		130	36	3.6	
4.5						
	Very stiff, slightly to moderately plastic, orange, clayey SILT: wet		138+			
5.0						
	End of borehole @ 5.0 m Target Depth 3.0m - deepened to 5.0m on 23/10/13 Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 1.0m		138+			

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CLIENT: Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 3 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA3

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 50.2

Depth (m)	Legend	Soil Description	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
		Topsoil					
		-becoming intermixed with orange, moderately plastic, silty CLAY: damp					Proposed LL 49.7. Cut -0.5m
0.5		**NATURAL:** Very stiff, slightly plastic, orange, orangey brown and light grey, silty CLAY: damp		138+			
		-becoming stiff, light grey with less orange: moist		103	50	2.1	
1.0							
			23/10/13	100	68	1.5	
1.5		-becoming less clay rich		87	53	1.6	
2.0		-becoming very silty CLAY: wet		88	46	1.9	
		Stiff, very slightly plastic to slightly plastic, orange and light grey, clayey SILT: moist					
2.5		-some red streaks present		91	42	2.2	
		Stiff, moderately plastic, light grey and orange, silty CLAY: moist		104	65	1.6	
3.0		End of borehole @ 3.0 m (Target Depth) Groundwater encountered @2.2m during drilling Standing groundwater on 23/10/13 measured @ 1.2m					
3.5							
4.0							
4.5							
5.0							

Tauranga Group Materials

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CLIENT:	Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 4 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 18/10/13	HAND AUGER No: HA4

Topsoil / Fill / Clay / Silt / Sand / Gravel / Peat / Rock

Ground Level: 50.2

Soil Description	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments, Samples, Other Test
Topsoil						
FILL(?): Firm, moderately plastic, orangey brown with orange patches, silty CLAY: damp to moist with occasional fine gravels						
NATURAL: Firm, moderately plastic, orange with minor light greyish brown streaks, silty CLAY: damp to moist			69	26	2.7	Proposed RL 49.8. GL - 0.4m
-becoming light grey with orange streaks, moist	0.5		55	16	3.4	
-becoming stiff	1.0		99	39	2.5	
-becoming moderately to highly plastic			103	32	3.2	
-becoming moderately plastic, very light grey with minor orange streaks	1.5	23/10/13	134	61	2.2	
-becoming slightly to moderately plastic						
-becoming moderately plastic, grey with orange streaks	2.0		97	53	1.8	
-becoming firm -minor orangey brown streaks present -becoming more silty	2.5		79	49	1.6	
			71	41	1.7	Deepened by JB on 23/10/13
Firm, highly plastic, light grey with some orange streaks and minor red specks, silty CLAY: wet	3.0		79	43	1.8	
-more pinkish red streaks present			61	28	2.2	
	3.5					
			55	39	1.4	
-becoming mainly orange and pink, slightly more silty	4.0					
			51	32	1.6	
	4.5					
			53	39	1.4	
	5.0					
End of borehole @ 5.0 m Target Depth 3.0m - deepened to 5.0m on 23/10/13 Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 1.5m			51	28	1.8	

Fill?

Tauranga Group Materials

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CLIENT: Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 5 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 23/10/13	HAND AUGER No: HA5

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 48.9

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					PROPOSED RL 49.5. FILL + 0.6m
	-becoming intermixed with orange clayey streaks					
	NATURAL: Stiff, moderately plastic, orangey brown with some browny grey streaks, silty CLAY: damp					
0.5	-becoming grey with orange streaks		132	53	2.5	
			93	39	2.4	
1.0						
			83	41	2.0	
	-becoming slightly to moderately plastic, very light grey with minor orange streaks, slightly more silty					
1.5	-becoming very stiff		138+			
2.0	-becoming stiff		134	55	2.4	
	-becoming very silty					
	-becoming moderately plastic with more orange streaks, less silty					
2.5	-@2.4m; becoming very stiff	23/10/13	138+			
	-becoming stiff, orange with grey streaks, less silty		97	51	1.9	
3.0	End of borehole @ 3.0 m (Target Depth) Groundwater not encountered during drilling Standing groundwater on completion measured @ 2.5m		89	51	1.7	
3.5						
4.0						
4.5						
5.0						

Tauranga Group Materials

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CLIENT:	Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 6 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA6

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: ~~49~~ 48.5

Material	Description	Depth (m)	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity
	Topsoil				
Fill	**FILL (Non-engineered?):** Very slightly plastic, light grey clayey SILT intermixed with topsoil: damp				
Tauranga Group Materials	Moderately plastic, grey with orange, red and some dark grey patches, silty CLAY: moist	0.5	125	56	2.2
	NATURAL: Stiff, moderately plastic, orange and light grey, silty CLAY: damp		117	59	2.0
		1.0			
	-becoming mainly light grey with occasional orange streaks		116	59	2.0
		1.5			
			95	56	1.7
		2.0	91	58	1.6
	-becoming slightly plastic, more silty				
		2.5	93	39	2.4
	Stiff, very slightly plastic, light grey with orange streaks, clayey SILT: wet		84	42	2.0
		3.0			
	End of borehole @ 3.0 m (Target Depth) Groundwater encountered @2.6m during drilling Standing groundwater on 23/10/13 measured @ 1.1m				
		3.5			
		4.0			
		4.5			
		5.0			

Water Level: 18/10/13

Comments Samples Other Test

Proposed RL 48.7.
Fill to 0.2m

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CLIENT:	Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 7 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 18/10/13	HAND AUGER No: HA7

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: ~~48.5~~ 49.5

Depth (m)	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
0.5	**NATURAL:** Stiff, slightly plastic, orangey brown, quite silty CLAY: damp -becoming moist -becoming moderately plastic, less silty with some light grey streaks		103	41	2.5	Proposed RL 48.8 Cut ~0.7m.
1.0	-becoming very stiff, light creamy orangey brown with some light grey streaks	23/10/13	138+			
1.5	-becoming slightly to moderately plastic, with some reddish orange specks, damp to moist -becoming moderately plastic, moist -becoming mainly light grey		138+			
2.0	-becoming stiff -some orangey brown streaks present		91	53	1.7	
2.5	-some reddish specks present		109	45	2.4	
3.0	-becoming slightly more silty with more orangey brown streaks		93	49	1.9	
3.5	End of borehole @ 3.0 m (Target Depth) Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 0.9m		89	43	2.1	
4.0			91	43	2.1	
4.5						
5.0						

Tauranga Group Materials

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CLIENT: Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 8 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA8

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 50.9

Tauranga Group Materials

Depth (m)	Soil Description	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					
	-becoming intermixed with orange clayey SILT					
0.5	**NATURAL:** Very stiff, very slightly plastic, orange clayey SILT: damp		138+			
	Stiff, slightly plastic, orange silty CLAY: damp		114	48	2.4	
1.0						
	-becoming orange and light grey		136	51	2.7	
1.5		24/10/13				
	-becoming moderately plastic, light grey with orange and occasional red streaks -@1.6m; becoming very stiff		138+			
2.0	-becoming stiff		116	75	1.5	Proposes LL 48?. LL -2.2m
2.5			106	66	1.6	
			126	70	1.8	
3.0	End of borehole @ 3.0 m (Target Depth) Groundwater not encountered during drilling Standing groundwater on 24/10/13 measured @ 1.5m					
3.5						
4.0						
4.5						
5.0						

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CLIENT:	Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 9 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA9

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 49.8

Depth (m)	Legend	Soil Description	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
		Topsoil					
		-becoming intermixed with orange clayey SILT					
0.5		**NATURAL:** Very stiff, very slightly plastic, orange clayey SILT: damp		138+			
		-becoming orange with grey streaks					
		Stiff, slightly to moderately plastic, orange with grey streaks, silty CLAY: damp		125	64	2.0	
1.0		Stiff, very slightly plastic, light grey with occasional orange streaks, clayey SILT with some fine sands: damp					
		-some red streaks present		128	61	2.1	Proposed RL 48.4 GWT - 1.4m.
1.5		Stiff, slightly plastic, light grey with orange and red streaks, silty CLAY: damp					
		-becoming moderately plastic		108	61	1.8	
			23/10/13				
2.0		-becoming light grey		84	27	3.1	
		-becoming light grey with orange streaks, moist					
		-becoming orange with light grey streaks		85	56	1.5	
2.5							
				85	60	1.4	
3.0				91	52	1.8	
		End of borehole @ 3.0 m (Target Depth) Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 1.7m					
3.5							
4.0							
4.5							
5.0							

Tauranga Group Materials

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CLIENT:	Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 10 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 18/10/13	HAND AUGER No: HA10

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 48.3

Tauranga Group Materials

Depth (m)	Soil Description	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil					Proposed RL 48.2 Cut -0.1m.
0.5	**NATURAL:** Stiff, moderately plastic, grey, very silty CLAY with some fine sands: wet		87	24	3.6	
	-becoming moist to wet with some browny grey streaks (organic stained), with a slight odour and some fine rootlets returned		85	18	4.7	
1.0	-becoming mainly browny grey and less silty					
	-becoming moderately to highly plastic	23/10/13	101	41	2.5	
1.5			105	43	2.4	
2.0	-very minor orange streaks present		130	53	2.5	
	-becoming slightly plastic, grey with orange streaks and more silty					
2.5	-becoming moderately plastic, grey and orange and less silty		103	61	1.7	
	-becoming firm, moderately to highly plastic, grey with orange streaks, slightly more silty, moist to wet		73	43	1.7	Deepened by JB on 23/10/13
3.0	Firm, highly plastic, grey with minor orange streaks, silty CLAY: saturated		71	32	2.2	
3.5			55	24		
			73	32		
4.0	-becoming stiff with more orange streaks present					
	-becoming mainly orange with minor grey streaks, slightly more silty		91	30		
4.5			120	36		
	Stiff, slightly to moderately plastic, dark grey, slightly sandy clayey SILT: wet					
5.0	-becoming very stiff		138+			
	End of borehole @ 5.0 m Target Depth 3.0m - deepened to 5.0m on 23/10/13 Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 1.3m					

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CLIENT:	Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 11 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA11

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: ~~48~~ 49.5.

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
-becoming intermixed with orange silty CLAY						
NATURAL: Very stiff, slightly plastic, orange and grey, silty CLAY: damp	0.5		138+			
-becoming moderately plastic						
-becoming stiff, orange with light grey and some dark grey streaks		23/10/13	122	61	2.0	
Stiff, moderately plastic, orange and light grey, silty CLAY: damp	1.0					Proposed RL 48.3 cut ~1.2m
-becoming light grey with orange streaks			89	56	1.6	
	1.5		84	52	1.6	
-some red streaks present						
	2.0		104	70	1.5	
	2.5		95	66	1.4	
-becoming slightly plastic, more silty						
			81	41	2.0	
	3.0					
End of borehole @ 3.0 m (Target Depth) Groundwater encountered @ 2.9m during drilling Standing groundwater on 23/10/13 measured @ 0.9m						
	3.5					
	4.0					
	4.5					
	5.0					

Tauranga Group Materials

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CLIENT: Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 12 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA12

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 51.6

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
FILL (Non-engineered?): Slightly plastic, grey brown with rare orange streaks, clayey SILT with gravels of different sizes: damp							Fill is back fill for ceramic sewer pipe
-becoming stiff		0.5		102	31	3.3	
NATURAL: Stiff, highly plastic, orange and light grey, silty CLAY: moist							
-becoming moderately plastic				103	50	2.1	
		1.0					
-becoming mostly orange				115	61	1.9	
-becoming orange and light grey		1.5	▽				
-becoming light grey, orange and red			24/10/13	103	64	1.6	
-becoming light grey and orange							
		2.0		94	57	1.6	
-becoming slightly plastic, light grey, orange and red							
		2.5		103	41	2.5	
-becoming pinky red and light grey							
-becoming more silt rich, orange, red and light grey				103	53	1.9	
		3.0					
End of borehole @ 3.0 m (Target Depth) Groundwater not encountered during drilling Standing groundwater on 24/10/13 measured @ 1.6m							
		3.5					
		4.0					
		4.5					
		5.0					

Tauranga Group Materials

Proposed LL 46.1
Cut 1 - 5.5m.

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CLIENT:	Bell Rose Trust	LOGGED: GM/JB CHECKED: MF	SHEET: 13 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: GV1335	DATE: 23/10/13	HAND AUGER No: HA13

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: ~~RL~~ 480

Depth (m)	Soil Description	Legend	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
	Topsoil						
0.5	**NATURAL:** Stiff, slightly plastic, grey with orange streaks, silty CLAY: damp			126	60	2.1	
	-becoming moist						
	-becoming grey with minor orange streaks			108	48	2.3	
1.0							
	-becoming lighter grey with minor orange streaks			102	48	2.1	
1.5	Stiff, slightly plastic, light grey with minor orange streaks, very silty CLAY: moist			90	48	1.9	
	-becoming light grey with orange streaks						
2.0			▽	92	44	2.1	
	-becoming grey with orange and red streaks		23/10/13				
2.5	Firm, slightly plastic, grey with orange streaks, clayey SILT: moist			64	36	1.8	
	Firm, moderately plastic, orange with grey streaks, very silty CLAY: moist						
	-becoming slightly plastic			62	32	1.9	
3.0							Deepened by JB on 23/10/13
	Stiff, slightly to moderately plastic, orange with minor grey streaks, very silty CLAY: wet			118	38		
3.5	Very stiff, slightly to moderately plastic, medium grey with orange mottles, very clayey SILT with some sand: wet			138+			
4.0				138+			
	End of borehole @ 4.0 m Target Depth 3.0m - deepened to 4.0m on 23/10/13 Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 2.2m						
4.5							
5.0							

Tauranga Group Materials

*WGM

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CLIENT: Bell Rose Trust	LOGGED: GM CHECKED: MF	SHEET: 14 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: GV1335	DATE: 23/10/13	HAND AUGER No: HA14

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 43.8

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil							Drilled in Gully
FILL (Non-engineered?): Firm, slightly plastic, brown orange and grey, silty CLAY with frequent fine to medium gravels: moist		0.5		UTP			Proposed U 48.1 fill + 4.3m
-becoming grey with orange streaks and brown mottles			23/10/13	72	32	2.3	Gravels
NATURAL: Firm, moderately plastic, brownish grey, silty CLAY(Mullock?) with fine rootlets: moist		1.0					
Firm, highly plastic, creamy brown/tan coloured, silty CLAY: wet		1.5		56	24	2.3	
-becoming saturated				50	22	2.3	
-becoming grey with slightly brownish stain		2.0					
Firm, moderately plastic, slightly brownish grey, very clayey SILT: saturated				64	22	2.9	
Very stiff, slightly plastic, grey to medium grey, slightly sandy clayey SILT: wet		2.5		138+			
				138+			
End of borehole @ 3.0 m (Target Depth) Groundwater encountered during drilling @ 1.6m Standing groundwater on completion measured @ 0.9m *Waitemata Group Materials		3.0		138+			
		3.5					
		4.0					
		4.5					
		5.0					

Fill

Tauranga Group Materials

*WGM

GEOTEK SERVICES LIMITED

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Phone (64-9) 261-0169 Facsimile (64-9) 261-0548 E-mail enquiries@geotek.co.nz

CLIENT: Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 15 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 18/10/13	HAND AUGER No: HA15

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 46.2

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Topsoil						
NATURAL: Stiff, moderately plastic, orange with greyish brown streaks, silty CLAY: moist to wet						
-streaks becoming light grey	0.5		120	36	3.3	
-becoming light grey with orange streaks		23/10/13	111	53	2.1	
	1.0					
			101	53	1.9	
	1.5					
			93	49	1.9	
-becoming orange with grey streaks	2.0		99	49	2.0	Proposed RL 44.2 Cut - 2.0m.
-becoming light grey with orange streaks			114	53	2.2	
	2.5					
-becoming very light grey with orange streaks, and fine white and orange clasts			91	49	1.9	
	3.0		89	41	2.2	
End of borehole @ 3.0 m (Target Depth) Groundwater not encountered during drilling Standing groundwater on 23/10/13 measured @ 1.0m						
	3.5					
	4.0					
	4.5					
	5.0					

Tauranga Group Materials

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CLIENT: Bell Rose Trust	LOGGED: ZM CHECKED: MF	SHEET: 16 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4814	DATE: 18/10/13	HAND AUGER No: HA16

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 47.0

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
FILL						
FILL (Non-engineered?): Stiff, non-plastic to very slightly plastic, grey with rare orange streaks, clayey SILT with fine gravels: damp						
Tauranga Group Materials						
NATURAL: Stiff, slightly plastic, light grey and orange, silty CLAY: damp	0.5		102	38	2.7	
-becoming moderately plastic		23/10/13	84	46	1.8	
	1.0					
			104	56	1.9	
	1.5					
			107	58	1.8	
-becoming slightly plastic and more silt rich						
	2.0		106	58	1.8	Proposed RL 44.8 Cut - 2.2m.
-becoming orange with light grey streaks						
	2.5		88	52	1.7	
-becoming light grey and orange			99	58	1.7	
	3.0					
End of borehole @ 3.0 m (Target Depth) Groundwater encountered @2.8m during drilling Standing groundwater on 23/10/13 measured @ 0.8m						
	3.5					
	4.0					
	4.5					
	5.0					

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CLIENT: Bell Rose Trust	LOGGED: JB/ ZM CHECKED: MF	SHEET: 17 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 23/10/13	HAND AUGER No: HA17

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 44.8

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill							
FILL (Non-engineered): Topsoil with wood and gravel inclusions							No resistance to shear vane until 0.9m
		0.5					
-becoming very slightly plastic with frequent small, round white stones present							
-becoming firm				53	22	2.4	
		1.0					
-becoming slightly plastic, brown, more clayey, moist to wet							
-becoming stiff				91	16	5.7	Deepened by ZM from 1.6m on 24/10/13
abundant gravels		1.5					
-becoming very stiff, highly plastic, orange and light grey, with brown topsoily streaks, silty CLAY with a range of gravels (including pieces of ceramic brick): moist				UTP			Outside of Proposed Earthworks.
		2.0		UTP			
-becoming stiff, dark brown and orange, no more gravels				130	72		
Tauranga Group Materials							
NATURAL: Stiff, moderately plastic, grey and orange, silty CLAY: damp		2.5					
				108	58		
-becoming light grey and orange							
-becoming slightly plastic, more silt rich: moist		3.0		128	80		
-becoming very stiff		3.5		138+			
-becoming stiff				126	63		
		4.0					
				104	64		
		4.5					
-becoming orange with some light grey streaks: wet				133	70		
		5.0		91	64		
End of borehole @ 5.0 m (Target Depth) Deepened on 24/10/13 Groundwater not encountered during drilling Standing groundwater not present on completion							

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CLIENT: Bell Rose Trust	LOGGED: JB CHECKED: MF	SHEET: 18 of 21	JOB REF: 5123
LOCATION : 84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: DR4830	DATE: 23/10/13	HAND AUGER No: HA18

SOIL DESCRIPTION

Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 40.4

	Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
Fill							Proposed RL 43.3 Fill 2.9m
FILL (Non-engineered?): Non plastic, topsoily clayey SILT: damp							
Stiff, moderately plastic, brown mottled with orange and grey, silty CLAY: moist							
		0.5		103	32	3.2	
-becoming very stiff				138+			
Slightly to moderately plastic, dark greyish brown clayey SILT: moist with a slight reductive odour							
-becoming stiff		1.0		107	18	5.9	
-piece of black plastic bag encountered							
Tauranga Group Materials							
NATURAL: Stiff, moderately plastic, grey with orange and some reddish orange streaks, silty CLAY: moist		1.5		99	39	2.5	
-becoming moderately to highly plastic, light grey with greyish brown and minor orange streaks							
-becoming mainly light grey		2.0		105	43	2.4	
-becoming very light grey			23/10/13	114	43	2.7	
		2.5		99	45	2.2	
		3.0		103	43	2.4	
-becoming very highly plastic, moist to wet							
-becoming firm		3.5		77	51	1.5	
				59	32	1.8	
		4.0					
-becoming highly plastic, medium grey with minor orange streaks				73	41	1.8	
-becoming moderately to highly plastic, dark grey with minor orange streaks, more silty and wet		4.5		69	45	1.5	
		5.0		69	53	1.3	
End of borehole @ 5.0m (Target Depth) Groundwater encountered @ 3.4m during drilling Standing groundwater on completion measured @ 1.9m							

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CLIENT:	Bell Rose Trust	LOGGED: GM/JB CHECKED: MF	SHEET: 19 of 21	JOB REF:	5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: GV1335	DATE: 23/10/13	HAND AUGER No:	HA19

SOIL DESCRIPTION

Legend: Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 41.3

Columns: Legend | Depth (m) | Water Level | Su - Peak Strength (kPa) | Remould Strength (kPa) | Sensitivity | Comments Samples Other Test

Tauranga Group Materials

NATURAL: Stiff, slightly plastic, grey with minor orange streaks, silty CLAY: moist
- -minor brown streaks
- -root

Stiff, slightly plastic, grey with minor orange streaks, very silty CLAY: moist

Stiff, slightly plastic, grey with minor orange streaks, clayey SILT: moist
- -brown streak
- -becoming firm
- -becoming grey with orange streaks
- -becoming orange with grey streaks
- -becoming stiff
- -becoming slightly to moderately light grey with minor orange streaks, wet
- -becoming medium grey
- -becoming medium to dark grey, slightly sandy
- -becoming slightly plastic, dark grey with minor orange streaks, no sand

Waitemata Group

Very stiff, slightly to moderately plastic, dark grey, very clayey SILT: moist
- -becoming saturated
- -becoming slightly plastic, slightly sandy

Depth markers: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

Water Level: 23/10/13 (at approx. 3.4 m)

Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity
92	38	2.4
108	34	3.2
86	36	2.4
92	26	3.5
72	30	2.4
68	38	1.8
102	38	2.7
114	40	2.9
103	30	3.4
120	41	2.9
138+		
138+		
138+		

Comments: PROPOSED PUSHUP ROAD. LL 42.6. FILL 1.3m.

Deepened by JB on 23/10/13

End of borehole @ 5.0 m
Target Depth 3.0m - deepened to 5.0m on 23/10/13
Groundwater encountered @ 4.2m during drilling
Standing groundwater on completion measured @ 3.4m

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Phone (64-9) 261-0169 Facsimile (64-9) 261-0548 E-mail enquiries@geotek.co.nz

CLIENT: Bell Rose Trust	LOGGED: GM CHECKED: MF	SHEET: 20 of 21	JOB REF: 5123
LOCATION: 84 - 90 Hobsonville Road, Hobsonville	DIAMETER: 50mm SV DIAL: GV1335	DATE: 23/10/13	HAND AUGER No: HA20

SOIL DESCRIPTION

Legend: Topsoil, Fill, Clay, Silt, Sand, Gravel, Peat, Rock

Ground Level: 38.4

Columns: Legend | Depth (m) | Water Level | Su - Peak Strength (kPa) | Remould Strength (kPa) | Sensitivity | Comments Samples Other Test

Tauranga Group Materials

Topsoil

FILL (Non-engineered?): Firm, non-plastic, dark grey, clayey SILT: moist

NATURAL: Firm, highly plastic, creamy brown, silty CLAY: wet

-becoming saturated

-becoming stiff, moderately plastic, moist

Stiff, slightly plastic, slightly brownish grey, clayey SILT: moist

-becoming moderately plastic, grey

-becoming firm, roots encountered

Firm, highly plastic, grey, silty CLAY: moist

-becoming slightly plastic

-becoming stiff

Slightly plastic, very slightly greenish grey, clayey SILT: moist

WGM*

Very stiff, slightly plastic, grey to medium grey, silty CLAY: moist

Very stiff, slightly plastic, medium grey, clayey SILT: moist

-some dark grey streaks

Depth markers: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

Water Level: 23/10/13

Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity
72	24	3.0
66	20	3.3
134	24	5.6
92	50	1.8
118	60	2.0
86	46	1.9
68	46	1.5
72	42	1.7
137	56	2.4
84	38	2.2
138+		
138+		
138+		

Proposed Public Road RL 40.6. Fill 2.2m.

End of borehole @ 5.0 m (Target Depth)
Groundwater encountered @ 1.0m during drilling
Standing groundwater on completion measured @ 0.7m
* Waitemata Group Materials

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CLIENT:	Bell Rose Trust	LOGGED: GM CHECKED: MF	SHEET: 21 of 21	JOB REF: 5123
LOCATION :	84 - 90 Hobsonville Road Hobsonville	DIAMETER: 50mm SV DIAL: GV1335	DATE: 24/10/13	HAND AUGER No: HA21

SOIL DESCRIPTION

Topsoil / Fill — Clay / Silt — Sand / Gravel — Peat / Rock

Ground Level: 39.5

Legend	Depth (m)	Water Level	Su - Peak Strength (kPa)	Remould Strength (kPa)	Sensitivity	Comments Samples Other Test
						Drilled in Gully
Topsoil						Outside of Proposed Earthworks.
NATURAL: Firm, moderately plastic, dark grey with fine dark orange streaks, silty CLAY (Mullock?): moist	0.5		62	18	3.4	
Firm, highly plastic, creamy brownish grey, silty CLAY: moist to wet			40	24	1.7	
-becoming saturated	1.0					
-becoming soft, grey			36	22	1.6	
	1.5					
-becoming firm			44	34	1.3	
-root encountered	2.0		50	34	1.5	
Stiff, highly plastic, grey to medium grey, very silty CLAY: wet	2.5		132	36	3.7	
			126	38	3.3	
	3.0		137	34	4.0	
End of borehole @ 3.0 m (Target Depth) Groundwater encountered @ 1.0m during drilling Standing groundwater on completion not encountered	3.5					
*Waitemata Group Materials	4.0					
	4.5					
	5.0					

Tauranga Group Materials

*WGM

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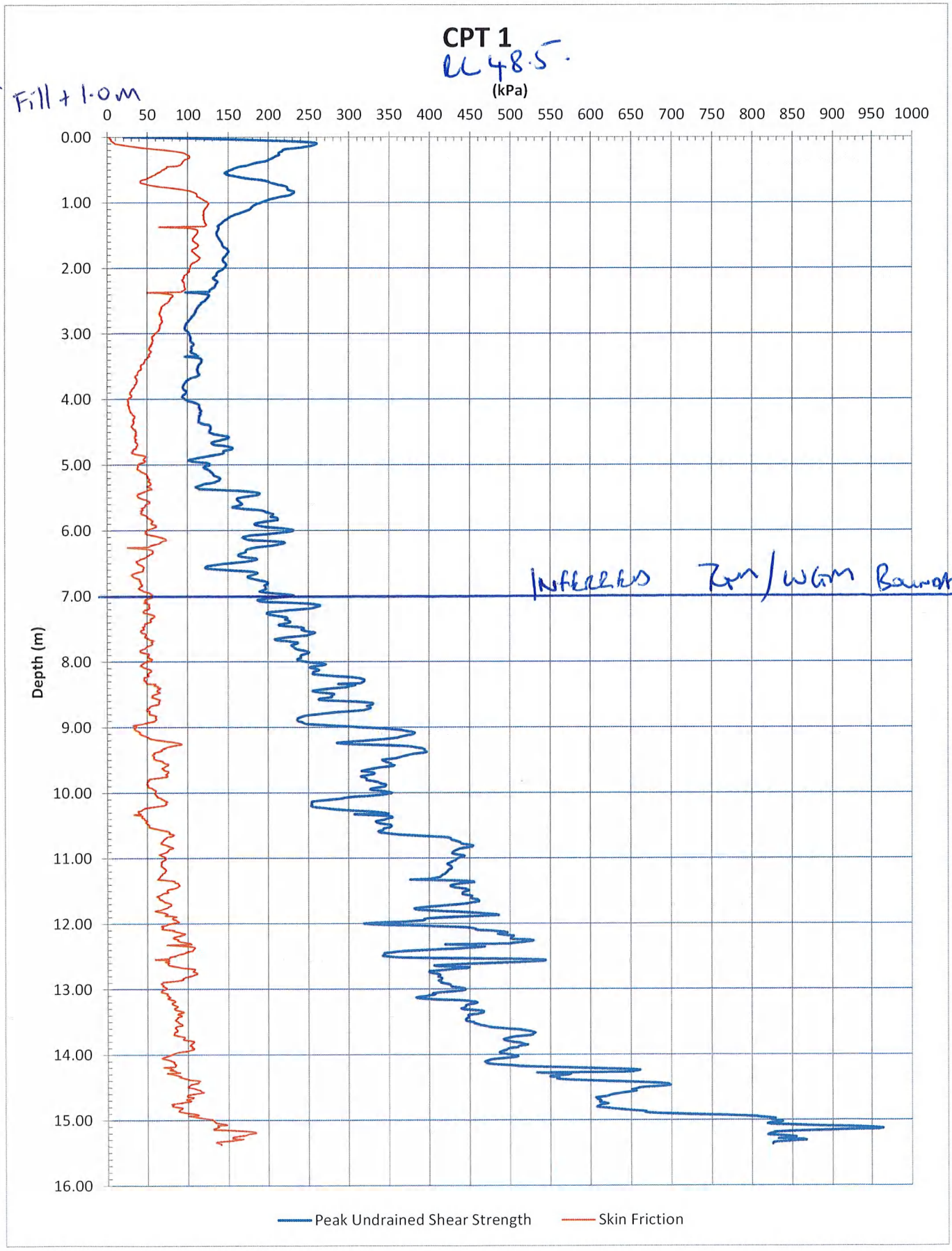
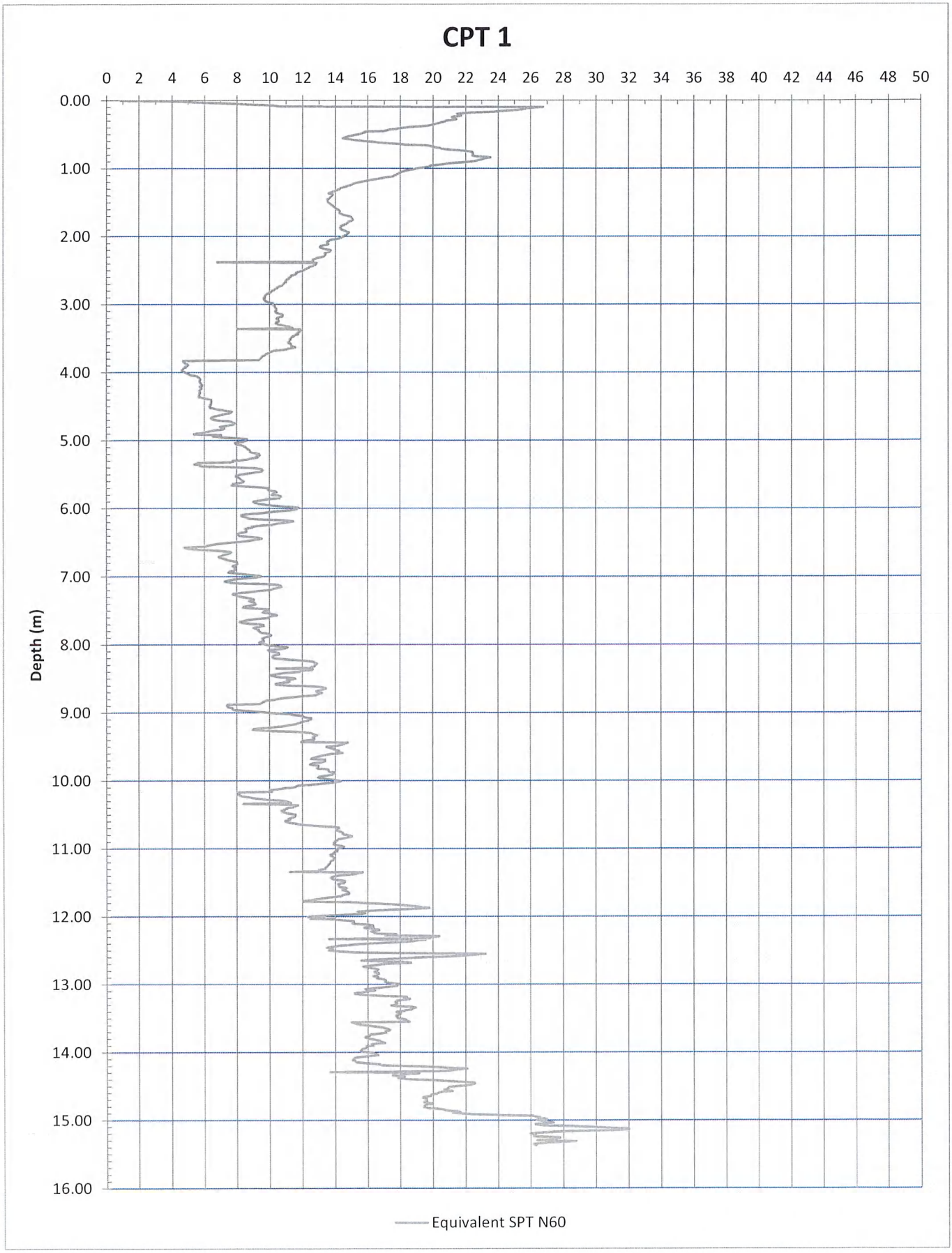
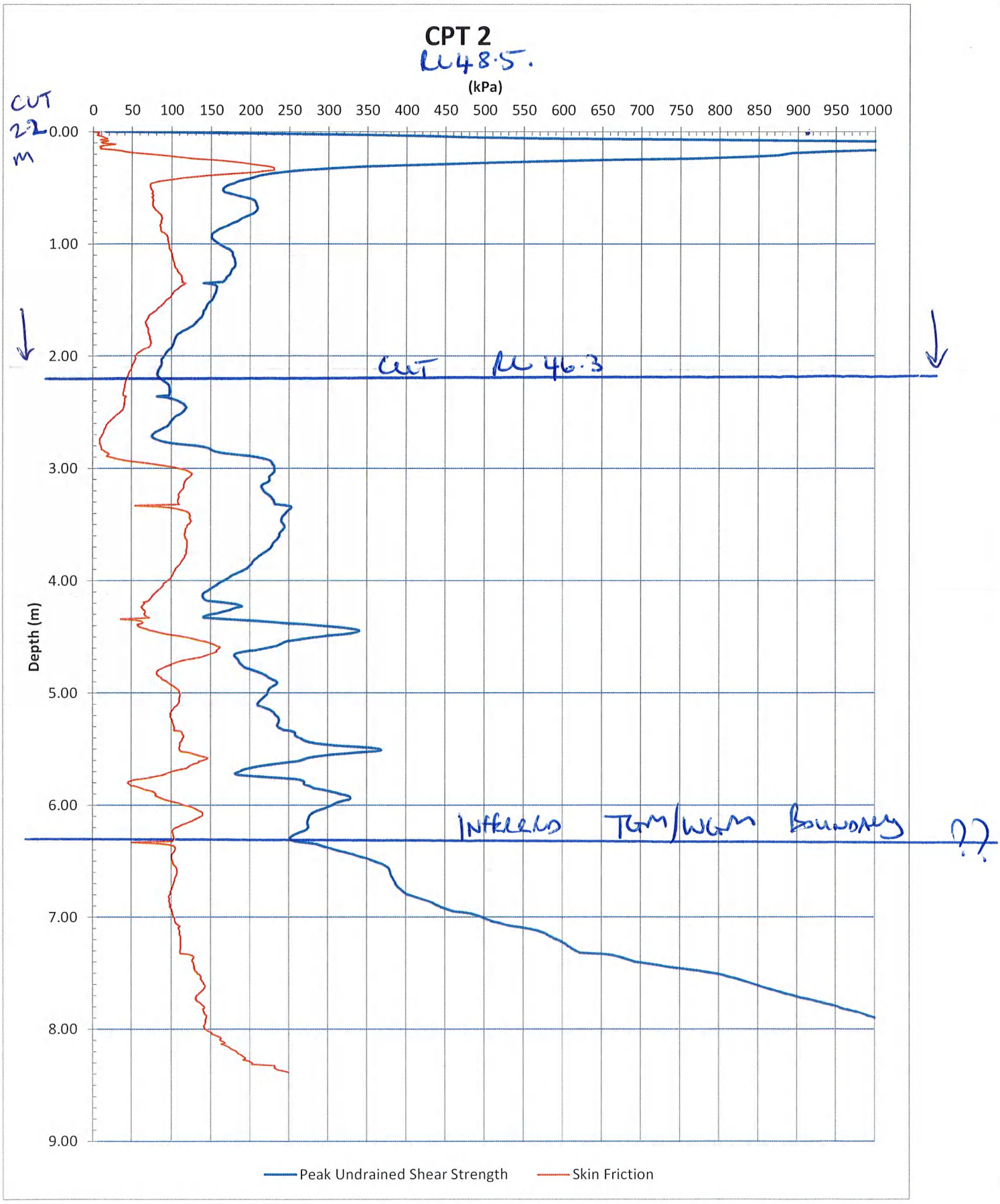
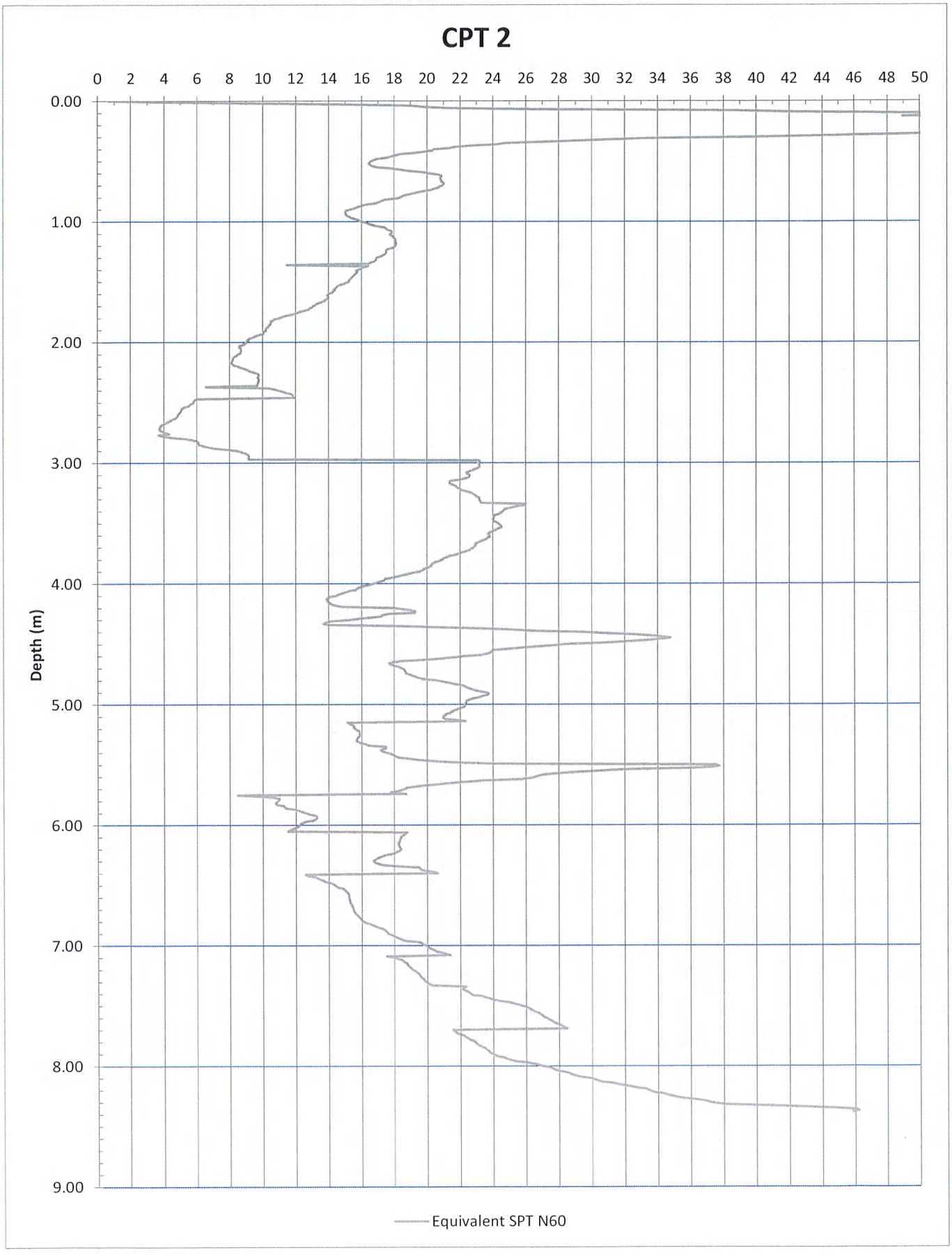
Phone (64-9) 261-0169 Facsimile (64-9) 261-0548 E-mail enquiries@geotek.co.nz


CPT 1
RL 48.5
Fill + 1.0m
(kPa)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00
Depth (m)
Interbeds Rock/Weak Boundary ??
Peak Undrained Shear Strength
Skin Friction


CPT 1
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00
Depth (m)
Equivalent SPT N60


CPT 2
RL 48.5.
(kPa)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
CUT 2.2 m
0.00
1.00
2.00
CUT RL 46.3
3.00
4.00
5.00
6.00
INFILLED TCM/WCM BOUNDARY ??
7.00
8.00
9.00
Depth (m)
Peak Undrained Shear Strength
Skin Friction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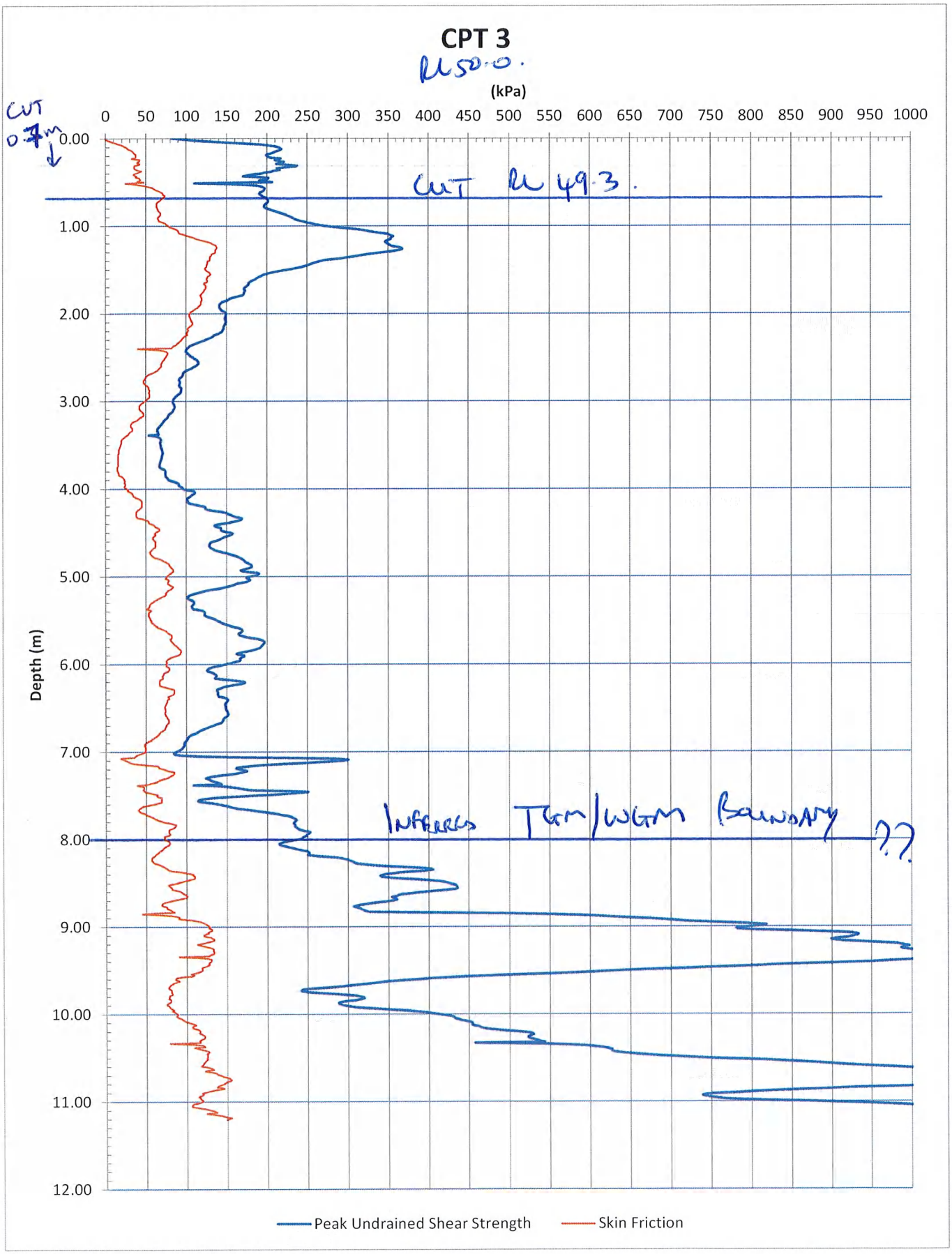
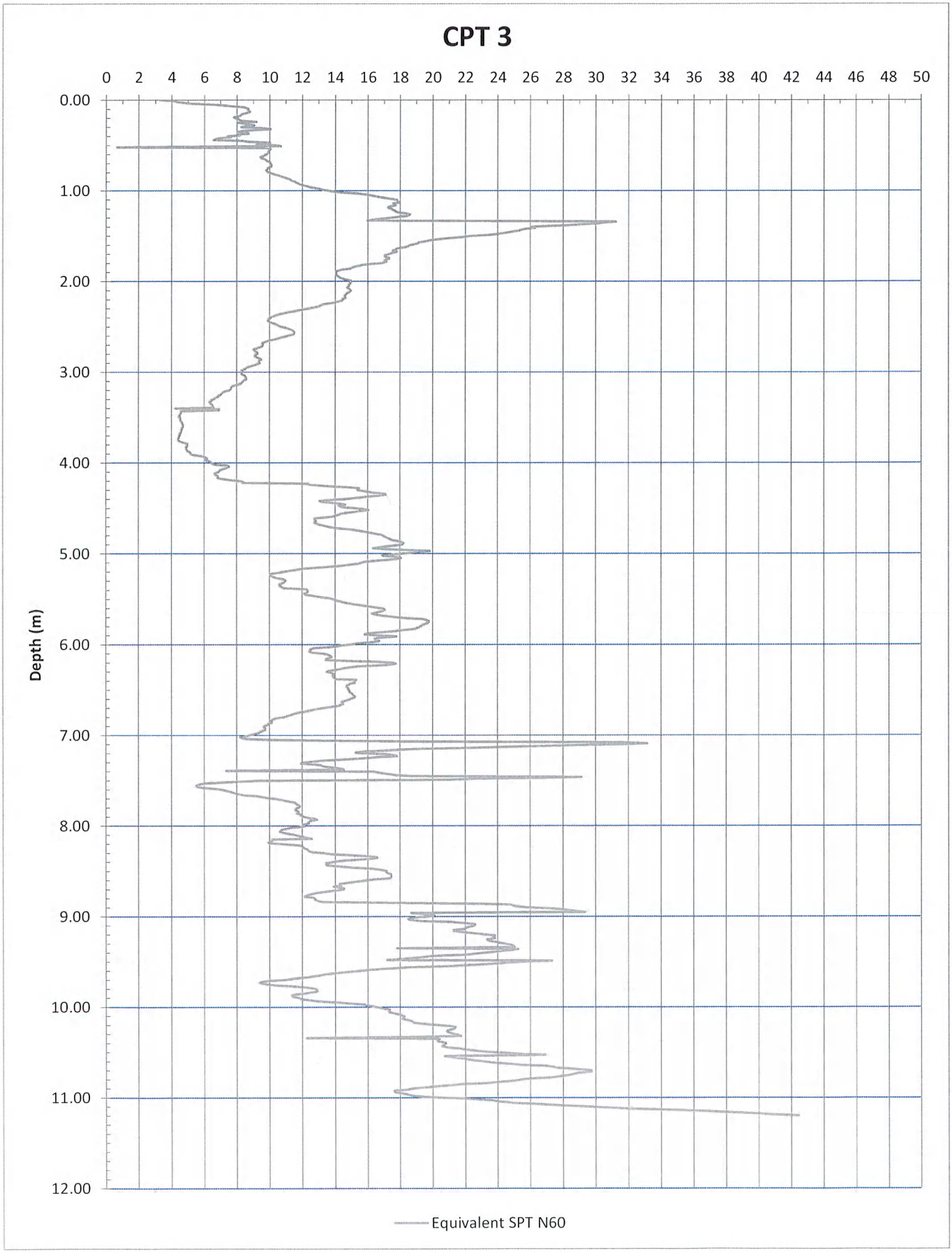
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
Depth (m)
Equivalent SPT N60


CPT 3
RL50.0.
(kPa)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
CUT 0.7m
CUT RL 49.3.
Depth (m)
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00
INFERRED TCM/WCM BOUNDARY ??
Peak Undrained Shear Strength
Skin Friction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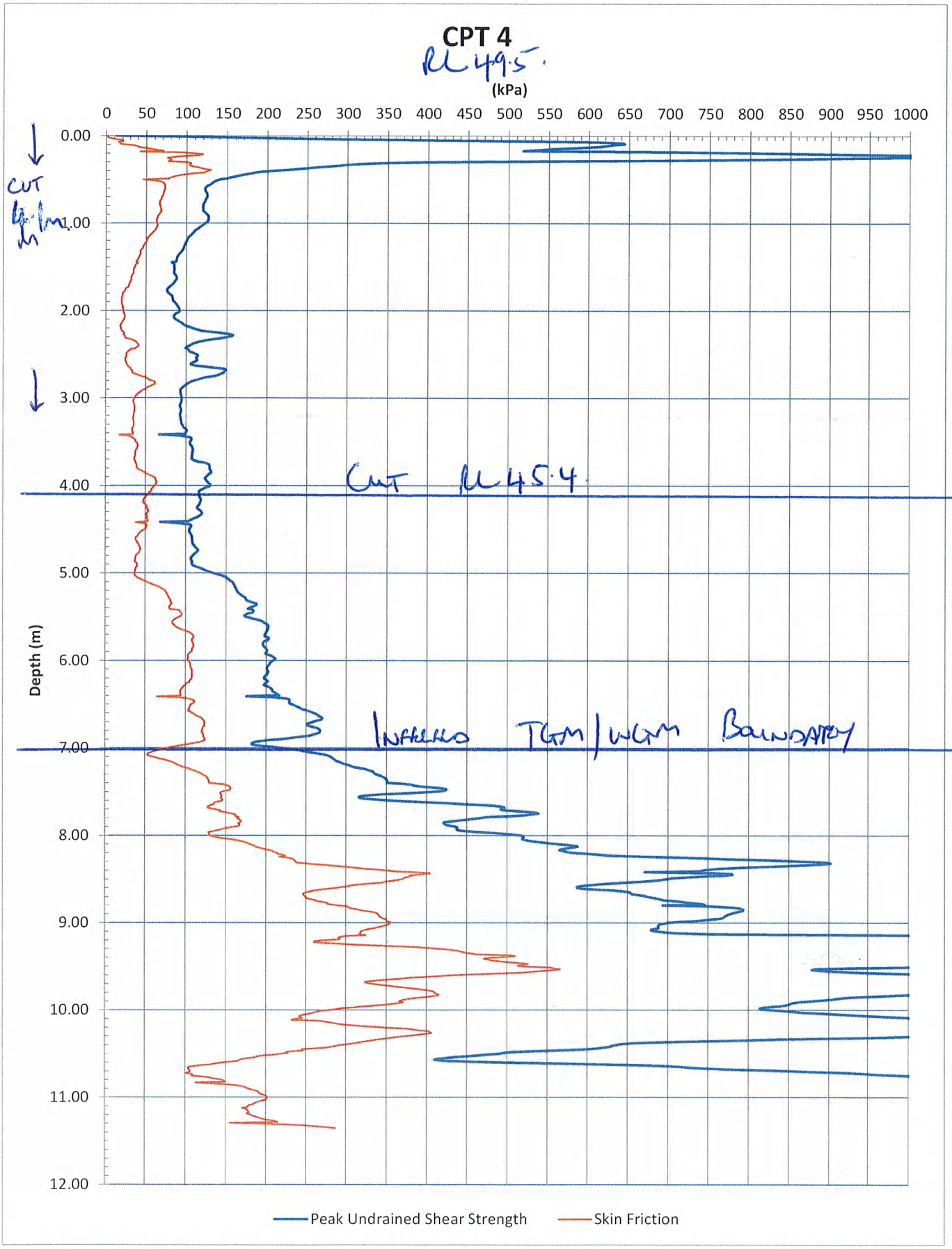
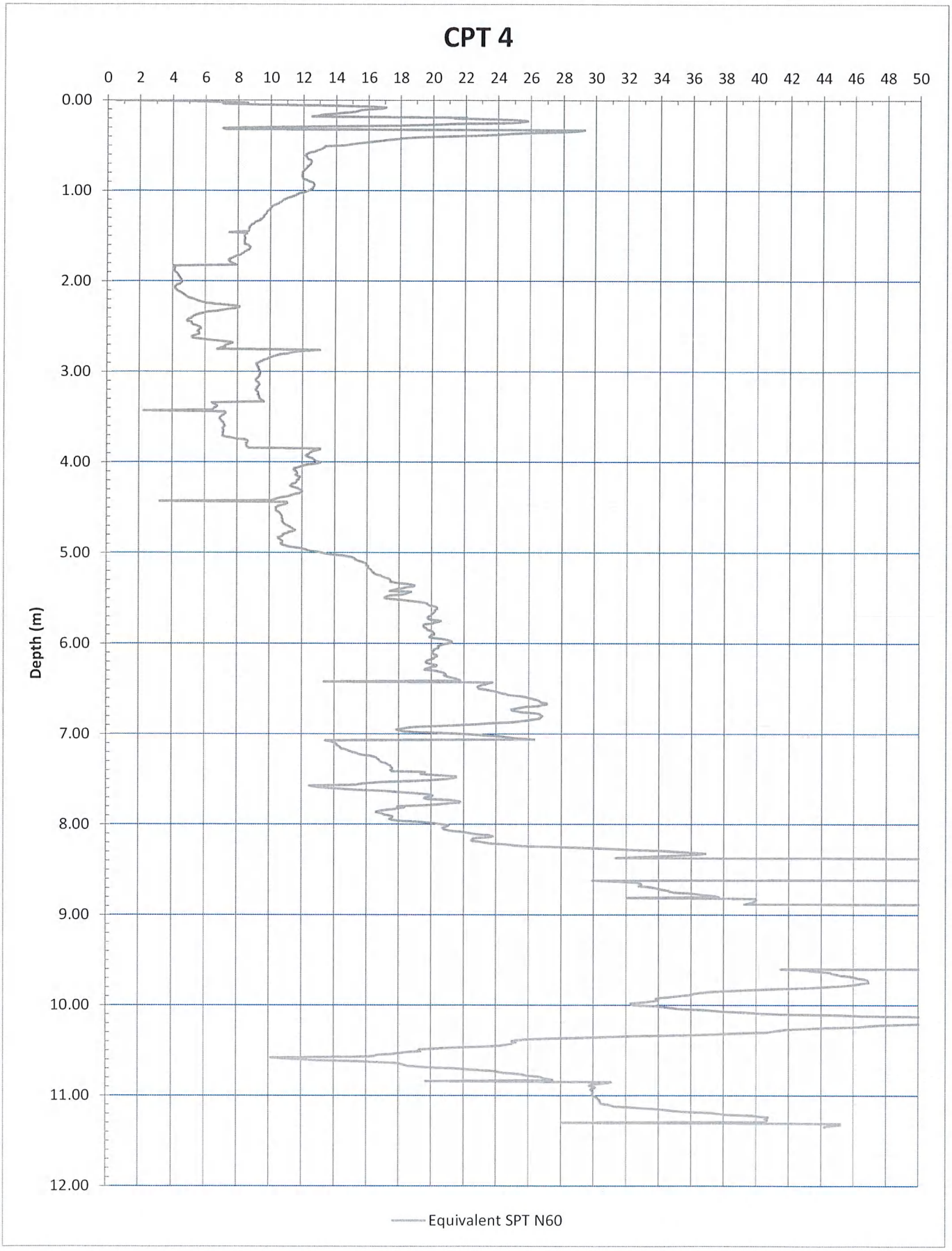
Depth (m)
Equivalent SPT N60


CPT 4
RL 49.5.
(kPa)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
Depth (m)
CUT
CUT RL 45.4.
INFERRED TGM/WGM BOUNDARY
??
Peak Undrained Shear Strength
Skin Friction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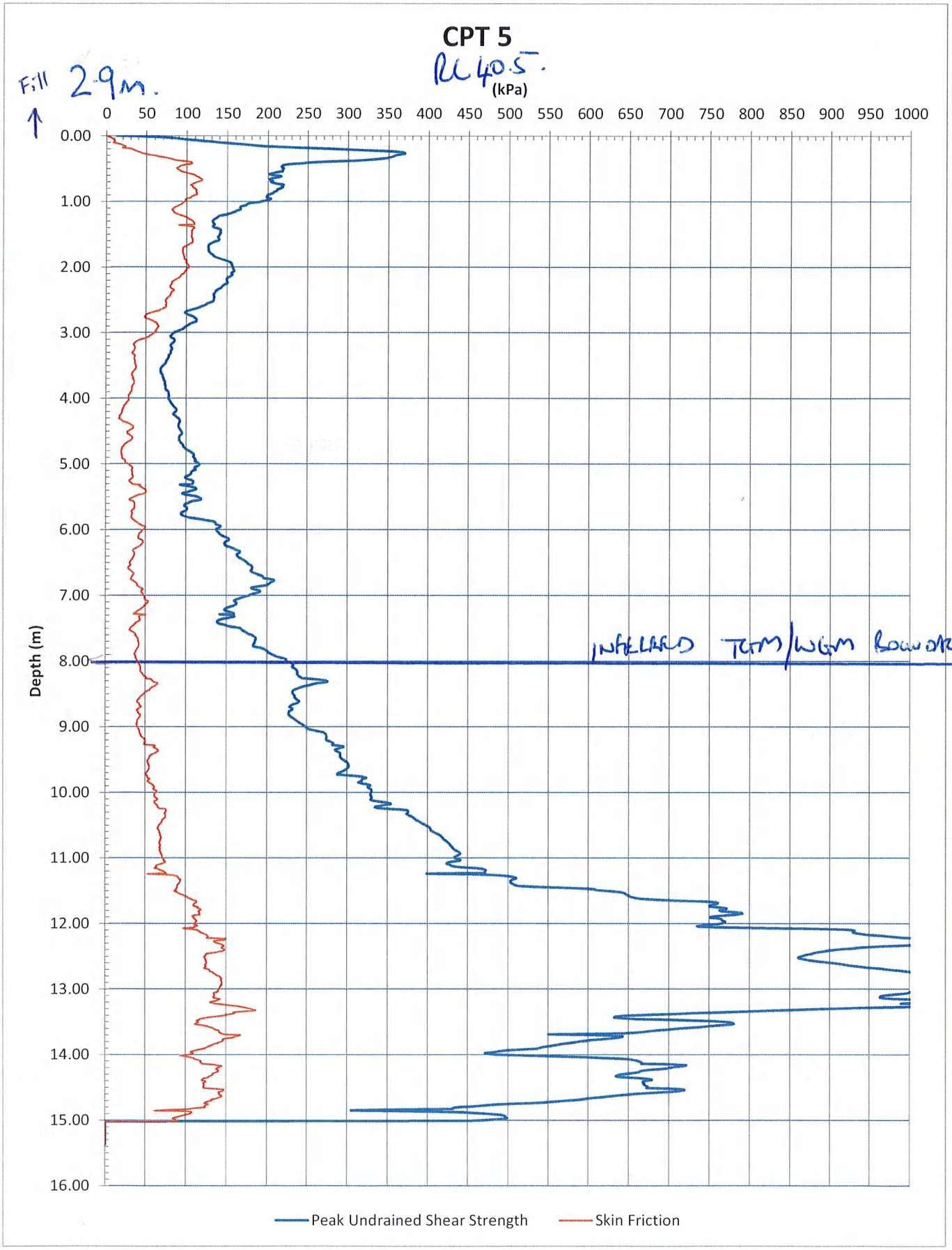
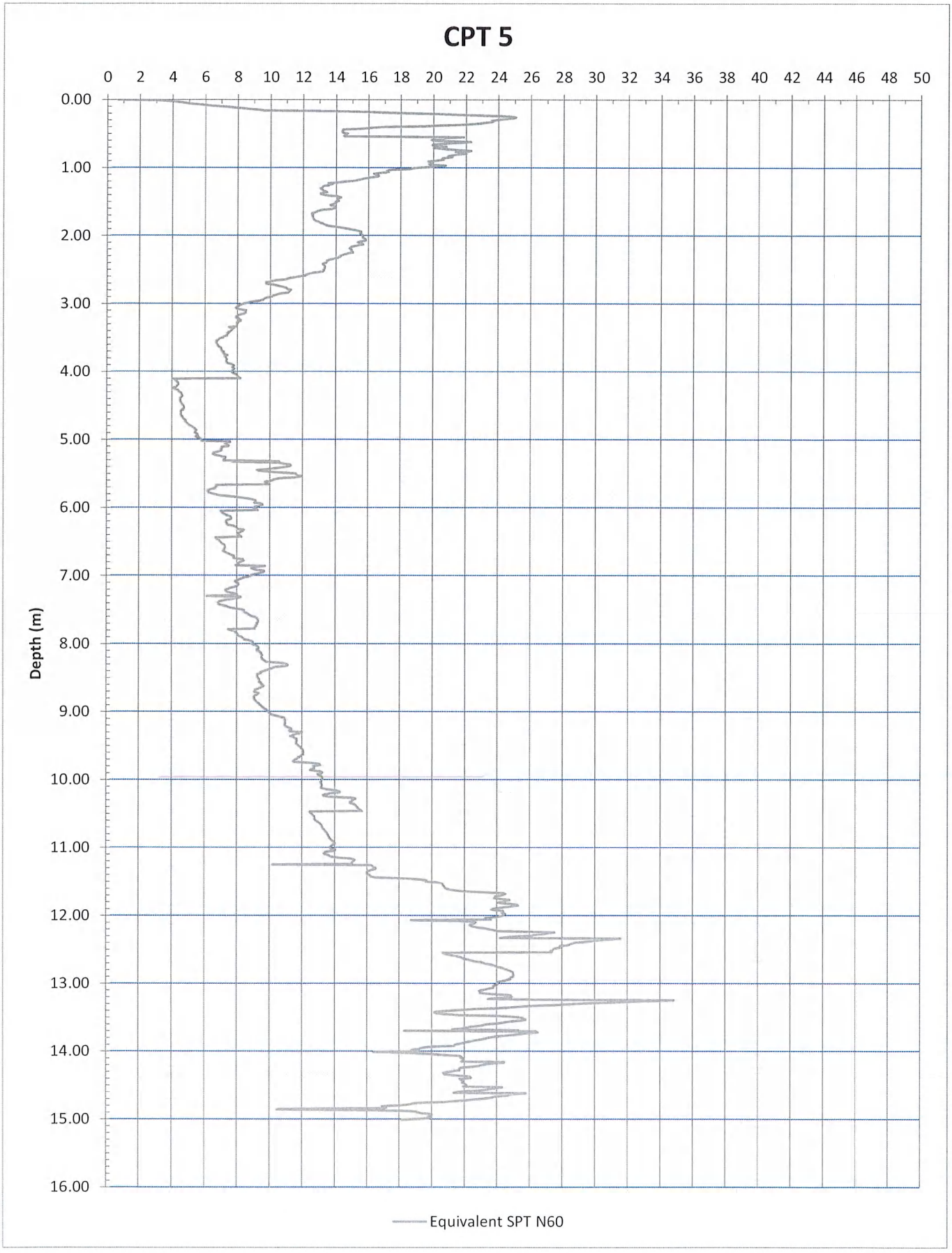
Depth (m)
Equivalent SPT N60


CPT 5
RL 40.5.
(kPa)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
Depth (m)
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00
Peak Undrained Shear Strength
Skin Friction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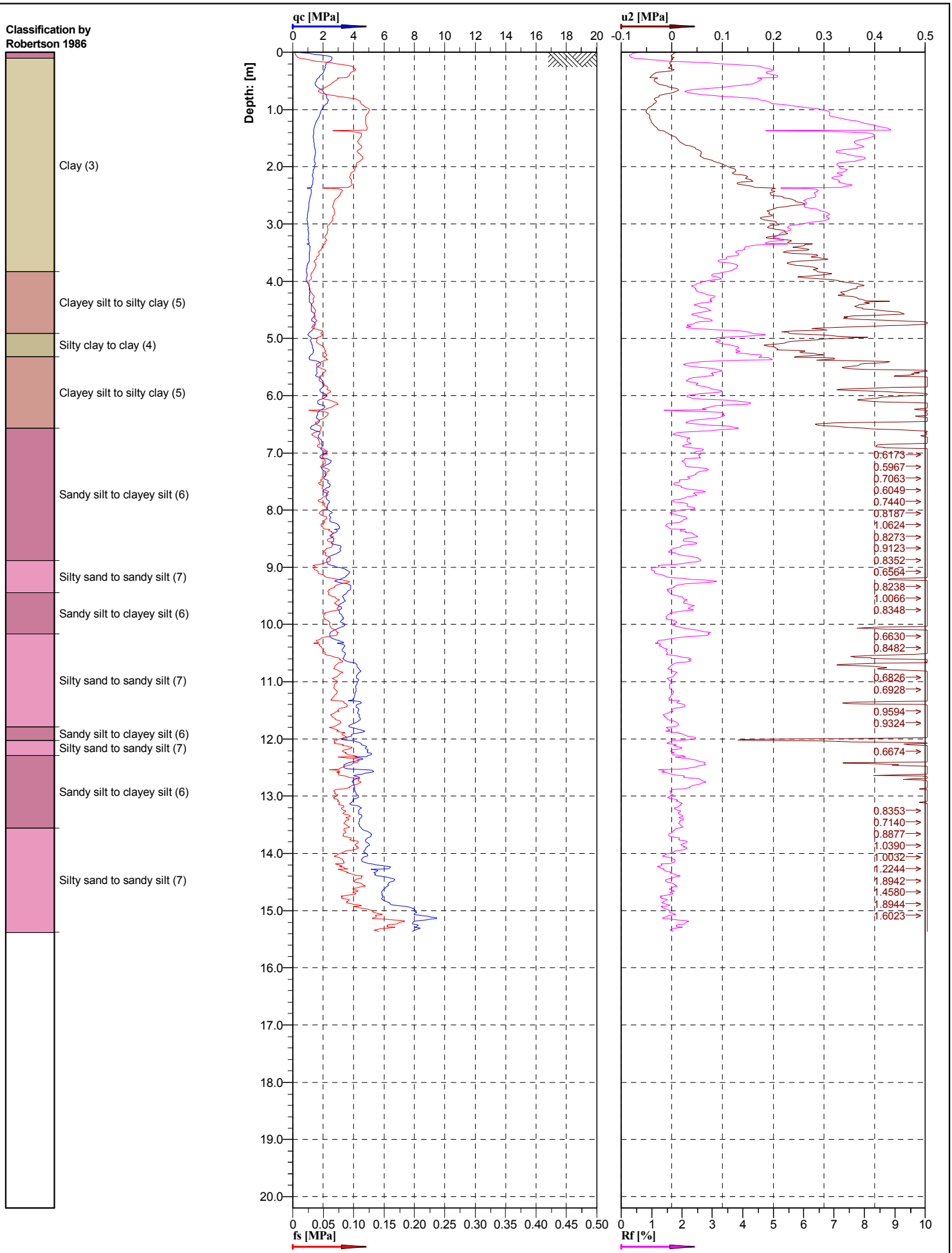
0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00
Depth (m)
Equivalent SPT N60

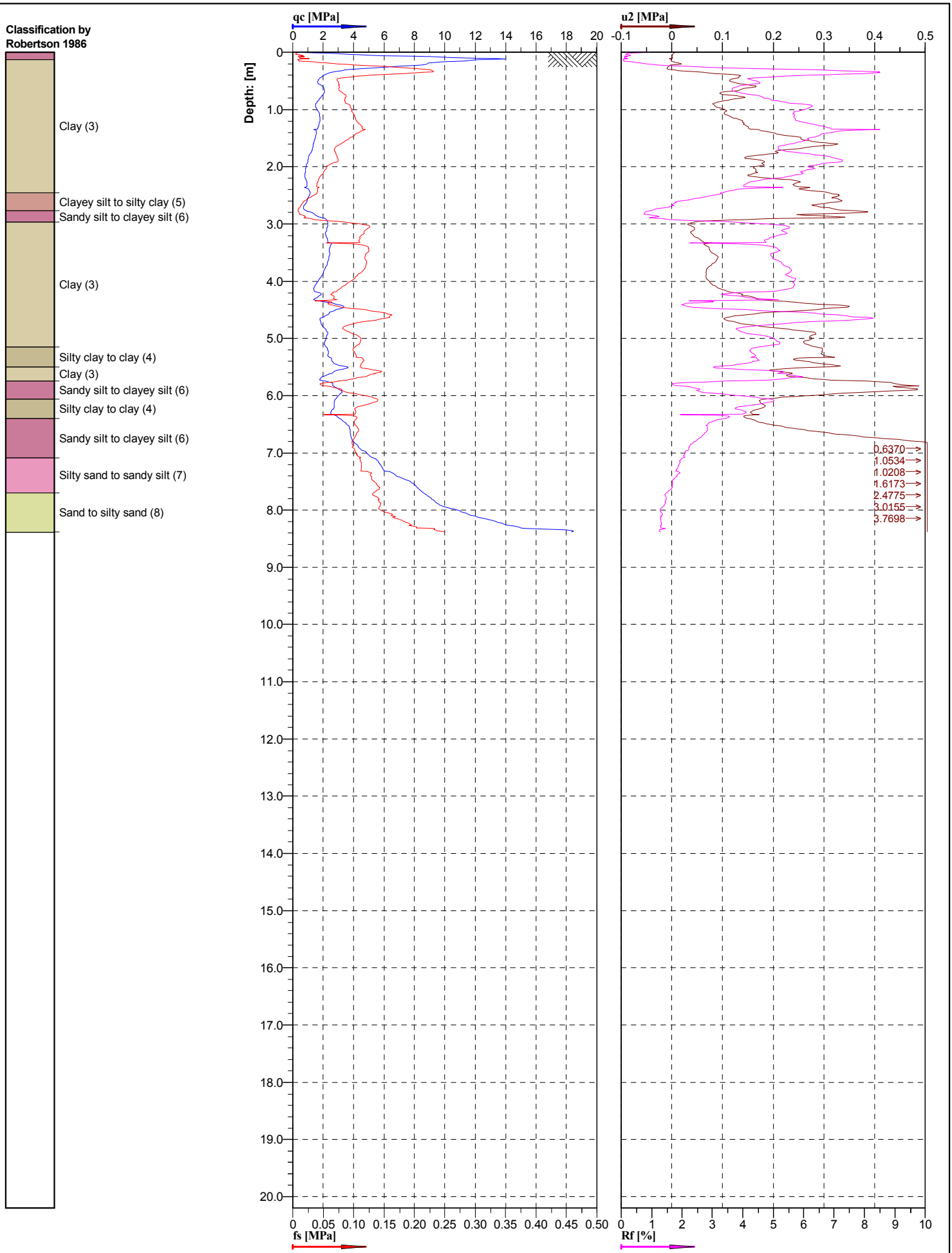


PRO-DRILL
SPECIALIST DRILLING ENGINEERS

u2

Cone No: S10CFIIP.S12141
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: 86 Hobsonville Rd Hobsonville	Position: X: 0 m, Y: 0 m	Ground level: 0.000	Test No.: CPT01
Project ID: Geotek 7273	Client: GEOTEK	Date: 10/04/2019	Scale: 1 : 85
Project: Geotek 7273		Page: 1/1	Fig.:
		File: Geotek 7273_CPT01.GEF	



PRO-DRILL
SPECIALIST DRILLING ENGINEERS

u2

Cone No: S10CFIIP.S12141
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: 86 Hobsonville Rd Hobsonville	Position: X: 0 m, Y: 0 m	Ground level: 0.000	Test No.: CPT02
Project ID: Geotek 7273	Client: GEOTEK	Date: 10/04/2019	Scale: 1 : 85
Project: Geotek 7273		Page: 1/1	Fig.:
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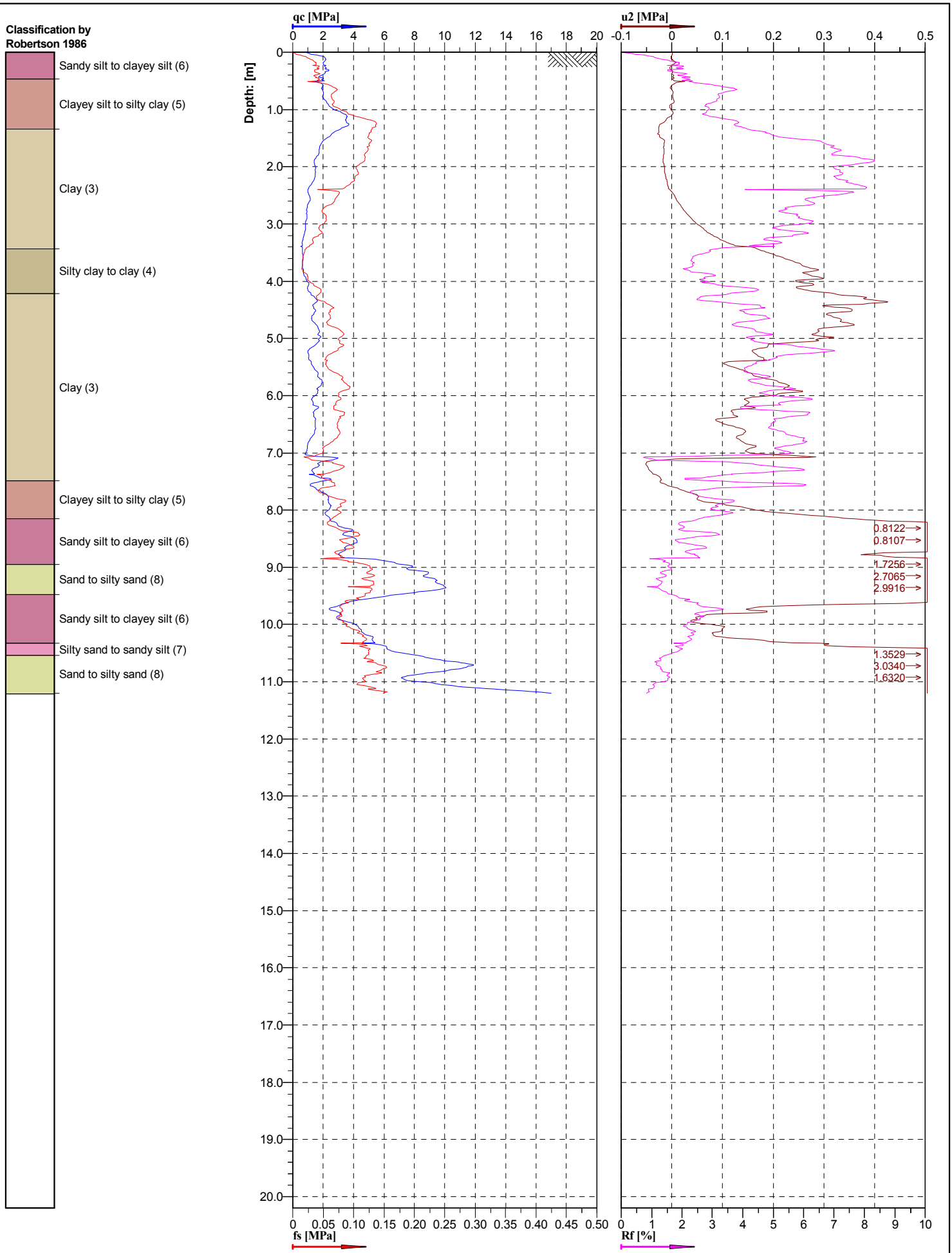
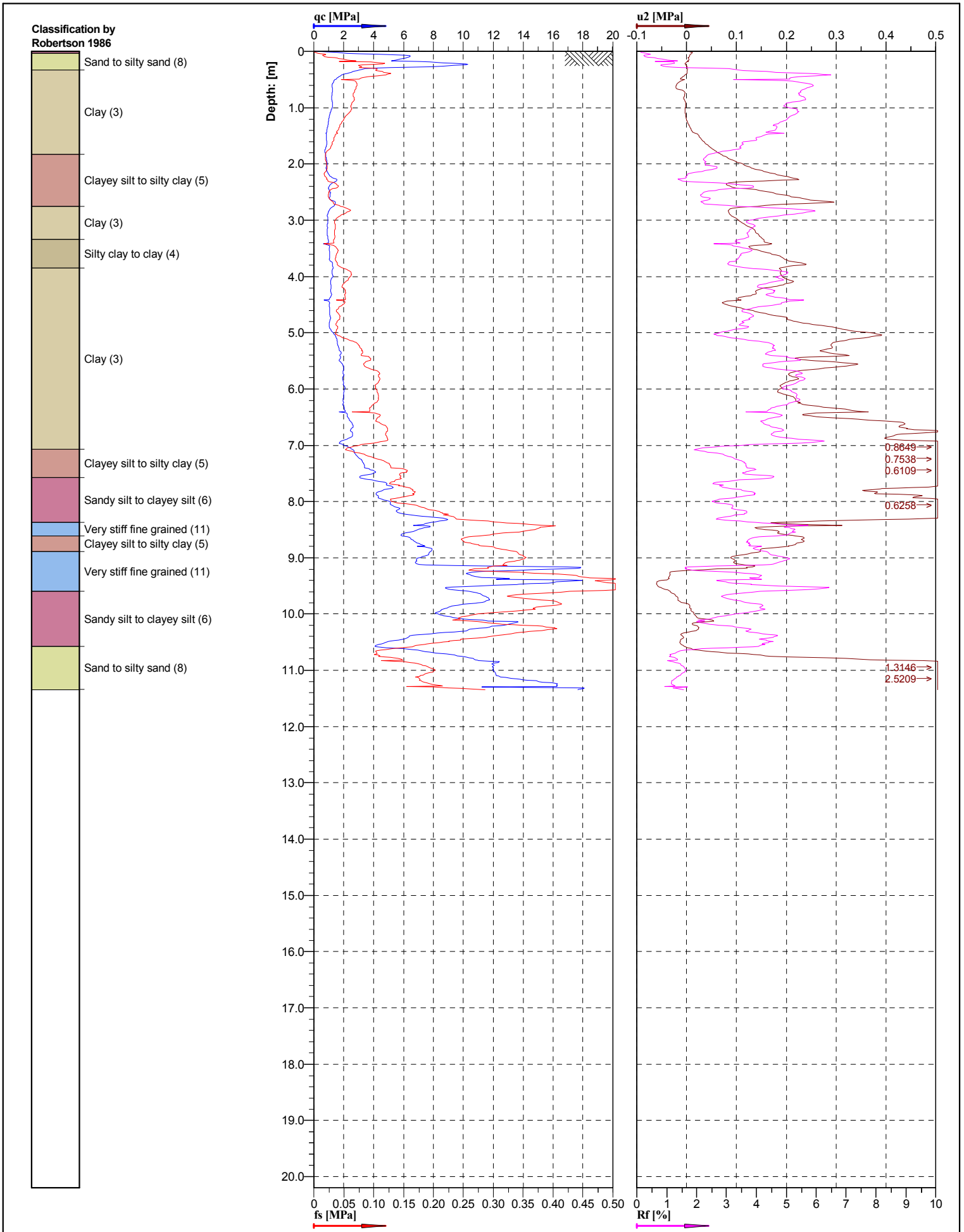


PRO-DRILL
SPECIALIST DRILLING ENGINEERS

u2

Cone No: S10CFIIP.S12141
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: 86 Hobsonville Rd Hobsonville	Position: X: 0 m, Y: 0 m	Ground level: 0.000	Test No.: CPT03
Project ID: Geotek 7273	Client: GEOTEK	Date: 10/04/2019	Scale: 1 : 85
Project: Geotek 7273		Page: 1/1	Fig.:
		File: Geotek 7273_CPT03.GEF	

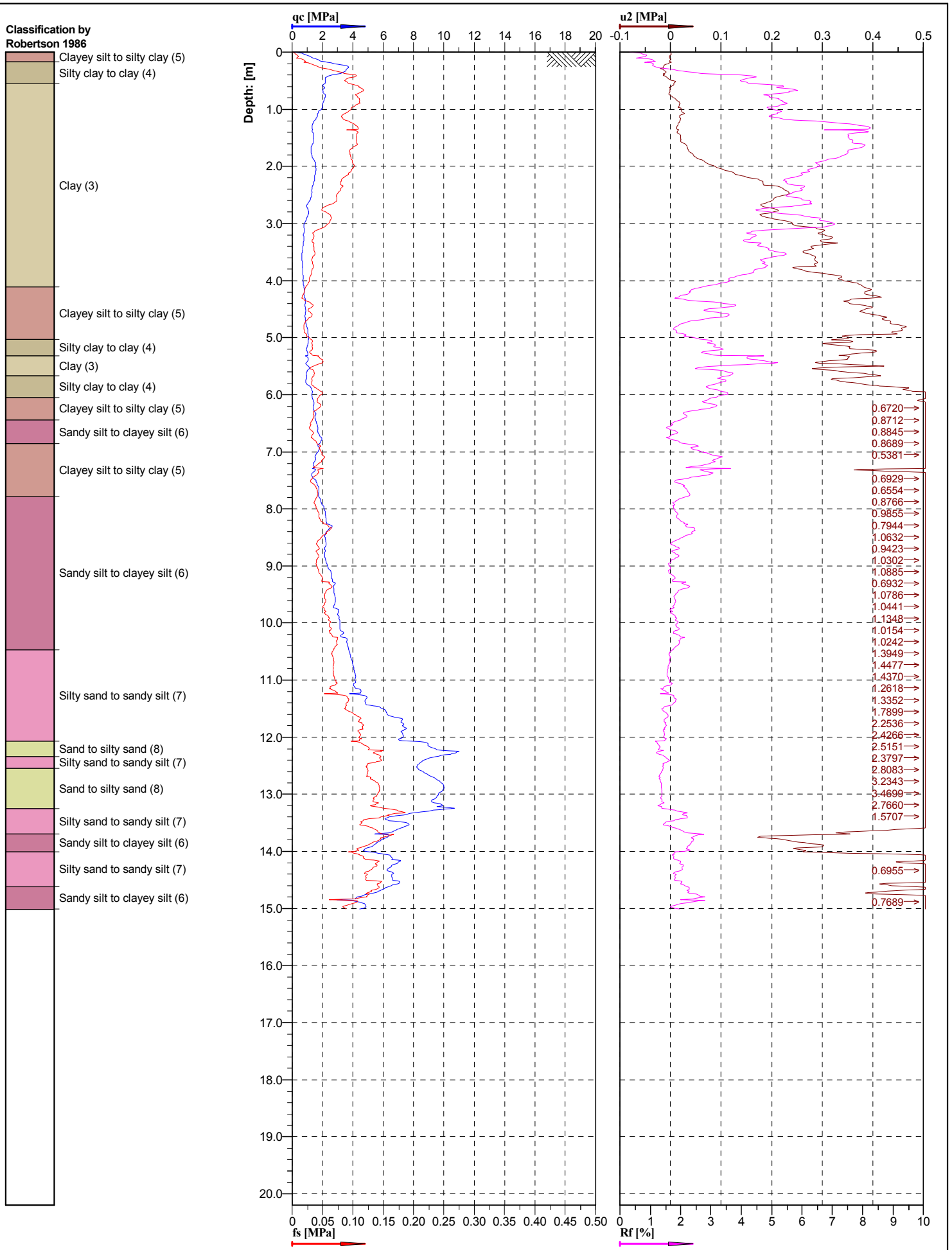


Location: 86 Hobsonville Rd Hobsonville	Position: X: 0 m, Y: 0 m	Ground level: 0.000	Test No.: CPT04
Project ID: Geotek 7273	Client: GEOTEK	Date: 10/04/2019	Scale: 1 : 85
Project: Geotek 7273		Page: 1/1	Fig.:
		File: Geotek 7273_CPT04.GEF	

PRO-DRILL
SPECIALIST DRILLING ENGINEERS

u2

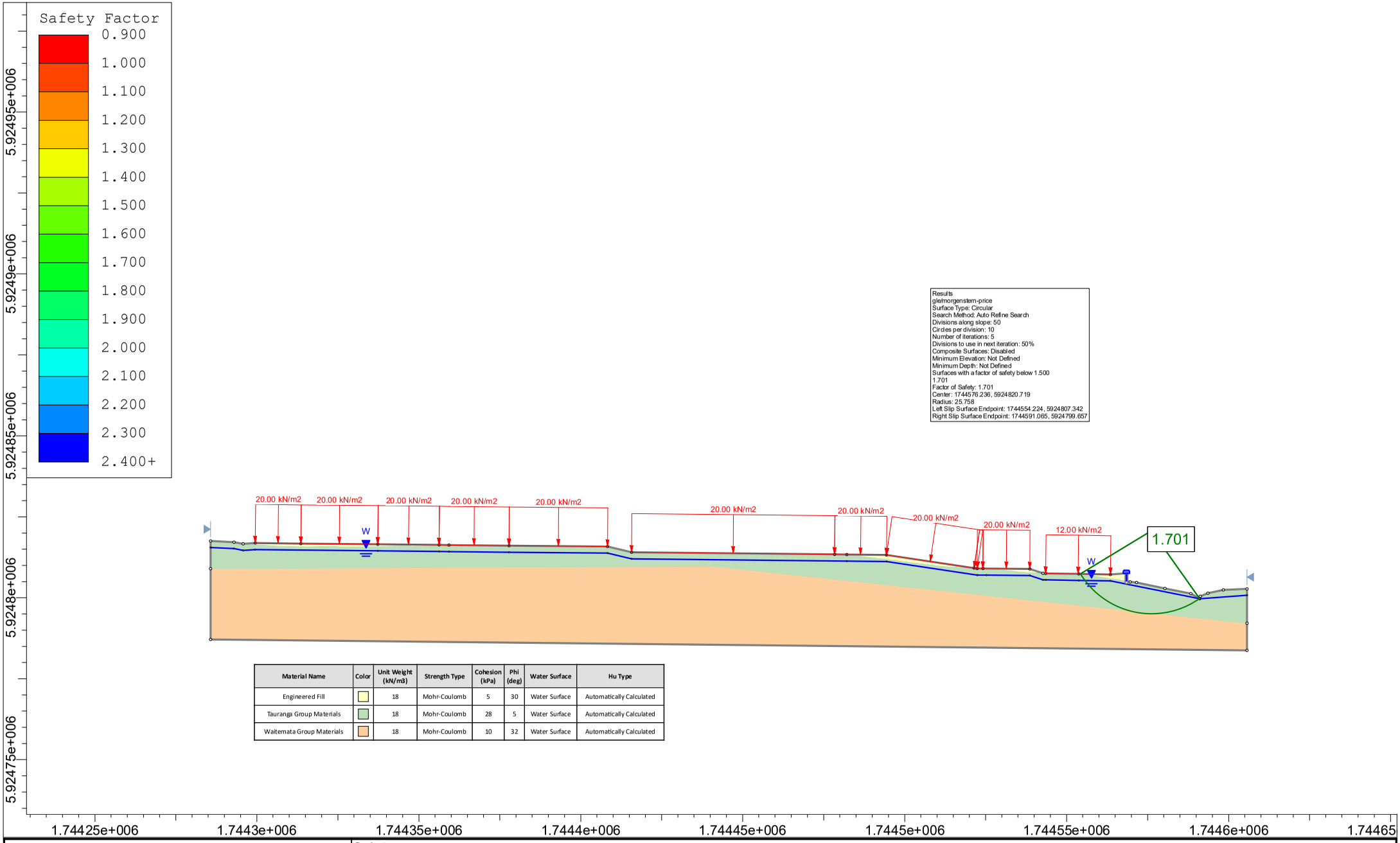
Cone No: S10CFIIP.S12141
Tip area [cm2]: 10
Sleeve area [cm2]: 150



Location: 86 Hobsonville Rd Hobsonville	Position: X: 0 m, Y: 0 m	Ground level: 0.000	Test No.: CPT05
Project ID: Geotek 7273	Client: GEOTEK	Date: 10/04/2019	Scale: 1 : 85
Project: Geotek 7273		Page: 1/1	Fig.:
		File: Geotek 7273_CPT05.GEF	

PRO-DRILL
SPECIALIST DRILLING ENGINEERS

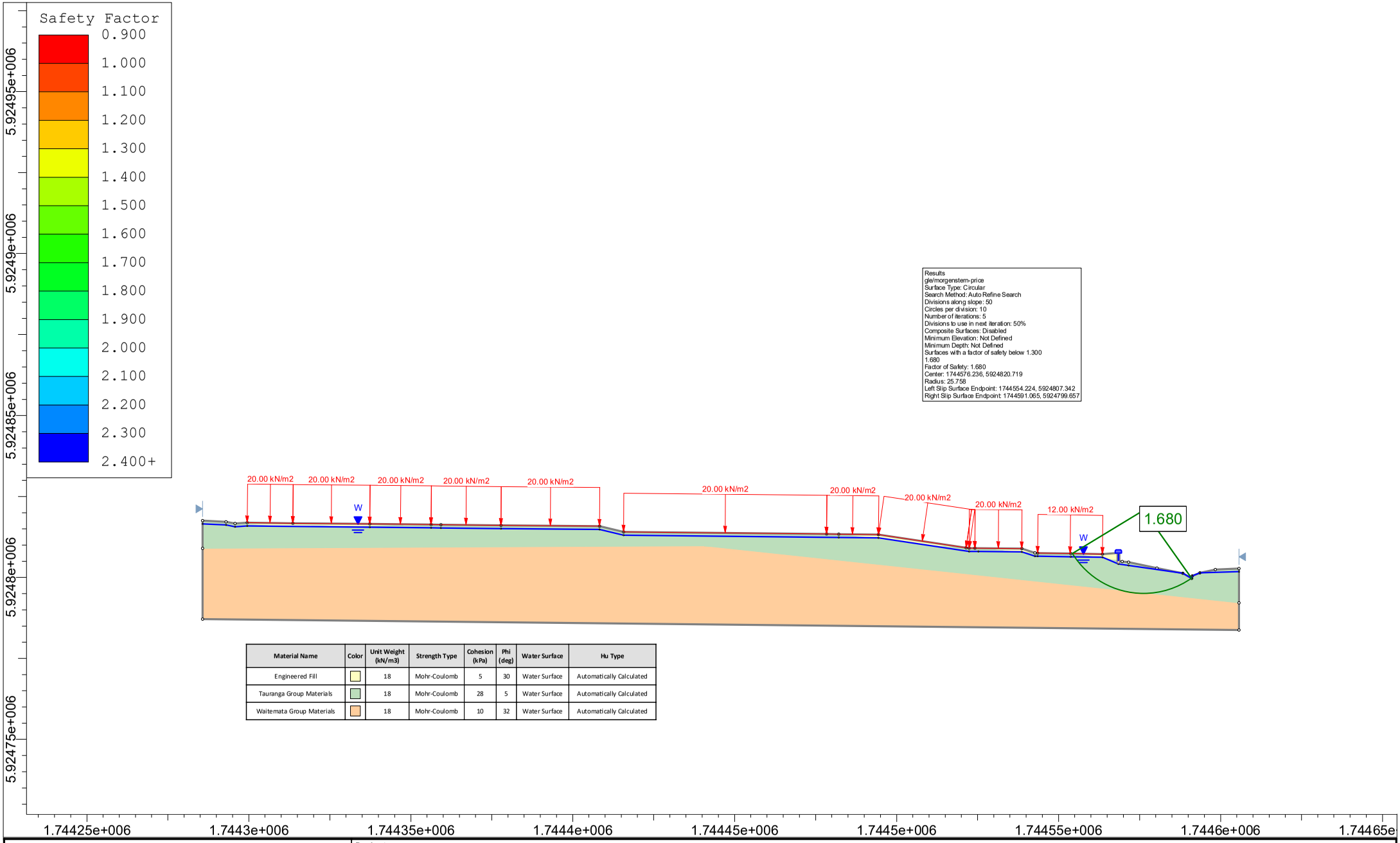
Cone No: S10CFIIP.S12141
Tip area [cm2]: 10
Sleeve area [cm2]: 150



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type
Engineered Fill		18	Mohr-Coulomb	5	30	Water Surface	Automatically Calculated
Tauranga Group Materials		18	Mohr-Coulomb	28	5	Water Surface	Automatically Calculated
Waitemata Group Materials		18	Mohr-Coulomb	10	32	Water Surface	Automatically Calculated

	Project	86 -88 Hobsonville Road		
	Analysis Description	Moderate Groundwater		
	Drawn By	EC	*Scale* 1:1500	*Company* Geotek
	Date	20/05/2019, 6:27:04 PM		*File Name* Moderate Groundwater.slim

SLIDEINTERPRET 6.033



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type
Engineered Fill		18	Mohr-Coulomb	5	30	Water Surface	Automatically Calculated
Tauranga Group Materials		18	Mohr-Coulomb	28	5	Water Surface	Automatically Calculated
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	Project	86 -88 Hobsonville Road		
	Analysis Description	Extreme Groundwater		
	Drawn By	EC	*Scale* 1:1500	*Company* Geotek
SLIDEINTERPRET 6.033	*Date*	20/05/2019, 6:27:04 PM		*File Name* Extreme Groundwater.slim