ORCHARD ROAD HOLDINGS LTD

MEADOWSTONE ALPHA SERIES, STAGE 4, WANAKA

GEOTECHNICAL COMPLETION REPORT & PROVISION OF SCHEDULE 2A FOR MEADOWSTONE ALPHA SERIES, STAGE 4 (LOTS 65 – 84)

REF: R6783-4A
DATE: 05 MAY 2025

GCL Ground Consulting Ltd

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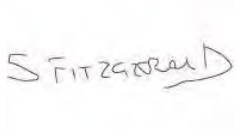
AUTHOR SIGNATURE			REVIEWER SIGNATURE	
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1 INTRODUCTION

1.1 GENERAL

GCL has been engaged to prepare the Geotechnical Completion Report (GCR) and Schedule 2A (S2A) for 20 residential lots (Lots 65 – 84) within Stage 4 of the Meadowstone Alpha Series development in Wanaka. This report has been completed at the request of Paterson's Land Professionals (Wanaka) on behalf of the client Orchard Road Holdings Ltd.

A Short Form Agreement (SFA) No. 6783-1226 was approved on 10 November 2020.

The site is currently legally described as Lot 909 DP 563778. A new Lot and DP number will be assigned to each of the newly created lots following LINZ approval and the issuance of Section 223c. The site location is presented in Drawing 001.

The site has undergone several stages of earthworks and geotechnical certification since development commenced around November 2020.

Structural fill earthworks were primarily undertaken to establish suitable gradients for residential development in the western section of the site, north of Serpentine Street, and to reinstate the Sediment Retention Pond (SRP) near the site's eastern boundary, adjacent to West Meadows Drive. Cut earthworks were undertaken to remove isolated areas of topographic relief across the site, enabling the achievement of the subdivision design levels and establishing gradients suitable for residential development.

A below ground stormwater disposal facility (Lot 200) was installed between the Oak Tree Reserve (Lot 201) and Serpentine Street.

GCL carried out a total of 50 inspections. Between 17 November 2020 and 19 January 2022, 28 inspections were completed in relation to the creation of Lots 79 – 84. An additional 22 inspections were undertaken between 4 June 2024 and 18 February 2025 to support the reinstatement of the Sediment Retention Pond (SRP).

Refer to Appendix A for a comprehensive account of Site Inspection Notes (SIN).

1.2 SCOPE OF WORK

- Provision of geo-professional services required to satisfy and address the consent conditions set out in Resource Consent RM230419
- Undertake a literature review for the project site, including all in-house, third-party reporting, and publicly available online resources;
- Validate the proposed development with the pre-development landform and inferred geological model;
- Complete earthworks construction monitoring on a regular basis or as requested by the earthwork's contractor/project manager;
- Ensure structural fill elements and NDM test results are to the required engineering standard for residential land development;
- Ensure national and local regulatory authority earth fill construction standards are met;
- Site-specific investigation to be completed on the final subbase surface for each lot as a requirement of resource consent;
- Provide the operations team with geotechnical guidance throughout the construction process;
- Provide a Geotechnical Completion Report (GCR) and Schedule 2A.

1.3 PROPOSED DEVELOPMENT

The development consists of 20 residential lots ranging in size from 706 to 1,172m^2. Positioned on the outskirts of the Wanaka township, the lots are north-facing and capture views of Lake Wanaka. Serpentine Street, accessed via West Meadows Drive, bisects through the development and provides access to most lots. A vehicle right-of-way, also accessed from West Meadows Drive, services Lots 65, 69, and 70

1.4 AS BUILT PLANS

Paterson's Land Professionals (Wanaka) has completed plans for the bulk earthworks undertaken, Drawing set W4449-4, Drawing No. 012, Sheet No. 200 – 202, Revision No. 0, Date: 03/04/25 (refer to Appendix D).

In general, the earthworks primarily involved two key areas of Structural Fill, ranging from 3.0m to 5.5m in depth, one located on the western side of the site and the other associated with the reinstatement of the SRP. Additionally, three isolated cut areas up to 3.6m deep were formed south of Serpentine Street. Minor ground profiling was also undertaken along the roadside of Serpentine Street and within the vehicle right-of-way at the southeast corner of the development to achieve suitable gradients for residential construction.

Refer to Appendix D for earthworks as-built plans.

1.5 REPORT DISCLAIMER

The report herein is a Geotechnical Completion Report (GCR) for the bulk earthworks carried out with Stage 4 (only) comprising Lots 65 – 84. It should be noted that this report does not provide:

- Certification of service trench backfills.
- Certification of earthworks undertaken along roads and R.O.W's, which were the responsibility of the Council. It is noted that general advice was provided during the earthworks by GCL regarding testing regimes etc.
- Certification of the Topsoil (finishing layer) placed on the lots (if any).
- The Stormwater Disposal Facility (Lot 200).

The report has been prepared in general alignment with the requirements provided in QLDC's Land Development and Subdivision Code of Practice (which supersedes NZS4404:2004).

2 SITE CONDITIONS

2.1 SITE LOCATION

The site comprises the following entities:

The site comprises Lot 909 DP 563778, which includes Lots 65 – 84 and spans approximately 2.786 hectares in a semi-rectangular shape. A revised lot number will be assigned upon LINZ's approval of the deposited plan.

Stage 4 is situated on the western outskirts of Wanaka, approximately 1.5km from the town centre. The site occupies the flanks of a north-facing glacial moraine overlooking Lake Wanaka. It forms part of a broader subdivision developed on former pastoral land adjacent to residential areas established during earlier stages. Residential development surrounds the site to the north, east, and south, with construction at various stages, while land to the west

remains undeveloped pasture. Access to each lot is provided via Serpentine Street and a vehicle right-of-way from West Meadows Drive.

2.2 SITE TOPOGRAPHY

The site is situated on the lower flanks of a north-facing glacial moraine, reaching a maximum elevation of 361masl with slope angles ranging between 5 – 10° to the horizontal. From the toe of the glacial moraine northward toward Lake Wanaka, the slope gradients reduce to less than 5° to the horizontal.

- The site's highest elevation is between 316 – 327m, east to west, respectively, along the southern boundary of lots 65, 69 – 70, and 72 – 78.
- The site's lowest elevation is circa 306m along the northern lot boundaries of Lot 79 – 84.
- Slope gradients across the site generally range between 8 – 15° (<1H:3V) to the horizontal, flattening towards the slope toe. An exception is a narrow, isolated area of engineered Fill located in places along the north side of Serpentine Road, where the slope reaches approximately 26° (1H:2V) to the horizontal.

2.3 SITE GEOLOGY

A general overview of the site geology is outlined below, based on the original geotechnical investigation conducted by Geosolve and supplemented by GCL's observations during subdivision earthworks.

- Uncontrolled Fill: None observed across the site, apart from minor side castings associated with the disused water race that runs parallel to the Stage 4 northern lot boundary and the EMP 'clean water' cut-off drain along the slope face towards the site's south.
- Topsoil: Native and covering Topsoil mantles the site to a depth of approximately 0.30 m below existing ground level.
- Colluvium/Alluvium: Underlying the Topsoil is sandy GRAVEL with lesser silt and root matter, extending to about 0.50 m depth, except in areas where engineered Fill has been placed to address naturally reduced bearing capacity.
- Aeolian Deposits: Present on the western portion of the site between 0.5 – 3.0 m depth. These deposits are composed primarily of fine to medium, moist, loosely consolidated SAND with some organic content.
- Lake Deposits: The predominant formation in the site's northern half, encountered at shallow depth (~0.50 m). Characterised by grey SILT with minor sand and fine to medium gravel, the silt is non-plastic and micaceous with weak laminations and presents firm to stiff strength. These sediments extend deeper beneath the Glacial Till in the southern half.
- Glacial Till: Dominant in the southern half, encountered from around 0.50 m depth. This material comprises light grey sandy SILT and silty SAND with occasional sandy GRAVEL horizons. Sand is fine to medium, gravel is mostly fine with some medium fractions, and the silt is non-plastic and micaceous, exhibiting stiff to very stiff (dense) consistency and massive structure.

2.4 SITE SURFACE WATER FEATURES

The site contains no surface water features; however, isolated areas along the northern boundary of Stage 4 are associated with groundwater springs. Additionally, the redundant water race has been decommissioned and removed during subdivision earthworks. Lot 200 includes a below-ground stormwater disposal facility designed to service the wider subdivision. The system is intended to self-inundate, with stormwater retained within the surrounding bunding and gradually infiltrating into the ground over time. Stormwater runoff will disperse downslope towards the north.

2.5 GROUNDWATER

Test pits completed during the original geotechnical investigation completed by Geosolve in the low-lying areas along the northern boundary of Stage 4 revealed groundwater at shallow depths ranging from 2.2 to 3.4m below existing ground level. GCL confirmed these findings during test pitting and soakage testing associated with the stormwater disposal facility at Lot 200, a separate project component not documented in this GCR. Conversely, test pits excavated along the upslope southern boundary during GeoSolve's original geotechnical investigation (to a maximum depth of 3.2 m) did not encounter groundwater.

Foundation design should account for the shallow groundwater depth and the associated potential for liquefaction, particularly in the site's northern, low-lying areas. It is unlikely that a continuous groundwater table would rise sufficiently to impact shallow foundations in the elevated lots towards the south. The implications of groundwater presence, liquefaction potential, and corresponding foundation design considerations are discussed in detail later in this report.

2.6 SLOPE INSTABILITY FEATURES

The site's native topography and slope gradients constructed across the site contain no slope instability features.

2.7 SITE HISTORY AND AERIAL PHOTOGRAPHS

Aerial photographs from Google Earth dating from 1985 to 2024 were studied to observe the site over time and assess the geomorphological setting. The review of historical aerial photography indicates that there has been no significant modification of the site over this period, aside from recent earthworks associated with subdivision development, as summarised below:

Table 1: Historic remote imagery summary

Year	Site Description
1985 - ~2015	• The Oak Tree Reserve and disused water race are visible across the subject site. • The site and wider area remain mostly unmodified.
2015 - 2021	• Subdivision earthworks are underway for earlier stages east of West Meadows Drive. • Soil stockpiling was observed in the area now identified as Lot 200, along with the reinstated sediment retention pond (SRP). • Minor shaping of slope faces along the southern lot boundary occurred during the finishing earthworks for Stage 3. • A smaller secondary SRP has been installed to the west, aligned with Serpentine Street.

	• Subdivision earthworks are under construction for earlier stages east of West Meadows Drive. • Some soil stockpiling is evident across the area, now referred to as Lot 200 and the since reinstated SRP. • Minor ground profiling was observed on the northern slope faces along the southern lot boundary as part of finishing earthworks associated with Stage 3. • Secondary, smaller SPR was installed towards the site's west in line with Serpentine Street.
2021 – 2024	• Stage 4 earthworks are in progress, including the installation of a clean water EMP cut-off drain, reinstatement of the smaller western SRP, and stormwater disposal device installation at Lot 200. • Residential dwellings are under construction in Stage 3. • Stage 4 bulk earthworks commenced in 2021. • Reinstatement of the main SRP occurred in 2024.

3 PREVIOUS INVESTIGATIONS AND REPORTING

The following geotechnical assessments have been completed for the subject site. These reports should be read in conjunction with this report:

- A geotechnical investigation for the Alpha Ridge Subdivision in Wanaka was carried out by GeoSolve (Report Reference 140376, dated October 2014). The conclusions presented in this report apply to all seven subdivision stages collectively, rather than Stage 4 specifically, and are summarised as follows:
    - Subsoils identified from the test pit excavations at the Alpha Ridge Subdivision are summarised in Section 4.2;
    - The water table was observed to vary from 1m to 3.5m bgl at various locations in the Low-land area, based on information from test pit logs and standpipe piezometers installed during HDCP investigations. The water table is at greater depth in the terrace slope area of the site;
    - Liquefaction analyses based on HDCP testing show that no liquefaction is predicted under SLS earthquake loading and low to moderate levels of liquefaction are predicted under ULS earthquake loading in the lowland area. Free field settlements during a ULS seismic event are estimated to vary between 0 and 100mm. No liquefaction induced settlement is predicted in the terrace slope area;
    - The risk of lateral spreading at the site is assessed to be very low;
    - Lowland region of the site: The subdivision could mostly be categorised as TC2 in accordance with recent DBH guidance. Some parts of the site can be categorised as TC1, although site specific geotechnical investigations are recommended to confirm this;
    - Upper regions of the site: The areas of the subdivision underlain by Glacial Till and Alluvium can be categorised as TC1 in accordance with recent DBH guidance and NZS 3604 good ground conditions prevail;
    - An isolated zone of Aeolian sand was observed in the western regions of the site (TP23). This area is likely to be TC1 due to the depth to water table and

associated crust thickness, however, should be differentiated with test pitting during the detailed design/building consent phase of works;

- Geotechnical parameters are presented in Section 6.2 of this report;
- There are a number of standard TC2 foundation solutions that will be suitable for use in the lowland areas of the site. Once earthworks details have been finalised a re-assessment of foundation options is recommended.
- Overall there are no geotechnical issues at the site that cannot be resolved using standard engineering solutions.

4 GEOLOGICAL SETTING

4.1 PUBLISHED GEOLOGY

The Geological Map of New Zealand, Sheet 18 (Wakatipu), at a scale of 1:250,000, maps the site at the interface between the following geological formations.

- The site is mapped as being underlain by OIS2 Late Pleistocene Glacier Deposits of the Hawea Formation, comprising unsorted bouldery clay-rich gravel (till) with minor banded silt and sand lenses.
- It's important to note that regional geological boundaries are indicative and typically mapped with a broad margin of error. In this case, based on subsurface investigations and ground observations during subdivision earthworks, the boundary of the OIS1 Holocene Lake Deposits, mapped approximately 120m north of the site, more accurately represents the underlying geology extending to the base of the slope.
- The Cardrona-Hawea Fault is mapped approximately 2.2km southeast of the site. This fault is best described as a 'possibly active' with a calculated rupture recurrence interval of 20,000 – 30,000 years.

4.2 QLDC & ORC GIS AND HAZARD MAPPING

With reference to the GIS platforms provided by Queenstown Lakes District Council (QLDC) and the Otago Regional Council (ORC), the following hazard information is recorded for the site:

- The site is not in a flood hazard zone.
- The site is not in an area associated with active fault zones. The Cardrona-Hawea Fault is 2.2km to the southeast.
- The site is not in an area of known active landslides.
- A 1:2500-year seismic event will cause significant shaking and damage to inappropriately designed structures.
- With reference to NZS1170.5 Section 3 and Supplement 1 C3.1.3, the seismic soil classification for the area is Class D.
- The liquefaction awareness classification for the site straddles both Domain A and Domain B1.
    - Generally, the lots north (downslope) of Serpentine Street are classified as Domain B1, which consists of ground predominantly underlain by poorly consolidated lake, beach or fan-delta sediments with a low to moderate liquefaction potential.

- Generally, the lots south (upslope) of Serpentine Street are classified as Domain A, which consists of ground predominantly underlain by rock or firm sediments with a low to nil liquefaction potential.
- The Queenstown and Wanaka District faces a heightened seismic hazard due to the potential occurrence of strong ground shaking associated with the potential rupture of the Alpine Fault situated along the West Coast of the South Island. According to recent research conducted by the Institute of Geological and Nuclear Sciences (GNS), there is a 75% likelihood of the Alpine Fault experiencing a rupture in the next 50 years. Consequently, the risk posed to structures within the designated development area by such a seismic event should not exceed the risk associated with the possible reactivation of the Alpine Fault.

4.3 SEISMIC CONSIDERATIONS

With reference to the ORC hazard mapping, the intensity of shaking from a 1:100-year and 1:2500-year event in the area will cause shaking to the level MMVII on the Modified Mercalli Intensity Scale such that:

- For a 1:100 yr. Event (MMVII - 'Very Strong Shaking') - negligible damage will be recorded in buildings of good design and construction.
- For a 1:2500 yr. Event (MMIX - 'Violent Shaking') – considerable damage to specially designed buildings, the partial collapse in lesser-designed buildings. Buildings shifted off foundations. Liquefaction in prone areas.

5 SUBDIVISION EARTHWORKS

5.1 GENERAL

- Subgrade preparation within engineered fill areas involved stripping the Topsoil and removing any unsuitable upper soils with reduced bearing capacity.
- Placement of engineered Fill across Lots 65 -69, 73 -74, 76, 79 - 84
- Cut earthworks across Lots 68 – 72, 75, 77 – 78 & 84
- Installation of the Serpentine Street and private vehicle access (Lot 65, 69 – 70).
- Installation of reticulated services.
- Reinstatement of sediment retention ponds (SRP) to an engineering standard, which mainly concerns Lots 66 – 69.
- Appropriate rehabilitation comprises covering Topsoil installation, grass seeding and hay spreading to all modified surfaces.

The bulk earthworks have been carried out to provide the following:

- To elevate and form level lots to maximise the landscape view and sun aspect.
- Access to this stage of development and each lot.
- The reticulated services required.
- Suitable grades for residential development.

5.2 SITE PREPARATION WORKS

The preparation of lots involved implementing earthworks to realise the subdivision design and establish a level building platform. The following summarises the methodology utilised and observations noted during inspection hold points:

- Removal of the Topsoil layer and the unusable upper soil horizon (Colluvium/Alluvium) occurred at a depth between 0.1 to 0.5m below ground level (bgl). Despite being non-organic, the Colluvium/Alluvium upper portion was removed due to its inherently reduced bearing capacity and compaction challenges, especially during inclement weather and the wetter months of winter.
- The subgrade surface beneath the Colluvium/Alluvium layer comprised the following:
    - Lake Sediments were observed across the northern (downslope) portion of the site and comprise grey, non-plastic, micaceous, laminated SILT with minor sand and fine to medium gravel. These soils were dry to moist and exhibited firm to stiff strength.
    - Aeolian Deposits were encountered in the western upslope area and consisted of brown SAND with minor organic material. These soils were dry to moist and loosely consolidated.
    - Glacial Till Deposits were observed across the southern (upslope) half of the site and consist of light grey, non-plastic, micaceous sandy SILT and silty SAND with occasional sandy GRAVEL horizons. These soils were dry, of stiff to very stiff (dense) consistency, and exhibited a massive structure.
- Prior to installing the engineered Fill, the subgrade surface underwent compaction (proof rolling) using a 15-ton dynamic, smooth drum roller to ensure consistent bearing capacity across the entire fill area.
- The ground conditions generally remained consistent with the original geotechnical appraisal conducted by GeoSolve, as discussed in Section 3.
- The site was prepared to meet the required standards, comprising the removal of Topsoil, unsuitable soils, organics, and hard spots, aligning with the criteria outlined in NZ3604:2011 and NZ4431:2022.

5.3 ENGINEERED FILL

The purpose of the structural fill installations was to establish grades suitable for residential development, provide terracing to enhance and maximise the landscape view aspect of each individual lot and to reinstate the former sediment retention pond. The extent of structural fill placement is summarised in the table below:

Appendix D illustrates the total structural fill thickness at each lot. The table below summarises the degree of earthworks undertaken for each lot.

Structural Fill used for the development of Stages 4 is characterised by the following:

- Type 1 (majority): Site-won Glacial Till comprising silty SAND with minor gravel and cobbles sourced from cut portions within the site.
- Type 2 (subordinate): Imported Glacial Outwash Deposits comprising SAND & GRAVEL/GRAVEL with some cobbles and boulders sourced from the Three Parks Commercial Development.

The process for constructing engineered Fill generally follows these steps:

- Site-won material is rehandled using a Moxy truck or delivered via truck and trailer unit to the prepared subgrade surface, where it is stockpiled.
- A 20-ton excavator spreads and levels the Fill into lifts approximately 200–250 mm thick.
- Water is applied as needed using a 10,000L water cart fitted with a controlled-release spray bar to condition the Fill.
- Compaction is carried out using a dynamic 15-ton smooth or padfoot drum roller.
- Multiple criss-cross passes are made until the required compaction standard is achieved.
- Each 600mm of constructed Fill is inspected and certified before further Fill is placed.

Table 2: summarises the extent and location of earthworks per Lot.

Lot No.	Structural Fill Earthworks	Cut / Other Earthworks
Lot 65 – 69 (Lots centralised or located on the peripheries of the SRP)	Up to 5.5m fill was placed with the thickest portions associated with Lot 67. Fill thinned towards the south and west to a nominal thickness between 1.5 – 2.0m required for appropriating subdivision design levels and creating semi-elevated terraces.	Up to 0.50m cut earthworks occurred on the western half of Lot 68 to lower an isolated area of topographic relief.
Lots 70 – 78 (Lots associated with the development slope face - South of Serpentine Street)	Up to 1.0m (nominally ~0.50m), Fill was placed in a couple of localised areas across Lots 73 – 74 and 76 to infill low areas to maintain broader subdivision design levels.	Cut earthworks occurred in three areas to remove isolated areas of topographic relief and associated with Lots 70 -72, 75 & 78. Cut earthworks were greatest across the northern lot boundary of Lot 75, whereby up to 3.5m of material was removed.
Lots 79 – 84 (Lots associated with the development slope toe – North of Serpentine Street)	Up to 3.0m Fill (nominally between 1.0 – 1.5m) was placed along the roadside lot boundary to establish suitable residential gradients from Serpentine Street. Fill generally only extends 5 – 7m from the southern roadside alignment.	Little to no cut earthworks aside from a small area (<0.5m) along the eastern boundary of Lot 84.

5.4 COMPACTION QUALITY ASSURANCE

Fill certification testing was undertaken for the duration of fill construction by both Ground Consulting Limited (GCL) and Central Testing Services (CTS). Fill certification testing was undertaken approximately every 600mm of Fill placed.

Compaction performance testing consisted of the following methods:

1) Scala penetrometer Testing (SPT)
    a. Scala testing was completed at regular inspection hold points by GCL.

b. SPT typically twinned each NDM site with a few additional SPTs to increase overall testing density.

c. See Appendix A for the site inspection SPT results and test locations.

2) NZ Standard Compaction & Dry Density tests

a. CTS completed laboratory tests on fill types as required.

b. See Appendix C for soil dry density certification.

3) Nuclear Density Meter (NDM) - Field Density & Water Content tests

a. 131 NDM tests were completed in total across Stage 4.

b. See Appendix C for the NDM results and test locations.

Fill has been constructed to an engineering standard based on the returned NDM and SPT test results and observations made during construction. GCL is satisfied that the required industry standards have been met.

5.5 NDM TEST RESULTS

The table below summarises the NDM test completed, the references NZ standard compaction test and general performance comments.

Table 3: Presents a summary of NDM test results.

Field Compaction Test Reference:	NZ Standard Compaction Reference Test	Target Relative Compaction (%)	Mean Relative Compaction (%)	Comments
Earth worked Lots excluding SRP				
21/1168 NDM No. 1 - 4	21/1286	95	99	All Pass
21/1235 NDM No. 5 - 7	21/1286	95	99	All Pass
21/1309 NDM No. 8 - 12	21/1286	95	97	All Pass
21/1566 NDM No. 13 - 18	21/1286 & 20/1773	95	100	All Pass
21/1600 NDM No. 19 - 21	20/1773	95	99	All Pass
21/1619 NDM No. 22 - 25	20/1773	95	100	All Pass
21/1704 NDM No. 26 - 30	20/1773	95	100	All Pass
21/1773 NDM No. 31 - 34	20/1773	95	98	All Pass

21/1913 NDM No. 35 - 37	20/1773	95	99	All Pass
21/1941 NDM No. 38 - 41	21/1946	95	100	All Pass
21/2230 NDM No. 42 - 43	21/1946	95	101	All Pass
21/2235 NDM No. 44 - 48	21/1946	95	96	All Pass, except No. 47 & 48
21/2286 NDM No. 49 - 51	21/1946	95	100	All Pass
21/2334 NDM No. 52 - 54	17/2876	95	97	All Pass
21/2438 NDM No. 55 - 57	15/1919 & 21/1946	95	97	All Pass
21/2669 NDM No. 58 - 61	21/2335 & 21/1946	95	93	No. 58 – 60 did not meet the required standard. No. 61, Pass.
21/2754 NDM No. 62 - 65	21/2335 & 21/1946	95	97	All Pass
21/2832 NDM No. 66 - 68	21/2335	95	96	All Pass
21/2832 NDM No. 66 - 68	21/2335	95	96	All Pass
21/3755 NDM No. 69 - 74	21/1946 & 17/1615	95	98	All Pass
22/084 NDM No. 75 - 77	15/1470	95	98	All Pass
22/192 NDM No. 78 - 80	15/1470	95	97	All Pass
Earth worked Lots <u>including</u> SRP				
CTS24W1004 NDM No. 1 – 3	22/1408	95	100	All Pass
CTS24W1014 NDM No. 4 - 6	22/1408	95	100	All Pass

CTS24W1026 NDM No. 7 - 9	22/1408	95	98	All Pass
CTS24W1041 NDM No. 10 - 12	22/1408	95	100	All Pass
CTS24W1076 NDM No. 13 - 15	22/1408	95	99	All Pass
CTS24W1091 NDM No. 16 - 18	22/1408	95	100	All Pass
CTS24W1117 NDM No. 19 - 21	22/1408	95	99	All Pass
CTS24W1123 NDM No. 22 - 24	22/1408	95	98	All Pass
CTS24W1148 NDM No. 25 - 27	22/1408	95	98	All Pass
CTS24W1205 NDM No. 28 - 30	22/1408	95	97	All Pass
CTS24W1242 NDM No. 31 - 33	22/1408	95	97	All Pass
CTS24W1289 NDM No. 34 - 36	22/1408	95	99	All Pass
CTS24W1300 NDM No. 37 - 39	22/1408	95	98	All Pass
CTS24W1314 NDM No. 40 - 42	22/1408	95	98	All Pass
CTS24W1344 NDM No. 43 - 45	22/1408	95	98	All Pass
CTS24W1355 NDM No. 46 - 47	22/1408	95	101	All Pass
CTS24W1391 NDM No. 48 - 49	22/1408	95	99	All Pass
CTS24W1403 NDM No. 50 - 51	22/1408	95	101	All Pass

5.6 FINISHING WORKS

A covering Topsoil layer between 0.20 – 0.30m thick was installed to facilitate grass growth.

5.7 NON-ENGINEERED FILL

The site contains no areas on non-engineered Fill.

5.8 SITE CUT

Cut earthworks were required to remove isolated areas of topographic relief, appropriate subdivision design levels and effect gradients suitable for residential development. The area of the greatest cut earthworks (~3.5m) was associated with Lot 75. Nominally cut earthworks were between 0.5 – 1.0m. Refer to Table 2 for a comprehensive account of Lot earthworks.

5.9 LOT SPECIFIC SCALA PENETROMETER TESTING

Two Scala Penetrometer Tests (SPT) were completed for each lot to determine the depth to 'Good Ground'. 'Good Ground' is defined by five blows per 100mm Scala rod advancement. The Scala's were taken to refusal/effective refusal interpreted as 10 blows or more for 50mm of Scala rod advancement.

Scala penetrometer testing met with shallow refusal for all test locations, confirming the presence of underlying competent natural granular material that meets the NZS3604 definition of 'good ground' criteria.

- Drawing 002 & 003 show the SPT investigation points undertaken by GCL for this GCR.
- Appendix B provides the Lot specific Scala test results.

It's important to note that further Scala penetrometer testing may be required during building platform development to confirm the level of bearing capacity below the Topsoil and any other unsuitable soil horizons. In accordance with NZS 3604:2011, one Scala per 50m^2 building footprint is the required standard.

5.10 CONCLUSIONS

The following standards have been met:

- NZS 3604:2011 – Good Ground was achieved throughout the fill construction process from the subbase level, whereby a 300kPa ultimate geotechnical bearing capacity can be relied upon for foundation design.
- However, it is important to note that some native soils may not meet the requirements for 'Good Ground' and may, therefore, necessitate site-specific structural engineering input.
- NZS 4431:2022 - Engineered Fill has been placed and compacted per the methodologies outlined in this standard.
- GCL is satisfied that the Structural Fill certification completed was completed to an engineering standard.

Appendix E of this report includes a Schedule 2A as per NZS4404:2010.

6 LIQUEFACTION

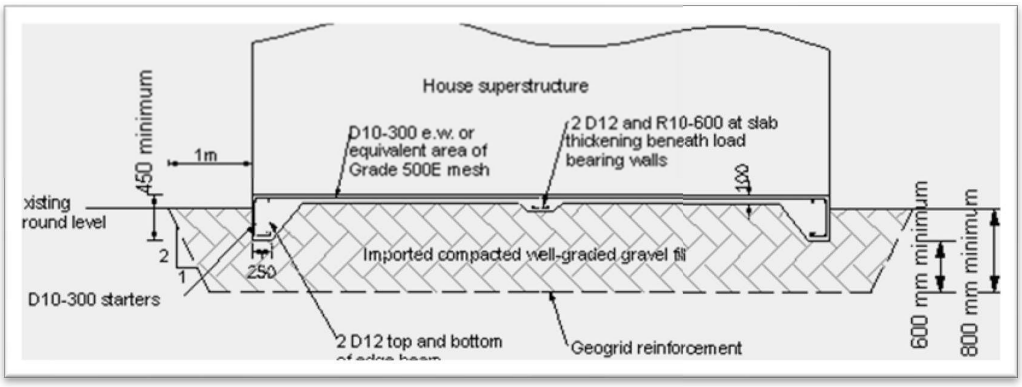
The original geotechnical investigation completed by GeoSolve identified ground conditions potentially susceptible to liquefaction during a significant seismic event, a finding GCL supports based on ground conditions observed during the installation of the stormwater disposal facility (Lot 200), bulk earthworks for Lots 79 – 84, and SRP reinstatement. As a result, residential lots within the 'low-lands' area should be considered TC2-type ground, with ground improvements as outlined in Section 6.3. TC2 requirements should apply unless future site-specific assessments, carried out for building consent, indicate otherwise.

Canterbury Technical Guidance documentation provides a series of foundation options for TC2-type ground conditions referenced in Part A Section 5.3.1. (Residential buildings with a concrete floor slab) & 5.3.2. (Residential buildings with a timber floor). The foundation solutions are based on a minimum ultimate bearing capacity of 200kPa and are summarised below. Engineered foundation design is required where the soil bearing capacity is less than 200kPa.

It is noted that for a minimum ultimate bearing capacity of 200kPa to be provided for all Lots and as an additional measure of liquefaction mitigation, a ground-improvement raft is required to be constructed, as discussed in Section 6.3.

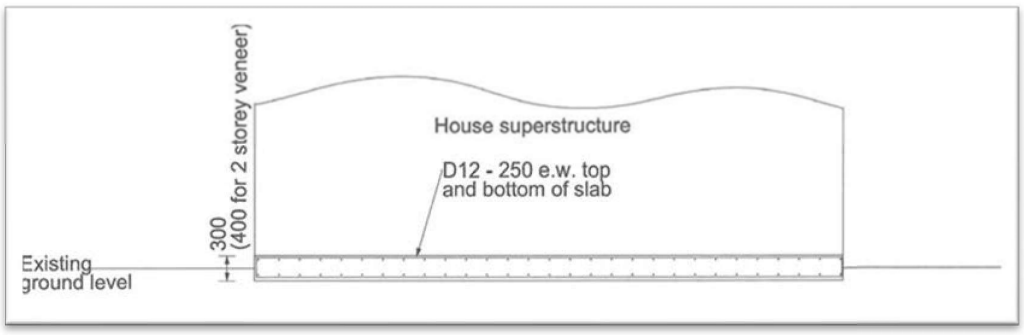
6.1 CONCRETE FLOOR SLAB CONSTRUCTION

Option 1: NZS 3604 slab foundation at grade on a reinforced gravel raft. Figure 5.5 from the Canterbury Technical Guidance documentation is provided below for reference.



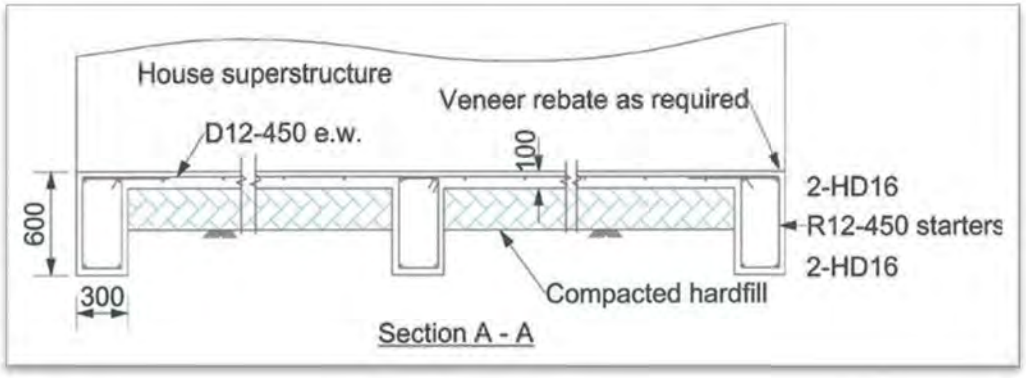
Note: Soil subgrade must have a minimum ultimate bearing capacity of 200kPa.

Option 2: Thick slab foundation over existing soil. Figure 5.6 from the Canterbury Technical Guidance documentation is provided below for reference.



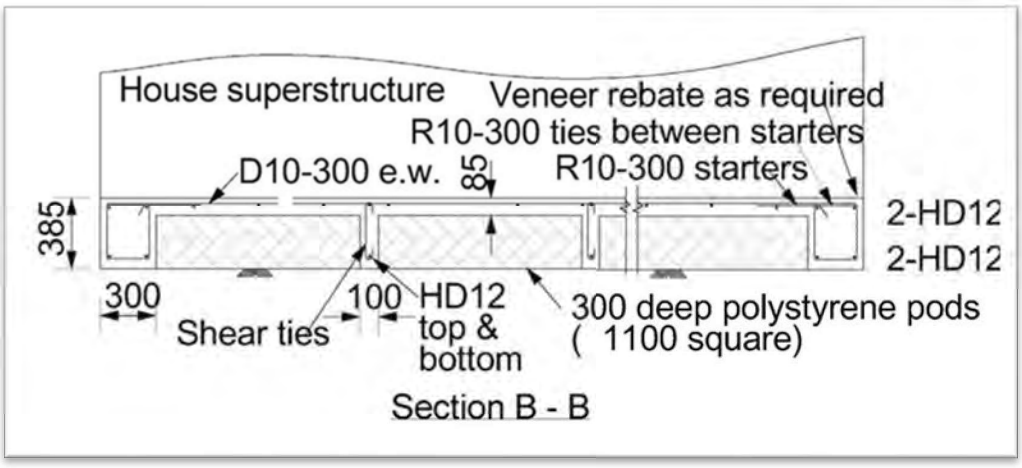
Note: NZS ground clearances adjacent to the house foundation must comply with DPC omitted for clarity. Soil subgrade must have a minimum ultimate bearing capacity of 200kPa.

Option 3: Beam grid and slab foundation over existing soil. Figure 5.8 from the Canterbury Technical Guidance documentation is provided below for reference.



Note: Reinforcing details are not sufficient for two-storey heavy-weight cladding (brick veneer) with a heavy roof but can be used for a two-storey heavy-weight cladding with a lightweight roof. Soil subgrade must have a minimum ultimate bearing capacity of 200kPa.

Option 4: Waffle slab foundation over existing soil. Figure 5.11 from the Canterbury Technical Guidance documentation is provided below for reference.



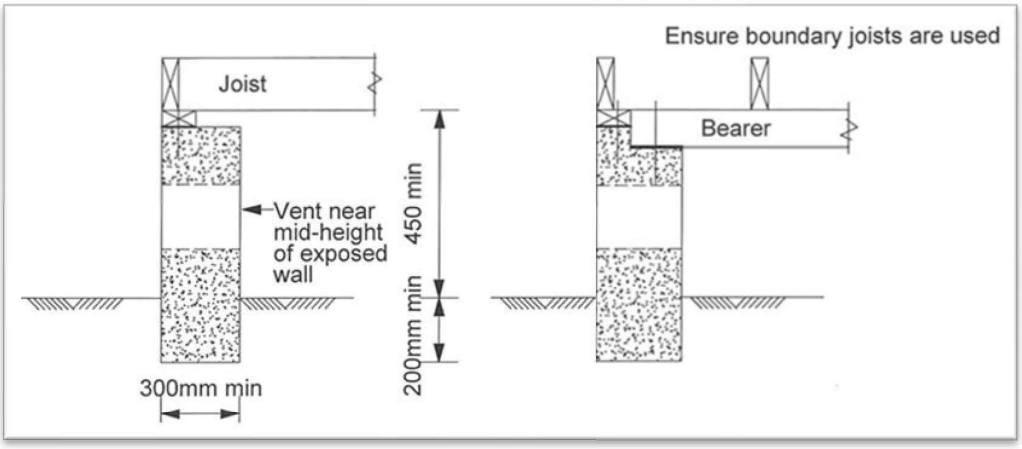
Note: NZS ground clearances adjacent to the house foundation must comply with DPC omitted for clarity. Soil subgrade must have a minimum ultimate bearing capacity of 200kPa. Shear ties following NZS 3101 are required in the ribs.

Option 5: Deep piles installed to a dense, non-liquefiable layer supporting a floor slab.

6.2 TIMBER FLOOR CONSTRUCTION

Option 1: NZS 3604 foundation piles supporting a one/two-level dwelling with a light roof and light to medium weight wall cladding (provided the soil provides an ultimate bearing capacity of 200kPa).

Option 2: Foundation wall supporting a one/two-level dwelling with a light to medium weight roof and cladding following Figure 5.12 from the Canterbury Technical Guidance documentation as referenced below.



Note: Reinforcement details as per Figure 4.2a. Soil subgrade must have a minimum ultimate bearing capacity of 200kPa.

6.3 BUILDING PLATFORM PREPARATION

For all TC2 foundation options (except deep piles), we recommend the following building platform preparation works:

- Undercut the building footprint to a depth of at least 1.0m below ground level, extending laterally 1.0m outside the foundation line.
- Install a layer of Geofabric and Geogrid directly onto the subgrade.
- Place and compact 200mm of granular material (constructed in two 100mm layers).
- Install a second layer of Geogrid.
- Place and compact another 800mm of granular material (constructed in five 100 – 150mm layers).
- The final product, comprising a 1000mm reinforced gravel mattress, will provide the necessary support for the above TC2 foundation options.

7 BUILDING PLATFORM STABILITY

7.1 GENERAL

The site is situated on a combination of 'cut to fill' earthworks and natural ground. These are underlain by a mix of soils with reduced bearing capacity and competent ground conditions. The area is also remote from steeper slopes and zones prone to slope instability.

Given the modest overall slope angles and the presence of underlying competent ground, the site is considered suitable for providing safe and stable building platforms for residential development.

7.2 BUILDING PLATFORM SUMMARY

Based on the original geotechnical investigation by Geosolve and additional subsurface assessments completed for the Geotechnical Completion Report, Table 4 (included with Schedule 2A in Appendix E) provides a summary of ground conditions, Technical category specification, indicative bearing capacities, and relevant commentary for each lot.

7.3 SOIL EXPANSIVENESS

The site soil is not considered to be expansive according to AS 2870 based on the logging of exposed soils during the excavations, earthworks and subsequent testing. Therefore, no specific foundation engineering is required with respect to the shrink/swell of the soils.

8 LIMITATIONS

8.1 GENERAL

Ground Consulting Ltd has undertaken this assessment in accordance with the brief as provided, based on the site and lot locations as shown in Drawings 002 & 003. This report has been provided for the benefit of our client and for the authoritative Council to rely on for the purpose of processing the consent for the specific project described herein. No liability is accepted by this firm or any of its directors, servants or agents, in respect of its use by any other person, and any other person who relies upon information contained herein does so entirely at their own risk.

The sub-surface conditions have been extrapolated between the investigations undertaken. Whilst care has been taken to provide sufficient sub-surface information following best practice, no guarantee can be given on the validity of the inference made, and it must be appreciated that actual conditions could vary from the assumed model.

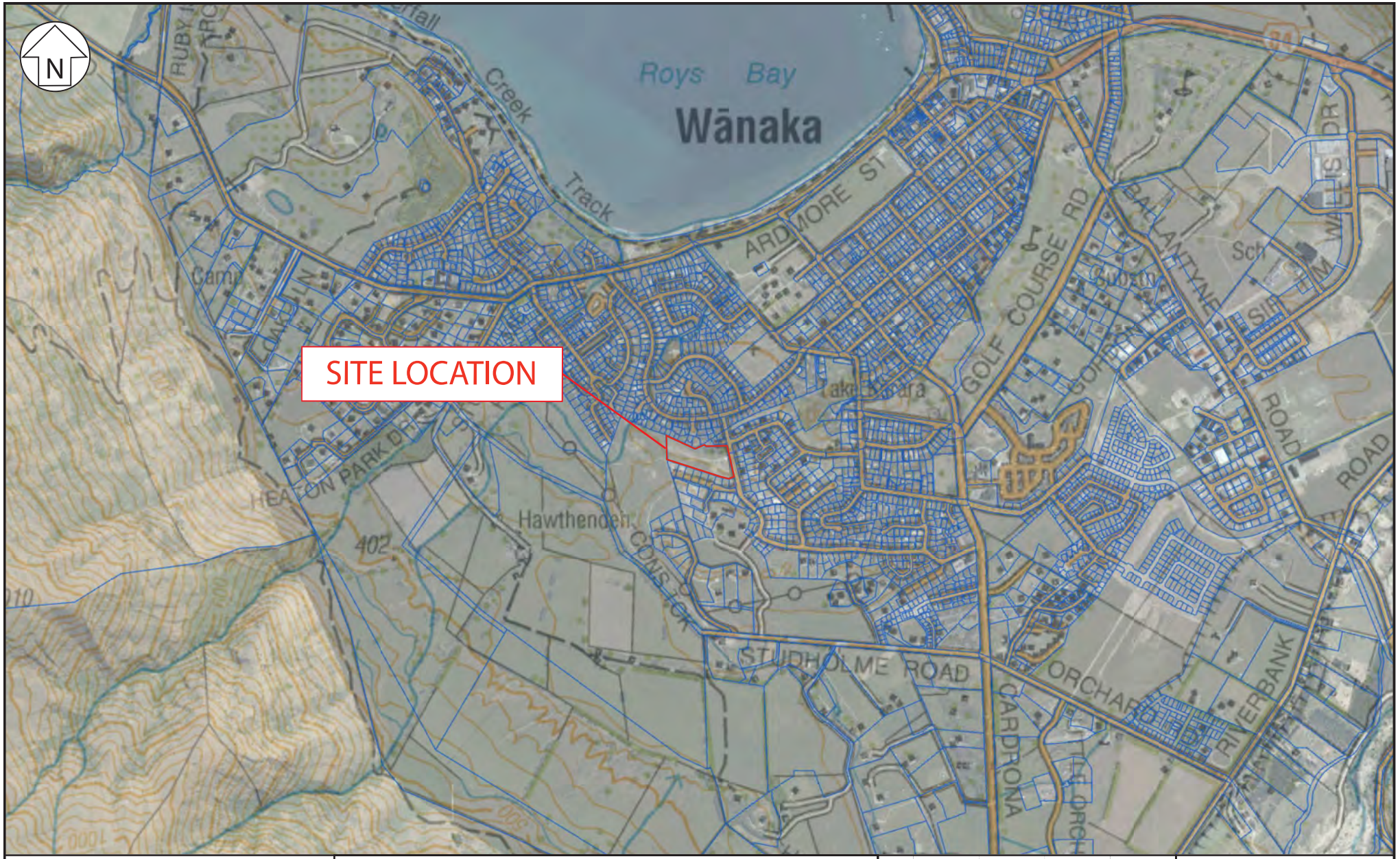
8.2 FURTHER INVESTIGATIONS REQUIRED

This assessment has been undertaken for the proposed site development to date to accompany the 224c application. Any structural changes, alterations and additions made to the proposed development should be checked by a suitably qualified person and may require further investigations and analysis for the purposes of obtaining a building. This includes but is not limited to:

- Building outside of the approved lots.
- Construction of a building platform that does not comply with the recommended site constraints.

In addition, geotechnical inspections may be required during construction to assess site slopes, foundation excavations, retaining walls and other geotechnical aspects of the development. This is to ensure ground conditions encountered are in accordance with the findings of this assessment. If ground conditions differ from those presented in this report, advice on design and construction modifications should be sought from a suitably qualified person.

DRAWINGS



GCL Ground Consulting Ltd

ORCHARD ROAD HOLDINGS LTD

MEADOWSTONE ALPHA SERIES (STAGE 4), WANAKA

SITE LOCATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	17/04/2025	Issued	SF	GCL

File Ref. R6783-4A-DRW001.ai

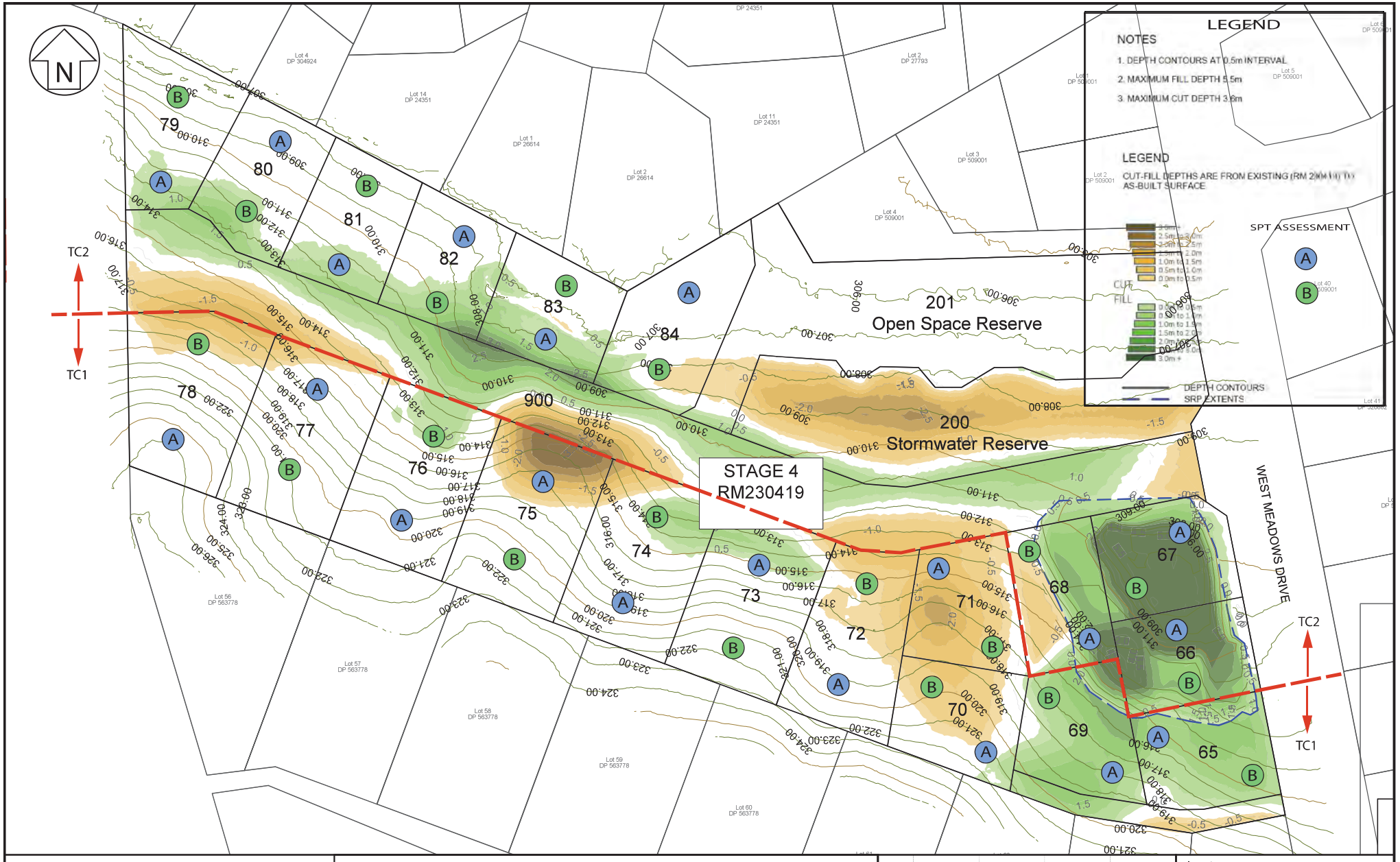
Scale (A4) 1:20,000

0 80 400 800m

Project No. 6783

Report Ref. R6783-4A

Drawing No. 001



GCL Ground Consulting Ltd

ORCHARD ROAD HOLDINGS LTD

MEADOWSTONE ALPHA SERIES (STAGE 4), WANAKA

SITE INVESTIGATION & FINISHED EARTHWORKS PLAN

Rev	Date	Status	Drafted	Reviewer
A	17/04/2025	Issued	SF	GCL

File Ref. R6783-4A-DRW002.ai

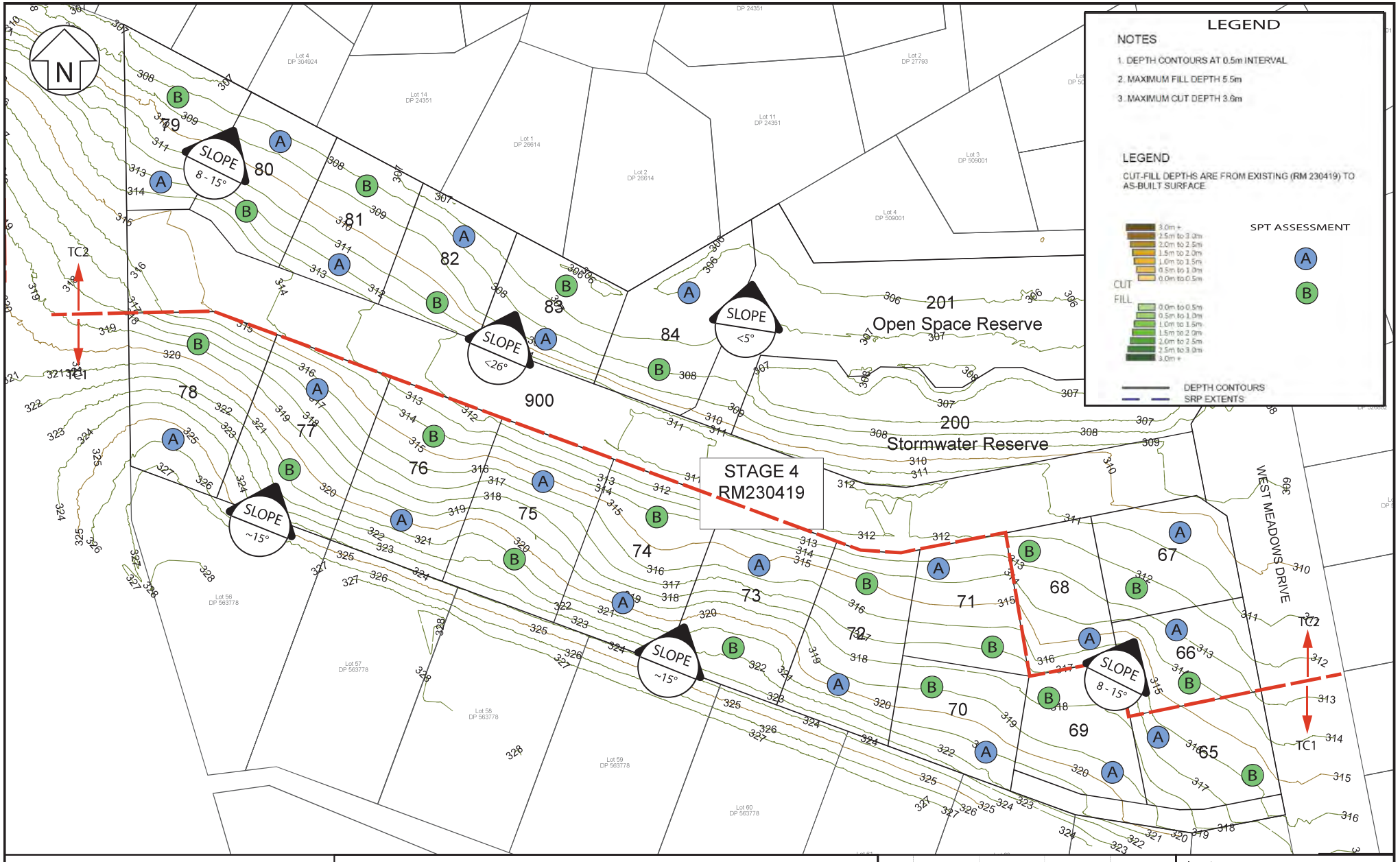
Scale (A4) NTS

0 0 0

Project No. 6783

Report Ref. R6783-4A

Drawing No. 002



GCL Ground Consulting Ltd

ORCHARD ROAD HOLDINGS LTD

MEADOWSTONE ALPHA SERIES (STAGE 4), WANAKA

SITE INVESTIGATION & FINISHED CONTOUR PLAN

Rev	Date	Status	Drafted	Reviewer
A	17/04/2025	Issued	SF	GCL

File Ref. R6783-4A-DRW003.ai

Scale (A4) NTS

0 0 0

Project No. 6783

Report Ref. R6783-4A

Drawing No. 003

APPENDIX A: SITE INSPECTION NOTES

SITE INSPECTION RECORD	
Project: Alpha Ridge Stage 4 - GCR	Project No. L6783-1A
Date: Tuesday 17 November 2020	Inspection No. 1
Engineer: SF	BC No.
Site Address: Alpha Ridge - Stage 4, Wanaka	

1. PREVIOUS INVESTIGATIONS & INSPECTIONS

- Various investigations and inspections completed by GCL throughout the Alpha Ridge Development, however nothing pertinent to Stage 4

2. INSPECTION OBJECTIVES

- Initial predevelopment site meeting in company of CMH
- Define Scope of Works
- Schedule timing to break ground

3. NEXT INSPECTION

- Project likely to start mid to late January 2021
- GCL to request engineering drawing set from PPG

4. ACCOMPANYING DOCUMENTS

- NA

Signed:	Checked:
S Fitzgerald	P. Forrest
Shannon Fitzgerald – Engineering Geologist	**Peter Forrest – Principal Engineering Geologist**

SITE INSPECTION RECORD	
Project: Alpha Ridge Stage 4 - GCR	Project No. L6783-1A
Date: Tuesday 26 January 2021	Inspection No. 2
Engineer: SF	BC No.
Site Address: Alpha Ridge - Stage 4, Wanaka	

1. PREVIOUS INVESTIGATIONS & INSPECTIONS
• Various investigations and inspections completed by GCL throughout the Alpha Ridge Development, however nothing pertinent to Stage 4
2. INSPECTION OBJECTIVES
• Met with QLDC, PPG, Property Group & CMH for prestart earthworks meeting at the request of CMH.
3. OUTCOME & ACTION POINTS
• GCL's involvement to commence during Stage 1B (Mid-February). • Initially, project focus is establishing EMP requirements comprising, project fencing, signage, constructing sediment runoff pond, water take points, freshwater diversion bunding and piping, and main haul road. • On completion, required earthworks to lots will commence. • GCL last job is to oversee the installation of stormwater disposal retention system • PPG to provide current earthworks staging plan and technical drawing set for SW solution.

Signed:	Checked:
S Fitzgerald	P. Forrest
Shannon Fitzgerald – Engineering Geologist	**Peter Forrest – Principal Engineering Geologist**

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6784-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 3
BC/RC No. NA	Date: Tuesday 30 March 2021
Engineer: SF	Time: 8:30 – 9:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

☒ SUBGRADE SURFACE ☒ ENGINEERED FILL ☑ EARTHWORKS MONITORING ☒ OTHER

General earthworks monitoring:

- Stage A & B under construction

OBSERVATIONS

- Sediment retention pond (SRP) has been constructed. Upslope filter cloth installed to most of cut batter. Further filter cloth to be installed to remaining upslope and downslope cut batters in due course.
- Fresh water diversion piping extends from Stage 3, passes through Stage 4 and terminates in water race adjacent The Oak Tree Stand.
- Road 6 has been temporally constructed for the purpose of soil cartage on and offsite. Road 6 extends from West Meadows Drive through to the western extent of Stage B.
- All tuff has been removed for Stages A & B, exposing topsoil, lesser amounts of silt and sand (upper soils) and a patch of uncontrolled fill in the south eastern corner of Stage B (immediately upslope of Stage 3 (SRP).
- It is understood that that surplus material from earthworks associated with Stage 3 and the construction of the Stage 3 SRP was temporarily stockpiled at the toe of the break in slope between Stage 3 & 4. The uncontrolled fill appears to have been placed on a mostly topsoil and grass organics free surface. The earthworks contractor is cutting to the original topographic surface (DTM provided by PPG) and undercutting (if required). This material is being removed from site and not being reused as engineered fill.
- See Sketch No. 1 for context and Photos No. 1 – 3 and earthworks progress

Sketch 1. Extent of earthworks as at 210330

NOTES & RECOMMENDATIONS ☒ RECTIFY AND HOLD ☑ CONTINUE AND HOLD

- GCL is required to inspect the subgrade surface prior to the construction of fill, which is tentatively scheduled for Monday 11 April.
- It is understood that site won (SILT & SAND, and lesser amounts of gravel) will be used as structural fill, which also requires inspection prior to placement and compaction. As such, some trail work is likely in order to define the optimum moisture level required to achieve a compaction to an engineering standard.

PHOTO 1

PHOTO 2

PHOTO 3

Signed:	Checked:
S Fitzgerald	P. Forrest
Shannon Fitzgerald – Engineering Geologist	Peter Forrest – Principal Engineering Geologist

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6784-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 4
BC/RC No. NA	Date: Thursday 8 April 2021
Engineer: SF	Time: 16:30 – 17:45
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

☑ SUBGRADE SURFACE ☒ ENGINEERED FILL ☒ EARTHWORKS MONITORING ☒ OTHER

Subgrade inspection for Stage B (fill portion in south east corner, directly south of SRP, immediately adjacent West Meadows Drive).

- Confirm the subgrade surface has been prepared appropriately for construction of engineered fill by ensuring all Topsoil, other unsuitable underlying material and hard spots have been removed.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity is suitable for the construction of engineered fill.

OBSERVATIONS & SPT RESULTS

- A subgrade cut had been completed across the fill area to a depth between 0.3 – 1.5m below existing ground level. The subsoils comprise:
  - 0.7m Uncontrolled Fill over,
  - 0.4m Toposil over,
  - 0.5m Light brown Sandy SILT / Silty SAND (lake sediments)
- The prepared surface is excavated well into the lake sediments formation. As such, all topsoil and other unsuitable materials had been removed.
- 4x shallow tests (<0.6m) depth were completed inside the 'fill area' to confirm the underlying geology. The test pits revealed lake sediments to at least 0.6m below subgrade surface.
- 4x SPT were completed to determine the level of bearing capacity from subgrade level. The test results are presented in the table below:

DEPTH (mm)	SPT101	Test Pit (Twinned)	SPT102	Test Pit (Twinned)	SPT103	Test Pit (Twinned)	SPT104	Test Pit (Twinned)
0 – 100	15	Light brown SAND (f-m), trace gravel (fine, sub R/A), trace silt	5	Off white / light brown SAND (f-m)	8	Light brown SAND (f-m) lenses of gravelly SAND (f – c, sub R/A)	4	Light brown SAND (f-m) lenses of gravelly SAND (f – c, sub R/A)
100 – 200	14		7		6		8	
200 – 300	6		9		9		7	
300 – 400	7		8		10		15	
400 - 500	5		5					
500 - 600	7		5					
600 - 700	12		9					
700 - 800	12		9					
800 - 900	10		9					
LOCATION	GPS 492		GPS 493		GPS 494		GPS 495	
TERMINATION	ED @ 0.90m		ED @ 0.90m		ER @ 0.35m		ER @ 0.40m	
NOTES								

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Good Ground is generally achieved from subgrade level across the full extent of the prepared subsurface. The prepared surface provides a suitable level of bearing capacity for the construction of engineered fill.
-

NOTES & RECOMMENDATIONS ☒ RECTIFY AND HOLD ☑ CONTINUE AND HOLD

- It is understood that up to 1.7m of engineered fill is required in the southeast corner of Stage B. As such, fill should be placed in 200 – 250mm layers and compacted with a 15T dynamic drum roller.
- The construction of fill should be inspected and tested by completion of SPT and NDM at the following hold points.
    - Subgrade + 600mm
    - Subgrade + 600 + 600mm
    - Subgrade + 600 + 600 + 500
    - Total Fill Thickness equals 1.7m
- The site won fill material comprising Gravelly SAND is suitable for reuse as engineered fill.

PHOTO 1

Photo 1. Depth of subgrade cut adjacent West Meadows Drive

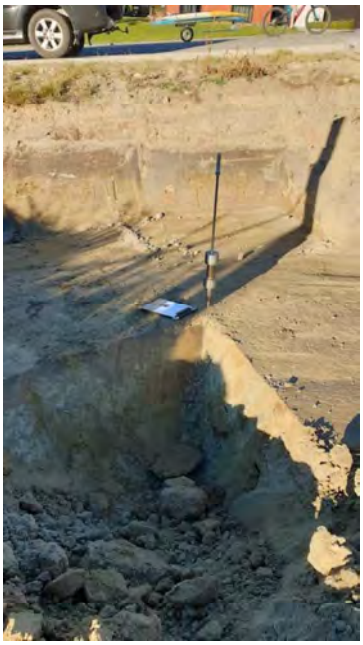
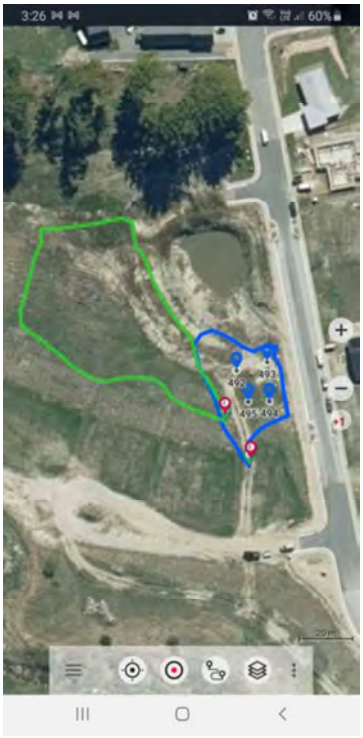
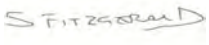
PHOTO 2	PHOTO 3
 *Photo 2. SPT101*	 *Photo 3. SPT102*

PHOTO 4	PHOTO 5
 *Photo 4. SPT103*	 *Photo 5. SPT104*

PHOTO 6	PHOTO 7
 *Photo 6. GPS locations of SPT (492 - 495), blue line = fill portion, green line = extent of subgrade cut*	 *Photo 7. Proposed site won fill material (Gravelly SAND)*

AUTHOR		REVIEWER
SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
ENGINEERING GEOLOGIST	TITLE	DIRECTOR
	SIGNATURE	

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6784-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 5
BC/RC No. NA	Date: Thursday 15 April 2021
Engineer: SF	Time: 09:00 – 10:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

☒ SUBGRADE SURFACE ☑ ENGINEERED FILL ☒ EARTHWORKS MONITORING ☒ OTHER

First fill inspection for Stage B.

- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity being achieved during the construction of fill.

OBSERVATIONS & SPT RESULTS

- Up to 600mm of structural fill had been installed from subgrade level.
- The fill material used for construction was site won (from stage B) comprising silty SAND, sandy SILT with lesser amounts of SAND, and minor gravel.
- Fill material was placed in 200 – 250mm layers and compacted with a combination of plate and smooth drum configured 15T dynamic rollers.
- The inherent moist content within the fill material was generally enough to facilitate optimal binding and compaction. On occasion water was administered from water bowser via rear mounted spray bar.
- A total of 4x SPT were completed to determine the level of bearing capacity achieved throughout the 600mm thick engineered soil profile. The test results are presented in the table below:

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104
0 – 100	5	8	6	9
100 – 200	7	14	8	8
200 – 300	9	6	10	5
300 – 400	10	13	10	5
400 - 500	9	10		5
500 - 600	10			11
600 - 700				14
700 - 800				15
800 - 900				9
LOCATION	GPS 501	GPS 502	GPS 503	GPS 504
TERMINATION	RF @ 0.55m	RF @ 0.45m	RF @ 0.40m	ED @ 0.90m
NOTES				

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Good Ground is achieved from subgrade level and maintained to a minimum depth of 0.6m. SPT typically refused on the fill / subgrade surface interface, except for SPT104 which terminated at 0.9m be depth default.
- It is understood that the first pass of NDM's were completed on this surface. GCL is required to review the test results (as soon practically possible) as part of the earthworks monitoring process and for completion of the GCR.

NOTES & RECOMMENDATIONS ☒ RECTIFY AND HOLD ☑ CONTINUE AND HOLD

- Continue with next 600mm structural fill installation.
- Maintain the same compaction methodology and process.
- Next inspection / hold point:
    - Subgrade + 600 + 600mm
    - Subgrade + 600 + 600 + 500
    - Total Fill Thickness equals 1.7m

PHOTO 1

Photo 1. Looking Northeast

PHOTO 2

Photo 2. Looking down from Stage 3

PHOTO 3

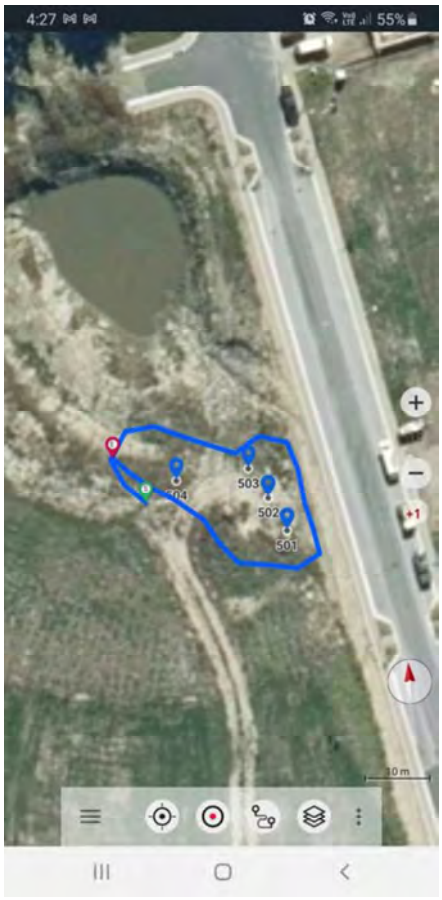
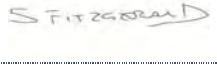


Photo 3. SPT locations (501 - 504), blue line = extent of constructed fill

AUTHOR		REVIEWER
SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
ENGINEERING GEOLOGIST	TITLE	DIRECTOR
	SIGNATURE	

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6784-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 6
BC/RC No. NA	Date: Tuesday 20 April 2021
Engineer: SF	Time: 11:00 – 12:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

☒ SUBGRADE SURFACE ☑ ENGINEERED FILL ☒ EARTHWORKS MONITORING ☒ OTHER

Second fill inspection for Stage B.

- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity being achieved during the construction of fill.

OBSERVATIONS & SPT RESULTS

- Up to 600mm of structural fill had been installed since last inspection (SIN No. 5 / 15/04/21).
- Therefore, a total of 1.2m of engineered fill has been constructed from subgrade level.
- The fill material used for construction was site won (from stage B) comprising silty SAND, sandy SILT with lesser amounts of SAND, and minor gravel.
- Fill material was placed in 200 – 250mm layers and compacted with a combination of plate and smooth drum configured 15T dynamic rollers.
- The inherent moist content within the fill material was generally enough to facilitate optimal binding and compaction. On occasion water was administered from water bowser via rear mounted spray bar.
- A total of 6x SPT were completed to determine the level of bearing capacity achieved throughout the 600mm thick engineered soil profile. The test results are presented in the table below:

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105	SPT106
0 – 100	5	4	5	4	4	4
100 – 200	4	5	5	5	5	4
200 – 300	6	5	5	4	5	5
300 – 400	10	8	8	8	7	8
400 - 500	6	7	6	7	5	6
500 - 600	17	4	5	5	7	4
600 - 700		16	4	8	7	6
700 - 800			10	10	10	10
800 - 900			9		7	8
LOCATION	GPS 505	GPS 506	GPS 507	GPS 508	GPS 509	GPS 510
TERMINATION	ER @ 0.60m	ER @ 0.70m	ED @ 0.90m	ER @ 0.80m	ED @ 0.90m	ED @ 0.90m
NOTES						

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Good Ground is typically achieved from 0.1m below subgrade level.
- It is understood that the second pass of NDM's were completed on this surface. GCL is required to review the test results (as soon practically possible) as part of the earthworks monitoring process and for completion of the GCR.

NOTES & RECOMMENDATIONS ☒ RECTIFY AND HOLD ☑ CONTINUE AND HOLD

- Increase the level of compaction between 200 – 250mm thick layers
- Continue with third and final 500mm structural fill installation.
- Next inspection / hold point:
    - Subgrade + 600 + 600 + 500
    - Total Fill Thickness equals 1.7m

PHOTO 1

Photo 1. Looking southwest from West Meadows Drive

PHOTO 2

Photo 2. Looking northwest across Alpine Meadows Stage 4 from West Meadows Drive.

PHOTO 3

Photo 3. SPT locations (505 - 5010), blue line = extent of constructed fill

AUTHOR		REVIEWER
SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
ENGINEERING GEOLOGIST	TITLE	DIRECTOR
	SIGNATURE	

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 7
BC/RC No. NA	Date: Thursday 22 April 2021
Engineer: SF	Time: 15:30 – 16:45
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

☑ SUBGRADE SURFACE ☑ ENGINEERED FILL ☒ EARTHWORKS MONITORING ☒ OTHER

Part 1: Third and final fill inspection for Stage B.

- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity being achieved during the construction of fill.

Part 2: Subgrade Inspection for 'cut' portion / Stage B

- Confirm the subgrade surface has been prepared appropriately for direct foundation installation or construction of engineered fill by ensuring all Topsoil, other unsuitable underlying material and hard spots have been removed.

OBSERVATIONS & SPT RESULTS

Part 1:

- Circa 500mm of structural fill had been installed since last inspection (SIN No. 6 - 20/04/21).
- Therefore, a total of 1.7m of engineered fill has been constructed from subgrade level.
- The fill material used for construction was site won (from stage B) comprising silty SAND, sandy SILT with lesser amounts of SAND, and minor gravel.
- Fill material was placed in 200 – 250mm layers and compacted with a combination of plate and smooth drum configured 15T dynamic rollers.
- The inherent moist content within the fill material was generally enough to facilitate optimal binding and compaction. On occasion water was administered from water bowser via rear mounted spray bar.
- A total of 6x SPT were completed to determine the level of bearing capacity achieved throughout the 500mm thick engineered soil profile. The test results are presented in the table below:

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105	SPT106
0 – 100	5	4	4	3	3	4
100 – 200	5	4	5	4	4	4
200 – 300	5	4	6	4	3	3
300 – 400	5	4	6	4	3	3
400 - 500	7	14	7	6	6	6
500 - 600	5		6	11	9	8
600 - 700	7		7	7	10	10
700 - 800	8		7	5	5	6
800 - 900	13		6	8	6	10
LOCATION	GPS 511	GPS 512	GPS 513	GPS 514	GPS 515	GPS 516
TERMINATION	ED @ 0.90m	RF @ 0.50m	ED @ 0.90m	ED @ 0.90m	ED @ 0.90m	ED @ 0.90m
NOTES						

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

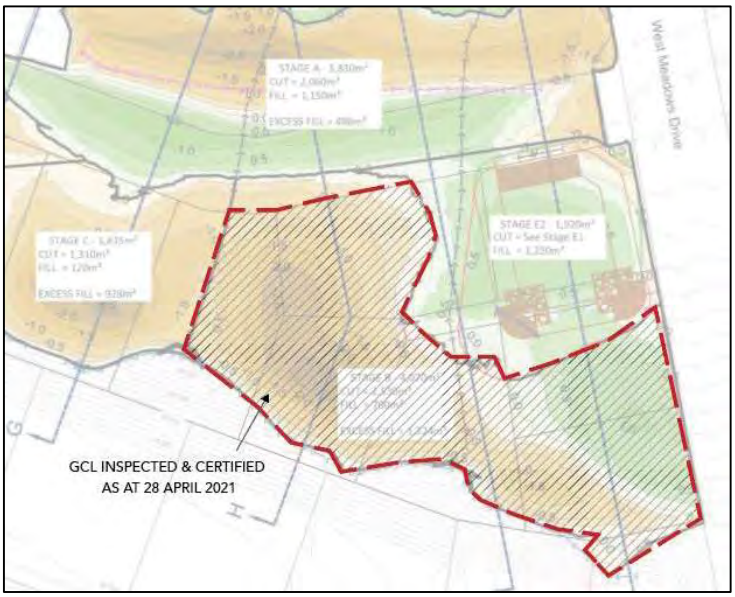
- Good Ground is typically achieved from 0.4m below subgrade level.
- It is understood that the third pass of NDM's were completed on this surface. GCL is required to review the test results (as soon practically possible) as part of the earthworks monitoring process and for completion of the GCR.

Part 2:

- A subgrade strip had been completed to a depth between 0.3 – 1.2m below existing ground level. The ground conditions generally comprise:
  - 400mm Topsoil over,
  - 400mm Weather Lake Sediments / alluvium. Light brown silty SAND / Sandy SILT
  - 400mm Lake sediments (Light brownish grey silty SAND / Sandy SILT.
- Observed in places (5-10% of exposed cut surface) were concertation's of discontinuous isolated patches of sandy GRAVEL (fine to coarse in size and subangular in shape). There is some corelation with this material type and the subtle topographic low features along the north face of Stage 4.
- A small portion of onlapping uncontrolled fill (<300mm) was placed on the western margin of the Stage 3 SRP / cut surface of stage 4. This will likely be trimmed when SRP is back filled during Stage E2.
- 'B' grade stockpile located upslope / central to Stage B to be removed in due course. See Photo 3

NOTES & RECOMMENDATIONS ☒ RECTIFY AND HOLD ☑ CONTINUE AND HOLD

- More compaction required around SPT sites No. 2, 4 – 6.
- Proceed with placing covering topsoil layer after further compaction.
- No further fill inspections are required for this stage of the development.



Sketch 1. Stage B - Certified as at 28 April 2021

PHOTO 1

Photo 1. Looking west across fill site

PHOTO 2

Photo 2. Depth of subgrade cut (0.3 – 1.2m). Illustrating soil profile along Stage 'B' / 'C' boundary

PHOTO 3	PHOTO 4
	
Photo 3. Green line = B grade stockpile to be removed, red line = extent of subgrade cut, blue line = fill site	*Photo 4. SPT locations*

PHOTO 5

Photo 5. Looking south across Stage B stripped surface

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ENGINEERING GEOLOGIST	TITLE	DIRECTOR
S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 8
BC/RC No. NA	Date: Thursday 13 May 2021
Engineer: SF	Time: 16:00 – 17:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

The ground profile for this stage of the subdivision has been revised. As such, the maximum fill profile for Stage 1B will be greater than 1.7m as originally scheduled. Stage 1B has been sub categorised into three areas to provide a level of geospatial earthworks control.

- Area 1: East Portion – main fill area immediately adjacent West Meadows Drive.
- Area 2: Central Portion
- Area 3: West Portion

The purpose of this site inspection is to confirm that fill is being constructed to an engineering standard. A bearing capacity assessment by completion of Scala penetrometer tests has been undertaken.

OBSERVATIONS & SPT RESULTS

Since the last inspection (SIN No. 7 – 22 April)

Area 1:

- Up to 600mm of fill has been installed, a total fill thickness of 2.3m (1.7m + 0.6m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.
- A total of six SPT were completed across this area.

Area 2:

- Up to 300mm of fill has been installed, a total fill thickness of 0.3m (subgrade + 0.3m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.
- No SPT were completed across this area.

Area 3:

- Between 400 - 600mm of fill has been installed, a total fill thickness of up to 0.6m (subgrade + 0.6m).
- Fill material was site won silty SAND / sandy SILT
- A total of three SPT were completed across this area.

Compaction comprised multiple passes with dynamic smooth and plate drum roller.
It is understood that CTS were scheduled to complete NDM testing (Pass No. 4???) on this surface.

A total of nine SPT were completed during this inspection. The test results are presented in the table below:

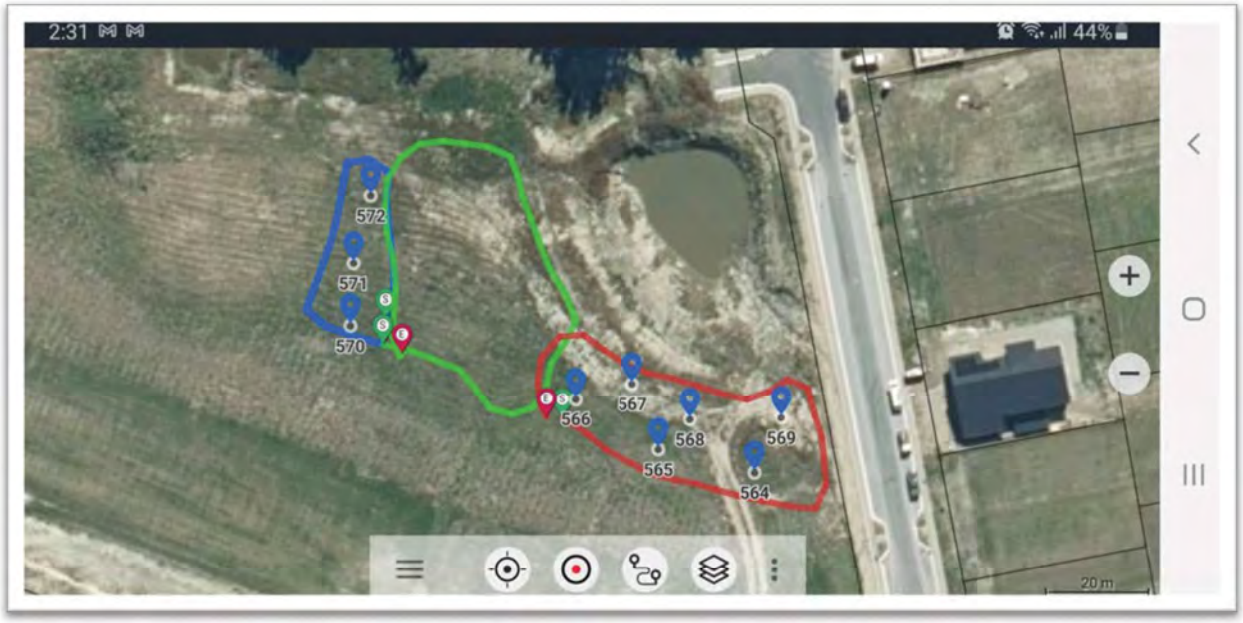

Figure 1. Red line = Area No. 1; Green line = Area No. 2; Blue line = Area No. 3

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105	SPT106	SPT107	SPT108	SPT109
0 – 100	10	13	16	9	13	8	4	5	4
100 – 200	12	20	16	20	18	13	6	6	7
200 – 300	20		14		22	22	7	5	9
300 – 400							4	5	10
400 - 500							5	6	11
500 - 600							7	7	7
600 - 700							8	6	6
700 - 800							9	8	5
800 - 900							12	10	5
GPS LOCATION	564	565	566	567	568	569	570	571	572
TERMINATION	ER = 0.30m	ER = 0.20m	ER = 0.30m	ER = 0.20m	ER = 0.30m	ER = 0.30m	ED = 0.90m	ED = 0.85m	ED = 0.90m
NOTES									

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

Area 1:

- Fill is being constructed to an engineering standard achieving an average blow count more than 8 per 100mm Scala rod advancement from subbase level.

Area 2:

- NA

Area 3:

- Fill is being constructed to an engineering standard. Scala's typically achieve a blow count of 5^{+} per 100mm rod advancement from 0.1m below subbase level, which is maintained or increases slightly with penetration through the 0.9m assessed soil profile.

NOTES & RECOMMENDATIONS	☒ RECTIFY AND HOLD	☑ CONTINUE AND HOLD

- GCL to review NDM results when issued by CTS.
- CMH to schedule fill inspections as required, unless otherwise undertaken during weekly visits by GCL.

PHOTO 1

Photo 1. Looking east across Area 1.

PHOTO 2

Photo 2. Looking across Area 3 (west) and Area 2 (central).

PHOTO 3

Photo 3. Looking west over Area 3.

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ENGINEERING GEOLOGIST	TITLE	DIRECTOR
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SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783-1A
Project: Meadowstone Alpha Series - Stage 4 (GCR)	Inspection No. 9
BC/RC No. NA	Date: Tuesday 25 May 2021
Engineer: SF	Time: 9:00 – 10:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

General inspection of recent earthworks with focus the level of constructed fill completed for the following area:

- Area 1: East Portion – main fill area immediately adjacent West Meadows Drive.
- Area 2: Central Portion
- Area 3: West Portion

OBSERVATIONS

GCL was unable to provide earthworks construction monitoring last week i.e. Monday 17 May – Friday 21 May 2021

- Based on correspondence with CMH it is understood that a further 600mm fill material was constructed across Areas 1 – 3 during this time.
- In addition, CTS completed NDM testing on Thursday 20 May 2021 – Pass No. 5???

The level of earthworks completed as at Friday 21 May is as follows:

Area 1:

- A further 600mm structural fill was installed, a total fill thickness of 2.9m (1.7m + 0.6m + 0.6m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.

Area 2:

- A further 600mm structural fill was installed, a total fill thickness of 0.9m (subgrade + 0.3m + 0.6m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.

Area 3:

- A further 600mm structural fill was installed, a total fill thickness of up to 1.2m (subgrade + 0.6m + 0.6m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.

Compaction comprised multiple passes with dynamic smooth and plate drum roller.

The level of earthworks completed as at Tuesday 25 May (10:00am) is as follows:

Area 1:

- A further 300mm structural fill was installed, a total fill thickness of 3.2m (1.7m + 0.6m + 0.6m + 0.3m).

- Fill material was sourced from the Ballantyne Ridge Stockpile.
- No compaction at this point

Area 2:

- A further 300mm structural fill was installed, a total fill thickness of 1.2m (subgrade + 0.3m + 0.6m + 0.3m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.
- This is the final ground profile RL, possibly 0.15m to high which will require some trimming.
- No compaction at this point

Area 3:

- A further 300mm structural fill was installed, a total fill thickness of up to 1.2m (subgrade + 0.6m + 0.6m).
- Fill material was sourced from the Ballantyne Ridge Stockpile.
- No compaction at this point.

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105	SPT106	SPT107	SPT108	SPT109
0 – 100									
100 – 200									
200 – 300									
300 – 400									
400 - 500									
500 - 600									
600 - 700									
700 - 800									
800 - 900									
GPS LOCATION									
TERMINATION									
NOTES									

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

NOTES & RECOMMENDATIONS ☒ RECTIFY AND HOLD ☑ CONTINUE AND HOLD

- GCL tentatively scheduled to complete site inspection comprising a Scala assessment on Monday 31 May, which should coincide with the usual 600mm engineered fill instalment and associated NDM testing.
- GCL to review NDM results when issued by CTS.
- CMH to schedule fill inspections as required, unless otherwise undertaken during weekly visits by GCL.

PHOTO

PHOTO

PHOTO

AUTHOR		REVIEWER
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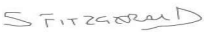
ENGINEERING GEOLOGIST	TITLE	DIRECTOR
	SIGNATURE	

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 10
BC/RC No. NA	Date: Tuesday 01 June 2021
Engineer: SF	Time: 08:30 – 09:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage B
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection (Refer to Figure 1& 2):
  - Area No. 1: known as the main fill area for 'Stage B' of the development.
  - Up to 600mm of fill has been constructed since last inspection.
    - Circa 600mm towards the western portion,
    - Circa 300 – 450mm through the central portion,
    - Circa 600mm towards the eastern portion
  - Fill laps upslope with sequential structural fill layers and thins downslope. The fill area continues to reduce in size as the proposed subdivision ground profile is realised.
  - Refer to Photo 1
- A buried topsoil horizon (0.4m thick) was observed in the vehicle 'right of way' that is currently under construction. It is likely that this material eventuated from earthworks associated with Stage 3 consequence of site levelling and ground profiling. It is understood that this material is localised and does not extend into Stage 4. No topsoil or unsuitable materials was observed in the subgrade inspection for Stage 4. As a precaution, GCL recommends undercutting any topsoil horizon where formal earthworks are being undertaken, even if the earthworks are roading in nature and not related to the appropriation of residential sites. A formal slope stability assessment should be completed if over steeping of cut batters occurs in carrying our such remedial earthworks. – See Photo 2
- Fill Material Type & Source: Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick
- Compaction Methodology: Employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- CTS were completing NDM at the time of investigation. NDM No: 26 – 30.
- A total of 5x SPT were completed, twinning each of the NDM test sites. The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

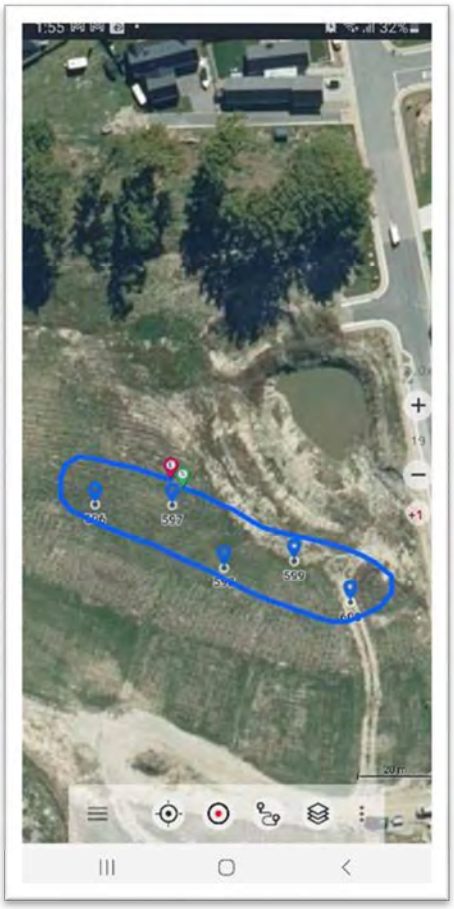


Figure 1. GPS locations of SPT sites

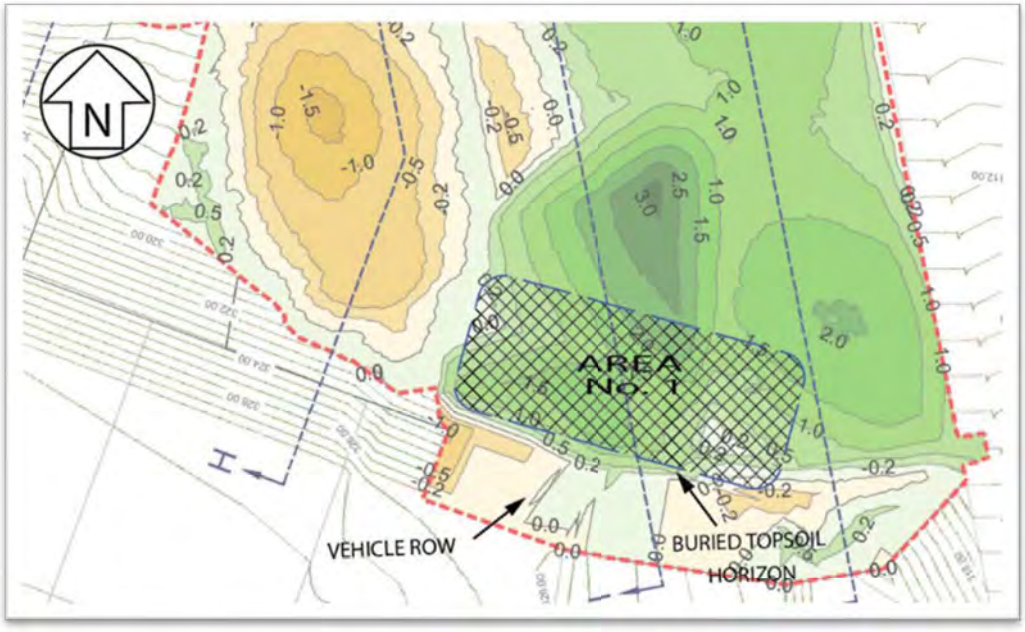


Figure 2: General location of engineered fill under construction relative to proposed earthworks plan

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105				
0 – 100	7	7	12	12	7				
100 – 200	16	15	13	14	20				
200 – 300	15	13	12	10	20				
300 – 400			14						
400 - 500			12						
500 - 600			13						
600 - 700									
700 - 800									
800 - 900									
LOCATION	GPS 596	GPS 597	GPS 598	GPS 599	GPS 600				
TERMINATION	RF = 0.25m	RF = 0.25m	RF = 0.55m	RF = 0.25m	RF = 0.20m				
NOTE	NDM 26	NDM 27	NDM 28	NDM 29	NDM 30				

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 10.3 blows per 100mm Scala rod advancement from subbase level to point of Scala termination
    - Scala's all with 'refusal' between 0.20 – 0.55m depth below subbase level
    - Good Ground is consistently achieved from subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING EAST, NDM TEST SITE MARK UP IN BOTTOM LEFT CORNER

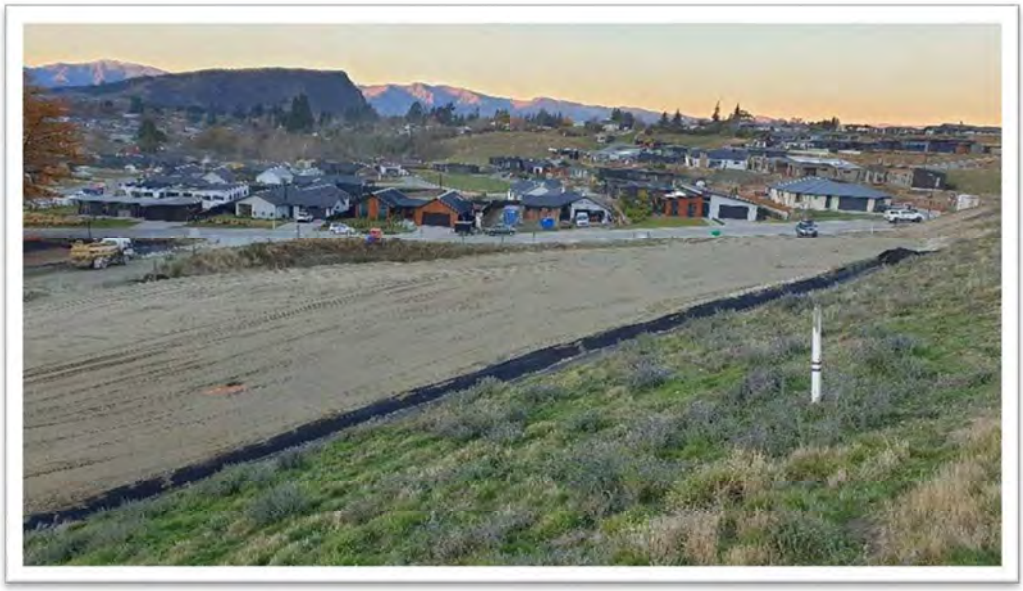


PHOTO 2 - SITE PHOTO LOOKING SOUTHWEST ALONG TOE OF VEHICLE ROW EXCAVATION.

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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 11
BC/RC No. NA	Date: Wednesday 09 June 2021
Engineer: SF	Time: 14:30- 15:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage B
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection (Refer to Figure 1& 2):
  - Area No. 1: known as the main fill area for 'Stage B' of the development.
  - Up to 600mm of fill has been constructed since last inspection.
  - Fill laps upslope with sequential structural fill layers thinning towards the west, north and east. The fill area continues to reduce in size as the proposed subdivision ground profile is realised.
  - Refer to Photo 1

- It is understood that the identified buried topsoil horizon at the toe of the vehicle ROW is being 'nibbled back/undercut' with successive fill layers. See GCL SIN No. 10 for context.

- Fill Material Type & Source: Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick

- Compaction Methodology: Employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.

- A total of 5x SPT were completed in a transect along the apparent thickest fill portion (upslope crest). The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

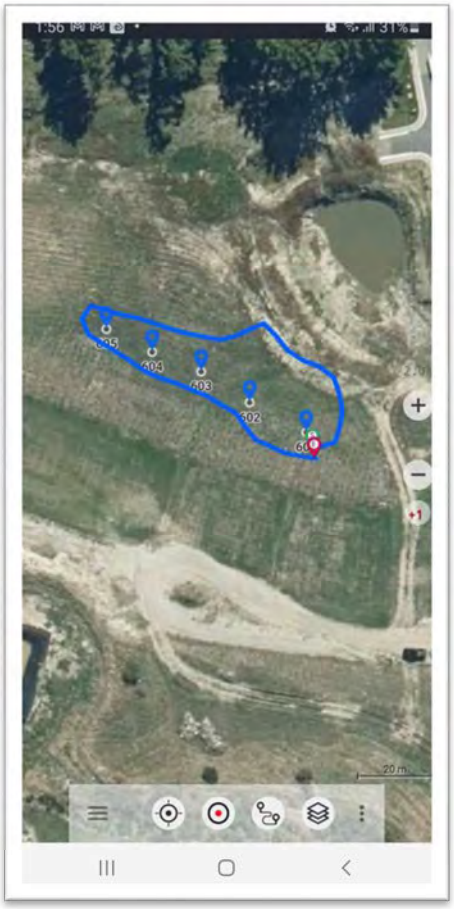

Figure 1. GPS locations of SPT sites

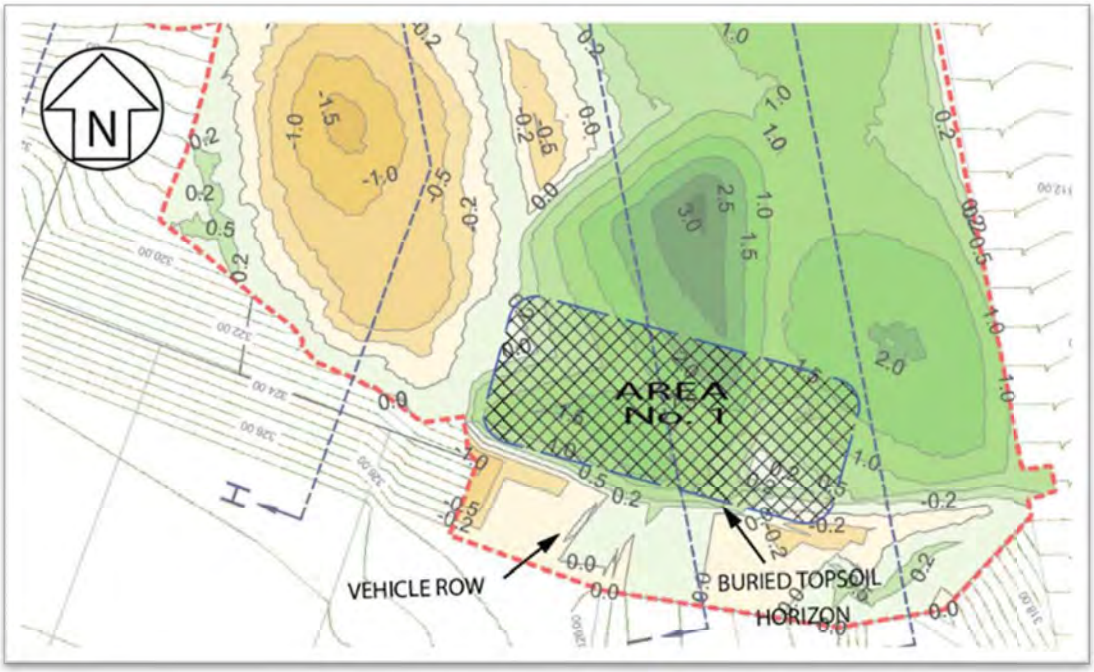

Figure 2: General location of engineered fill under construction relative to proposed earthworks plan

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105				
0 – 100	10	7	7	7	10				
100 – 200	24	8	9	9	27				
200 – 300	13	10	12	16					
300 – 400	15	17	26	16					
400 - 500	15	12		20					
500 - 600									
600 - 700									
700 - 800									
800 - 900									
LOCATION	GPS 601	GPS 602	GPS 603	GPS 604	GPS 605				
TERMINATION	RF = 0.45m	RF = 0.45m	RF = 0.40m	RF = 0.50m	RF = 0.20m				
NOTE	n/a	n/a	n/a	n/a	n/a				

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 13.8 blows per 100mm Scala rod advancement from subbase level to point of Scala termination
    - Scala's all with 'refusal' between 0.20 – 0.50m depth below subbase level
    - Good Ground is consistently achieved from subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING EAST,

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 12
BC/RC No. NA	Date: Tuesday 22 June 2021
Engineer: SF	Time: 15:00 - 16:00
Site Address: West Meadows Drive, Wanaka	

GCL Ground Consulting Ltd

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage B
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection (Refer to Figure 1& 2):
  - Area No. 1: known as the main fill area for 'Stage B' of the development.
  - Up to 600mm of fill has been constructed since last inspection.
  - Fill laps upslope with sequential structural fill layers thinning towards the west, north and east. The fill area continues to reduce in size as the proposed subdivision ground profile is realised.
  - Refer to Photo 1

- The second layer of fill material had been constructed through recent rain resulting in partial soil saturation of the upper 300mm. Consequently, compaction and binding of fill material has been complicated.

- Fill Material Type & Source: Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick

- Compaction Methodology: Employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.

- A total of 5x SPT were completed in a transect along the apparent thickest fill portion (upslope crest). The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

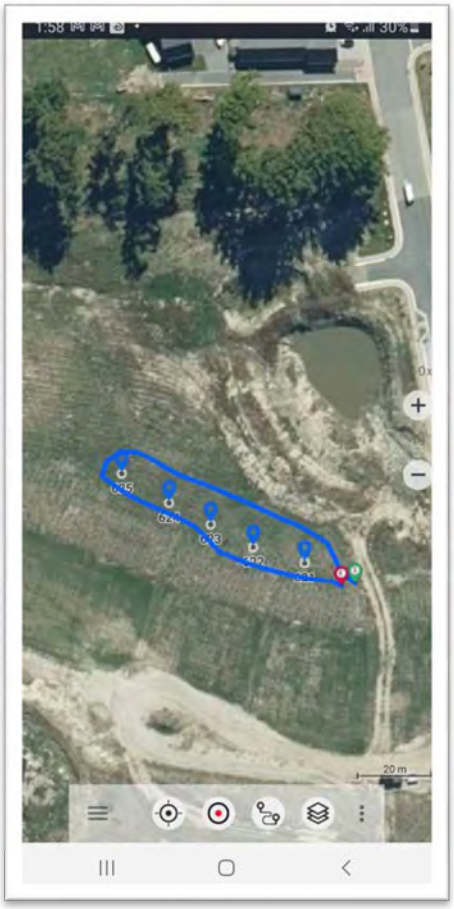

Figure 1. GPS locations of SPT sites

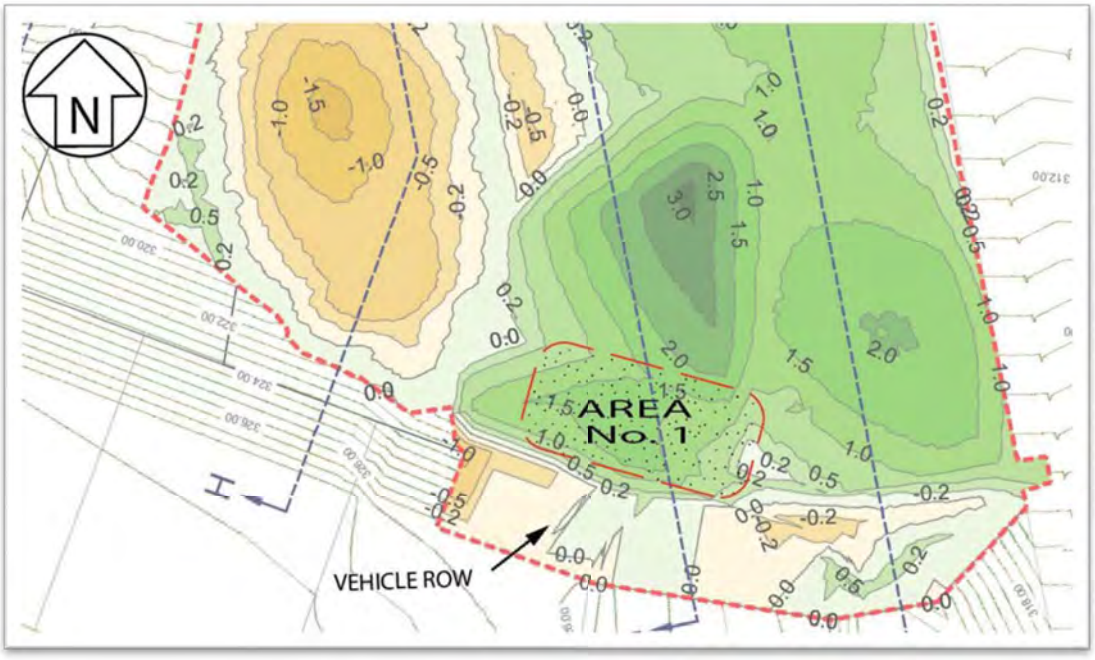

Figure 2: General location of engineered fill under construction relative to proposed earthworks plan

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105				
0 – 100	4	3	9	2	10				
100 – 200	4	6	5	2					
200 – 300	2	4	5	3					
300 – 400	2	5	9	9					
400 - 500	3	4	8	15					
500 - 600	6		5						
600 - 700	10		13						
700 - 800									
800 - 900									
LOCATION	GPS 621	GPS 622	GPS 623	GPS 624	GPS 625				
TERMINATION	RF = 0.65m	RF = 0.50m	RF = 0.70m	RF = 0.50m	RF = 0.10m				
NOTE	n/a	n/a	n/a	n/a	n/a				

RF = Refusal, ER = Effective Refusal, ED = End by default

- "Highlighted test results refer to areas of poor compaction"

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 4.5 blows per 100mm Scala rod advancement for the upper 300mm
    - 5.9 blows 'collectively; from subbase level to point of Scala termination
    - Scala's all with 'refusal' between 0.10 – 0.70m depth below subbase level
    - Good Ground <u>was not</u> consistently achieved from subbase level
- ~~The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.~~

NOTES & RECOMMENDATIONS

- The upper 300mm (second fill layer) has compacted poorly due to over saturation of soils during construction because of recent rain.
- Remedial earthworks are required prior to the next fill instalment, comprising:
    - Allow the material to self-drain,
    - Carryout further compaction (rolling),
    - Retest by competition of SPT
- Aside from this inspection, fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING NORTHWEST,

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE		SIGNATURE	

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 13
BC/RC No. NA	Date: Thursday 1 July 2021
Engineer: SF	Time: 14:00 - 15:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage B
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- Two area were assessed during this inspection (Refer to Figure 1& 2):
  - Area No. 1: known as the main fill area for 'Stage B' of the development.
    - The final fill layer (< 600mm) had been placed and compacted for this stage of the development.
    - Fill laps upslope thinning towards the west, north and east.
    - A final ground profiling 'trim' was underway at the time of inspection.
    - Refer to Photo 1
  - Area No. 2: The northern peripheries of the previous fill surface.
    - This surface (area) required remedial earthworks and testing prior to further fill construction - See SIN No. 12 for context.
    - As Area No. 1 only occupied the upper slopes of the greater fill area, this then allowed for completion of SPT of the remediated surface.
    - No Photo for context
- Fill Material Type & Source: Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick
- Compaction Methodology: Employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- It is understood that CTS are scheduled to complete NDM testing today.
- A total of 4x SPT were completed.
  - 2x in the final fill surface
  - 2x in the fill surface associated with the 22/06 (SIN No. 12) which required remedial earthworks and testing.
- The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

Figure 1. GPS locations of SPT sites, Greenline = extent of earthworks completed on the 22/6 (SIN No. 12), Redline = Extent of fill earthworks to date (SIN No. 13)

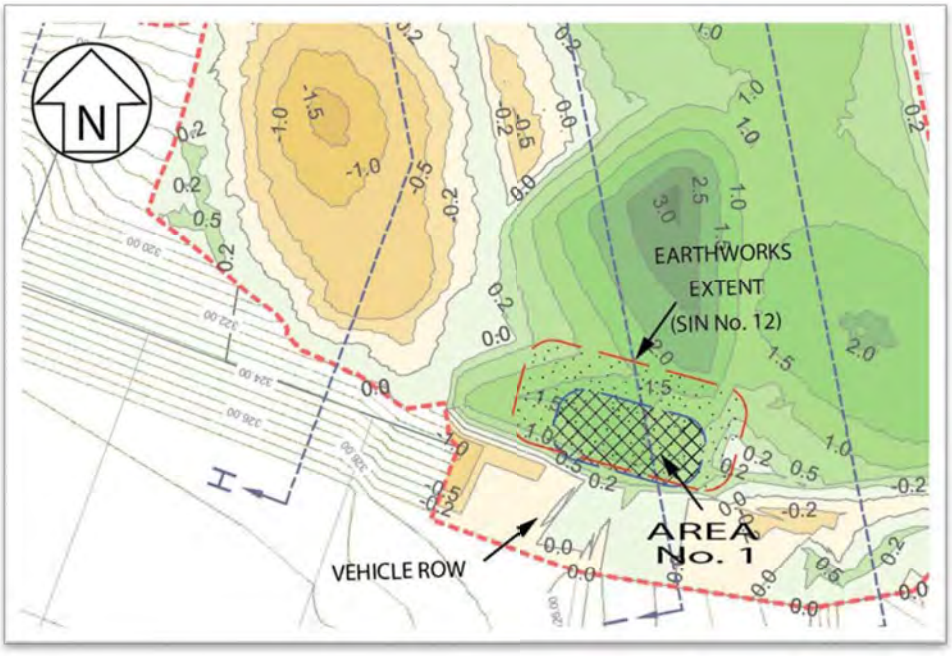

Figure 2: General location of engineered fill under construction relative to proposed earthworks plan

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104					
0 – 100	6	6	8	8					
100 – 200	11	15	20	18					
200 – 300	17	20							
300 – 400	22								
400 - 500									
500 - 600									
600 - 700									
700 - 800									
800 - 900									
LOCATION	GPS 653	GPS 654	GPS 655	GPS 656					
TERMINATION	RF = 0.40m	RF = 0.30m	RF = 0.20m	RF = 0.20m					
NOTE	Remediated Surface		Area No. 1						

RF = Refusal, ER = Effective Refusal, ED = End by default

- "Highlighted test results refer to areas of poor compaction"

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results are summarised below:
    - Area No. 1
        - 13.5 blows per 100mm Scala rod advancement
        - Scala's met 'refusal' at 0.20m depth below subbase level
        - Good Ground was consistently achieved from subbase level
    - Remediated Surface pertaining to SIN No. 12
        - 13.8 blows per 100mm Scala rod advancement
        - Scala's met 'refusal' between 0.3m – 0.4m depth below subbase level
        - Good Ground was consistently achieved from subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- The remediated fill surface discussed in SIN No. 12 and throughout this SIN, and the final fill instalment for this stage of the development has been completed to the required engineering standard.
- No further structural fill inspections are anticipated for this part of the development.

PHOTO 1 - SITE PHOTO LOOKING NORTHWEST,

AUTHOR		REVIEWER	
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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE		SIGNATURE	

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 14
BC/RC No. NA	Date: Tuesday 20 July 2021
Engineer: SF	Time: 9:00 – 10:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Subgrade Inspection for Earthworks Stage D
- Confirm the prepared surface (subgrade surface) is suitable for the construction of engineered fill.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: Centred around the central western portion of the development (reference= max fill depth of 3.0m.)
- Area No. 1 lies within a subtle negative topographic feature – a former ephemeral flow path. As such, there appears to a thickening of the upper soil profile, a combination of reworked alluvium and aeolian placed sediments, which has resulted in ground weaker than the surrounding area.
- A subgrade stripe was completed to 0.5m below ground level removing all topsoil and part of the upper soil horizon exposing moist light grey / light brown Lake Sediments (mottled silts and sand) and pockets of sandy gravel further upslope. The stripped surface measured approximately 20m Long x 10m Wide.
- Two mechanically excavated test pits were completed to establish ground conditions to a maximum depth of 0.7m below subgrade level. The test pits were constructed from subgrade level. I.e. 500mm below existing ground level.
- A single SPT twinned each test pit. The SPT locations and test results are illustrated in the figure and table below respectively.

Figure 1: SPT locations. Waypoint 697 = TP101, Waypoint 698 = TP102

Figure 2: General location of test pitting

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102							
0 – 100	3	2							
100 – 200	4	2							
200 – 300	6	2							
300 – 400	5	3							
400 - 500	17	3							
500 - 600		2							
600 - 700		2							
700 - 800		5							
800 - 900		5							
LOCATION	GPS 697	GPS 698							
TERMINATION	RF = 0.50m	ED = 0.90m							
NOTES									

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- The Scala test results returned a blow count between:
  - 2 – 6 from prepared surface to 300mm below subgrade level
  - 2 – 17 from 300mm to 900mm below subgrade level.
  - Scala's met with both 'refusal' and by 'depth default'
  - Good Ground <u>was not</u> consistently achieved from subgrade level.

NOTES & RECOMMENDATIONS

- Undercut the site by a further 300mm and construct a layer of fill. Refrain from dynamic use of the drum roller as this may drawer moisture to the surface complicating the construction of engineered fill.

- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 – STRIPPED SURFACE

PHOTO 1 – TEST PIT 101

PHOTO 2 – TEST PIT 102

AUTHOR		REVIEWER	
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SIGNATURE	S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 15
BC/RC No. NA	Date: Wednesday 28 July 2021
Engineer: SF	Time: 17:00 – 18:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Subgrade Inspection for Earthworks Stage D
- Confirm the prepared surface (subgrade surface) is suitable for the construction of engineered fill.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: Centred around the central western portion of the development (reference= max fill depth of 3.0m.)
- Area No. 1 lies within a subtle negative topographic feature – a former ephemeral flow path. As such, there appears to a thickening of the upper soil profile, a combination of reworked alluvium and aeolian placed sediments, which has resulted in ground weaker than the surrounding area.
- The site was undercut by a further 300 – 500 mm to remove areas identified as soft ground. In the most part, the subgrade presents like the initial subgrade strip completed in SIN No. 14, comprising moist light grey / light brown Lake Sediments (mottled silts and sand) and pockets of sandy gravel further upslope.
- The depth of the subgrade strip is estimated a maximum at 1.1m (adjacent) water race thinning upslope to lesser amounts.
- No SPT were completed.

Figure 1: General location of subgrade strip pending construction of engineered fill

SPT TEST RESULTS - NO SPT COMPLETED.

DEPTH (mm)									
0 – 100									
100 – 200									
200 – 300									
300 – 400									
400 - 500									
500 - 600									
600 - 700									
700 - 800									
800 - 900									
LOCATION									
TERMINATION									
NOTES									

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

NOTES & RECOMMENDATIONS

- The subgrade surface has been suitably prepared for the construction of engineered fill. As mentioned in SIN No.14, exercise caution with the first layer of fill to prevent 'wicking' of subsoil moisture, which could inherently complicate compaction of fill material.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 – STRIPPED SURFACE LOOKING SOUTHEAST

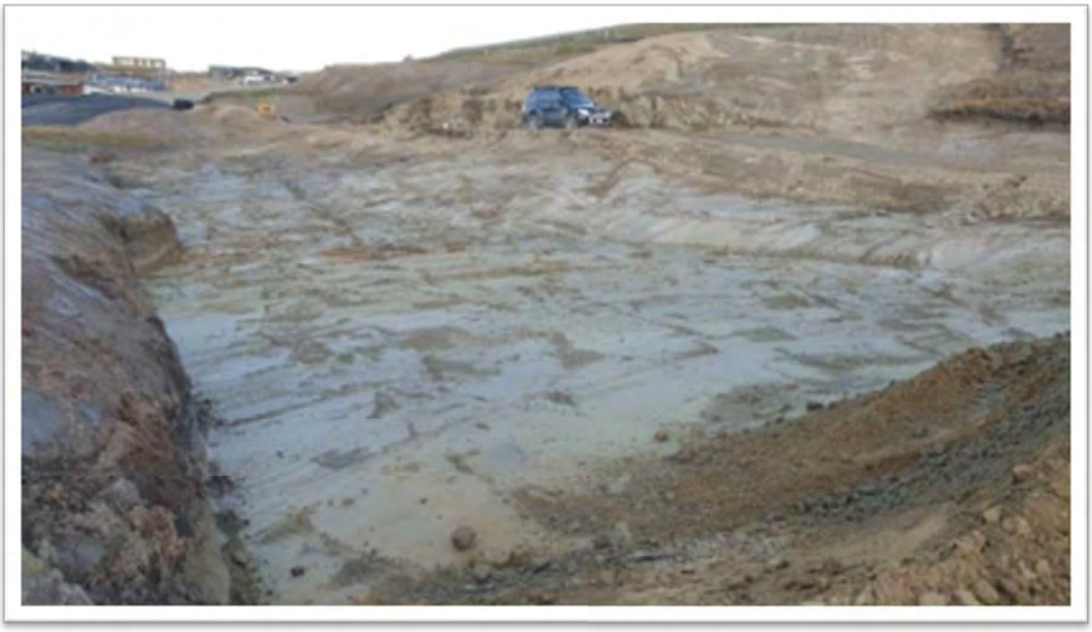

PHOTO 2 – STRIPPED SURFACE LOOKING EAST

AUTHOR		REVIEWER	
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SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 16
BC/RC No. NA	Date: Thursday 29 July 2021
Engineer: SF	Time: 14:00 – 16:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: Centred around the central western portion of the development (reference= max fill depth of 3.0m.)
- Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick. The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- Constructed fill comprised:
  - The first 600mm fill layer had been constructed across Area No. 1 between the -3.3 & -2.7mFL.
- CMH requested GCL monitor the first couple lifts as the area was relatively small and time required to construct next lift was minimal.
- Four passes of Scala penetrometer testing comprising two test each was required as the first few attempts indicated that the material was not binding / compacting accordingly. As such, the remedial corrective action comprised a 200mm undercut, re-rolled and subsequently reinstatement.
- A total of 8x SPT were completed within Area No. 1. No GPS pick up was undertaken as SPT sites were only meters apart. The test results presented in the and table below:

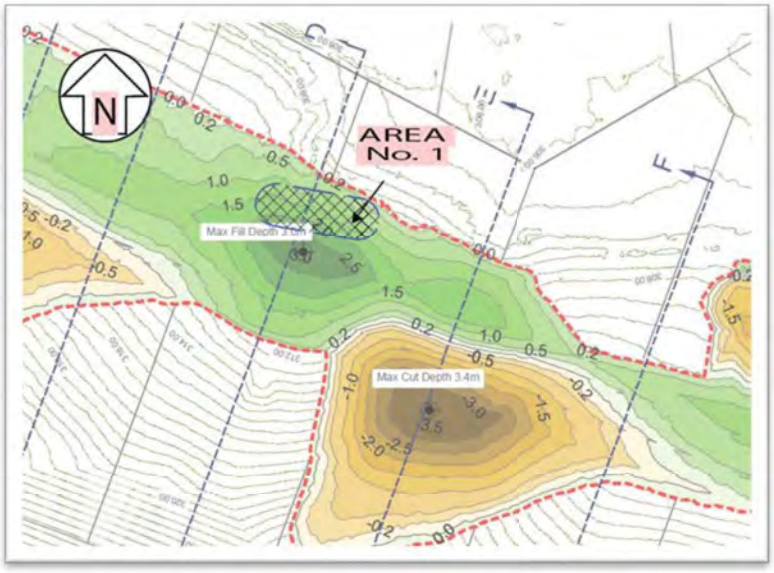

Figure 1: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT 101	SPT 102	SPT 103	SPT 104	SPT 105	SPT 106	SPT 107	SPT 108	
0 – 100	2	2	2	2	4	4	2	4	
100 – 200	3	8	4	7	5	7	5	7	
200 – 300	4	8	6	9	5	8	8	8	
300 – 400	6	12	2	11	2	9	6	10	
400 - 500	8		1	11	3	5	1		
500 - 600	10		4	6	5	2	6		
600 - 700	10		5	4	5	4	7		
700 - 800	10		10	2	5		10		
800 - 900	11			2					
LOCATION									
TERMINATION	ED = 0.90m	EF = 0.35m	ED = 0.80m	ED = 0.90m	ED = 0.75m	ED = 0.65m	RF = 0.75m	RF = 0.35m	
NOTES	Test No. 1		Test No. 2		Test No. 3		Test No. 4		

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- The Scala results for the first three tests indicated that compaction was not being achieved to the required standard.
- Based on the fourth and final test, the Scala test results returned an average blow count of:
  - 5^{+} from 0 to 300mm below subbase level
  - 8x from 300mm to depth of Scala termination
  - Scala's terminated by 'effective refusal' at a maximum depth of 0.75m below subbase level
  - Good Ground is achieved from 0.1m below subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with current fill placement and compaction procedure.
- In the absence of GCL staff avaibility, GCL has authorised the construction of the third fill installation (-2.1 to 1.5mFL), providing NDM testing is completed and consistently meets the 95% compaction standard on the second fill instalment (-2.7 to -2.1mFL). This should take place on Monday 2 August 2021.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 – AREA NO. 1 - FIRST 600MM FILL CONSTRUCTED (– 2.7MFL)

AUTHOR		REVIEWER	
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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 17
BC/RC No. NA	Date: Tuesday 03 August 2021
Engineer: SF	Time: 15:30 – 16:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: Centred around the central western portion of the development (reference= max fill depth of 3.0m.)
  - Same fill area as reported in SIN No. 14 - 16
- Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick. The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- Constructed fill comprised:
  - NB The second layer of fill was not monitored by GCL, however the layer was subject to NDM testing which all passed.
  - The third 600mm fill layer had been constructed across Area No. 1 between the -1.8 & -2.4mFL.
  - A total fill thickness of1.8m has been constructed in this location to date.
- The subgrade surface towards the east of Area No. 1 was improved by an excavator trim (<50mm), removing all residual unsuitable soils dislodged from haul equipment and recent heavy rain which was resulted in some slope wash. The subgrade surface presents as light brown and grey sand, silt sand and lesser amounts of fine gravel. The subgrade surface exposes the interface between the overlying outwash deposit and or till and underlying lake sediments – Refer to Photo No. 2.
- 5x NDM were being undertaken at time of inspection (3x along the crest & 2 x across the slope)
- A total of 3x SPT were completed along the fill crest line, which twinned NDM No. A, B, C
- The SPT locations are illustrated in figure 1 and the test results presented in the table below.

Figure 1. GPS locations of SPT sites

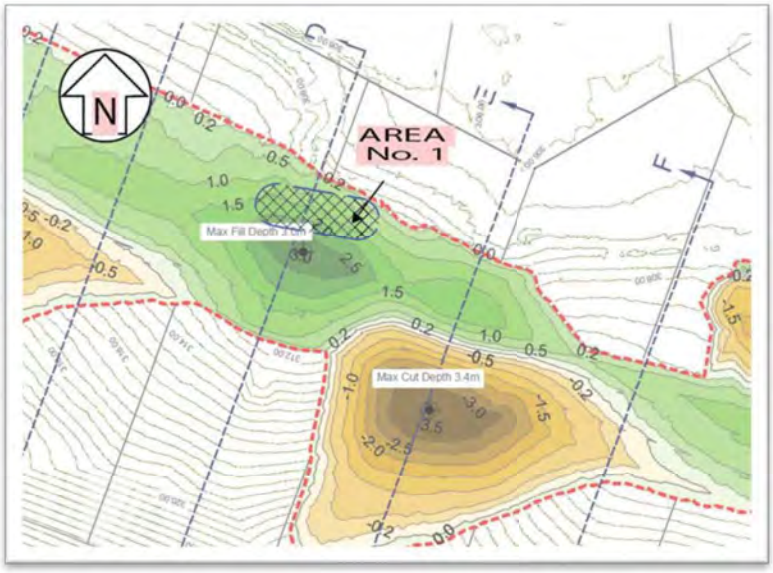

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT 101	SPT 102	SPT 103						
0 – 100	3	5	5						
100 – 200	6	9	6						
200 – 300	8	12	9						
300 – 400	11	14	8						
400 - 500	12	21	12						
500 - 600	14	19	15						
600 - 700	7	22	19						
700 - 800	9		17						
800 - 900	8								
LOCATION	GPS 774	GPS 775	GPS 776						
TERMINATION	RF = 0.90m	RF = 0.70m	RF = 0.80m						
NOTE	NDM A	NDM B	NDM C						

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 11^{+} from subbase level to point of Scala termination
    - Scala's met with 'refusal' between 0.70 – 0.90m depth below subbase level
    - Good Ground is achieved from 0.1m below subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 – AREA NO. 1 - THIRD 600MM FILL CONSTRUCTED (– 1.8MFL)

PHOTO 2 – AREA NO. 1 – IMPROVED SUBGRADE SURFACE

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 18
BC/RC No. NA	Date: Thursday 05 August 2021
Engineer: SF	Time: 09:00 – 10:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: Immediately to the southeast of the main fill under construction to date
  - The subgrade was inspected, certified, and reported in SIN No. 17.
  - Refer to Figure No. 2
- Fill constructed comprised:
  - Construction of the first < 600mm (approx.) fill layer.
  - Fill layer laps onto slope and thins in places, fill is likely less than 600mm in places.
  - This subbase surface is recognised as the -1.8mFL.
  - A total fill thickness of 600m has been constructed in this location to date.
  - It is understood that by appropriating the ground level across this portion of the development will now allow for structural fill to tie directly into the western portion (main fill area) achieving a single working surface / mFL.
- Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick. The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- An uncompacted layer of fill had also been placed on the main fill area.
- The subgrade surface towards the north west of the main fill area had been improved by a further 50 - 100mm scrape, removing any residual unsuitable soils exposing a mixture of light brown silty SAND, schist boulders / floaters and lesser amounts of sandy GRAVEL. This makes way for the remaining structural fill to lap onto an appropriately prepared surface.
  - Refer to Photo No. 1
- A total of 3x SPT were completed along the fill crest line.
- The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

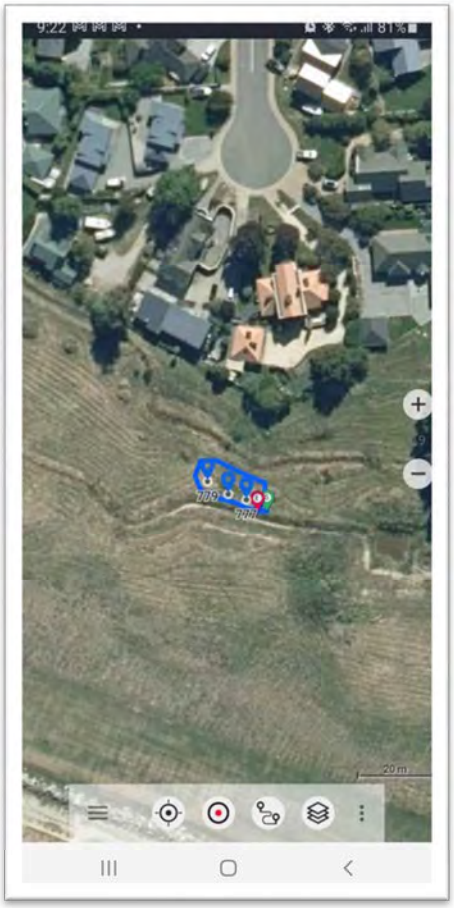

Figure 1. GPS locations of SPT sites

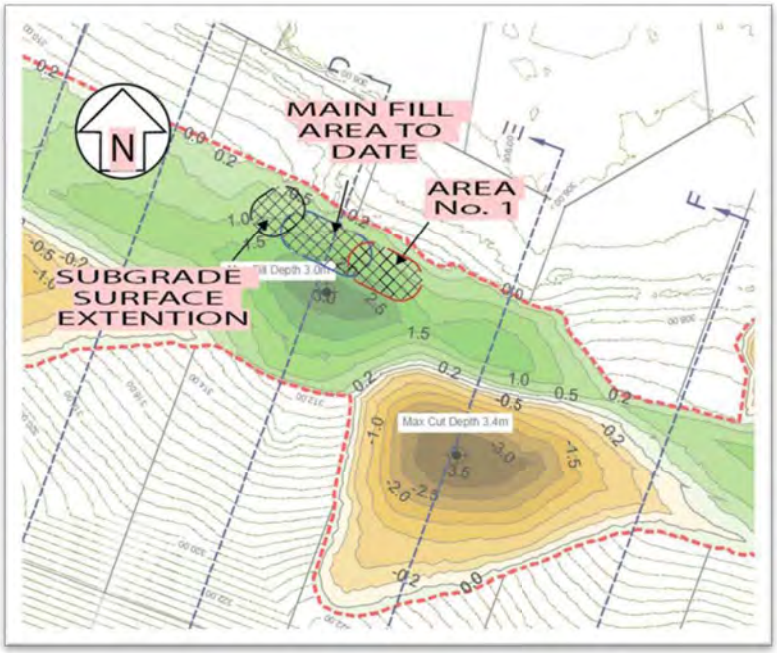

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103						
0 – 100	5	3	3						
100 – 200	7	10	7						
200 – 300	8	10	7						
300 – 400	6	16	6						
400 - 500	6	10	5						
500 - 600	13		3						
600 - 700	18		9						
700 - 800			14						
800 - 900			14						
LOCATION	GPS 777	GPS 778	GPS 779						
TERMINATION	ER = 0.70m	RF = 0.45m	ER = 0.90m						
NOTE									

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 8^{+} from subbase level to point of Scala termination
    - Scala's met with 'refusal or 'effective refusal' between 0.45 – 0.90m depth below subbase level
    - Good Ground is consistently achieved from 0.1m below subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING TOWARDS THE SOUTHEAST,
LEFT: (AREA NO. 1) FIRST 600MM FILL CONSTRUCTED (– 1.8MFL). CENTRE: 300MM LOOSE FILL LAYER OVER MAIN FILL AREA. RIGHT: IMPROVED SUBGRADE SURFACE.

AUTHOR		REVIEWER	
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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 19
BC/RC No. NA	Date: Monday 09 August 2021
Engineer: SF	Time: 12:00 – 13:00
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: comprising the main fill area and the extension to the southwest (refer to SIN No. 18) which is now being treated as a single fill area.
  - Refer to Figure No. 2
- Fill constructed comprised:
  - Construction of the fourth 600mm fill layer from -1.8mFL to -1.2mFL
  - The area of engineered fill continues to increase in size towards the northwest, southeast and upslope as successive fill layers are constructed
  - This subbase surface is recognised as the -1.2mFL
  - A total fill thickness of 2.4m has been constructed in this location to date
- Fill material sourced from Alpine Meadows Stage 1 comprising Outwash Deposits (sandy gravel and lesser amounts of cobbles and boulders) had been reused as engineered fill. Fill was placed and spread to form a layer between 250 – 300mm thick. The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- The subgrade extension towards the northwest had been inspected and certified last week (refer to SIN No. 18). The subgrade surface was appropriately prepared for the construction of engineered fill.
- Three NDMs were being completed at time of inspection (NDM No. 49 – 51)
- A total of 3x SPT were completed along the fill crest line, twinning each of the NDM's completed.
- The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

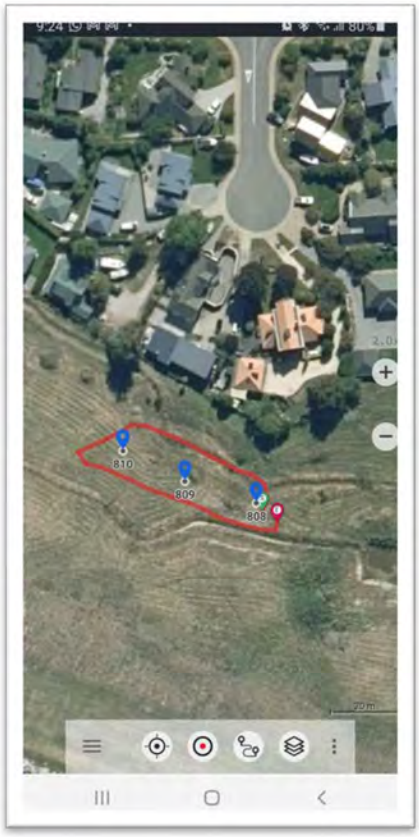

Figure 1. GPS locations of SPT sites

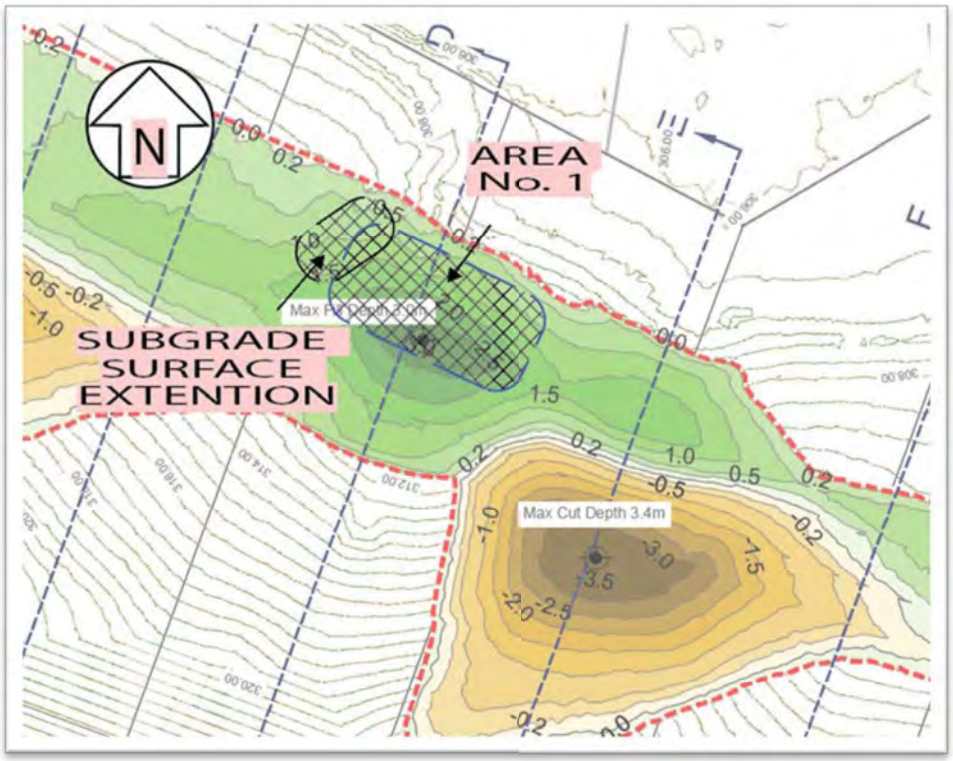

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103						
0 – 100	2	4	4						
100 – 200	7	9	6						
200 – 300	9	12	11						
300 – 400	20	12	13						
400 - 500			17						
500 - 600									
600 - 700									
700 - 800									
800 - 900									
LOCATION	GPS 808	GPS 809	GPS 810						
TERMINATION	ER = 0.40m	RF = 0.35m	RF = 0.50m						
NOTE	NDM 49	NDM 50	NDM 51						

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 9.6 from subbase level to point of Scala termination
    - Scala's met with 'refusal or 'effective refusal' between 0.35 – 0.50m depth below subbase level
    - Good Ground is consistently achieved from 0.1m below subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING TOWARDS THE EAST, ILLUSTRATING A SINGLE FILL AREA OF THE -1.2MFL SUBBASE SURFACE, NDM NO. 51 IN THE FOREGROUND

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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 20
BC/RC No. NA	Date: Thursday 12 August 2021
Engineer: SF	Time: 08:30 – 09:30
Site Address: West Meadows Drive, Wanaka	

INSPECTION TYPE

- Ongoing earthworks monitoring and certification:
  - Fill Inspection for Earthworks Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: commonly known as the main fill area (western) for this phase of the development.
  - Inspect quality of site won fill material
  - Refer to Figure No. 2
- Fill constructed comprised:
  - Construction of the fifth 600mm fill layer from -1.2mFL to -0.6mFL
  - The area of engineered fill continues to increase in size towards the northwest, southeast and upslope as successive fill layers are constructed
  - This subbase surface is recognised as the -0.6mFL
  - A total fill thickness of 3.0m has been constructed in this location to date
  - Refer to Photo 1 & 2
- Fill used in the construction of fill was site won material comprising light brown sand (medium to coarse grained) with minor gravel (medium to coarse in size) and trace silt, which presents at surface as poorly graded and bedded. As such, the fill material required a level of onsite blending (homogenising) prior to placement ensuring binding and compaction was achieved without complication. The fill material was sourced immediately upslope of the main fill area.
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- CTS are scheduled to complete NDM testing today
- A total of 6x SPT were completed. 3x along the fill crest line & 3x along the slope face.
- The SPT locations are illustrated in Figure 1 and the test results presented in the table below.

Figure 1. GPS locations of SPT sites

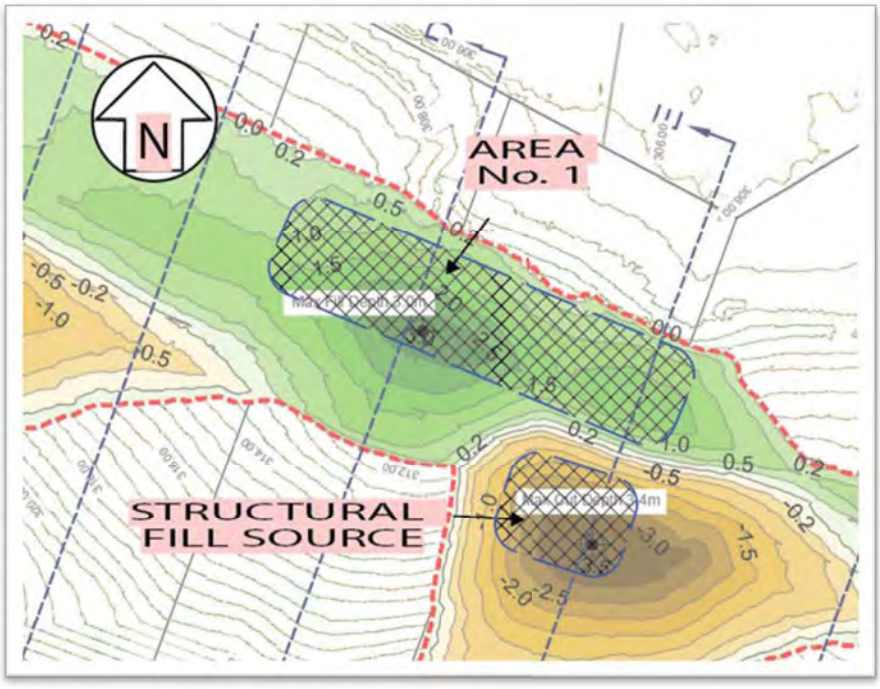

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT103	SPT103	SPT103			
0 – 100	3	4	3	4	3	4			
100 – 200	7	7	8	6	6	9			
200 – 300	8	10	13	8	8	11			
300 – 400	12	12	18	9	13	15			
400 - 500	10	20	11	8	16	12			
500 - 600				14	16	18			
600 - 700				15	10				
700 - 800				12					
800 - 900									
LOCATION	GPS 828	GPS 829	GPS 830	GPS 831	GPS 832	GPS 833			
TERMINATION	ER = 0.45m	ER = 0.50m	ER = 0.45m	ER = 0.75m	ER = 0.65m	ER = 0.60m			
NOTE	SPT completed along Crest			SPT completed along slope face					

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - Along the crest:
        - 9.7 from subbase level to point of Scala termination
        - Scala's met with 'effective refusal' between 0.45 – 0.50m depth below subbase level
    - Along the slope face:
        - 10.3 from subbase level to point of Scala termination
        - Scala's met with 'effective refusal' between 0.60 – 0.75m depth below subbase level
    - Good Ground is consistently achieved from 0.1m below subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING EAST, ILLUSTRATING -0.6MFL SUBBASE SURFACE, EXCAVATOR IN BACKGROUND AT FILL SOURCE, SPT103/GPS830 IN FOREGROUND

PHOTO 2 - SITE PHOTO LOOKING WEST, ILLUSTRATING -0.6MFL SUBBASE SURFACE, SPT106/GPS833 IN FOREGROUND

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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 21
BC/RC No. NA	Date: Monday 6 September 2021
Engineer: SF	Time: 13:30 – 14:15
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - Area No. 1: commonly known as the main fill area (western) for this phase of the development.
  - Inspect quality of site won fill material
  - Refer to Figure No. 2
- Fill constructed comprised:
  - Construction of the sixth and final 600mm
  - The area of engineered fill continues to increase in size towards the northwest, southeast and upslope as successive fill layers are constructed
  - This subbase surface is recognised as the finished surface, less some minor trim earthworks and placement of covering topsoil
  - A total fill thickness of approximately 3.6m has been constructed in this location to date
  - Refer to Photo 1 & 2
- Fill used in the construction of fill was site won material comprising light brown sand (medium to coarse-grained) with minor gravel (medium to coarse in size) and trace silt, which presents as poorly graded and bedded at the surface. As such, the fill material required a level of onsite blending (homogenising) prior to placement, ensuring binding and compaction was achieved without complication. The fill material was sourced immediately upslope of the main fill area.
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and plate). Cross rolling, finishing with the smooth drum is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- CTS had completed 3x NDM tests before GCL's inspection. NDM No includes 55 -57.
- A total of 5x SPT were completed.
  - 3x SPT twin each of the NDM tests sites (mid-slope)
  - 2x SPT traverse the fill toe line
- The SPT locations are illustrated in Figure 1, and the test results are presented in the table below.

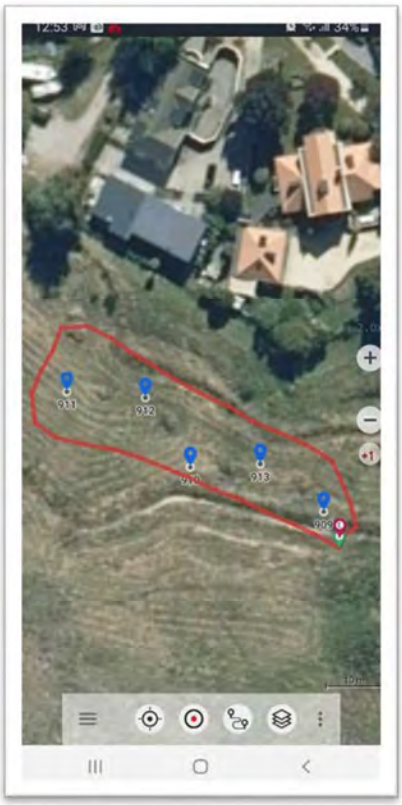

Figure 1. GPS locations of SPT sites

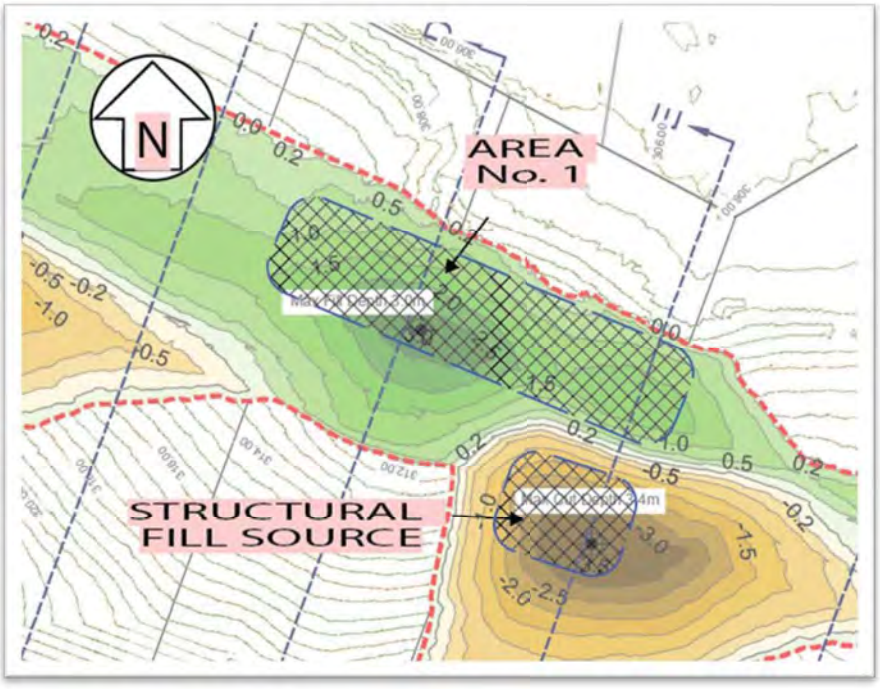

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105				
0 – 100	3	5	5	6	2				
100 – 200	5	4	6	11	5				
200 – 300	7	7	6	10	6				
300 – 400	9	12	10	14	7				
400 - 500	10	12	13	11	8				
500 - 600	11	10	12	16	11				
600 - 700	14		10		10				
700 - 800	9								
800 - 900	12								
LOCATION	GPS 909	GPS 910	GPS 911	GPS 912	GPS 913				
TERMINATION	ED = 0.90m	ER = 0.55m	ER = 0.65m	ER = 0.75m	ER = 0.65m				
NOTE	NDM 55	NDM 56	NDM 57	SPT completed along fill toe					

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - Along the fill toe:
        - 9.7x from subbase level to the point of Scala termination
        - Scala's met with 'effective refusal' around 0.70m below subbase level
    - Along the mid-slope face:
        - 9x from subbase level to the point of Scala termination
        - Scala's typically met with 'effective refusal' around 0.50m, except for SPT 101, which terminated by 'depth default' at 0.90m below subbase level
    - Good Ground is typicallyachieved from 0.1m below subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- Fill is being constructed to an engineering standard. Continue with the current fill compaction procedure and material type.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO LOOKING WEST ILLUSTRATING FINAL GROUND PROFILE, SPT101/NDM 55 IN FOREGROUND

PHOTO 1 - SITE PHOTO LOOKING EAST ILLUSTRATING FINAL GROUND PROFILE, SPT103/NDM 57 IN FOREGROUND

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
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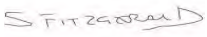
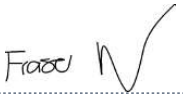
SIGNATURE		SIGNATURE	

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 22
BC/RC No. NA	Date: Wednesday 15 September 2021
Engineer: SF	Time: 09:00 – 10:00
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the level of bearing capacity or native subsoils and/or engineered fill.

OBSERVATIONS

- Two areas were assessed during this inspection:
- Area 1
    - Refers to a small (20 – 30m^2) fill area along the upslope side of the road alignment. The fill area is associated with roading and outside the residential lots. However, it was assessed accordingly for thoroughness.
    - Approx. 400mm site won fill material had been constructed at the time of inspection
    - Based on the subgrade quality surrounding the fill placed and knowledge of how earthworks have been conducted in the past, it is reasonable to assume that the subgrade surface has been prepared to the required standard.
    - Fill had been constructed inline with the usual process.
    - No SPT completed.
- Area 2
    - Subgrade inspection for the remaining proposed fill area between the western development lot boundary and completed earthworks to date
    - 300 – 400mm of topsoil and upper soils (Loess) had been removed, exposing transitional soils comprising;
        - ~80% Light brown silty SAND, trace cobbles and boulders (Loess)
        - ~10% mottled blackish-brown silty SAND
        - ~ 10% sandy GRAVEL, mainly in the upslope/southwest corner
    - No SPT were completed
    - See Notes for remedial earthworks
- Refer to Figures 1 & 2 for the location of Areas 1 & 2 and photos for context

Figure 1. Greenline = extent of subgrade strip, Redline = small road alignment fill area

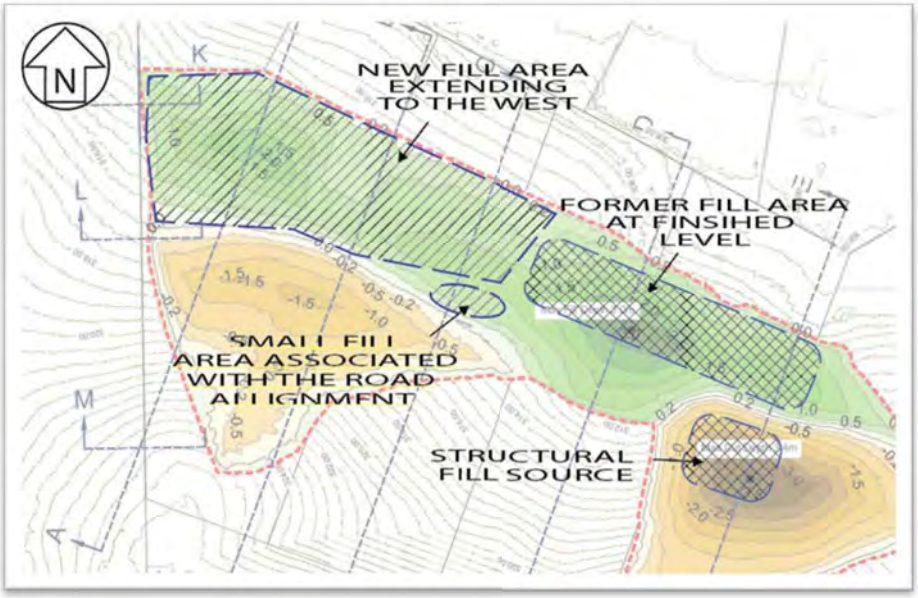
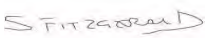
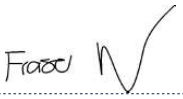


Figure 2: General location of engineered fill under construction

NOTES & RECOMMENDATIONS
• Re: Area 2: Remove a further 50mm from the entire prepared surface focusing on the mottled Loess areas. Take photos and send to GCL for validation. • GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO, LOOKING WEST, SMALL FILL AREA ASSOCIATED WITH ROAD ALIGNMENT

PHOTO 2 - SITE PHOTO OF SUBGRADE SURFACE FOR YOUR FILL AREA, LOOKING SOUTHEAST

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE		SIGNATURE	

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 23
BC/RC No. NA	Date: Monday 20 September 2021
Engineer: SF	Time: 14:30 – 15:30
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the bearing capacity of native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - A westerly extension of the main fill area
  - Inspect quality of fill material
  - Refer to Figure No. 2
- Fill constructed comprised:
  - Construction of the first 600mm layer
  - Total fill for this area = SG+ 0.6m
  - Refer to Photo 1 & 2
- Fill used for structural purposes was imported from Alpine Medows, comprising sandy GRAVEL with some cobbles and occasional boulders. This material has proven to perform well as engineered fill in the past.
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and pad). Cross rolling, finishing with the smooth drum, is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- No NDM had been completed at the time of inspection
- A total of 3x SPT were completed. SPT was completed along the crest line through the thickest fill portion. The SPT locations are illustrated in Figure 1, and the test results are presented in the table below.
- NOTE
  - The subgrade surface north of the road alignment (culdesac) was being proof rolled at the time of inspection
  - Cut earthworks (up to 1.5m) had been completed south of the road alignment (culdesac). The material excavated from this site will be reused for engineered fill at some point. The material comprises glacial deposits (till) – light grey SAND and lesser amounts of sandy GRAVEL.

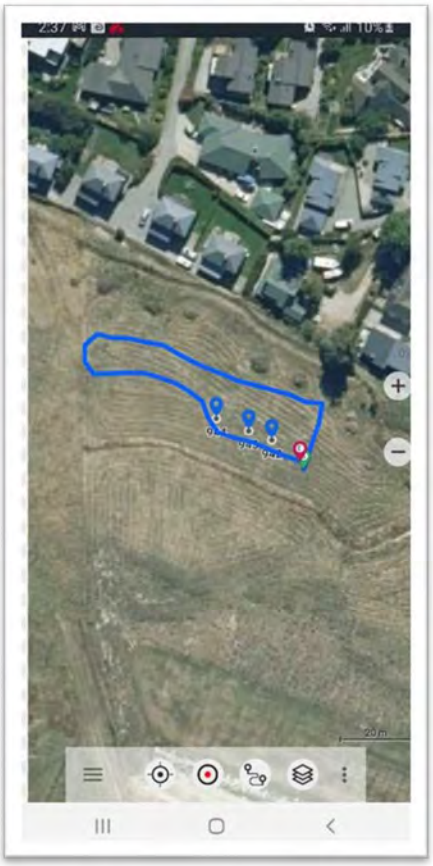


Figure 1. GPS locations of SPT sites

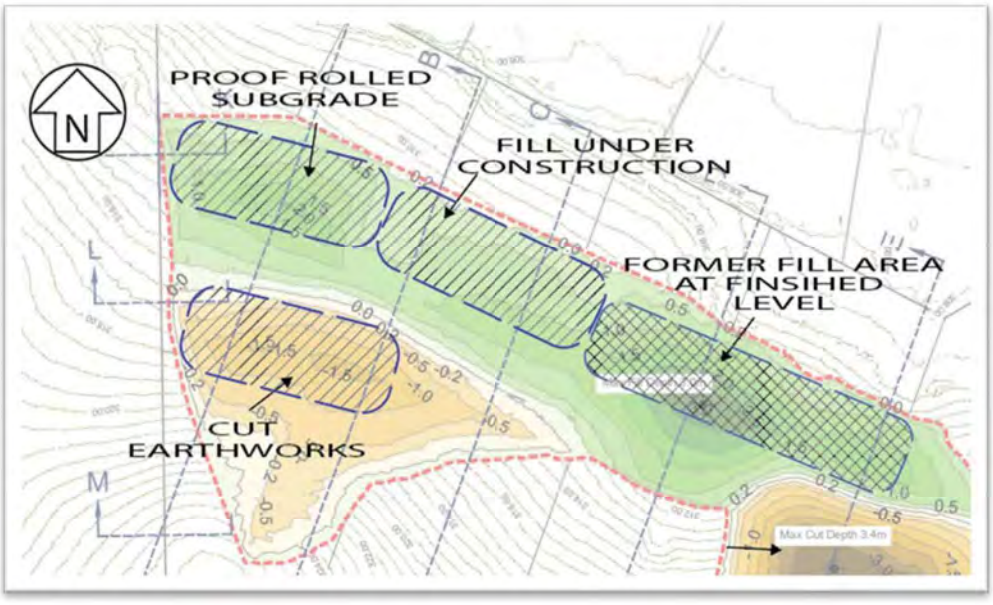


Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103						
0 – 100	5	5	5						
100 – 200	11	8	6						
200 – 300	10	9	6						
300 – 400	10	10	6						
400 - 500		9	4						
500 - 600		10	4						
600 - 700		13	3						
700 - 800		13	5						
800 - 900		10	5						
LOCATION	GPS 942	GPS 943	GPS 944						
TERMINATION	ER = 0.35m	ED = 0.90m	ED = 0.90m						
NOTE	n/a	n/a	n/a						

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill is being constructed to an engineering standard. Continue with the current compaction methodology and material type.
- The Scala test results returned an average blow count of:
    - 7.6x from subbase level to the point of Scala termination
    - SPT 101 met with 'effective refusal' at 0.35m, whereas SPT 102 & 103 terminated with 'depth default' at 0.90m below subbase level.
    - The reduction in bearing capacity observed at SPT102 – 103 likely reflects the soil strength of the underlying subgrade as opposed to the engineered fill.
    - Good Ground is achieved from subbase level
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO OF FIRST 600MM FILL LAYER, LOOKING WEST, PROOF ROLLING OF SUBGRADE IN BACKGROUND AND CUT EARTHWORKS IN TOP LEFT CORNER

AUTHOR		REVIEWER	
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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 24
BC/RC No. NA	Date: Thursday 23 September 2021
Engineer: SF	Time: 16:30 – 17:30
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application. Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the bearing capacity of native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
  - The fill area immediately north of the culdesac (AREA No. 2)
  - Inspect quality of fill material
  - Refer to Figure No. 2
- Fill constructed comprised:
  - Construction of the first 600mm layer
  - Total fill for this area = SG+ 0.6m
  - Refer to Photo 1 & 2
- Site won glacial till comprising SAND and lesser amounts of sandy GRAVEL and silt was used for structural fill. The fill material was sourced immediate upslope from the subject will area.
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and pad). Cross rolling, finishing with the smooth drum, is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- No NDM had been completed at the time of inspection
- A total of 4x SPT were completed. SPT was completed through the central fill portion, where fill should be thickest. The SPT locations are illustrated in Figure 1, and the test results are presented in the table below.
- See notes for required remedial earthworks.

Figure 1. GPS locations of SPT sites

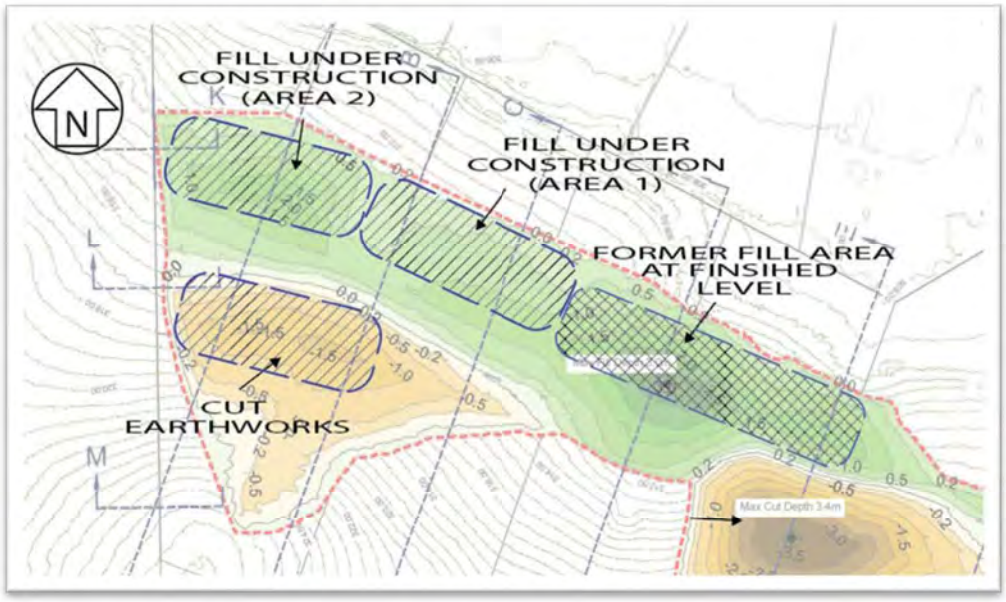

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104					
0 – 100	2	3	3	2					
100 – 200	3	3	5	3					
200 – 300	2	6	6	3					
300 – 400	2	9	5	4					
400 - 500	3	7	6	3					
500 - 600	3	6	5	3					
600 - 700	3	4	5	2					
700 - 800	3	4	5	2					
800 - 900	2	4	5	2					
LOCATION	GPS 954	GPS 955	GPS 956	GPS 957					
TERMINATION	ED = 0.90m	ED = 0.90m	ED = 0.90m	ED = 0.90m					
NOTE									

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- Fill construction failed to me the required engineering standard.
- The Scala test results returned an average blow count of:
    - 3.8x from subbase level to the point of Scala termination
    - All Scalas terminated by 'depth default' at 0.90m below subbase level.
    - The reduction in bearing capacity observed at SPT102 – 103 likely reflects the soil strength of the underlying subgrade as opposed to the engineered fill.
    - Good Ground is not achieved – See required remedial earthworks notes
- The bearing capacity meets the criteria of "Good Ground' as per NZS 3604:2011.

NOTES & RECOMMENDATIONS

- The entire fill area requires further compaction before subsequent structural fill layers can be constructed. In addition, NDM testing should be completed on this surface.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO OF FIRST 600MM FILL LAYER, LOOKING EAST,

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE	
Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 25
BC/RC No. NA	Date: Tuesday 28 September 2021
Engineer: SF	Time: 11:00 – 12:00
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application.
- Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the bearing capacity of native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
- Area 2
    - No further fill constructed since the last visit – this assessment was to ensure compaction has been achieved to the required standard as per GCL SIN No. 24
    - Total fill for this area = SG + 0.9m
    - The fill material comprises site won SAND and lesser amounts of sandy GRAVEL and silt
    - A further 300 - 400mm (estimated) fill remains to be constructed to achieve finish design RL
    - It is understood that the NDM tests completed last week on this surface had failed, hence the requirement for further compaction.
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and pad). Cross rolling, finishing with the smooth drum, is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- No NDM had been completed at the time of inspection
- A total of 4x SPT were completed mid-slope. It is understood that the SPT were completed through a thin structural fill portion i.e.
    - Engineered frill from subbase level to 0.4m below subbase level
    - Subgrade / natural subsoils from 0.4m to 0.9m below subbase level
    - SPT locations are illustrated in Figure 1, and the test results are presented in the table below.
- Refer to Figures 1 & 2 and Photos for context,

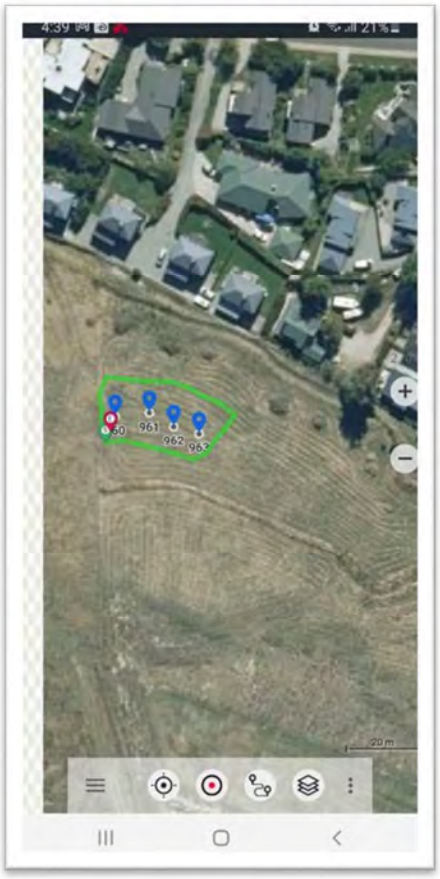

Figure 1. GPS locations of SPT sites, Greenline = Area 2

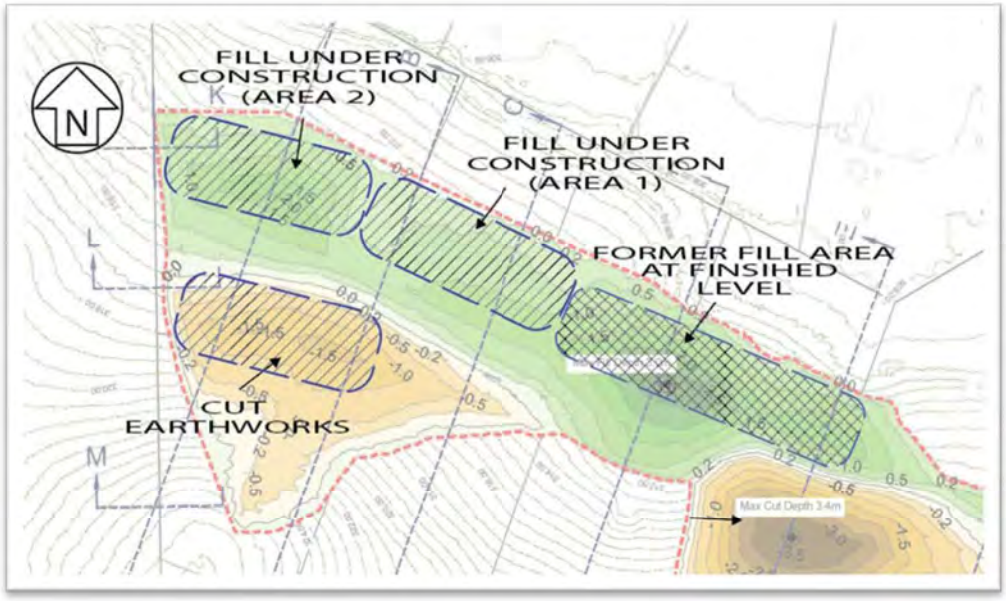

Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104						
0 – 100	5	4	4	1						
100 – 200	9	5	5	5						
200 – 300	5	7	7	5						
300 – 400	4	5	5	6						
400 - 500	3	4	4	5						
500 - 600	3	4	4	5						
600 - 700	3	3	3	7						
700 - 800	3	4	4	8						
800 - 900	2	4	4	9						
LOCATION	GPS 960	GPS 961	GPS 962	GPS 963						
TERMINATION	ED = 0.90m	ED = 0.90m	ED = 0.90m	ED = 0.90m						
NOTE										

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when five or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

The Scala test returned an average blow count of:

- Engineered Fill: = 5.1x from subbase level to 0.4m below subbase level
- Subgrade: = 4.3x from 0.4m below subbase level to the point of Scala termination
    - All Scalas terminated by 'depth default' at 0.9m below subbase level
    - Good Ground is not consistently achieved across the fill area – see required remediation notes.

NOTES & RECOMMENDATIONS

- RE: Area 2 - The entire fill area requires further compaction before constructing subsequent structural fill layers. In addition, NDM testing should be completed on this surface.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO OF AREA 2 LOOKING EAST, SCALA REPRESENTS THE LOCATION OF SPT101

AUTHOR		REVIEWER	
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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 26
BC/RC No. NA	Date: Tuesday 5 October 2021
Engineer: SF	Time: 11:30 – 12:30
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application.
- Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the bearing capacity of native subsoils and/or engineered fill.

OBSERVATIONS

- Two areas were assessed during this inspection:
- Area 1
    - A subsequent 600mm fill layer was constructed
    - Total fill for this area = SG + 1.2m
    - The fill material comprises site won SAND and lesser amounts of sandy GRAVEL and silt
    - A further 150mm (estimated) fill remains to be constructed to achieve finish design RL
- Area 2
    - A subsequent 300mm fill layer was constructed
    - Total fill for this area = SG + 0.9m
    - The fill material comprises site won SAND and lesser amounts of sandy GRAVEL and silt
    - A further 300 - 400mm (estimated) fill remains to be constructed to achieve finish design RL
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and pad). Cross rolling, finishing with the smooth drum, is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- No NDM had been completed at the time of inspection
- A total of 10x SPT were completed.
    - 7x on Area 1, along the fill crest and central portion of fill slope
    - 3x on Area 2, along the fill crest through the thickest fill portion
    - SPT locations are illustrated in Figure 1, and the test results are presented in the table below.
- Refer to Figures 1 & 2 and Photos for context,

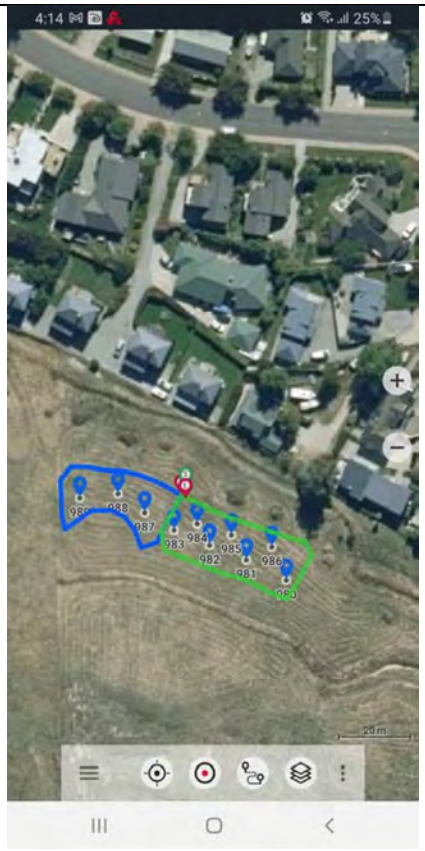


Figure 1. GPS locations of SPT sites, Blueline = Area 2, Greenline = Area 1

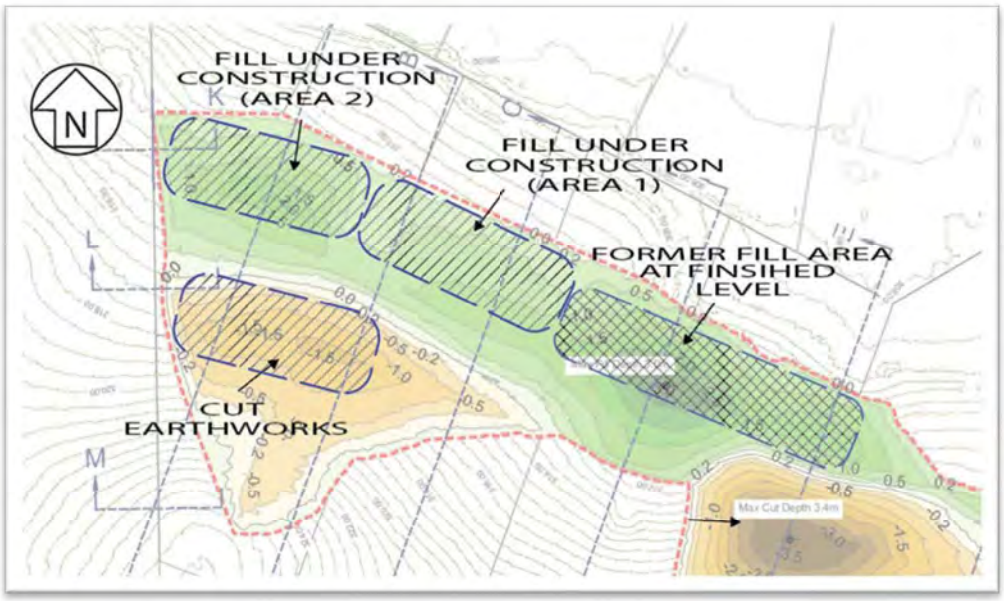


Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105	SPT106	SPT107	SPT108	SPT109	SPT110
0 – 100	3	5	3	3	3	5	2	3	5	5
100 – 200	4	5	7	4	5	5	6	5	13	9
200 – 300	6	8	10	15	12	7	8	12	19	15
300 – 400	14	10	8		12	18	10	18		14
400 - 500			15		13					10
500 - 600					7					8
600 - 700					7					5
700 - 800					7					5
800 - 900					6					5
LOCATION	GPS 980	GPS 981	GPS 982	GPS 983	GPS 984	GPS 985	GPS 986	GPS 987	GPS 988	GPS 989
TERMINATION	RF =0.40m	RF =0.35m	RF =0.50m	RF =0.30m	ED = 0.90m	RF = 0.40m	RF = 0.35m	RF = 0.30m	RF = 0.30m	ED = 0.90m
NOTE	Area 1							Area 2		

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

Areas 1 & 2 returned an average Scala blow count as follows:

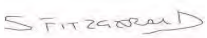
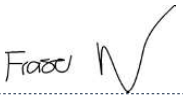
- Area 1
  - 7.6x from subbase level to the point of Scala termination
  - Scalas are typically terminated by 'refusal' 0.30 – 0.5m below subbase level, except for SPT105, which ended by 'depth default' at 0.90m below subbase level.
  - Good Ground is not achieved from subbase level – See required remedial earthworks notes
- Area 2
  - 9.4x from subbase level to the point of Scala termination
  - Scalas are typically terminated by 'refusal' around 0.30 m below subbase level, except for SPT110, which ended by 'depth default' at 0.90m below subbase level.
- Good Ground is typically achieved from 0.1m below subbase level

NOTES & RECOMMENDATIONS

- RE: Area 1 - The entire fill area requires further compaction before subsequent structural fill layers can be constructed. In addition, NDM testing should be completed on this surface.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO OF AREA 1 LOOKING EAST,

PHOTO 2 - SITE PHOTO OF AREA 2 LOOKING WEST,

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE		SIGNATURE	

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783-1A
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 27
BC/RC No. NA	Date: Tuesday 14 December 2021
Engineer: SF	Time: 16:00 – 17:00
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- Confirm remedial earthworks had been completed in accordance with GCL instruction (SIN 26)
- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application.
- Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala Penetrometer tests to confirm the bearing capacity of native subsoils and/or engineered fill.

OBSERVATIONS

- Two areas were assessed during this inspection:
- Area 1 – Central Portion
    - No further fill constructed since last visit (5 October)
    - Estimated fill depth: SG +1.2m
    - This area required further compaction prior to final certification and installation of covering topsoil
    - No further structural fill required for this area
- Area 2 – Western Portion
    - No further fill constructed since last visit (5 October)
    - Estimated fill depth: SG + 0.9m
    - This area required further compaction prior to final certification and installation of covering topsoil
    - A further 1m structural fill is required across the entire area to appropriate the required ground profile for Stage D.
- NDM were scheduled for completion at both Areas 1 & 2 at the earliest available opportunity
- A total of 11x SPT were completed.
    - 8x on Area 1, along the fill crest and central portion of fill slope
    - 3x on Area 2, through the central portion
    - SPT locations are illustrated in Figure 1, and the test results are presented in the table below.
- Refer to Figures 1 & 2 and Photos for context,

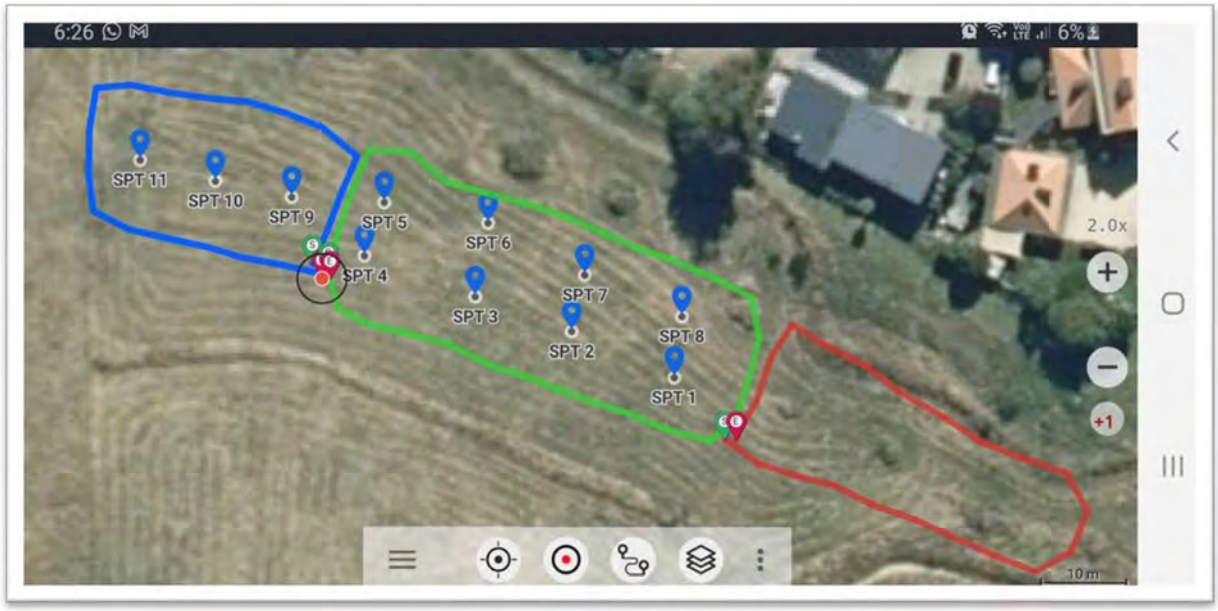


Figure 1. GPS locations of SPT sites, Blueline = Area 2, Greenline = Area 1, Redline = Previously certified structural fill

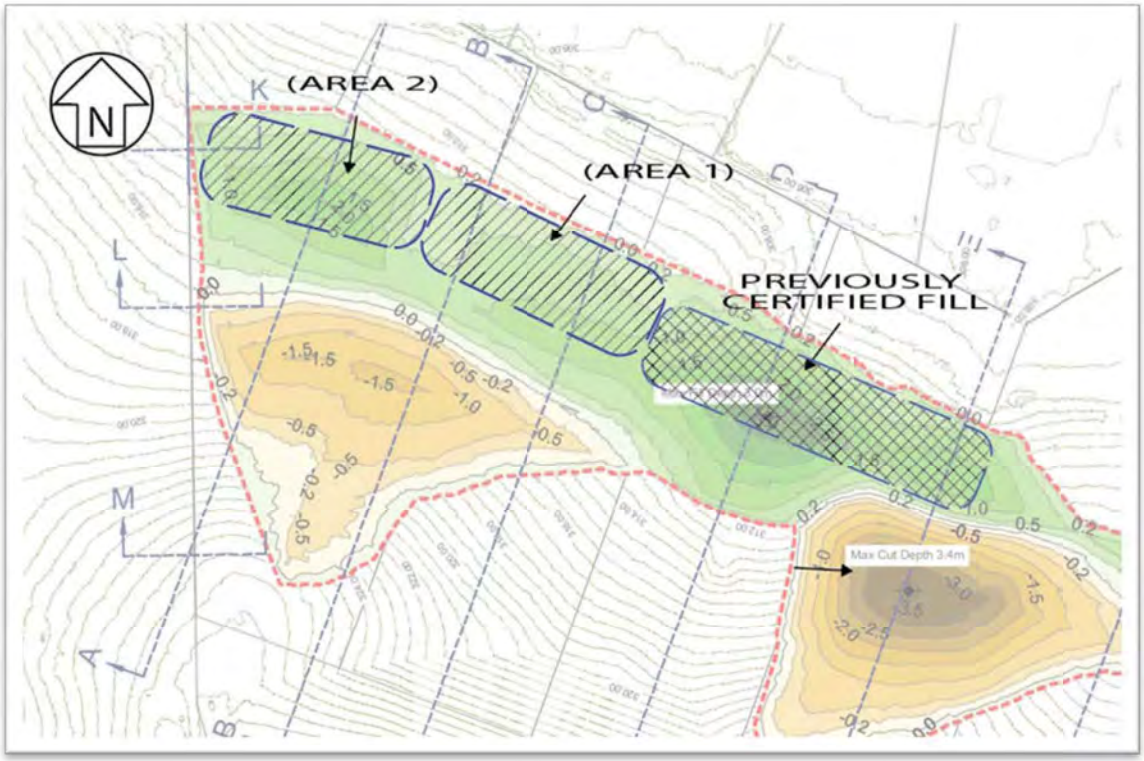


Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103	SPT104	SPT105	SPT106	SPT107	SPT108	SPT109	SPT110	SPT111
0 – 100	8	7	7	5	6	5	5	7	8	7	9
100 – 200	13	11	17	7	10	9	13	16	15	14	16
200 – 300	10	16		10	17	13	14		15	18	18
300 – 400				17	10	12	11		18		
400 - 500						10	16				
500 - 600											
600 - 700											
700 - 800											
800 - 900											
LOCATION	Area 1 – See Figure 1								Area 2 – See Figure 1		
TERMINATION	RF = 0.25m	RF = 0.30m	RF = 0.20m	RF = 0.40m	RF = 0.35m	RF = 0.45m	RF = 0.50m	RF = 0.20m	RF = 0.40m	RF = 0.30m	RF = 0.30m
NOTE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when 5 or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

Areas 1 & 2 returned an average Scala blow count as follows:

- Area 1
  - 10.8x from subbase level to the point of Scala termination
  - Scala's terminated by 'refusal' between 0.20m – 0.50m below subbase level,
  - Good Ground is consistently achieved from subbase level
- Area 2
  - 13.8x from subbase level to the point of Scala termination
  - Scala's terminated by 'refusal' between 0.20m – 0.40m below subbase level,
  - Good Ground is consistently achieved from subbase level

NOTES & RECOMMENDATIONS

- Remedial earthworks (compaction) have been completed in accordance with GCL work instruction. As such, structural fill has been constructed to the required engineering standard.
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO OF PREVIOUSLY CERTIFIED FILL FOR CONTEXT, LOOKING EAST,

PHOTO 2 - SITE PHOTO OF AREA 1 LOOKING EAST, SPT104 FOR REFERENCE

PHOTO 3 - SITE PHOTO OF AREA 2 LOOKING WEST,

AUTHOR		REVIEWER	
NAME	SHANNON FITZGERALD BSc PGDIPSci MAIG	NAME	FRASER WALSH CMEngNZ (Engel)
TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S Fitzgerald	SIGNATURE	Fraser

SITE INSPECTION NOTE

Client: Orchard Road Holdings Ltd	Project No. 6783-1A
Project: Alpha Series (Stage 4) Earthworks Monitoring & Certification	Inspection No. 28
BC/RC No. NA	Date: Wednesday 19 January 2022
Engineer: SF	Time: 09:00 – 10:00
Site Address: West Meadows Drive, Wanaka	

SCOPE OF WORKS

- First inspection for 2022
- Ongoing earthworks monitoring and certification for construction - Stage D
- Confirm the fill material type and compaction methodology is suitable for the application.
- Confirm the construction of structural fill is completed to the required engineering standard and in accordance with local council regulations.
- Completion of Scala penetrometer tests to confirm the bearing capacity of native subsoils and/or engineered fill.

OBSERVATIONS

- One area was assessed during this inspection:
- Area 1 – Western Fill Area
    - Two fill layers comprising a 600mm (as of Friday 14/01/22, referred to as the 'first' layer) + 400mm layer (as of Tuesday 18/01/22, refer to as the 'second' layer), totalling 1,000mm, had been constructed since the last inspection in 2021. However, structural fill thins downslope (toward north boundary) to less than 300mm at the toe of the fill area.
    - Estimated total fill depth: SG + 1.9m
        - GCL was unable to inspect the 'first' 600mm fill layer completed on 14/01/22 due to Christmas 2021 staff holidays, although it is understood that this layer (first layer) was NDM tested. Three NDM were completed through the thickest fill portion along the crest line. GCL pending review of NDM test results.
        - The subsequent 'second' 400mmmm fill layer was inspected.
    - No further structural fill is required. The fill area is pending final NDM testing before the 150mm covering topsoil is placed
- Fill material was site won silty SAND with lesser amounts of gravel.
- Benching of the final fill layers was required to ensure that direct compaction was achieved given slope gradients had increased, rendering regular rolling less effective.
- The compaction methodology employs the use of two 15T dynamic drum rollers (smooth and pad). Cross rolling, finishing with the smooth drum, is the typical practice. Water is administered to achieve optimal water content for compaction, although this is required to a lesser degree during the wetter winter months.
- NDM are scheduled for completion on the 'second' fill layer this afternoon.
- A total of 3x SPT were completed
    - SPT were completed along the fill Crestline targeting the thickest fill portion
    - SPT were also extended to maximum refusal or depth default (0.9m) below subbase level to assess the 'first' fill layer completed last week.
    - SPT locations are illustrated in Figure 1, and the test results are presented in the table below.
- Refer to Figures 1 & 2 and Photos for context,
- Note:
    - The finalised fill areas east on the subject fill area had covering topsoil installed and grass seed distributed.
    - In addition, the cut subgrade surface to the south (upslope) of the subject fill area also had covering topsoil installed and grass seed distributed.
    - Furthermore, the Stormwater facility documented in detail under Job 2A is complete. The site presents as topsoiled with some grass strike.

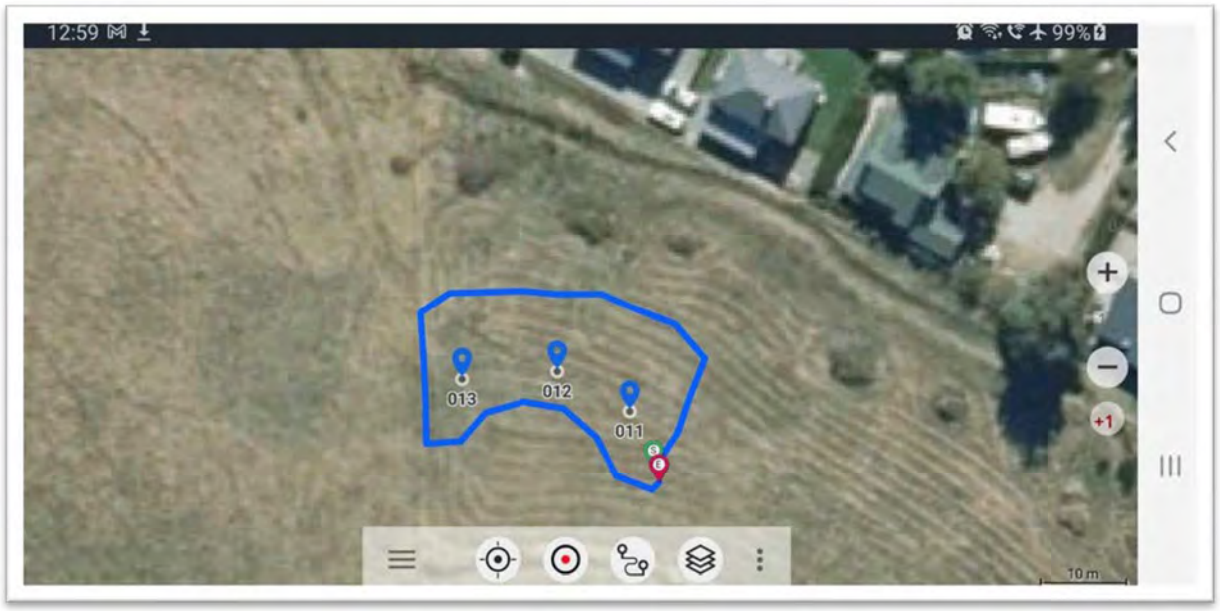


Figure 1. GPS locations of SPT sites, Blueline = Area 1,

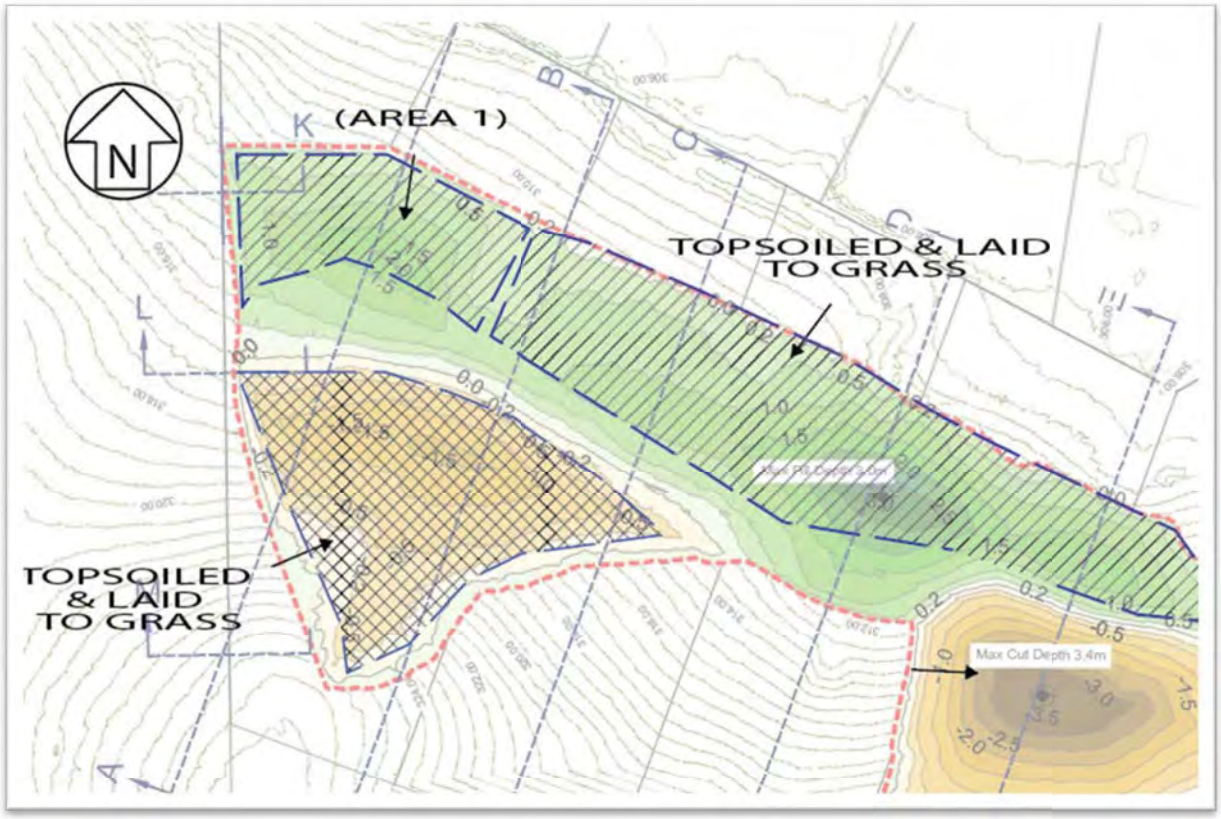


Figure 2: General location of engineered fill under construction

SPT TEST RESULTS

DEPTH (mm)	SPT101	SPT102	SPT103								
0 – 100	1	2	3								
100 – 200	7	4	5								
200 – 300	10	6	7								
300 – 400	11	7	8								
400 - 500	9	9	8								
500 - 600	7	11	10								
600 - 700	27	9	16								
700 - 800		6									
800 - 900		18									
LOCATION	GPS 11	GPS 12	GPS 13								
TERMINATION	RF = 0.70m	RF = 0.90m	RF = 0.65m								
NOTE	n/a	n/a	n/a								

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when five or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

A summary of the Scala penetrometer test results is listed below (reported as blows per 100mm Scala rod advancement):

- From subbase level to 0.4m below subbase level:
  - A blow count between 1 - 11, averaging 5.9 was achieved, soil strength increased with subsequent Scala blows.
  - Scala's termination: n/a
  - Good Ground is achieved from 0.1m below subbase level
- From 0.4m below subbase level to the point of Scala termination:
  - A blow count between 6 - 27, averaging 11.8 was achieved.
  - Scala's terminated by 'refusal' between 0.65m – 0.90m below subbase level,
  - Good Ground is consistently achieved throughout the engineered fill profile

NOTES & RECOMMENDATIONS

- Fill earthworks have been completed to an engineering standard. No further fill inspections are required.
- It is understood that the project focus will shift to the following objectives:
  - Install 750mm concrete pipeline between original Triton Arch System and the detention pond along the northern boundary of stage 1/2
  - Appropriate (beautifying) the required subdivision ground profile along the northern lot boundary of Stage D
  - Reinstate the temporary SRP with engineered fill
- GCL to complete weekly inspections and / or carry out inspection work as requested by CMH

PHOTO 1 - SITE PHOTO OF TOPSOILED FINALISED FILL AREAS, LOOKING EAST,

PHOTO 2 - SITE PHOTO OF AREA 1 LOOKING EAST, SPT103 FOR REFERENCE

AUTHOR		REVIEWER	
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TITLE	ENGINEERING GEOLOGIST	TITLE	DIRECTOR
SIGNATURE	S FITZGERALD	SIGNATURE	Fraser

SITE INSPECTION NOTE	
Client: Willow Ridge Developments C/- PPG Wanaka & CMH	Project No. 6783-3A
Project: Alpha Series Stage 4 (SRP)	Inspection No. 1
RC No: TBC	Date: Tuesday, 4 June 2024
Inspect Eng: SF | Report Eng: SF	Time: 10:45 – 11:45
Site Address: Alpha Series Stage 4 Wanaka	

SCOPE OF WORKS

Reinstating former Stage 4 SRP with engineered fill to create residential lot.

- Verify that the subgrade surface is suitable for either direct foundation installation or engineered fill construction by removing topsoil layers and any unsuitable underlying materials and or hard spots.
- Ensure compliance with relevant national and local regulations, including NZS3604:2010, NZS4431:2022, and NZS4404:2010/QLDC COP(2020).
- Conduct Scala penetrometer assessments to validate the bearing capacity within structural fill zones and or native subgrade surfaces, as necessary.
- Communicate observations and operational directives effectively with clients and or earthworks contractors.

OBSERVATIONS

- The SRP excavation had been 'skimmed' to remove all ingress fines that had accumulated during the facilities service life. The subgrade presented as a mixture of interbedded SAND and GRAVEL and dark grey silty SAND/sandy silt. The SAND and GRAVEL component was dry and reasonably competent achieving a soil strength of 'dense' following an SPT assessment. The SILT and SAND towards the south (upslope) was dry – moist and firm/stiff, as opposed to the same material towards the north (downslope) which was moist and very soft/soft. The latter is likely the location where water ponded before being dewatered. This area might prove problematic during compaction, where heave/pumping could occur. As such, undercut might be required depending on initial compaction performance.
- Non engineered fill overlying a buried topsoil horizon towards the eastern SRP crest should not be reused as E/Fill.
- Minor uncontrolled fill pockets around the SRP south, west and northern sides should be undercut once fill reaches a level where it is practical to do so.
- Remaining silty SAND stockpiled towards SRP west is permissible for reuse as E/fill providing a blend ratio of 50/50 is utilised. Note the fine grain material may prove problematic to compact following rain events due to its moisture sensitive nature.
- Alpine Meadows sandy GRAVEL proposed for main E/fill source.
- 3x SPT were completed across the prepared subgrade surface. The test results and locations are presented and illustrated in Table and Figure 1 below.

Figure 1: Location of Scalas relative to SRP constraints and prepared subgrade surface (blue polygon)

SCALA PENETROMETER TEST RESULTS

Table 1. summary of SPT test results, GPS coordinates and NDM ID (if applicable)

DEPTH (mm)	SPT 101	SPT 102	SPT 103							
0 – 100	3	0	2							
100 – 200	5	3	5							
200 – 300	8	6	6							
300 – 400	12	9	10							
400 - 500	17	14	10							
500 - 600		11								
600 - 700		5								
700 - 800		4								
800 - 900		6								
GPS LOCATION	229	230	231							
TERMINATION	ER = 0.50m	ED = 0.90m	ER = 0.45m							
NDM ID	n/a	n/a	n/a							

RF = Refusal, ER = Effective Refusal, ED = End by default

"Good Ground" as per the criteria of NZS 3604:2011 is achieved when five or more blows per 100mm Scala rod advancement is met, whereby an ultimate bearing capacity of 300kPa can be relied on for foundation design".

- A summary of Scala test results is provided below (reported as per 100mm Scala rod advancement):
  - A Scala blow count between 0 – 17 (average: 7.1) was achieved,
  - The Scala blow count demonstrates reasonable strength (dense) through the SAND and GRAVEL layer meeting with 'effective refusal' around 0.50m below subgrade level, as opposed to encountering the silty SAND layer in SPT102, which returns a blow count between 4 – 6, and SPT terminated at 0.90m by depth default.
  - Good Ground in the context of NZS3604 was consistently achieved from 0.20m below subbase level.

NOTES & RECOMMENDATIONS

General.

- The subgrade surface was prepared to the required engineering standard.
- Please send any relevant earthworks photos to shannon@gclttech.co.nz

E/W Program

- Remove leaf layer that has accumulated along the northerns downslope side of SRP
- Establish levelling layer and compact subgrade surface.
- Installed 3x lifts (max 250mm) to form one 600mm certifiable layer
- SPT and NDM testing to be completed for every 600mm fill layer created.

Inspection Scheduling

- Please allow a minimum of two days lead time.
- Project Manager to schedule inspections with GCL as required; otherwise, GCL will contact or make weekly inspections to monitor earthwork's progress and conformance.

No. 1	SITE PHOTO OF PREPARED SUBGRADE IN SRP LOOKING NORTHWEST

No. 2	SITE PHOTO OF PREPARED SUBGRADE IN SRP LOOKING SOUTHEAST

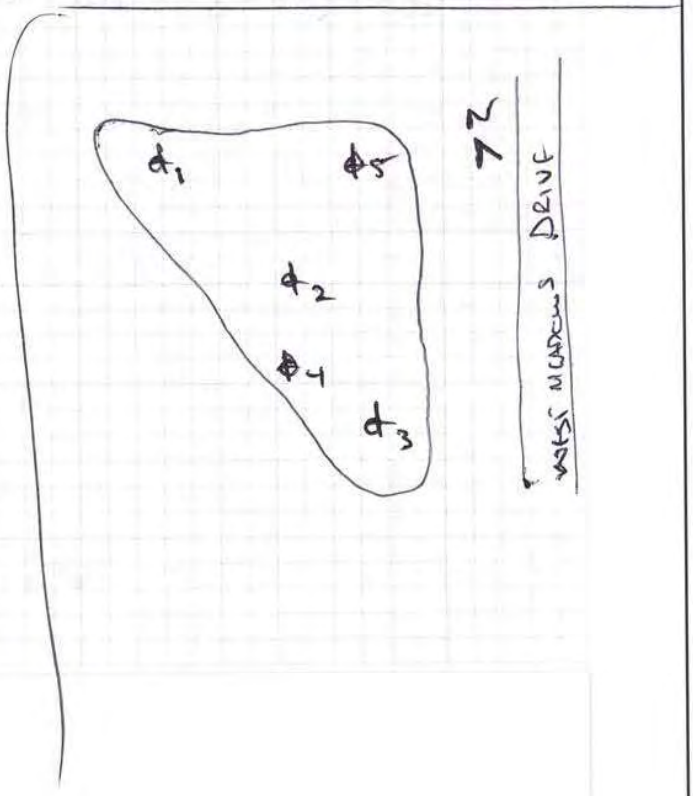
GCL	PROJECT:	ALPHA SERIES 4 -SEP.	DATE:	THR, 6 JUNE 24
	JOB No:	6783-3A	SIN No.	3A - SIN2.

			NDM																			
			GPS	232			233			234			235			236							
			SPT	1			2			3			4			5							
0.05	2.05	4.05		2			4			2			1			4							
0.10	2.10	4.10		3	5		5	9		3	5		2	3		4	8						
0.15	2.15	4.15		2			9			2			4			2							
0.20	2.20	4.20		3	5		6	15		3	5		6	10		5	7						
0.25	2.25	4.25		4			4			4			7			6							
0.30	2.30	4.30		3	7		10	14		6	10		7	14.		4	10						
0.35	2.35	4.35		3			8			8			7			5							
0.40	2.40	4.40		2	5		10	18		7	15		5	12		8	13						
0.45	2.45	4.45		3						3			4			10							
0.50	2.50	4.50		2	5					4	7		3	7									
0.55	2.55	4.55		3						4			4										
0.60	2.60	4.60		4	7					4	8		3	7									
0.65	2.65	4.65		4						4			4										
0.70	2.70	4.70		3	7					1	5		3	7									
0.75	2.75	4.74		4						1			5										
0.80	2.80	4.80		4	8					1	2		2	7									
0.85	2.85	4.85		3						1			1										
0.90	2.90	4.90		3	6					1	2.		1	2.									
0.95	2.95	4.95																					
1.00	3.00	5.00			ED			ED.			ED.			ED			ED.						
1.05	3.05	5.05																					
1.10	3.10	5.10																					
1.15	3.15	5.15																					
1.20	3.20	5.20																					
1.25	3.25	5.25																					
1.30	3.30	5.30																					
1.35	3.35	5.35																					
1.40	3.40	5.40																					
1.45	3.45	5.45																					
1.50	3.50	5.50																					
1.55	3.55	5.55																					
1.60	3.60	5.60																					
1.65	3.65	5.65																					
1.70	3.70	5.70																					
1.75	3.75	5.75																					
1.80	3.80	5.80																					
1.85	3.85	5.85																					
1.90	3.90	5.90																					
1.95	3.95	5.95																					
2.00	4.00	6.00																					

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

- FIRST LEVELLING / FILL LAYER INSTALLED ~ 600mm.
- FILL IMPORTED FROM ARDING MEADOWS (SANDY CREEK).
- STD CMA COMPACTION METHODOLOGY.
- 57 SPT COMPLETED IN 'FINE' DLE FORMATION.
- COMPACTION MEETS THE REQUIRED STD FROM ~~SUBGRADE~~ BT SUBBASE LEVEL.
- REDUCED BEARING CAPACITY FROM 0.7m IN SPT 103+104 REPRESENTS ENCOUNTERING SOFT SILTY SAND (NMRK FORMATION).
- UPTO 5m FILL TO BE INSTALLED TO ACHIEVE DESIGN LEVEL.



SITE PHOTO OF FIRST FILL INSTALLATION LOOKING SOUTH, SPT 105 FOR REFERENCE

SITE PHOTO OF FIRST FILL INSTALLATION LOOKING SOUTH

GCL Ground Consulting Ltd	PROJECT:	ASA.	DATE:	THU, 11 JUNE 24.
	JOB No:	6783-3A	SIN No.	SIN 3.

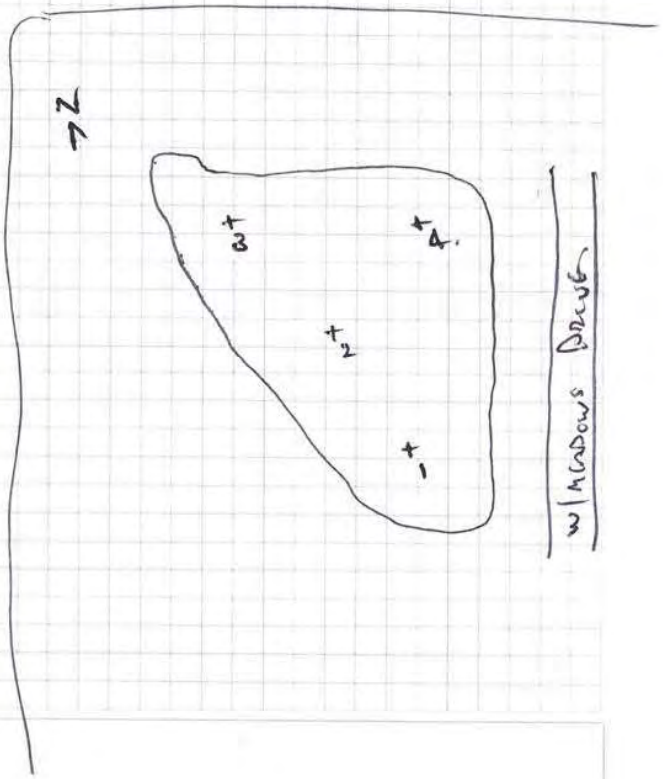
		NDM	4.		5		6.		n/a.											
		GPS																		
		SPT	1		2		3		4.		5		6		7		8		9	10
0.05	2.05	4.05	5		4		2		4											
0.10	2.10	4.10	6	11	7	11	5	7.	6	10										
0.15	2.15	4.15	7		8		6		9											
0.20	2.20	4.20	10	17	8	16	7	13	6	15										
0.25	2.25	4.25			12		7		6											
0.30	2.30	4.30		RF	12	24.	6	13	4	10										
0.35	2.35	4.35					7		10											
0.40	2.40	4.40				ER.	12	19												
0.45	2.45	4.45						ER.												
0.50	2.50	4.50								ER.										
0.55	2.55	4.55																		
0.60	2.60	4.60																		
0.65	2.65	4.65																		
0.70	2.70	4.70																		
0.75	2.75	4.74																		
0.80	2.80	4.80																		
0.85	2.85	4.85																		
0.90	2.90	4.90	98%		96%		96%		—											
0.95	2.95	4.95																		
1.00	3.00	5.00																		
1.05	3.05	5.05																		
1.10	3.10	5.10																		
1.15	3.15	5.15																		
1.20	3.20	5.20																		
1.25	3.25	5.25																		
1.30	3.30	5.30																		
1.35	3.35	5.35																		
1.40	3.40	5.40																		
1.45	3.45	5.45																		
1.50	3.50	5.50																		
1.55	3.55	5.55																		
1.60	3.60	5.60																		
1.65	3.65	5.65																		
1.70	3.70	5.70																		
1.75	3.75	5.75																		
1.80	3.80	5.80																		
1.85	3.85	5.85																		
1.90	3.90	5.90																		
1.95	3.95	5.95																		
2.00	4.00	6.00																		

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

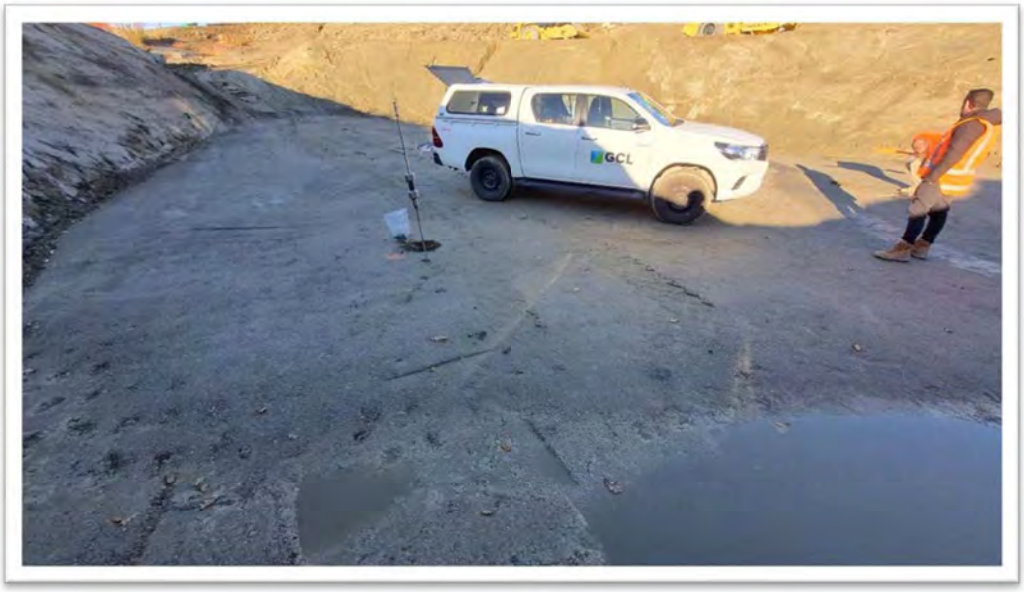
FILL INSPECTION

- 600mm FILL INSTALLED SINCE LAST VISIT.
- SAME FILL AND COMP METHODOLOGY ~~SAME~~
- 3t STATIC ROLLING PER 300mm LIFT.
- 4 x SPT COMPLETED, 3 x NDM COMPLETED.
- COMPACTION ACHIEVED TO AN E/STD FROM SUBBASE LEVEL.

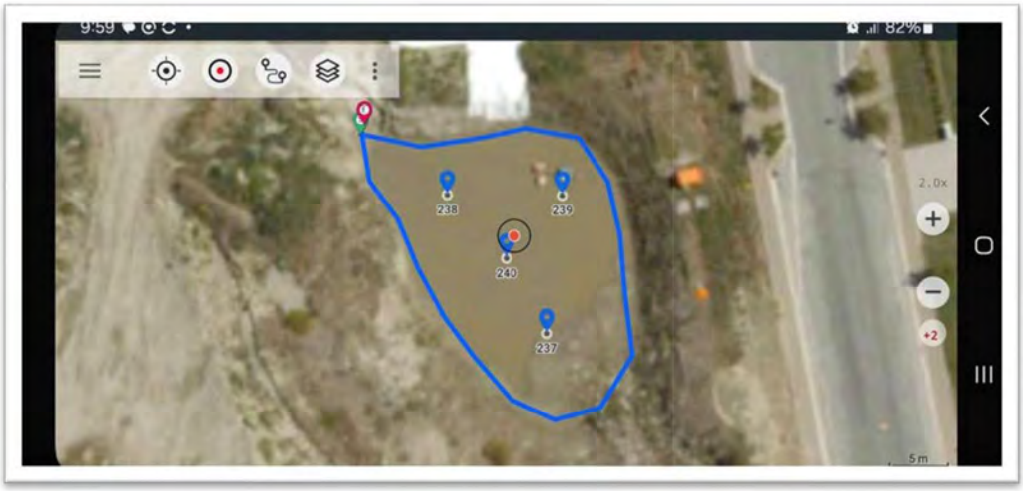


SITE PHOTO OF FIRST FILL INSTALLATION LOOKING NORTH

SITE PHOTO OF FIRST FILL INSTALLATION LOOKING SOUTH, SPT103 FOR REFERENCE



SITE PHOTO OF SPT LOCATIONS



GCL Ground Consulting Ltd	PROJECT:	ALPHA SERIES 4 (SEP)	DATE:	WGD, 12 JUNE 24.			
	JOB No:	6783- 3A.	SIN No.	4.			

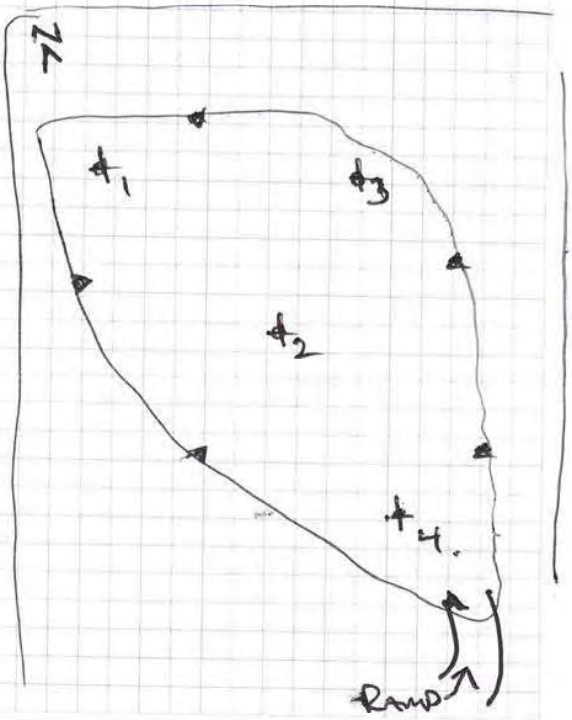
		NDM																				
		GPS																				
		SPT	1		2		3		4		5		6		7		8		9		10	
0.05	2.05	4.05	10		5		4		3													
0.10	2.10	4.10	10	20	6	11	5	9.	4	7												
0.15	2.15	4.15	4		7		5		5													
0.20	2.20	4.20	4	8	8	15	7	12	8	13												
0.25	2.25	4.25	9		13		10		10													
0.30	2.30	4.30	7	16	12	25	11	22														
0.35	2.35	4.35	8																			
0.40	2.40	4.40	7	15		ER		ER.		RF												
0.45	2.45	4.45	14																			
0.50	2.50	4.50		ER																		
0.55	2.55	4.55																				
0.60	2.60	4.60																				
0.65	2.65	4.65																				
0.70	2.70	4.70																				
0.75	2.75	4.74																				
0.80	2.80	4.80																				
0.85	2.85	4.85																				
0.90	2.90	4.90																				
0.95	2.95	4.95																				
1.00	3.00	5.00																				
1.05	3.05	5.05																				
1.10	3.10	5.10																				
1.15	3.15	5.15																				
1.20	3.20	5.20																				
1.25	3.25	5.25																				
1.30	3.30	5.30																				
1.35	3.35	5.35																				
1.40	3.40	5.40																				
1.45	3.45	5.45																				
1.50	3.50	5.50																				
1.55	3.55	5.55																				
1.60	3.60	5.60																				
1.65	3.65	5.65																				
1.70	3.70	5.70																				
1.75	3.75	5.75																				
1.80	3.80	5.80																				
1.85	3.85	5.85																				
1.90	3.90	5.90																				
1.95	3.95	5.95																				
2.00	4.00	6.00																				

SCALA PENETROMETER TEST RESULTS

GCL Geotech Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

FILL INSPECTION AT SRP.

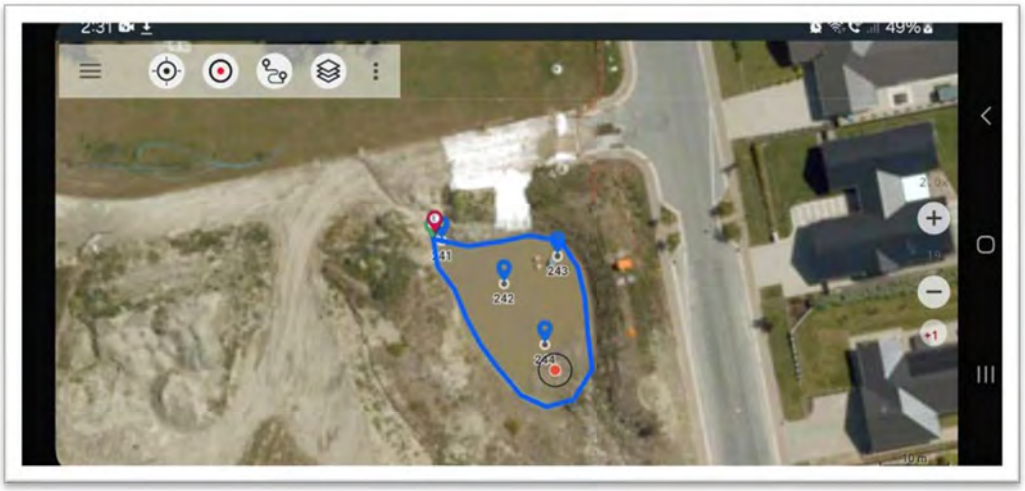
- 600MM FILL INSITU SINCE LAST VISIT.
- SAME FILL + COMP METHOD.
- 4 x SPT COMPLETED.
- NDM'S SCHEDULED AM.
- UPPER 100MM FROM FOR SPT101.
- E/FILL CONSTRUCTED TO THE REQUIRED SID.
- 'QC' ACHIEVED FROM SUBBASE LEVEL



SITE PHOTO OF FIRST FILL INSTALLATION LOOKING NORTH, SPT 104 FOR REFERENCE

SITE PHOTO OF FIRST FILL INSTALLATION LOOKING SOUTH, SPT101 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS



GCL Ground Consulting Ltd

PROJECT:	ALPHA SERIES 4 (SRD)	DATE:	TUE, 13 JUNE
JOB No:	6783 - 3A.	SIN No.	5.

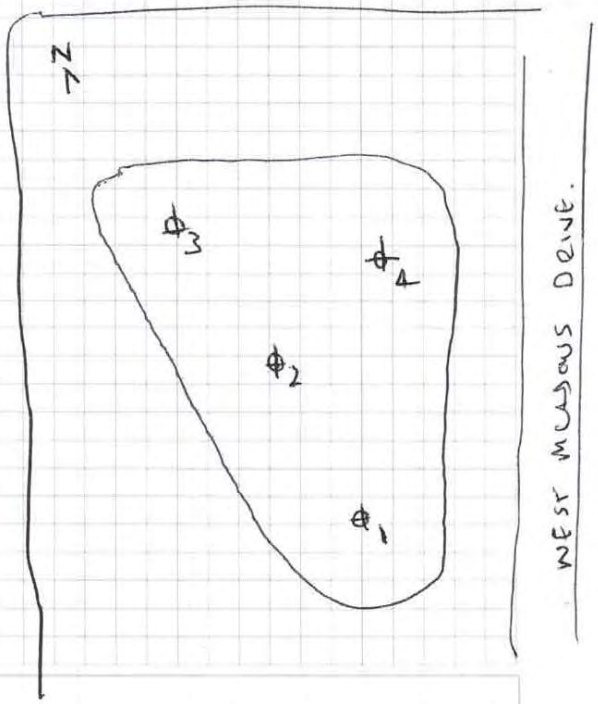
			NDM																	
			GPS	245		246		247		248										
			SPT	1		2.		3		4		5		6		7		8		9		10	
0.05	2.05	4.05		5		5		2		3													
0.10	2.10	4.10		6	11	5	10	5	7	5	8												
0.15	2.15	4.15		9		6		4		0													
0.20	2.20	4.20		10	19	7	13	4	8	6	14												
0.25	2.25	4.25		9		8		6		6													
0.30	2.30	4.30		15	24	9	17.	6	12	8	14												
0.35	2.35	4.35				8		10		10													
0.40	2.40	4.40			ER.	10	18	11	21	7	17												
0.45	2.45	4.45				11				12													
0.50	2.50	4.50					ER		ER		ER												
0.55	2.55	4.55																					
0.60	2.60	4.60																					
0.65	2.65	4.65																					
0.70	2.70	4.70																					
0.75	2.75	4.74																					
0.80	2.80	4.80																					
0.85	2.85	4.85																					
0.90	2.90	4.90																					
0.95	2.95	4.95																					
1.00	3.00	5.00																					
1.05	3.05	5.05																					
1.10	3.10	5.10																					
1.15	3.15	5.15																					
1.20	3.20	5.20																					
1.25	3.25	5.25																					
1.30	3.30	5.30																					
1.35	3.35	5.35																					
1.40	3.40	5.40																					
1.45	3.45	5.45																					
1.50	3.50	5.50																					
1.55	3.55	5.55																					
1.60	3.60	5.60																					
1.65	3.65	5.65																					
1.70	3.70	5.70																					
1.75	3.75	5.75																					
1.80	3.80	5.80																					
1.85	3.85	5.85																					
1.90	3.90	5.90																					
1.95	3.95	5.95																					
2.00	4.00	6.00																					

SCALA PENETROMETER TEST RESULTS

GCL Groups Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

SRP FILL INSPECTION.

- 600mm E/FILL INSTALL SINCE LAST VISIT.
- SAME FILL AND COMP METHOD.
- 4 SPT COMPLETED.
- NDM'S SCHEDULED FOR LATE MORNING.
- PASS!! - 'GOOD GROUND' ARISING FROM SUBBASE LEVEL.
- NOTE: UNDERCUT ANY AREAS OF PLASTIC SANDY SILT!!.



SITE PHOTO OF FIRST FILL INSTALLATION LOOKING NORTH, SPT 101 FOR REFERENCE

SITE PHOTO OF FIRST FILL INSTALLATION LOOKING SOUTH, SPT104 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS

GCL Ground Consulting Ltd	PROJECT:	ALANA SERIES 4 (SRP)	DATE:	TUE, 18 JUNE 24.
	JOB No:	6783	SIN No.	6

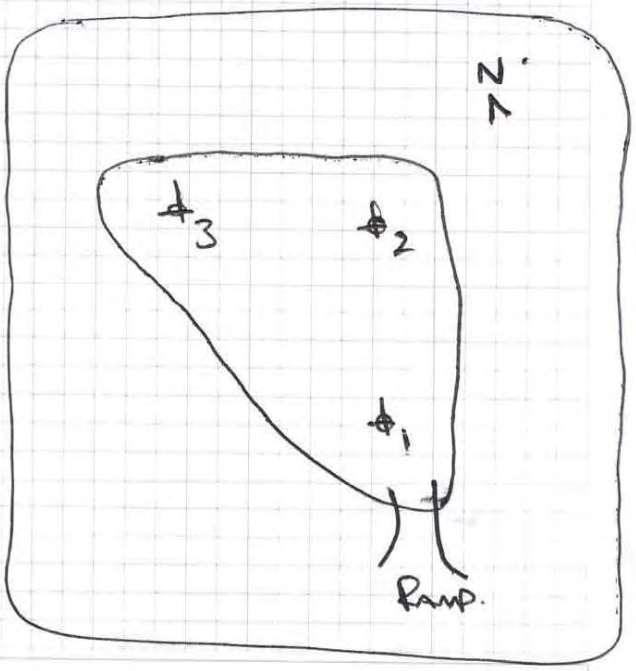
		NDM	A		B		C								
		GPS	254		255		256								
		SPT	1		2		3		4	5	6	7	8	9	10
0.05	2.05	4.05	2		3		2								
0.10	2.10	4.10	4	6	4	7	2	4							
0.15	2.15	4.15	5		3		4								
0.20	2.20	4.20	5	10	4	7	4	8.							
0.25	2.25	4.25	4		5		10								
0.30	2.30	4.30	7	11	5	10									
0.35	2.35	4.35	10		7										
0.40	2.40	4.40	10	20	11	18		ER.							
0.45	2.45	4.45													
0.50	2.50	4.50		ER.		ER									
0.55	2.55	4.55													
0.60	2.60	4.60													
0.65	2.65	4.65													
0.70	2.70	4.70													
0.75	2.75	4.74													
0.80	2.80	4.80													
0.85	2.85	4.85													
0.90	2.90	4.90													
0.95	2.95	4.95													
1.00	3.00	5.00													
1.05	3.05	5.05													
1.10	3.10	5.10													
1.15	3.15	5.15													
1.20	3.20	5.20													
1.25	3.25	5.25													
1.30	3.30	5.30													
1.35	3.35	5.35													
1.40	3.40	5.40													
1.45	3.45	5.45													
1.50	3.50	5.50													
1.55	3.55	5.55													
1.60	3.60	5.60													
1.65	3.65	5.65													
1.70	3.70	5.70													
1.75	3.75	5.75													
1.80	3.80	5.80													
1.85	3.85	5.85													
1.90	3.90	5.90													
1.95	3.95	5.95													
2.00	4.00	6.00													

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm FILL INSTALLATION INSPECTION.

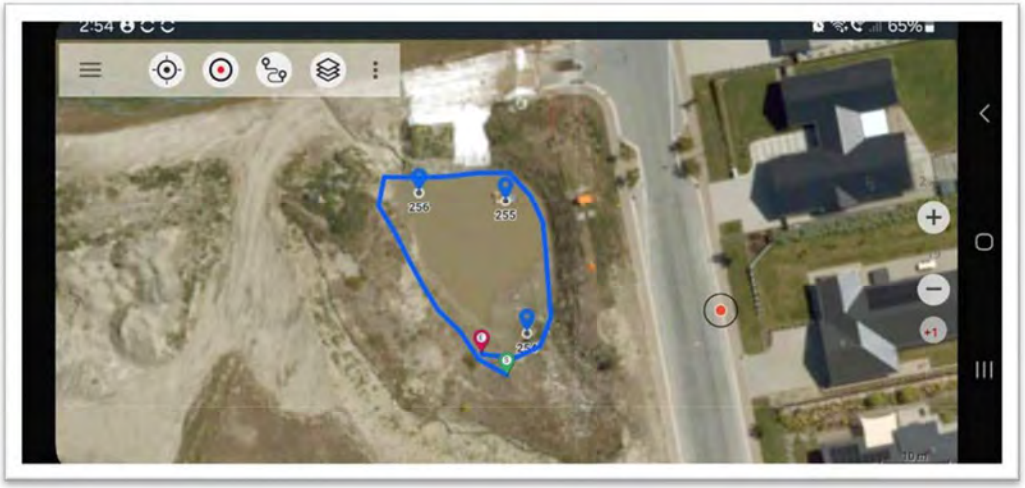
- FILL = 1/2 SITE WON (SILTY SAND) + 1/2 IMPORTED (SANDY GRAVEL).
- 3 NDM (A, B, C) COMPLETED, TWINNED WITH SPT.
- MINOR 'HEAVE' ACROSS ENTIRE LAYER
- 'CHANGE!' FILL TYPE BACK TO 100% IMPORTED.



SITE PHOTO OF NEXT FILL INSTALLATION LOOKING NORTH, SPT 101 FOR REFERENCE

SITE PHOTO OF NEXT FILL INSTALLATION LOOKING SOUTH, SPT 103 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS



GCL	PROJECT:	ALPHA SERIES 4 (SEP).	DATE:	THR, 20 JUNE 24.
	JOB No:	6783.	SIN No.	7.

(4).

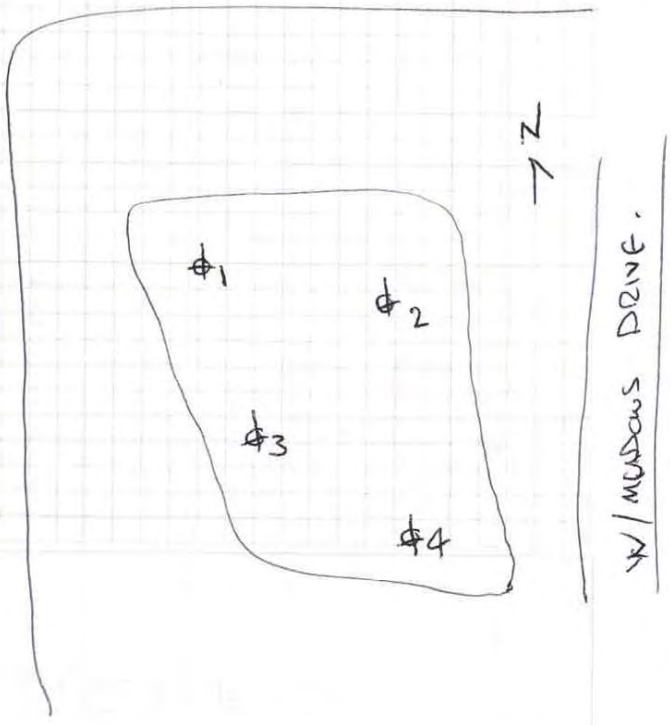
			NDM																					
			GPS	260				261				262				263									
			SPT	1				2				3				4.									
0.05	2.05	4.05		3				3				3				2									
0.10	2.10	4.10		6		9		7		10		4		7		4		6.							
0.15	2.15	4.15		5				7				5				4									
0.20	2.20	4.20		4		9		6		13		4		9		2		6							
0.25	2.25	4.25		3				6				3				4									
0.30	2.30	4.30		3		6		5		11		5		8		4		8							
0.35	2.35	4.35		4				7				6				6									
0.40	2.40	4.40		5		9		8		15		4		10		5		11							
0.45	2.45	4.45		4				10				5				6									
0.50	2.50	4.50		4		8				RF		5		10		10		16							
0.55	2.55	4.55		5								7													
0.60	2.60	4.60		5		10						10		17				RF							
0.65	2.65	4.65		6																					
0.70	2.70	4.70		7		13								RF											
0.75	2.75	4.74		10																					
0.80	2.80	4.80				RF																			
0.85	2.85	4.85																							
0.90	2.90	4.90																							
0.95	2.95	4.95																							
1.00	3.00	5.00																							
1.05	3.05	5.05																							
1.10	3.10	5.10																							
1.15	3.15	5.15																							
1.20	3.20	5.20																							
1.25	3.25	5.25																							
1.30	3.30	5.30																							
1.35	3.35	5.35																							
1.40	3.40	5.40																							
1.45	3.45	5.45																							
1.50	3.50	5.50																							
1.55	3.55	5.55																							
1.60	3.60	5.60																							
1.65	3.65	5.65																							
1.70	3.70	5.70																							
1.75	3.75	5.75																							
1.80	3.80	5.80																							
1.85	3.85	5.85																							
1.90	3.90	5.90																							
1.95	3.95	5.95																							
2.00	4.00	6.00																							

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm FILL INSPECTION.

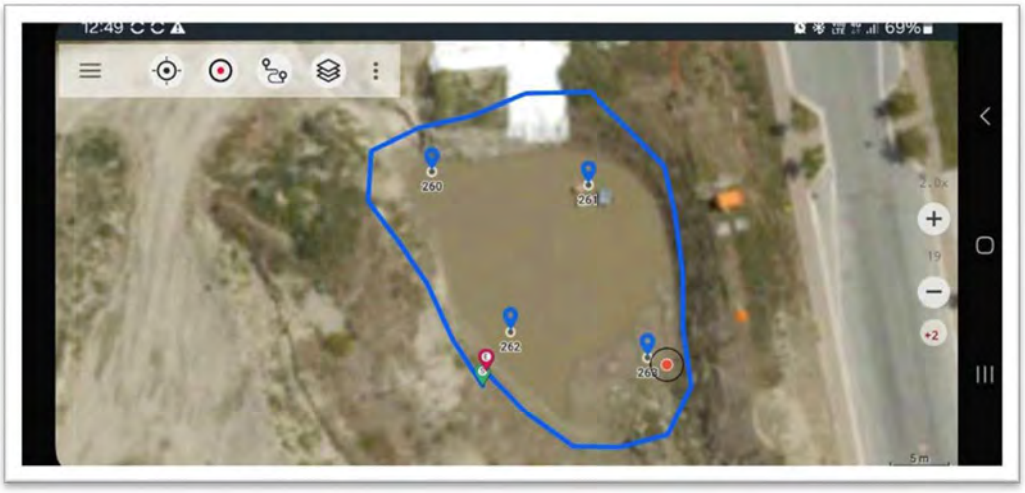
- FILL SOURCED FROM THREE PARKS. (SANDY CRAIG), SAME FILL SINCE START OF JOB.
- MIXLITE OF SHEEPS FOOT + SMOOTH DRUM TO ACHIEVE COMPACTION.
- 4x SPT COMPLETED.
- COMPACTION COMPLETED TO AN E/ STD.
- NDM SCHEDULED FOR TODAY (PM).



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH, SPT 104 FOR REFERENCE

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS



GCL	PROJECT:	ALPINA SERIES 4. (SRP).	DATE:	MON, 24 JUNE
	JOB No:	6783.	SIN No.	8.

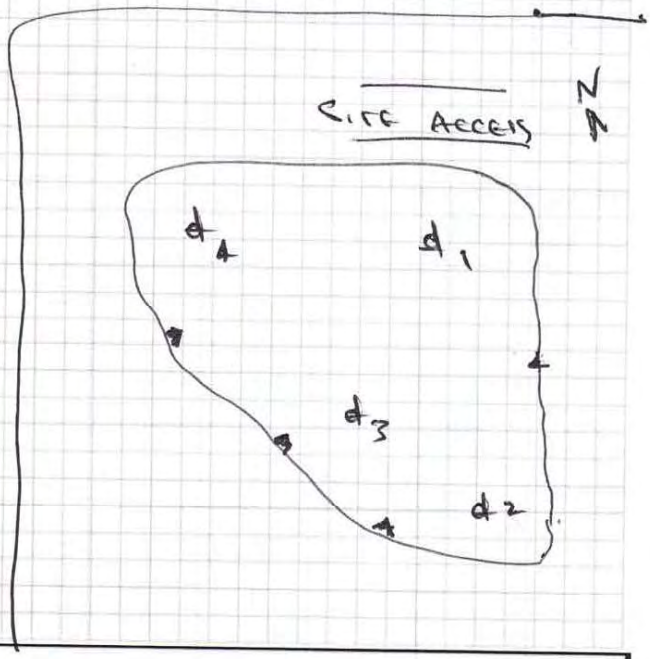
		SPT	1		2		3		4.		5	6	7	8	9	10
		NDM	—		—		—		—							
		GPS	264		265		266		267.							
0.05	2.05	4.05	2		2		2		3							
0.10	2.10	4.10	5	7	4	6	5	7.	5	8						
0.15	2.15	4.15	5		5		8		6							
0.20	2.20	4.20	5	10	5	10	6	14.	7	13						
0.25	2.25	4.25	4		7		5		7							
0.30	2.30	4.30	4	8	6	13	5	10	5	12						
0.35	2.35	4.35	10		10		10		3							
0.40	2.40	4.40	12	22	10		10	20	7	10						
0.45	2.45	4.45							10							
0.50	2.50	4.50		ER.		ER		ER	10	20						
0.55	2.55	4.55														
0.60	2.60	4.60								ER						
0.65	2.65	4.65														
0.70	2.70	4.70														
0.75	2.75	4.74														
0.80	2.80	4.80														
0.85	2.85	4.85														
0.90	2.90	4.90														
0.95	2.95	4.95														
1.00	3.00	5.00														
1.05	3.05	5.05														
1.10	3.10	5.10														
1.15	3.15	5.15														
1.20	3.20	5.20														
1.25	3.25	5.25														
1.30	3.30	5.30														
1.35	3.35	5.35														
1.40	3.40	5.40														
1.45	3.45	5.45														
1.50	3.50	5.50														
1.55	3.55	5.55														
1.60	3.60	5.60														
1.65	3.65	5.65														
1.70	3.70	5.70														
1.75	3.75	5.75														
1.80	3.80	5.80														
1.85	3.85	5.85														
1.90	3.90	5.90														
1.95	3.95	5.95														
2.00	4.00	6.00														

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm E/FILL INSPECTION (LEVEL WITH SITE ACCESS).

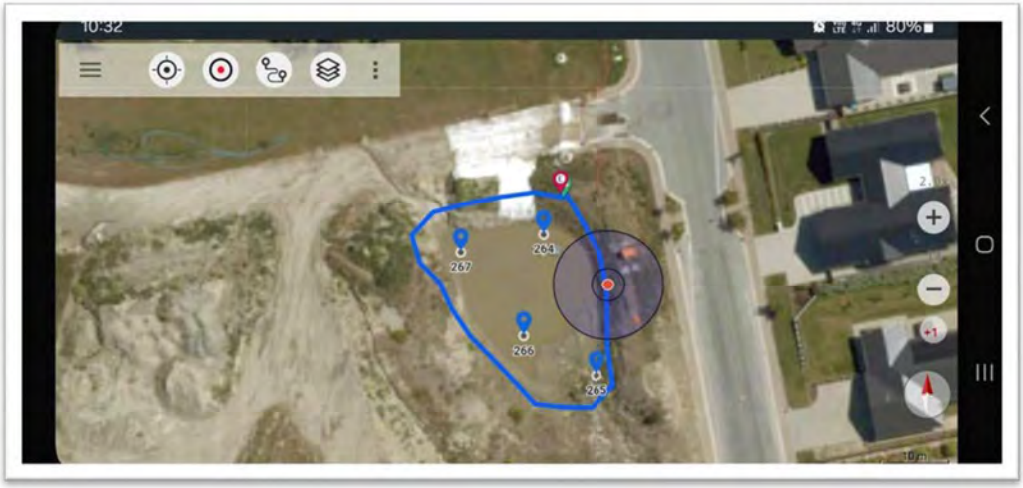
- NO LOOKOUTS AREAS OF 'HEART' OBSERVED AT BASE OF RAMP OR ALONG SW SRP BOUNDARY.
- SAME FILL MATERIAL & LOAD MONITORED.
- 4 SPT COMPLETE; COMPACTION ACHIEVED TO A E/ SND FROM SUBBASE LEVEL.
- NDM SCHEDULED FOR TODAY (AM).



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH, SPT 102 FOR REFERENCE

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH, SPT 104 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS



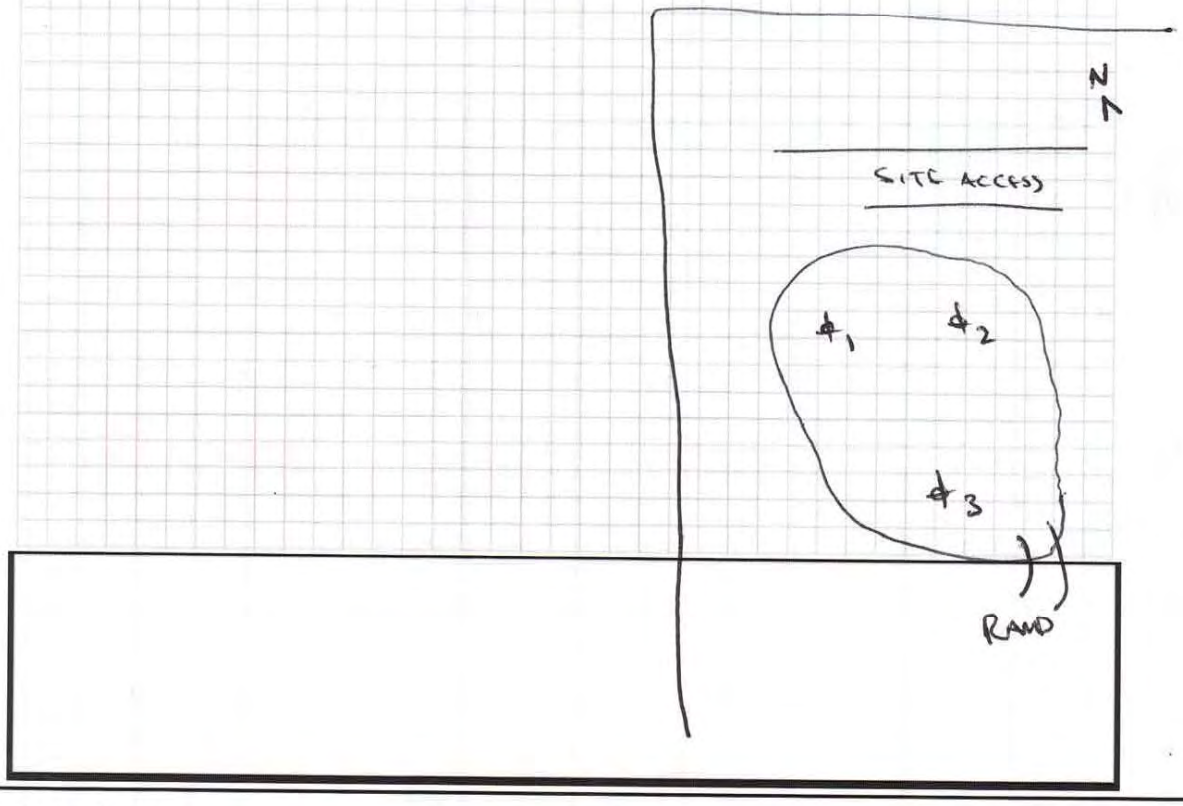
GCL Ground Consulting Ltd

PROJECT:	ALPHA SERIES 4 (SED)	DATE:	WED, 26 JUNE 24.
JOB No:	6783.	SIN No.	9

			NDM	22		23		24.													
			GPS	271		272		273													
			SPT	1		2		3		4		5		6		7		8		9	10
0.05	2.05	4.05		4		5		2													
0.10	2.10	4.10		4	8	5	10	5	7												
0.15	2.15	4.15		5		8		7													
0.20	2.20	4.20		5	10	8	16	8	15												
0.25	2.25	4.25		7		7		6													
0.30	2.30	4.30		5	12	4	11	6	12.									..		.	
0.35	2.35	4.35		5		5															
0.40	2.40	4.40		6	11	10	15		RF.												
0.45	2.45	4.45		12																	
0.50	2.50	4.50			EQ.		EQ.														
0.55	2.55	4.55																			
0.60	2.60	4.60																			
0.65	2.65	4.65																			
0.70	2.70	4.70																			
0.75	2.75	4.74																			
0.80	2.80	4.80																			
0.85	2.85	4.85																			
0.90	2.90	4.90																			
0.95	2.95	4.95																			
1.00	3.00	5.00																			
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

SCALA PENETROMETER TEST RESULTS

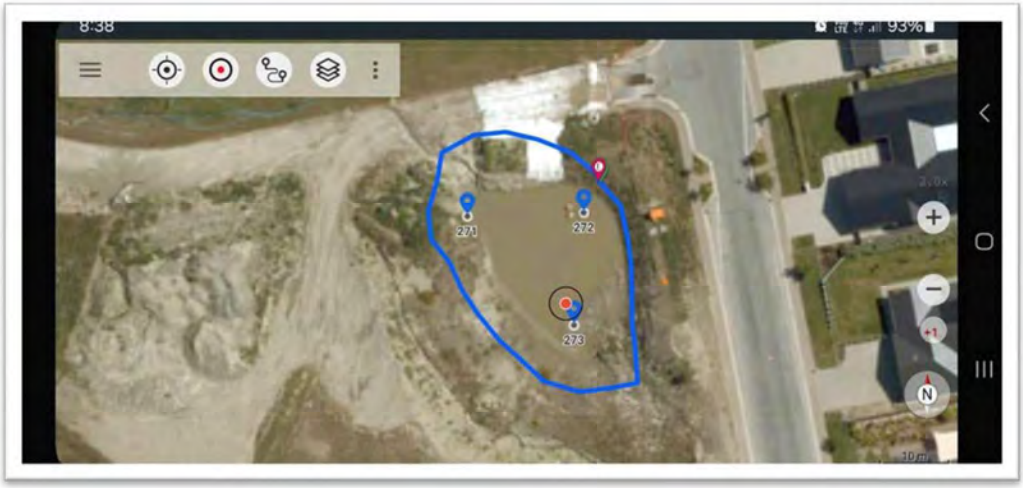
- ± 600mm E/FILL INSPECTION.
- SAME FILL + COMP METHOD.
- 3x NDM (22-24) COMPLETED, TWINNED WITH SPT.
- FILL IS BEING COMPACTED TO AN ENGINEERING STD.
- 1.2m ABOVE ANY LOCALISED AREAS OF HEAVE ASSOCIATED WITH MOISTER SOFTENED SILTS/SAND.
- RANGING 600mm ABOVE SITE ACCESS LEVEL.



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH, SPT 103 FOR REFERENCE

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS



GCL Ground Consulting Ltd	PROJECT:	ALPHA SERIES 4 (SRD)	DATE:	THUR, 27 JUNE 24.
	JOB No:	6783.	SIN No.	10

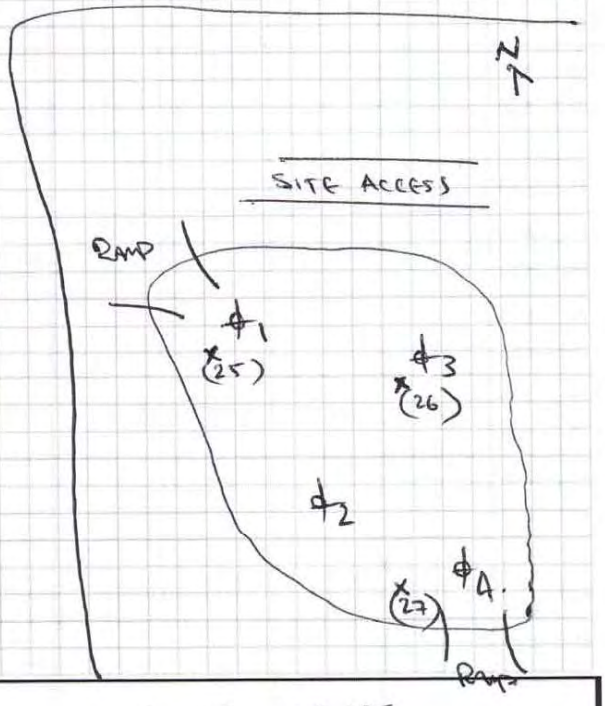
			NDM	(25)				(26)		(27)											
			GPS	280		281		282		283											
			SPT	1		2		3		4		5		6		7		8		9	10
0.05	2.05	4.05		2		4		4		4											
0.10	2.10	4.10		5	7	6	10	6	10	6	10										
0.15	2.15	4.15		6		7		8		7											
0.20	2.20	4.20		5	11	7	14.	8	16	7	14.										
0.25	2.25	4.25		8		6		10		6											
0.30	2.30	4.30			RF.	6	12	RF/RF		5	11										
0.35	2.35	4.35				6				10											
0.40	2.40	4.40				6	12			RF/RF											
0.45	2.45	4.45				10															
0.50	2.50	4.50					RF														
0.55	2.55	4.55																			
0.60	2.60	4.60																			
0.65	2.65	4.65																			
0.70	2.70	4.70																			
0.75	2.75	4.74																			
0.80	2.80	4.80																			
0.85	2.85	4.85																			
0.90	2.90	4.90																			
0.95	2.95	4.95																			
1.00	3.00	5.00																			
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

SCALA PENETROMETER TEST RESULTS

GCL Geotech Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm E/FILL INSTALL

- SAME FILL + COMP METHOD.
- 4Y SPT COMPLETED ON EVEN CENTRES.
- FILL IS BEING COMPACTED TO AN E/STD.
- 'GG' ACHIEVED FROM SUBBASE LEVEL.
- NDM'S BEING COMPLETED AT TIME OF INSPECTION. (NO. 26-27)
- FORMAL SUBGRADE INSPECTION OF EAST AND SOUTH SRP FACES DURING NEXT VISIT - MINOR U/FILL TO BE REMOVED.

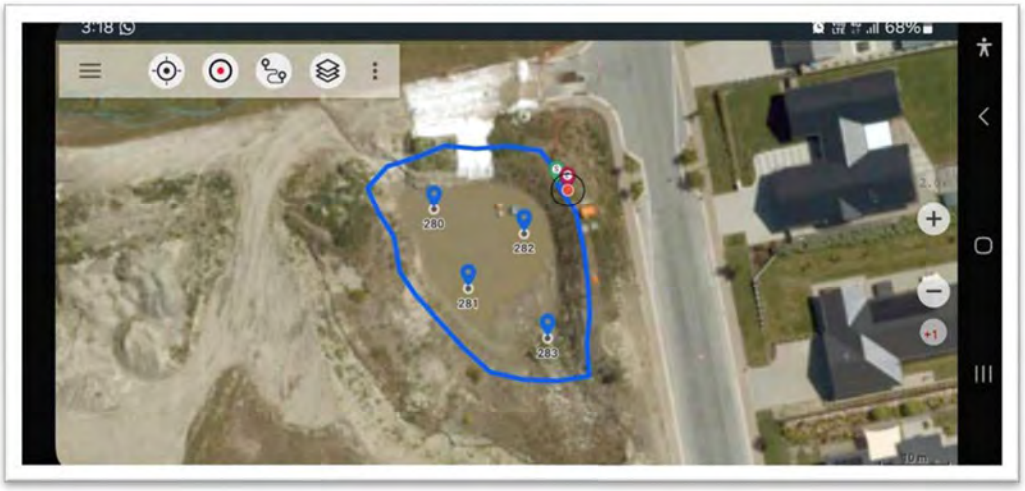


X = NDM NUMBER SPT.

SITE PHOTO OF FILL INSTALLATION LOOKING NORTH, SPT 104 FOR REFERENCE

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS

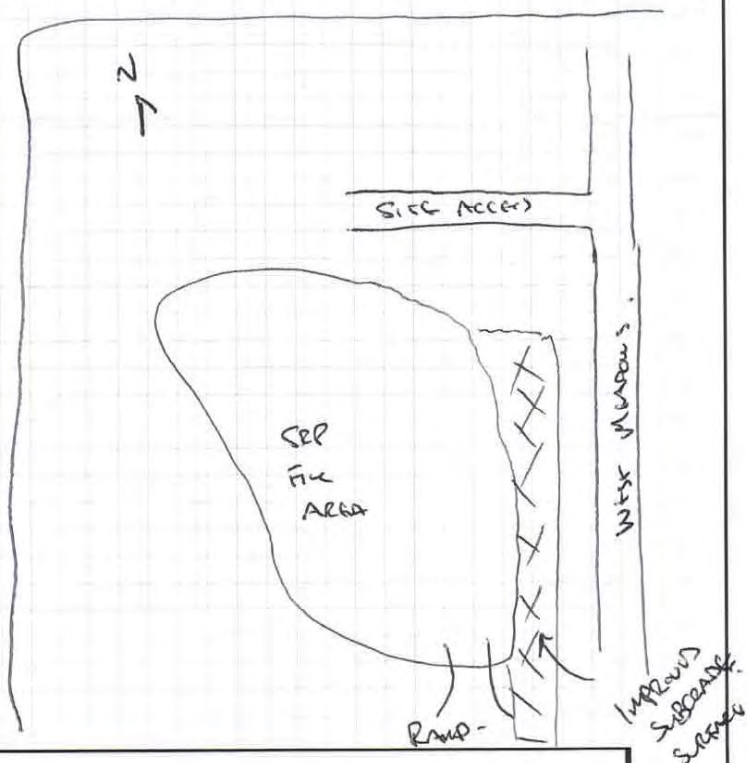


SITE PHOTO OF TYPICAL STRUCTURAL FILL MATERIAL

GCL	PROJECT:	AS4 (SRP).	DATE:	WED 3 JULY. 24..
	JOB No:	6783.	SIN No.	11

SUBGRADE INSPECTION.

- A SUBGRADE INSPECTION WAS CONDUCTED ALONG THE SRP'S EASTERN CREST TO CONFIRM UNCONTROLLED FILL AND BURIED TOPSOIL HORIZON (USED IN BENCHING) HAD BEEN REMOVED TO THE REQUIRED STANDARD BEFORE PLACING 'E-FILL'.
- A GENERAL CUT BETWEEN 600-900mm WAS COMPLETED REMOVING UNSUITABLE SOILS, REVEALING A SUBGRADE OF DRY, MEDIUM DENSE, BEDDED SAND AND MINOR SILT.
- THE AREA WAS SUITABLE PREPARED FOR THE CONSTRUCTION OF E/FILL.



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH

GCL Ground Consulting Ltd

PROJECT:	ALPHA SERIES 4 (SRP)	DATE:	THUR, 4 JULY 24
JOB No:	6783-3A.	SIN No.	12.

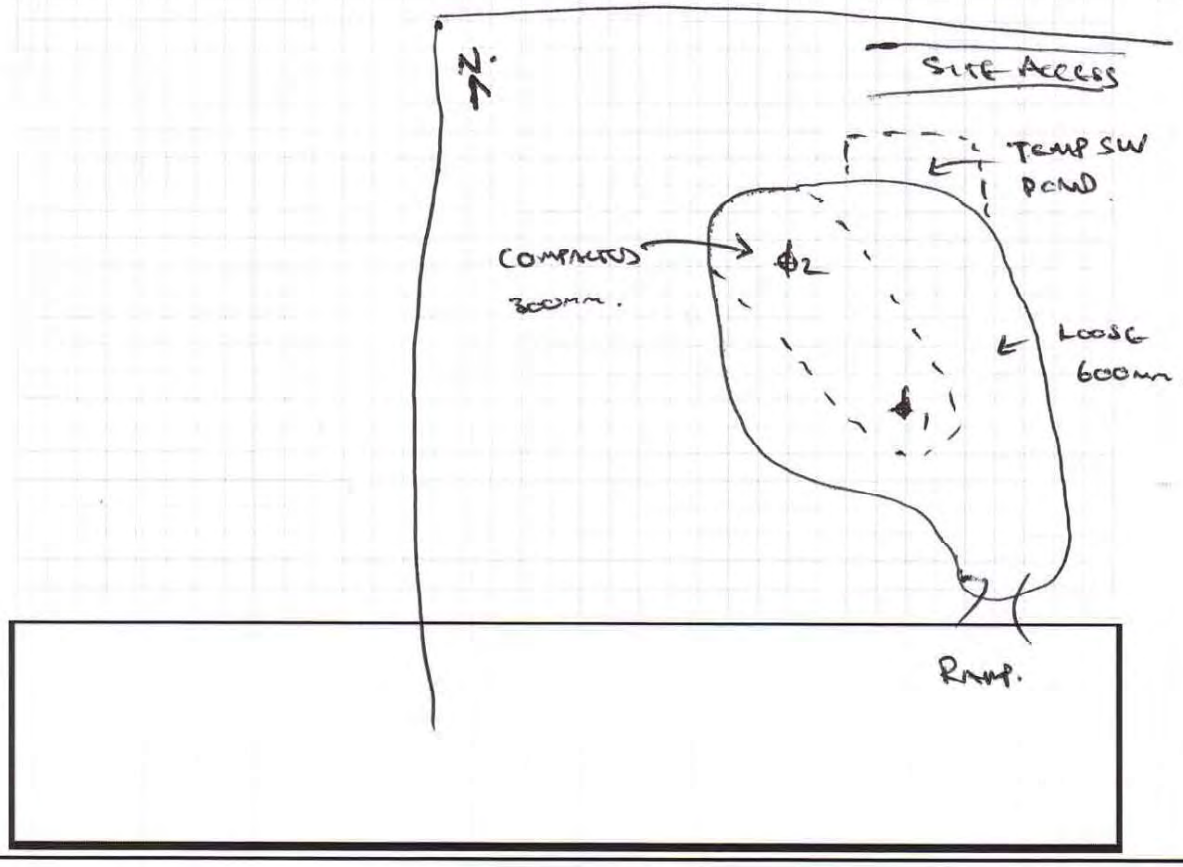
			NDM																			
			GPS	294.		295																
			SPT	1		2		3		4		5		6		7		8		9		10
0.05	2.05	4.05		1		2																
0.10	2.10	4.10		2	3	4	6															
0.15	2.15	4.15		2		3																
0.20	2.20	4.20		2	4	2	5															
0.25	2.25	4.25		8		3																
0.30	2.30	4.30		3	11	5	8															
0.35	2.35	4.35		3		8																
0.40	2.40	4.40		5	8	9	17															
0.45	2.45	4.45		10		12																
0.50	2.50	4.50			EQ.		EQ.															
0.55	2.55	4.55																				
0.60	2.60	4.60																				
0.65	2.65	4.65																				
0.70	2.70	4.70																				
0.75	2.75	4.74																				
0.80	2.80	4.80																				
0.85	2.85	4.85																				
0.90	2.90	4.90																				
0.95	2.95	4.95																				
1.00	3.00	5.00																				
1.05	3.05	5.05																				
1.10	3.10	5.10																				
1.15	3.15	5.15																				
1.20	3.20	5.20																				
1.25	3.25	5.25																				
1.30	3.30	5.30																				
1.35	3.35	5.35																				
1.40	3.40	5.40																				
1.45	3.45	5.45																				
1.50	3.50	5.50																				
1.55	3.55	5.55																				
1.60	3.60	5.60																				
1.65	3.65	5.65																				
1.70	3.70	5.70																				
1.75	3.75	5.75																				
1.80	3.80	5.80																				
1.85	3.85	5.85																				
1.90	3.90	5.90																				
1.95	3.95	5.95																				
2.00	4.00	6.00																				

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm Fill Instalation - Partially Compacted

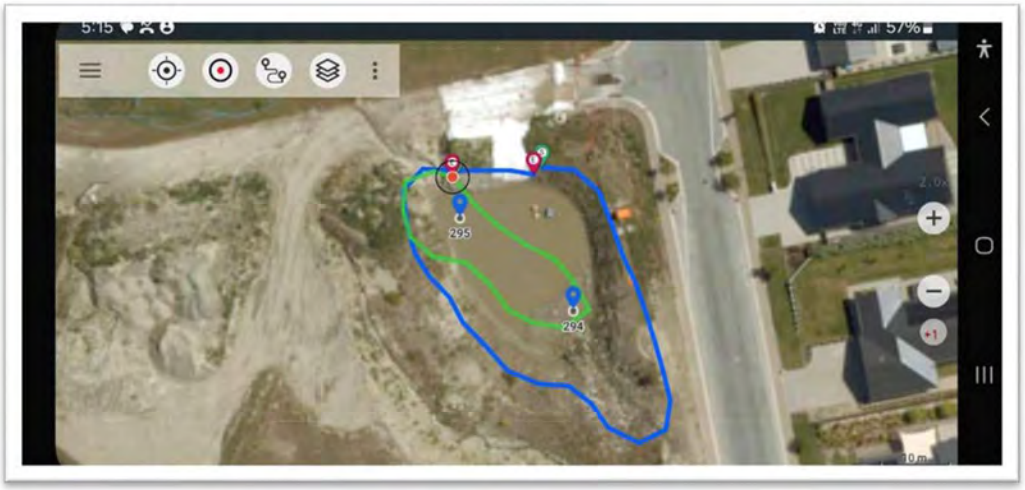
- Fill through central portion mostly compacted, loose material around the peripherys needs compaction.
- Same fill material + comp method.
- Temp SW pond at fill area north required reinstatement to an E/ SND when appropiate.
- NDM scheduled for Friday (tomorrow).
- 2x SPT completed, through 300mm portion.
  ↳ Further compaction required.



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH

SPT LOCATIONS RELATIVE TO FILL AREA



GCL Ground Classifying Ltd

PROJECT:	ALPHA SERIES A (SRD)	DATE:	MON, 8 JULY 24.
JOB No:	6783.	SIN No.	13.

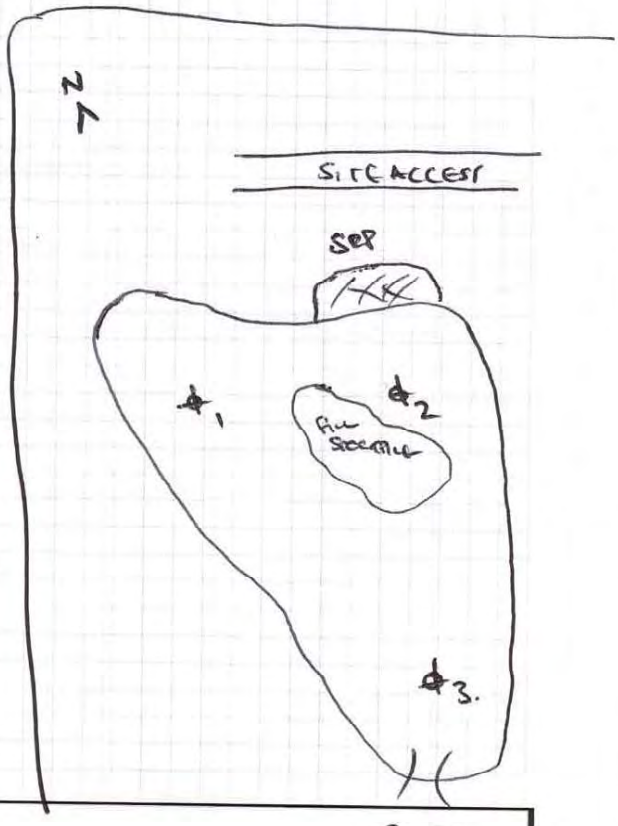
			NDM	28.		29		30													
			GPS	296		297		298													
			SPT	1		2		3.		4		5		6		7		8		9		10	
0.05	2.05	4.05		5		2		3													
0.10	2.10	4.10		8	13	2	5	6	9												
0.15	2.15	4.15		7		3		6													
0.20	2.20	4.20		4	11	5	8	5	11												
0.25	2.25	4.25		4		3		6													
0.30	2.30	4.30		3	7	4	7	5	11												
0.35	2.35	4.35		4		4		8													
0.40	2.40	4.40		5	9	3	7	13	21												
0.45	2.45	4.45		10		5															
0.50	2.50	4.50		8	18	13	18		OR												
0.55	2.55	4.55		9			ER														
0.60	2.60	4.60		10	19																
0.65	2.65	4.65			ER																
0.70	2.70	4.70																			
0.75	2.75	4.74																			
0.80	2.80	4.80																			
0.85	2.85	4.85																			
0.90	2.90	4.90																			
0.95	2.95	4.95																			
1.00	3.00	5.00																			
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

FORMAL CERTIFICATION FOR THE 600mm FILL LAYER INSTALLED LAST THURSDAY THAT WAS UNDER COMPACTION AT THE TIME OF INSPECTION.

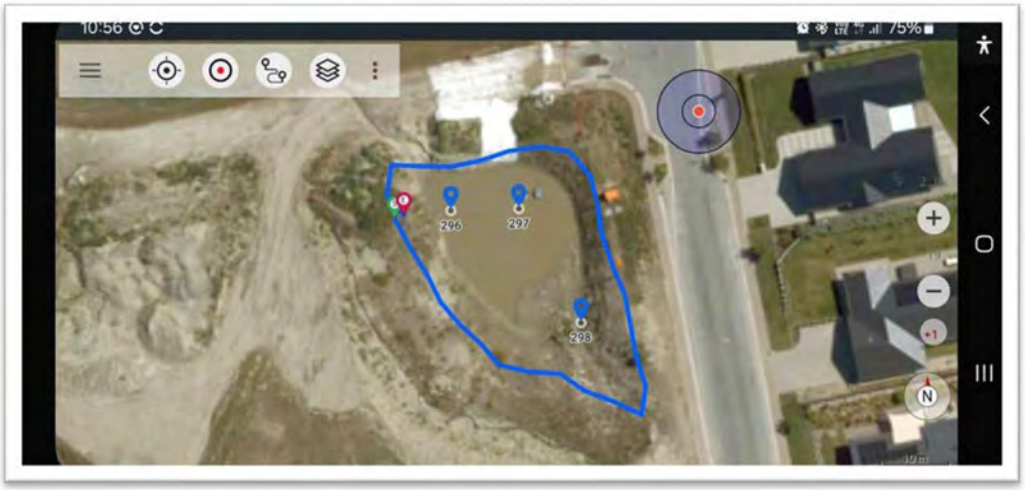
- SAME FILL + COMP METHOD.
- CROSS PROFILE (FINAL) BEING CUT IN NE CORNER.
- 3x NDM COMPLETED (No. 28 – 30), NO. 29 WAS UNDER FILL STOCKPILE, ALL THINNED WITH SPT.
- COMPACTION ACHIEVED TO THE REQUIRED E/SND!!!
- 'SKIM' ALL SUBSOIL SURFACES PRIOR TO FILL INSTALLATION TO CONFIRM SOIL SUITABILITY.



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH

SPT LOCATIONS RELATIVE TO FILL AREA



GCL Ground Consulting Ltd	PROJECT:	ALANA SERIES 4 (SRP)	DATE:	WED, 10 JULY 24
	JOB No:	6783-3A	SIN No.	14.

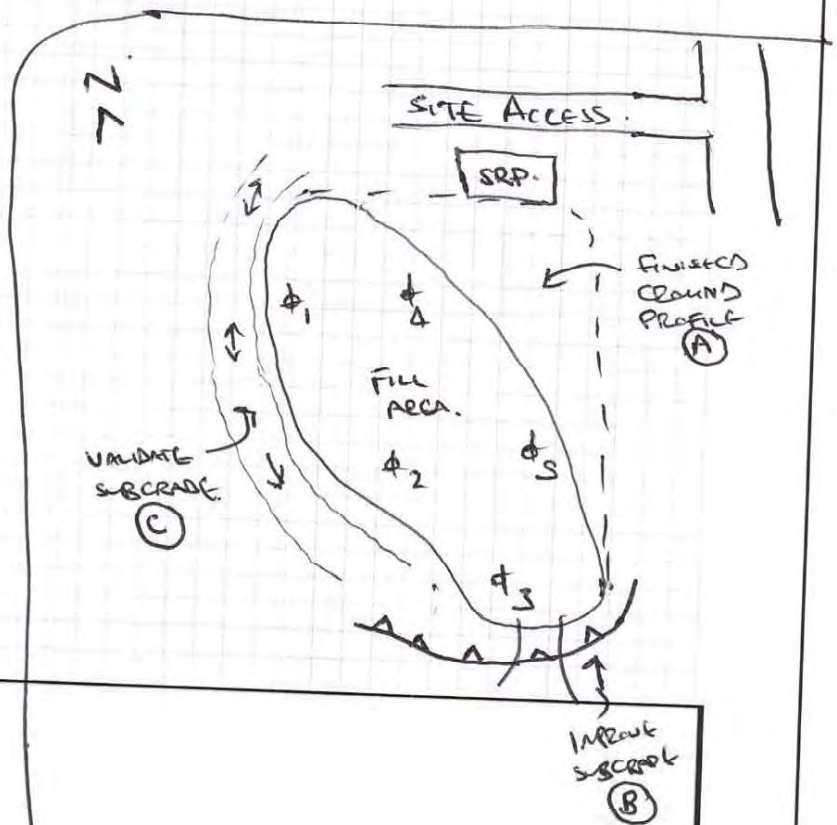
		NDM																				
		GPS	309		310		311		312		313		6		7		8		9		10	
		SPT	1		2		3		4		5.											
0.05	2.05	4.05	2		2		2		1		1											
0.10	2.10	4.10	3	5	4	6	5	7	4	5	5	6										
0.15	2.15	4.15	5		5		7		4		3											
0.20	2.20	4.20	4	9	5	10	5	12	4	8	4	7										
0.25	2.25	4.25	4		4		4		4		4											
0.30	2.30	4.30	4	8	3	7	3	7	4	8	4	8.										
0.35	2.35	4.35	10		4		3		3		10											
0.40	2.40	4.40		ER	7	11	3	6	4	7		ER.										
0.45	2.45	4.45			10		3		6													
0.50	2.50	4.50				ER.	4	7	10	16												
0.55	2.55	4.55					4															
0.60	2.60	4.60					3	7		ER.												
0.65	2.65	4.65					4															
0.70	2.70	4.70					7	11														
0.75	2.75	4.74					10															
0.80	2.80	4.80						ER														
0.85	2.85	4.85																				
0.90	2.90	4.90																				
0.95	2.95	4.95																				
1.00	3.00	5.00																				
1.05	3.05	5.05																				
1.10	3.10	5.10																				
1.15	3.15	5.15																				
1.20	3.20	5.20																				
1.25	3.25	5.25																				
1.30	3.30	5.30																				
1.35	3.35	5.35																				
1.40	3.40	5.40																				
1.45	3.45	5.45																				
1.50	3.50	5.50																				
1.55	3.55	5.55																				
1.60	3.60	5.60																				
1.65	3.65	5.65																				
1.70	3.70	5.70																				
1.75	3.75	5.75																				
1.80	3.80	5.80																				
1.85	3.85	5.85																				
1.90	3.90	5.90																				
1.95	3.95	5.95																				
2.00	4.00	6.00																				

SCALA PENETROMETER TEST RESULTS

GCL Groups Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm E/FILL INSPECTION

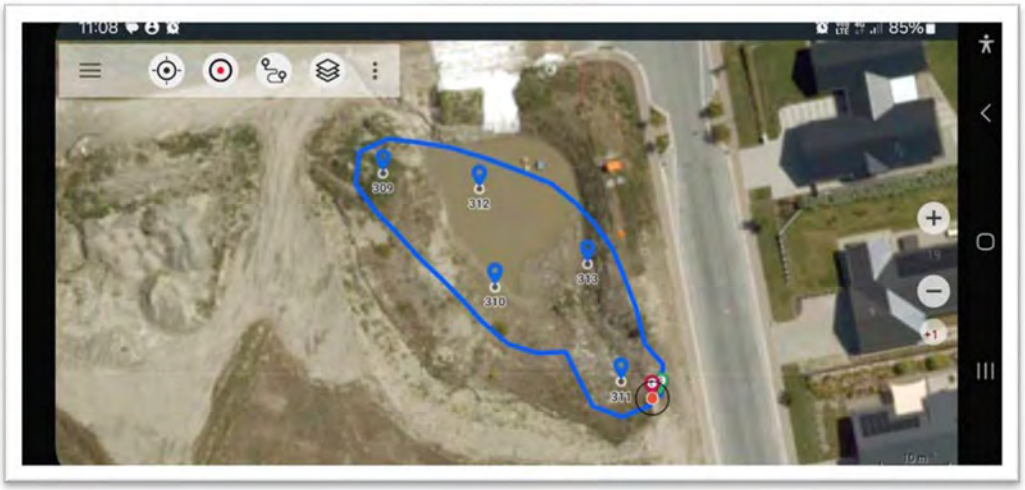
- SAND FILL + COMP METHOD.
- (A) GROUND PROFILE (FINAL DESIGN) OCCURING ALONG NORTH EASTERN FILL BOUNDARY.
- (B) SUBGRADE IMPROVEMENTS REQUIRED ALONG SOUTH FILL BOUNDARY :: STRIP OF FILL, REMOVE BURIED TS HORIZON, REINSTALL FILL.
- (C) ALSO, GCL TO VALIDATE SUBGRADE SURFACE QUALITY ALONG WESTERN FILL BOUNDARY (FORMER RAMP).
- 5Y SPT COMPLETED.
- NDM'S SCHEDULED FOR TODAY.
- COMPACTION ACHIEVED TO AN E/ STD.
- 2.0 → 3.0m E/FILL REMAINING.



SITE PHOTO OF FILL INSTALLATION LOOKING NORTH, SPT103 FOR REFERENCE

SITE PHOTO OF FILL INSTALLATION LOOKING SOUTH, SPT101 FOR REFERENCE

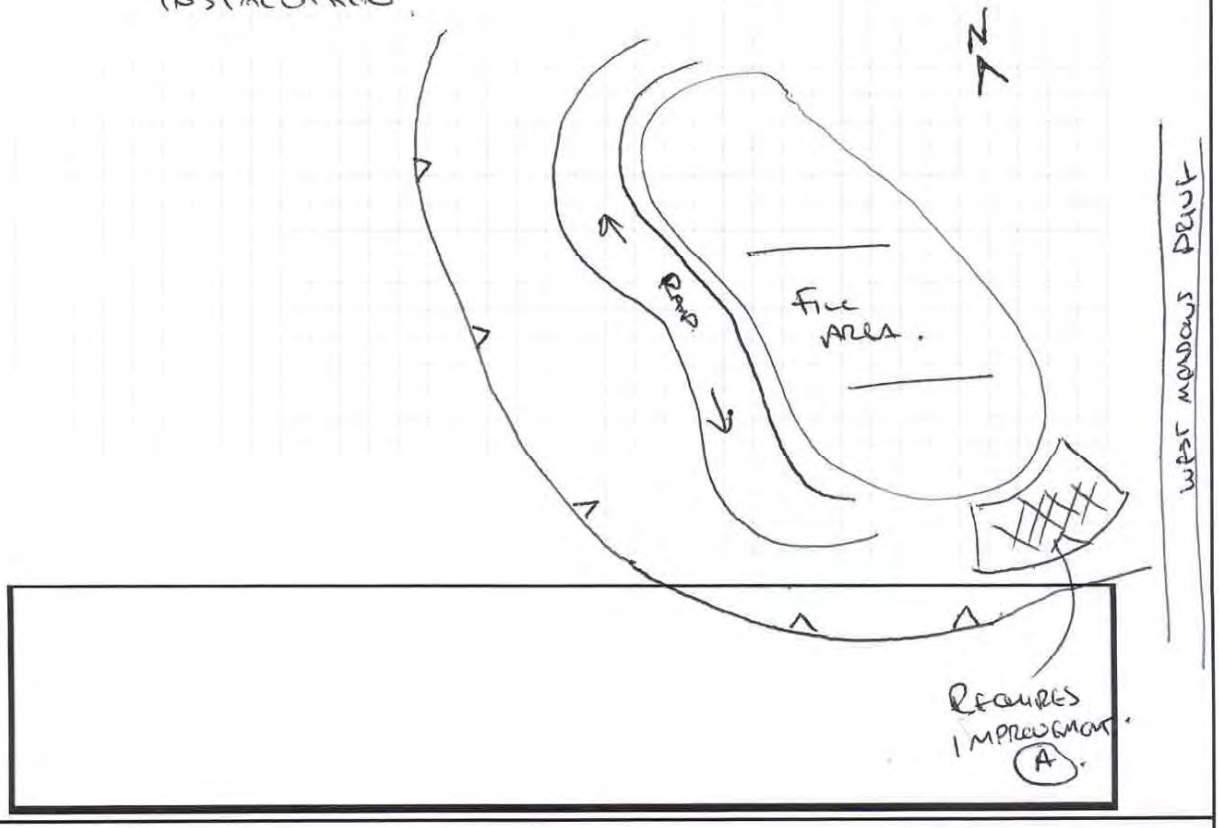
SPT LOCATIONS RELATIVE TO FILL AREA



GCL	PROJECT:	ALPHA SERIES 4 (SRD)	DATE:	THUR, 11 JULY 24.
	JOB No:	6783	SIN No.	15 -

SUBGRADE SURFACE QUALITY INSPECTION PERTAINS TO THE SOUTH AND WEST FORMED SRP SURFACES + WESTERN ACCESS RAMP.

- A 'SKIM' ACROSS THE DESCRIBED SURFACE WAS COMPLETED REVEALING A MIXTURE OF NATURAL FORMATION (SILTY SAND, DRY, DENSE) + 1 TO 2 GENERATIONS OF E/FILL TOWARDS THE SOUTH.
- THE FILL OVER NATURAL SOIL INTERFACE COULD BE OBSERVED, WHICH REVEALED AND APPROPRIATELY PREPARED SUBGRADE SURFACE DEVOID OF TOPSOIL.
- MINOR IMPROVEMENT STILL REQUIRED IN THE (A) SOUTH EAST CORNER, OTHERWISE, THE SUBGRADE SURFACE IS SUITABLE FOR AREA E/FILL INSTALLATION.



SITE PHOTO OF RECONDITIONED SUBGRADE SURFACE ALONG SOUTH AND WEST OF FORMER SRP, LOOKING SOUTH (1)

SITE PHOTO OF RECONDITIONED SUBGRADE SURFACE ALONG SOUTH AND WEST OF FORMER SRP, LOOKING SOUTH (2)

SITE PHOTO OF RECONDITIONED SUBGRADE SURFACE ALONG FORMER WESTERN SRP RAMP

SITE PHOTO OF SUBGRADE IMPROVEMENT REQUIREMENT IN SOUTHEASTERN CORNER

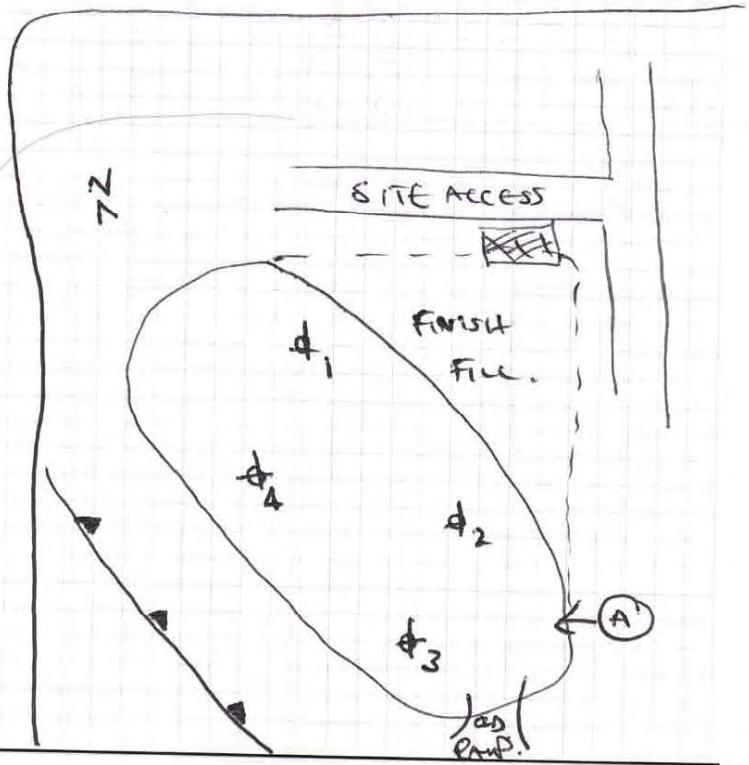
		PROJECT:	ARPINA SERIES 4 (SRP)						**DATE:**	MON, 15 JULY 24						
		JOB No:	6783						**SIN No.**	16						
		NDM	—		—		—		—							
		GPS	324		325		326		377							
		SPT	1		2		3		4.		5	6	7	8	9	10
0.05	2.05	4.05	2		2		2		3							
0.10	2.10	4.10	4	6	4	6	4	6	5	8						
0.15	2.15	4.15	5		5		6		7							
0.20	2.20	4.20	7	12	5	10	5	11	7	14.						
0.25	2.25	4.25	8		4		4		7							
0.30	2.30	4.30	8	16	4	8	4	8	8	15						
0.35	2.35	4.35	4		4		4		8							
0.40	2.40	4.40	5	9	3	7	3	7	10	18						
0.45	2.45	4.45	7		4		3			ER.						
0.50	2.50	4.50	12	19	10	14	4	7								
0.55	2.55	4.55					4									
0.60	2.60	4.60		ER		ER	6	10								
0.65	2.65	4.65					5									
0.70	2.70	4.70					4	9								
0.75	2.75	4.74					3									
0.80	2.80	4.80					3	6								
0.85	2.85	4.85					2									
0.90	2.90	4.90					3	5.								
0.95	2.95	4.95														
1.00	3.00	5.00						ED.								
1.05	3.05	5.05														
1.10	3.10	5.10														
1.15	3.15	5.15														
1.20	3.20	5.20														
1.25	3.25	5.25														
1.30	3.30	5.30														
1.35	3.35	5.35														
1.40	3.40	5.40														
1.45	3.45	5.45														
1.50	3.50	5.50														
1.55	3.55	5.55														
1.60	3.60	5.60														
1.65	3.65	5.65														
1.70	3.70	5.70														
1.75	3.75	5.75														
1.80	3.80	5.80														
1.85	3.85	5.85														
1.90	3.90	5.90														
1.95	3.95	5.95														
2.00	4.00	6.00														

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm E/FILL INSTALLATION.

- FINAL SMOOTH DRUM COMPACTION BEING COMPLETED AT TIME OF INSPECTION.
- SAME FILL TYPE + COMP METHOD.
- NDM'S SCHEDULED FOR TOPAM.
- 4x SPT COMPLETED.
- 'GOOD GROUND' ACHIEVED FROM SUBBASE LEVEL – I.E., COMPACTION ACHIEVED TO THE REQUIRED E/ STD.
- SPT 103, LIKELY INTERCEPTED NATURAL SUBGRADE (SILTY SAND) ON THE EDGE OF THE FORMER SRP RAMP FROM. 0.70m BELOW SUBBASE LEVEL.
- (A) CMR REMEDIATED APPROPRIATELY AS PER PREVIOUS SIN.



SITE PHOTO OF SUBBASE SURFACE, LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SUBBASE SURFACE, LOOKING NORTH, SPT 103 FOR REFERENCE

SITE PHOTO OF REMEDIATED SUBGRADE IN SOUTHEASTERN CORNER

SITE PHOTO OF REMEDIATED SUBGRADE IN SOUTHWESTERN CORNER

GCL Ground Consulting Ltd	PROJECT:	ALPHA SERIES A (SRD)	DATE:	THUR, 18 JULY 24.
	JOB No:	6783.	SIN No.	17

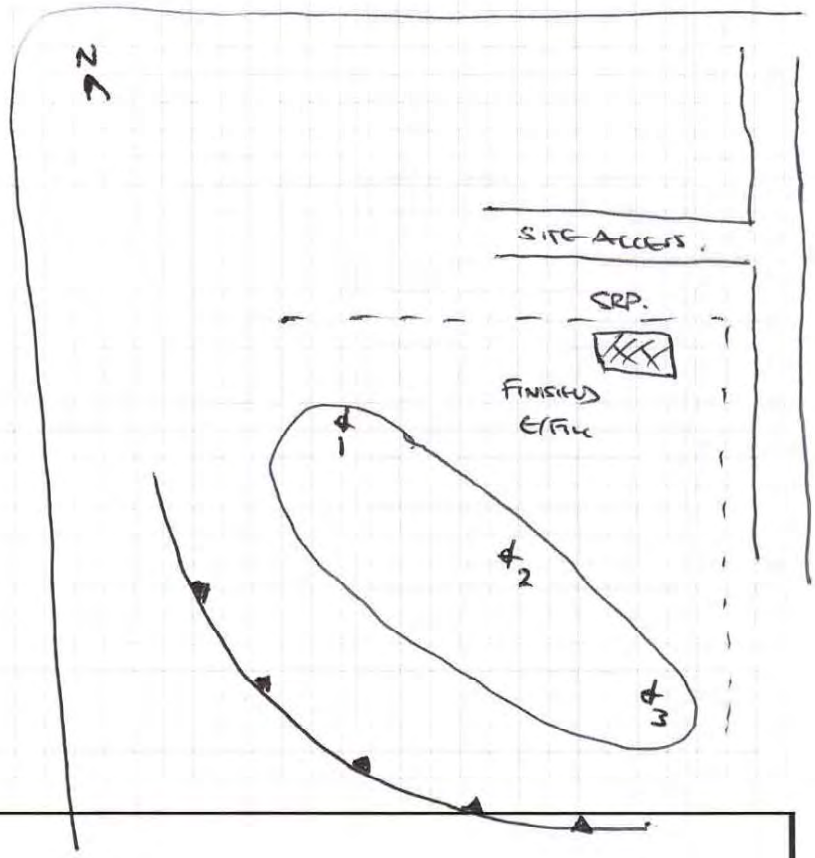
			NDM	37		38		39													
			GPS	333		334		335													
			SPT	1		2		3		4		5		6		7		8		9		10	
0.05	2.05	4.05		3		3		2													
0.10	2.10	4.10		6	9	5	8	4	6												
0.15	2.15	4.15		6		6		4													
0.20	2.20	4.20		6	12	5	11	5	9.												
0.25	2.25	4.25		5		6		5													
0.30	2.30	4.30		5	10	5	11	4	9.												
0.35	2.35	4.35		4		6		4													
0.40	2.40	4.40		12	16	6	12	4	8												
0.45	2.45	4.45			ER	11		5													
0.50	2.50	4.50					ER	10	15												
0.55	2.55	4.55							ER.												
0.60	2.60	4.60																			
0.65	2.65	4.65																			
0.70	2.70	4.70																			
0.75	2.75	4.74																			
0.80	2.80	4.80																			
0.85	2.85	4.85																			
0.90	2.90	4.90																			
0.95	2.95	4.95																			
1.00	3.00	5.00																			
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

SCALA PENETROMETER TEST RESULTS

GCL	PROJECT:		DATE:	
	JOB No:		SIN No.	

600m E/FILL INSPECTION,

- THE SUBSEQUENT FILL LAYER HAD BEEN SPREAD/LEVELLED ACROSS THE SOUTHERN HALF AT THE TIME OF INSPECTION. (NDM SITES LEFT OPEN).
- SAME FILL + COMP METHOD.
- 3x NDM'S (NO. 37-39) HAD BEEN COMPLETED, TWINNED WITH SPT.
- E/FILL COMPACTED TO AN E/STD — PROCEED!!



SITE PHOTO OF SUBBASE SURFACE, LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SUBBASE SURFACE, LOOKING NORTH, SPT 103 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS

GCL Ground Consulting Ltd

PROJECT:	ALPHA SERIES 4 (SRP).	DATE:	MON, 22 JULY 24.
JOB No:	6783.	SIN No.	18

			NDM	40		41		42.													
			GPS	336		337		338.													
			SPT	1		2.		3		4		5		6		7		8		9		10	
0.05	2.05	4.05		2		4		3													
0.10	2.10	4.10		6	8	6	10	6	9.												
0.15	2.15	4.15		7		8		7													
0.20	2.20	4.20		6	13	8	16	6	13.												
0.25	2.25	4.25		7		5		5													
0.30	2.30	4.30		6	13	6	11.	7	12.												
0.35	2.35	4.35		7		5		5													
0.40	2.40	4.40		12	19	10	15	5	10												
0.45	2.45	4.45				15		12													
0.50	2.50	4.50			ER		ER		ER												
0.55	2.55	4.55																			
0.60	2.60	4.60																			
0.65	2.65	4.65																			
0.70	2.70	4.70																			
0.75	2.75	4.74																			
0.80	2.80	4.80																			
0.85	2.85	4.85																			
0.90	2.90	4.90																			
0.95	2.95	4.95																			
1.00	3.00	5.00																			
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

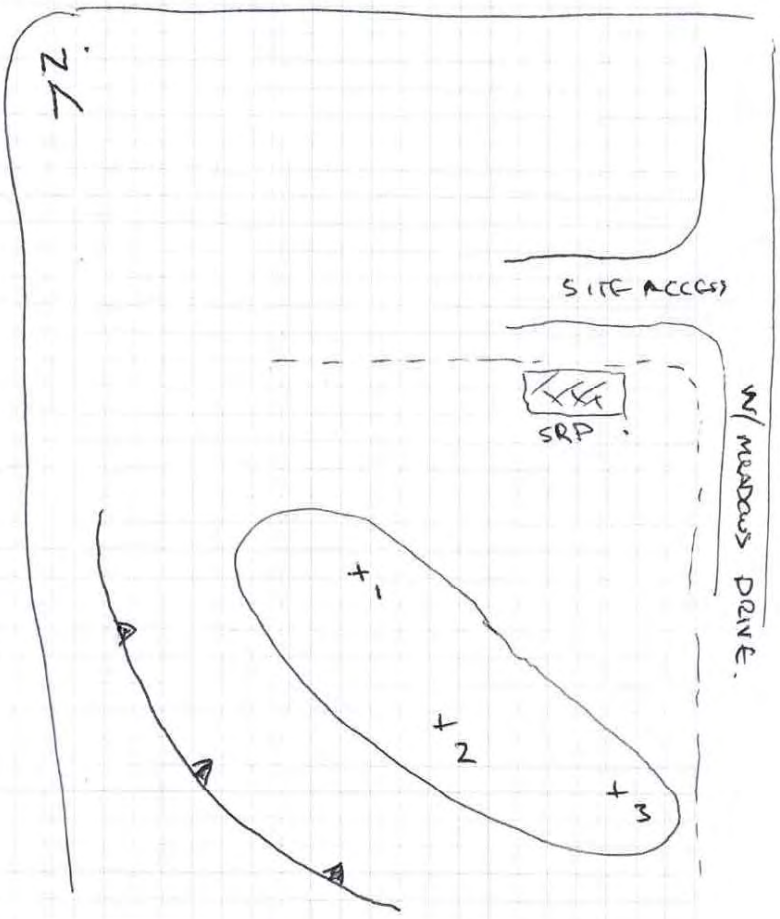
SCALA PENETROMETER TEST RESULTS

GCL Groups Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

600mm FILL INSPECTION:

- SAME FILL + COMP METHOD.
- 3x NDM'S HAD BEEN COMPLETED (No. 40-42).
- 3x SPT TWINNED NDM TEST SITES.

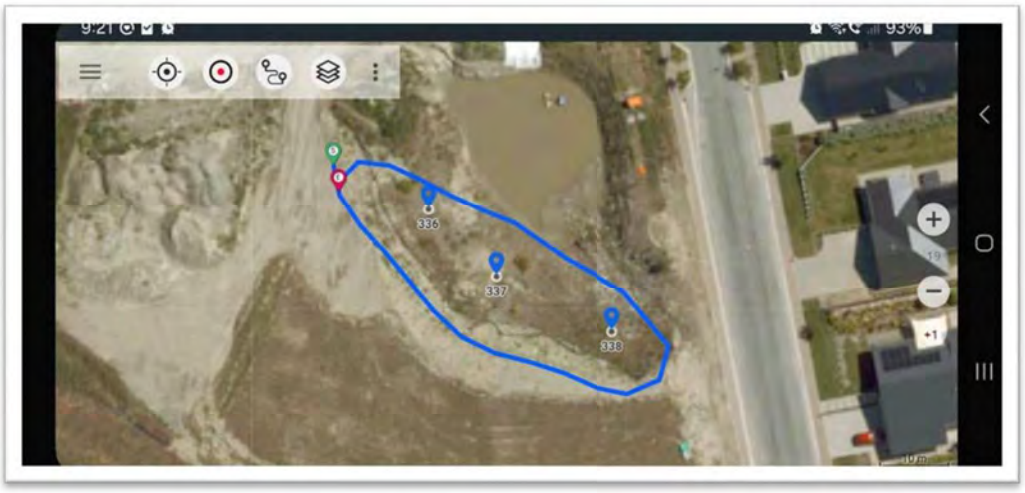
=> STRUCTURAL FILL COMPARED TO AN E/STD !!



SITE PHOTO OF SUBBASE SURFACE, LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SUBBASE SURFACE, LOOKING NORTH, SPT 103 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS



GCL Ground Consulting Ltd

PROJECT:	ALPHA SERVICES 4 (SRP)	DATE:	24/07/24.
JOB No:	6783.	SIN No.	19

			NDM																											
			GPS																											
			SPT	1			2			3			4			5			6			7			8			9			10	
0.05	2.05	4.05		3			4			3			3																	
0.10	2.10	4.10		4	7		6	10		3	6		3	6																
0.15	2.15	4.15		6			8			5			4																	
0.20	2.20	4.20		7	13		8	16		6	11		5	9																
0.25	2.25	4.25		6			8			4			12																	
0.30	2.30	4.30		6	12		7	15		8	12			EQ																
0.35	2.35	4.35		5			8			10																				
0.40	2.40	4.40		5	10		8	16			RF.																			
0.45	2.45	4.45		4			11																							
0.50	2.50	4.50		3	7			BL																						
0.55	2.55	4.55		4																										
0.60	2.60	4.60		8	12.																									
0.65	2.65	4.65		8																										
0.70	2.70	4.70		10	18.																									
0.75	2.75	4.74		5																										
0.80	2.80	4.80		5	10																									
0.85	2.85	4.85		5																										
0.90	2.90	4.90		7	12																									
0.95	2.95	4.95																												
1.00	3.00	5.00			ED																									
1.05	3.05	5.05																												
1.10	3.10	5.10																												
1.15	3.15	5.15																												
1.20	3.20	5.20																												
1.25	3.25	5.25																												
1.30	3.30	5.30																												
1.35	3.35	5.35																												
1.40	3.40	5.40																												
1.45	3.45	5.45																												
1.50	3.50	5.50																												
1.55	3.55	5.55																												
1.60	3.60	5.60																												
1.65	3.65	5.65																												
1.70	3.70	5.70																												
1.75	3.75	5.75																												
1.80	3.80	5.80																												
1.85	3.85	5.85																												
1.90	3.90	5.90																												
1.95	3.95	5.95																												
2.00	4.00	6.00																												

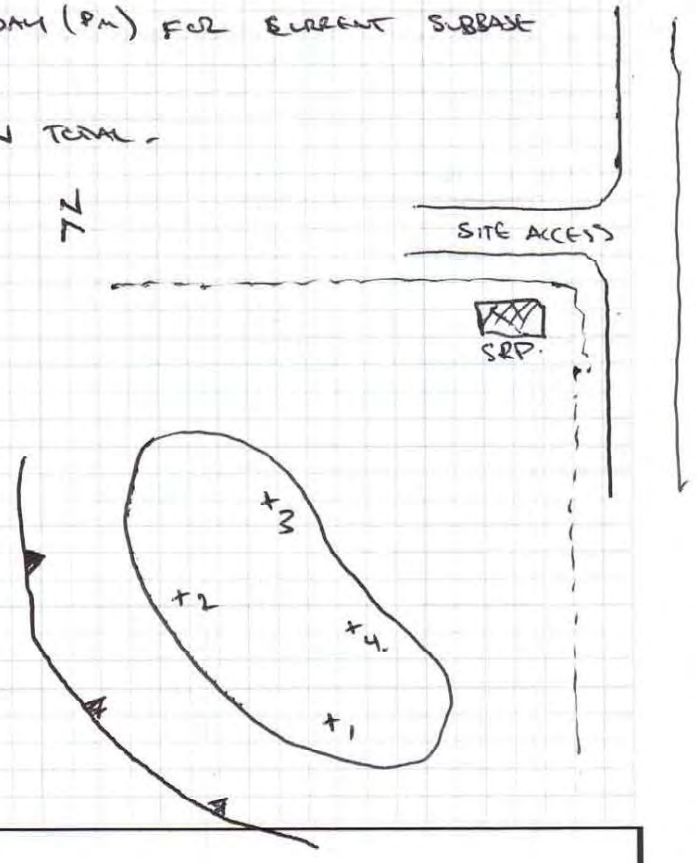
SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

1200mm E/FILL INSPECTION.

- SAME FILL TYPE + COMP METHOD
- ONE INSPECTION (SPT 101 + 102) COMPLETED ON SUBBASE SURFACE (CURRENTLY IN FINAL STAGES OF COMPACTION.
- SECOND INSPECTION (SPT 103 + 104) COMPLETED 600mm BELOW SUBBASE LEVEL. DIGGER EXCAVATED CRAWL (-600mm) TO ALLOW SPT TO BE COMPLETED FROM THE CORRECT RL.
- UNDERSTAND NDM'S WERE COMPLETED ON THE SUBBASE MINUS 600mm SURFACE. NDM'S ARE SCHEDULED FOR TODAY (PM) FOR CURRENT SUBBASE SURFACE.
- 4x SPT COMPLETED IN TOTAL.

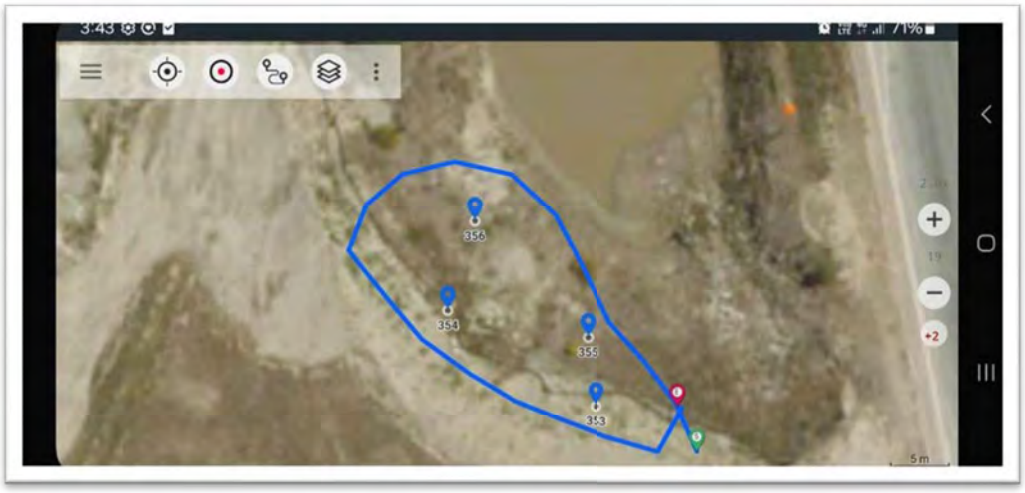
- STRUCTURAL FILL AT SUBBASE LEVEL + 600mm BELOW SUBBASE LEVEL WAS CONSTRUCTED TO AN E/STD!!!.



SITE PHOTO OF SUBBASE SURFACE, LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SUBBASE SURFACE, LOOKING NORTH, SPT 102 FOR REFERENCE

SITE PHOTO OF SHALLOW TEST PITS (SUBBASE MINUS 600MM TO ASSESS UNDERLYING FILL LAYER,	
SPT 103	SPT 104
	

SITE PHOTO OF SPT LOCATIONS


GCL Ground Consulting Ltd

PROJECT:	ALPHA SERIES 4. (SEP).	DATE:	SAT, 27 JULY 24.
JOB No:	6783.	SIN No.	20.

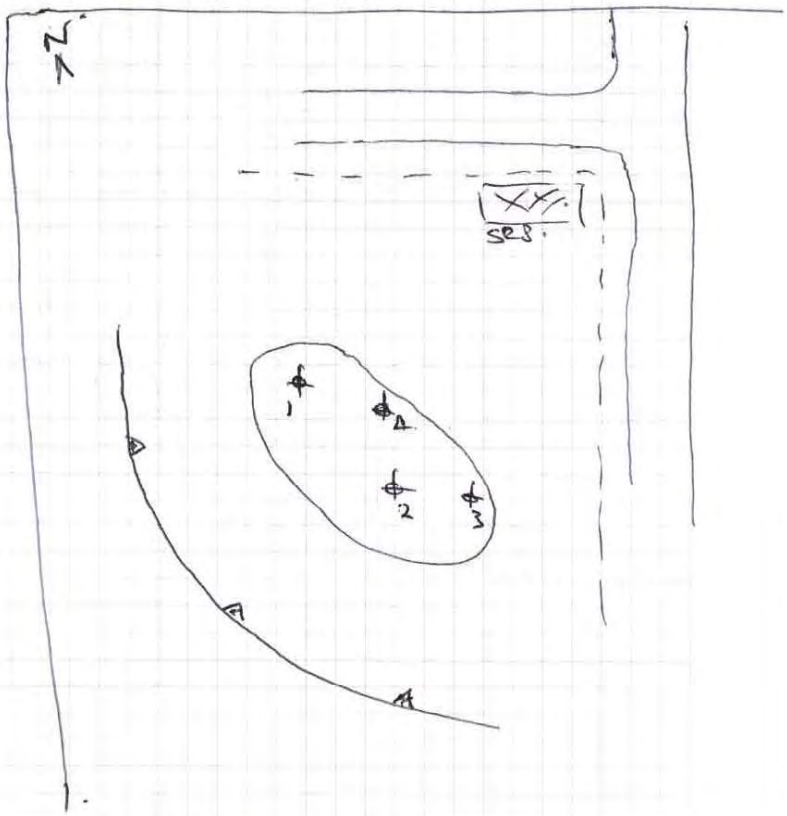
			NDM	S0		S1		—	—												
			GPS	357		358		359		360											
			SPT	1		2		3		4		5		6		7		8		9	10
0.05	2.05	4.05		3		6		7		10											
0.10	2.10	4.10		7	10	6	12	7	14	10	20										
0.15	2.15	4.15		12		8		10		10											
0.20	2.20	4.20			RF.	8	16		ER		ER										
0.25	2.25	4.25				12															
0.30	2.30	4.30				10	22														
0.35	2.35	4.35																			
0.40	2.40	4.40					ER														
0.45	2.45	4.45																			
0.50	2.50	4.50																			
0.55	2.55	4.55																			
0.60	2.60	4.60																			
0.65	2.65	4.65																			
0.70	2.70	4.70																			
0.75	2.75	4.74																			
0.80	2.80	4.80																			
0.85	2.85	4.85																			
0.90	2.90	4.90																			
0.95	2.95	4.95																			
1.00	3.00	5.00																			
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

SCALA PENETROMETER TEST RESULTS

GCL Groundwork Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

1200mm E/FILL INSPECTION.

- SAND FILL + COMP MEMED.
- ONE INSPECTION (SPT 101+102) COMPLETED ON SUBBASE SURFACE AS AT FRIDAY 26 JULY.
- SECOND INSPECTION (SPT 103+104) COMPLETED ON THE PREVIOUS FILL LAYER (SB- 600mm). TWO STAGED TP (-600mm) CONSTRUCTED TO ALLOW DIRECT OBSERVATION/ ASSESMENT OF THIS SURFACE.
- NDM 50 + 51 COMPLETED AT INSPECTION NO. 1 INTERIM/ HOLD POINT.
- 4+ SPT COMPLETED IN TOTAL.



PASS!! — STRUCTURAL FILL CONSTRUCTED TO ANZ E/ STANDARDS.

— PROCEED!!.

SITE PHOTO OF SUBBASE SURFACE, LOOKING SOUTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SUBBASE SURFACE, LOOKING NORTH, SPT 102 FOR REFERENCE

SITE PHOTO OF SHALLOW TEST PITS (SUBBASE MINUS 600MM TO ASSESS UNDERLYING FILL LAYER,	
SPT 103	SPT 104
	

SITE PHOTO OF SPT LOCATIONS

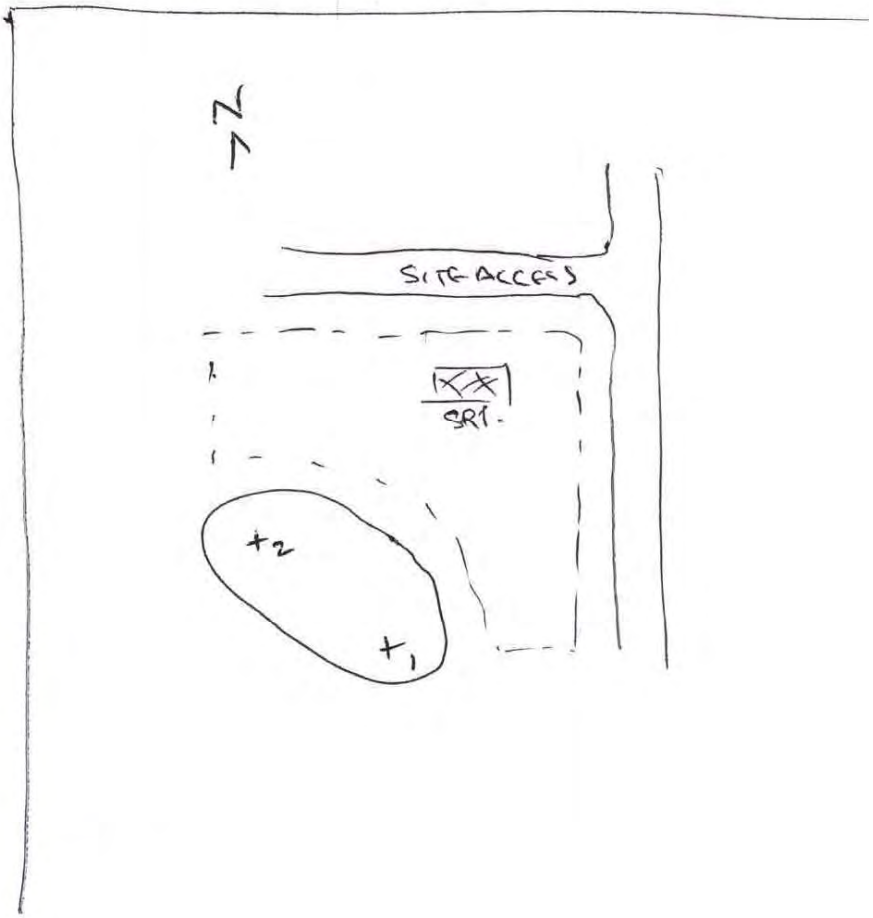

GCL Geotech Consulting Ltd	PROJECT:	ALAIA SERIES 4 (SED)	DATE:	THUR, 1 AUG 24.
	JOB No:	6783.	SIN No.	21.

			NDM	S2		S3															
			GPS	367		368															
			SPT	1		2		3		4		5		6		7		8		9		10	
0.05	2.05	4.05		2		2															
0.10	2.10	4.10		3	5.	3	5.														
0.15	2.15	4.15		3		3															
0.20	2.20	4.20		3	6.	2	5.														
0.25	2.25	4.25		3		3															
0.30	2.30	4.30		4	7.	5	8.														
0.35	2.35	4.35		3		2															
0.40	2.40	4.40		3	6	3	5.														
0.45	2.45	4.45		3		2															
0.50	2.50	4.50		2	5.	2	4.														
0.55	2.55	4.55		3		2															
0.60	2.60	4.60		5	8.	3	5.														
0.65	2.65	4.65		6		5															
0.70	2.70	4.70		6	12.	5	10														
0.75	2.75	4.74		5		6															
0.80	2.80	4.80		5	10	6	12.														
0.85	2.85	4.85		9		5															
0.90	2.90	4.90		10	19	5	10														
0.95	2.95	4.95		//		//															
1.00	3.00	5.00			CD.		CD.														
1.05	3.05	5.05																			
1.10	3.10	5.10																			
1.15	3.15	5.15																			
1.20	3.20	5.20																			
1.25	3.25	5.25																			
1.30	3.30	5.30																			
1.35	3.35	5.35																			
1.40	3.40	5.40																			
1.45	3.45	5.45																			
1.50	3.50	5.50																			
1.55	3.55	5.55																			
1.60	3.60	5.60																			
1.65	3.65	5.65																			
1.70	3.70	5.70																			
1.75	3.75	5.75																			
1.80	3.80	5.80																			
1.85	3.85	5.85																			
1.90	3.90	5.90																			
1.95	3.95	5.95																			
2.00	4.00	6.00																			

SCALA PENETROMETER TEST RESULTS

600mm FILL INSPECTION (FINAL) FOR SRP.

- MINOR HEAVE DUE TO RECENT INCLEMENT WEATHER, WHICH HAS CAUSED SOIL SOFTENING DUE TO OVER SATURATION – THIS WILL DRY OUT OVERTIME!!!
- SAME FILL MATERIAL + COMP METHOD.
- 2x NDM COMPLETE (NO. 52+53), TWINNED WITH SCALA'S.
- STRUCTURAL FILL CONSTRUCTED TO THE REQUIRED E/JM.
- NO FURTHER INSPECTIONS REQUIRED.



SITE PHOTO OF SUBBASE SURFACE, LOOKING NORTH, SPT 101 FOR REFERENCE

SITE PHOTO OF SUBBASE SURFACE, LOOKING SOUTH, SPT 102 FOR REFERENCE

SITE PHOTO OF SPT LOCATIONS

GCL Ground Consulting Ltd

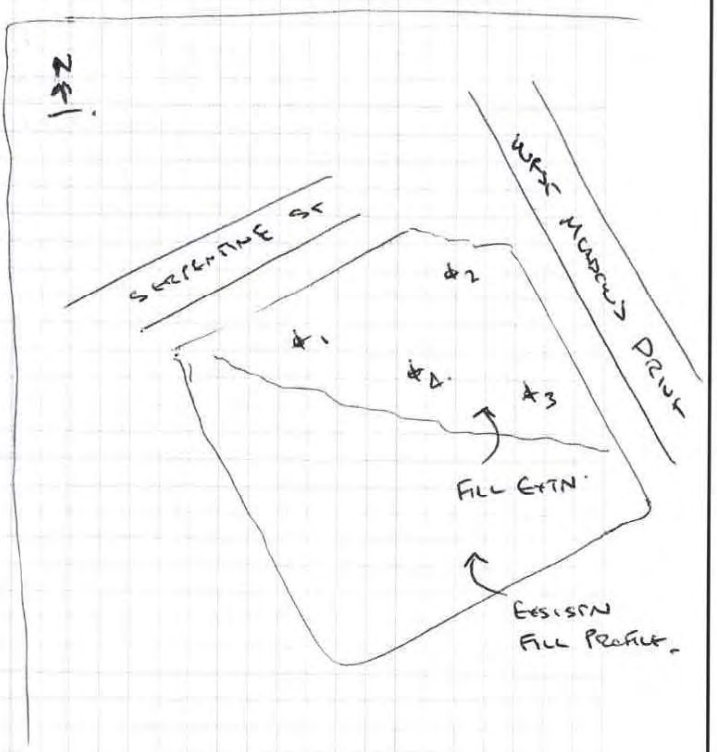
PROJECT:	Lot 67, ASA.	DATE:	Tue, 18 Feb 25.
JOB No:	6783.	SIN No.	22

			NDM																	
			GPS	1		2		3		4										
			SPT	1		2		3		4		5		6		7		8		9		10	
0.05	2.05	4.05		2		1		1		2													
0.10	2.10	4.10		4	6	2	3	2	3	2	4												
0.15	2.15	4.15		2		2		2		4													
0.20	2.20	4.20		5	7	1	3	4	6	3	7												
0.25	2.25	4.25		5		1		3		1													
0.30	2.30	4.30		4	9	2	3	2	5	1	2												
0.35	2.35	4.35		10		10		4		2													
0.40	2.40	4.40			10		10	10	14	10	12												
0.45	2.45	4.45																					
0.50	2.50	4.50			GR		GR		GR		GR												
0.55	2.55	4.55																					
0.60	2.60	4.60																					
0.65	2.65	4.65																					
0.70	2.70	4.70																					
0.75	2.75	4.74																					
0.80	2.80	4.80																					
0.85	2.85	4.85																					
0.90	2.90	4.90																					
0.95	2.95	4.95																					
1.00	3.00	5.00																					
1.05	3.05	5.05																					
1.10	3.10	5.10																					
1.15	3.15	5.15																					
1.20	3.20	5.20																					
1.25	3.25	5.25																					
1.30	3.30	5.30																					
1.35	3.35	5.35																					
1.40	3.40	5.40																					
1.45	3.45	5.45																					
1.50	3.50	5.50																					
1.55	3.55	5.55																					
1.60	3.60	5.60																					
1.65	3.65	5.65																					
1.70	3.70	5.70																					
1.75	3.75	5.75																					
1.80	3.80	5.80																					
1.85	3.85	5.85																					
1.90	3.90	5.90																					
1.95	3.95	5.95																					
2.00	4.00	6.00																					

SCALA PENETROMETER TEST RESULTS

GCL Ground Consulting Ltd	PROJECT:		DATE:	
	JOB No:		SIN No.	

* RETROSPECTIVE E/FILL INSPECTION FOR A MINOR ADJUSTMENT TO FINISHED GROUND LEVEL FOR LOT 67.
- SUBGRADE APPROVED TO HAUL PREPARED TO THE REQUIRED STD. E/N CONTRACTOR CONFIRMS COMPLIANCE.
- UP TO 600mm PLACED, THICKEST TOWARDS THE SITES NORTHEAST CORNER, THINING UPSLOPE.
- TOPSOIL REINSTATED.
- 4x SPT COMPLETED ON EVEN CENTRES.



PASS - E/FILL COMPLETED TO THE REQUIRED SND. UBC 300kPa ACHIEVED FROM BELOW THE 300mm COVERING TS LAYER.
- NO FURTHER INSPECTIONS REQUIRED.

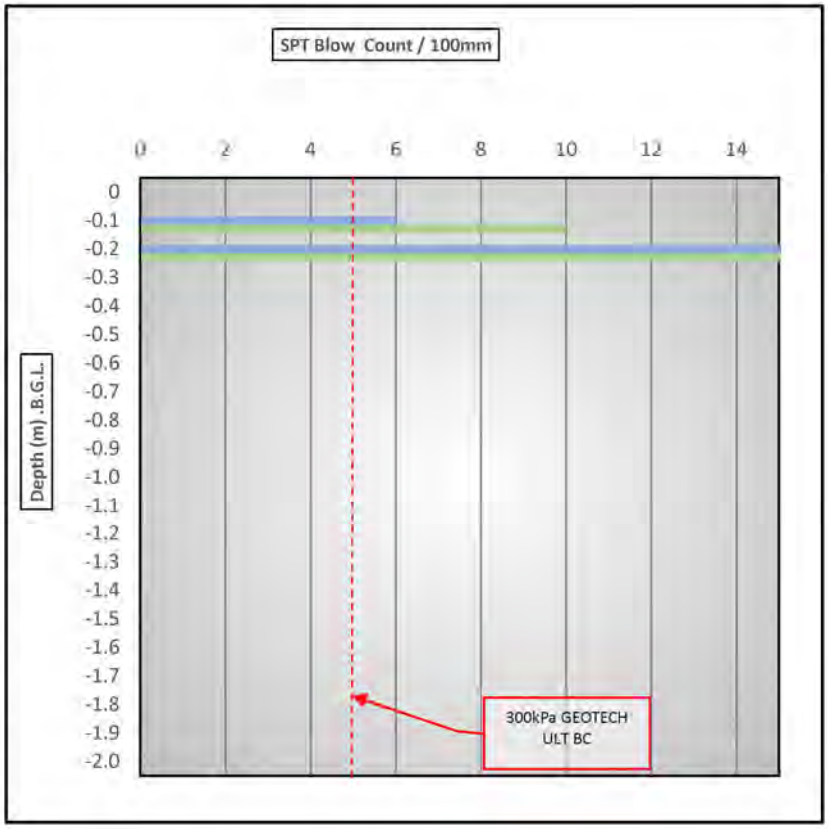
SITE PHOTO OF ADJUSTED FINISHED GROUND LEVEL, LOOKING EAST ACROSS LOT 67

SITE PHOTO OF ADJUSTED FINISHED GROUND LEVEL, LOOKING NORTH ACROSS LOT 67

APPENDIX B: LOT SPECIFIC SPT RESULTS COMPLETED BY GCL

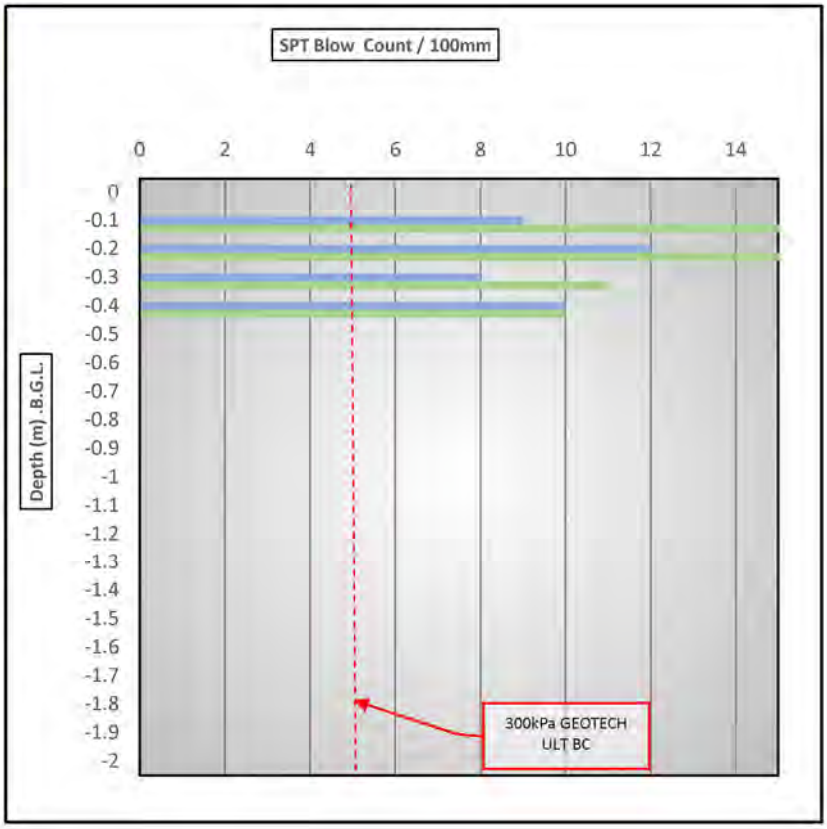
LOT 65

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	6	10
-0.2	26	20
-0.3	0	0
-0.4	0	0
-0.5	0	0
-0.6	0	0
-0.7	0	0
-0.8	0	0
-0.9	0	0
-1.0	0	0
-1.1	0	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2.0		



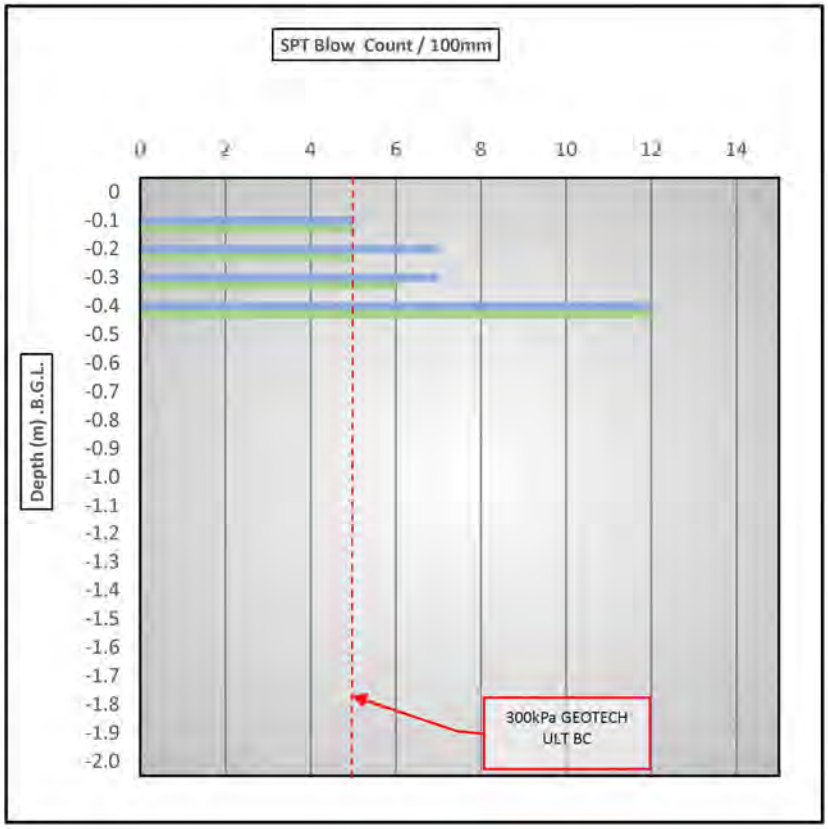
LOT 66

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	9	19
-0.2	12	19
-0.3	8	11
-0.4	10	10
-0.5	0	0
-0.6	0	0
-0.7	0	0
-0.8	0	0
-0.9	0	0
-1	0	0
-1.1	0	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2		



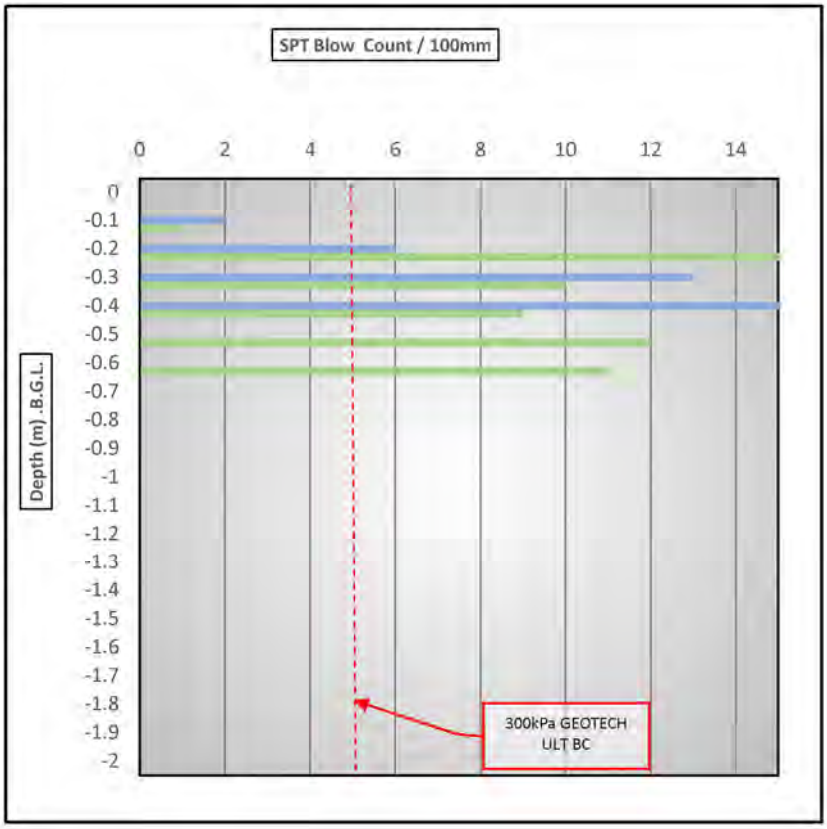
LOT 67

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	5	5
-0.2	7	5
-0.3	7	6
-0.4	12	12
-0.5	0	0
-0.6	0	0
-0.7	0	0
-0.8	0	0
-0.9	0	0
-1.0	0	0
-1.1	0	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2.0		



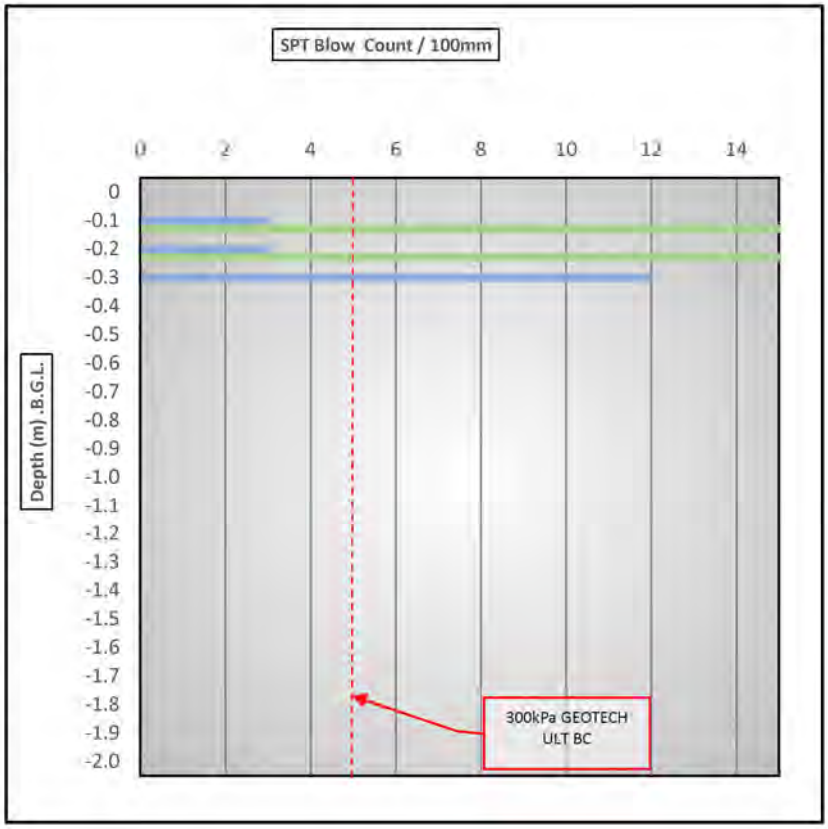
LOT 68

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	2	1
-0.2	6	16
-0.3	13	10
-0.4	20	9
-0.5	0	12
-0.6	0	11
-0.7	0	0
-0.8	0	0
-0.9	0	0
-1	0	0
-1.1	0	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2		



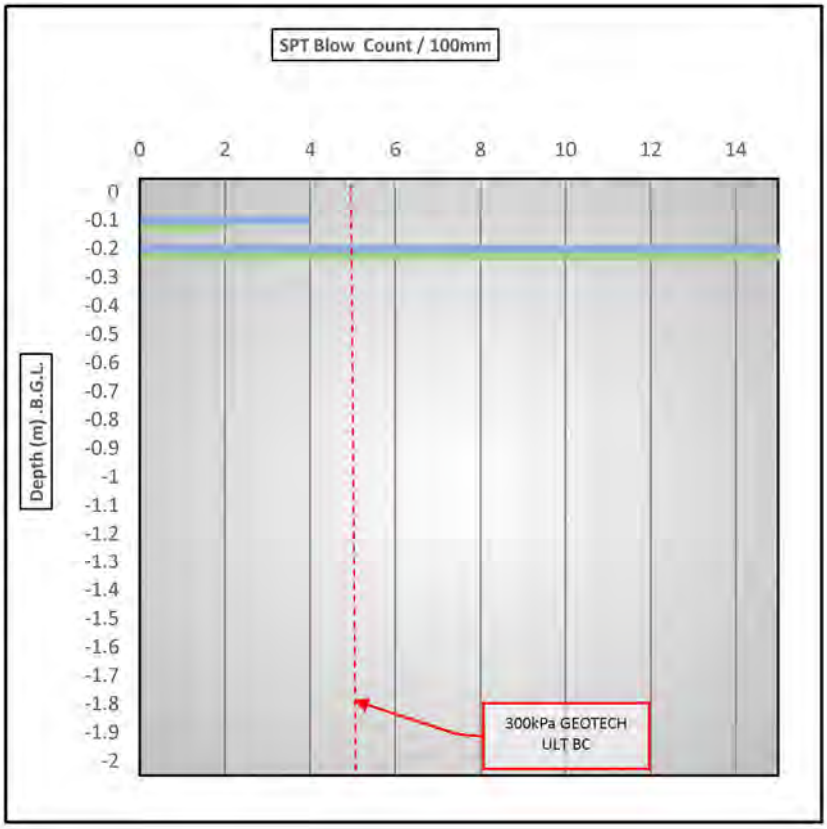
LOT 69

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	3	16
-0.2	3	20
-0.3	12	0
-0.4	0	0
-0.5	0	0
-0.6	0	0
-0.7	0	0
-0.8	0	0
-0.9	0	0
-1.0	0	0
-1.1	0	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2.0		



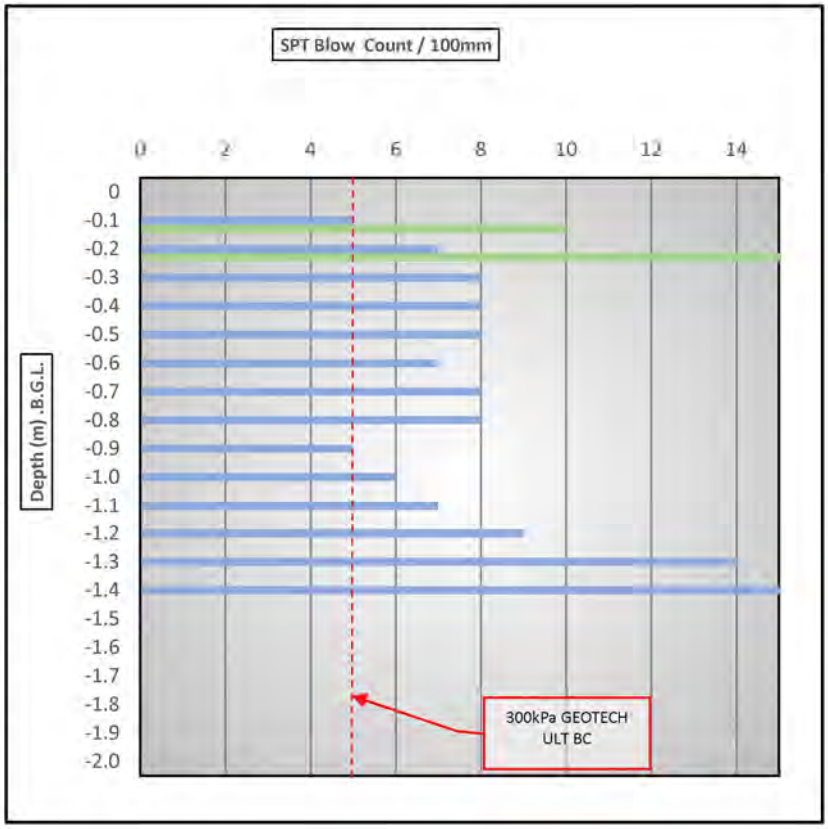
LOT 70

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	4	2
-0.2	24	20
-0.3	0	0
-0.4	0	0
-0.5	0	0
-0.6	0	0
-0.7	0	0
-0.8	0	0
-0.9	0	0
-1	0	0
-1.1	0	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2		



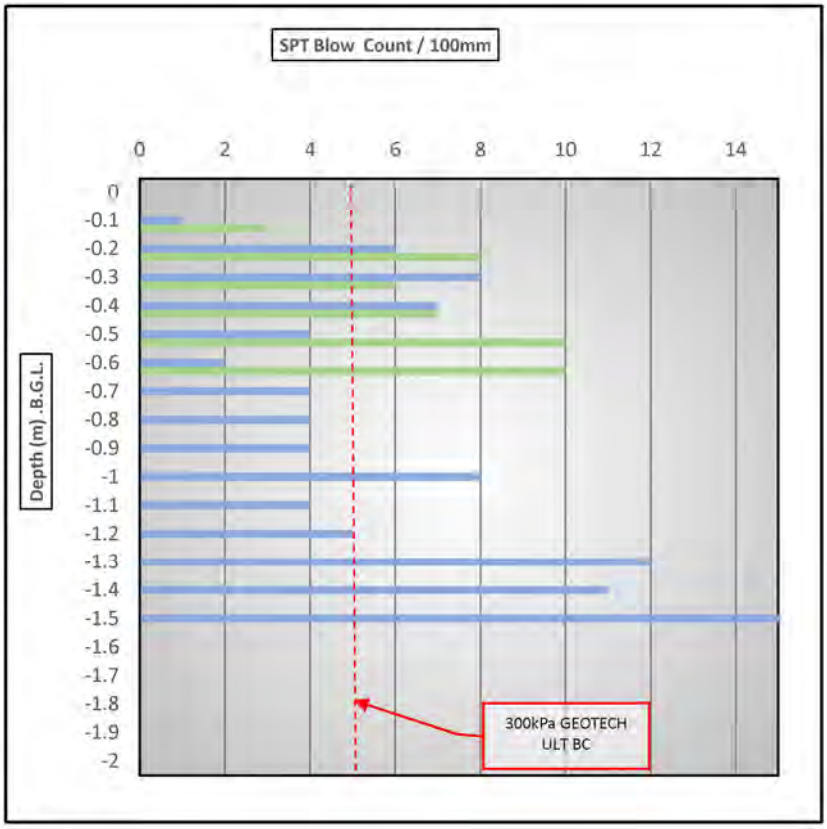
LOT 71

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	5	10
-0.2	7	20
-0.3	8	0
-0.4	8	0
-0.5	8	0
-0.6	7	0
-0.7	8	0
-0.8	8	0
-0.9	5	0
-1.0	6	0
-1.1	7	0
-1.2	9	0
-1.3	14	0
-1.4	16	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2.0		



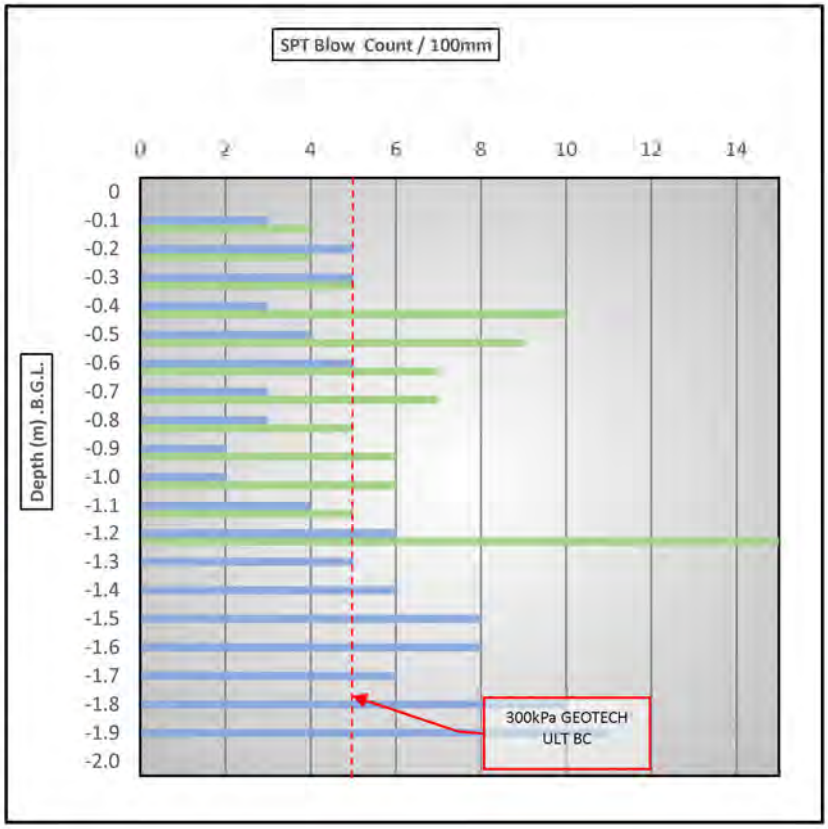
LOT 72

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	1	3
-0.2	6	8
-0.3	8	6
-0.4	7	7
-0.5	4	10
-0.6	2	10
-0.7	4	0
-0.8	4	0
-0.9	4	0
-1	8	0
-1.1	4	0
-1.2	5	0
-1.3	12	0
-1.4	11	0
-1.5	20	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2		



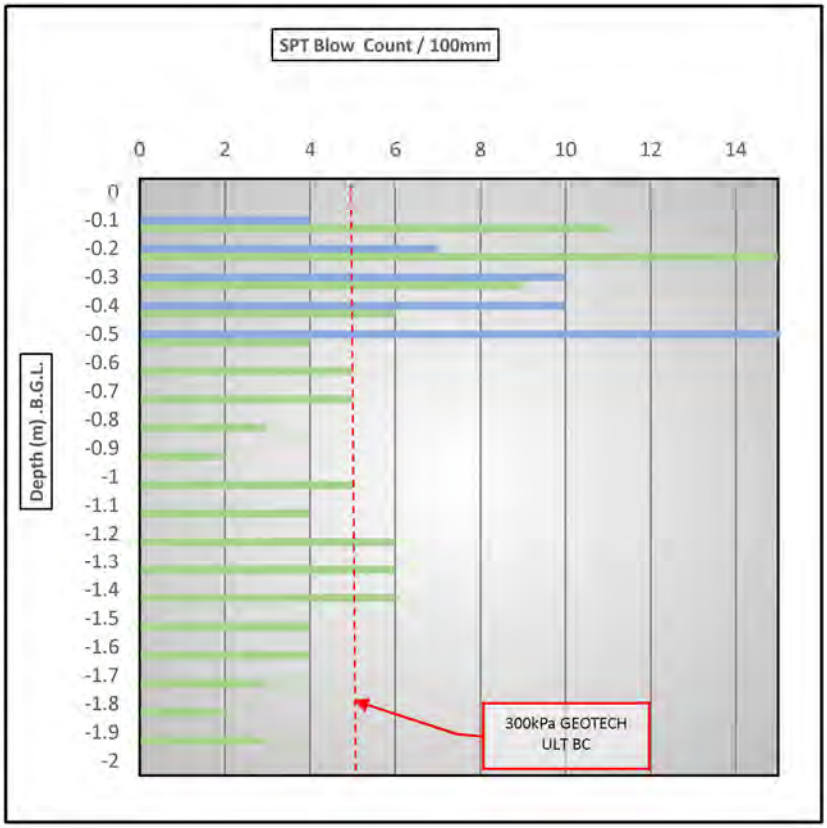
LOT 73

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	3	4
-0.2	5	4
-0.3	5	5
-0.4	3	10
-0.5	4	9
-0.6	5	7
-0.7	3	7
-0.8	3	5
-0.9	2	6
-1.0	2	6
-1.1	4	5
-1.2	6	15
-1.3	5	0
-1.4	6	0
-1.5	8	0
-1.6	8	0
-1.7	6	0
-1.8	10	0
-1.9	11	0
-2.0		



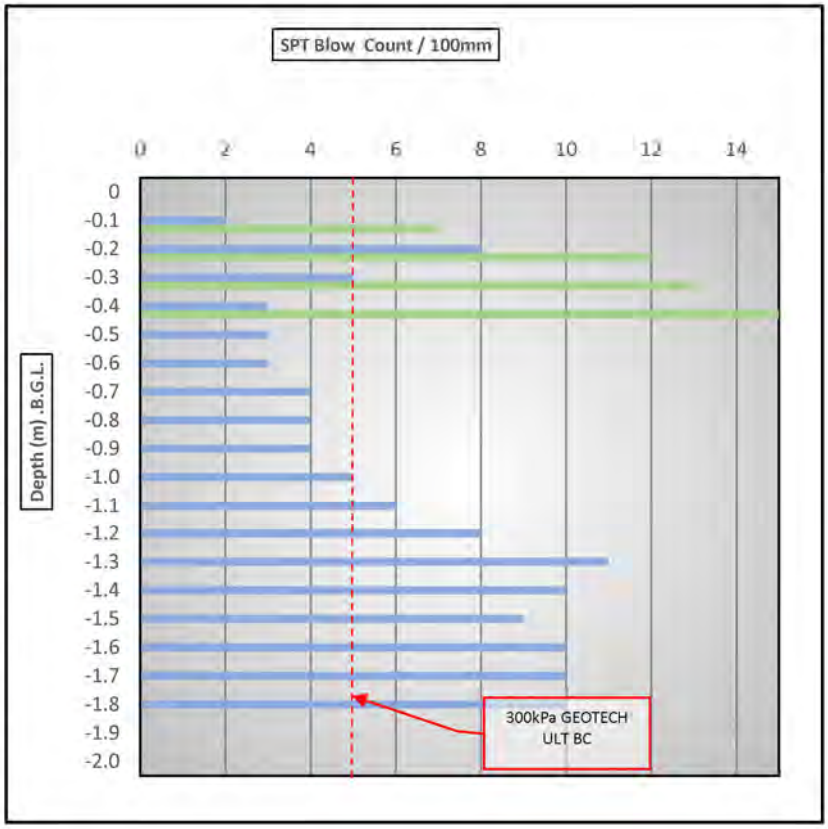
LOT 74

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	4	11
-0.2	7	15
-0.3	10	9
-0.4	10	6
-0.5	20	4
-0.6	0	5
-0.7	0	5
-0.8	0	3
-0.9	0	2
-1	0	5
-1.1	0	4
-1.2	0	6
-1.3	0	6
-1.4	0	6
-1.5	0	4
-1.6	0	4
-1.7	0	3
-1.8	0	2
-1.9	0	3
-2		



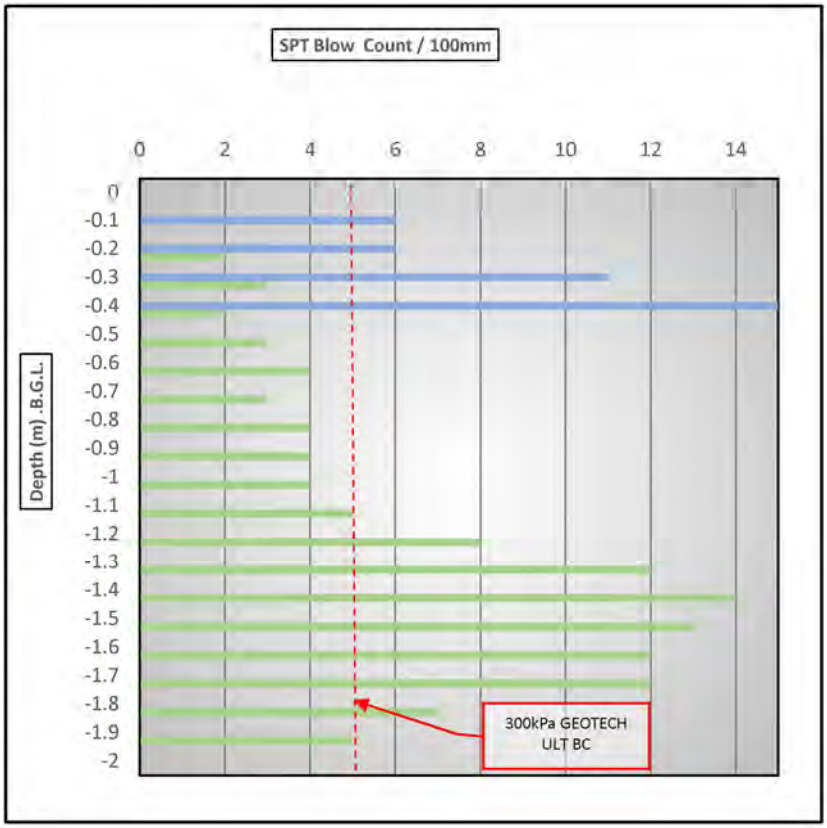
LOT 75

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	2	7
-0.2	8	12
-0.3	5	13
-0.4	3	15
-0.5	3	0
-0.6	3	0
-0.7	4	0
-0.8	4	0
-0.9	4	0
-1.0	5	0
-1.1	6	0
-1.2	8	0
-1.3	11	0
-1.4	10	0
-1.5	9	0
-1.6	10	0
-1.7	10	0
-1.8	10	0
-1.9	0	0
-2.0		



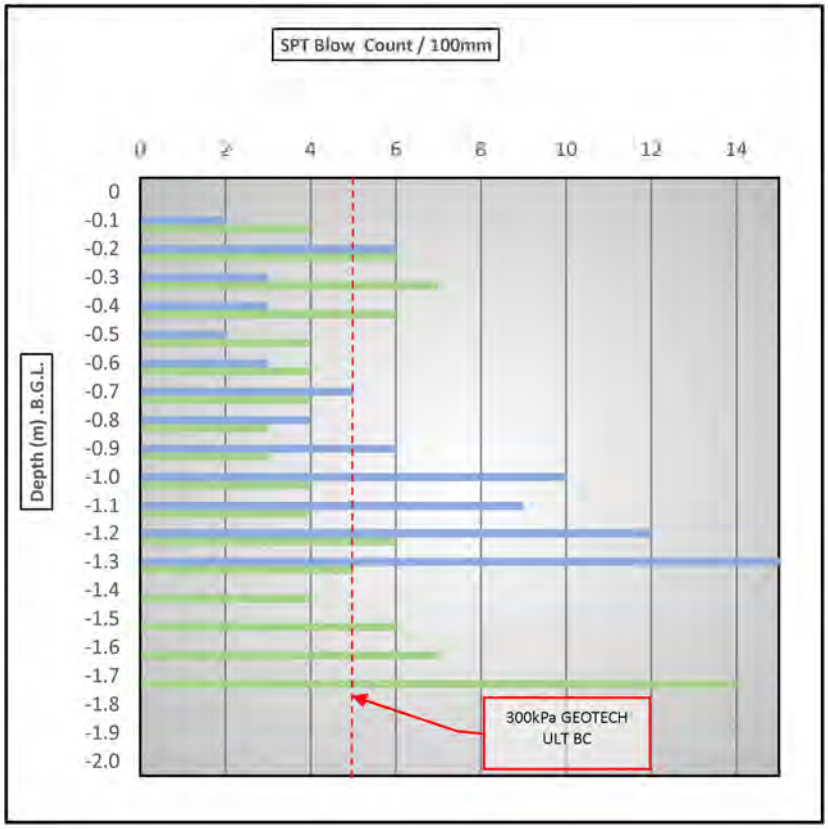
LOT 76

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	6	0
-0.2	6	2
-0.3	11	3
-0.4	15	2
-0.5	0	3
-0.6	0	4
-0.7	0	3
-0.8	0	4
-0.9	0	4
-1	0	4
-1.1	0	5
-1.2	0	8
-1.3	0	12
-1.4	0	14
-1.5	0	13
-1.6	0	12
-1.7	0	12
-1.8	0	7
-1.9	0	5
-2		



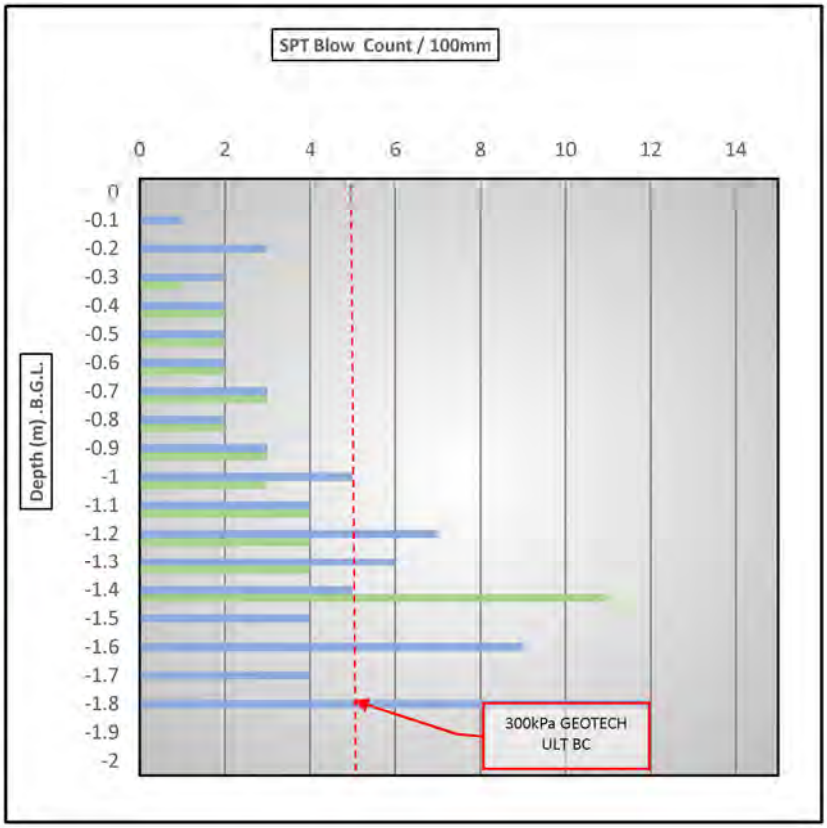
LOT 77

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	2	4
-0.2	6	6
-0.3	3	7
-0.4	3	6
-0.5	2	4
-0.6	3	4
-0.7	5	4
-0.8	4	3
-0.9	6	3
-1.0	10	4
-1.1	9	4
-1.2	12	6
-1.3	21	5
-1.4	0	4
-1.5	0	6
-1.6	0	7
-1.7	0	14
-1.8	0	0
-1.9	0	0
-2.0		



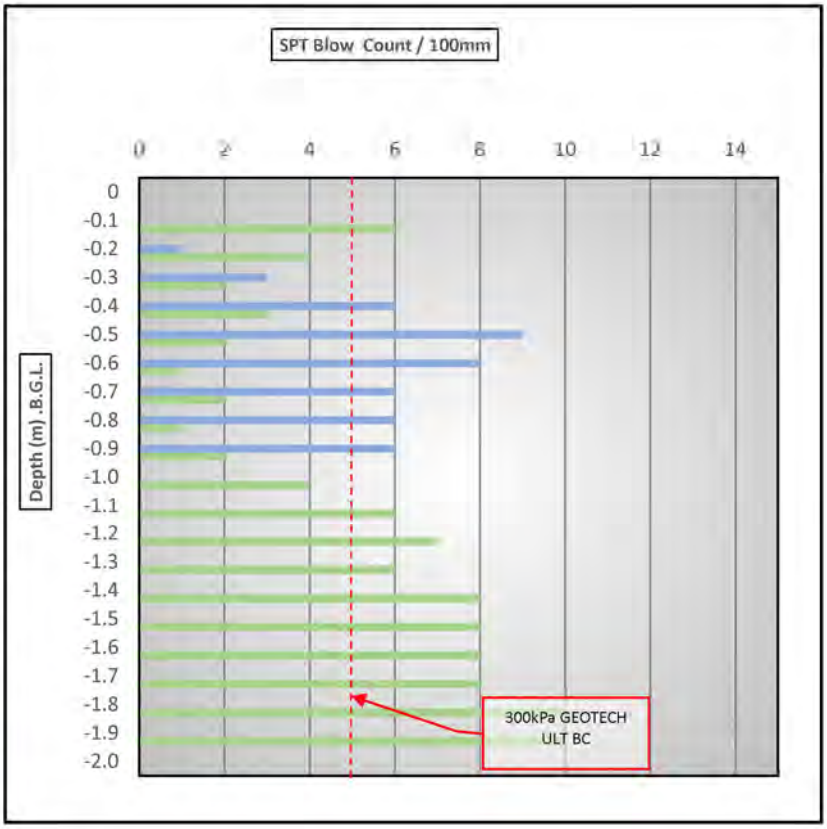
LOT 78

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	1	0
-0.2	3	0
-0.3	2	1
-0.4	2	2
-0.5	2	2
-0.6	2	2
-0.7	3	3
-0.8	2	2
-0.9	3	3
-1	5	3
-1.1	4	4
-1.2	7	4
-1.3	6	4
-1.4	5	11
-1.5	4	0
-1.6	9	0
-1.7	4	0
-1.8	12	0
-1.9	0	0
-2		



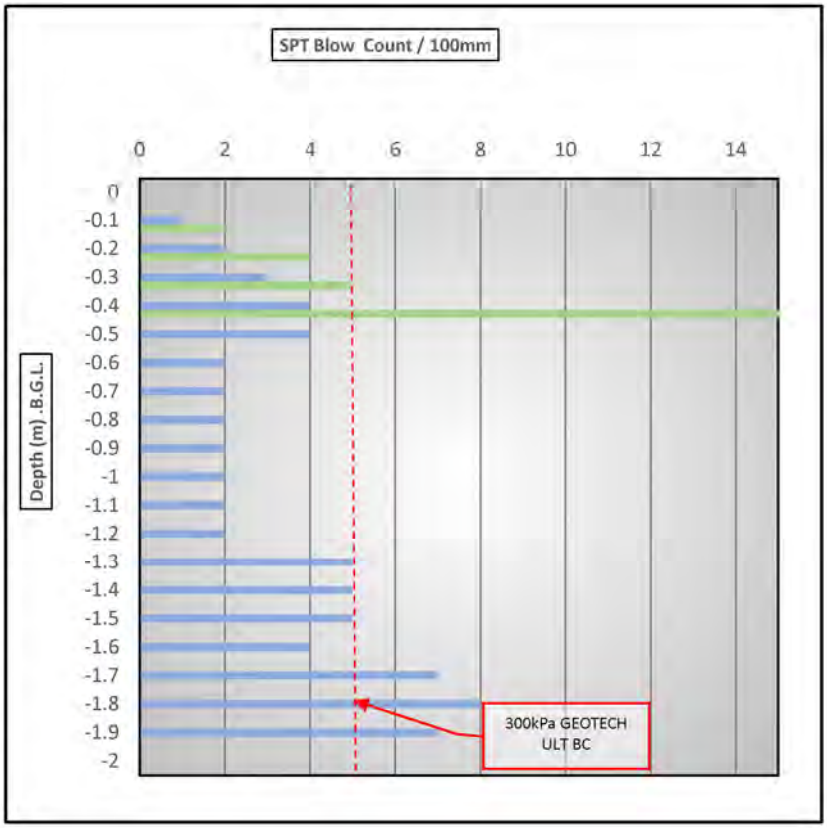
LOT 79

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	0	6
-0.2	1	4
-0.3	3	2
-0.4	6	3
-0.5	9	2
-0.6	8	1
-0.7	6	2
-0.8	6	1
-0.9	6	2
-1.0	0	4
-1.1	0	6
-1.2	0	7
-1.3	0	6
-1.4	0	8
-1.5	0	8
-1.6	0	8
-1.7	0	8
-1.8	0	10
-1.9	0	10
-2.0		



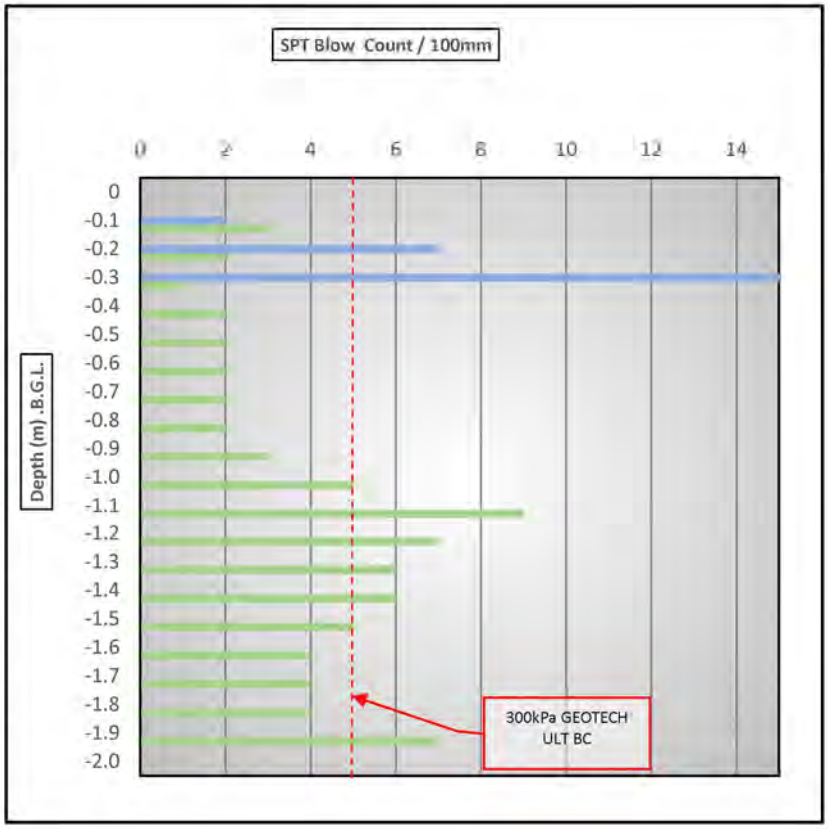
LOT 80

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	1	2
-0.2	2	4
-0.3	3	5
-0.4	4	16
-0.5	4	0
-0.6	2	0
-0.7	2	0
-0.8	2	0
-0.9	2	0
-1	2	0
-1.1	2	0
-1.2	2	0
-1.3	5	0
-1.4	5	0
-1.5	5	0
-1.6	4	0
-1.7	7	0
-1.8	8	0
-1.9	7	0
-2		



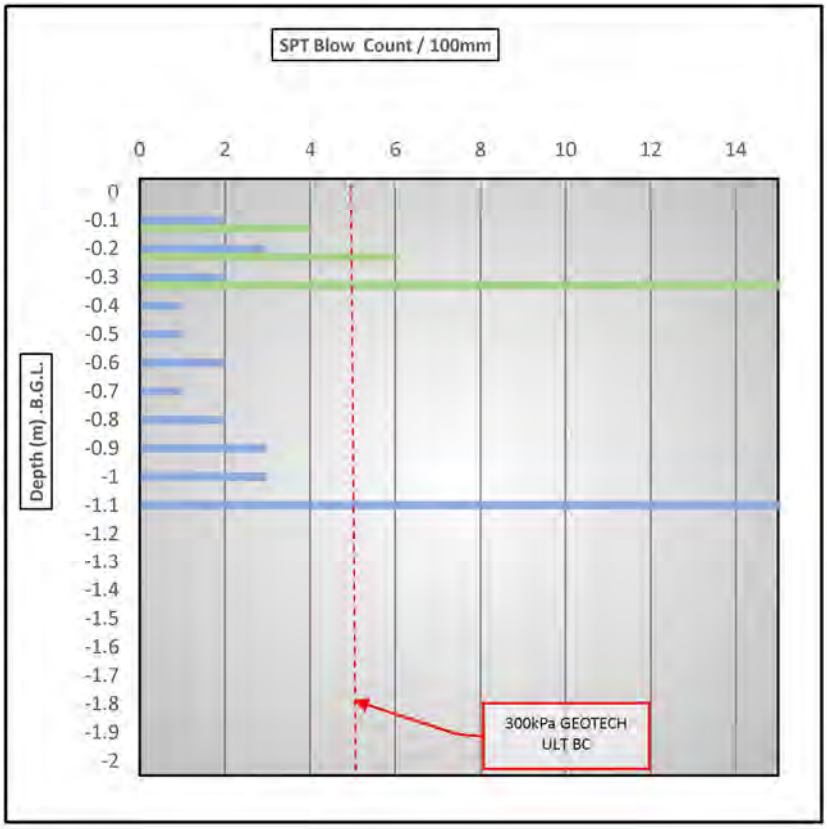
LOT 81

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	2	3
-0.2	7	2
-0.3	20	1
-0.4	0	2
-0.5	0	2
-0.6	0	2
-0.7	0	2
-0.8	0	2
-0.9	0	3
-1.0	0	5
-1.1	0	9
-1.2	0	7
-1.3	0	6
-1.4	0	6
-1.5	0	5
-1.6	0	4
-1.7	0	4
-1.8	0	4
-1.9	0	7
-2.0		



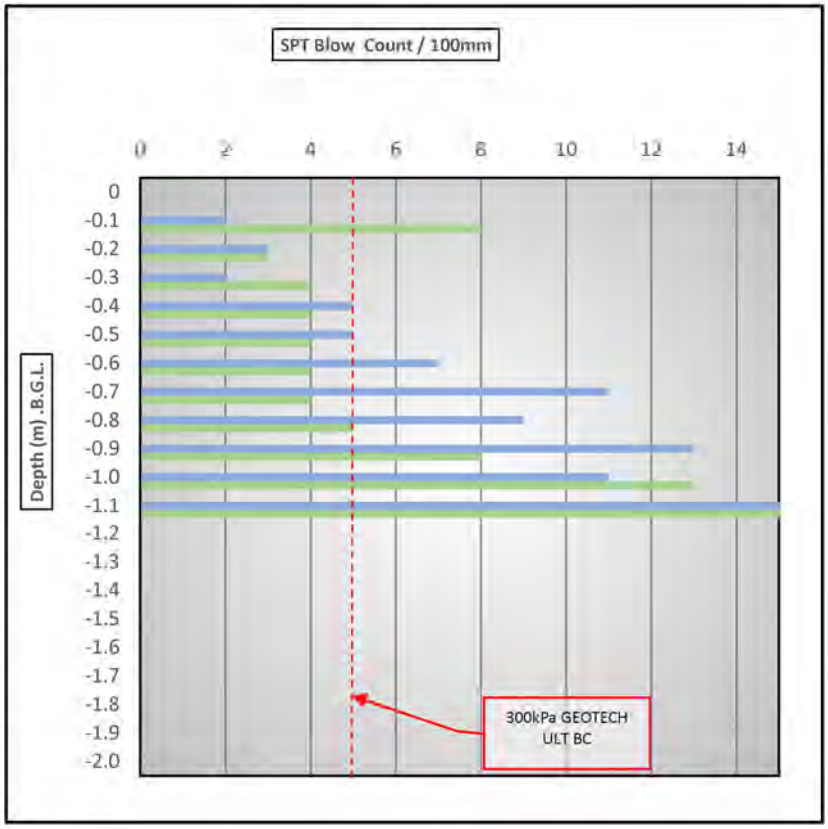
LOT 82

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	2	4
-0.2	3	6
-0.3	2	19
-0.4	1	0
-0.5	1	0
-0.6	2	0
-0.7	1	0
-0.8	2	0
-0.9	3	0
-1	3	0
-1.1	26	0
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2		



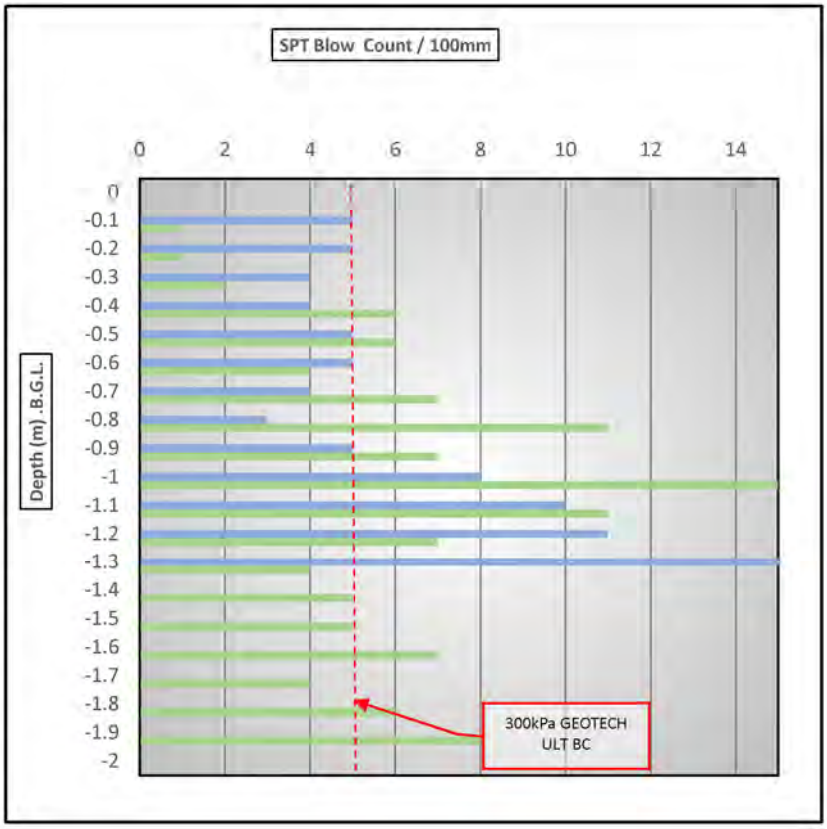
LOT 83

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	2	8
-0.2	3	3
-0.3	2	4
-0.4	5	4
-0.5	5	4
-0.6	7	4
-0.7	11	4
-0.8	9	5
-0.9	13	8
-1.0	11	13
-1.1	20	20
-1.2	0	0
-1.3	0	0
-1.4	0	0
-1.5	0	0
-1.6	0	0
-1.7	0	0
-1.8	0	0
-1.9	0	0
-2.0		



LOT 84

DEPTH (mBGL)	SPT (A)	SPT (B)
0	0	0
-0.1	5	1
-0.2	5	1
-0.3	4	2
-0.4	4	6
-0.5	5	6
-0.6	5	4
-0.7	4	7
-0.8	3	11
-0.9	5	7
-1	8	15
-1.1	10	11
-1.2	11	7
-1.3	18	4
-1.4	0	5
-1.5	0	5
-1.6	0	7
-1.7	0	4
-1.8	0	6
-1.9	0	8
-2		



APPENDIX C: NDM TEST RESULTS

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1168

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy SILT with minor gravel**	**Sample Source:**	**Cut To Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Fisher**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
1	N802897.01, E372806.17	313.94	300	2.03	1.77	15.1	98	9	36
2	N802902.48, E372805.09	313.37	300	2.02	1.75	15.1	100	10	36
3	N802907.29, E372800.88	313.09	300	2.03	1.75	16.0	99	8	36
4	N802907.28, E372790.04	313.67	300	1.99	1.75	13.3	100	13	36
Mean Values Sites: 1 to 4				2.02	1.76	14.9	99	10	36
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1286.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:1 - 1.79 t/m³ (corrected for 5% +19mm fraction)
   S:2 - 1.76 t/m³ (no correction for oversize required)
   S:3 - 1.76 t/m³ (no correction for oversize required)
   S:4 - 1.76 t/m³ (no correction for oversize required)

   See Reference No. 21/1286 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Fisher & C.J. Julius **Date:** 14 to 16-Apr-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1235

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy SILT with minor gravel**	**Sample Source:**	**Cut to Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
5	N802893.78, E372796.69	315.41	300	1.97	1.75	12.1	100	15	36
6	N802903.65, E372786.71	314.95	300	2.04	1.77	15.7	98	8	36
7	N802905.38, E372800.07	313.93	300	2.04	1.74	16.8	99	7	37
Mean Values Sites: 5 to 7				2.02	1.75	14.9	99	10	36
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1286.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:5 - 1.76 t/m³ (no correction for oversize required)
   S:6 - 1.81 t/m³ (corrected for 8% +19mm fraction)
   S:7 - 1.76 t/m³ (no correction for oversize required)

   See Reference No. 21/1286 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: **C. Maxwell & K. Hipkins** **Date: 20 & 21-Apr-21**

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1286

Date: 29 April 2021

TEST REPORT - NZ STANDARD COMPACTION

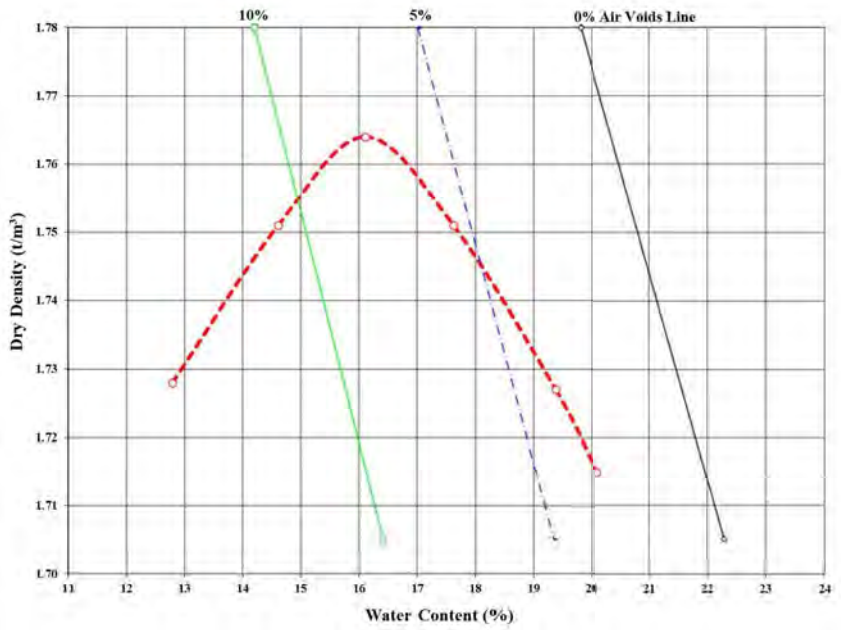
Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy SILT with minor gravel**	**Order No:**	**N/A**
Sample Source:	**Cut to Fill**	**Sample Label No:**	**01572**
Date & Time Sampled:	**20-Apr-21**	**Sampled By:**	**C. Maxwell**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Date Received:**	**20-Apr-21**

NZ STANDARD COMPACTION - NZS 4402:1986, Test 4.1.1

% Retained (+19.0mm Fraction)	**2.0 %**
Maximum Dry Density: (-19.0mm Fraction)	**1.76 t/m^3**
Optimum Water Content: (-19.0mm Fraction)	**16.0 %**

Notes:

- *The sample was received in a natural state.*
- *The material tested in the NZ Standard Compaction test was the fraction passing a 19.0mm test sieve.*
- *The air voids lines were calculated from an assumed solid density of 2.75 t/m^3.*



General Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample description based on NZ Geotechnical Society Guidelines 2005.*
- *This report may not be reproduced except in full.*

Tested By: K. Hipkins & A.P. Julius **Date:** 24 to 29-Apr-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY
№ 434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1309

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy SILT with minor gravel**	**Sample Source:**	**Cut to Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
8	N802891.75, E372804.68	315.65	250	2.00	1.71	16.5	96	9	38
9	N802904.03, E372799.41	314.53	250	1.98	1.71	15.8	97	11	38
10	N802900.78, E372784.45	315.76	250	2.01	1.71	16.9	97	9	38
11	N802902.71, E372768.26	316.63	250	2.01	1.72	16.8	98	9	37
12	N802914.23, E372769.19	315.50	250	2.02	1.73	16.9	98	8	37
Mean Values Sites: 8 to 12				**2.00**	**1.72**	**16.6**	**97**	**9**	**38**
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1286.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:8 - 1.79 t/m³ (corrected for 5% +19mm fraction)
   S:9 - 1.76 t/m³ (no correction for oversize required)
   S:10 - 1.76 t/m³ (no correction for oversize required)
   S:11 - 1.76 t/m³ (no correction for oversize required)
   S:12 - 1.76 t/m³ (no correction for oversize required)

   See Reference No. 21/1286 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & K. Hipkins **Date:** 27 to 29-Apr-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1566

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy SILT with minor gravel and Sandy GRAVEL with minor / some silt**	**Sample Source:**	**Cut to Fill and Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
13	N802894.89, E372804.65	315.76	250	2.07	1.77	16.8	101	6	36
14	N802943.40, E372723.82	314.06	250	2.07	1.78	16.3	101	6	35
15	N802931.75, E372720.23	315.95	250	2.31	2.20	5.1	99	9	20
16	N802916.32, E372763.56	316.20	250	2.35	2.25	4.6	99	8	18
17	N802900.75, E372773.86	316.77	250	2.36	2.25	4.8	100	7	18
18	N802904.43, E372791.97	315.33	250	2.34	2.18	7.1	98	5	21
Mean Values Sites: 13 to 18				2.25	2.07	9.1	100	7	25
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No's 21/1286 & 20/1773.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:13 - 1.76 t/m³ (no correction for oversize required)
   S:14 - 1.76 t/m³ (no correction for oversize required)
   S:15 - 2.22 t/m³ (corrected for 13% +19mm fraction)
   S:16 - 2.26 t/m³ (corrected for 28% +19mm fraction)
   S:17 - 2.24 t/m³ (corrected for 18% +19mm fraction)
   S:18 - 2.23 t/m³ (corrected for 16% +19mm fraction)

   See Reference No. 21/1286 for NZ standard compaction details for Sites 13 & 14.
   See Reference No. 20/1773 for NZ standard compaction details for Sites 15 to 18.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 14 to 17-May-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1600

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor / some silt**	**Sample Source:**	**Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
19	N802922.08, E372733.60	317.47	250	2.34	2.20	6.2	100	6	20
20	N802929.48, E372718.33	316.85	250	2.34	2.18	7.4	98	5	21
21	N802941.40, E372725.16	314.85	250	2.32	2.20	5.2	99	8	20
Mean Values Sites: 19 to 21				2.33	2.20	6.3	99	6	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 20/1773.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:19 - 2.21 t/m³ (corrected for 10% +19mm fraction)
   S:20 - 2.22 t/m³ (corrected for 13% +19mm fraction)
   S:21 - 2.24 t/m³ (corrected for 17% +19mm fraction)

   See Reference No. 20/1773 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: **C. Maxwell & C. Julius** **Date: 19 & 20-May-21**

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY
№ 434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1619

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor / some silt**	**Sample Source:**	**Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
22	N802891.01, E372801.71	316.77	250	2.32	2.17	6.8	98	6	21
23	N802905.62, E372790.19	315.73	250	2.31	2.18	6.2	98	7	21
24	N802898.88, E372771.97	317.44	250	2.36	2.25	4.9	102	7	18
25	N802915.94, E372764.41	316.63	250	2.34	2.23	5.1	101	8	19
Mean Values Sites: 22 to 25				2.33	2.21	5.8	100	7	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 20/1773.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:22 - 2.21 t/m³ (corrected for 10% +19mm fraction)
   S:23 - 2.22 t/m³ (corrected for 13% +19mm fraction)
   S:24 - 2.21 t/m³ (corrected for 10% +19mm fraction)
   S:25 - 2.20 t/m³ (corrected for 7% +19mm fraction)

   See Reference No. 20/1773 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 20 & 21-May-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1704

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor / some silt**	**Sample Source:**	**Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
26	N802921.44, E372720.61	318.24	250	2.35	2.21	6.5	100	5	20
27	N802920.30, E372741.77	317.91	250	2.35	2.23	5.4	101	7	19
28	N802903.76, E372756.60	318.06	200	2.30	2.18	5.6	99	9	21
29	N802904.96, E372774.46	317.38	250	2.37	2.25	5.2	102	6	18
30	N802892.86, E372790.01	317.44	250	2.36	2.23	5.6	100	6	19
Mean Values Sites: 26 to 30				2.35	2.22	5.6	100	7	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 20/1773.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:26 - 2.22 t/m³ (corrected for 11% +19mm fraction)
   S:27 - 2.21 t/m³ (corrected for 9% +19mm fraction)
   S:28 - 2.20 t/m³ (corrected for 6% +19mm fraction)
   S:29 - 2.21 t/m³ (corrected for 10% +19mm fraction)
   S:30 - 2.22 t/m³ (corrected for 13% +19mm fraction)

   See Reference No. 20/1773 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & K. Hipkins **Date:** 1 & 2-Jun-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1773

Date: 15 June 2021

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor / some silt**	**Sample Source:**	**Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details			Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs)	RL (cs)							
31	N802917.84, E372722.06	318.93	250	2.36	2.17	9.0	98	2	21
32	N802912.56, E372741.42	318.98	250	2.33	2.18	7.3	99	5	21
33	N802896.14, E372758.44	319.09	250	2.35	2.17	8.0	97	4	21
34	N802906.24, E372768.42	318.13	250	2.34	2.20	6.3	98	6	20
Mean Values Sites: 31 to 34				2.35	2.18	7.6	98	4	21
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 20/1773.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the sample description based on NZ Geotechnical Society Guidelines 2005 and the client supplied information (cs).*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:31 - 2.21 t/m³ (corrected for 8% +19mm fraction)
   S:32 - 2.20 t/m³ (corrected for 7% +19mm fraction)
   S:33 - 2.23 t/m³ (corrected for 15% +19mm fraction)
   S:34 - 2.26 t/m³ (corrected for 26% +19mm fraction)

   See Reference No. 20/1773 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & K. Hipkins **Date:** 10 & 11-Jun-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1913

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor / some silt**	**Sample Source:**	**Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
35	802895.525	372773.290	319.033	300	2.33	2.17	7.2	98	6	21
36	802899.897	372753.550	319.644	300	2.36	2.18	8.4	98	2	21
37	802908.110	372733.404	320.437	300	2.33	2.20	5.8	99	7	20
Mean Values Sites: 35 to 37					2.34	2.18	7.1	99	5	21
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 20/1773.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:35 - 2.20 t/m³ (corrected for 7% +19mm fraction)
   S:36 - 2.22 t/m³ (corrected for 12% +19mm fraction)
   S:37 - 2.22 t/m³ (corrected for 12% +19mm fraction)

   See Reference No. 20/1773 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 23 & 24-Jun-21

Checked By: 

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
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Reference No: 22/1913

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 23 & 24-Jun-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/1941

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**Alpine Meadows**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Fisher**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
38	802890.562	372769.429	320.188	300	2.38	2.24	6.0	101	5	18
39	802895.183	372758.192	320.359	300	2.35	2.23	5.5	100	7	19
40	802900.272	372746.324	320.636	300	2.32	2.20	5.6	100	8	20
41	802906.170	372741.470	320.271	300	2.38	2.23	6.8	100	4	19
Mean Values Sites: 38 to 41					2.36	2.23	6.0	100	6	19
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:38 - 2.23 t/m³ (corrected for 23% +19mm fraction)
   S:39 - 2.22 t/m³ (corrected for 21% +19mm fraction)
   S:40 - 2.20 t/m³ (corrected for 12% +19mm fraction)
   S:41 - 2.23 t/m³ (corrected for 22% +19mm fraction)

   See Reference No. 21/1946 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Fisher & C. Julius **Date:** 29 & 30-Jun-21

Checked By: 

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Reference No: 22/1941

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Fisher & C. Julius **Date:** 29 & 30-Jun-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2230

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**Alpine Meadows**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
42	802997.254	372628.451	308.236	300	2.34	2.21	5.8	99	7	20
43	802998.754	372615.820	309.510	250	2.40	2.29	5.1	102	5	17
Mean Values Sites: 42 & 43					2.37	2.25	5.4	101	6	18
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:42 - 2.22 t/m³ (corrected for 19% +19mm fraction) *S:43 - 2.24 t/m³ (corrected for 32% +19mm fraction)*

   See Reference No. 21/1946 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: **C. Maxwell & C. Julius** **Date:** **2 & 3-Aug-21**

Checked By:

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2230

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 2 & 3-Aug-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2235

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**Alpine Meadows**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Fisher**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
44	803001.129	372610.803	310.396	300	2.26	2.17	4.1	97	12	21
45	802996.344	372621.321	309.839	300	2.29	2.21	3.8	98	11	20
46	802994.448	372626.739	309.508	300	2.27	2.19	3.6	98	13	20
47	802997.986	372628.659	308.542	300	2.18	2.10	3.7	93	16	23
48	803004.344	372615.886	309.136	300	2.18	2.10	3.9	94	16	24
Mean Values Sites: 44 to 48					2.23	2.15	3.8	96	13	22
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*

2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:44 - 2.22 t/m³ (corrected for 19% +19mm fraction)
   S:45 - 2.24 t/m³ (corrected for 30% +19mm fraction)
   S:46 - 2.24 t/m³ (corrected for 29% +19mm fraction)
   S:47 - 2.25 t/m³ (corrected for 38% +19mm fraction)
   S:48 - 2.24 t/m³ (corrected for 28% +19mm fraction)

   See Reference No. 21/1946 for NZ standard compaction details.

3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*

4. *This report may not be reproduced except in full.*

Tested By: C. Fisher & C. Julius **Date:** 3 & 4-Aug-21

Checked By:

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Central Testing Services
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Reference No: 21/2235

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Fisher & C. Julius **Date:** 3 & 4-Aug-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2286

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**Alpine Meadows**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
49	802988.076	372652.786	308.798	300	2.32	2.23	4.1	101	10	19
50	802993.089	372632.338	309.824	300	2.26	2.19	3.1	97	13	20
51	803004.384	372612.040	310.327	300	2.34	2.26	3.4	101	10	18
Mean Values Sites: 49 to 51					2.31	2.23	3.5	100	11	19
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:49 - 2.21 t/m³ (corrected for 15% +19mm fraction)
   S:50 - 2.25 t/m³ (corrected for 41% +19mm fraction)
   S:51 - 2.24 t/m³ (corrected for 32% +19mm fraction)

   See Reference No. 21/1946 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 9 & 10-Aug-21

Checked By:

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Central Testing Services
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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2286

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Maxwell & C. Julius **Date:** 9 & 10-Aug-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2334

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**Borrow to Fill – Ballantyne Ridge**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
52	802985.059	372651.819	309.933	300	2.20	2.05	7.2	96	11	26
53	802992.233	372631.000	310.385	300	2.23	2.13	4.6	98	13	23
54	803006.725	372610.786	310.628	300	2.20	2.10	4.9	98	14	24
Mean Values Sites: 52 to 54					2.21	2.10	5.6	97	13	25
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.78 t/m³ – See Reference No. 17/2876.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:52 - 2.14 t/m³ (no correction for oversize required)
   S:53 - 2.17 t/m³ (corrected for 7% +19mm fraction)
   S:54 - 2.14 t/m³ (no correction for oversize required)

   See Reference No. 17/2876 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 12 & 13-Aug-21

Checked By:

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
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Reference No: 21/2334

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 12 & 13-Aug-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2335

Date: 4 September 2021

TEST REPORT - NZ STANDARD COMPACTION

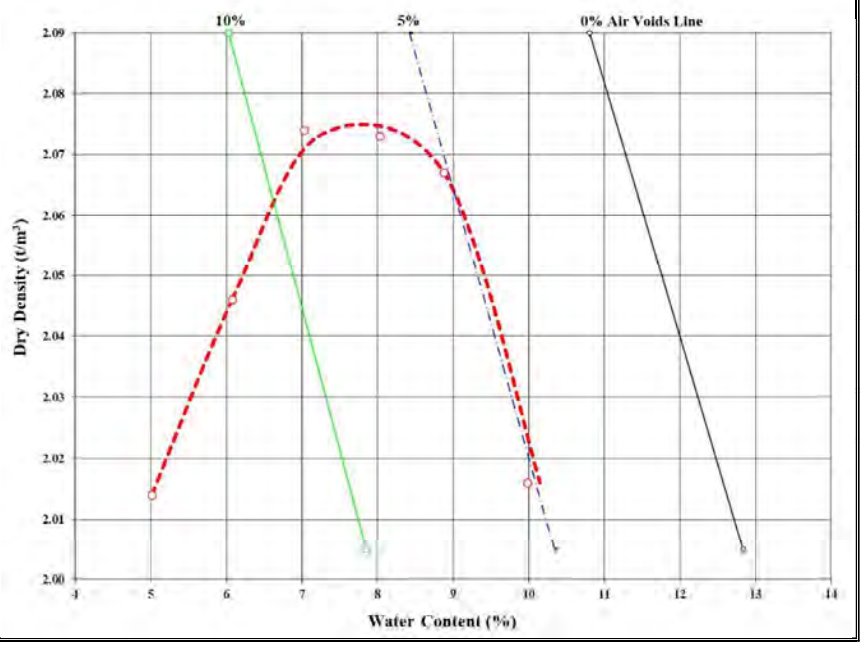
Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge, Wanaka**		
Sample Description:	**Gravelly SILT with some sand**	**Order No:**	**N/A**
Sample Source:	**Cut to Fill**	**Sample Label No:**	**01564**
Date & Time Sampled:	**2-Aug-21**	**Sampled By:**	**C. Maxwell**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Date Received:**	**2-Aug-21**

NZ STANDARD COMPACTION - NZS 4402:1986, Test 4.1.1

% Retained (+19.0mm Fraction)	**4.0 %**
Maximum Dry Density: (-19.0mm Fraction)	**2.07 t/m^3**
Optimum Water Content: (-19.0mm Fraction)	**8.0 %**

Notes:

- *The sample was received in a natural state.*
- *The material tested in the NZ Standard Compaction test was the fraction passing a 19.0mm test sieve.*
- *The air voids lines were calculated from an assumed solid density of 2.70 t/m^3.*



General Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample description based on NZ Geotechnical Society Guidelines 2005.*
- *This report may not be reproduced except in full.*

Tested By: K. Hipkins **Date:** 1 to 3-Sep-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2438

Date: 29 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**SILT with some sand and trace of gravel and Sandy GRAVEL with minor silt**	**Sample Source:**	**Cut to Fill and Borrow to Fill (Alpine Meadows)**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
55	802984.366	372658.467	310.266	300	1.96	1.76	11.8	96	15	36
56	802991.588	372634.615	310.858	300	2.01	1.85	9.1	100	16	33
57	803002.928	372614.492	311.387	300	2.21	2.12	4.2	96	14	23
Mean Values Sites: 55 to 57					2.06	1.91	8.4	97	15	31
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No's 15/1919 & 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*

2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:55 - 1.84 t/m³ (no correction for oversize required)
   S:56 - 1.84 t/m³ (no correction for oversize required)
   S:57 - 2.22 t/m³ (corrected for 18% +19mm fraction)

   See Reference No. 15/1919 for NZ standard compaction details for Sites 55 & 56.
   See Reference No. 21/1946 for NZ standard compaction details for Site 57.

3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*

4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 6 & 7-Sep-21

Checked By: 

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Reference No: 21/2438

Date: 29 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

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Tested By: C. Maxwell & C. Julius **Date:** 6 & 7-Sep-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2669

Date: 29 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Gravelly SILT with some sand and Sandy GRAVEL with minor silt**	**Sample Source:**	**Cut to Fill and Borrow to Fill (Alpine Meadows)**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
Site No.	GPS Coordinates [cs] Northing	GPS Coordinates [cs] Easting	RL [cs]							
58	803029.145	372547.192	313.738	300	1.98	1.84	7.6	89	18	32
59	803030.962	372557.562	312.840	250	2.07	1.91	8.2	92	14	29
60	803021.349	372569.139	313.066	250	2.17	2.06	5.4	93	14	25
61	803010.687	372584.962	312.720	250	2.26	2.18	3.5	97	13	21
Note: Retested – See Reference No 21/2754.										
Mean Values Sites: 58 to 61					2.12	2.00	6.2	93	15	27
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

[1] Voids were calculated from an assumed solid density of 2.70 t/m³ for Sites 58 & 59 – See Reference No. 21/2335. Voids were calculated from an assumed solid density of 2.75 t/m³ for Sites 60 & 61 – See Reference No. 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information [cs] and the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:58 - 2.07 t/m³ (no correction for oversize required)
   S:59 - 2.07 t/m³ (no correction for oversize required)
   S:60 - 2.21 t/m³ (corrected for 15% +19mm fraction)
   S:61 - 2.26 t/m³ (corrected for 48% +19mm fraction)

   See Reference No. 21/2335 for NZ standard compaction details for Sites 58 & 59.
   See Reference No. 21/1946 for NZ standard compaction details for Sites 60 & 61.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 23 to 25-Sep-21

Checked By:

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Reference No: 21/2669

Date: 29 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Maxwell & C. Julius **Date:** 23 to 25-Sep-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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Reference No: 21/2754

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Retest of 21/2669**		
Sample Description:	**Gravelly SILT with some sand and Sandy GRAVEL with minor silt**	**Sample Source:**	**Cut to Fill and Alpine Meadows**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
Site No.	GPS Coordinates [cs] Northing	GPS Coordinates [cs] Easting	RL [cs]							
62	803029.082	372545.118	313.940	250	2.17	1.98	9.8	95	7	27
63	803030.125	372557.353	313.001	250	2.16	1.98	8.9	96	9	27
64	803023.478	372572.291	312.321	250	2.28	2.14	6.2	98	9	22
65	803011.818	372580.730	313.081	250	2.25	2.15	5.1	97	11	22
Mean Values Sites: 62 to 65					2.21	2.06	7.5	97	9	24
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

[1] Voids were calculated from an assumed solid density of 2.70 t/m³ for Sites 62 & 63 – See Reference No. 21/2335. Voids were calculated from an assumed solid density of 2.75 t/m³ for Sites 64 & 65 – See Reference No. 21/1946.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information [cs] and the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:62 - 2.07 t/m³ (no correction for oversize required)
   S:63 - 2.07 t/m³ (no correction for oversize required)
   S:64 - 2.19 t/m³ (corrected for 9% +19mm fraction)
   S:65 - 2.20 t/m³ (corrected for 14% +19mm fraction)

   See Reference No. 21/2335 for NZ standard compaction details for Sites 62 & 63.
   See Reference No. 21/1946 for NZ standard compaction details for Sites 64 & 65.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 28 & 29-Sep-21

Checked By: 

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Reference No: 21/2754

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Maxwell & C. Julius **Date:** 28 & 29-Sep-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/2832

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Gravelly SILT with some sand**	**Sample Source:**	**Cut to Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
66	803023.920	372576.777	311.980	300	2.15	2.00	7.3	97	11	26
67	803020.316	372592.749	310.704	250	2.13	1.98	7.6	95	12	27
68	803007.109	372602.233	312.020	300	2.14	1.98	7.7	96	11	27
Mean Values Sites: 66 to 68					2.14	1.99	7.5	96	11	26
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.70 t/m³ – See Reference No. 21/2335.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from a maximum dry density of 2.07 t/m³ (no correction for oversize required).*

   See Reference No. 21/2335 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 5 & 6-Oct-21

Checked By: 

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Reference No: 21/2832

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Maxwell & C. Julius **Date:** 5 & 6-Oct-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/3775

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**Sandy GRAVEL with minor silt and Gravelly SAND with minor silt**	**Sample Source:**	**Alpine Meadows and Cut to Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
69	803026.587	372549.123	314.426	300	2.33	2.28	2.3	102	12	17
70	803027.676	372568.714	312.516	300	2.22	2.15	3.3	97	15	22
71	803012.916	372587.448	312.859	300	2.16	2.09	3.7	99	15	23
72	803012.894	372606.382	310.757	300	2.09	1.98	5.4	97	16	27
73	802997.589	372625.356	310.954	300	2.18	2.09	3.8	95	16	24
74	802986.800	372652.188	310.337	300	2.05	1.96	4.7	96	18	27
Mean Values Sites: 69 to 74					2.17	2.09	3.9	98	15	23
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ for Sites 69, 70 & 73 – See Reference No. 21/1946. Voids were calculated from a tested solid density of 2.70 t/m³ for Sites 71, 72 & 74 – See Reference No. 17/1615.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the calculation of % relative compaction, the client supplied information (cs) and the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry densities, corrected in accordance with USBR Des-E38 where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   S:69 - 2.23 t/m³ (corrected for 23% +19mm fraction)
   S:70 - 2.22 t/m³ (corrected for 17% +19mm fraction)
   S:71 - 2.10 t/m³ (corrected for 13% +19mm fraction)
   S:72 - 2.05 t/m³ (no correction for oversize required)
   S:73 - 2.21 t/m³ (corrected for 16% +19mm fraction)
   S:74 - 2.05 t/m³ (no correction for oversize required)

   See Reference No. 21/1946 for NZ standard compaction details for Sites 69, 70 & 73.
   See Reference No. 17/1615 for NZ standard compaction details for Sites 71, 72 & 74.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Pearson **Date:** 14 & 15-Dec-21

Checked By:

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Central Testing Services
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Reference No: 21/3775

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Maxwell & C. Pearson **Date:** 14 & 15-Dec-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 22/084

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**SILT with some sand and minor gravel**	**Sample Source:**	**Borrow to Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Fisher**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Water Content (%)	Relative Compaction (%)	Air Voids [(1)] (%)	Total Voids [(1)] (%)
Site No.	GPS Coordinates [(cs)] Northing	GPS Coordinates [(cs)] Easting	RL [(cs)]							
75	803027.468	372563.684	313.929	300	2.17	1.90	14.3	97	3	30
76	803029.791	372554.855	314.399	300	2.14	1.95	10.2	99	8	28
77	803032.686	372545.711	314.264	300	2.18	1.92	13.3	98	3	29
Mean Values Sites: 75 to 77					2.16	1.92	12.6	98	5	29
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

[(1)] Voids were calculated from an assumed solid density of 2.70 t/m^3 – See Reference No. 15/1470.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the client supplied information [(cs)] and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from a maximum dry density of 1.96 t/m^3 (no correction for oversize required).*

   See Reference No. 15/1470 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Fisher & K. Hipkins **Date:** 14 to 16-Jan-22

Checked By: 

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 22/084

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Fisher & K. Hipkins **Date:** 14 to 16-Jan-22

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 22/192

Date: 30 March 2022

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka**		
Sample Description:	**SILT with some sand and minor gravel**	**Sample Source:**	**Borrow to Fill**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Fisher**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1**		

FIELD DENSITY & WATER CONTENT RESULTS

Location Details				Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Water Content (%)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
Site No.	GPS Coordinates (cs) Northing	GPS Coordinates (cs) Easting	RL (cs)							
78	803023.357	372565.294	314.298	300	2.06	1.84	11.8	94	10	32
79	803029.344	372558.655	314.432	300	2.17	1.95	11.7	99	5	28
80	803029.966	372545.693	314.785	300	2.12	1.89	12.5	96	6	30
Mean Values Sites: 78 to 80					2.12	1.89	12.0	97	7	30
NZS 4431:1989, Section 7.4.2.1 Specification:					**Minimum Relative Compaction: 95.0 %.**					

(1) Voids were calculated from an assumed solid density of 2.70 t/m³ – See Reference No. 15/1470.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the client supplied information (cs) and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from a maximum dry density of 1.96 t/m³ (no correction for oversize required).*

   See Reference No. 15/1470 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Fisher & C. Julius **Date:** 19 to 21-Jan-22

Checked By: 

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 22/192

Date: 30 March 2022

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Note:

- ***This report may not be reproduced except in full.***

Tested By: C. Fisher & C. Julius **Date:** 19 to 21-Jan-22

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1004

Date: 11 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
1	See location page 2	See page 2	250	2.31	2.20	5.1	18	2.25	98	9	20
2	See location page 2	See page 2	250	2.41	2.29	5.6	27	2.27	101	4	17
3	See location page 2	See page 2	250	2.34	2.24	4.6	17	2.24	100	9	19
Mean Values Sites: 1 to 3				2.35	2.24	5.1	21	-	100	7	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 7 to 9-Jun-24

Checked By: A. Rowe

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Reference No: CTS24W1004

Date: 11 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 7 to 9-Jun-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1014

Date: 12 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**A. Rowe**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
4	See location page 2	See page 2	250	2.38	2.25	5.6	10	2.22	101	6	18
5	See location page 2	See page 2	250	2.35	2.22	5.9	13	2.23	100	6	19
6	See location page 2	See page 2	250	2.34	2.23	5.1	29	2.27	98	8	19
Mean Values Sites: 4 to 6				2.36	2.23	5.6	17	-	100	6	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: A. Rowe & C. Pearson **Date:** 11 & 12-Jun-24

Checked By: A. Rowe

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Reference No: CTS24W1014

Date: 12 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: A. Rowe & C. Pearson **Date:** 11 & 12-Jun-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1026

Date: 14 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
7	See location page 2	See page 2	250	2.30	2.18	5.5	14	2.23	98	9	21
8	See location page 2	See page 2	250	2.30	2.20	4.4	16	2.24	98	10	20
9	See location page 2	See page 2	250	2.30	2.19	4.7	16	2.24	98	10	20
Mean Values Sites: 7 to 9				2.30	2.19	4.9	15	-	98	10	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Pearson **Date:** 12 to 14-Jun-24

Checked By: A. Rowe

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Reference No: CTS24W1026

Date: 14 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Pearson **Date:** 12 to 14-Jun-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1041

Date: 14 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**A. Rowe**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1** **Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
10	See location page 2	See page 2	250	2.32	2.21	5.1	10	2.22	99	9	20
11	See location page 2	See page 2	250	2.31	2.19	5.4	9	2.22	99	9	20
12	See location page 2	See page 2	250	2.38	2.27	4.8	10	2.22	102	7	18
Mean Values Sites: 10 to 12				2.33	2.22	5.1	10	-	100	8	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: A. Rowe & C. Pearson **Date:** 13 & 14-Jun-24

Checked By: A. Rowe

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Reference No: CTS24W1041

Date: 14 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: A. Rowe & C. Pearson **Date:** 13 & 14-Jun-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1076

Date: 20 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1** **Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
13	See location page 2	See page 2	250	2.36	2.23	5.5	18	2.24	99	6	19
14	See location page 2	See page 2	250	2.38	2.25	5.7	13	2.23	101	5	18
15	See location page 2	See page 2	250	2.33	2.19	6.2	17	2.24	98	7	20
Mean Values Sites: 13 to 15				2.35	2.22	5.8	16	-	99	6	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 18 to 20-Jun-24

Checked By: LTS

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1076

Date: 20 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 18 to 20-Jun-24

Checked By: L.T Smith

Approved Signatory

L.T Smith

L.T. Smith
Key Technical Personnel

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1091

Date: 24 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1** **Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
16	See location page 2	See page 2	250	2.37	2.24	5.7	7	2.21	101	6	19
17	See location page 2	See page 2	250	2.31	2.20	5.2	7	2.21	99	9	20
18	See location page 2	See page 2	250	2.30	2.19	5.0	15	2.23	98	9	20
Mean Values Sites: 16 to 18				2.33	2.21	5.3	10	-	100	8	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 20 to 22-Jun-24

Checked By:

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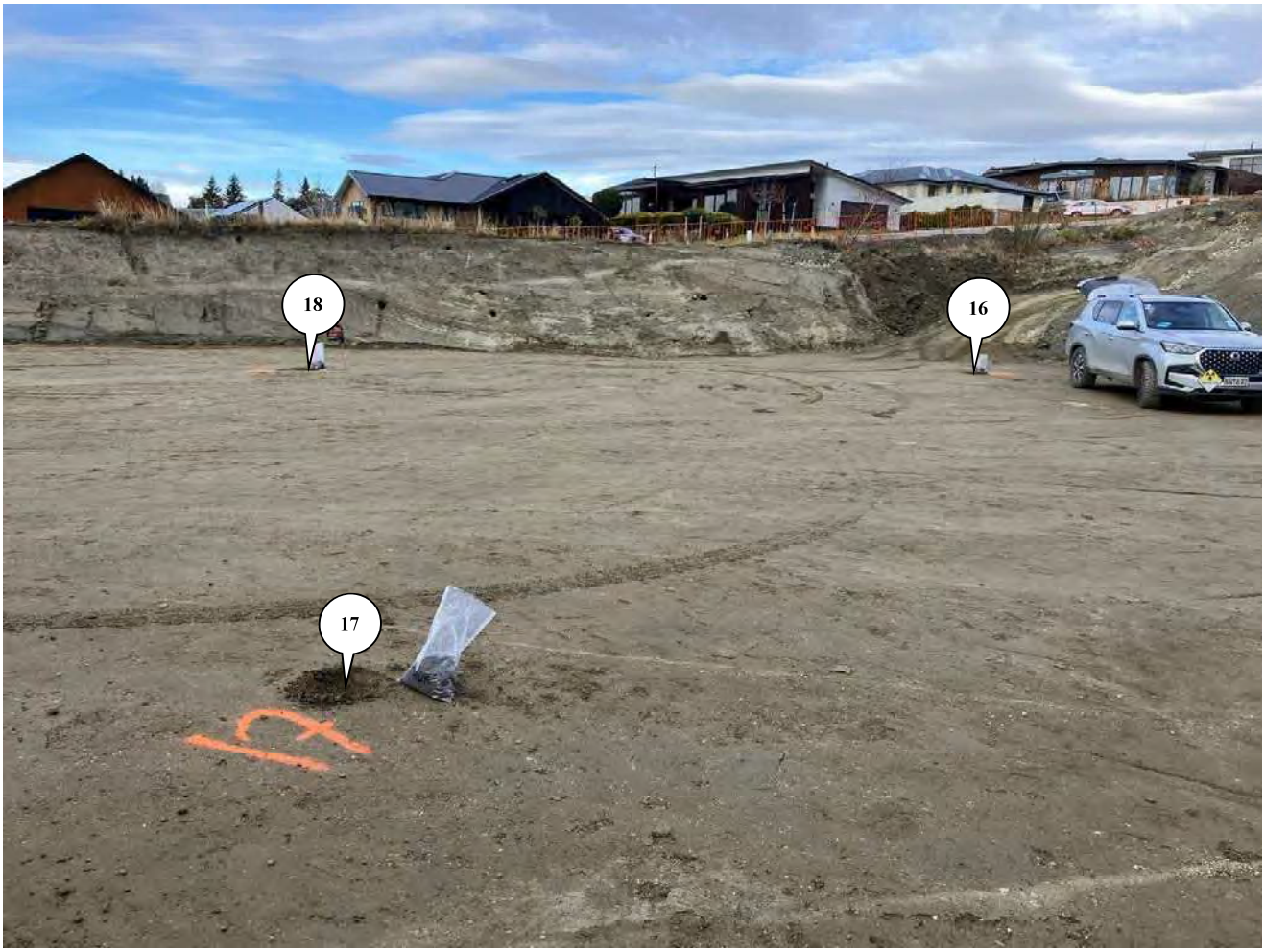
Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1091

Date: 24 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)



Approximate Test Locations

Note:

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Tested By: C. Maxwell & M. Duncan **Date:** 20 to 22-Jun-24

Checked By:

Approved Signatory

L.T. Smith
Key Technical Personnel

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1117

Date: 26 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-E38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
19	See location page 2	See page 2	250	2.36	2.26	4.7	23	2.26	100	7	18
20	See location page 2	See page 2	250	2.33	2.21	5.1	16	2.24	99	8	20
21	See location page 2	See page 2	250	2.30	2.18	5.5	12	2.23	98	9	21
Mean Values Sites: 19 to 21				2.33	2.22	5.1	17	-	99	8	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & T. Shaw **Date:** 24 & 25-Jun-24

Checked By: L T Sut

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Central Testing Services
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Reference No: CTS24W1117

Date: 26 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & T. Shaw **Date:** 24 & 25-Jun-24

Checked By: L.T. Smith

Approved Signatory

L.T. Smith
Key Technical Personnel

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Reference No: CTS24W1123

Date: 27 June 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718/D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
22	See location page 2	See page 2	250	2.26	2.16	4.9	9	2.22	97	11	22
23	See location page 2	See page 2	250	2.27	2.17	4.6	9	2.22	98	11	21
24	See location page 2	See page 2	250	2.28	2.17	4.7	9	2.22	98	11	21
Mean Values Sites: 22 to 24				2.27	2.17	4.7	9	-	98	11	21
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Henderson **Date:** 25 & 26-Jun-24

Checked By: A. Rowe

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Reference No: CTS24W1123

Date: 27 June 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & C. Henderson **Date:** 25 & 26-Jun-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1148

Date: 1 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-E38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
25	See location page 2	See page 2	250	2.26	2.16	4.4	21	2.25	96	12	21
26	See location page 2	See page 2	250	2.33	2.23	4.6	19	2.25	99	9	19
27	See location page 2	See page 2	250	2.32	2.22	4.3	26	2.26	98	9	19
Mean Values Sites: 25 to 27				2.30	2.20	4.4	22	-	98	10	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Henderson **Date:** 27-Jun-24 to 1-Jul-24

Checked By: A. Rowe

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Reference No: CTS24W1148

Date: 1 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & C. Henderson **Date:** 27-Jun-24 to 1-Jul-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1205

Date: 8 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-E38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids (1) (%)	Total Voids (1) (%)
28	See location page 2	See page 2	250	2.30	2.17	6.2	12	2.23	97	8	21
29	See location page 2	See page 2	250	2.35	2.20	6.7	20	2.25	98	5	20
30	See location page 2	See page 2	250	2.30	2.19	5.2	24	2.26	97	9	20
Mean Values Sites: 28 to 30				2.32	2.19	6.0	19	-	97	7	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

(1) Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Pearson **Date:** 5 to 8-Jul-24

Checked By: A. Rowe

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Reference No: CTS24W1205

Date: 8 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & C. Pearson **Date:** 5 to 8-Jul-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1242

Date: 15 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
31	See location page 2	See page 2	250	2.26	2.15	5.3	18	2.25	96	10	22
32	See location page 2	See page 2	250	2.27	2.15	5.4	10	2.22	97	10	22
33	See location page 2	See page 2	250	2.32	2.21	5.1	15	2.24	99	8	20
Mean Values Sites: 31 to 33				2.28	2.17	5.3	15	-	97	10	21
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & L.T. Smith **Date:** 10 to 12-Jul-24

Checked By:

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

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Reference No: CTS24W1242

Date: 15 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & L.T. Smith **Date:** 10 to 12-Jul-24

Checked By:

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1289

Date: 17 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
34	See location page 2	See page 2	250	2.28	2.18	4.7	14	2.23	98	11	21
35	See location page 2	See page 2	250	2.31	2.20	5.0	9	2.22	99	9	20
36	See location page 2	See page 2	250	2.33	2.23	4.6	13	2.23	100	9	19
Mean Values Sites: 34 to 36				2.31	2.20	4.7	12	-	99	9	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & J. Smith **Date:** 15 to 17-Jul-24

Checked By: A. Rowe

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Central Testing Services
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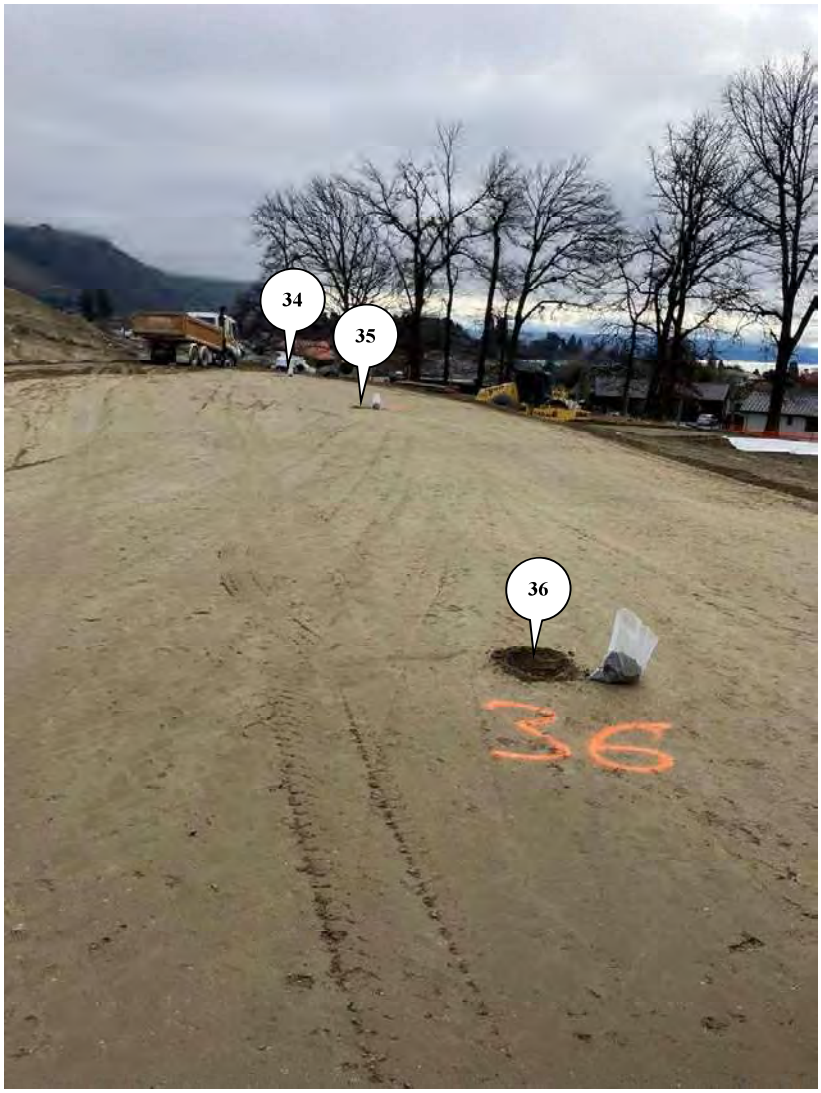
Reference No: CTS24W1289

Date: 17 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)



Approximate Test Locations

Note:

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Tested By: C. Maxwell & J. Smith **Date:** 15 to 17-Jul-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1300

Date: 22 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
37	See location page 2	See page 2	250	2.33	2.22	4.9	18	2.24	99	8	19
38	See location page 2	See page 2	250	2.28	2.16	5.5	13	2.23	97	10	21
39	See location page 2	See page 2	250	2.31	2.21	4.4	17	2.24	99	10	20
Mean Values Sites: 37 to 39				2.31	2.20	4.9	16	-	98	9	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Pearson **Date:** 17 to 19-Jul-24

Checked By:

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Central Testing Services
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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1300

Date: 22 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & C. Pearson **Date:** 17 to 19-Jul-24

Checked By:

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1314

Date: 23 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
40	See location page 2	See page 2	250	2.29	2.19	4.4	12	2.23	98	11	20
41	See location page 2	See page 2	250	2.25	2.16	4.5	12	2.22	97	12	21
42	See location page 2	See page 2	250	2.32	2.21	4.8	9	2.22	100	9	20
Mean Values Sites: 40 to 42				2.29	2.19	4.6	11	-	98	10	20
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 19 to 23-Jul-24

Checked By:

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1314

Date: 23 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & M. Duncan **Date:** 19 to 23-Jul-24

Checked By:

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1344

Date: 25 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
43	See location page 2	See page 2	250	2.29	2.19	4.3	13	2.23	98	11	20
44	See location page 2	See page 2	250	2.27	2.18	4.4	7	2.21	98	11	21
45	See location page 2	See page 2	250	2.26	2.16	4.4	9	2.22	98	12	21
Mean Values Sites: 43 to 45				2.27	2.18	4.4	10	-	98	11	21
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & T. Shaw **Date:** 23 to 25-Jul-24

Checked By:

ACCREDITED IANZ TESTING LABORATORY №434

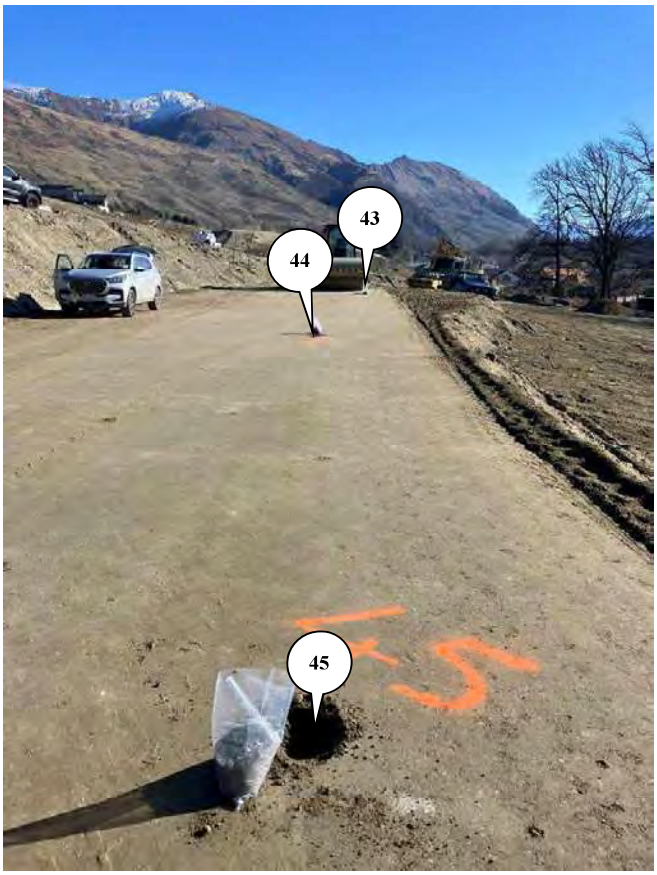
Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1344

Date: 25 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)



Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: C. Maxwell & T. Shaw **Date:** 23 to 25-Jul-24

Checked By:

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1355

Date: 29 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
46	See location page 2	See page 2	250	2.35	2.25	4.7	19	2.25	100	8	18
47	See location page 2	See page 2	250	2.40	2.31	3.7	27	2.27	102	7	16
Mean Values Sites: 46 & 47				2.38	2.28	4.2	23	-	101	8	17
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 24 to 26-Jul-24

Checked By: A. Rowe

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
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Reference No: CTS24W1355

Date: 29 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & C. Julius **Date:** 24 to 26-Jul-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

ACCREDITED IANZ TESTING LABORATORY №434

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

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1391

Date: 29 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**C. Maxwell**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1 Corrected Maximum Dry Density – USBR Des-38 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m³)	Dry Density (t/m³)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m³)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
48	See location page 2	See page 2	250	2.30	2.20	4.4	26	2.26	97	10	20
49	See location page 2	See page 2	250	2.35	2.25	4.4	21	2.25	100	8	18
Mean Values Sites: 48 to 49				2.33	2.23	4.4	24	-	99	9	19
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m³ – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: C. Maxwell & C. Julius **Date:** 25 & 26-Jul-24

Checked By: A. Rowe

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Reference No: CTS24W1391

Date: 29 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

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Tested By: C. Maxwell & C. Julius **Date:** 25 & 26-Jul-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

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Reference No: CTS24W1403

Date: 29 July 2024

TEST REPORT - FIELD DENSITY & WATER CONTENT

Client Details:	**Central Machine Hire, P.O. Box 495, Wanaka**	**Attention:**	**B. Fenn**
Job Description:	**Alpha Ridge Subdivision, Wanaka – Stage 4; Pond Fill**		
Sample Description:	**Sandy GRAVEL with minor silt**	**Sample Source:**	**3 Parks Development, Wanaka**
Sample Method:	**NZS 4407:2015, Test 2.4.8.3**	**Sampled By:**	**A. Rowe**
Test Methods:	**Field Density - NZS 4407:2015, Test 4.2; Water Content - NZS 4402:1986, Test 2.1** **Corrected Maximum Dry Density – ASTM D4718 / D4718M-15 & NZS 4402:1986, Test 2.8.2**		

FIELD DENSITY & LABORATORY WATER CONTENT RESULTS

Location Details											
Site No.	Test Location	Fill Depth	Probe Depth (mm)	Wet Density (t/m^3)	Dry Density (t/m^3)	Laboratory Water Content (%)	+19.0mm Fraction (%)	Corrected Maximum Dry Density (t/m^3)	Relative Compaction (%)	Air Voids [1] (%)	Total Voids [1] (%)
50	See location page 2	See page 2	250	2.34	2.24	4.3	9	2.22	101	9	18
51	See location page 2	See page 2	250	2.34	2.24	4.3	10	2.22	101	9	18
Mean Values Sites: 50 & 51				2.34	2.24	4.3	9	-	101	9	18
NZS 4431:1989, Section 7.4.2.1 Specification:				**Minimum Relative Compaction: 95.0 %.**							

[1] Voids were calculated from an assumed solid density of 2.75 t/m^3 – See Reference No. 22/1408.

Note:

1. *Information contained in this report which is Not IANZ Accredited relates to; the calculation of the corrected maximum dry density, the %+19mm fraction, the calculation of % relative compaction and the sample description based on NZ Geotechnical Society Guidelines 2005.*
2. *Relative compaction values have been calculated from the following maximum dry density test reference results where the % +19mm fraction was greater than 5% (see NZS 4402:1986, Test 4.1.1 Note 1).*

   See Reference No. 22/1408 for NZ standard compaction details.
3. *The results stated above are specific to the test locations as recorded. CTS accepts no liability for any extrapolated use of this data.*
4. *This report may not be reproduced except in full.*

Tested By: A. Rowe & M. Duncan **Date:** 26 to 28-Jul-24

Checked By: A. Rowe

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P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1403

Date: 29 July 2024

TEST REPORT – FIELD DENSITY & WATER CONTENT (cont.)

Approximate Test Locations

Note:

- *This report may not be reproduced except in full.*

Tested By: A. Rowe & M. Duncan **Date:** 26 to 28-Jul-24

Checked By: A. Rowe

Approved Signatory

A. Rowe

A. Rowe
Key Technical Personnel

ACCREDITED
TESTING LABORATORY
№ 434

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

APPENDIX D: AS BUILT EARTHWORKS PLAN SET

patersons.
Land Professionals

CLIENT
ORCHARD ROAD HOLDINGS LIMITED
MEADOWSTONE ALPHA SERIES
STAGE 4, WANAKA

DRAWING TITLE
CONTOUR PLAN - EXISTING SURFACE

DATUM INFORMATION
COORDINATE SYSTEM -
DATUM DUNEDIN VERTICAL DATUM 1958
ORIGIN OF COORDINATES -
ORIGIN OF LEVELS -

REV	DRAWN	DATE	NOTE
0	DS	03/04/25	-

STATUS FOR INFORMATION

SURVEYED	PAT	25/06/20
DESIGNED	-	
DRAWN	DS	03/04/25
REVIEWED	AF	03/04/25
APPROVED	MB	03/04/25

PROJECT	W4449-4
DRAWING NO	012
SHEET	200
REVISION	0
SCALE (A3)	1:1000

patersons.
Land Professionals

CLIENT
ORCHARD ROAD HOLDINGS LIMITED
MEADOWSTONE ALPHA SERIES
STAGE 4, WANAKA

DRAWING TITLE
CONTOUR PLAN - AS-BUILT SURFACE

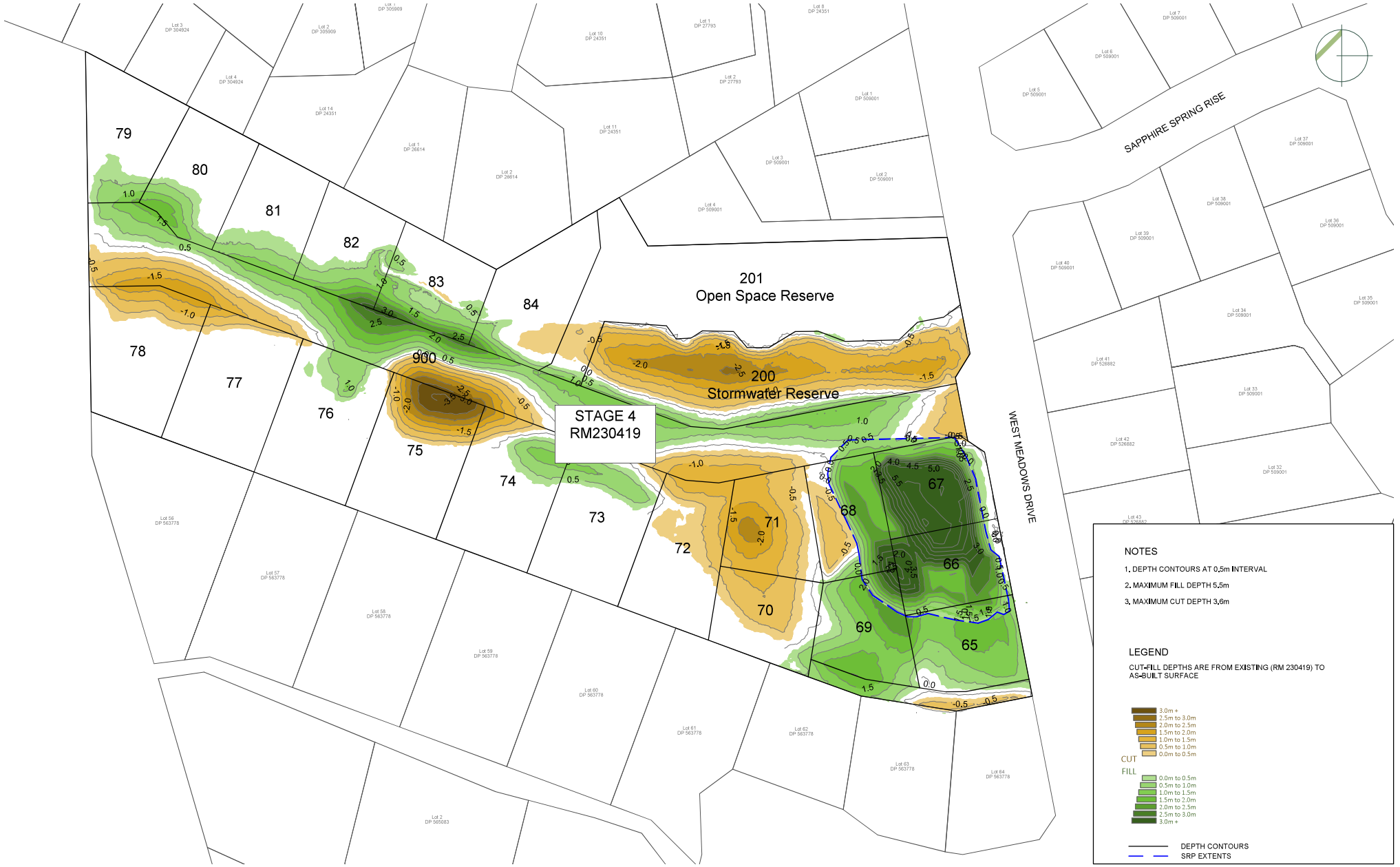
DATUM INFORMATION
COORDINATE SYSTEM -
DATUM DUNEDIN VERTICAL DATUM 1958
ORIGIN OF COORDINATES -
ORIGIN OF LEVELS -

REV	DRAWN	DATE	NOTE
0	DS	03/04/25	-

STATUS FOR INFORMATION

SURVEYED	SS	02/04/25
DESIGNED	TM	12/09/23
DRAWN	DS	03/04/25
REVIEWED	AF	03/04/25
APPROVED	MB	03/04/25

PROJECT	W4449-4
DRAWING NO	012
SHEET	201
REVISION	0
SCALE (A3)	1:1000



patersons. Land Professionals

CLIENT
ORCHARD ROAD HOLDINGS LIMITED
MEADOWSTONE ALPHA SERIES
STAGE 4, WANAKA

DRAWING TITLE
CUT - FILL DEPTHS

DATUM INFORMATION
COORDINATE SYSTEM -
DATUM DUNEDIN VERTICAL DATUM 1958
ORIGIN OF COORDINATES -
ORIGIN OF LEVELS -

REV	DRAWN	DATE	NOTE
0	DS	03/04/25	-

STATUS FOR INFORMATION

SURVEYED	PH	17/12/24
DESIGNED	TM	12/09/23
DRAWN	DS	03/04/25
REVIEWED	AF	03/04/25
APPROVED	MB	03/04/25

PROJECT	W4449-4
DRAWING NO	012
SHEET	202
REVISION	0
SCALE (A3)	1:1000

APPENDIX E: SCHEDULE 2A

QUEENSTOWN OFFICE
157 GLENDA DRIVE, FRANKTON
POST: PO BOX 2963, QUEENSTOWN 9349
EMAIL: queenstown@gcltech.co.nz
TEL: 03 442 5700

SCHEDULE 2A

STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

Development:	Meadowstone Alpha Series (Stage 4) – Lots 65 - 84, Wanaka
Council ref:	RM230419
Developer:	Orchard Road Holdings Ltd
Location:	Stage 4 comprises Lot 909 DP 563778. The DP number for each newly created lot is currently pending LINZ's approval.

I, **Luke Kennedy** of Ground Consulting Ltd (GCL)

Hereby confirm that:

1. I am a geo-professional as defined in section 1.2.2 of NZS 4404:2010 and was retained by the developer as the geo-professional on the above development.
2. The extent of my preliminary investigations are described in the GeoSolve Ltd Report Ref; 140376, dated October 2014, and the conclusions and recommendations of that document have been re-evaluated in preparing this report. The extent of my inspections during construction and the results of all tests and/or re-evaluations carried out are as described in my geotechnical completion report **R6783-4A, dated 05 May 2025**:
3. In my professional opinion, not to be construed as a guarantee, I consider that:
   a) The earth fills shown on the attached plan **Drawing 002 & Appendix D (report reference: GCL R6783-4A)** have been placed in compliance with the requirements of the Queenstown Lakes District Council and my specification, unless as detailed within **Sections 1.5, 5 to 8 and Table 4 of the GCR Report R6783-4A**.
   b) The completed works take into account land slope and foundation stability considerations, subject to the appended foundation recommendations and earthworks restrictions of R6783-4A.
   c) Subject to 3(a), 3(b) and 3(c) of this Schedule, the original ground not affected by filling is suitable for the erection of buildings designed according to NZS 3604 provided that:
      i. Recommendations in **Sections 1.5, 5 to 8 and Table 4 of the GCR Report R6783-4A** are adhered to
   e) Subject to 3(a), 3(b), 3(c) and 3(d) of this Schedule, the filled ground has been completed to an engineering standard and is suitable for the erection of buildings designed according to NZS 3604 provided that:
      ii. Recommendations in **Sections 1.5, 5 to 8 and Table 4 of the GCR Report R6783-4A** are adhered to

f) The original ground not affected by filling, and the filled ground are not subject to erosion, falling debris (including soil, rock, snow and ice), subsidence (including liquefaction induced subsidence), inundation (including flooding, overland flow, storm surge, tidal effects and ponding) or slippage in accordance with the provisions of Section 106 of the Resource Management Act 1991 provided that:

i. TC2 type foundations are utilised for selected Lots as prescribed within GCL report R6783-4A.

iii. Recommendations in Sections 1.5, 5 to 8 and Table 4 of the GCR Report R6783-4A are adhered to

4. This professional opinion is furnished to the TA and the 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 building.

5. This certificate shall be read in conjunction with my geotechnical report referred to in clause 2 above and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.

Signed:

Luke Kennedy
Senior Engineering Geologist

Date: 05 May 2025

Table 4: Summary of Schedule 2A Requirements for Development

Lot No.	General Geology Described from the surface (excl Topsoil)	Technical Category	Expected Ultimate Bearing Capacity (kPa)	Additional Schedule 2A requirements for developments and Notes
65	Engineered Fill over, Glacial Till	TC1	300 kPa	n/a
66	Engineered Fill over Lake Deposits and Glacial Till	TC2	300 kPa	Engineered Fill and Competent Glacial Till is approximately 5m thick over Lake Sediments.
67	Engineered Fill over Lake Deposits and Glacial Till	TC2	300 kPa	
68	Engineered Fill across the eastern site half and cut earthworks comprising Glacial Till across the site's western half	TC2	300 kPa	
69	Engineered Fill over, Glacial Till	TC1	300 kPa	n/a
70	The bulk of the site comprises cut earthworks underlain by Glacial Till	TC1	300 kPa	Natural soils across the southern half of each lot may include areas of Uncontrolled Fill or buried topsoil horizons. These are likely associated with superficial fill spillage downslope, ground disturbance from heavy machinery used during Stage 3, and construction of the EMP clean water diversion channel for Stage 4.
71	The site comprises cut earthworks underlain by Glacial Till	TC1	300 kPa	
72	The site's northern half comprises cut earthworks underlain by reduced bearing capacity colluvium and/or Aeolian Deposits before encountering competent Glacial Till. The site's southern half comprises an unmodified natural soil profile.	TC1	200 kPa from 1.2m below existing ground level	
			300 kPa from 1.2m below existing ground level	
73	The site's northern half comprises minor structural fill earthworks underlain by reduced bearing capacity colluvium and/or Aeolian Deposits before encountering competent Glacial Till. The site's southern half comprises an unmodified natural soil profile and minor cut earthworks in the northern corner of Lot 74.	TC1	200 kPa from 1.2m below existing ground level	
			300 kPa from 1.2m below existing ground level	
74		TC1	240 kPa from existing ground level	
75	The site's northern half comprises cut earthworks underlain by reduced bearing capacity colluvium and/or Aeolian Deposits before	TC1	200 kPa from 1.2m below existing ground level	

	encountering competent Glacial Till. The site's southern half comprises an unmodified natural soil profile.		300 kPa from 1.2m below existing ground level	
76	These sites mainly comprise an unmodified natural soil profile, aside from minor cut earthworks exposing reduced bearing capacity aeolian deposits along the northern boundary of Lot 78 and minor fill earthworks along the northern boundary of Lot 76. Competent Glacial Till is anticipated from around 1.2m below ground level.	TC1	200 kPa from 1.2m below existing ground level 300 kPa from 1.2m below existing ground level	
77		TC1		
78		TC1		
79 - 84	Circa 600mm Engineered Fill extending 2 – 5 m from the southern boundary over,	TC2	300 kPa to a maximum depth of 0.60m below existing ground level,	Natural soils across the northern half of each lot may include areas of uncontrolled Fill or buried topsoil horizons, likely resulting from the former decommissioned water race and the installation of buried reticulated services. Static groundwater lies between 2 – 3m depth along the northern lot boundary (Circa 307mRL)
	Natural soils comprising reduced bearing capacity Colluvium over Lake Deposits		150 kPa from the existing surface level to 1.2m below the existing ground level 200 kPa from 1.2m below existing ground level	

APPENDIX F: NZS4431:2022 EARTHFILL STATEMENT

NZS 4431:2022

STATEMENT OF SUITABILITY OF EARTHFILL FOR RESIDENTIAL DEVELOPMENT – APPENDIX A

To: Queenstown Lakes District Council, 47 Ardmore Street Wanaka, 9305

Development:	Meadowstone Alpha Series (Stage 4) – Lots 65 - 84, Wanaka
Council ref:	RM230419
Developer:	Orchard Road Holdings Ltd
Location:	Stage 4 comprises Lot 909 DP 563778. The DP number for each newly created lot is currently pending LINZ's approval.

The earth fills shown on the attached plan No: **R6783-4A (GCR) DRW002 & Appendix D** have been placed in compliance with the terms of NZS 4431:2022 unless where detailed in **Sections 1.5, 5 to 8 and Table 4 of R6783-4A.**

While work was in progress, I retained as my inspecting engineer the engineer named below, who is a Chartered Member of Engineering New Zealand (PEngGeol), as per the Chartered Professionals Engineers of New Zealand Act 2002.

Address: **Luke Kennedy, Ground Consulting Limited (Senior Engineering Geologist), 24 Seddon Street, Pukekohe.**

The attached plan No: **R6783-4A (GCR) DRW002 & Appendix D** shows the lots to be affected by filling and the extent of the fill.

In the opinion of the inspecting engineer, the following special limitations should be observed:

Recommendations and requirements detailed within **GCL Report R6783-4A (GCR),** in particular:

- **Sections 1.5, 5 to 8;**
- **Appendix E: Schedule 2A**;
- **Table 4: Summary of Schedule 2A requirements for development.**

The certification that the earth fills have been placed in compliance with the terms of NZS 4431:2022 does not remove the necessity for the normal inspection and design of the foundations as would be made in the natural ground and requirements outlined within **Sections 1.5, 5 to 8 of the appended GCL report R6783-4A** .

Signature: **Luke Kennedy**

Position: **Senior Engineering Geologist, Ground Consulting Ltd**

Date: **05 May 2025**

On Behalf of: **Orchard Road Holdings Ltd**

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GCL
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