

# Millwater Arran Hills Residential Subdivision Precinct 6 Stage 1C

## Geotechnical Completion Report

WFH Properties Limited



Reference: 773-AKLGE206639-BK

11 January 2023

# MILLWATER ARRAN HILLS RESIDENTIAL SUBDIVISION, PRECINCT 6, STAGE 1C

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## PREPARED FOR

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## Document authorisation

Our ref: 773-AKLGE206639-BK

This Geotechnical Completion Report presents all supporting geotechnical data, Woods Limited as-built plans, and our Suitability Statement in relation to land development works undertaken to form Stage 1C of the Millwater Arran Hills Precinct 6 residential subdivision.

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

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

For and on behalf of Tetra Tech Coffey



**Stephen Parkes**

Associate Engineering Geologist



## QUALITY INFORMATION

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## 1. INTRODUCTION

This Geotechnical Completion Report (GCR) has been prepared for WFH Properties Limited (WFH) as part of the documentation required to be submitted to Auckland Council following residential subdivision development and bulk earthworks.

It contains Tetra Tech Coffey's Suitability Statement, relevant test data, and the Woods Limited as-built plan set relating to Stage 1C of the Millwater Arran Hills, Precinct 6 residential subdivision. The Woods Limited as-built plan set is listed below in Table 1.

**Table 1: Schedule of Precinct 6 - Stage 1C Subdivision As-Built Plans**

Title	Reference No.	Date
Final Surface As-built Plan	P22-006-00-1000-AB	20/12/2022
Cut and Fill As-built Plan – Original Surface to Final Surface	P22-006-00-1100-AB	20/12/2022
Cut and Fill As-built Plan – Lowest Surface to Final Surface	P22-006-00-1102-AB	20/12/2022
Cut and Fill As-built Plan – Original Surface to Lowest Surface	P22-006-00-1104-AB	20/12/2022
Subsoil Drainage As-built Plan	P22-006-00-1200-AB	20/12/2022
Retaining Wall As-built Plans	P22-006-00-1400 to 1402-AB	20/12/2022
Roading As-built Plans	P22-006-00-2000 to 2002-AB	08/06/2023
Stormwater As-builts	P22-006-00-3000 to 3003-AB	20/12/2022
Wastewater As-builts	P22-006-00-4000 to 4002-AB	13/01/2023

The following Tetra Tech Coffey (formerly Coffey) and Woods Limited (Woods) Precinct 6 drawings and Auckland Council / Watercare Standard Details are presented in Appendix B for reference.

**Table 2: Summary of Appended Reference Drawings**

Title	Reference No.	Date
Tetra Tech Coffey Geotechnical Investigation Plan <sup>(1)</sup>	BK/001	11/01/2023
Tetra Tech Coffey Geotechnical Works Plan <sup>(2)</sup>	BK/002	11/01/2023
Coffey Geotechnical Remediation Plan Design Drawings	AG/001 and AG/005	20/07/2020
Coffey Undercut Detail Plan Design Drawing	AG/008	20/11/2019
Coffey Shear Key 1 Geotechnical Treatment Layout Plan	Figure 3	19/06/2019
Coffey Shear Key 1B/1C, 1D and 1E Detail – Design Drawings	AB/006 to AB/008	06/09/2019
Woods Retaining Wall 311 Longitudinal Section	37600-01-159-EW	11/09/2019
Coffey Wall 311 / RE Slope 311 Design Detail Drawing	AL/004 Rev. D	18/06/2020
Woods Retaining Wall 700 Longitudinal Section	37600-01-173-EW	08/08/2019
Coffey Wall 700 Design Detail Drawing	AL/006 Rev. F	13/07/2020
Woods Retaining Wall 701 Longitudinal Section	37600-03-174-EW	24/03/2021
Coffey Wall 701 Design Detail Drawing	AL/007 Rev. D	01/04/2021

Woods Gully 1 Drainage Long Section	37600-02-EW-160	30/09/2019
Coffey Gully 1 Manhole / Anti-seepage Collar Design Detail	NTE08/002	04/12/2019
Coffey Settlement Monitoring Plan	AN/01	03/10/2019
Auckland Council Stormwater Pipe and Manhole Construction Clearance Requirements	SW22	November 2015
Watercare Pipe and Manhole Construction Clearance	WW 53	19-05-2015
Watercare Building Close to or Over Local Network Sewer	WW 54	20-09-2013

#### Notes (relating to Table 2)

- (1) Depicts Tetra Tech Coffey Geotechnical Investigation locations, carried out at the completion of Stage 1C subdivision works to assess ultimate bearing capacity and topsoil depths on the completed lots.
- (2) Depicts all geotechnical works carried out within the subdivision boundary, including geotechnical works certified prior to issue of this report.

This GCR covers the construction period April 2019 to May 2023 and is intended to be used for certification purposes for the following lots associated with subdivision consent SUB60305557:

- 2 residential superlots numbered Lots 1002 and 1003;
- 1 Jointly Owned Access Lot (JOAL) numbered Lot 501;
- 1 esplanade reserve numbered Lot 802;
- 2 new public roads named Tuahere Road (formerly Road 4) and Skulander Crescent (formerly Road 1); and
- 1 new public timber boardwalk linking the subdivision with completed Precinct 5 to the north (Lot 6000).

The subdivision encompasses portions of existing property 119 Kowhai Road (legal description Lot 2 DP 311431, SECT 3 SO 537746).

Stage 1C is bound by future subdivision stages currently undergoing bulk earthworks to the west. A tributary of the Orewa River and completed Millwater subdivision Precinct 5 are to the north and private residential lots within completed Subdivision Stage 1 are located immediately to the south and east.

The earthworks detailed and certified in this report were carried out under Resource Consent LUC60305555.

## 2. RELATED REPORTS

The following geotechnical reports have been prepared by Tetra Tech Coffey (formerly Coffey) for various aspects of the subdivision:

- 773-AKLGE204203-AA, dated 25 May 2017 – Geotechnical Investigation Report for Millwater Precinct 6;
- 773-AKLGE206639-AB Rev.1, dated 24 October 2019 – Geotechnical Design Report for Shear Key 1;
- 773-AKLGE206639-AC Rev. 2, dated 29 November 2019 – Geotechnical Works Specification
- 773-AKLGE206639-AD Rev.1, dated 24 October 2019 – Geotechnical Design Philosophy
- 773-AKLGE206639-AG Rev. 1, dated 25 August 2020 – General Earthworks Design Report
- 773-AKLGE206639-AI, dated 9, December 2019 – Settlement Assessment Report;
- 773-AKLGE206639-NTE08 Rev. 1, dated 3 December 2019 – Gully 1 Geotechnical Works;
- 773-AKLGE206639-AL Rev. 2, dated 15 April 2021 – Geotechnical Design Report for Mass Block Walls;
- 773-AKLGE206639-AN Rev.2, dated 13 May 2020 – Geotechnical Monitoring Protocol;

- 773-AKLGE206639-BH, dated 16 June 2022 – Producer Statement – PS4 (Construction Review) for Retaining Walls 311 and 312.
- 773-AKLGE206639-BN, dated 29 November 2022 – Producer Statement – PS4 (Construction Review) for Retaining Wall 700; and
- 773-AKLGE206639-BQ, dated 18 April 2023 – Producer Statement – PS4 (Construction Review) for Timber Boardwalk – BCO10349216

The following historic report was prepared by Tonkin and Taylor (T&T) detailing initial earthworks within the Stage 1C boundary, and was reviewed as part of the writing of this report;

- 21854.0034/AHP6EW.v1, dated June 2019 – Millwater Precinct 6 Enabling Works Geotechnical Completion Report

## 3. CONSTRUCTION WORKS

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### 3.1 PLANT

The main items of plant used by the main contractor for bulk earthworks, Hick Bros. Civil Construction Limited, comprised:

- D8 Bulldozer and scoop
- D7 Bulldozer and scoop
- D6 Bulldozer and scoop
- Reticulated Dump Trucks
- 623 Motor scraper
- 36-tonne excavator
- 30-tonne excavator
- 20-tonne excavator
- 8-tonne excavator
- 5-tonne excavator
- 815 compactors
- Padfoot roller
- 25-tonne water truck
- Front-end loader
- Tractor and pulled discs

The main items of plant used by the main contractor for civil works on Stage 1C, JG Civil Limited, were:

- 22.5-tonne excavators
- 13.5-tonne excavator
- 5-tonne excavators
- 1.5-tonne excavators
- 6-wheel dump trucks
- Tractor and pulled discs
- Smooth drum roller
- Pad-foot roller
- Grader



- Front-end loader
- 25-tonne water truck

## 3.2 CONSTRUCTION PROGRAMME

### 3.2.1 Enabling Earthworks (March to November 2017)

Prior to commencement of the main bulk earthworks contract, an enabling earthworks package of work was completed between March and November 2017, under the supervision of T&T. This work is detailed and certified in the T&T Geotechnical Completion Report reference 21854.0034/AHP6EW.v1, dated June 2019.

In summary, the enabling earthworks carried out within Stage 1C involved:

- Stripping of vegetation and organic material;
- Construction of a temporary sediment retention pond within 1002, involving cutting of a ridgeline to depths of up to 3.5m.

### 3.2.2 Bulk Earthworks (June 2019 to April 2022)

Bulk earthworks within Stage 1C commenced in June 2019 with the stripping of topsoil within a North-South orientated gully (Gully 1) located in the west of the subdivision. The location of Gully 1 is shown on the Geotechnical Works Plan, ref: BK/002 in Appendix B.

Construction of the portion of Shear Key SK1 within Stage 1C commenced in September 2019 in the western half of the subdivision and gradually progressed eastwards throughout the 2019-2020 earthworks season. The requirement for a shear key was identified following the initial geotechnical site investigation, to achieve the minimum required factors of safety against instability for subdivision development.

The shear key construction works involved the undercutting of natural soils down to 1m into bedrock, as per the specifications prescribed in the approved geotechnical design (the Shear key design drawings are presented in Appendix B), and replacement with subsoil drainage and Engineered clay backfill. Shear Vane and Nuclear Densometer compaction testing of the engineered clay backfill was carried out daily to ensure quality of the structural fill. Compaction testing records are provided in Appendix D.

Construction of the shear key was completed in March 2020.

General cut to fill earthworks across the broader Stage 1C area commenced the following earthworks season. This involved mucking out lower Gully 1 of soft alluvial and organic material and installation of underfill drainage, prior to commencement of filling in the lower gully. To ensure redundancy was incorporated into the subsoil drainage network, subsoil drainage from the upper and lower gully's were separated via anti-seepage collars, a buried concrete manhole and separate drainage outlet structures. Following completion of the subsoil drainage, all drains were positively flush tested. The Gully 1 subsoil drainage design is shown on the Appended Woods 'Gully 1 Drainage Long Section' in Appendix B.

Upon completion of the Gully 1 subsoil drainage network, a settlement monitoring plate (S08) was placed on the underlying stripped natural subgrade surface, and gradually extended in length in unison with the filling operation. This enabled monthly settlement monitoring readings to be carried out within the deepest fill area of Stage 1C during the bulk earthworks stage. The Coffey 'Settlement Location Plan' provided in Appendix B shows the location of S08. Settlement monitoring records are provided in Appendix E. Further discussion on the completed settlement monitoring is provided in Section 5.3.

General cut and fill earthworks progressed throughout the 2019-2020 earthworks season allowing for the construction of segmental block retaining walls 700 and 311 to commence in May and November 2020 respectively. These walls were constructed using the no-fines concrete Mass Bloc facing system and comprised varying lengths of High-Density Polyethylene (HDPE) geogrid reinforcement connected to the

blocks and embedded in the wall backfill which comprised a combination of compacted hardfill and Engineered clay fill. Drainage for Wall 700 discharged to the water course north of Stage 1C via concrete wingwall outlet structures. Drainage for Wall 311 was extended beneath future JOAL 501, to be connected to the future Stage 1C subdivision stormwater network off Skulander Crescent. Wall 700 was completed in February 2021 and Wall 311 was completed in April 2021.

In February 2021, a temporary sediment retention pond (SRP) was constructed within Lot 1003 to treat earthworks surface run-off. This remained in place until post-commencement of the civil works package.

In November 2021, excavations were carried out to form the retaining wall footing for segmental block retaining wall 701, and to construct the drainage and drainage outlets for this structure. Following this, works to construct the wall commenced, comprising placement of Mass Bloc facing blocks, geogrid reinforcement and compacted hardfill and clay fill to bring the wall up to finished level. This was achieved in April 2022.

### 3.2.3 Civil Works (May 2022 to May 2023)

Stage 1C civil construction works commenced in May 2022 with the decommissioning of the temporary SRP located within Lot 1003. This involved the undercutting of soft unsuitable subgrade soils from the base of the pond and filling of the pond up to finished subgrade level with engineered clay fill.

Finished subgrade level was reached within Lots 1002 and 1003 by mid-May, allowing both lots to be topsoiled.

Roading works commenced in May, with the lime stabilisation of road subgrades and installation of the underchannel subsoil drains. GAP65 subbase was placed across all roads by the end of May.

Public stormwater and wastewater drainage construction commenced at the end of May 2022, reaching completion at the end of June.

Kerbing works on all public roads commenced in July and were completed by the end of the month.

Underground services were installed throughout June.

JOAL 501 was trimmed to subgrade in early August, followed by placement of basecourse aggregate and pouring of concrete, which was completed by mid-September.

Basecourse was placed across all public roads in August, allowing roads to be sealed with chipseal and asphalt in September. All roads were marked and signage erected in October.

All concrete footpaths were poured throughout August and September, allowing berms to be topsoiled and landscaping works to be completed throughout October.

Installation of the pedestrian and crash barriers behind Segmental Block Wall 700 was carried out in October.

Also in October, two additional subsoil drains were installed within Reserve Lot 802, to provide additional drainage downslope of Wall 700. The locations of these drains are shown on the Woods Subsoil Drainage As-built Plan in Appendix A.

Construction of the pedestrian boardwalk linking Stage 1C with Godfrey Drive, located within Lot 6000, was commenced in January 2023 with the installation of the bored timber piles.

Tetra Tech Coffey observed ground conditions exposed within the pile holes and confirmed the pile hole specifications during construction, and tested the compaction of hardfill placed to form the boardwalk abutments.

The bridge was completed in May 2024 following installation of the abutment pedestrian balustrades.

## 4. QUALITY ASSURANCE AND CONTROLS

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### 4.1 CONSTRUCTION OBSERVATIONS

Construction observations were undertaken during the earthworks and civil works on a near daily basis to assess compliance with NZS 4431 and our project specific recommendations and specifications presented in the various geotechnical reports referenced above in Section 2. Our site observation work included:

- Ground conditions exposed in the shear key excavations (base and faces)
- Installation of shear key drainage including placement and construction of drainage outlets;
- Topsoil stripping and benching of slopes prior to the placement of earth fills;
- Excavation and construction of Segmental Block Retaining Walls 700 and 701 including foundation preparation, geogrid placement and lateral extent, drainage construction and backfill compaction;
- Ground conditions and founding material exposed in undercuts beneath retaining walls;
- Construction of pedestrian barriers along the crests of Retaining Walls 700 and 701<sup>1</sup>;
- Observations of the removal of soft alluvial and organic natural soils and placement of underfill drainage in natural Gully 1 beneath the main fill area, prior to fill placement;
- Construction of subsoil drainage;
- Flush testing of underfill drains upon completion; and
- Observation of ground conditions within pile holes for construction of the timber boardwalk.

<sup>1</sup> See section 5.13 for more details.

Test measurements undertaken during site inspections included:

- Compaction Testing of clay fill in accordance with the Tetra Tech Coffey Geotechnical Works Specification;
- Compaction Testing of hardfill for Segmental Block (Mass Bloc) retaining walls 700 and 701, and the Timber Boardwalk abutment backfill;
- Dynamic Cone Penetrometer Resistance Tests (Scalas) on natural and stabilised road and JOAL pavement subgrades in accordance with NZS 4402: 1998 Test 6.5.2 – Hand method using a Dynamic Cone Penetrometer.

### 4.2 EARTH FILL QUALITY CONTROL CRITERIA

The quality control criteria for compaction testing of earth fills were based on minimum allowable shear strength and maximum allowable air voids in accordance with the Tetra Tech Coffey Geotechnical Works Specification for Millwater as follows:

Air Voids Percentage: (as defined in NZS 4402:1986) taken as 1 test per 1500m<sup>3</sup> of fill placed and not less than 1 test per 500mm lift of fill per fill area.

- Maximum Single Value: 12%
- Average Value: 10%

Undrained Shear Strength: (measured by calibrated shear vane to BS1337 method).

- Minimum Single Value: 110 kPa
- Average Value: 140 kPa



In-situ density, shear strength and water content tests were carried out in areas of filling at or in excess of the frequency recommended by NZS 4431. Test results are IANZ (International Accreditation New Zealand) endorsed and full details are appended.

In addition, laboratory Triaxial Tests of Engineered fill sampled from high importance areas (i.e. shear key excavations, RE Slope backfill) has been carried out to confirm design soil parameters. Testing was carried out in accordance with test method AS1289.6.4.2 (Note 4).

## 5. PROJECT EVALUATION

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### 5.1 STABILITY EVALUATION

#### 5.1.1 General

Global stability conditions in Precinct 6 Stage 1C have been assessed under a range of groundwater conditions and seismic loading. The soil parameters used for the analyses (as referred to in our design philosophy report referenced 773-AKLGE206639-AD) were adopted based on extensive investigation and modelling of the site.

The stability analysis results have demonstrated factors of safety against instability in accordance with the requirements of Auckland Council Code of Practice for Land Development and Subdivision – Section 2 Earthworks and Geotechnical Requirements Version 1.6 dated 24 September 2013.

We consider that the results are acceptable, and we are therefore satisfied that the building platform areas in all Stage 1 residential lots are not subject to natural hazards as described in Section 71(3) of the Building Act 2004.

To the best of our knowledge, there have been no significant departures to the landform than was considered in the aforementioned Tetra Tech Coffey investigation and design reports (see referenced reports in Section 2). Furthermore, observations of earthworks and undercuts have confirmed that the ground model forming the basis of the stability analysis presented in these reports is applicable.

On this basis, the stability analysis conclusions presented in the Tetra Tech Coffey reports may continue to be relied upon.

Additional comments and recommendations are described below in Sections 5.1.2 to 5.12.

#### 5.1.2 Shear Key SK1

Global stability conditions for the subdivision have been enhanced by construction of a Shear Key (SK1) adjacent to the northern site boundary (see drawing BK/002 in Appendix B for shear key extent).

The shear key was excavated into competent bedrock and installed with subsoil drainage which discharges into the adjacent watercourse via several concrete wingwall outfall structures.

The shear key excavation was logged during construction by a Tetra Tech Coffey Engineering Geologist and compared with the design model for Quality Assurance purposes.

The shear key design drawings are provided in Appendix B for reference.

## 5.2 RETAINING WALLS

### 5.2.1 Existing Retaining Walls

Two segmental block retaining walls, namely Walls 700 and 701, have been constructed in Precinct 6 Stage 1C, and one segmental block retaining wall, namely Wall 311, has been constructed adjacent to the southern stage boundary. The walls were constructed under Building Consent numbers BCO10301029-2, BCO10301029-7 and BCO10301029-3 respectively. The Producer Statement – Construction Review (PS4s) for these walls are provided in Appendix F.

Table 3 below summarises the retaining wall construction details.

**Table 3: Summary of Segmental Block Retaining Wall Construction Details**

Wall #	Retaining Wall Length (m)	Retaining Wall Facing System	Wall Backfill	Geogrid Type	Max. Geogrid Embedment Length (m)	Design Wall Surcharge Load (kPa)
311	188	Mass Bloc	3m width of GAP65 hardfill behind the blocks, then engineered clay fill to the extent of geogrid reinforcement	Tensar RE580	5.8	12
700	130	Mass Bloc		Tensar RE580	6.5	12
701	113	Mass Bloc		Tensar RE580	11.50	12

The retaining walls were constructed with subsoil drainage, with regular outlet connections into the sealed public stormwater drainage network or separate outfall structures to adjacent water courses, at the locations shown on the Woods Retaining Wall as-built drawings reference P22-006-00-1400 to 1402-AB. If any of the retaining wall drains are intercepted by future construction works within JOAL 501 or Esplanade Reserve 802, they should be reinstated under the supervision of a Chartered Professional Engineer, familiar with the contents of this report. The capacity of the retaining wall drains to function should not be reduced or compromised as blocked retaining wall drainage can, in some circumstances, lead to failure of the retaining wall.

The retaining walls were designed to accommodate a 12kPa uniformly distributed surcharge load above the walls to take into account potential future fill placement or load from dwellings. Any greater loading will require specific design to transfer the load to a foundation system below the zone of influence of the wall.

Advice should be sought from Tetra Tech Coffey prior to any excavations being carried out within JOAL 501, as undercuts made downslope of Wall 311 may have detrimental effects on the stability of the wall and/or upslope private lots.

Survey monitoring of the retaining walls was carried out post-construction in accordance with the Tetra Tech Coffey Geotechnical Monitoring Protocol referenced above in Section 2, to confirm that vertical and lateral movements were within design tolerances for the retaining walls. The majority of the deflections of the monitoring points observed were attributed to earthworks plant operating in the area. As such, we are satisfied that any post-construction movements have now likely attenuated. The monitoring results are provided in Appendix E.

The retaining wall design drawings are provided in Appendix B for reference.

## 5.2.2 Future Retaining Walls on the Private Lots

Retaining walls to be constructed on the private lots may be designed in accordance with the soil parameters provided in Table 4 below:

**Table 4: Summary of Retaining Wall Design Parameters**

Soil Unit Weight, $\gamma$ (kN/m <sup>3</sup> )	Effective Cohesion, $c'$ (kPa)	Effective Internal Angle of Frictional Resistance, $\phi'$ (degrees)	Undrained Shear Strength of Foundation Soils, $s_u$ (kPa)
18	0	30	60

Retaining wall designs should give due regard to any sloping ground above or below the proposed wall locations and make appropriate allowances for traffic and building surcharge loads.

## 5.3 FILL INDUCED SETTLEMENT

Subdivision bulk earthworks undertaken included mucking out of organic and soft deposits from gully inverts prior to filling, the installation of subsoil/underfill drainage and quality control testing during the placement of the fill to confirm compliance with the fill compaction specification. These works have been undertaken as part of the normal earthworks process and, amongst other things, serve to reduce the settlement magnitude and time for post-filling settlements to attenuate.

A series of settlement monitoring devices were installed across Stage 1, adjacent to Stage 1C, to measure induced settlements. The locations are shown on the Settlement Monitoring Location plan in Appendix E. Settlement plates were placed on the stripped natural ground level beneath fill areas prior to fill placement and brought up to ground level as filling progressed to monitor the consolidation of the underlying natural soils. In addition, settlement markers were installed at finished ground level to monitor surface movements upon completion of the earthworks.

Each of the monitoring locations were selected to monitor where settlements were expected to be at their greatest (maximum fill depths), as well as at specific locations of interest, such as on proposed public drainage alignments.

The monitoring results in Appendix E show that settlement trends have attenuated to low levels and that  $T_{90}$  (90% of primary consolidation) has most likely been attained. The markers were decommissioned to allow site operations to continue, following approval from the Geotechnical Engineer that fill induced settlement had likely surpassed  $T_{90}$ .

## 5.4 SUBSOIL DRAINAGE

The following sub-sections contain a description of the subsoil drainage installed during bulk earthworks to control groundwater levels across Stage 1C and allow for the dissipation of generated pore water pressures. The drain locations are shown on the Woods Subsoil Drainage as-built plans referenced P22-006-00-1200-AB in Appendix A, and Tetra Tech Coffey Geotechnical Works Plan referenced BK/002 in Appendix B.

The capacity of the subsoil drains to function as intended should not be reduced or compromised, as blocked subsoil drainage may, in certain circumstances, have a detrimental effect on site stability.

Where any subsoil drain is intercepted by construction works it must be reinstated under the direction of a Chartered Professional Engineer experienced in geomechanics and familiar with the contents of this report, to ensure the integrity of the subsoil drainage system is maintained.

Specific discussion on retaining wall drainage is provided in Section 5.2.1 above.



### 5.4.1 Underfill Drains

Perforated underfill drains were placed in mucked out gully inverts prior to filling to tap groundwater seepage and also in cut benches formed prior to filling, as required by NZS 4431.

These drains were intended to intercept localised groundwater seepage and springs during earthworks and to help provide general control of groundwater. These drains require no specific maintenance.

The locations of the underfill drains are shown on Woods drawings P22-006-00-1200-AB in Appendix A. These drains have been installed beneath the fill areas, which is in places is over 8m deep. As such, no engineering solution is required to bridge these drains where they pass beneath residential lots, and they are unlikely to be intercepted by future building works.

### 5.4.2 Flushing of Subsoil Drains

Flush testing of the subsoil drains to confirm their function was undertaken using water carts connected to the drain inlet Novaflos. A Tetra Tech Coffey engineer was on-site to observe flushing operations. All of the subsoil drains were successfully flush tested prior to placement of the subsoil drain capping layer of engineered clay fill.

## 5.5 SHARED TIMBER BOARDWALK WITHIN LOT 6000

A 63m long timber pedestrian boardwalk has been constructed to link Stage 1C with Godfrey Drive north of the stage boundary.

The bridge abutments encompass Retaining Wall 701 (southern abutment) and the existing MSE retaining wall located in previously completed subdivision Stage Precinct 5 (northern abutment).

The walls were designed to accommodate the anticipated bridge loadings and geogrids were placed at depths to ensure they weren't damaged during installation of the reinforced concrete sill beams which support the bridge deck.

During construction, ground conditions within pile hole excavations were observed daily by Tetra Tech Coffey to confirm accordance with the assumptions stated in the Novare Shared Path Boardwalk Structural Design Report referenced 3200/41 Rev. B, dated 14/03/2022, and the recommendations of CMW Geosciences Geotechnical Investigation Report referenced AKL2018-0161AB Rev.0 dated 28 November 2018.

The boardwalk was constructed under Building Consent BCO10349216.

## 5.6 BEARING CAPACITY

Following the completion of earthworks operations, a series of hand auger boreholes were drilled in appropriate areas of cut and filled ground to assess representative finished subsurface conditions and hence evaluate likely foundation options for future residential building development. The resulting bearing capacity recommendations are presented in the appended Suitability Statement.

At current subgrade levels, all cut, filled and undisturbed original ground has a geotechnical ultimate bearing capacity of 300 kPa (as required by NZS3604) within the zone of influence of conventional shallow residential building foundation loads.

Where a geotechnical ultimate bearing capacity greater than 300 kPa is required, further site-specific investigation and design of foundations should be carried out prior to Building Consent application.

It should be noted that NZS 3604 only allows a maximum fill depth of 600mm above finished ground level across the building platform of a dwelling unless an Engineering design solution is proposed, due to the risk of induced settlement or instability of the subsoils caused by the weight of the fill.

## 5.7 EXPANSIVE SOILS

Two sets of Laboratory Expansive Soil Tests were carried out on soil samples retrieved from Lots 1002 and 1003 (as shown on Tetra Tech Coffey drawing BK/001 in Appendix B) and from within the zone of likely influence of shallow building foundations.

Testing to assess the Shrink Swell Index ( $I_{ss}$ ) was carried out in accordance with AS1289 Test 7.1.1 and was used in conjunction with the advice in Acceptable Solution B1/AS1 of the New Zealand Building Code to calculate the characteristic surface movement ( $y_s$ ) and expansive soil class.

The test results are IANZ (International Accreditation New Zealand) endorsed and full details are included in Appendix C.

Based on the results of laboratory testing, plus our visual and tactile assessment of the soils on site, we have assessed the AS2870 expansive site class as M (Moderately reactive) for Lots 1002 and 1003.

On some expansive clay sites, if cast on-grade floor slab construction takes place during a long dry summer, exposed building platform soils may dry out and become highly desiccated.

Over time the presence of the floor slab will cause capillary rise of moisture to the underside of the damp proof course and potentially expansive dry ground may become wet and swell, causing floor slab uplift. The effect may be very slight in some cases and extreme in others, especially if free water can reach the central underside of the slab as could occur if any subsoil drainage is discharged beneath the slab or an under-slab water pipe leaks.

Floor slab uplift usually remains unnoticed in carpeted homes but can cause distress on tile floors and in garages where cracks are more apparent. It may also rack upper storeys if non-load bearing ground floor walls are lifted and act as struts. Further, it may cause drainage problems on flat roofed houses where gutter gradients may be reversed.

Thorough soaking (in the form of low flow sprinklers for an extended period rather than flooding of the surface with a hose once is recommended to allow for infiltration into the soil) of the exposed building platform area, a few days before hardfill placement, can help to reduce the problem. Careful detailing of construction joints in brittle building elements can also be of benefit. Alternatively, removal and replacement of the desiccated surface layers is recommended.

It is also recommended that site specific testing be carried out by individual lot owners to ascertain the expansive site class for each individual lot.

## 5.8 STORMWATER CONTROLS

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

Uncontrolled stormwater discharges onto the ground surface or into soakage pits can cause erosion, scour and/or instability on sloping land and are not permitted on any of the residential lots in this subdivision.

## 5.9 SERVICE TRENCHES

As is normal on all subdivisions, construction of foundations within the 45-degree zone of influence from 0.5m beneath pipe inverts will require Engineering input. The Auckland Council drawing referenced SW22 extracted from Chapter 4 of the Auckland Council Code of Practice for Land Development and Subdivision, Version 3.0, January 2022 depicts bridging requirements for stormwater pipes, and drawings WW53 and WW54 taken from Watercare CoP for Land Development and Subdivision Version

1.5 May 2015, depicts bridging requirements for wastewater pipes. These drawings are provided in Appendix B for reference.

As shown on the Woods Wastewater as-built drawings referenced P22-006-00-4000 to 4002-AB, Lots 1002 and 1003 are shown to have wastewater service trenches within their boundaries. The resulting limitations are discussed in the following Suitability Statement. These drawings are presented in Appendix A.

## 5.10 TOPSOIL

Upon completion of the subdivisional works a series of shallow hand auger boreholes were drilled at the locations of each likely building platform (as shown on Tetra Tech Coffey drawing BK/001 in Appendix B) to assess indicative topsoil depths on all residential lots.

Depths of topsoil were found to range from 150 to 200mm, however, due to both the nature of the method of investigation and the method of topsoil placement, variation in topsoil depths across the lots from those reported is expected.

Site specific findings are presented in the Suitability Statement Summary (Table 6) in Section 6. However, we strongly recommend that lot purchasers complete their own checks of actual topsoil depths across their specific lot.

## 5.11 PUBLIC ROAD AND JOAL SUBGRADES

Dynamic Cone Penetrometer (Scala) Tests were undertaken at regular intervals along the road and JOAL subgrades in Stage 1C. The test results were subsequently forwarded to Woods for pavement design validation purposes. Areas demonstrating low equivalent CBR values were typically either reworked with lime/cement stabilisation treatment, or undercut and replaced with hardfill or Engineered clay fill.

## 5.12 CONTRACTORS WORK

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

- (i) The approved Contract drawings and design details;
- (ii) The approved Contract specifications;
- (iii) Authorised Variations issued during the execution of the works;
- (iv) The conditions of Resource, Earthworks and Building Consents where applicable; and
- (v) The relevant Tetra Tech Coffey reports, recommendations, specifications and site instructions.

In addition we assume that all As-Built information and other details provided to the Client and/or Tetra Tech Coffey by the Contractor and other consultants are accurate and correct in all respects.

## 5.13 INCOMPLETE WORKS

At the time of writing of this report, the following items were incomplete:

- Installation of the pedestrian barrier fence above Retaining Wall 701, for the portion of wall located outside of Stage 1C. This will be installed during a subsequent civil stage, upon which CCC will be applied for to close out the retaining wall Building Consent. This will be documented in the future Geotechnical Completion for Stage 2B.

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

I, Chris Armstrong of Tetra Tech Coffey (NZ) Limited, Auckland, hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering as defined in section 1.2.3 of NZS 4404 and was retained by the Owner/Developer as the Geotechnical Engineer for Stage 1C, Precinct 6 of the Millwater Subdivisional Development.
2. The extent of investigations carried out to date are described in the Geotechnical Investigation Report referenced 773-AKLGE204203-AA, dated 25 July 2017, and the geotechnical design reports referenced above in Section 2. The Tonkin and Taylor Geotechnical Completion Report referenced 21854.0034/AHP6Ew.v1, dated June 2019 provides earthworks certification for the enabling works package, completed at the site prior to the works detailed in this report. The conclusions and recommendations of these documents have been re-evaluated as part of the preparation of this report.
3. Engineered fill placed as part of Precinct 6 Stage 1C construction and shown on the appended Woods Limited as-built plans is certified herein.
4. In my professional opinion, not to be construed as a guarantee, I consider that:

- (a) The completed earthworks give due regard to land, slope and foundation stability considerations within the residential lots.
- (b) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on all residential lots in Stage 1C.

Where a geotechnical ultimate bearing capacity greater than 300 kPa is required, (i.e. outside the limits of NZS 3604), further specific site investigation and foundation design should be carried out prior to building consent application.

- (c) The function of the subsoil drains (including outlets), as depicted on the appended Woods Limited Subsoil Drainage as-built plans referenced P22-006-00-1200-AB (Appendix A), should not be compromised by any future building development, landscaping or roading works. Any bored or driven piles should be positioned to avoid damaging the drains. **Where any subsoil drain is intercepted by building works, it must be reinstated under the direction of a Chartered Professional Engineer to ensure the long-term function and integrity of the subsoil drainage system is maintained.**
- (d) The backfilling and compaction of the stormwater and wastewater trenches on this subdivision has, where possible, been carried out to appropriate standards having regard for the prevailing ground conditions and associated compaction induced pipe loadings.

Nevertheless, no building development should take place within the 45-degree zone of influence taken from 0.5m beneath drain inverts unless endorsed by a Chartered Professional Engineer experienced in geomechanics to ensure that lateral stability and differential settlement issues are addressed, and that building loads are transferred beyond the influence of the pipe and beyond the extent of the trench backfill.

Woods as-built plans P22-006-00-3000 to 3003-AB and P22-006-00-4000 to 4002-AB (Appendix A) should be referred to for the locations of public drainage lines on all lots. A copy of drawings SW22, WW53 and WW54 extracted from Auckland Council and Watercare Codes of Practice of Land Development and Subdivision are provided in Appendix B for guidance.

Any bridging piles that may be required can be designed in accordance with the following soil parameters:

**Table 5: Pile Design Parameters**

Effective Internal Angle of Frictional Resistance, $\phi'$ (degrees)	Undrained Shear Strength, $s_u$ (kPa)	Geotechnical ultimate end bearing capacity beyond 1.0m depth (kPa)	Ultimate side adhesion beyond 1.0m depth (kPa)*
30	60	450kPa	30

\*Side adhesion to be ignored within the upper 1m of soil

The structural designer should attend to the details of pile type, depth, spacing, diameter and load capacity, and also ensure there is allowance in the design for any differential movements that may occur between piled and unpiled portions of the dwelling.

- (e) On no account should stormwater be concentrated into pits (including stormwater detention or bio-retention treatment type pits) near sloping ground or batters, or in areas of sandy soils or fractured rock unless endorsed by specific designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics. This is to ensure that appropriate permanent impervious lining of the pit is incorporated so that long term infiltration into the surrounding soils is not increased on account of its potentially adverse impact on local and global stability.
- (f) The assessed AS 2870 expansive site Class is M (Moderately reactive) for Lots 1002 and 1003.
- (g) The seismic site subsoil category on all Lots 1002 and 1003 is assessed to be Class C (shallow soil site) in accordance with NZS1170.5.
- (h) Subject to the geotechnical limitations, recommendations and expansive soil assessments associated with Section 6, Items 4(a), 4(b), 4(c), 4(d), 4(e), 4(f) and 4(g) above, it is considered that:
  - i. The cut, filled and undisturbed original ground within residential lot boundaries is generally suitable for residential buildings constructed in accordance with NZS 3604 (that incorporate specific foundation and associated structural design considering the expansive soils site class) and related documents.
  - ii. On all lots in Stage 1C, shallow foundation design may be carried out in accordance with AS 2870 (Class M as indicated in 4(f) above), or alternatively, a specific foundation and structural design may be undertaken for NZS3604 type foundations by a Chartered Professional Engineer who should allow for expansive soil effects in the design. In this latter case, the minimum foundation embedment depth below cleared ground level may be ascertained from Table 7.4A or 7.4B in Amendment 19 to the Acceptable Solutions and Verification Methods to Clause B1 Structure of the New Zealand Building Code, effective 28 November 2019.

Table 6 below summarises the status of each residential lot covered by this Suitability Statement.

## 7. LIMITATIONS

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The professional opinion contained within this report is furnished to Auckland Council and WFH Properties Limited for their purposes alone on the express condition that it will not be relied upon by any other person. Prospective purchasers should still satisfy themselves as to any specific conditions pertaining to their particular land interest.

This opinion does not remove the necessity for the normal inspection of ground conditions and the design of foundations as would be made under all normal conditions.

For and on behalf of Tetra Tech Coffey

Prepared By:



**Stephen Parkes**

Associate Engineering Geologist  
PEngGeol / CMEngNZ

Authorised By:



**Chris Armstrong**

Principal Geotechnical Engineer  
CPEng / CMEngNZ

Reviewed By:



**Peter Marchant**

Principal Geotechnical Engineer  
CPEng / CMEngNZ



**Table 6: Suitability Statement Summary**

Lot #	Comments	Tospoil Depth (mm)	Ultimate Bearing Capacity (kPa)	AS2870 Expansive Site Class
1002	<p>Protection of the function of subsoil drains required (refer to Clause (6.4(c))</p> <p>Sewer/ Stormwater line limitations apply (refer to Clause 6.4 (d))</p> <p>Care required with Stormwater disposal (refer to Clause 6.4 (e))</p> <p>The NZS1170.5 Seismic Site Subsoil Class is assessed to be Class C (refer to Clause 6.4(g))</p> <p>Elsewhere, AS 2870 foundation design or specific CPEng design with minimum footing depth in accordance with Amendment 19 to section B1 of the NZ Building Code, for Class M NZS 3604 type strip or pad foundations</p>	200	300	M
1003	<p>Protection of the function of subsoil drains required (refer to Clause (6.4(c))</p> <p>Sewer/ Stormwater line limitations apply (refer to Clause 6.4 (d))</p> <p>Care required with Stormwater disposal (refer to Clause 6.4 (e))</p> <p>The NZS1170.5 Seismic Site Subsoil Class is assessed to be Class C (refer to Clause 6.4(g))</p> <p>Elsewhere, AS 2870 foundation design or specific CPEng design with minimum footing depth in accordance with Amendment 19 to section B1 of the NZ Building Code, for Class M NZS 3604 type strip or pad foundations</p>	150	300	M

## APPENDIX A: WOODS AS-BUILT DRAWINGS

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NOTES

1. COORDINATES SHOWN ARE IN TERMS OF NEW ZEALAND TRANSVERSE MERCATOR (NZTM) PROJECTION.
2. LEVELS SHOWN ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946.
3. CONTOURS ARE AT 0.25m INTERVALS.
4. BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
5. PLANS HAVE BEEN REVIEWED BY TETRA TECH COFFEY.
6. PLANS SHOULD BE READ IN CONJUNCTION WITH THE GCR.

LEGEND

- CONTOURS MAJOR
- CONTOURS MINOR
- STAGE BOUNDARIES
- LOT BOUNDARIES
- EXISTING CONTOURS MAJOR
- EXISTING CONTOURS MINOR

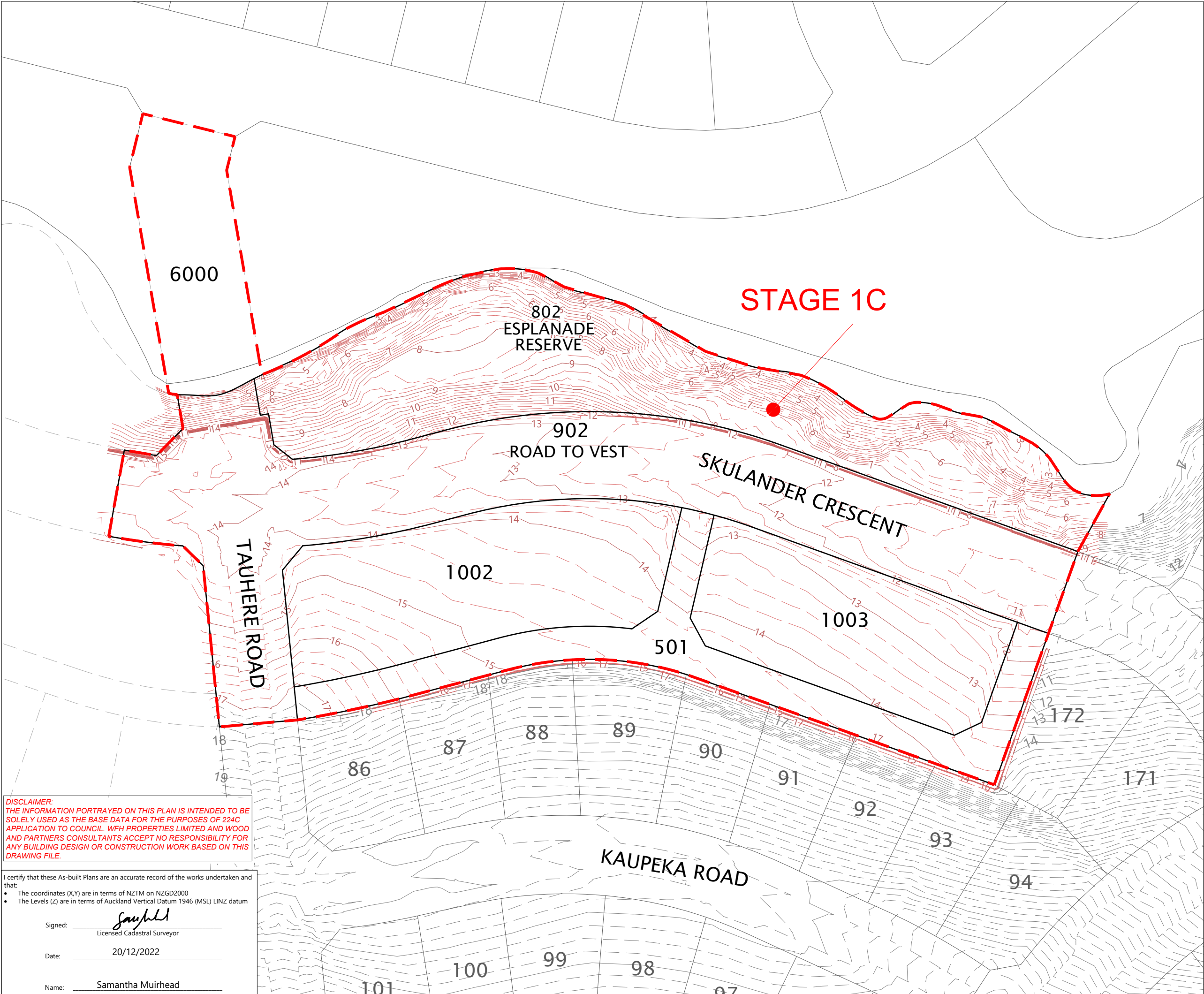
REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ

MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

FINAL SURFACE ASBUILT PLAN

STATUS	AS-BUILT	REV
SCALE	1:750 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1000-AB	



DISCLAIMER:  
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF 224C APPLICATION TO COUNCIL. WFH PROPERTIES LIMITED AND WOOD AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS DRAWING FILE.

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The coordinates (X,Y) are in terms of NZTM on NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: Licensed Cadastral Surveyor

Date: 20/12/2022

Name: Samantha Muirhead

- NOTES
- 1. COORDINATES SHOWN ARE IN TERMS OF NEW ZEALAND TRANSVERSE MERCATOR (NZTM) PROJECTION.
  - 2. CONTOURS ARE AT 0.25m INTERVALS.
  - 3. BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
  - 4. PLANS HAVE BEEN REVIEWED BY TETRA TECH COFFEY.
  - 5. PLANS SHOULD BE READ IN CONJUNCTION WITH THE GCR.

LEGEND

- ZERO CONTOUR
- CUT CONTOUR
- FILL CONTOUR
- STAGE BOUNDARIES
- LOT BOUNDARIES

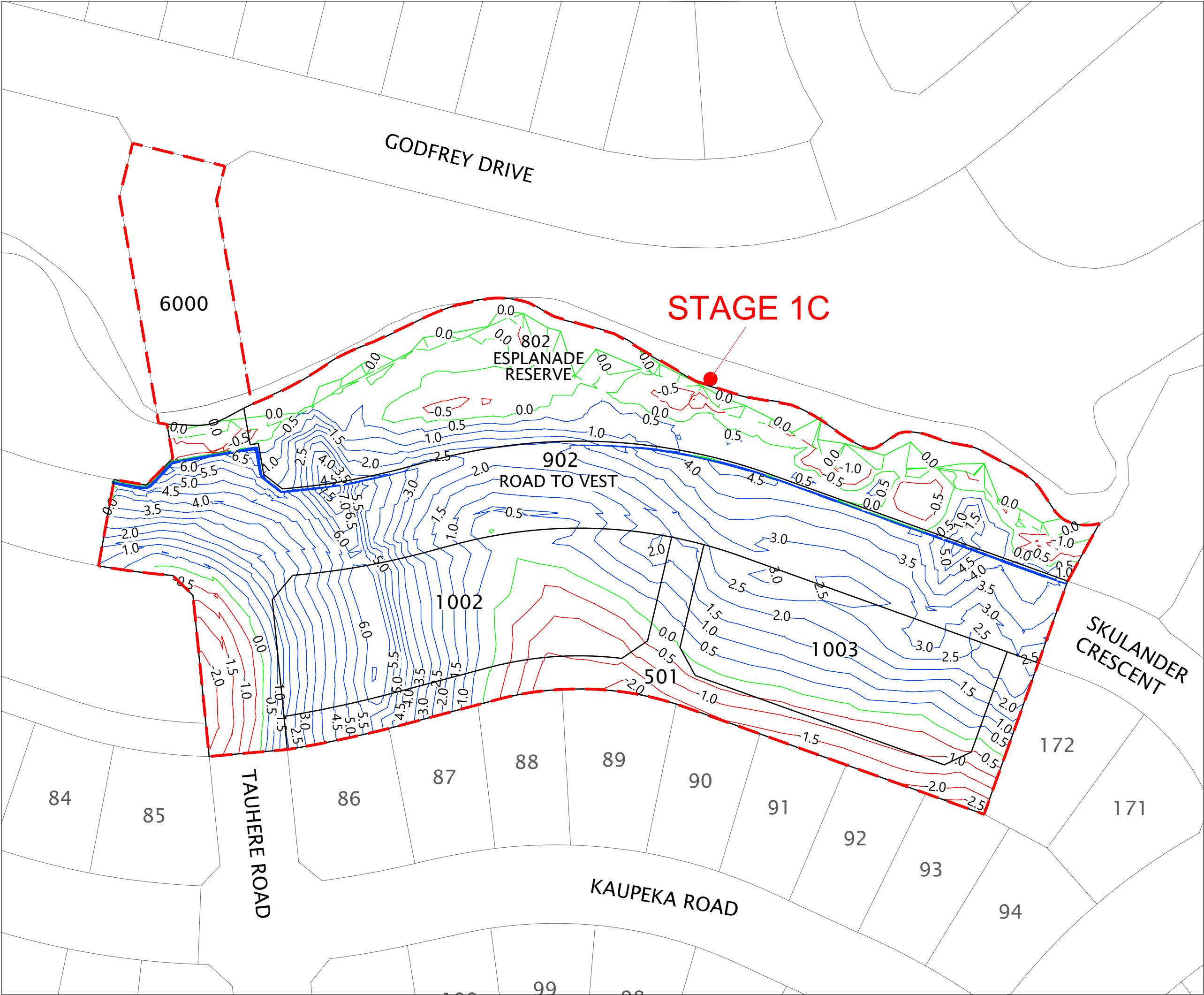
DISCLAIMER:  
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REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023  WOODS.CO.NZ
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	

MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C  
CUT AND FILL ASBUILT  
SHEET 1 OF 6  
ORIGINAL SURFACE TO  
FINAL SURFACE

STATUS	AS-BUILT	REV
SCALE	1:750 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1100-AB	





NOTES

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3. BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
4. PLANS HAVE BEEN REVIEWED BY TETRA TECH COFFEY.
5. PLANS SHOULD BE READ IN CONJUNCTION WITH THE GCR.

LEGEND

- ZERO CONTOUR
- CUT CONTOUR
- FILL CONTOUR
- STAGE BOUNDARIES
- LOT BOUNDARIES

DISCLAIMER:  
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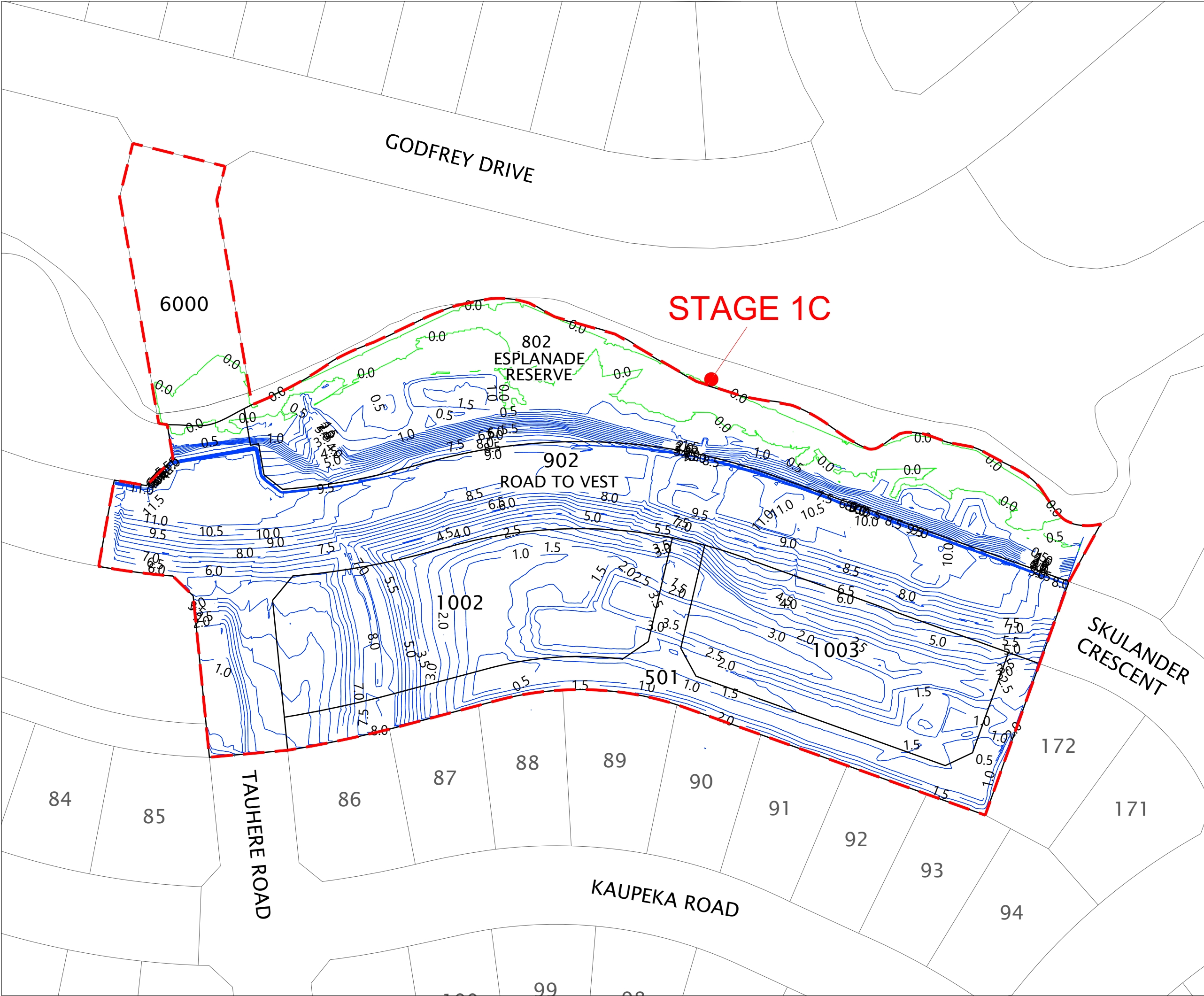
REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023 <a href="http://WOODS.CO.NZ">WOODS.CO.NZ</a>
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	



MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C  
CUT AND FILL ASBUILT  
SHEET 3 OF 6  
LOWEST SURFACE TO  
FINAL SURFACE

STATUS	AS-BUILT	REV
SCALE	1:750 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1102-AB	



- NOTES
1. COORDINATES SHOWN ARE IN TERMS OF NEW ZEALAND TRANSVERSE MERCATOR (NZTM) PROJECTION.
  2. CONTOURS ARE AT 0.25m INTERVALS.
  3. BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
  4. PLANS HAVE BEEN REVIEWED BY TETRA TECH COFFEY.
  5. PLANS SHOULD BE READ IN CONJUNCTION WITH THE GCR.

LEGEND

- ZERO CONTOUR
- CUT CONTOUR
- FILL CONTOUR
- STAGE BOUNDARIES
- LOT BOUNDARIES

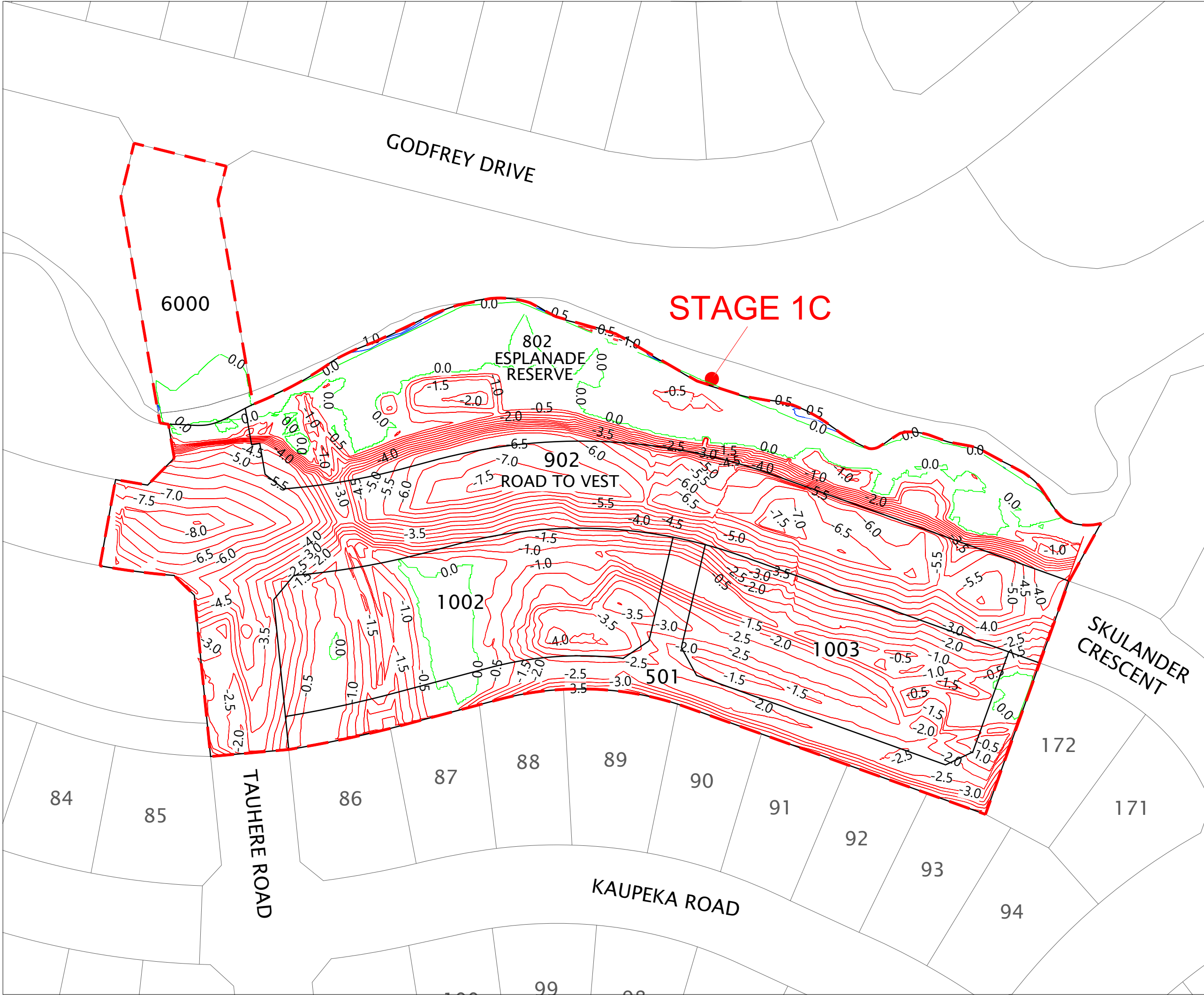
DISCLAIMER:  
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REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

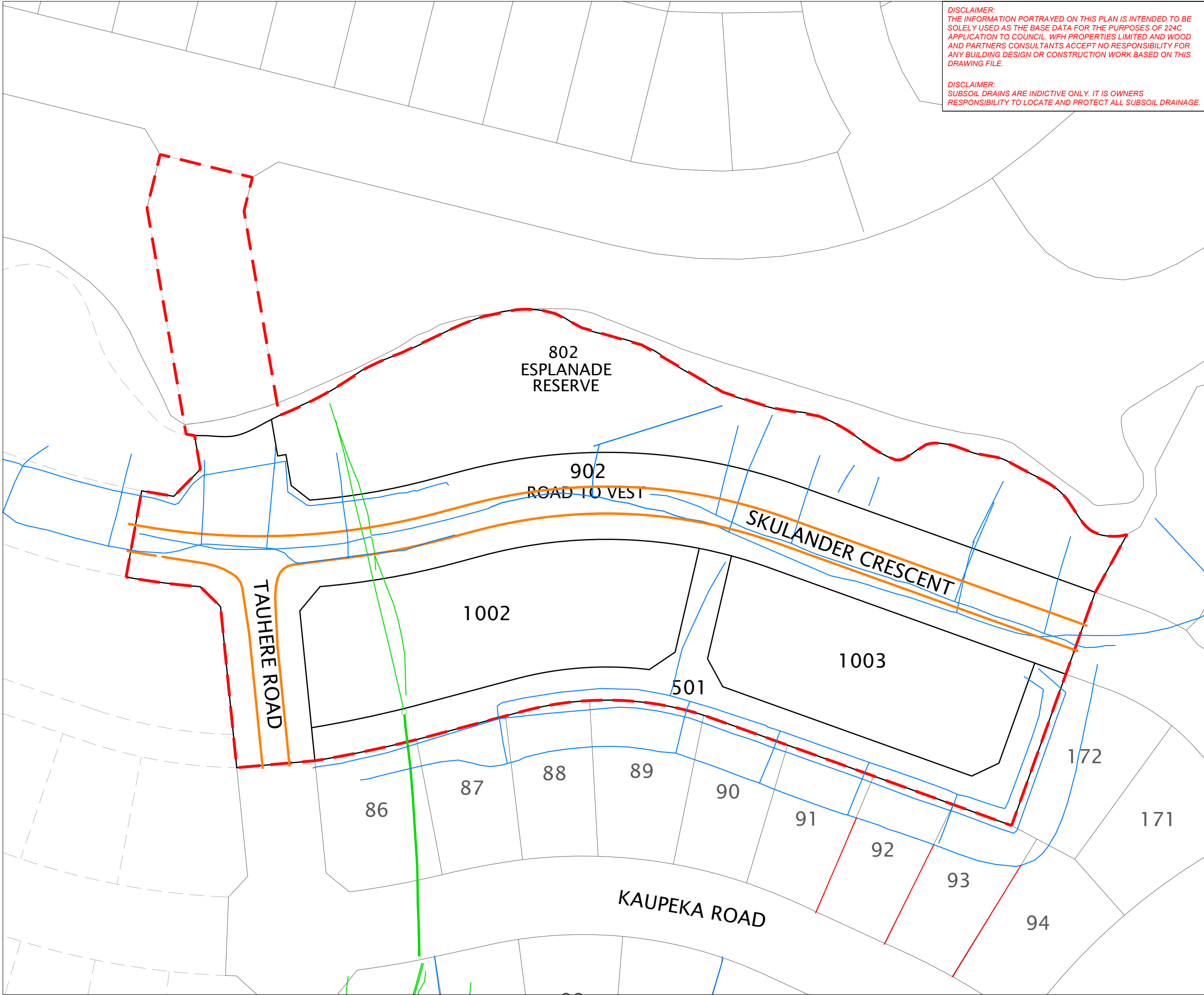
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DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	

MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C  
CUT AND FILL ASBUILT  
SHEET 5 OF 6  
ORIGINAL SURFACE TO  
LOWEST SURFACE

STATUS	AS-BUILT	REV
SCALE	1:750 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1104-AB	







DISCLAIMER:  
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DISCLAIMER:  
SUBSOIL DRAINS ARE INDICTIVE ONLY. IT IS OWNERS RESPONSIBILITY TO LOCATE AND PROTECT ALL SUBSOIL DRAINAGE.



NOTES

- 1. COORDINATES SHOWN ARE IN TERMS OF NEW ZEALAND TRANSVERSE MERCATOR (NZTM) PROJECTION.
- 2. LEVELS SHOWN ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946.
- 3. SUBSOIL DRAINAGE DATA SUPPLIED BY CONTRACTOR.
- 4. BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
- 5. PLANS HAVE BEEN REVIEWED BY TETRA TECH COFFEY.
- 6. PLANS SHOULD BE READ IN CONJUNCTION WITH THE GCR.

LEGEND

- RE SLOPE/ RETAINING WALL DRAINAGE
- UNDERFILL DRAINS
- UNDER CHANNEL DRAINS
- COUNTERFORT DRAINS
- STAGE BOUNDARIES
- LOT BOUNDARIES

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	EY	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	EY	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ

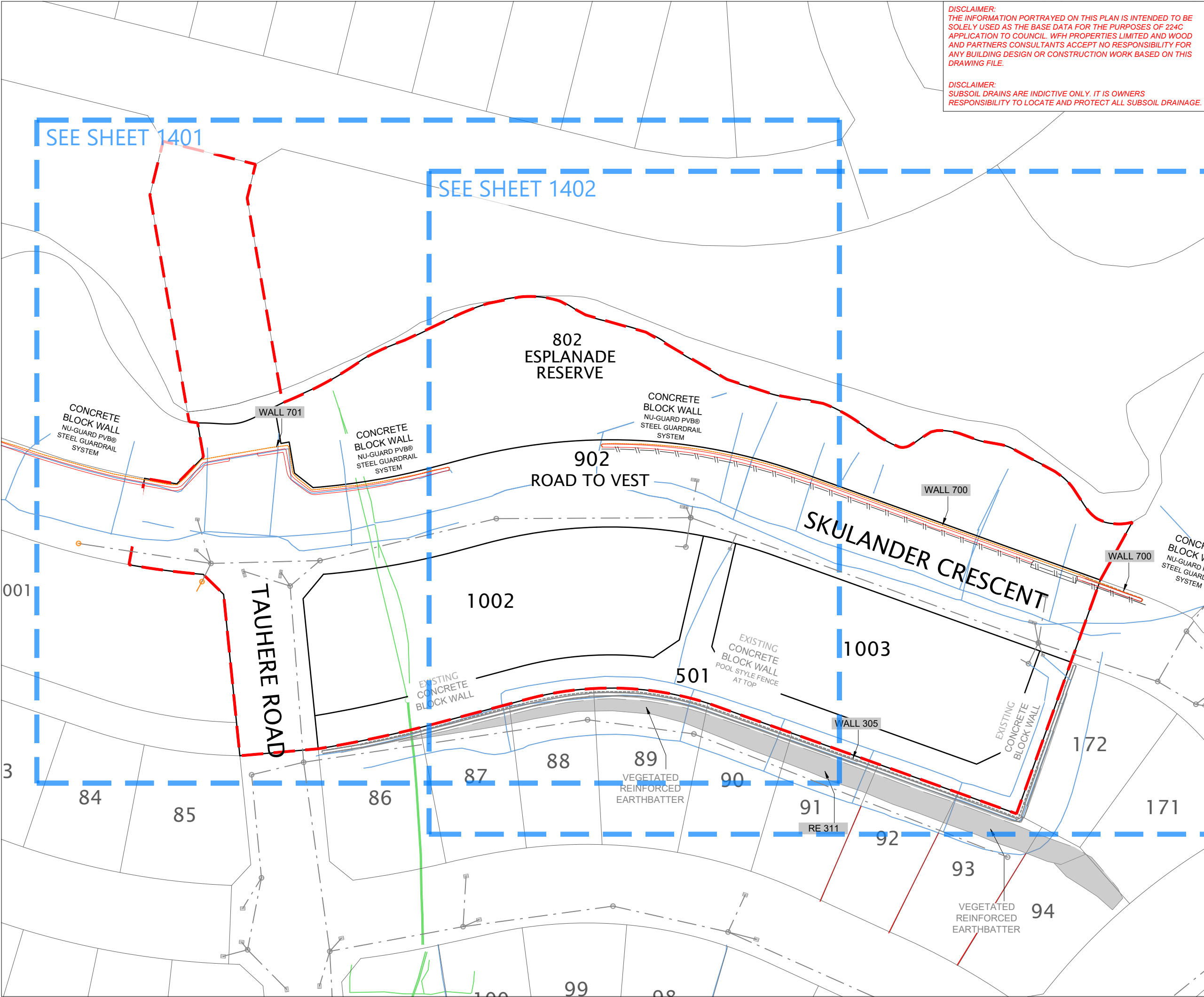
MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

SUBSOIL DRAINAGE ASBUILT PLAN

STATUS	AS-BUILT	REV
SCALE	1:750 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1200-AB	

DISCLAIMER:  
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APPLICATION TO COUNCIL. WFH PROPERTIES LIMITED AND WOOD  
AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR  
ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS  
DRAWING FILE.

DISCLAIMER:  
SUBSOIL DRAINS ARE INDICTIVE ONLY. IT IS OWNERS  
RESPONSIBILITY TO LOCATE AND PROTECT ALL SUBSOIL DRAINAGE.



**LEGEND:**

- BOTTOM FACE OF WALL
- TOP FACE OF WALL
- RE SLOPE / RETAINING WALL DRAINAGE
- UNDERFILL DRAINS
- FENCE
- TOP OF BANK
- BOTTOM OF BANK
- BOUNDARY
- OFFSET TO BOUNDARY (FROM WALL)
- STORMWATER LINE & MANHOLE

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023 <a href="http://WOODS.CO.NZ">WOODS.CO.NZ</a>
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	

**MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C**

RETAINING WALL ASBUILT PLAN  
LAYOUT SHEET  
SHEET 1 OF 3

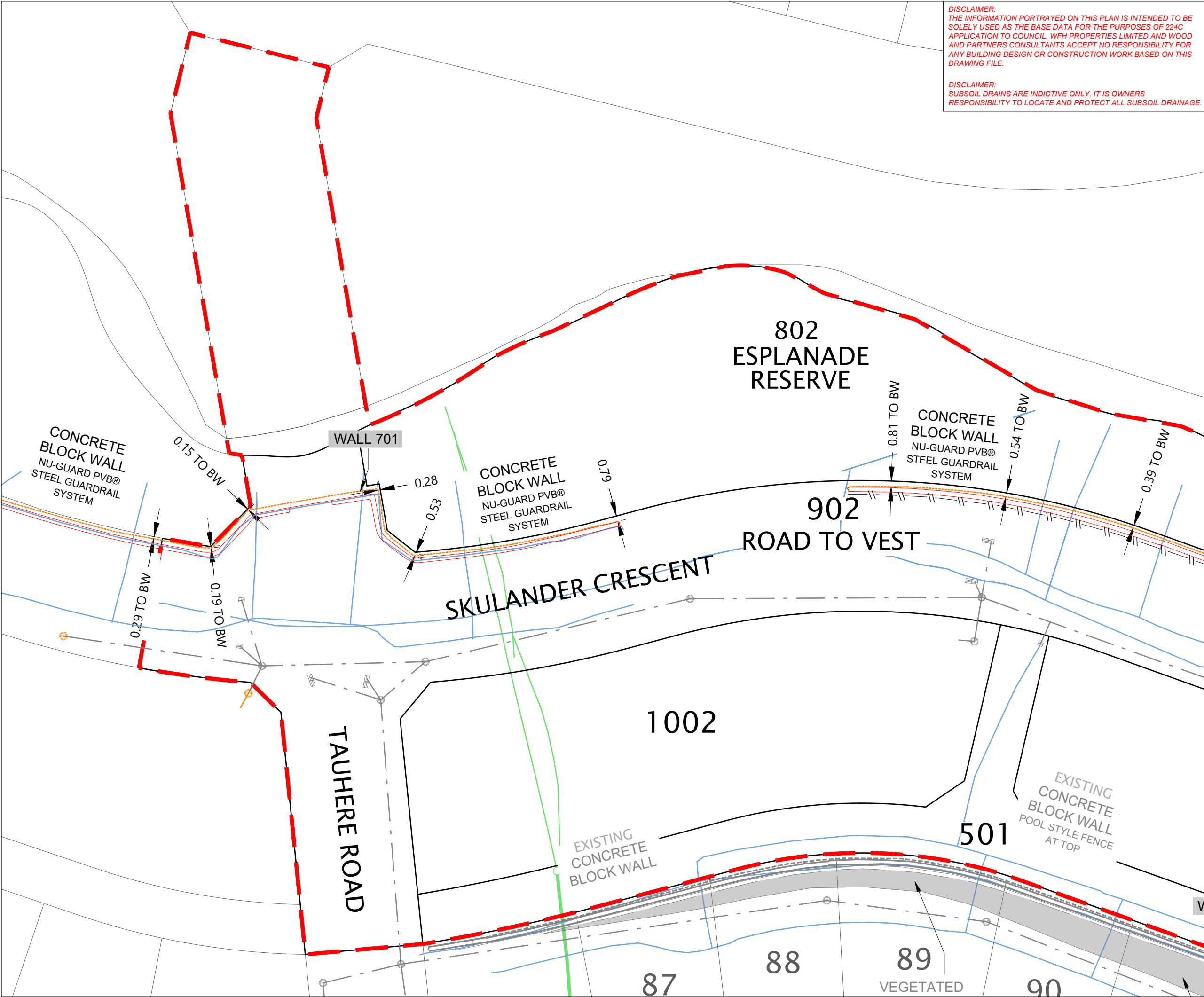
STATUS	AS-BUILT	REV
SCALE	1:750 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1400-AB	

DISCLAIMER:  
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APPLICATION TO COUNCIL. WFH PROPERTIES LIMITED AND WOOD  
AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR  
ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS  
DRAWING FILE.

DISCLAIMER:  
SUBSOIL DRAINS ARE INDICTIVE ONLY. IT IS OWNERS  
RESPONSIBILITY TO LOCATE AND PROTECT ALL SUBSOIL DRAINAGE.

**LEGEND:**

- BOTTOM FACE OF WALL
- TOP FACE OF WALL
- RE SLOPE / RETAINING WALL DRAINAGE
- UNDERFILL DRAINS
- FENCE
- TOP OF BANK
- BOTTOM OF BANK
- BOUNDARY
- OFFSET TO BOUNDARY (FROM WALL)
- STORMWATER LINE & MANHOLE



REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ



N



MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

RETAINING WALL ASBUILT PLAN  
SHEET 2 OF 3

STATUS	AS-BUILT	REV
SCALE	1:500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1401-AB	

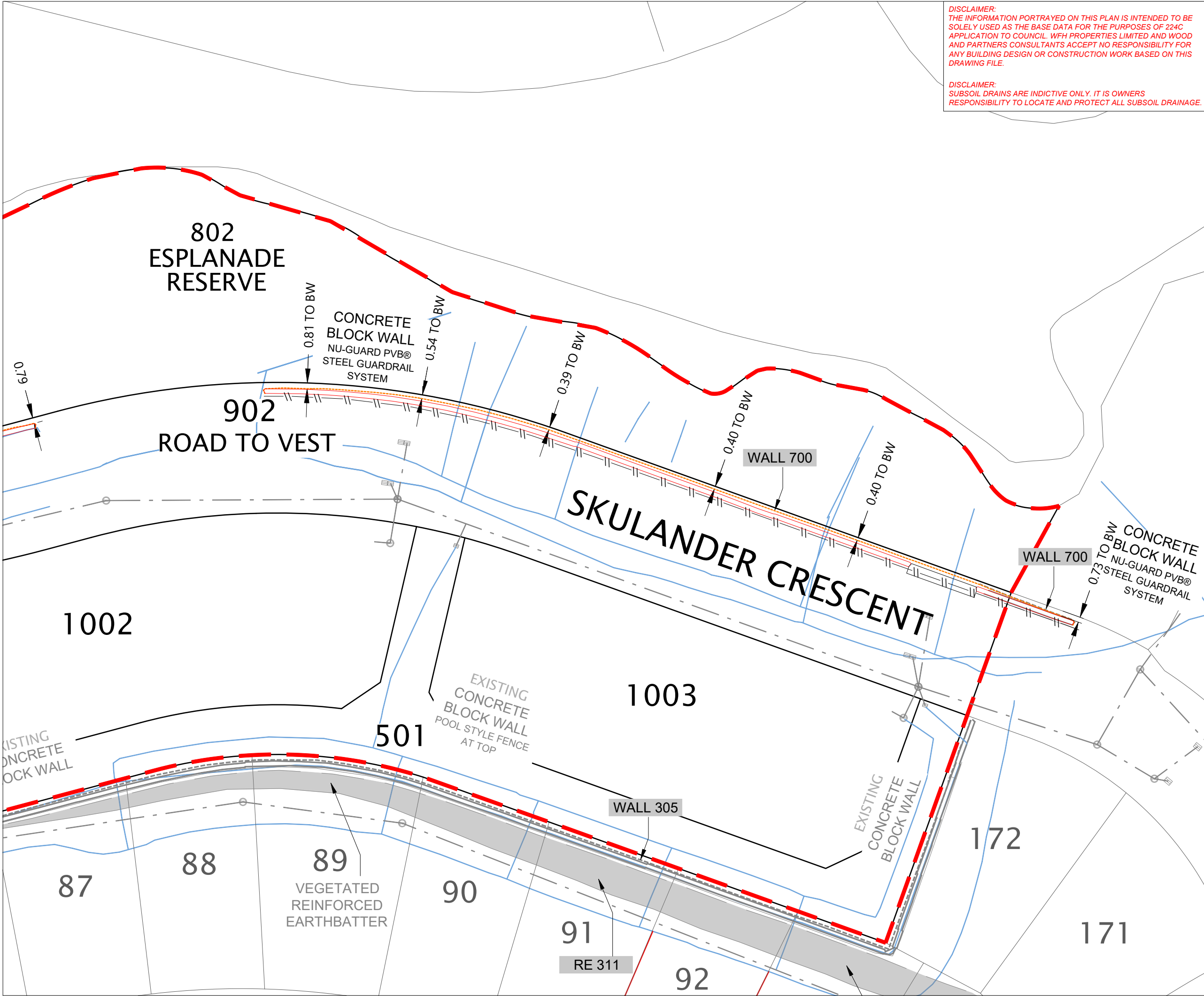


DISCLAIMER:  
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE  
SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF 224C  
APPLICATION TO COUNCIL. WFH PROPERTIES LIMITED AND WOOD  
AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR  
ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS  
DRAWING FILE.

DISCLAIMER:  
SUBSOIL DRAINS ARE INDICATIVE ONLY. IT IS OWNERS  
RESPONSIBILITY TO LOCATE AND PROTECT ALL SUBSOIL DRAINAGE.

**LEGEND:**

- BOTTOM FACE OF WALL
- TOP FACE OF WALL
- RE SLOPE / RETAINING WALL DRAINAGE
- UNDERFILL DRAINS
- FENCE
- TOP OF BANK
- BOTTOM OF BANK
- BOUNDARY
- 0.10m OFFSET TO BOUNDARY (FROM WALL)
- STORMWATER LINE & MANHOLE



REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	MD	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023 <a href="http://WOODS.CO.NZ">WOODS.CO.NZ</a>
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	



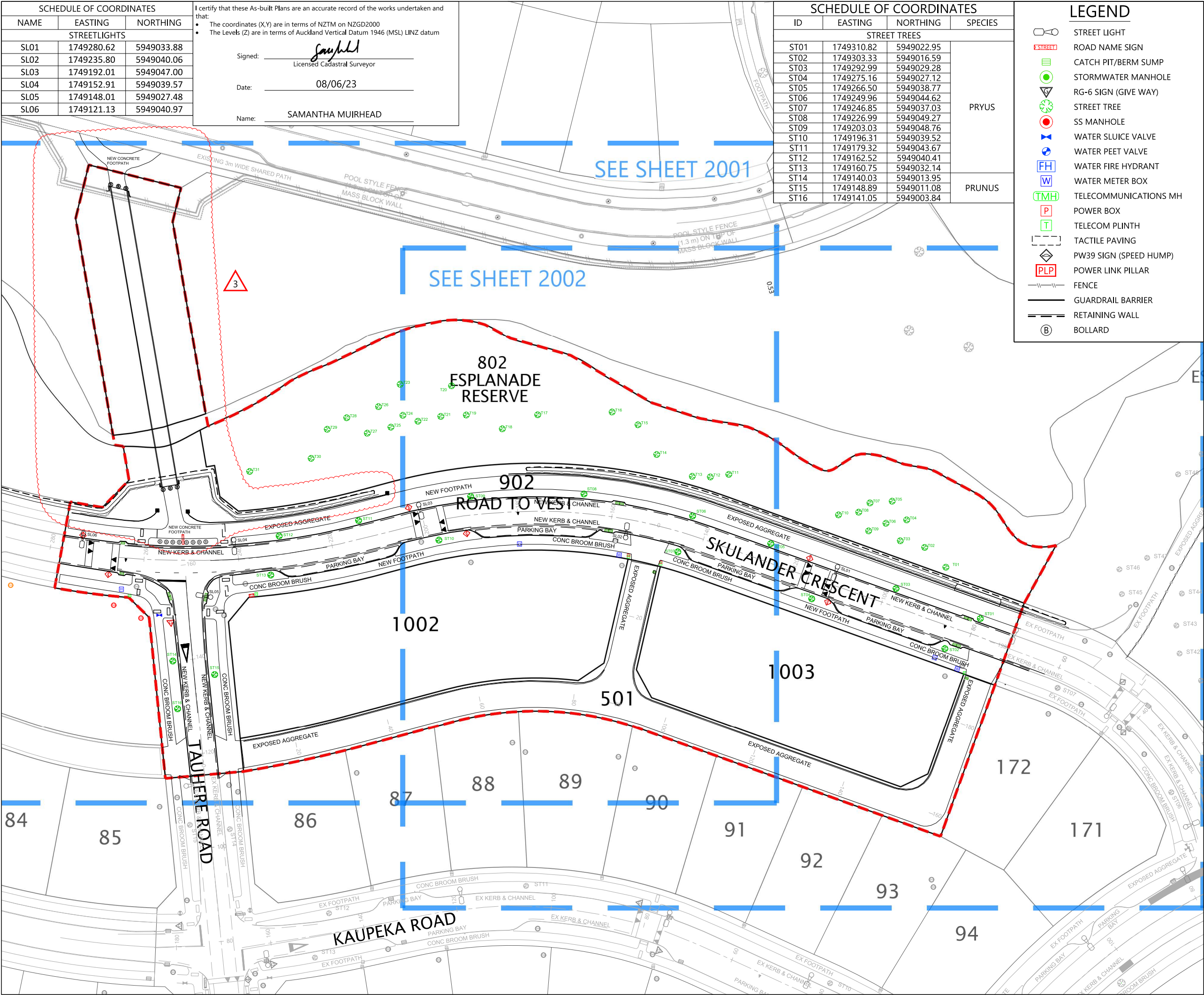
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**MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C**

**RETAINING WALL ASBUILT PLAN  
SHEET 2 OF 3**

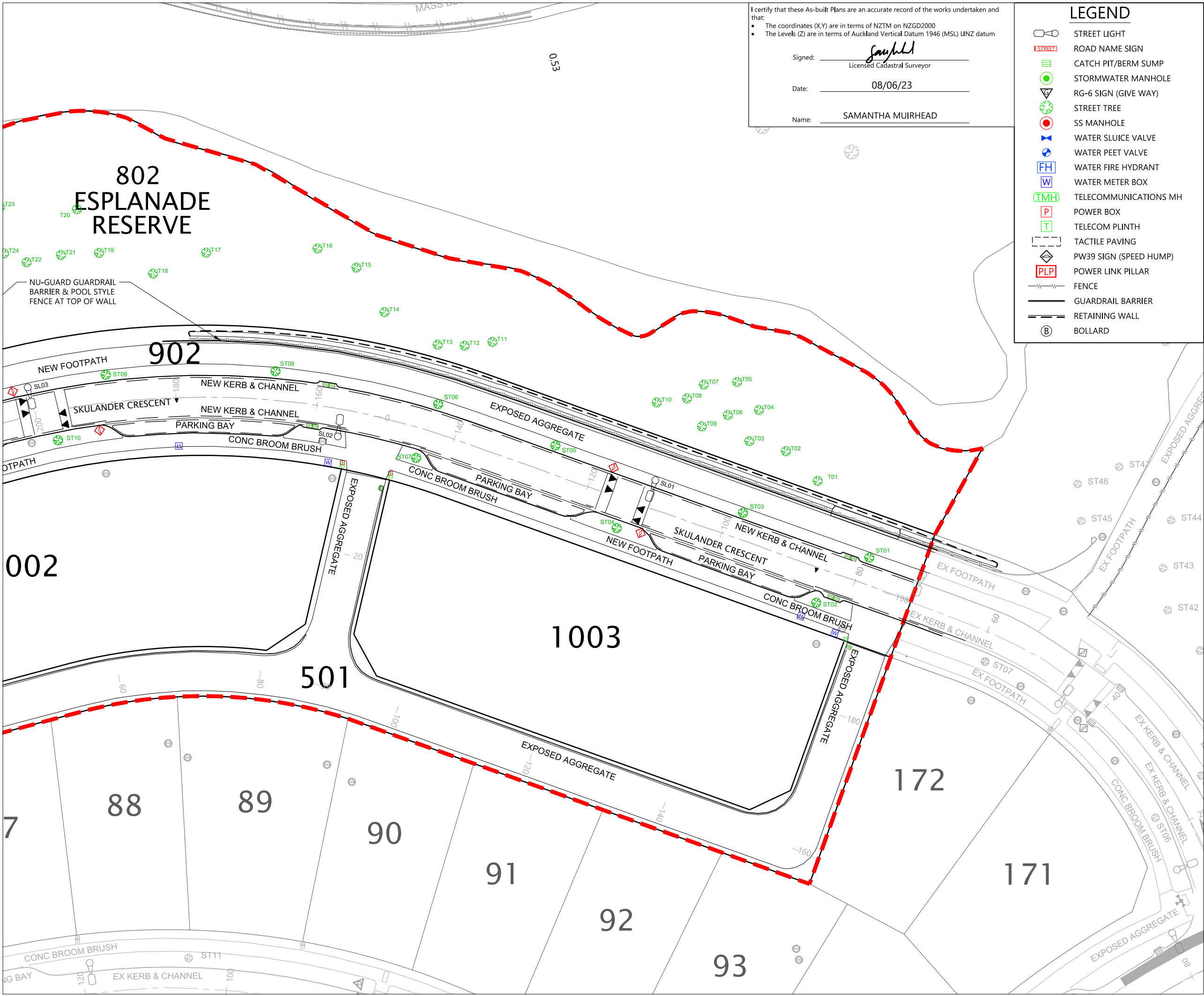
STATUS	AS-BUILT	REV
SCALE	1:500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-1402-AB	











I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The coordinates (X,Y) are in terms of NZTM on NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed: *Samantha Muirhead*  
Licensed Cadastral Surveyor

Date: 08/06/23

Name: SAMANTHA MUIRHEAD

- ### LEGEND
- STREET LIGHT
  - ROAD NAME SIGN
  - CATCH PIT/BERM SUMP
  - STORMWATER MANHOLE
  - RG-6 SIGN (GIVE WAY)
  - STREET TREE
  - SS MANHOLE
  - WATER SLUICE VALVE
  - WATER PEET VALVE
  - WATER FIRE HYDRANT
  - WATER METER BOX
  - TELECOMMUNICATIONS MH
  - POWER BOX
  - TELECOM PLINTH
  - TACTILE PAVING
  - PW39 SIGN (SPEED HUMP)
  - POWER LINK PILLAR
  - FENCE
  - GUARDRAIL BARRIER
  - RETAINING WALL
  - BOLLARD

### NOTES

- ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY DATA AND CONTRACTOR RECEIVED DATA.
- BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.

**DISCLAIMER:**  
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF 224C APPLICATION TO COUNCIL. WFH PROPERTIES LIMITED AND WOOD AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS DRAWING FILE.

REVISION DETAILS		BY	DATE
1	ISSUED FOR INFORMATION	SM	20/12/22
2	BRIDGE DETAILS ADDED	SM	16/01/23
3	BRIDGE CONSTRUCTED	SM	08/06/23

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023 <a href="http://WOODS.CO.NZ">WOODS.CO.NZ</a>
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	

MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

ROADING ASBUILT PLAN  
SHEET 3 OF 3

STATUS	AS-BUILT	REV
SCALE	1:500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-2002-AB	



SCHEDULE OF COORDINATES		
STORMWATER LOT CONNECTIONS		
NAME	EASTING	NORTHING
LOT 1002	1749230.36	5949033.34
LOT 1003	1749303.27	5949009.44
LOT 173	1749283.18	5948856.18
LOT 152	1749293.71	5948870.28
LOT 153	1749304.24	5948885.86
STORMWATER LOT CONNECTIONS (FOR FUTURE LOTS)		
LOT 1001	1749129.32	5949023.80

LEGEND

STORMWATER MANHOLE

STORMWATER CESSPIT

NEW STORMWATER

EXISTING STORMWATER

FUTURE STORMWATER

LOT BOUNDARY

STAGE BOUNDARY

FUTURE BOUNDARY

SW

SW

SW

SW

SW

SW

SW

NOTE: LNS= LID NOT SET AT FINAL LEVEL  
LL= LID LEVEL

- NOTES
1. ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

2. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.

3. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.

REVISION DETAILS		BY	DATE
1	ISSUED FOR 224C	SM	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ

N

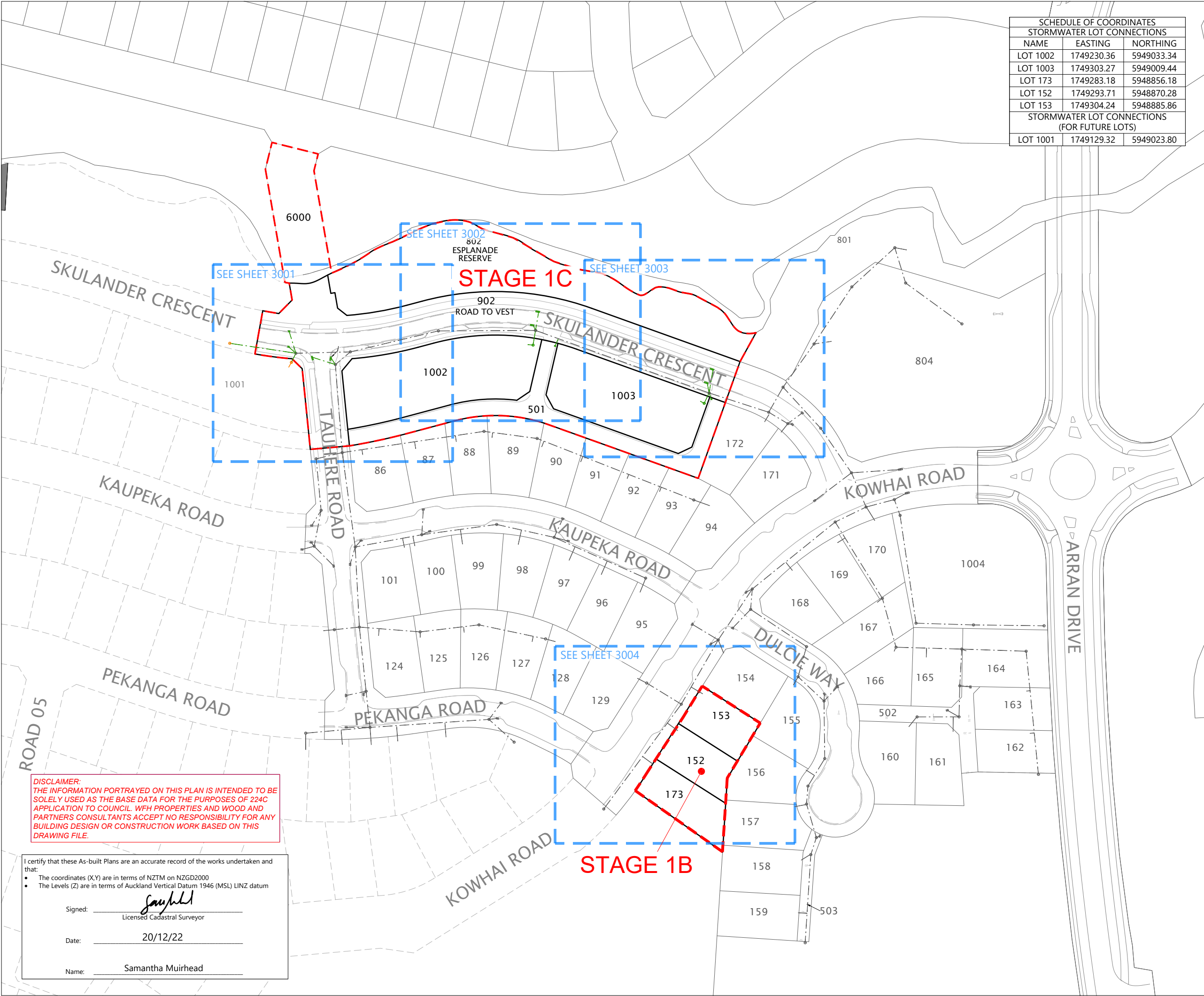
WFH

PROPERTIES

MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

STORMWATER ASBUILT PLAN  
OVERALL LAYOUT  
SHEET 1 OF 5

STATUS	AS-BUILT	REV
SCALE	1:1500 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-3000-AB	



Plot Date: 9:57:45 pm,20 December 2022, SAMANTHAM  
File: C:\12DS\ENERGY\DATA\WP-PEN-APP-01\P22-006 - ARRAN HILL P6 STAGE 1C 20922\CADD\SURV\AB\P22-006-00-3000-AB STORMWATER.DWG



LEGEND

STORMWATER MANHOLE	
STORMWATER CESSPIT	
NEW STORMWATER	
EXISTING STORMWATER	
FUTURE STORMWATER	
LOT BOUNDARY	
STAGE BOUNDARY	
FUTURE BOUNDARY	

NOTE: LNS= LID NOT SET AT FINAL LEVEL  
LL= LID LEVEL

NOTES

- ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
- ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.

REVISION DETAILS		BY	DATE
1	ISSUED FOR 224C	SM	20/12/22

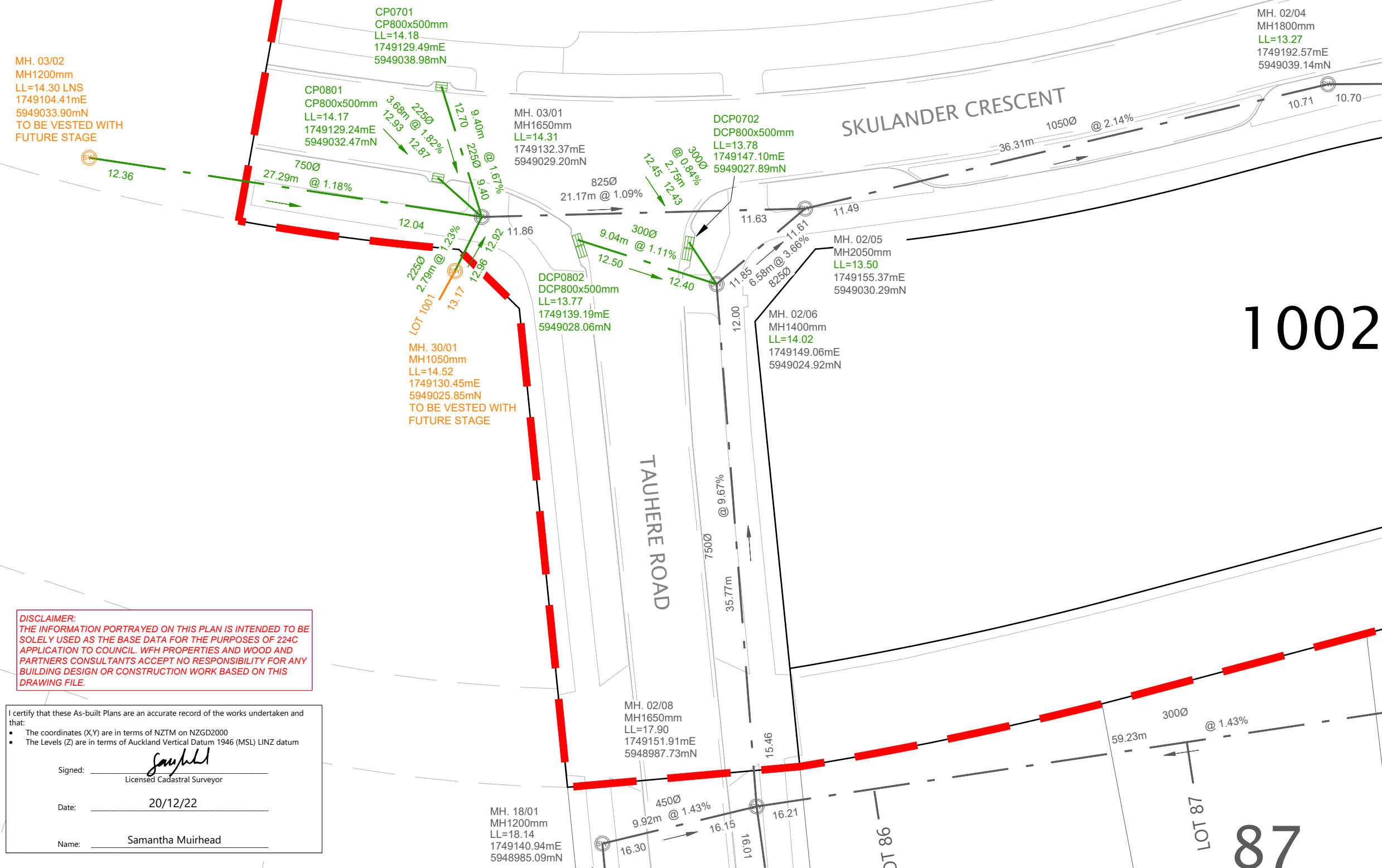
SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ



MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

STORMWATER ASBUILT PLAN  
SHEET 2 OF 5

STATUS	AS-BUILT	REV
SCALE	1:300 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-3001-AB	



**DISCLAIMER:**  
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF 224C APPLICATION TO COUNCIL. WFH PROPERTIES AND WOOD AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS DRAWING FILE.

I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The coordinates (X,Y) are in terms of NZTM on NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed:   
Licensed Cadastral Surveyor

Date: 20/12/22

Name: Samantha Muirhead





# 802 ESPLANADE RESERVE

902

SKULANDER CRESCENT

MH. 02/04  
MH1800mm  
LL=13.27  
1749192.57mE  
5949039.14mN

DCP 0601  
DCP800x500mm  
LL=12.36  
1749232.65mE  
5949041.52mN

DCP0501  
DCP800x500mm  
LL=12.31  
1749234.96mE  
5949047.22mN

MH. 02/03  
MH2050mm  
LL=12.52  
1749233.62mE  
5949039.35mN

MH. 29/01  
MH1050mm  
LL=13.60  
1749232.58mE  
5949033.15mN

CP. 0401  
CP 675x450mm  
LL=12.54  
1749241.88mE  
5949032.76mN

1002


501

1003

**DISCLAIMER:**  
THE INFORMATION PORTRAYED ON THIS PLAN IS INTENDED TO BE SOLELY USED AS THE BASE DATA FOR THE PURPOSES OF 224C APPLICATION TO COUNCIL. WFH PROPERTIES AND WOOD AND PARTNERS CONSULTANTS ACCEPT NO RESPONSIBILITY FOR ANY BUILDING DESIGN OR CONSTRUCTION WORK BASED ON THIS DRAWING FILE.

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- The coordinates (X,Y) are in terms of NZTM on NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

Signed:   
Licensed Cadastral Surveyor

Date: 20/12/22

Name: Samantha Muirhead

**LEGEND**

STORMWATER MANHOLE

STORMWATER CESSPIT

NEW STORMWATER


EXISTING STORMWATER


FUTURE STORMWATER


LOT BOUNDARY


STAGE BOUNDARY


FUTURE BOUNDARY




















NOTE: LNS= LID NOT SET AT FINAL LEVEL  
LL= LID LEVEL

**NOTES**

1. ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

2. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.

3. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.

REVISION DETAILS		BY	DATE
1	ISSUED FOR 224C	SM	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ





MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

STORMWATER ASBUILT PLAN  
SHEET 3 OF 5

STATUS	AS-BUILT	REV
SCALE	1:300 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-3002-AB	



Plot Date: 9:57:46 pm,20 December 2022, SAMANTHAM

LEGEND

- STORMWATER MANHOLE
- STORMWATER CESSPIT
- NEW STORMWATER
- EXISTING STORMWATER
- FUTURE STORMWATER
- LOT BOUNDARY
- STAGE BOUNDARY
- FUTURE BOUNDARY

NOTE: LNS= LID NOT SET AT FINAL LEVEL  
LL= LID LEVEL

NOTES

- ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY AND LINZ APPROVAL.
- ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.

REVISION DETAILS		BY	DATE
1	ISSUED FOR 224C	SM	20/12/22

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	
		WOODS.CO.NZ



MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C

STORMWATER ASBUILT PLAN  
SHEET 4 OF 5

STATUS	AS-BUILT	REV
SCALE	1:300 @ A3	1
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-3003-AB	

1003

172

DISCLAIMER:  
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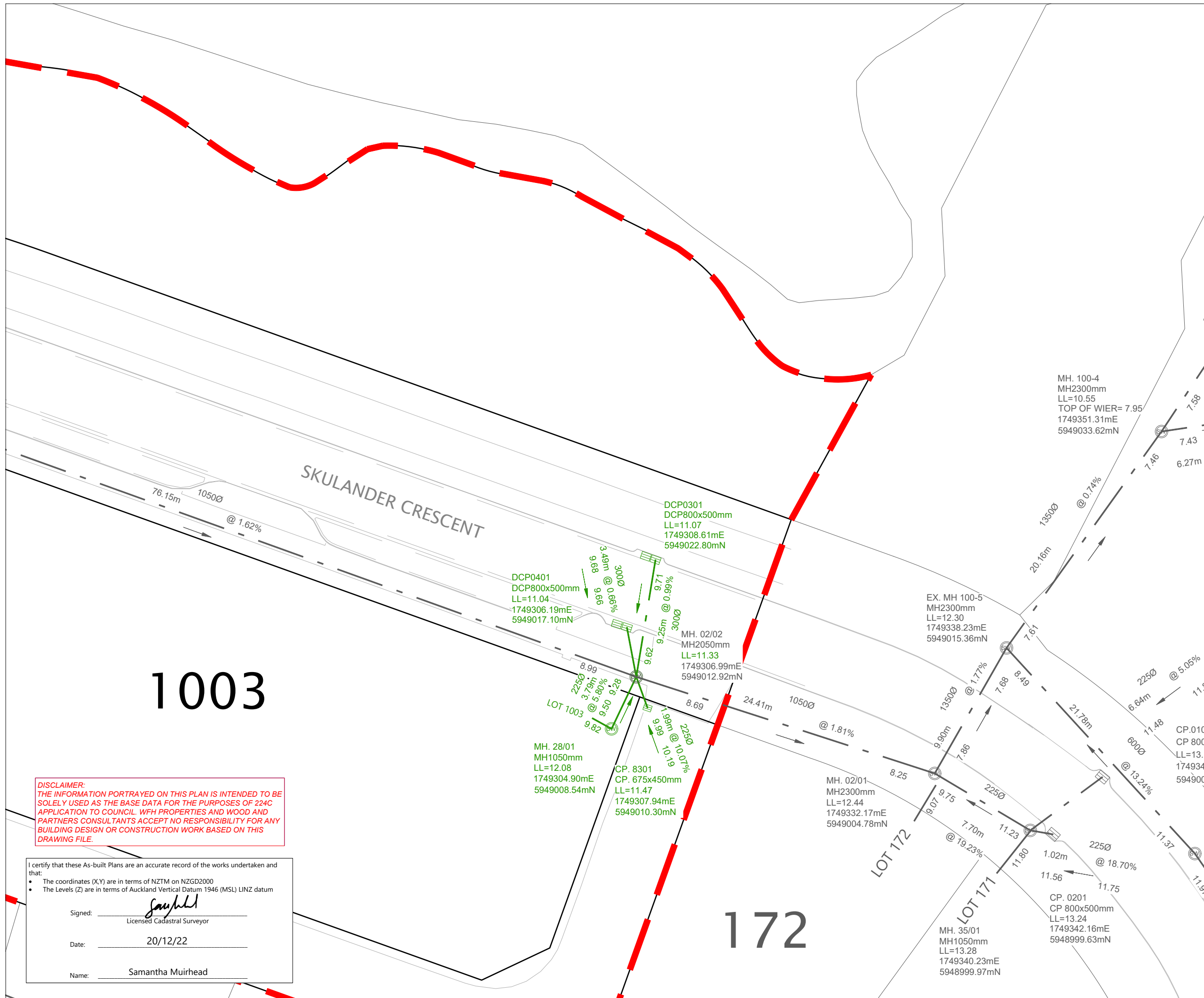
I certify that these As-built Plans are an accurate record of the works undertaken and that:

- The coordinates (X,Y) are in terms of NZTM on NZGD2000
- The Levels (Z) are in terms of Auckland Vertical Datum 1946 (MSL) LINZ datum

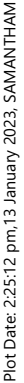
Signed: Licensed Cadastral Surveyor

Date: 20/12/22

Name: Samantha Muirhead

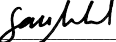


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I certify that these As-Built Plans are an accurate record of the works undertaken and that:








- The coordinates (X,Y) are in terms of NZTM on NZGD2000, and are within +/- 50mm.
- The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are as following:
  - For all pipe inverts & channels to be an within +/- 10mm (locally)
  - For all other assets +/-20mm (e.g. Manhole covers, Earthworks)

Signed:  \_\_\_\_\_  
Licensed Cadastral Surveyor

Date: 13/01/2023 \_\_\_\_\_

Name: SAMANTHA MUIRHEAD \_\_\_\_\_

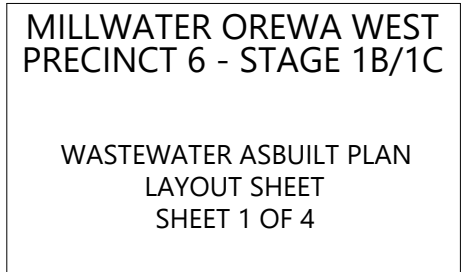
## LEGEND

NEW SANITARY SEWER MANHOLE TO VEST	
NEW SANITARY SEWER TO VEST	
EXISTING SANITARY SEWER	
FUTURE SANITARY SEWER	
LOT BOUNDARY	
FUTURE BOUNDARY	
STAGE BOUNDARY	
DROP-PROTECTION STRUCTURE	(DPS)

LNS= LID NOT SET AT FINAL LEVEL.  
TO BE SET IN FUTURE STAGE

1. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
2. ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.
3. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.
4. ALL NEW SANITARY SEWER LINES ARE 150mmØ uPVC CLASS SN16 UNLESS SPECIFIED OTHERWISE.

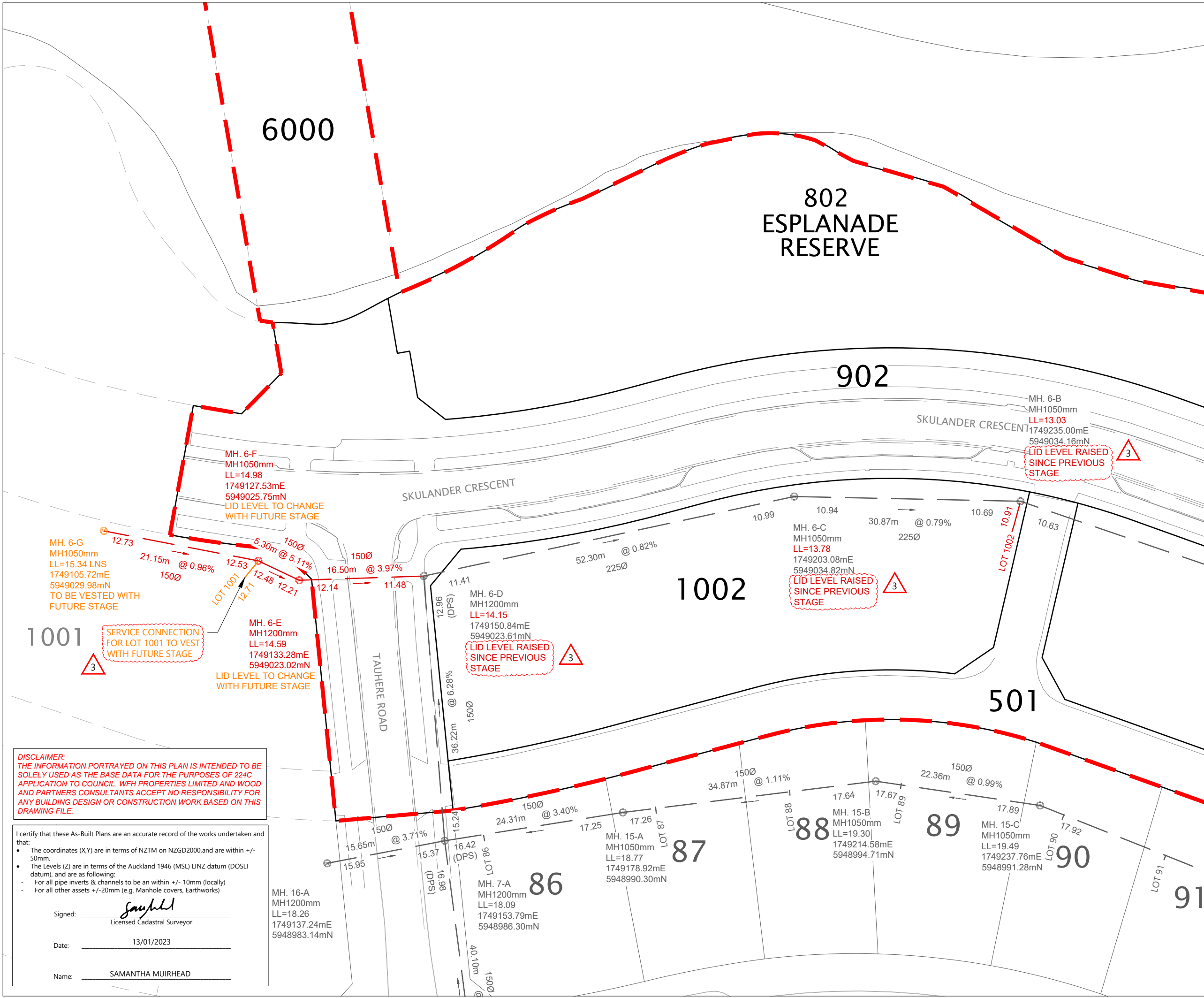
SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	<a href="http://WOODS.CO.NZ">WOODS.CO.NZ</a>



STATUS	AS-BUILT	REV
SCALE	1:1500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-4000-AB	

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\P22-006 - ARRAN HILL P6 STAGE 1C\_20922\CAD\SURV\AB\P22-006-00-4000-AB WASTEWATER.DWG





**LEGEND**

NEW SANITARY SEWER MANHOLE TO VEST (SS)

NEW SANITARY SEWER TO VEST (SS)

EXISTING SANITARY SEWER (SS)

FUTURE SANITARY SEWER (SS)

LOT BOUNDARY (SS)

FUTURE BOUNDARY (SS)

STAGE BOUNDARY (SS)

DROP-PROTECTION STRUCTURE (DPS)

LNS= LID NOT SET AT FINAL LEVEL. TO BE SET IN FUTURE STAGE

**NOTES**

- LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
- ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.
- ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.
- ALL NEW SANITARY SEWER LINES ARE 150mmØ uPVC CLASS SN16 UNLESS SPECIFIED OTHERWISE.

REVISION DETAILS		BY	DATE
1	ISSUED FOR 224c	SM	20/12/22
2	NOTES AMENDED	SM	10/01/23
3	ADDITIONAL NOTES ADDED	SM	13/01/23

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	WOODS.CO.NZ

N

**WFH**  
PROPERTIES

**MILLWATER OREWA WEST  
PRECINCT 6 - STAGE 1B/1C**


**WASTEWATER ASBUILT PLAN  
SHEET 2 OF 4**

STATUS	AS-BUILT	REV
SCALE	1:500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-4001-AB	

**DISCLAIMER:**  
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I certify that these As-Built Plans are an accurate record of the works undertaken and that:

- The coordinates (X,Y) are in terms of NZTM on NZGD2000, and are within +/- 50mm.
- The Levels (Z) are in terms of the Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are as following:
  - For all pipe inverts & channels to be an within +/- 10mm (locally)
  - For all other assets +/- 20mm (e.g. Manhole covers, Earthworks)

Signed:   
Licensed Cadastral Surveyor

Date: 13/01/2023

Name: SAMANTHA MUIRHEAD



NEW SANITARY SEWER MANHOLE  
TO VEST

NEW SANITARY SEWER TO VEST

EXISTING SANITARY SEWER

FUTURE SANITARY SEWER

LOT BOUNDARY

FUTURE BOUNDARY

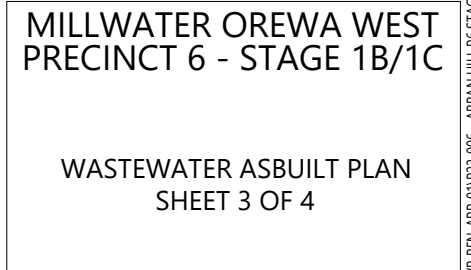
STAGE BOUNDARY

DROP-PROTECTION STRUCTURE  
(DPS)

LNS= LID NOT SET AT FINAL LEVEL.  
TO BE SET IN FUTURE STAGE

1. LOT BOUNDARIES ARE SUBJECT TO FINAL SURVEY.
2. ALL PIPE AND MH DIAMETERS ARE INTERNAL, AND SHOWN IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.
3. ASBUILT DATA HAS BEEN SOURCED FROM A COMBINATION OF WOODS SURVEY MEASURED DATA AND CONTRACTOR RECEIVED DATA.
4. ALL NEW SANITARY SEWER LINES ARE 150mmØ uPVC CLASS SN16 UNLESS SPECIFIED OTHERWISE.

SURVEYED	WOODS	BUILDING B, LEVEL 1 8 NUGENT STREET GRAFTON AUCKLAND 1023
DESIGNED	WOODS	
DRAWN	MD	
CHECKED	JM	
APPROVED	SM	

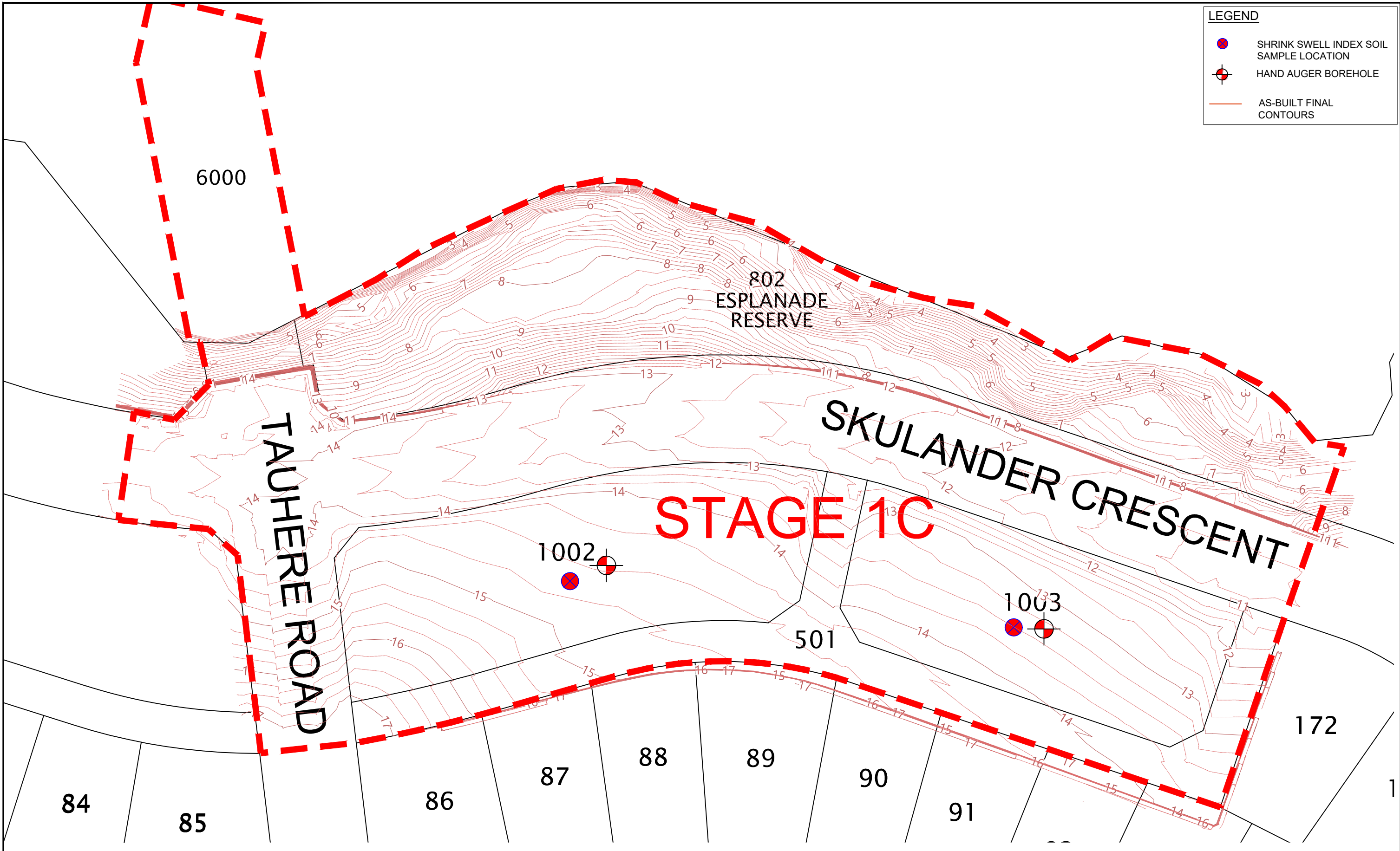




STATUS	AS-BUILT	REV
SCALE	1:500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P22-006-00-4002-AB	

## APPENDIX B: REFERENCE DRAWINGS

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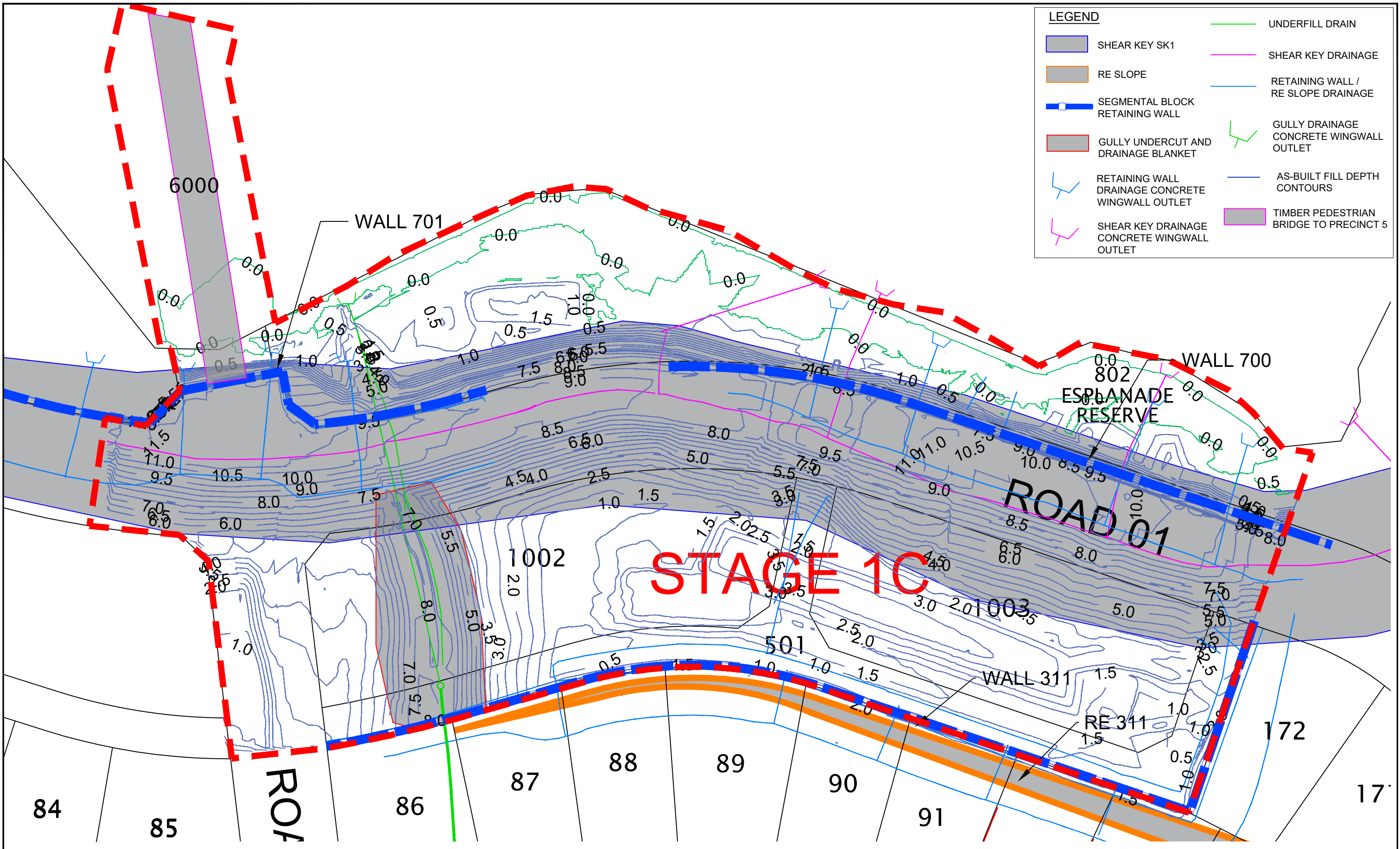
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revision	no.	description	drawn	approved	date		drawn	SP		client: WFH PROPERTIES LTD		
	A	FOR STAGE 1C GEOTECHNICAL COMPLETION REPORT	SP	SP	11/01/2023		approved	SP		project: MILLWATER - OREWA WEST - PRECINCT 6 SUBDIVISION STAGE 1C		
							date	11/01/2023		title: GEOTECHNICAL INVESTIGATION PLAN		
							scale	AS SHOWN		project no: 773-AKLGE206639 figure no: BK/001 rev: A		
							original size	A3				

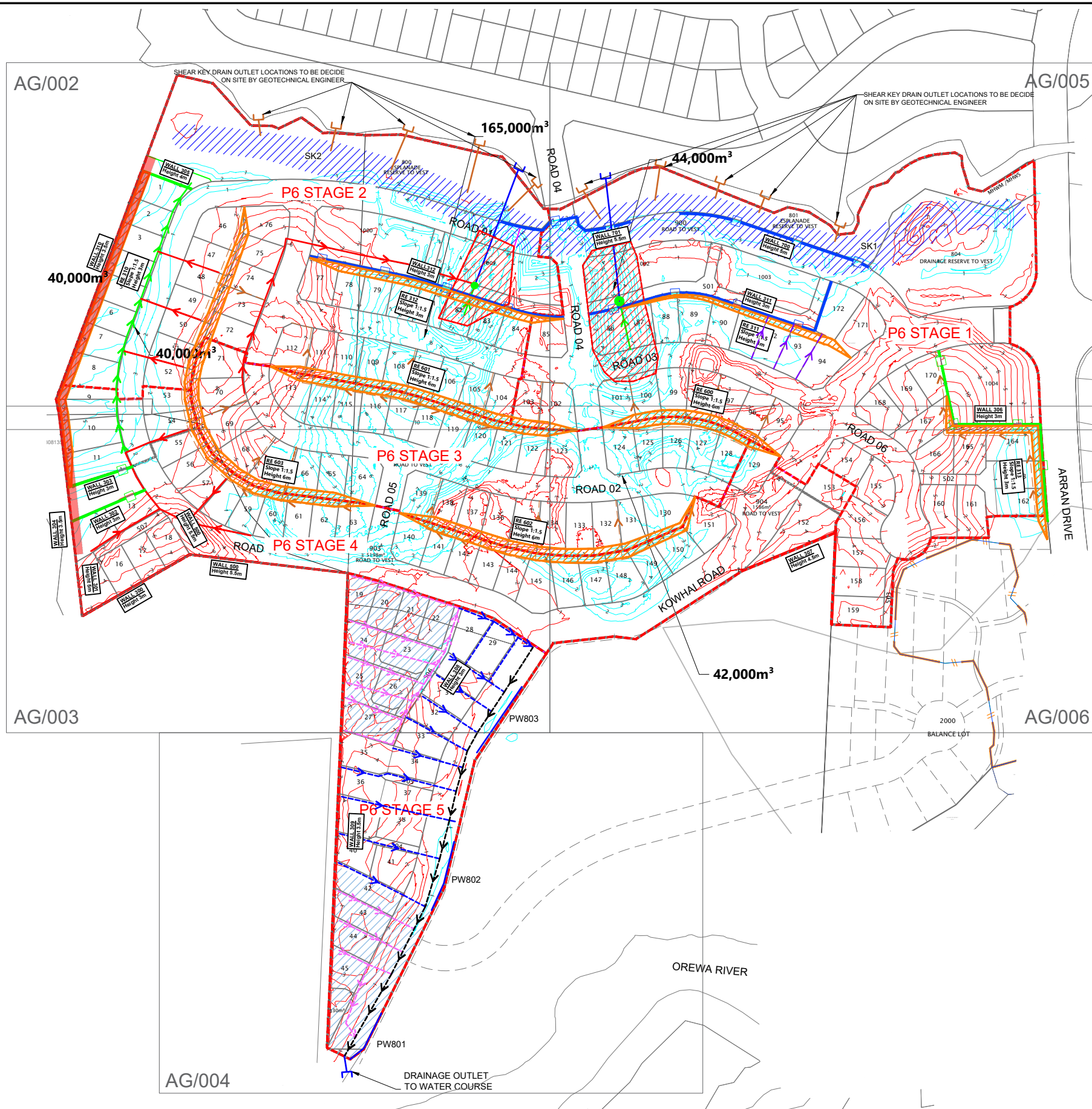


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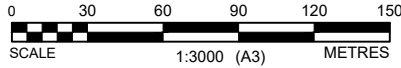
revision	no.	description			drawn	approved	date	<div>0612 SCALE 1:600 (A3) METRES</div>			drawn	SP	<div>TtTETRA TECHCOFFEY</div>			client:	WFH PROPERTIES LTD		
	A	FOR STAGE 1C GEOTECHNICAL COMPLETION REPORT			SP	SP	11/01/2023				approved	SP				project:	MILLWATER - OREWA WEST - PRECINCT 6 SUBDIVISION STAGE 1C		
											date	11/01/2023				title:	GEOTECHNICAL WORKS PLAN		
											scale	AS SHOWN				project no:	773-AKLGE206639	figure no:	BK/002
											original size	A3						rev:	A


PLOT DATE: 20/07/2020 4:08:12 PM DWG FILE: \\NTS0808F\S25808\GEN29\PROJECTS\773-AKLGE\PROJECTS\206639 - MILLWATER - OREWA WEST - PRECINCT 6\COFFEY DRAWINGS\CAD\STEPHEN\773-AKLGE\206639-AG.DWG



EARTHWORKS VOLUMES		
STAGE	CUT	FILL
STAGE 1	109,000m3	50,000m3
STAGE 2	45,000m3	94,000m3
STAGE 3	26,000m3	93,000m3
STAGE 4	21,000m3	60,400m3
STAGE 5	39,000m3	-

- LEGEND
- PROPOSED CUT CONTOURS (1m INTERVAL)
  - PROPOSED FILL CONTOURS (1m INTERVAL)
  - REINFORCED EARTH WALL
  - RETAINING WALL - TIMBER
  - RETAINING WALL - KEYSTONE
  - RETAINING WALL - MASS BLOCK
  - BOUNDARY
  - STAGE BOUNDARY
  - WICK DRAINS
  - DSM COLUMNS
  - SHEAR KEY EXCAVATION
  - 2.5M NOMINAL UNDERCUTS
  - UNSUITABLE UNDERCUTS
  - CF DRAINS (DETAIL 1)
  - CF DRAINS (DETAIL 2)
  - CF DRAINS (DETAIL 3)
  - CF DRAINS (DETAIL 4)
  - UNDERFILL DRAINS
  - RE SLOPE DRAINS
  - COLLECTOR DRAINS
  - PE OUTLET LINE
  - SHEAR KEY OUTLET
  - PROPOSED PALISADE WALLS
  - PROPOSED MANHOLE LOCATION

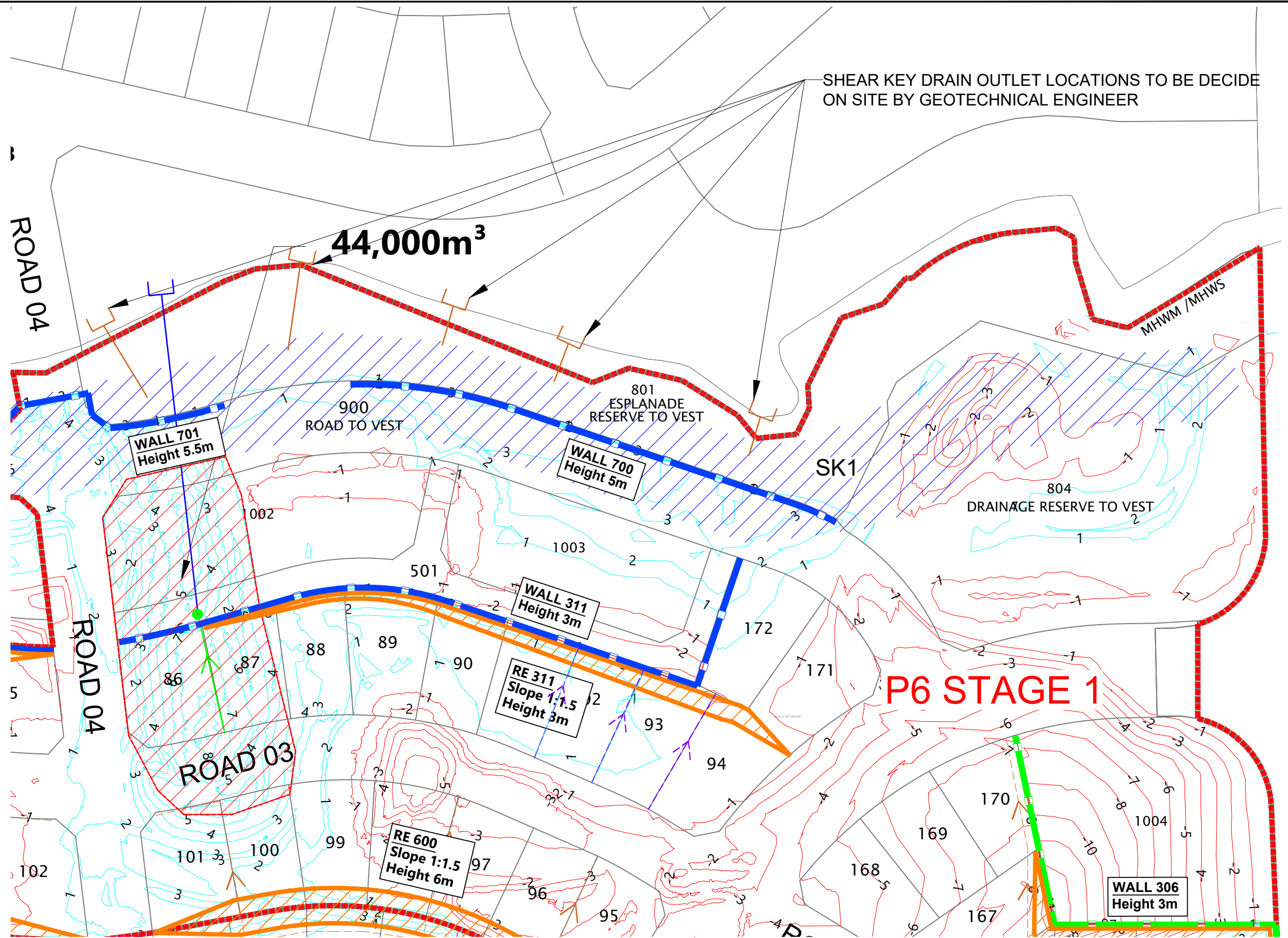


revision	no.	description	drawn	approved	date	drawn	RZ	 A TETRA TECH COMPANY	client:	WFH PROPERTIES LTD		
	A	ORIGINAL ISSUE (FOR EW GDR)	RZ	SP	04/12/2019	approved	SP		project:	MILLWATER - OREWA WEST - PRECINCT 6		
	B	UPDATE TO CF DRAIN LAYOUT	RZ	SP	20/07/2020	date	20/07/2020		title:	GEOTECHNICAL REMEDIATION PLAN		
						scale	AS SHOWN		project no:	773-AKLGE206639	figure no:	AG/001
						original size	A3		rev:	B		

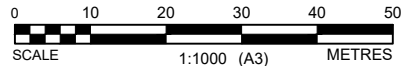


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LEGEND	
	PROPOSED CUT CONTOURS (1m INTERVAL)
	PROPOSED FILL CONTOURS (1m INTERVAL)
	REINFORCED EARTH WALL
	RETAINING WALL - TIMBER
	RETAINING WALL - KEYSTONE
	RETAINING WALL - MASS BLOCK
	BOUNDARY
	STAGE BOUNDARY
	WICK DRAINS
	DSM COLUMNS
	SHEAR KEY EXCAVATION
	2.5M NOMINAL UNDERCUTS
	UNSUITABLE UNDERCUTS
	CF DRAINS (DETAIL 1)
	CF DRAINS (DETAIL 2)
	CF DRAINS (DETAIL 3)
	CF DRAINS (DETAIL 4)
	UNDERFILL DRAINS
	RE SLOPE DRAINS
	COLLECTOR DRAINS
	PE OUTLET LINE
	SHEAR KEY OUTLET
	PROPOSED PALISADE WALLS
	PROPOSED MANHOLE LOCATION



revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE (FOR EW GDR)	RZ	SP	04/12/2019
	B	UPDATE TO CF DRAIN LAYOUT	RZ	SP	20/07/2020



drawn	RZ
approved	SP
date	20/07/2020
scale	AS SHOWN
original size	A3



client:	WFH PROPERTIES LTD		
project:	MILLWATER - OREWA WEST - PRECINCT 6		
title:	GEOTECHNICAL REMEDIATION PLAN		
project no:	773-AKLGE206639	figure no:	AG/005
rev:	B		





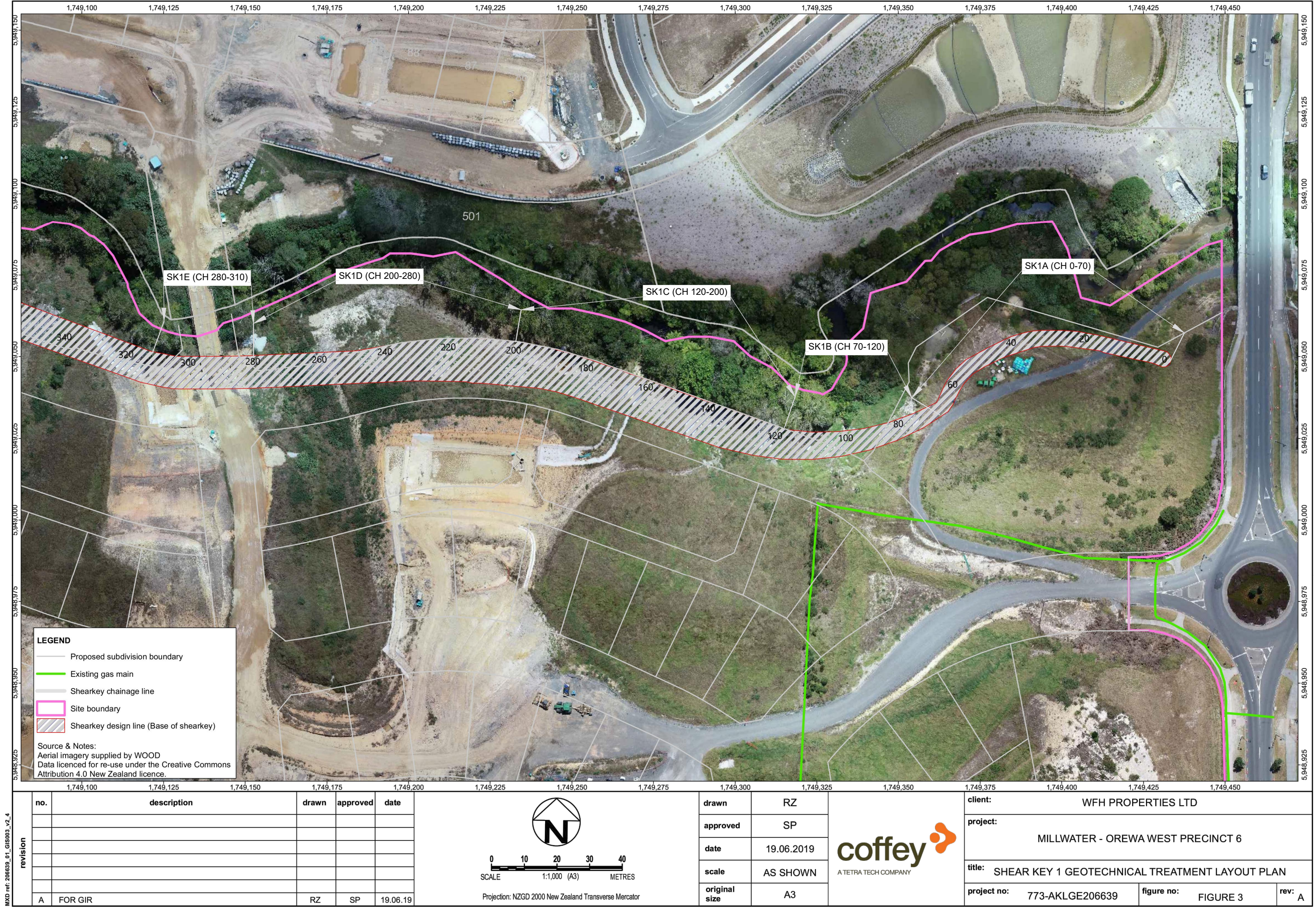
0 30 60 90 120 150  
SCALE 1:3000 (A3) METRES



coffey  
A TETRA TECH COMPANY

client:	WFH PROPERTIES LTD		
project:	MILLWATER - OREWA WEST - PRECINCT 6		
title:	UNDERCUT DETAIL PLAN		
project no:	773-AKLGE206639	figure no:	AG/008
		rev:	A






**LEGEND**

- Proposed subdivision boundary
- Existing gas main
- Shearkey chainage line
- Site boundary
- Shearkey design line (Base of shearkey)

Source & Notes:  
Aerial imagery supplied by WOOD  
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revision	no.	description			drawn	approved	date
	A	FOR GIR			RZ	SP	19.06.19



010203040

SCALE1:1,000 (A3)METRES

Projection: NZGD 2000 New Zealand Transverse Mercator

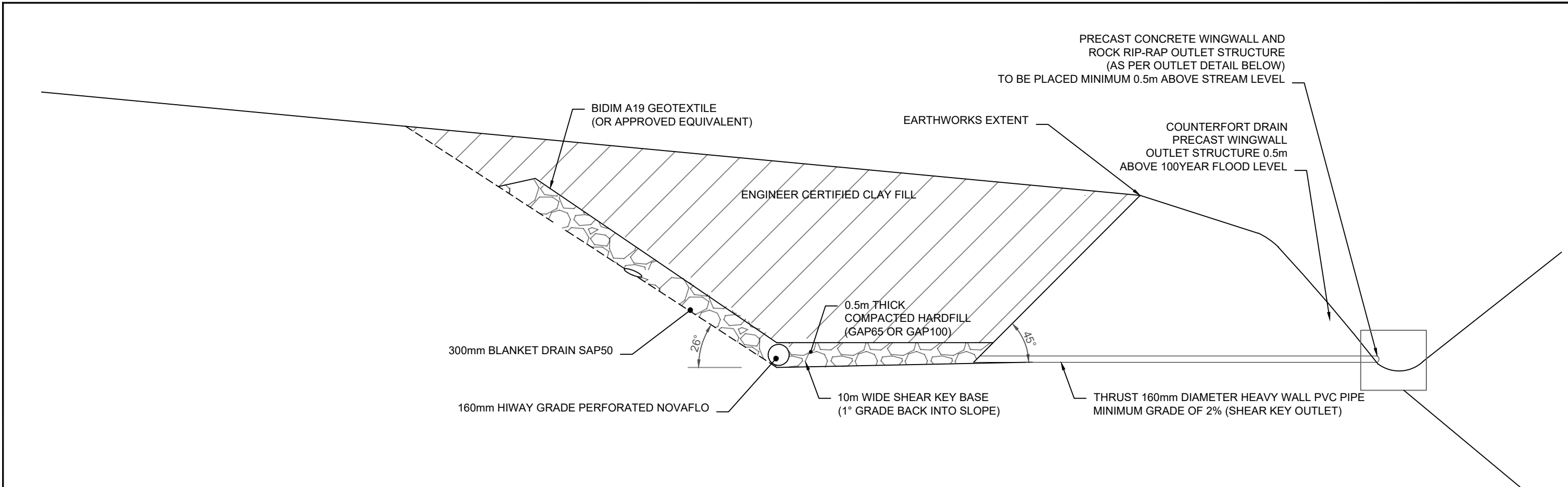
drawn	RZ
approved	SP
date	19.06.2019
scale	AS SHOWN
original size	A3



client: WFH PROPERTIES LTD		
project: MILLWATER - OREWA WEST PRECINCT 6		
title: SHEAR KEY 1 GEOTECHNICAL TREATMENT LAYOUT PLAN		
project no: 773-AKLGE206639	figure no: FIGURE 3	rev: A



PLOT DATE: 22/10/2019 12:38:31 PM DWG FILE: \\TTSR08FS2\808\GEN2\9 PROJECTS\73-AKLGE PROJECTS\CAD\LONG SECTION.DWG PRECINCT 6\7 COFFEY DRAWINGS\CAD\LONG SECTION.DWG - MILLWATER - OREWA WEST -



**HOLD POINTS:**

OBSERVATIONS OF ALL ASPECTS OF THE SHEAR KEY ARE REQUIRED BY COFFEY TO CONFIRM THAT THE DESIGN REQUIREMENTS ARE SATISFIED AND TO ENABLE CERTIFICATION OF THE COMPLETED WORKS. THIS LEVEL OF CONSTRUCTION MONITORING IS CONSISTENT WITH ENGNZ MONITORING LEVEL CM4. THESE INCLUDE, BUT ARE NOT LIMITED TO OBSERVATIONS OF THE FOLLOWING HOLD POINTS:

1. SHEAR KEY FOUNDING LEVEL;
2. SHEAR KEY DRAINAGE (PLACEMENT OF ALL DRAIN COIL INCLUDING OUTLET);
3. PLACEMENT OF GEOTEXTILE CLOTH OVER BASAL HARDFILL AND BLANKET DRAINAGE;
4. COMPACTION OF HARDFILL AT THE BASE OF THE SHEAR KEY;
5. DIMENSIONS OF CONSTRUCTED SHEAR KEY (INCLUDING BASE WIDTH AND BATTER ANGLES)

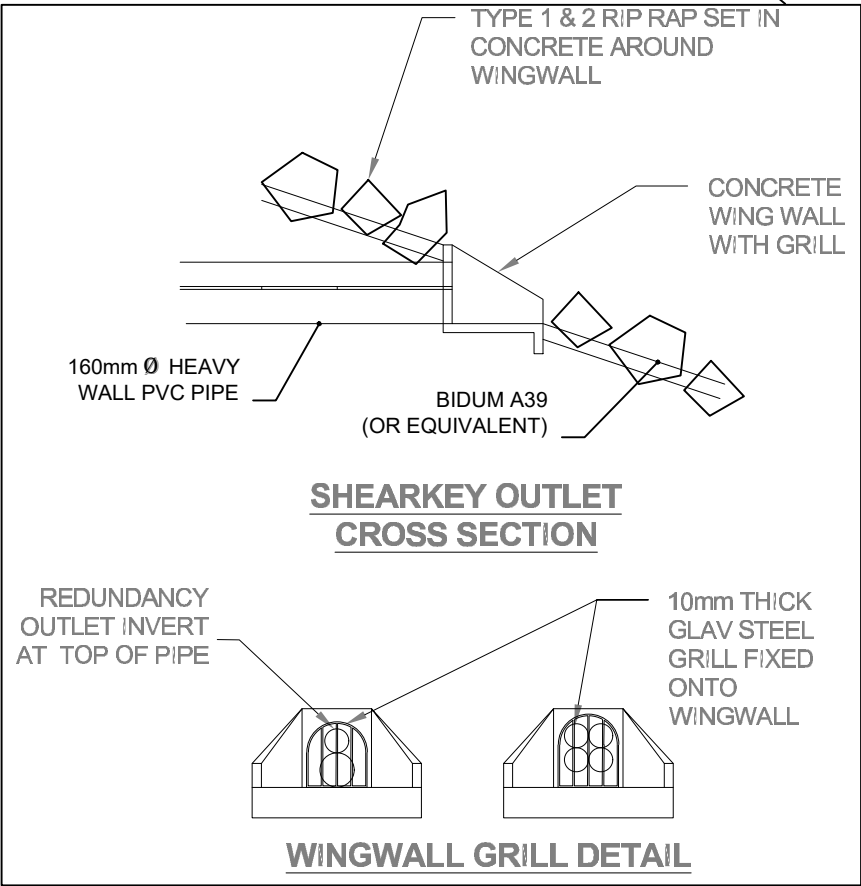
**ASBUILT:**

ACCURATE ASBUILT INFORMATION WILL BE REQUIRED WHICH SHOULD INCLUDE:

1. SHEAR KEY AND ASSOCIATED BENCHING CONTOURS WHERE APPLICABLE;
2. SHEAR KEY BASAL HARDFILL THICKNESS;
3. SHEAR KEY DRAINAGE;
4. SHEAR KEY DRAINAGE OUTLETS.

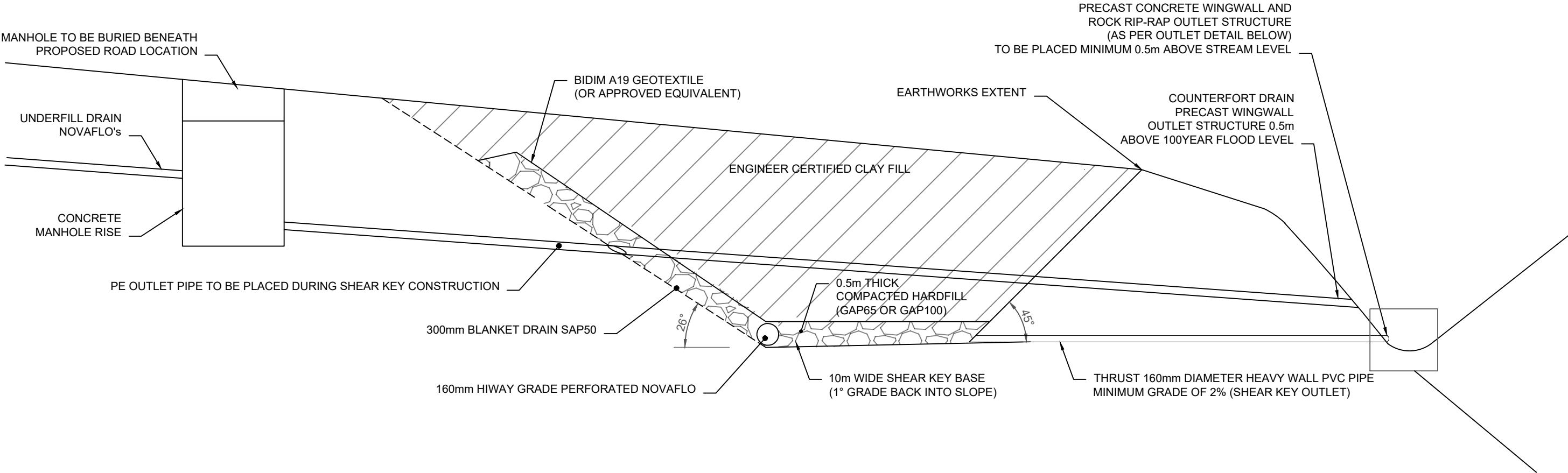
**NOTES:**

1. SHEAR KEY BASE TO BE EXCAVATED A MINIMUM DEPTH OF 1m INTO COMPETENT IDENTIFIED WAITEMATA GROUP N>50 BEDROCK, (LIKELY TO BE RL 2 BETWEEN CH120 AND CH200, BUT MAY REQUIRE FURTHER EXCAVATION TO RL. 1 BETWEEN CH150-CH180);
2. SHEAR KEY BASAL DRAINAGE SHOULD CONSIST OF 160mm HIWAY NOVAFLO DRAINS PLACED WITHIN THE COMPACTED HARDFILL AND WILL BE CONFIRMED DURING CONSTRUCTION;
3. FILL COMPACTION TESTING ON SHEAR KEY CLAY FILL IS REQUIRED EVERY 0.5m VERTICAL LIFT;
4. COHESIVE FILL TO ACHIEVE AN AVERAGE UNDRAINED SHEAR STRENGTH of >140 KPa (MINIMUM SINGLE VALUE OF 110KPa). AVERAGE AIR VOIDS TO BE LESS THAN 10% (MAXIMUM SINGLE TEST OF 12%). BASAL HARDFILL TO ACHIEVE A MINIMUM CLEGG IMPACT VALUE OF 25;
5. THRUST SHEAR KEY OUTLETS REQUIRED APPROXIMATELY EVERY 25m. FINAL POSITIONS TO BE CONFIRMED BY COFFEY ONSITE TO ENSURE LOW POINTS ARE DRAINED AND ADEQUATE FALL IS ACHIEVED.



revision	no.	description		drawn	approved	date	<div>012345 SCALE 1:100 (A3) METRES</div>		drawn	RZ	<div>coffeyA TETRA TECH COMPANY</div>		client: WFH PROPERTIES LTD		
	A	ORIGINAL ISSUE		RZ	SP	06/09/2019			approved	SP			project: MILLWATER PRECINCT 6		
									date	06/09/2019			title: SHEAR KEY 1B/C DETAIL (CH70 - CH200)		
									scale	1:100			project no: 773-AKLGE206639		
									original size	A3			figure no: AB/006		
													rev: A		

PLOT DATE: 22/10/2019 12:37:02 PM DWG FILE: \\TTSR08FS2\808\GEN\2\9 PROJECT\73\AKLGE PROJECT\9206639 - MILLWATER - OREWA WEST - PRECINCT 6\7 COFFEY DRAWINGS\CAD\LONG SECTION.DWG



**HOLD POINTS:**

OBSERVATIONS OF ALL ASPECTS OF THE SHEAR KEY ARE REQUIRED BY COFFEY TO CONFIRM THAT THE DESIGN REQUIREMENTS ARE SATISFIED AND TO ENABLE CERTIFICATION OF THE COMPLETED WORKS. THIS LEVEL OF CONSTRUCTION MONITORING IS CONSISTENT WITH ENGNZ MONITORING LEVEL CM4. THESE INCLUDE, BUT ARE NOT LIMITED TO OBSERVATIONS OF THE FOLLOWING HOLD POINTS:

1. SHEAR KEY FOUNDING LEVEL;
2. SHEAR KEY DRAINAGE (PLACEMENT OF ALL DRAIN COIL INCLUDING OUTLET);
3. PLACEMENT OF GEOTEXTILE CLOTH OVER BASAL HARDFILL AND BLANKET DRAINAGE;
4. COMPACTION OF HARDFILL AT THE BASE OF THE SHEAR KEY;
5. DIMENSIONS OF CONSTRUCTED SHEAR KEY (INCLUDING BASE WIDTH AND BATTER ANGLES)

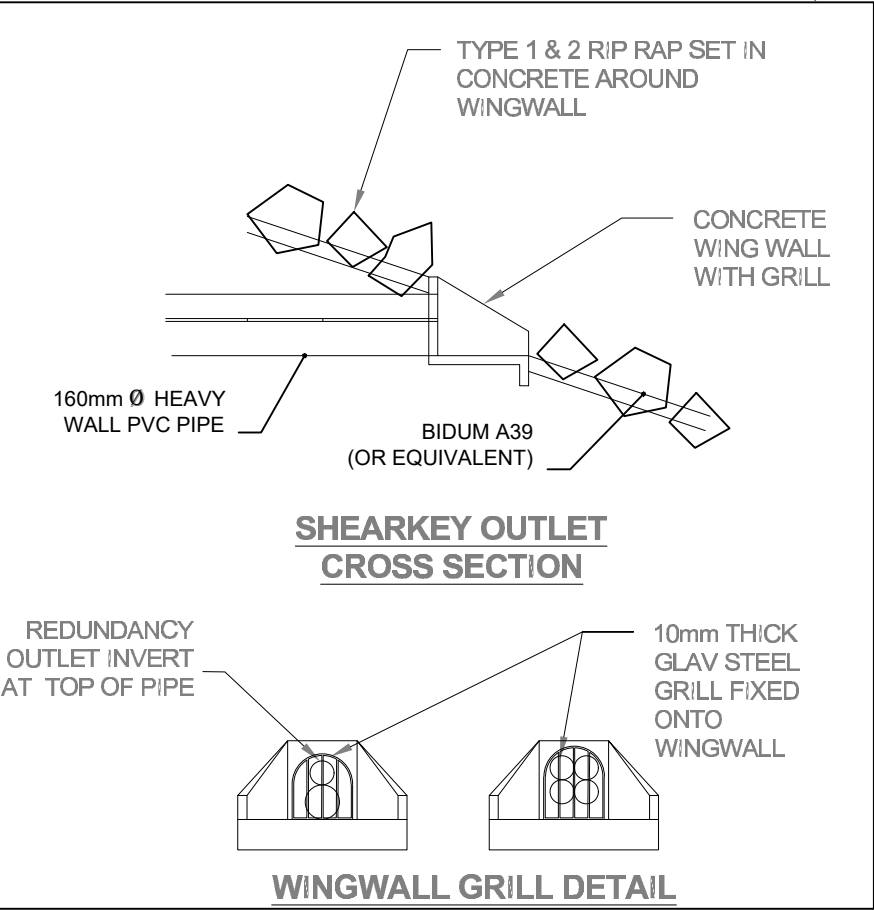
**ASBUILT:**

ACCURATE ASBUILT INFORMATION WILL BE REQUIRED WHICH SHOULD INCLUDE:

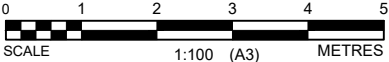
1. SHEAR KEY AND ASSOCIATED BENCHING CONTOURS WHERE APPLICABLE;
2. SHEAR KEY BASAL HARDFILL THICKNESS;
3. SHEAR KEY DRAINAGE;
4. SHEAR KEY DRAINAGE OUTLETS.

**NOTES:**

1. SHEAR KEY BASE TO BE EXCAVATED A MINIMUM DEPTH OF 1m INTO COMPETENT IDENTIFIED WAITEMATA GROUP N>50 BEDROCK, (LIKELY TO BE RL 4 BETWEEN CH220 AND CH280);
2. SHEAR KEY BASAL DRAINAGE SHOULD CONSIST OF 160mm HIWAY NOVAFLO DRAINS PLACED WITHIN THE COMPACTED HARDFILL AND WILL BE CONFIRMED DURING CONSTRUCTION;
3. FILL COMPACTION TESTING ON SHEAR KEY CLAY FILL IS REQUIRED EVERY 0.5m VERTICAL LIFT;
4. COHESIVE FILL TO ACHIEVE AN AVERAGE UNDRAINED SHEAR STRENGTH OF >140 KPa (MINIMUM SINGLE VALUE OF 110KPa). AVERAGE AIR VOIDS TO BE LESS THAN 10% (MAXIMUM SINGLE TEST OF 12%). BASAL HARDFILL TO ACHIEVE A MINIMUM CLEGG IMPACT VALUE OF 25;
5. THRUST SHEAR KEY OUTLETS REQUIRED APPROXIMATELY EVERY 25m. FINAL POSITIONS TO BE CONFIRMED BY COFFEY ONSITE TO ENSURE LOW POINTS ARE DRAINED AND ADEQUATE FALL IS ACHIEVED.



revision	no.	description		drawn	approved	date
	A	ORIGINAL ISSUE		RZ	SP	06/09/2019



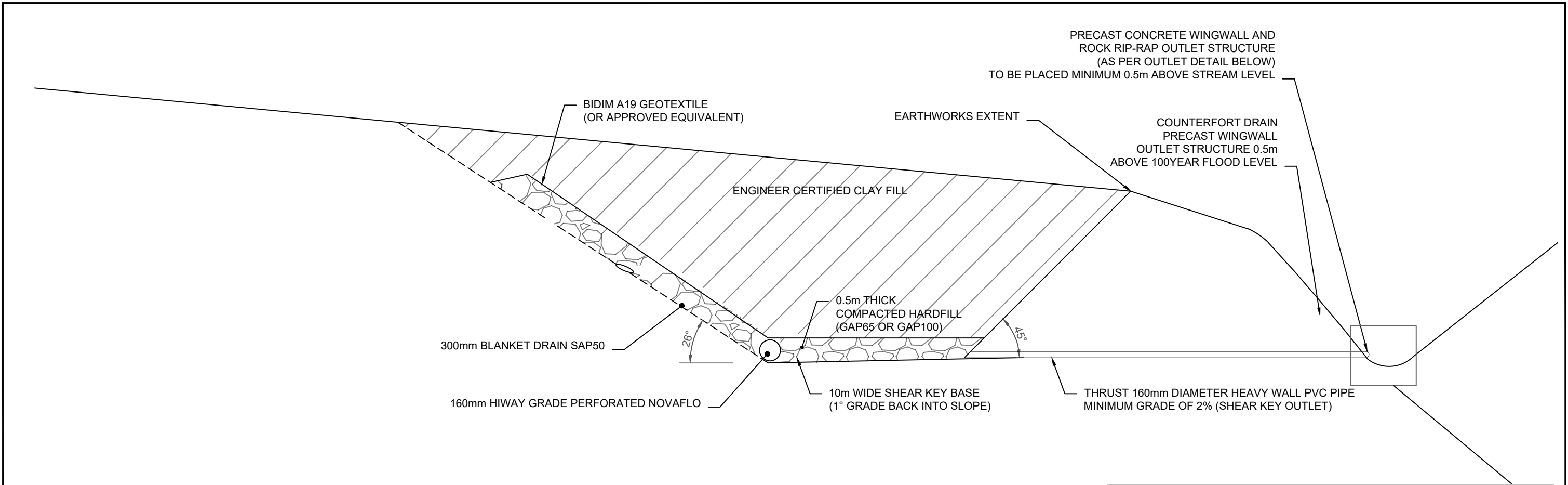
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approved	SP
date	06/09/2019
scale	1:100
original size	A3



client:		WFH PROPERTIES LTD	
project:		MILLWATER PRECINCT 6	
title:		SHEAR KEY 1D DETAIL (CH200 - CH280)	
project no:	773-AKLGE206639	figure no:	07
		rev:	A



PLOT DATE: 22/10/2019 12:37:38 PM DWG FILE: \\TTSR08FS2\808\GEN2\9 PROJECT\73-AKLGE PROJECT\9206639 - MILLWATER - OREWA WEST - PRECINCT 6\7 COFFEY DRAWINGS\CAD\LONG SECTION.DWG



**HOLD POINTS:**

OBSERVATIONS OF ALL ASPECTS OF THE SHEAR KEY ARE REQUIRED BY COFFEY TO CONFIRM THAT THE DESIGN REQUIREMENTS ARE SATISFIED AND TO ENABLE CERTIFICATION OF THE COMPLETED WORKS. THIS LEVEL OF CONSTRUCTION MONITORING IS CONSISTENT WITH ENGZ MONITORING LEVEL CM4. THESE INCLUDE, BUT ARE NOT LIMITED TO OBSERVATIONS OF THE FOLLOWING HOLD POINTS:

1. SHEAR KEY FOUNDING LEVEL;
2. SHEAR KEY DRAINAGE (PLACEMENT OF ALL DRAIN COIL INCLUDING OUTLET);
3. PLACEMENT OF GEOTEXTILE CLOTH OVER BASAL HARDFILL AND BLANKET DRAINAGE;
4. COMPACTION OF HARDFILL AT THE BASE OF THE SHEAR KEY;
5. DIMENSIONS OF CONSTRUCTED SHEAR KEY (INCLUDING BASE WIDTH AND BATTER ANGLES)

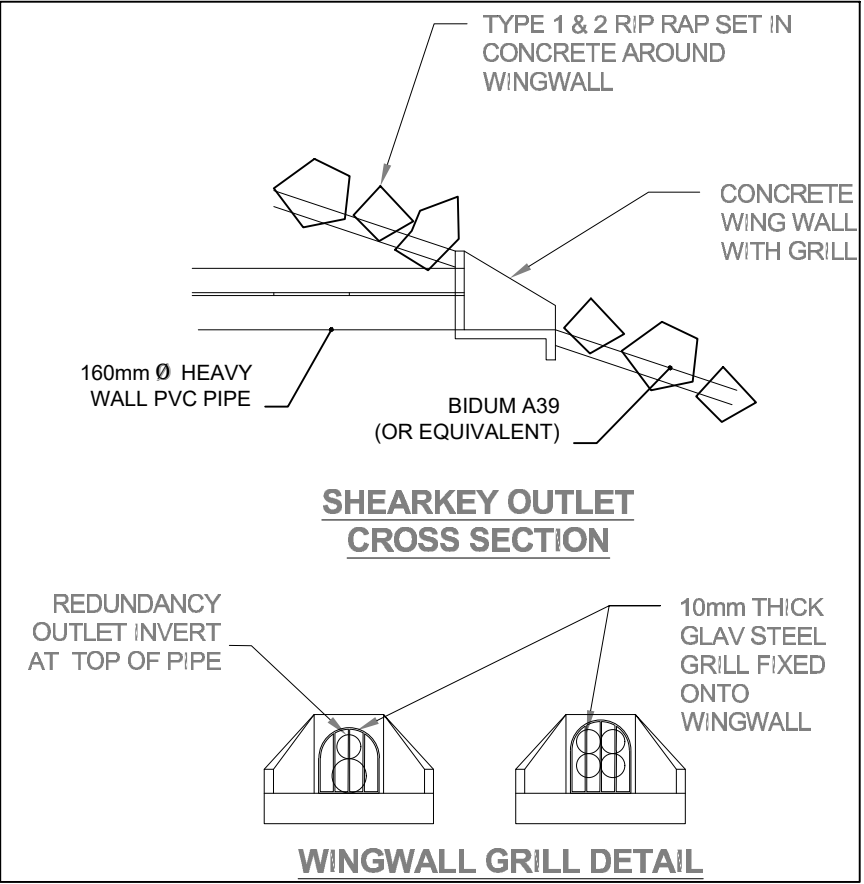
**ASBUILT:**

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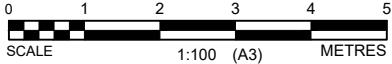
1. SHEAR KEY AND ASSOCIATED BENCHING CONTOURS WHERE APPLICABLE;
2. SHEAR KEY BASAL HARDFILL THICKNESS;
3. SHEAR KEY DRAINAGE;
4. SHEAR KEY DRAINAGE OUTLETS.

**NOTES:**

1. SHEAR KEY BASE TO BE EXCAVATED A MINIMUM DEPTH OF 1m INTO COMPETENT IDENTIFIED WAITEMATA GROUP N>50 BEDROCK, (LIKELY TO BE RL 3 BETWEEN CH280 AND CH310);
2. SHEAR KEY BASAL DRAINAGE SHOULD CONSIST OF 160mm HIWAY NOVAFLO DRAINS PLACED WITHIN THE COMPACTED HARDFILL AND WILL BE CONFIRMED DURING CONSTRUCTION;
3. FILL COMPACTION TESTING ON SHEAR KEY CLAY FILL IS REQUIRED EVERY 0.5m VERTICAL LIFT;
4. COHESIVE FILL TO ACHIEVE AN AVERAGE UNDRAINED SHEAR STRENGTH of >140 KPa (MINIMUM SINGLE VALUE OF 110KPa). AVERAGE AIR VOIDS TO BE LESS THAN 10% (MAXIMUM SINGLE TEST OF 12%). BASAL HARDFILL TO ACVHIEVE A MINIUUM CLEGG IMPACT VALUE OF 25;
5. THRUST SHEAR KEY OUTLETS REQUIRED APPROXIMATELY EVERY 25m. FINAL POSITIONS TO BE CONFIRMED BY COFFEY ONSITE TO ENSURE LOW POINTS ARE DRAINED AND ADEQUATE FALL IS ACHIEVED.



revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	RZ	JF	06/09/2019



drawn	RZ
approved	SP
date	06/09/2019
scale	1:100
original size	A3



client:	WFH PROPERTIES LTD		
project:	MILLWATER PRECINCT 6		
title:	SHEAR KEY 1E DETAIL (CH280 - CH310)		
project no:	773-AKLGE206639	figure no:	08
rev:	A		

LEGEND

TOP OF RETAINING WALL

BOTTOM OF RETAINING WALL

EXISTING GROUND LEVEL

- WALL DESIGN AS PER WALL 11 - DETAIL 1
- WALL DESIGN AS PER WALL 11 - DETAIL 2
- WALL DESIGN AS PER WALL 11 - DETAIL 3
- WALL DESIGN AS PER WALL 11 - DETAIL 4

- NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

2. ALL CONCRETE TO BE 17.5MPa 28 DAY CONCRETE STRENGTH.

3. CONTRACTOR IS TO CONFIRM LOCATION AND HEIGHT OF EXISTING SERVICES TO ENGINEER PRIOR TO WORKS COMMENCING.

4. CONTRACTOR TO CONFIRM HEIGHT OF RETAINING WALL PRIOR TO ORDERING OF MATERIALS.

5. WALL SUBSOIL DRAIN TO FEED INTO CESSPITS OR KERB & CHANNEL AS APPROVED BY THE ENGINEER.

6. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.

7. ALL UNSUITABLE MATERIAL AS DEFINED IN THE SPECIFICATION IS TO BE REMOVED AND THE STRIPPED AREAS INSPECTED BY THE ENGINEER BEFORE COMMENCEMENT.

8. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS.

9. ANY MODIFICATIONS TO THE CONSENTED EROSION AND SEDIMENT CONTROL MEASURES MUST BE APPROVED BY THE ENGINEER PRIOR TO THE CONSTRUCTION.

10. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE.

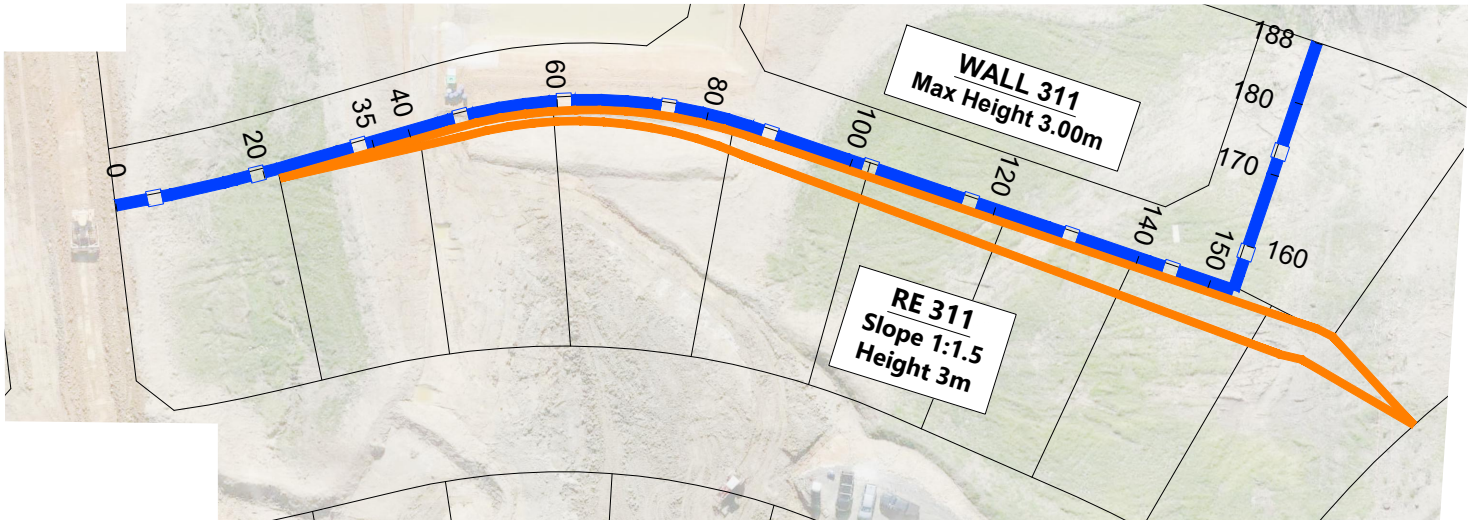
11. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE AND ENSURE THAT THEY HAVE A COPY OF THE RESOURCE CONSENT FROM THE ENGINEER.

6. CONTRACTOR TO ENSURE HE HAS ALL APPROVALS FROM LOCAL AUTHORITIES PRIOR TO COMMENCING WORKS.

7. SEDIMENT AND EROSION CONTROL ARE TO BE IN ACCORDANCE WITH ARC TP90 AND ARE TO BE IN PLACE PRIOR TO EARTHWORKS COMMENCING.

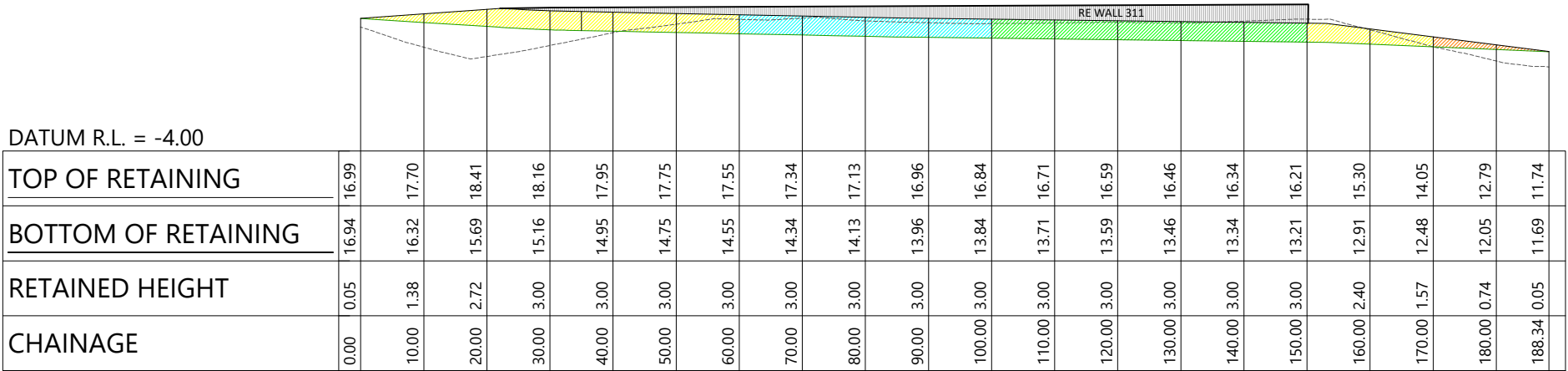
8. ALL WORKS ARE TO BE IN ACCORDANCE WITH THE GEOTECHNICAL SPECIFICATION

9. RETAINING WALLS TO BE CLEAR OF BOUNDARIES.



MASS BLOCK RETAINING WALL 311 PLAN

SCALE 1:1000



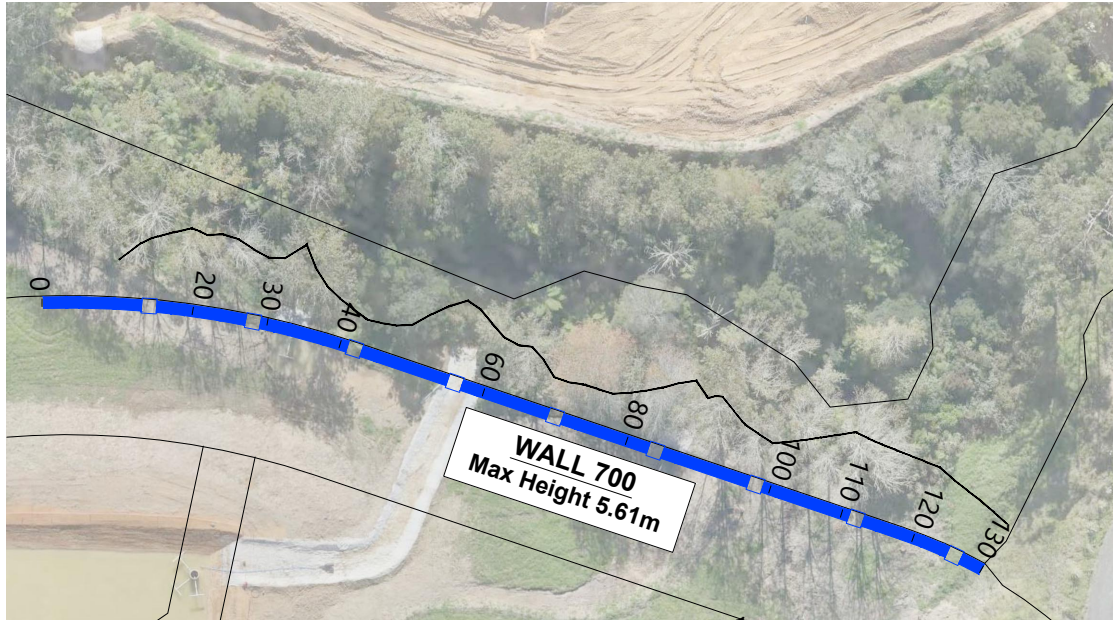
RETAINING WALL 311 LONGITUDINAL SECTION



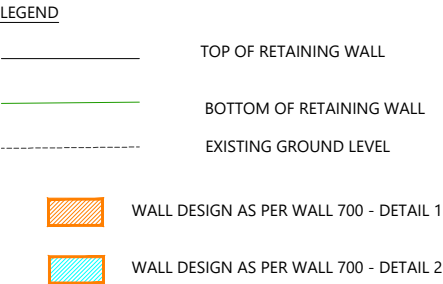
REVISION DETAILS					ARRAN DRIVE OREWA AUCKLAND		MILLWATER - PRECINCT 6 OREWA WEST RETAINING WALL PLAN & LONG SECTION				STATUS	ISSUED FOR INFORMATION	REV
1	ISSUED FOR CONSENT	RV	JULY 2017	DESIGNED							SCALE	H 1:1000 @A3 V 1:500 @A3	4
2	ISSUED FOR INFORMATION	NSC	21/06/19	DRAWN							COUNCIL	AUCKLAND COUNCIL	
3	WALL DETAIL HATCHING ADDED	NSC	08/08/19	CHECKED							DWG NO	37600-01-159-EW	
4	WALL HATCHING UPDATED	NSC	11/09/19	APPROVED		WOODS.CO.NZ							







MASSBLOCK RETAINING WALL 700  
PLAN  
SCALE 1:1000

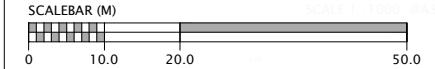


- NOTES
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
  - ALL CONCRETE TO BE 17.5MPa 28 DAY CONCRETE STRENGTH.
  - CONTRACTOR IS TO CONFIRM LOCATION AND HEIGHT OF EXISTING SERVICES TO ENGINEER PRIOR TO WORKS COMMENCING.
  - CONTRACTOR TO CONFIRM HEIGHT OF RETAINING WALL PRIOR TO ORDERING OF MATERIALS.
  - WALL SUBSOIL DRAIN TO FEED INTO CESSPITS OR KERB & CHANNEL AS APPROVED BY THE ENGINEER.
  - UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
  - ALL UNSUITABLE MATERIAL AS DEFINED IN THE SPECIFICATION IS TO BE REMOVED AND THE STRIPPED AREAS INSPECTED BY THE ENGINEER BEFORE COMMENCEMENT.
  - EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS.
  - ANY MODIFICATIONS TO THE CONSENTED EROSION AND SEDIMENT CONTROL MEASURES MUST BE APPROVED BY THE ENGINEER PRIOR TO THE CONSTRUCTION.
  - THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE.
  - THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE AND ENSURE THAT THEY HAVE A COPY OF THE RESOURCE CONSENT FROM THE ENGINEER.
  - CONTRACTOR TO ENSURE HE HAS ALL APPROVALS FROM LOCAL AUTHORITIES PRIOR TO COMMENCING WORKS.
  - SEDIMENT AND EROSION CONTROL ARE TO BE IN ACCORDANCE WITH ARC TP90 AND ARE TO BE IN PLACE PRIOR TO EARTHWORKS COMMENCING.
  - ALL WORKS ARE TO BE IN ACCORDANCE WITH THE GEOTECHNICAL SPECIFICATION
  - RETAINING WALLS TO BE CLEAR OF BOUNDARIES.

DATUM R.L. □ -8.00

TOP OF RETAINING	11.90	12.01	11.99	11.88	11.76	11.64	11.51	11.39	11.26	11.21	11.15	11.26	11.48	11.99	12.63
BOTTOM OF RETAINING	11.80	10.31	8.82	7.78	7.67	7.32	7.38	7.52	6.77	5.60	6.79	7.00	8.48	10.49	12.50
RETAINED HEIGHT	0.10	1.70	3.17	4.09	4.10	4.31	4.13	3.87	4.49	5.61	4.35	4.26	3.00	1.51	0.13
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	84.79	90.00	100.00	110.00	120.00	129.97

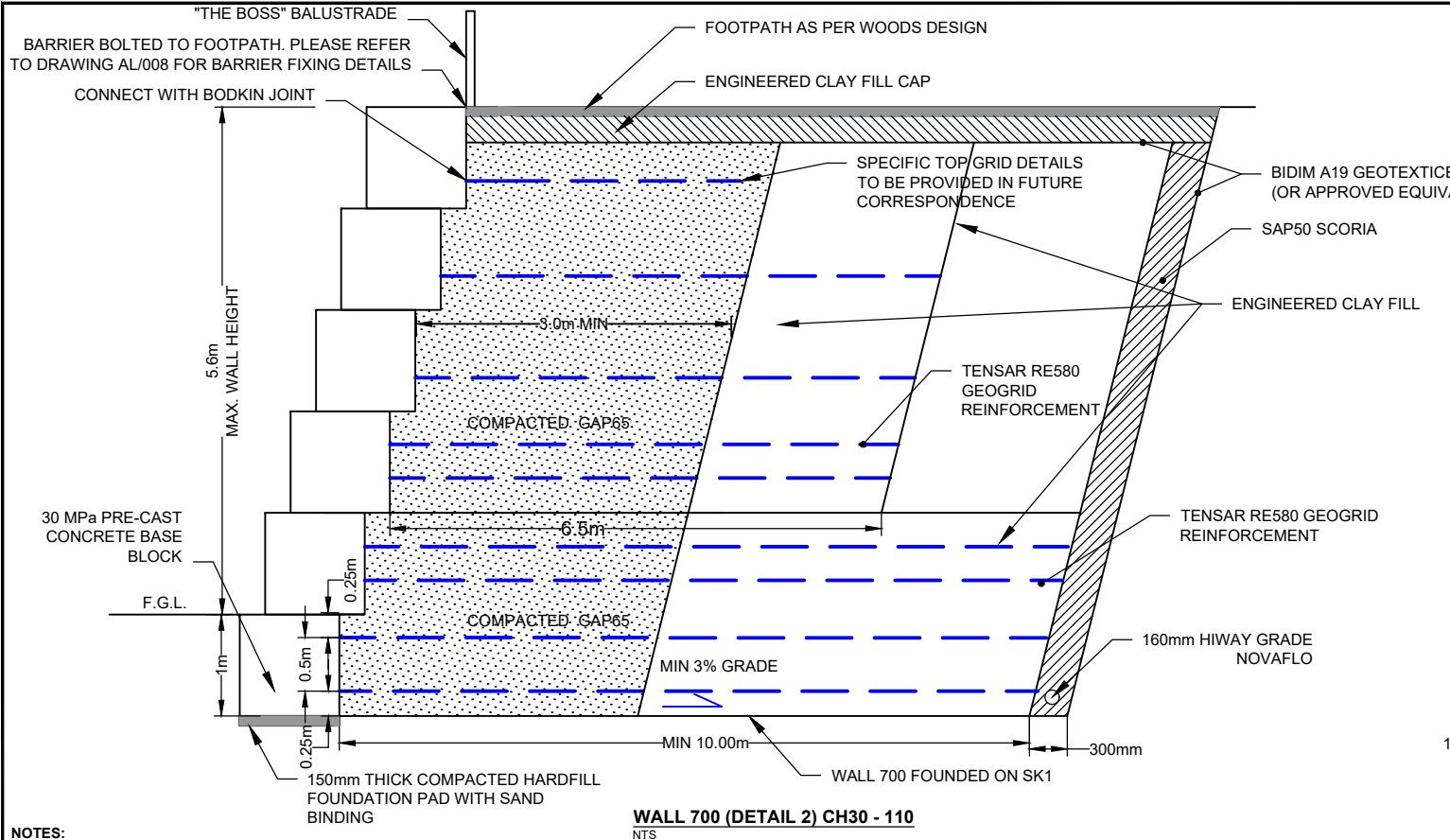
RETAINING WALL 700 LONGITUDINAL SECTION



REVISION DETAILS		INT	DATE	SURVEYED	.	ARRAN DRIVE OREWA AUCKLAND		MILLWATER - PRECINCT 6 OREWA WEST RETAINING WALL PLAN & LONG SECTION		STATUS	ISSUED FOR INFORMATION	REV
1	ISSUED FOR CONSENT	RV	JULY 2017	DESIGNED	RV					SCALE	H 1:1000 @A3 V 1:500 @A3	3
2	ISSUED FOR INFORMATION	NSC	21/06/19	DRAWN	NSC					COUNCIL	AUCKLAND COUNCIL	
3	WALL DETAIL HATCHING ADDED	NSC	08/08/19	CHECKED	.					DWG NO	37600-01-173-EW	
				APPROVED	.					WOODS.CO.NZ		



PLOT DATE: 13/07/2020 3:24:09 PM DWG FILE: \\NTS0808\F52\808\GEN\9 PROJECTS\73\AKLGE PROJECTS\206639 - MILLWATER - OREWA WEST - PRECINCT 6\7 COFFEY DRAWINGS\CAD\TINY\173-AKLGE206639-AL.06.DWG



**NOTES:**  
WALL HEIGHT CHANGES BETWEEN CH30-110. REGARDLESS OF WALL HEIGHT, ALL SECTIONS OF WALL 700 BETWEEN THESE CHAINAGES MUST HAVE 4 LAYERS OF 10M ENBEDDED RE560 CONNECTED TO THE BOTTOM 2 BLOCKS (AS SHOWN ABOVE)

**CONSTRUCTION NOTES:**  
THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE COFFEY DESIGN REPORT FOR REFERENCES AND SPECIFICATIONS AKLGE206639-AL AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

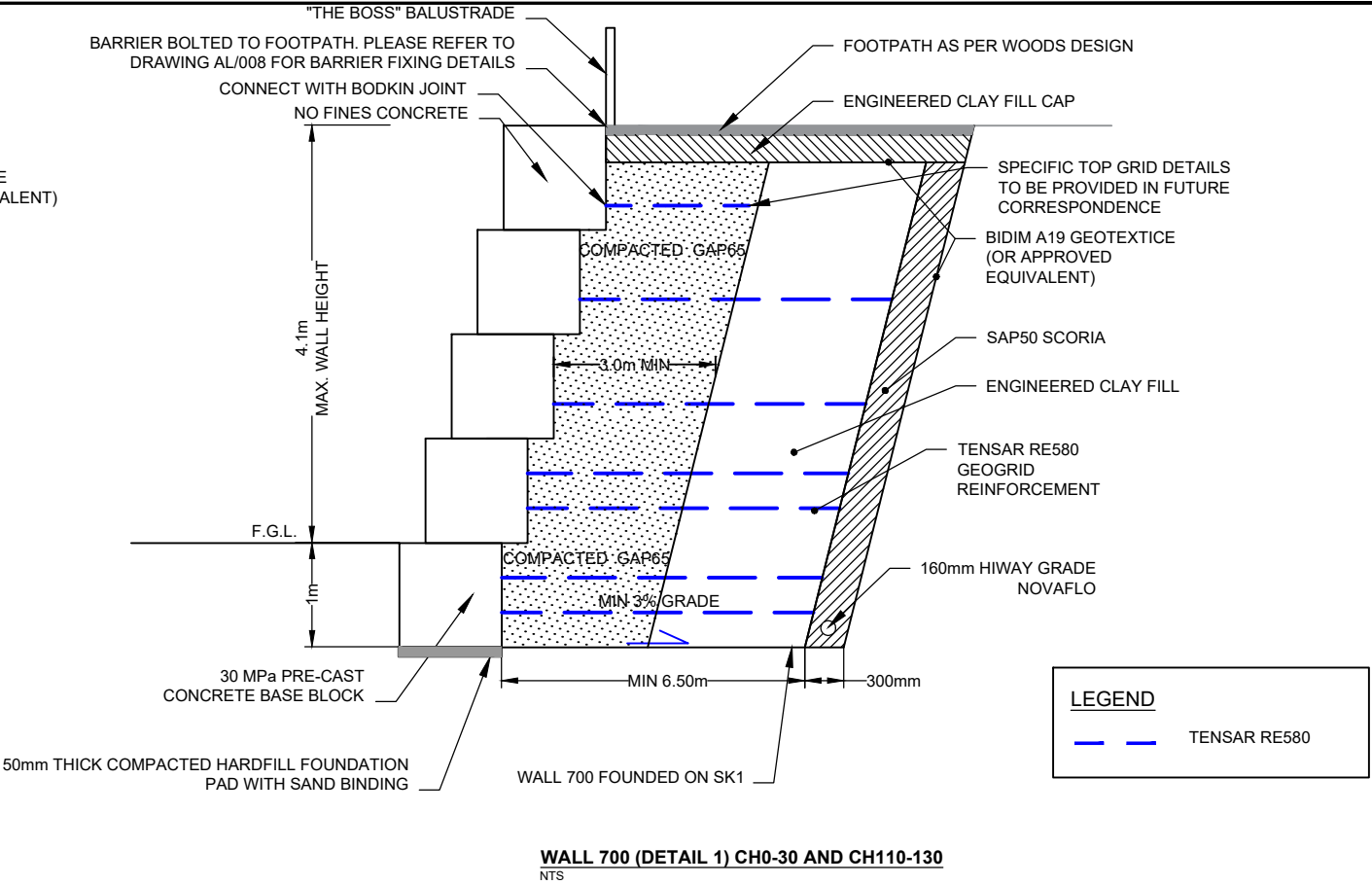
**FOUNDATION MATERIAL**  
FOUNDATION MATERIAL IS REQUIRED TO HAVE A MINIMUM GEOTECHNICAL ULTIMATE BEARING CAPACITY OF 300KPA OTHERWISE AN UNDERCUT OF UP TO 1.0M DEEP IS REQUIRED, TO BE BACKFILLED WITH COMPACTED GAP65 HARDFILL.

**EXCAVATION**  
WITH ANY EXCAVATION THERE IS A RISK OF BATTER COLLAPSE ESPECIALLY ADJACENT TO BOUNDARIES, STRUCTURES AND SERVICES. THE CONTRACTOR IS RESPONSIBLE AT ALL TIMES FOR ENSURING THE TEMPORARY STABILITY OF THE WORKS. CUT BATTERS SHOULD NOT BE LEFT UNSUPPORTED FOR MORE THAN A FEW DAYS AND NEVER DURING HEAVY RAIN. WHERE BATTERS ARE EXPOSED FOR MORE THAN A FEW DAYS, POLYETHENE SHEETING SHOULD BE INSTALLED TO COVER THE EXPOSED CUT FACE, THIS POLYETHENE MUST BE REMOVED PRIOR TO BACKFILLING.

**UNFORSEEN GROUND CONDITIONS**  
THE CONTRACTOR SHALL REFER TO THE DESIGN ENGINEER AS SOON AS POSSIBLE FOR FURTHER INSTRUCTION SHOULD ANY UNFORSEEN CIRCUMSTANCES OR ABNORMAL SITE CONDITIONS BE ENCOUNTERED DURING CONSTRUCTION.

- GEOGRID & BACKFILL MATERIAL**
1. THE GEOGRID PRODUCT MUST MATCH THAT SPECIFIED IN THE RECENTGEOTECHNICAL DESIGN REPORT AND DESIGN DRAWINGS. ALTERNATIVE PRODUCTS SHALL NOT BE USED WITHOUT PRIOR APPROVAL BY THE DESIGN ENGINEER. GEOGRID HANDLING, TENSIONING, SECURING, AND PLACEMENT MUST BE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS. IN PARTICULAR, THE CORRECT ORIENTATION OF UNIAXIAL TYPE GRIDS IS CRITICAL.
  2. GEOGRID SPECIFICATIONS ARE SHOWN IN THE SEGMENTAL BLOCK WALL TABLE BELOW. BACKFILL TO BE GAP65 AND GAP20 FOR WALL ROCK OR SIMILAR APPROVED.
  3. BACKFILL MATERIAL SHOULD BE PLACED AND COMPACTED IN LAYERS TO 95% OF THE MAXIMUM DRY DENSITY (MDD), AND IN ACCORDANCE WITH THE COFFEY GEOTECHNICAL WORKS SPECIFICATION CONTAINED WITH THE REPORT REFERENCED ABOVE.
  4. GEOGRID TO BE PLACED LEVEL OR WITH A 1% FALL TO REAR OF THE WALL. GRID SHOULD BE FREE OF WRINKLES AND LIGHTLY TENSIONED/PULLED TAUT PRIOR TO AND DURING BACKFILLING.
  5. CONTRACTOR TO ENSURE GRIDS ARE ORIENTATED CORRECTLY. GRIDS SHOULD BE ROLLED OUT PERPENDICULAR TO THE WALL.
  6. GRID LAYERS ARE TO BE CONTINUOUS OVER THE DESIGN REINFORCEMENT DEPTH. NO JOINTS ARE PERMITTED PARALLEL TO THE FACE.
  7. UPPER GEOGRID LAYER TO INCLUDE LOCAL CUT TO ALLOW FOR SPIRAL TUBE FOR THE BARRIER POST. SPIRAL TUBE TO BE PLACED PRIOR TO BACKFILLING. EXCAVATION INTO THE SEGMENTAL BLOCK WALL BACKFILL TO RETROFIT THE SPIRAL TUBE IS NOT ACCEPTABLE.
  8. THE GEOGRID LAYER EXTENTS AND POSITION ARE TO BE SURVEYED. AS BUILT DATA SHOULD BE SUPPLIED TO COFFEY UPON WALL COMPLETION FOR COA.

Chainage Interval (m)	Wall detail #	Max Retained Height (m)	Total Wall Height Including Embedment (m)	Max Surcharge Slope		Max Toe Slope Angle	Geogrid				Additional notes
				Angle (°)	Height (m)		Length (m)	No. of reinforcement layers (Max.)	Vertical spacing of geogrid (m)	Type	
0 - 30 & 110 - 130	1	4.1	5.0	4	1	1 in 3	6.50	8	0.5/1.0	RE580	Wall to be founded on shear key 1. undercut required beneath base block
30 - 110	2	5.0	6.0	4	1	1 in 3	6.5/10.0	9	0.5/1.0	RE580	



**DRAINAGE**  
CONTRACTOR SHOULD ENSURE WALL OUTLET DRAINAGE IS MAINTAINED DURING CONSTRUCTION AND ABLE TO DISCHARGE FLOWS DURING CONSTRUCTION WORKS. UNDER NO CIRCUMSTANCES SHOULD DRAINAGE OUTLETS BE COVERED/BLOCKED DURING CONSTRUCTION. ALL DRAINAGE OUTLETS SHOULD BE CONNECTED TO THE DEVELOPMENT RETICULATED STORMWATER SYSTEMS (OR ENGINEER APPROVED STRUCTURE) UPON COMPLETION OF THE WALL. CONNECTION TO THE RETICULATION SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER PRIOR TO BACKFILL/COMPLETION.

**SETTING OUT**  
THE CONTRACTOR IS RESPONSIBLE FOR MAKING SURE THE RETAINING WALL IS SET OUT AT THE CORRECT LOCATION AND THAT THE MAXIMUM RETAINED HEIGHTS, TOE SLOPE ANGLES (BELOW THE WALL) AND SLOPE SURCHARGE ANGLES (ABOVE THE WALL) ARE IN ACCORDANCE WITH THOSE SHOWN ON THE DESIGN CALCULATIONS AND DRAWINGS. THE RETAINED HEIGHT SHALL BE MEASURED FROM THE FINISHED GROUND SURFACE IN FRONT OF THE WALL TO THE FINISHED GROUND SURFACE IMMEDIATELY BEHIND THE WALL. THE MAXIMUM RETAINED HEIGHT, SLOPE SURCHARGE AND TOE SLOPE SHALL BE AS SPECIFIED ON THE COFFEY SERVICES (NZ) LIMITED DRAWINGS AND MUST NOT BE EXCEEDED WITHOUT THE WRITTEN APPROVAL OF THE COFFEY DESIGN ENGINEER.

**BARRIER / FALL PREVENTION AND BARRIER POST FOUNDATION**  
WALLS OVER 1.0 METRE IN HEIGHT SHALL HAVE A HANDRAIL / FALL PREVENTION IN ACCORDANCE WITH THE NEW ZEALAND BUILDING CODE CLAUSE F4. BARRIER POST FOUNDATION TO BE EITHER MOWING STRIP DESIGNED BY OTHERS OR 400Ø BY 1.0M DEEP SPIRALTUBE.

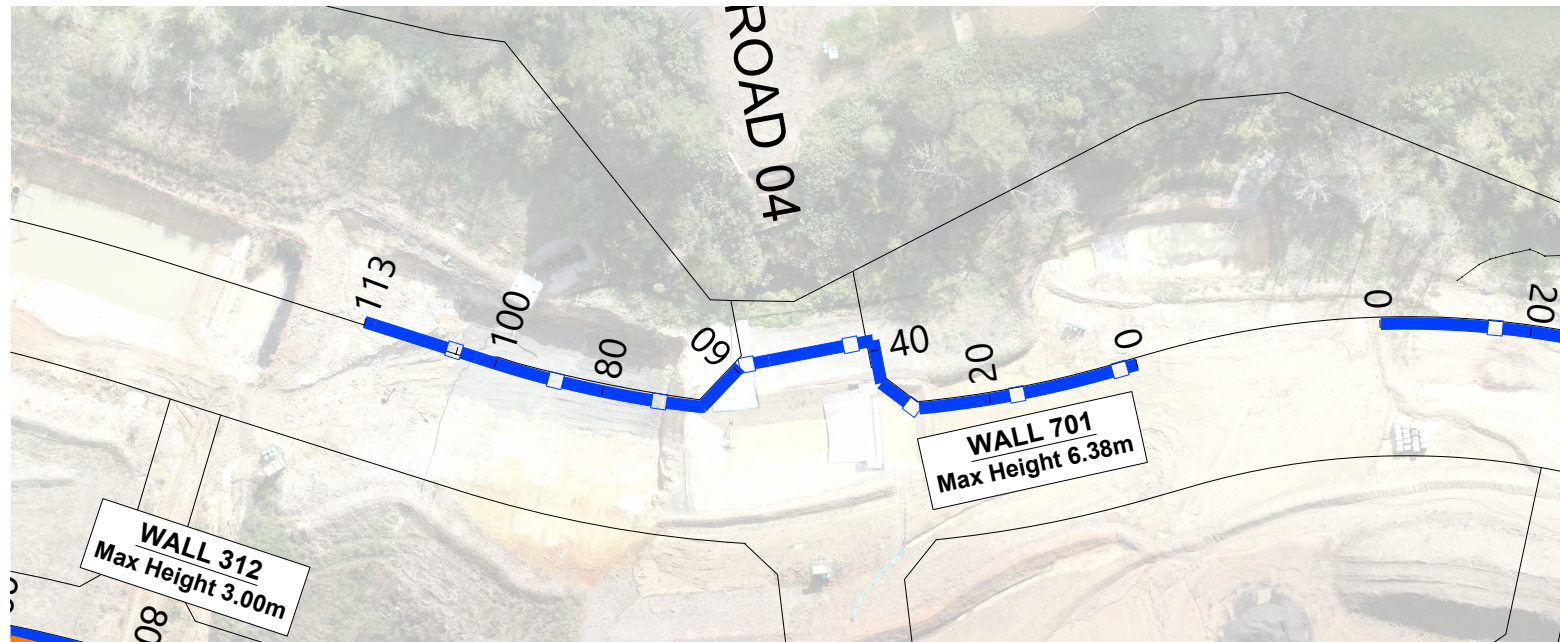
**WASTE MATERIAL**  
ALL WASTE MATERIALS MUST BE REMOVED FROM SITE ON COMPLETION OF THE WORKS. IT IS NOT ACCEPTABLE TO PLACE THESE MATERIALS BEHIND THE WALL WITHIN THE BACKFILL MATERIAL.

**MASS BLOCK RETAINING WALL INSPECTION**  
INSPECTION OF ALL ASPECTS OF MASS BLOCK RETAINING WALL ARE REQUIRED BY COFFEY TO CONFIRM THAT THE DESIGN REQUIREMENTS ARE SATISFIED AND TO ENABLE CERTIFICATION OF THE COMPLETED WORKS. THIS LEVEL OF CONSTRUCTION MONITORING IS CONSISTENT WITH ENGNZ MONITORING LEVEL CM4. THESE INCLUDE, BUT MAY NOT BE LIMITED TO INSPECTION AT THE FOLLOWING **HOLD POINTS**:

- MASS BLOCK WALL FOUNDATION EXCAVATIONS, STRENGTH AND BENCHING;
- FOUNDATION HARDFILL PLACEMENT (FOOTING AND SERVICE CROSSING);
- DRAINAGE AND GEOTEXTILE PLACED AT REAR OF WALL;
- HARDFILL, GEOGRID PLACEMENT AND COMPACTION TESTING;
- DRAINAGE OUTLET CONSTRUCTION;
- BARRIER POST FOUNDATION (SPIRAL SLEEVES), AND;
- REINFORCING BAR AND CONCRETE PLACEMENT FOR TOP THREE BLOCK COURSES.

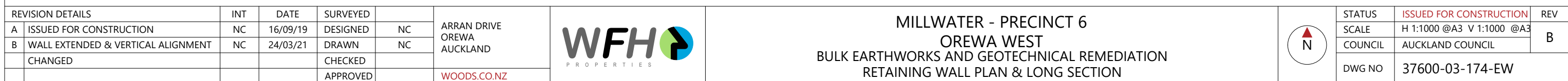
**FOR CONSTRUCTION**

revision	no.	description			drawn	approved	date	<div><div><div>00.51.01.52.02.53.0</div><div>Horizontal Scale (metres)</div></div><div><div>00.51.01.52.02.53.0</div><div>Vertical Scale (metres)</div></div></div>	drawn	RZ	<div><div>coffey</div><div>A TETRA TECH COMPANY</div></div>	client: WFH PROPERTIES LTD		
	A	ORIGINAL ISSUE			RZ	AC	15/08/2019		approved	AC		project: MILLWATER - OREWA WEST - PRECINCT 6		
	B	DESIGN AS OF 20.02.2020 (NOT APPROVED)			LM	AC	20/02/2020		date	13/07/2020		title: WALL 700 DESIGN DETAIL		
	C	UPDATE AFTER AMENDMENTS TO DESIGN			RZ	AC	26/02/2020		scale	NTS		project no: 773-AKLGE206639 figure no: AL/006 rev: F		
	D	FOR CONSTRUCTION			RZ	AC	01/05/2020		original size	A3				
	E	WITH BARRIER DETAIL 18/06/2020			RZ	SP	18/06/2020							
	F	UPDATE TO BARRIER DETAIL			RZ	SP	13/07/2020							

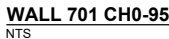


**LEGEND**

- TOP OF RETAINING WALL
- BOTTOM OF RETAINING WALL
- EXISTING GROUND LEVEL







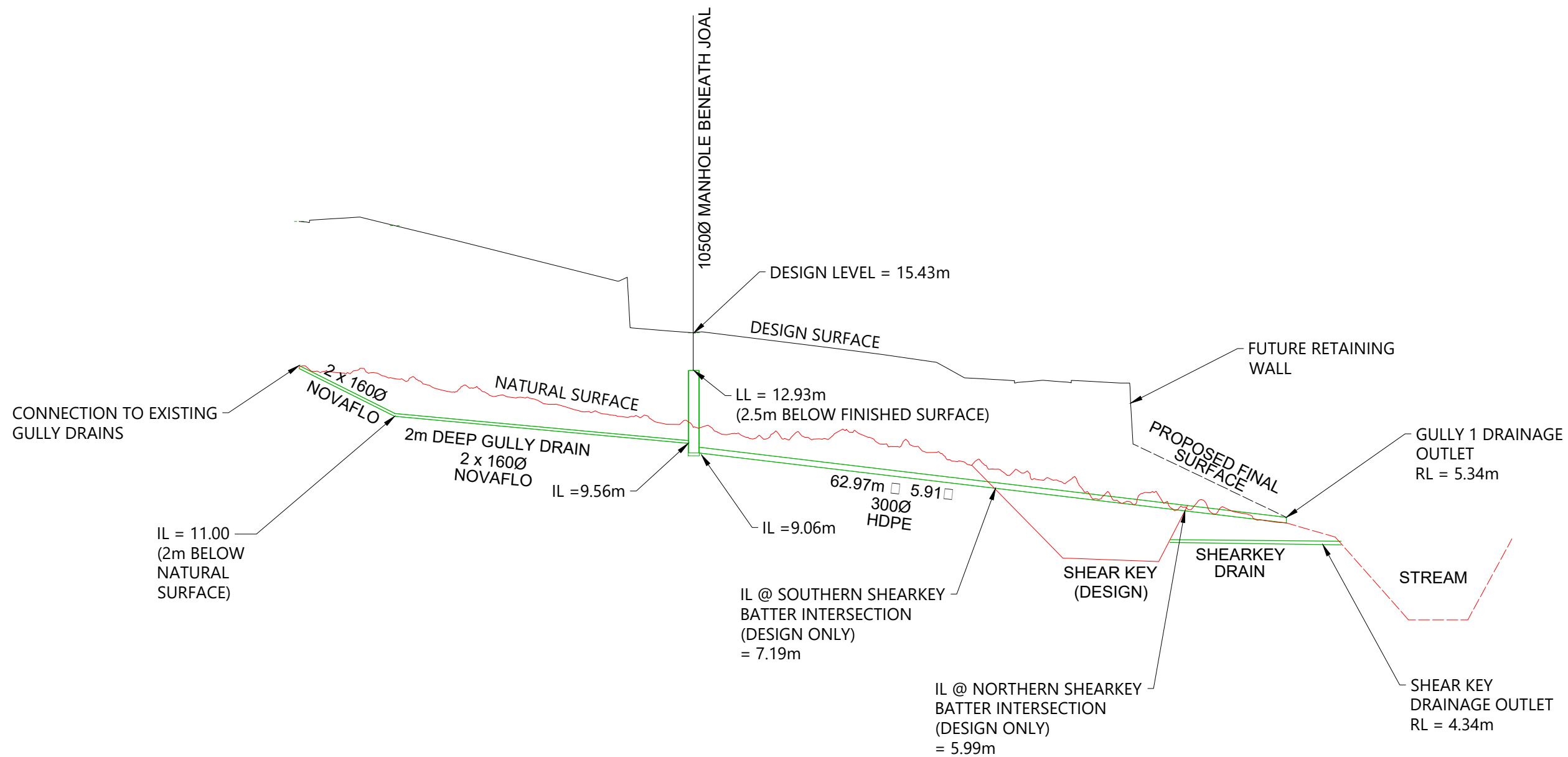
TENSAR RE580

**FOR CONSTRUCTION**

drawn	RZ
approved	AC
date	1/04/2021
scale	NTS
original size	A3



client: WFH PROPERTIES LTD		
project: MILLWATER - OREWA WEST - PRECINCT 6		
title: WALL 701 DESIGN DETAIL		
project no: 773-AKLGE206639	figure no: AL/007	rev: D



REVISION DETAILS					ARRAN DRIVE OREWA AUCKLAND
A	ISSUED FOR CONSTRUCTION	NC	30/09/2019	DESIGNED	
				DRAWN	
				CHECKED	
				APPROVED	

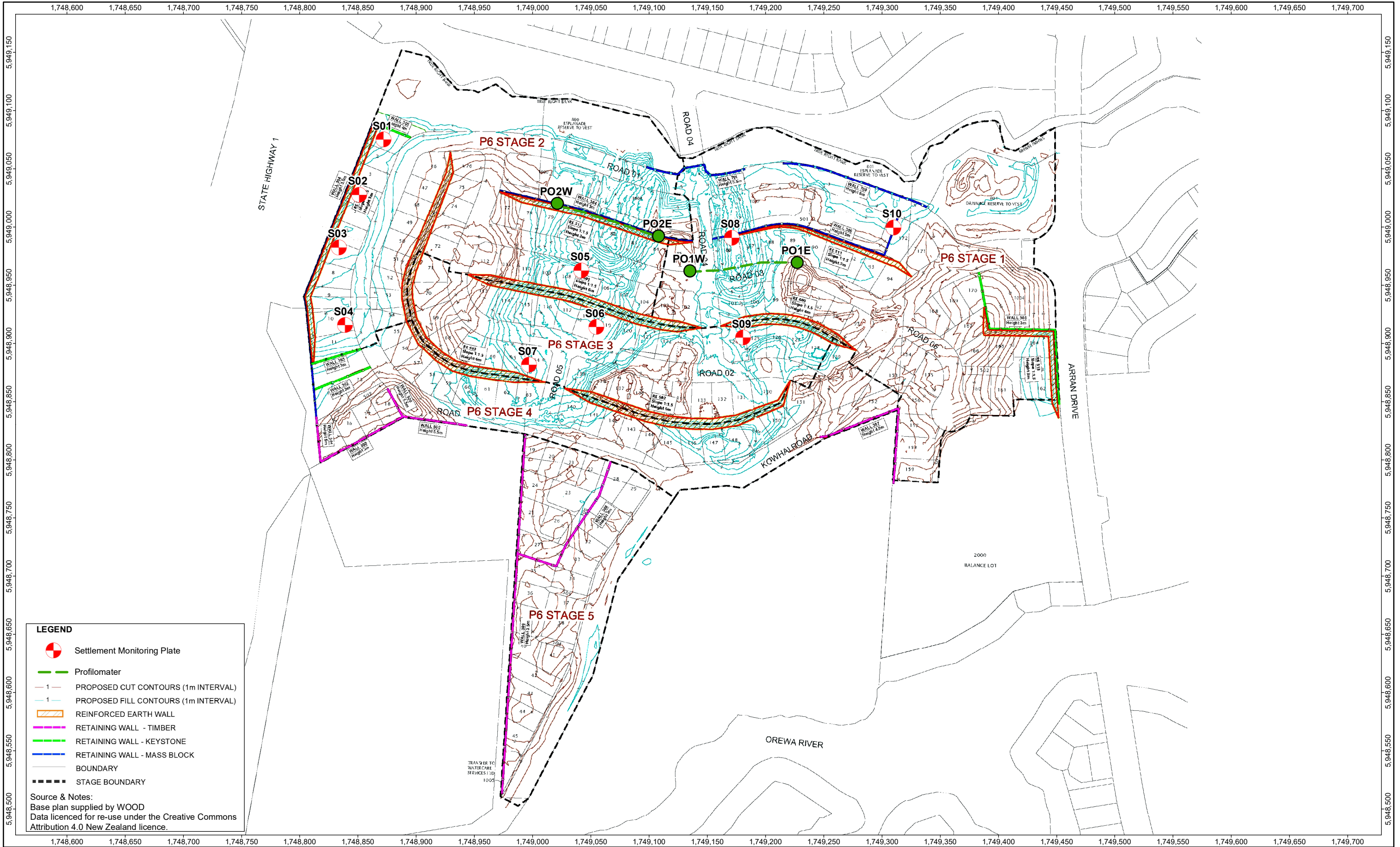


MILLWATER - PRECINCT 6  
OREWA WEST  
GULLY 1 DRAINAGE LONGSECTION

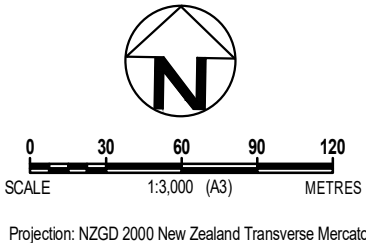
STATUS	ISSUED FOR CONSTRUCTION	REV
SCALE	N.T.S.	A
COUNCIL	AUCKLAND COUNCIL	
DWG NO	37600-02-EW-160	







revision	no. description drawn approved date				
A	FOR GIR	RZ	AC	27.08.19	

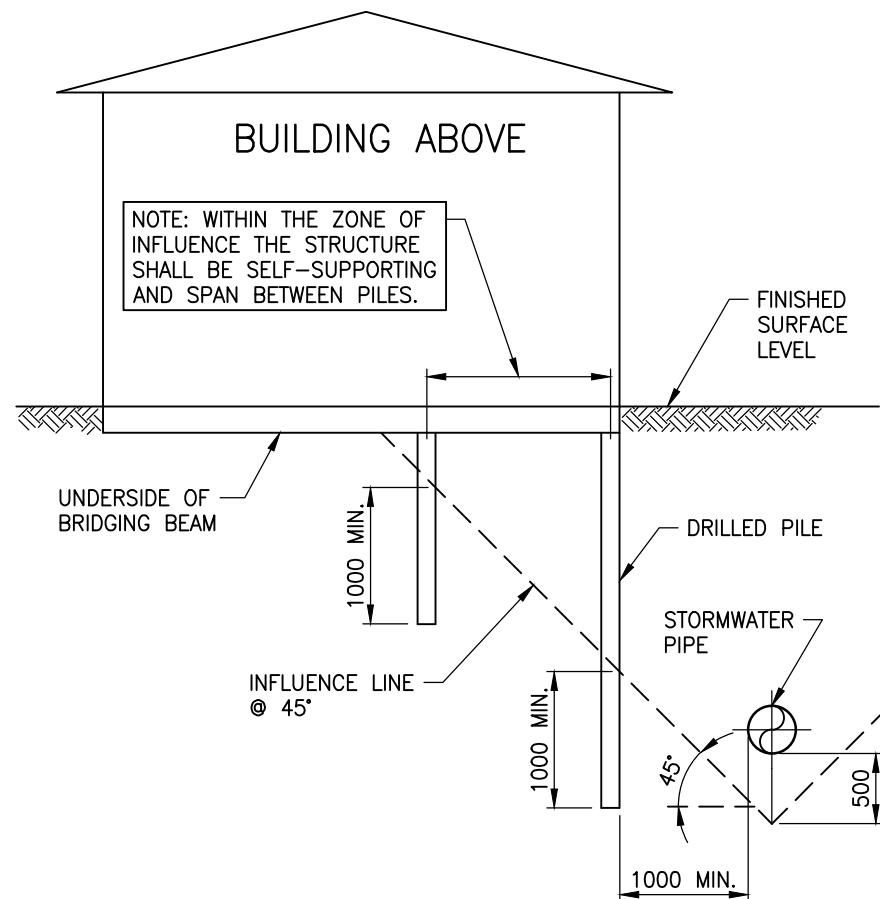


drawn	RZ
approved	AC
date	03.10.2019
scale	AS SHOWN
original size	A3



client: WFH PROPERTIES LTD		
project: MILLWATER - OREWA WEST PRECINCT 6		
title: SETTLEMENT MONITORING PLAN		
project no: 773-AKLGE206639	figure no: AN/01	rev: B

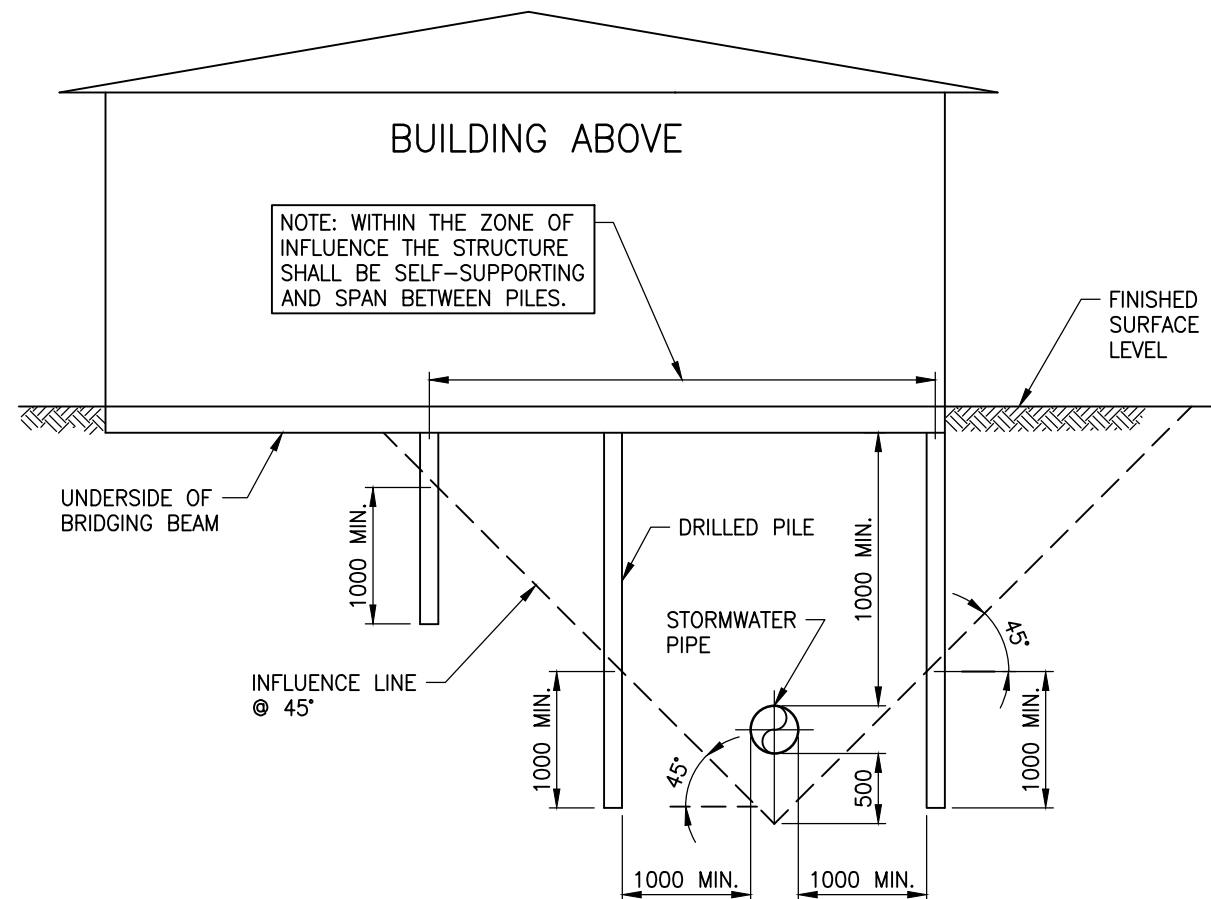
PLOT DATE 12/8/2015 11:54 AM I:\AENVA\Projects\AED4840 AC CoP Ch1\04 Deliverables\Drawings\AC-STD-SW22.dwg



BUILD CLOSE

"BUILD CLOSE" NOTES:

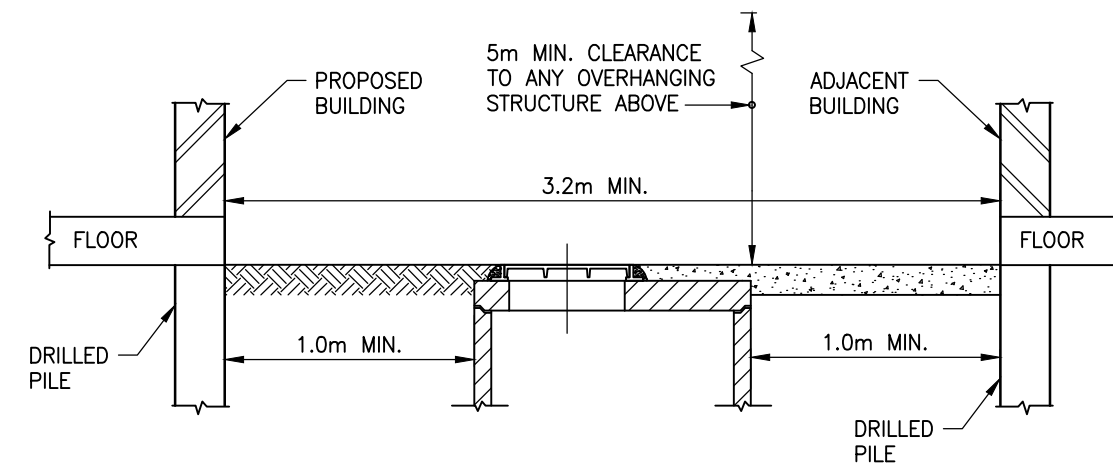
1. OUTSIDE ZONE OF INFLUENCE, NORMAL FOUNDATION REQUIREMENTS APPLY.
2. SPECIFIC APPROVAL IS REQUIRED FROM AUCKLAND COUNCIL IF BUILDING IS ADJACENT TO PIPES LARGER THAN 375mm INTERNAL DIAMETER, OR GREATER THAN 2.0m DEEP.
3. BUILDING SHALL GENERALLY BE OUTSIDE ALL OVERLAND FLOW PATHS AND FLOODPLAINS. SEE SECTION 4.3.5.6 AND 4.3.5.7 OF THE SWCoP FOR FURTHER DETAILS.
4. PILES SHALL BE CONSTRUCTED TO A DEPTH OF 1.0m BELOW INFLUENCE LINE.



BUILD OVER

"BUILD OVER" NOTES:

1. OUTSIDE ZONE OF INFLUENCE, NORMAL FOUNDATION REQUIREMENTS APPLY.
2. THE DETAIL APPLIES TO STORMWATER PIPES 375mm NOMINAL DIAMETER OR LESS.
3. BRIDGING OVER PIPES LARGER THAN 375mm NOMINAL DIAMETER IS GENERALLY NOT ALLOWED.
4. PILES SHALL BE CONSTRUCTED TO A DEPTH OF 1.0m BELOW INFLUENCE LINE.
5. BRIDGING IS GENERALLY NOT ALLOWED OVER PIPES WHERE CLEAR VERTICAL SEPARATION DISTANCE FROM TOP OF PIPE TO UNDERSIDE OF BRIDGING BEAM IS LESS THAN 1.0m.



MANHOLE CONSTRUCTION CLEARANCE

GENERAL NOTES:

1. THE INFORMATION ON THIS PAGE IS INTENDED TO SHOW EXAMPLES OF TYPICAL SCENARIOS AND SHALL BE USED FOR GENERAL GUIDANCE PURPOSES ONLY. SIGNIFICANT VARIATIONS ON A SITE-BY-SITE BASIS ARE TO BE EXPECTED AND IT IS IN NO WAY IMPLIED THAT MEETING ANY OF THESE REQUIREMENTS WILL GUARANTEE APPROVAL.
2. REQUIREMENTS FOR FOUNDATION DESIGN, ETC. APPLY TO BOTH SIDES OF THE PIPE.
3. NO DRIVEN PILES ARE PERMITTED WITHIN 10m OF BRICK STORMWATER STRUCTURES, OR WITHIN 5m OF ALL OTHER STORMWATER STRUCTURES.
4. SPECIFIC APPROVAL IS REQUIRED FROM AUCKLAND COUNCIL FOR DRIVEN PILES IN PARTIALLY DRILLED HOLES, WITHIN THE 5m-10m ZONE.
5. PILES THAT MAY BE REQUIRED TO RESIST HORIZONTAL FORCES WILL REQUIRE SPECIFIC DESIGN.
6. PILE/FOOTING LOCATION POINT MUST BE BELOW 45° "ZONE OF INFLUENCE".
7. ALL MANHOLES SHALL HAVE 24 HOURS UNOBSTRUCTED ACCESS.
8. MANHOLES IN BASEMENTS, OR IN LOCATIONS WHERE SUFFICIENT CLEARANCE IS UNAVAILABLE, ARE NOT PERMITTED.
9. ALL PIPE BUILDOVERS WILL REQUIRE APPROVAL BY AUCKLAND COUNCIL.
10. REFER TO SECTION 4.3.23 OF THE SWCoP FOR PIPE BUILDOVER REQUIREMENTS.
11. FOR MANHOLES GREATER THAN 4m DEEP OR LARGER THAN 1200mm DIA. SPECIFIC DESIGN (INCLUDING CLEARANCE REQUIREMENTS) IS REQUIRED.

STORMWATER CODE OF PRACTICE  
STANDARD DETAILS

REVISION: 2  
REV DATE: 1 NOVEMBER 2015  
CAD FILENAME: AC-STD-SW22.DWG

**AUCKLAND COUNCIL**

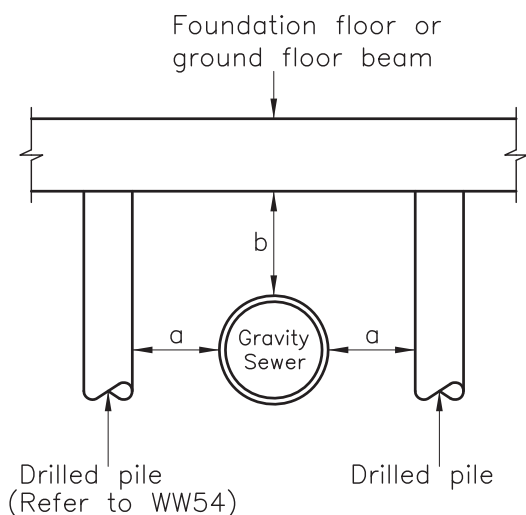
STORMWATER PIPE AND MANHOLE CONSTRUCTION CLEARANCE REQUIREMENTS  
MANHOLES NEAR BUILDINGS AND BUILDING CLOSE OVER PIPES

ENVIRONMENTAL-SW

Auckland Council  
Te Kaitiaki o Tāmaki Makaurau

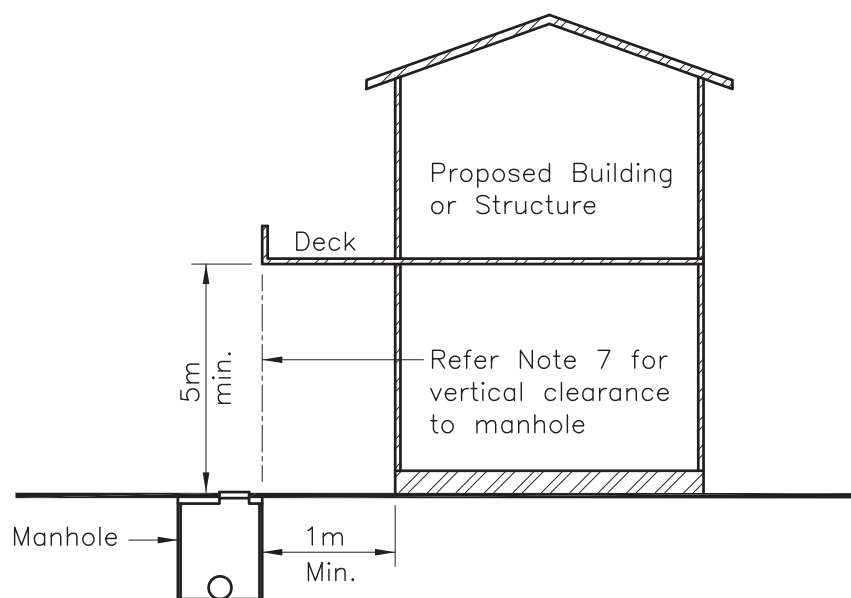
ORIGINAL SCALE A3  
SCALE: N.T.S.

DRAWING SET SHEET  
SWCoP 1 OF 1  
DRAWING No. REV  
SW22 2



Minimum Pile Clearances						
Type of Sewer	Sewer Depth < 3m		Sewer Depth 3m–5m		Sewer Depth >5m	
	a	b	a	b	a	b
Local Wastewater Network	1m	0.6m	1m	0.6m	1.5m	0.6m
Transmission (Trunk) Sewer	1m	1m	2m	1m	3m	1.5m

### PIPE CONSTRUCTION CLEARANCE



### MANHOLE CONSTRUCTION CLEARANCE

#### NOTES:

1. Locate sewer to survey accuracy or by hand piloting.
2. No driven piles within 5m of a sewer or 10m of brick sewer.
3. All manholes shall have 24 hrs unobstructed access.
4. No construction shall occur above a manhole or within tolerances 'a' or 'b' in table above.
5. Rising mains shall not be built over.
6. Brick sewers and those sewers in poor condition shall not be built over unless they are replaced with new sewers which will be to current standard.
7. Vertical clearance from the top of the chamber shall be 5m Min. over the full width of the chamber.

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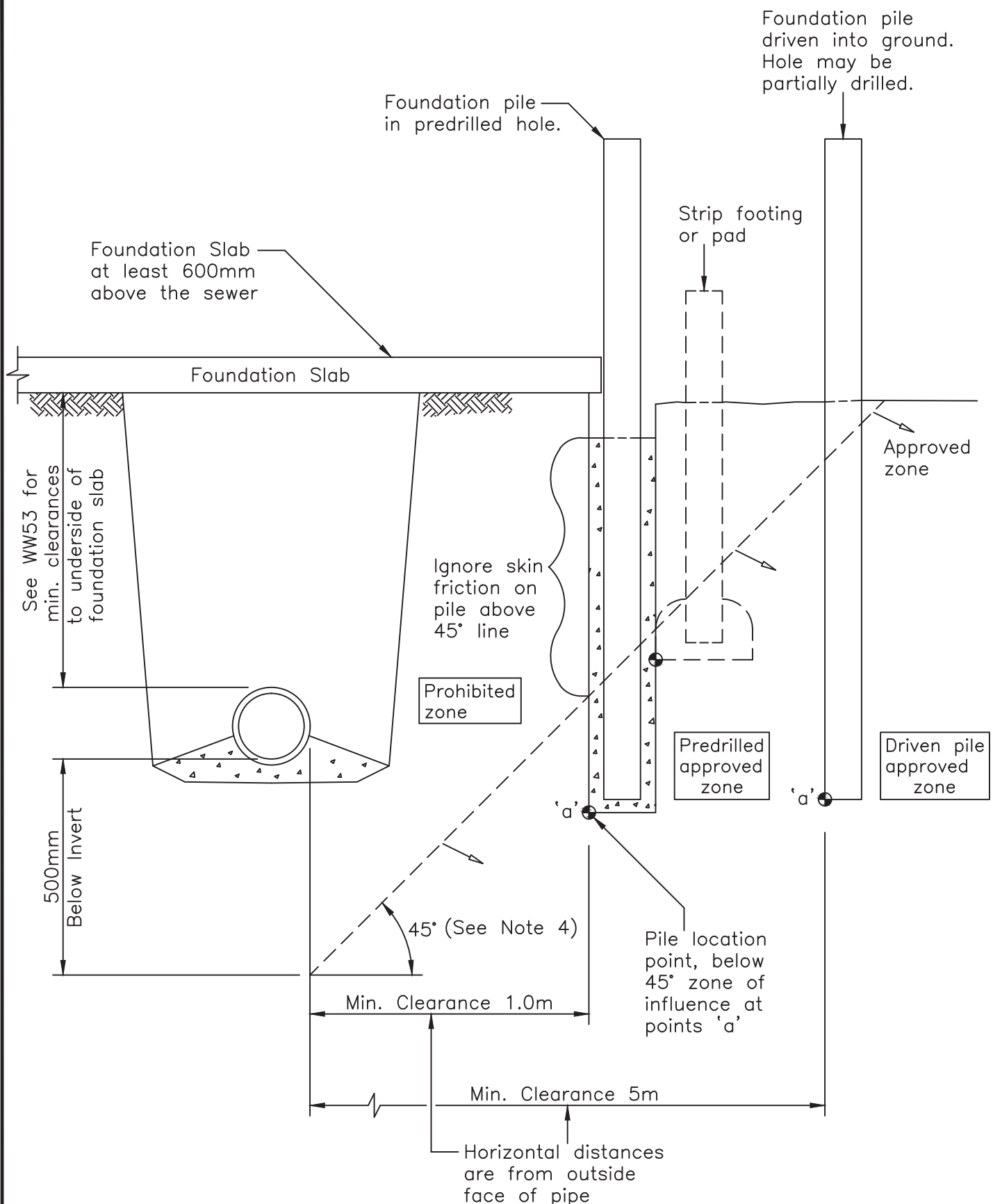


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### PIPE AND MANHOLE CONSTRUCTION CLEARANCE

SCALE:	N.T.S.
ISSUE DATE:	19-05-2015
DWG No.	2010070.044B
REFERENCE No.	WW 53





#### NOTES:

1. No driven piles are permitted within 10m of brick Sewers, or within 5m of all other sewers.
2. Piles that are required to resist horizontal forces will require specific design.
3. Pile/Footing location point must be below 45° zone of influence.
4. Zone of influence typically 45° or angle determined by a structural engineer.

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## BUILDING CLOSE TO OR OVER LOCAL NETWORK SEWER

SCALE:	N.T.S.
ISSUE DATE:	20-9-2013
DWG No.	2010070.045
REFERENCE No.	WW 54

## APPENDIX C: CLASSIFICATION TESTS

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## Shrink Swell Index Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: SSI:ETAM22S-07709

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes

Project No.: 773-ETAM01553

Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

Lot No.: - TRN: -

Tests indicated as not accredited are outside the scope of the laboratory's accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: James McKelvey  
(Senior Technician)  
IANZ Accredited Laboratory Number: 105  
Date of Issue: 1/09/2022

### Sample Details

Sample ID: ETAM22S-07709

Date Sampled: 21/08/2022

Date Submitted: 25/08/2022

Date Tested: 25/08/2022

Project Location: 117 Kowhai Road, Orewa

Sample Location: Lot 1002

Borehole Number: Lot 1002

Borehole Depth (m): -

Sampling Method: Unknown (Not IANZ Endorsed)

Material: Undisturbed Soil

Source: Unknown (Sampled by Client)

### Swell Test

AS 1289.7.1.1

Swell on Saturation (%): 0.9

Moisture Content before (%): 24.4

Moisture Content after (%): 25.9

Est. Unc. Comp. Strength before (kPa): 450

Est. Unc. Comp. Strength after (kPa): 250

### Shrink Test

AS 1289.7.1.1

Shrink on drying (%): 3.6

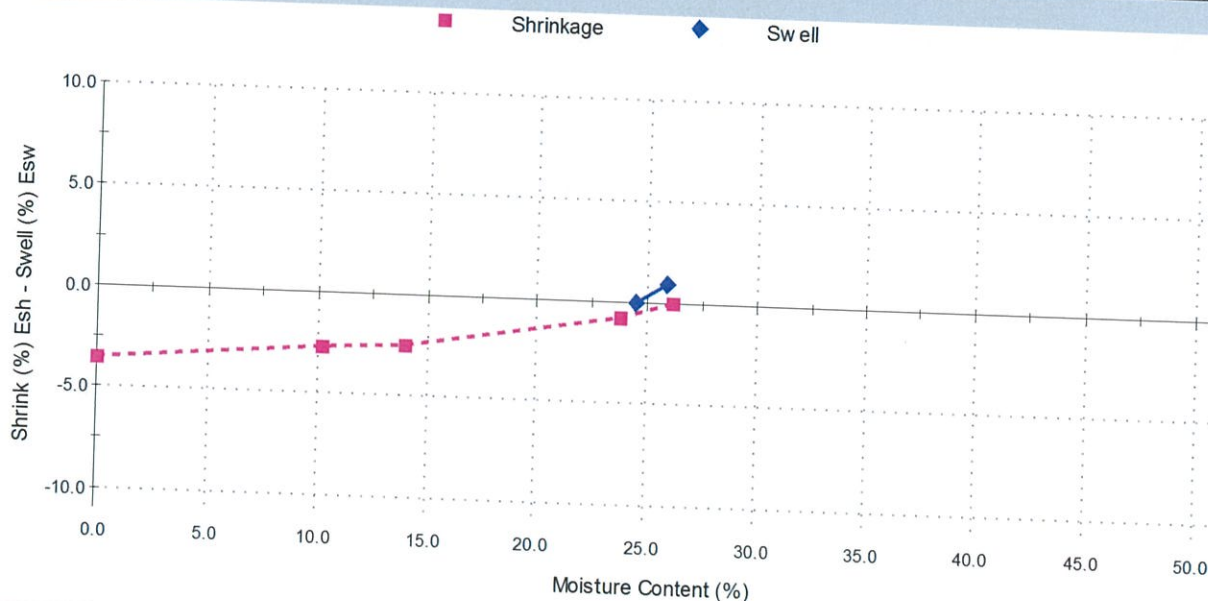
Shrinkage Moisture Content (%): 26.1

Est. inert material (%): 14%

Crumbling during shrinkage: 0.5%

Cracking during shrinkage: 1%

### Shrink Swell



Shrink Swell Index - Iss (%): 2.2

### Comments

# Not accredited

Est. Unc. Comp. Strength readings are not IANZ Endorsed as part of this Report.

Work Order No : ETAM22W01552

Tested By: JM

## Shrink Swell Index Report

Report No: SSI:ETAM22S-07710

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** - **TRN:** -

Tests indicated as not accredited are outside the scope of the laboratory's accreditation. (This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



*James McKelvey*

Approved Signatory: James McKelvey  
(Senior Technician)  
IANZ Accredited Laboratory Number: 105  
Date of Issue: 1/09/2022

### Sample Details

**Sample ID:** ETAM22S-07710

**Date Sampled:** 21/08/2022

**Date Submitted:** 25/08/2022

**Date Tested:** 25/08/2022

**Project Location:** 117 Kowhai Road, Orewa

**Sample Location:** Lot 1003

**Borehole Number:** Lot 1003

**Borehole Depth (m):** -

**Sampling Method:** Unknown (Not IANZ Endorsed)

**Material:** Undisturbed Soil

**Source:** Unknown (Sampled by Client)

### Swell Test

AS 1289.7.1.1

**Swell on Saturation (%):** -0.4

**Moisture Content before (%):** 23.8

**Moisture Content after (%):** 25.2

**Est. Unc. Comp. Strength before (kPa):** 450+

**Est. Unc. Comp. Strength after (kPa):** 450+

### Shrink Test

AS 1289.7.1.1

**Shrink on drying (%):** 1.5

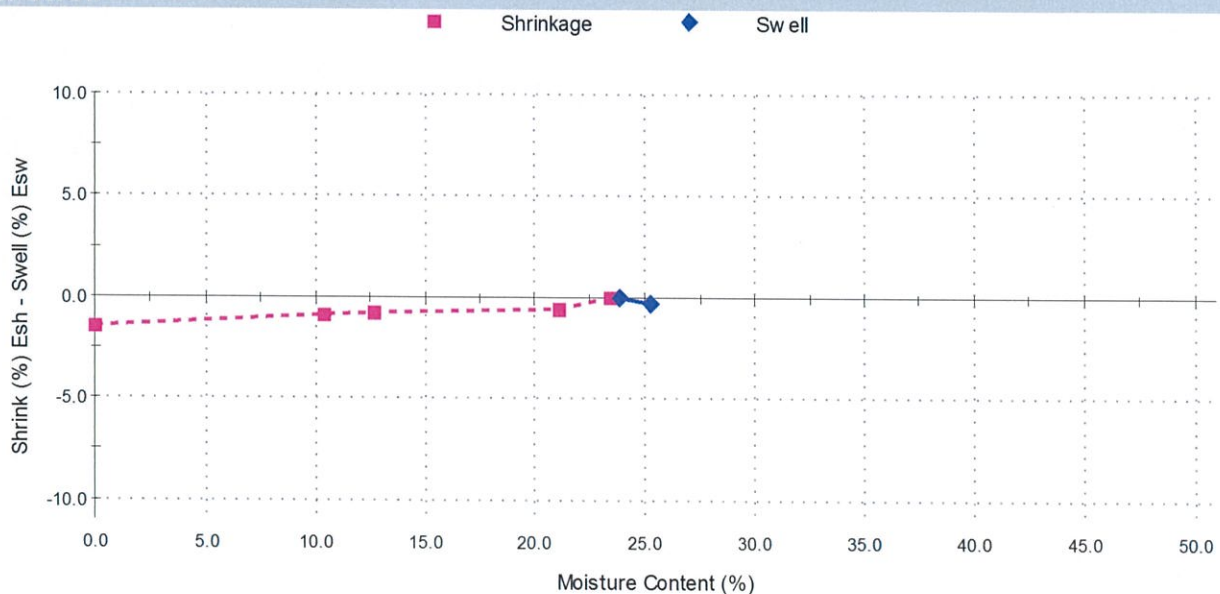
**Shrinkage Moisture Content (%):** 23.4

**Est. inert material (%):** 14%

**Crumbling during shrinkage:** 5%

**Cracking during shrinkage:** 3%

### Shrink Swell



**Shrink Swell Index - Iss (%):** 0.9

### Comments

# Not accredited

Est. Unc. Comp. Strength readings are not IANZ Endorsed as part of this Report.


Work Order No : ETAM22W01552

Tested By: JM



## APPENDIX D: EARTHWORKS FIELD DENSITY SUMMARY SHEETS

---

<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;">  <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 20px; text-align: right;"> <p>Approved Signatory: Cesar Pura</p> <p>Issue date: 13/01/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
9/01/2020	20W00024	JJ	68	Fill	Silty CLAY	Gully 1	1749172	5949024	-	150	~0.8m to Finished Level	UTP	UTP	UTP	UTP	1.92	26.4	1.52	2.70	4
9/01/2020	20W00024	JJ	69	Fill	Silty CLAY	Gully 1	1749175	5949010	-	150	~0.8m to Finished Level	UTP	UTP	UTP	UTP	1.85	29.2	1.43	2.70	5

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00024

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6



**Location:** As below

Tested by: JJ

Date tested: 9/01/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">  <p><b>IANZ</b> ACCREDITED LABORATORY</p> </div> <div style="font-size: small;"> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 15/01/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
13/01/2020	20W00037	TR	73	Fill	Silty CLAY	Gully 1	1749170	5949039	9.40	150		202	202	173	192	1.88	28.1	1.46	2.70	5
13/01/2020	20W00037	TR	74	Fill	Silty CLAY	Gully 1	1749178	5949011	9.80	150		202	202	195	192	1.92	27.9	1.50	2.70	2

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00037

Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: TR

Date tested: 13/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;">  <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 100px; text-align: right;">   <b>Approved Signatory:</b> Cesar Pura  <b>Issue date:</b> 22/01/2020         </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
14/01/2020	20W00048	MP	75	Fill	Silty CLAY	Gully 1	1749177	5948974	10.31	150		UTP	UTP	UTP	183	1.92	26.0	1.53	2.70	4
14/01/2020	20W00048	MP	76	Fill	Silty CLAY	Gully 1	1749174	5948983	10.25	150		UTP	UTP	UTP	UTP	1.85	26.8	1.46	2.70	7
14/01/2020	20W00048	MP	77	Fill	Silty CLAY	Gully 1	1749176	5948798	10.05	150		183	183	166	UTP	1.89	28.2	1.47	2.70	4



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00048

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

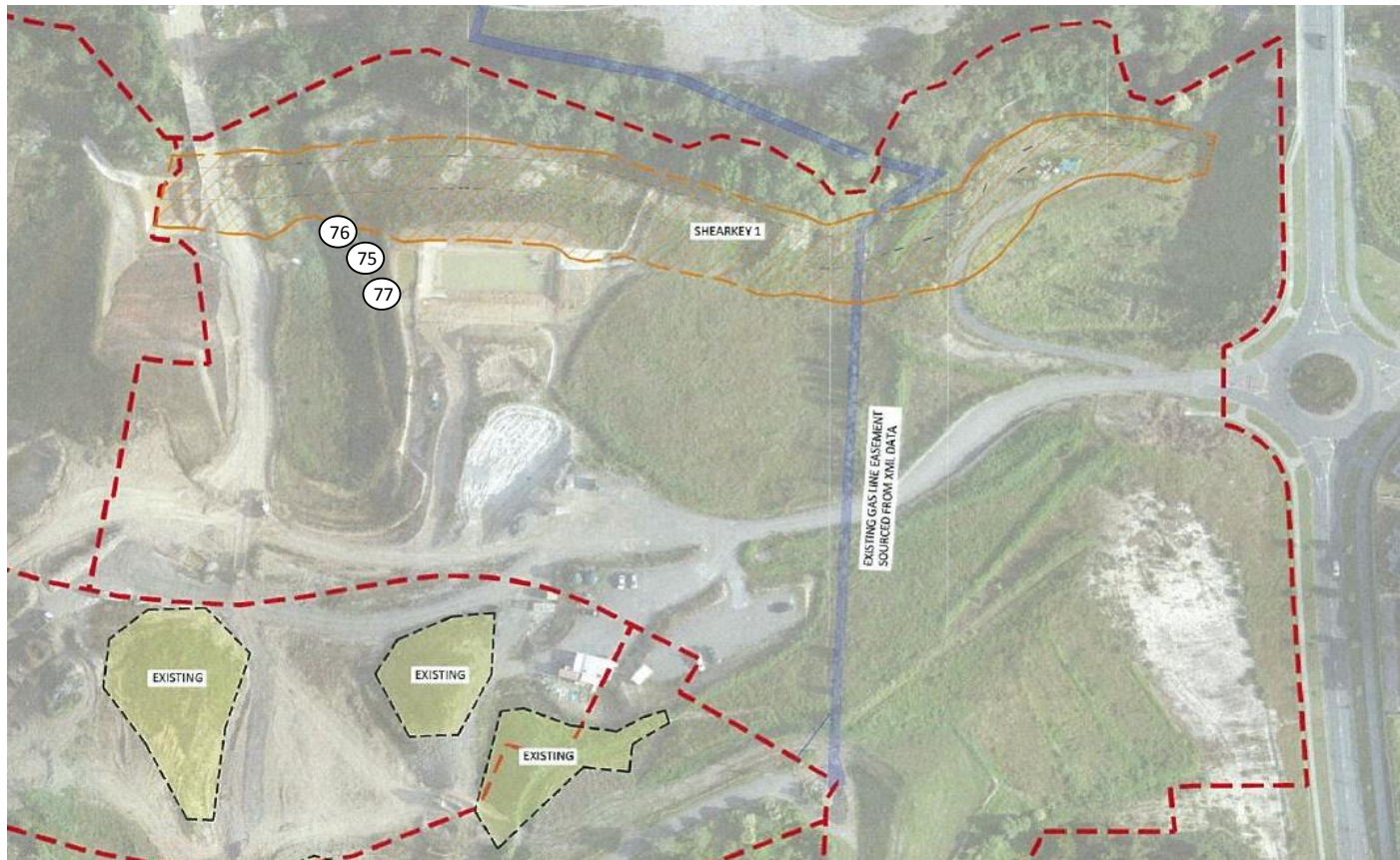
**Location:** As below



Tested by:

MP

Date tested:

14/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding-top: 10px;"> <div style="text-align: center;">  <p><b>IANZ</b> ACCREDITED LABORATORY</p> </div> <div style="text-align: center;"> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: center;">   <p>Approved Signatory: Cesar Pura Issue date: 22/01/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
17/01/2020	20W00069	TR	<b>80</b>	Fill	Gravelly CLAY	Gully 1	1749177	5948951	11.65	150		152	155	166	173	1.89	31.4	1.44	2.70	2
17/01/2020	20W00069	TR	<b>81</b>	Fill	Gravelly CLAY	Gully 1	1749175	5949010	11.30	150		159	162	202	157	1.88	36.0	1.38	2.70	0

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00069

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by:



TR

Date tested:

17/01/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>ACCREDITED LABORATORY</p> </div> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 22/01/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
20/01/2020	20W00086	TR	82	Fill	Gravelly CLAY	Gully 1	1749159	5949008	12.50	150		UTP	UTP	UTP	UTP	1.90	22.6	1.55	2.70	8
20/01/2020	20W00086	TR	83	Fill	Gravelly CLAY	Gully 1	1749171	5948992	12.30	150		UTP	UTP	UTP	UTP	1.86	25.5	1.48	2.70	7
20/01/2020	20W00086	TR	84	Fill	Gravelly CLAY	Gully 1	1749178	5948975	12.20	150		UTP	UTP	UTP	UTP	1.85	28.2	1.45	2.70	6

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00086

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below


Tested by:

TR

Date tested:

20/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;">  <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 20px; text-align: right;"> <p>Approved Signatory: Cesar Pura</p> <p>Issue date: 23/01/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
21/01/2020	20W00100	TR	85	Fill	Silty CLAY	Gully 1	1749170	5948938	-	150		202	202	162	152	1.81	27.6	1.42	2.70	8
21/01/2020	20W00100	TR	86	Fill	Silty CLAY	Gully 1	1749182	5948970	-	150		152	162	150	202	1.79	40.7	1.28	2.70	1



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00100

Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: TR

Date tested: 21/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">  <p><b>IANZ</b> ACCREDITED LABORATORY</p> </div> <div style="text-align: center;"> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 29/01/2020</p> </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
22/01/2020	20W00118	TR	87	Fill	Silty CLAY	Gully 1	1749165	5949017	13.00	150		202+	162	192	UTP	1.89	26.8	1.49	2.70	5
22/01/2020	20W00118	TR	88	Fill	Silty CLAY	Gully 1	1749189	5948993	13.00	150		UTP	182	202	185	1.90	24.0	1.53	2.70	7
22/01/2020	20W00118	TR	89	Fill	Silty CLAY	Undercut Wall 306	1749387	5948934	17.10	150		150	150	162	159	1.82	34.1	1.36	2.70	3
22/01/2020	20W00118	TR	90	Fill	Silty CLAY	Undercut Wall 306	1749393	5948916	18.10	150		150	171	185	155	1.71	40.8	1.22	2.70	5

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00118

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by:



TR

Date tested:

22/01/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2  All tests reported herein have been performed in accordance with the laboratory's scope of accreditation <div style="text-align: right;">   <b>Approved Signatory:</b> Cesar Pura  <b>Issue date:</b> 29/01/2020       </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
23/01/2020	20W00123	TR	91	Fill	Silty CLAY	Gully 1	1749175	5949010	13.23	150		162	159	202+	202+	1.82	27.2	1.43	2.70	8
23/01/2020	20W00123	TR	92	Fill	Silty CLAY	Gully 1	1749176	5948989	13.19	150		169	198	162	192	1.87	28.0	1.46	2.70	5
23/01/2020	20W00123	TR	93	Fill	Silty CLAY	Gully 1	1749177	5948973	14.30	150		185	195	182	202	1.87	28.1	1.46	2.70	5

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00123

Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: TR

Date tested: 23/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">   <b>IANZ</b>          ACCREDITED LABORATORY       </div> <div style="text-align: center;">         All tests reported          herein have been          performed in accordance          with the laboratory's          scope of accreditation       </div> <div style="text-align: right;">   <b>Approved Signatory:</b> Cesar Pura  <b>Issue date:</b> 29/01/2020       </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
24/01/2020	20W00128	TR	94	Fill	Silty CLAY	Gully 1	1749156	5949011	13.91	150		UTP	UTP	UTP	UTP	1.89	32.2	1.43	2.70	1
24/01/2020	20W00128	TR	95	Fill	Silty CLAY	Gully 1	1749180	5948962	14.92	150		157	202	195	150	1.78	36.1	1.30	2.70	5
24/01/2020	20W00128	TR	96	Fill	Silty CLAY	Wall 306	1749411	5948910	18.88	150		126	124	140	121	1.78	37.7	1.29	2.70	4
24/01/2020	20W00128	TR	97	Fill	Silty CLAY	Wall 306	1749429	5948912	18.98	150		140	126	124	138	1.77	38.9	1.27	2.70	3
24/01/2020	20W00128	TR	98	Fill	Silty CLAY	Wall 306	1749412	5948911	18.88	150	Retest of Test No. 96	202	202	202	189	1.82	36.3	1.33	2.70	2
24/01/2020	20W00128	TR	99	Fill	Silty CLAY	Wall 306	1749430	5948909	18.98	150	Retest of Test No. 97	189	182	185	198	1.82	32.7	1.37	2.70	5



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00128

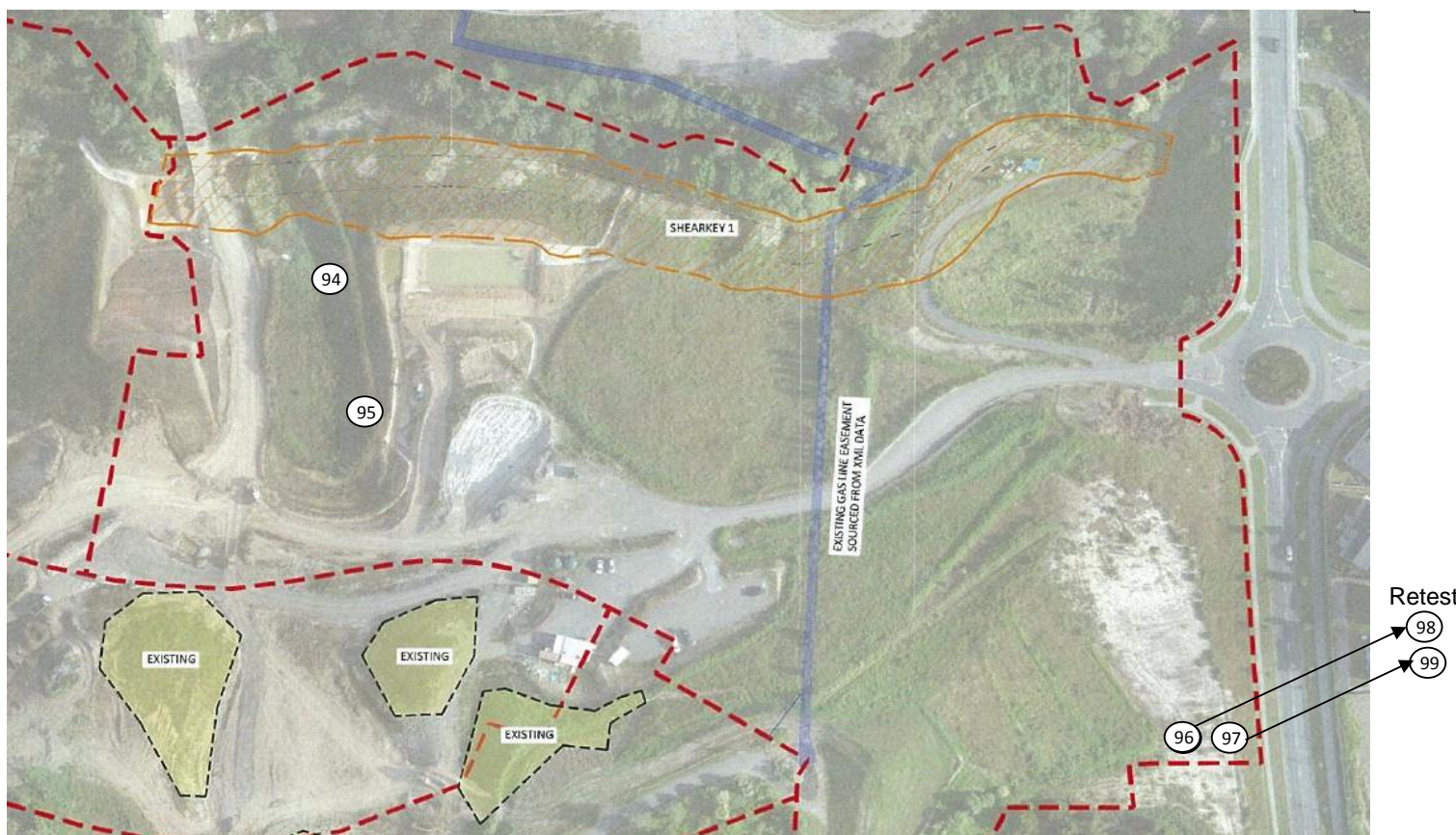
Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: TR

Date tested: 24/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">   <b>IANZ</b>          ACCREDITED LABORATORY       </div> <div style="text-align: center;">         All tests reported          herein have been          performed in accordance          with the laboratory's          scope of accreditation       </div> <div style="text-align: right;">           Approved Signatory: Cesar Pura          Issue date: 4/02/2020       </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
28/01/2020	20W00171	MP	100	Fill	Silty CLAY	Gully 1	1749183	5948956	-	150		176	202	189	185	1.91	24.9	1.52	2.70	5
28/01/2020	20W00171	MP	101	Fill	Silty CLAY	Gully 1	1749167	5948986	-	150		173	185	202	202	1.89	26.6	1.49	2.70	5

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00171

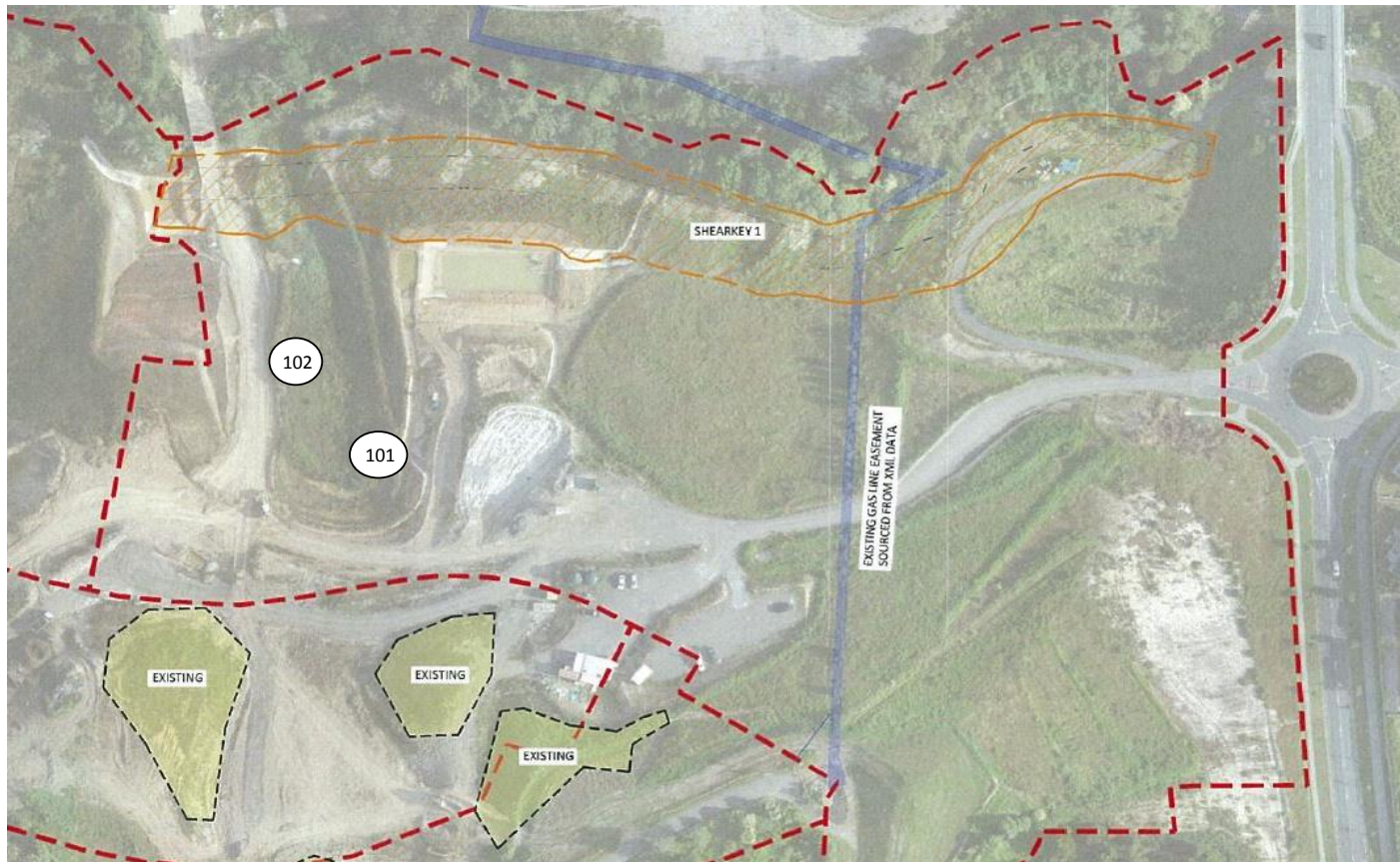
Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6



**Location:** As below

Tested by: MP

Date tested: 28/01/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">  <p><b>IANZ</b> ACCREDITED LABORATORY</p> </div> <div style="text-align: center;"> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 4/02/2020</p> </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
29/01/2020	20W00215	TR	102	Fill	Silty CLAY	Gully 1	1749184	5948964	17.50	150		202	202	202	189	1.87	28.0	1.46	2.70	5
29/01/2020	20W00215	TR	103	Fill	Silty CLAY	Gully 1	1749162	5948981	17.50	150		182	152	173	189	1.88	33.9	1.40	2.70	0

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00215

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by:

TR

Date tested:

29/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;"> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 20px; text-align: right;"> <p>Approved Signatory: Cesar Pura Issue date: 4/02/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
30/01/2020	20W00219	TR	104	Fill	Silty CLAY	Gully 1	1749162	5948975	18.00	150		150	173	185	159	1.87	33.6	1.40	2.70	1
30/01/2020	20W00219	TR	105	Fill	Silty Sandy CLAY	Shearkey	1749253	5949039	6.30	150		150	171	185	202	1.83	39.1	1.31	2.70	0
30/01/2020	20W00219	TR	106	Fill	Silty Sandy CLAY	Shearkey	1749268	5949038	4.88	150		157	159	202	182	1.81	35.5	1.33	2.70	3
30/01/2020	20W00219	TR	107	Fill	Silty CLAY	Gully 1	1749175	5948960	18.00	150		150	159	164	189	1.87	28.8	1.45	2.70	5



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00219

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

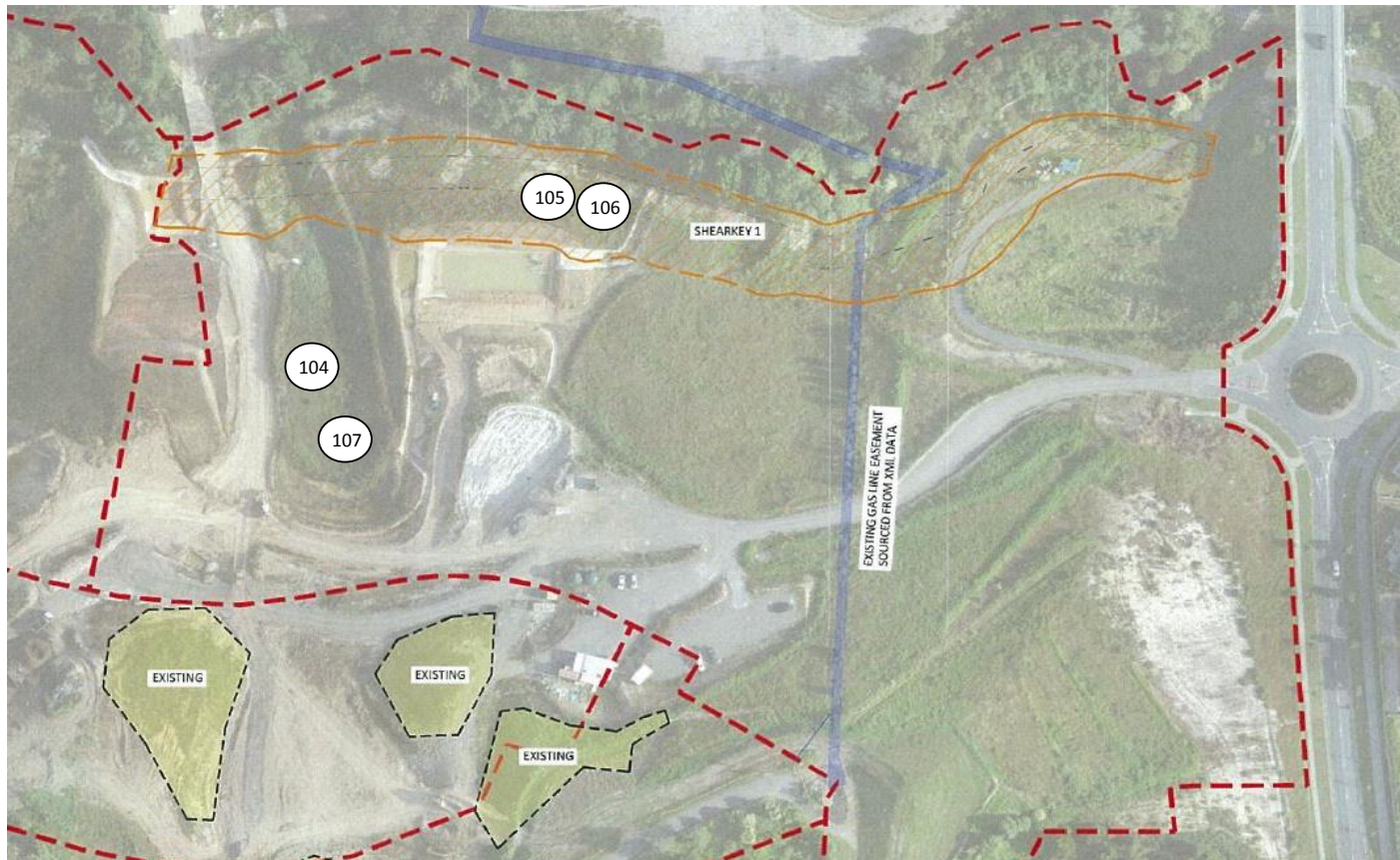
**Location:** As below



Tested by:

TR

Date tested:

30/01/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">   <b>IANZ</b>  <small>ACCREDITED LABORATORY</small> </div> <div style="text-align: center;"> <p style="font-size: 0.8em;">All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 4/02/2020</p> </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa <small>UTP = Unable to penetrate</small>				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) <small>Assumed</small>	Air Voids (%)
31/01/2020	20W00230	MP	108	Fill	CLAY	Shearkey	1749264	5949039	5.50	150		UTP	UTP	202+	202+	1.90	32.2	1.44	2.70	0
31/01/2020	20W00230	MP	109	Fill	CLAY	Shearkey	1749251	5949042	7.00	150		185	162	150	150	1.81	36.4	1.33	2.70	2
31/01/2020	20W00230	MP	110	Fill	CLAY	Gully 1	1749161	5948951	19.04	150		150	150	150	185	1.80	34.0	1.35	2.70	4
31/01/2020	20W00230	MP	111	Fill	CLAY	Gully 1	1749192	5948974	17.80	150		150	150	150	138	1.82	38.0	1.32	2.70	1
31/01/2020	20W00230	MP	112	Fill	CLAY	Undercut	1749450	5948854	20.00	150		202	202	202	202	1.83	30.6	1.40	2.70	5
31/01/2020	20W00230	MP	113	Fill	CLAY	Undercut	1749448	5948873	20.00	150		150	150	162	162	1.84	33.6	1.37	2.70	3

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00230

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

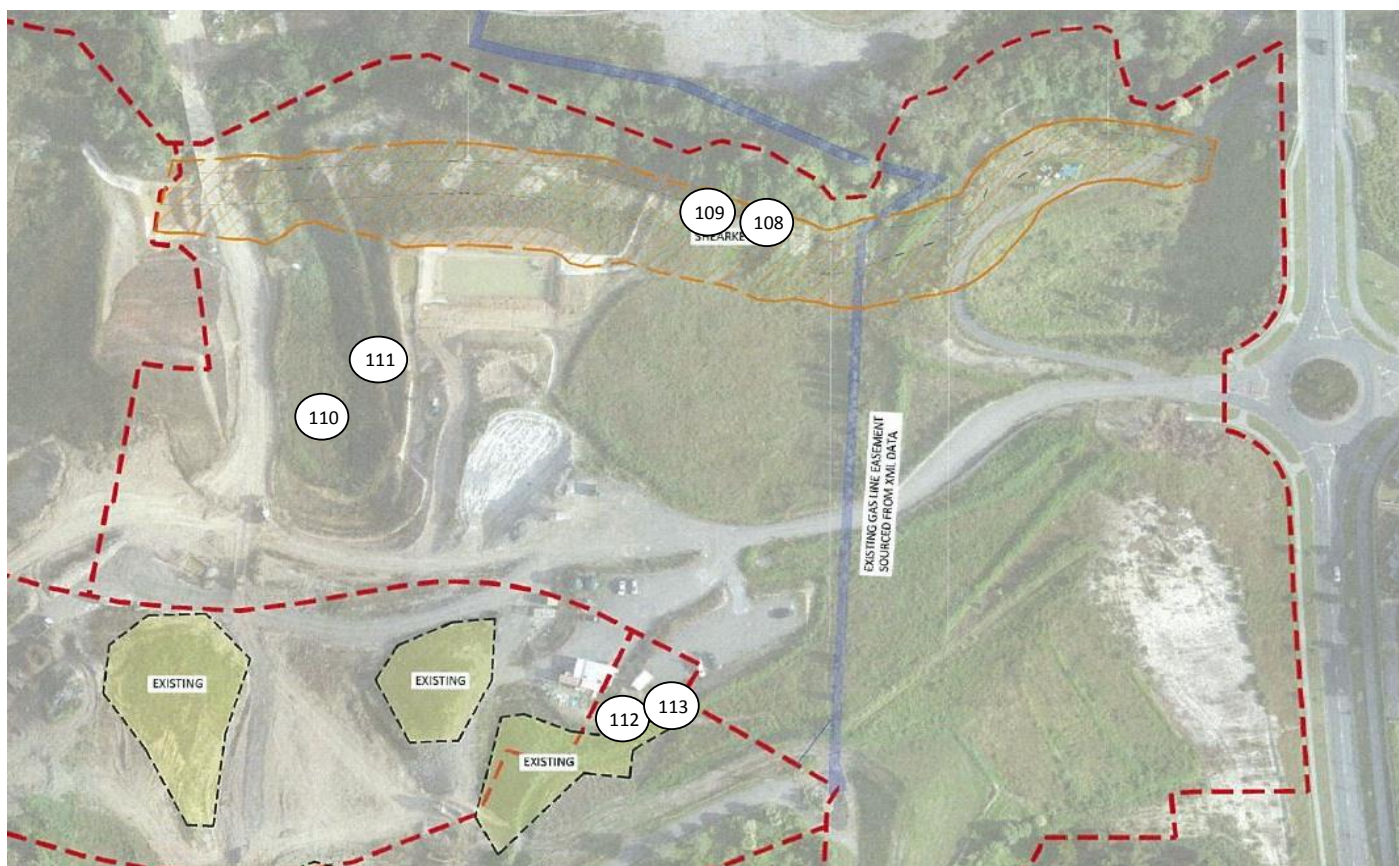
**Location:** As below

Tested by:

MP

Date tested:

31/01/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;"> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 100px; text-align: right;">   <b>Approved Signatory:</b> Cesar Pura  <b>Issue date:</b> 12/02/2020         </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
8/02/2020	20W00286	MA	125	Fill	CLAY	Area F Shearkey 1	1749704	5949027	4.65	150		152	150	157	192	1.85	34.6	1.37	2.70	2
8/02/2020	20W00286	MA	126	Fill	CLAY	Area F Shearkey 1	1749285	5949033	4.96	150		185	202+	192	176	1.84	36.3	1.35	2.70	1
8/02/2020	20W00286	MA	127	Fill	CLAY	Area F Shearkey 1	1749261	5949034	5.45	150		202+	202+	202+	202+	1.90	29.6	1.46	2.70	3
8/02/2020	20W00286	MA	128	Fill	CLAY	Gully 1	1749215	5948966	21.45	150		202+	202+	198	202+	1.87	28.4	1.46	2.70	5
8/02/2020	20W00286	MA	129	Fill	CLAY	Gully 1	1749191	5948934	21.40	150		UTP	UTP	UTP	UTP	1.91	18.7	1.61	2.70	10

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00286

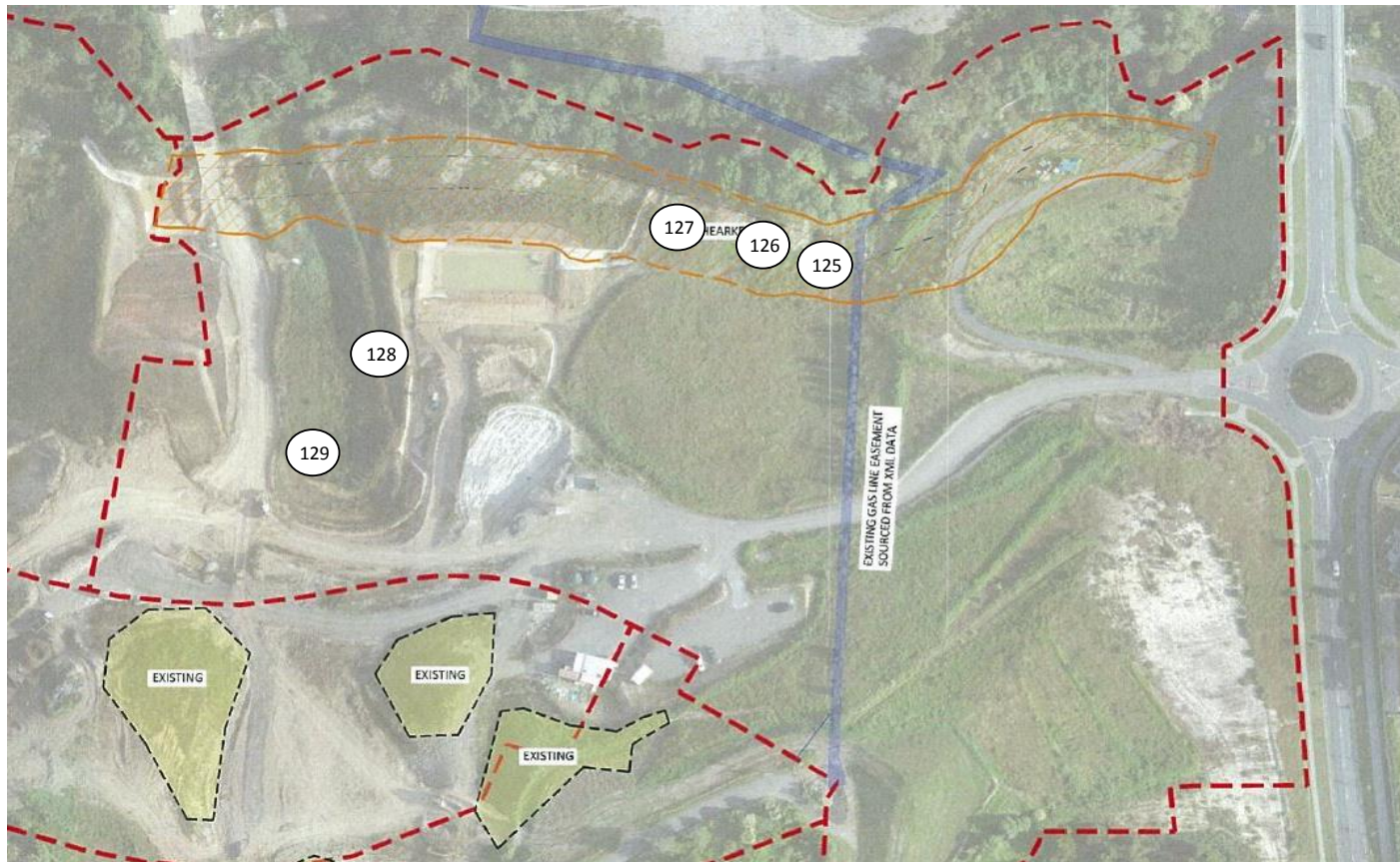
Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: MA

Date tested: 8/02/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>ACCREDITED LABORATORY</p> </div> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 12/02/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
10/02/2020	20W00298	TR, VD	130	Fill	Silty CLAY	Gully 1	1749198	5948931	23.20	150		171	202+	UTP	152	1.87	23.8	1.51	2.70	8
10/02/2020	20W00298	TR, VD	131	Fill	Silty CLAY	Gully 1	1749212	5948959	21.30	150		178	182	202+	157	1.89	30.0	1.46	2.70	2
10/02/2020	20W00298	TR, VD	132	Fill	Silty CLAY	Shearkey	1749275	5949041	5.60	150		UTP	202+	202+	202+	1.93	29.3	1.49	2.70	1
10/02/2020	20W00298	TR, VD	133	Fill	Silty CLAY	Shearkey	1749301	5949025	4.90	150		171	202+	175	159	1.83	33.6	1.37	2.70	3
10/02/2020	20W00298	TR, VD	134	Fill	Silty CLAY	Gully 1	1749191	5948952	21.40	150		173	185	UTP	UTP	1.94	26.1	1.54	2.70	3



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM20W00298

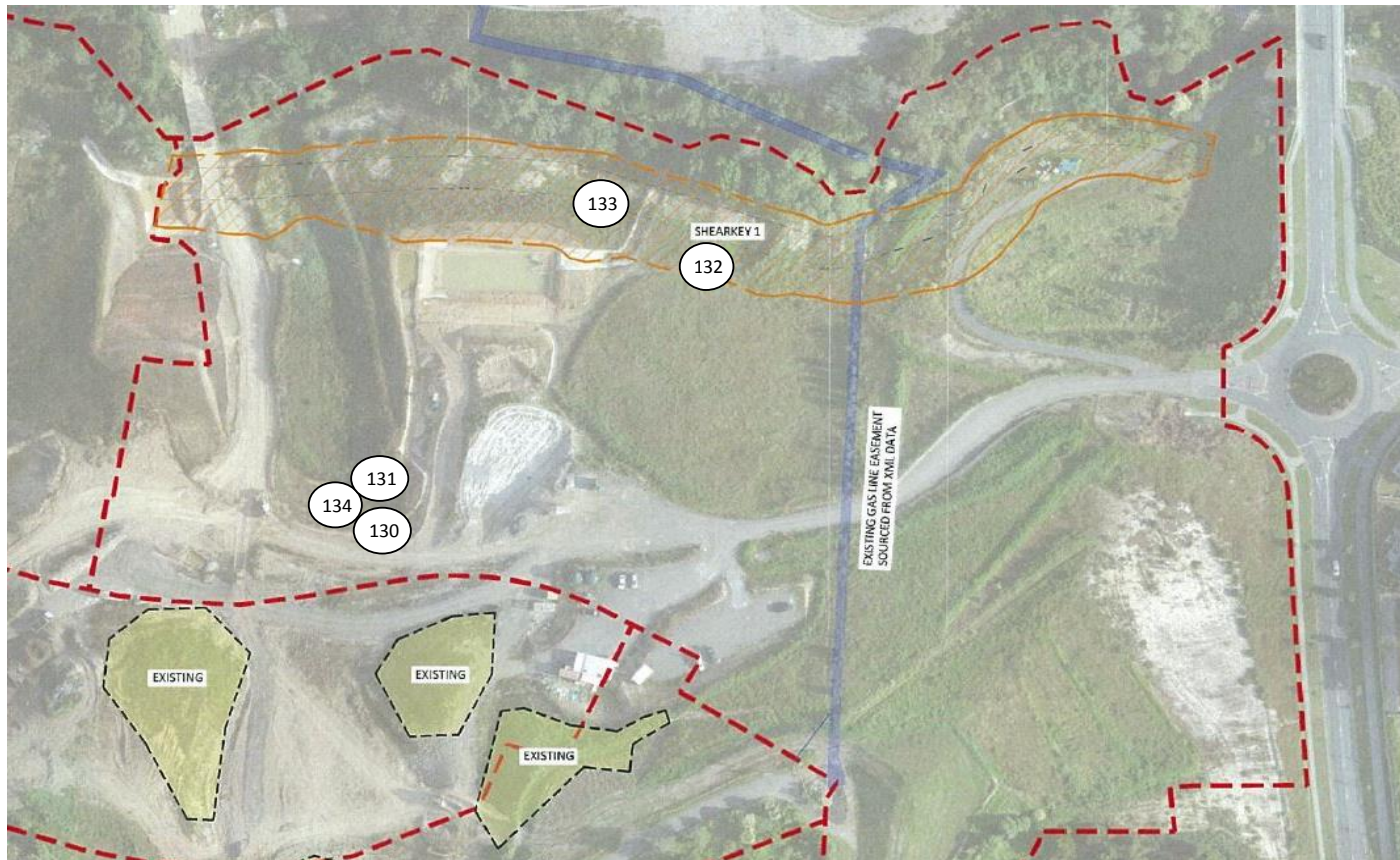
Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: TR, VD

Date tested: 10/02/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2  All tests reported herein have been performed in accordance with the laboratory's scope of accreditation <div style="text-align: right;">   <b>Approved Signatory:</b> Cesar Pura  <b>Issue date:</b> 19/02/2020       </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
13/02/2020	20W00321	LW	146	Fill	Clayey SILT	Shearkey 1	1749264	5949026	8.80	150		145	179	184+	151	1.83	32.4	1.38	2.70	4
13/02/2020	20W00321	LW	147	Fill	Clayey SILT	Shearkey 1	1749280	5949021	8.60	150		138	147	179	174	1.88	28.6	1.46	2.70	4
13/02/2020	20W00321	LW	148	Fill	Clayey SILT	Refer to plan	1749185	5948815	35.80	150		170	147	184+	156	1.88	31.3	1.43	2.70	2
13/02/2020	20W00321	LW	149	Fill	Clayey SILT	Refer to plan	1749206	5948834	35.30	150		179	161	134	147	1.78	33.0	1.34	2.70	6

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00321

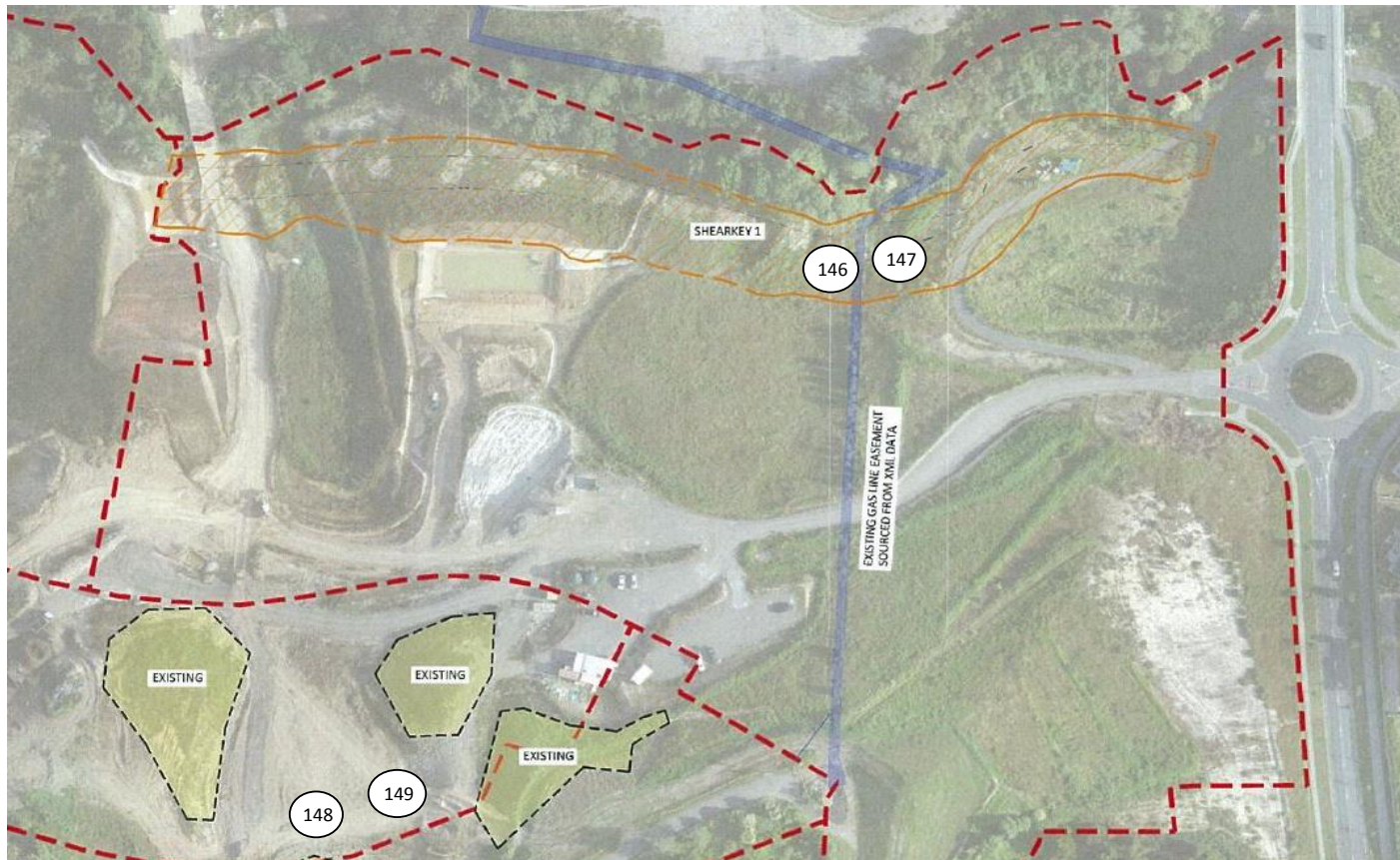
Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6


**Location:** As below

Tested by: LW

Date tested: 13/02/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;">  <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 100px; text-align: right;"> <p>Approved Signatory: Cesar Pura</p> <p>Issue date: 19/02/2020</p> </div> </div>									
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1); Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
14/02/2020	20W00335	LW	150	Fill	Clayey SILT	Shearkey 1	1749288	5949021	8.90	150		184	170	184+	179	1.81	35.8	1.33	2.70	3
14/02/2020	20W00335	LW	151	Fill	Clayey SILT	Shearkey 1	1749236	5949040	10.50	150		UTP	UTP	UTP	184+	1.88	25.9	1.49	2.70	6
14/02/2020	20W00335	LW	152	Fill	Clayey SILT	Refer to plan	1749161	5948823	36.60	150		UTP	UTP	184+	156	1.87	31.9	1.42	2.70	2
14/02/2020	20W00335	LW	153	Fill	Clayey SILT	Refer to plan	1749170	5948806	36.60	150		UTP	UTP	UTP	170	1.87	31.7	1.42	2.70	2
14/02/2020	20W00335	LW	154	Fill	Clayey SILT	Refer to plan	1749201	5948819	36.50	150		184	165	156	184+	1.85	32.0	1.40	2.70	3

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00335

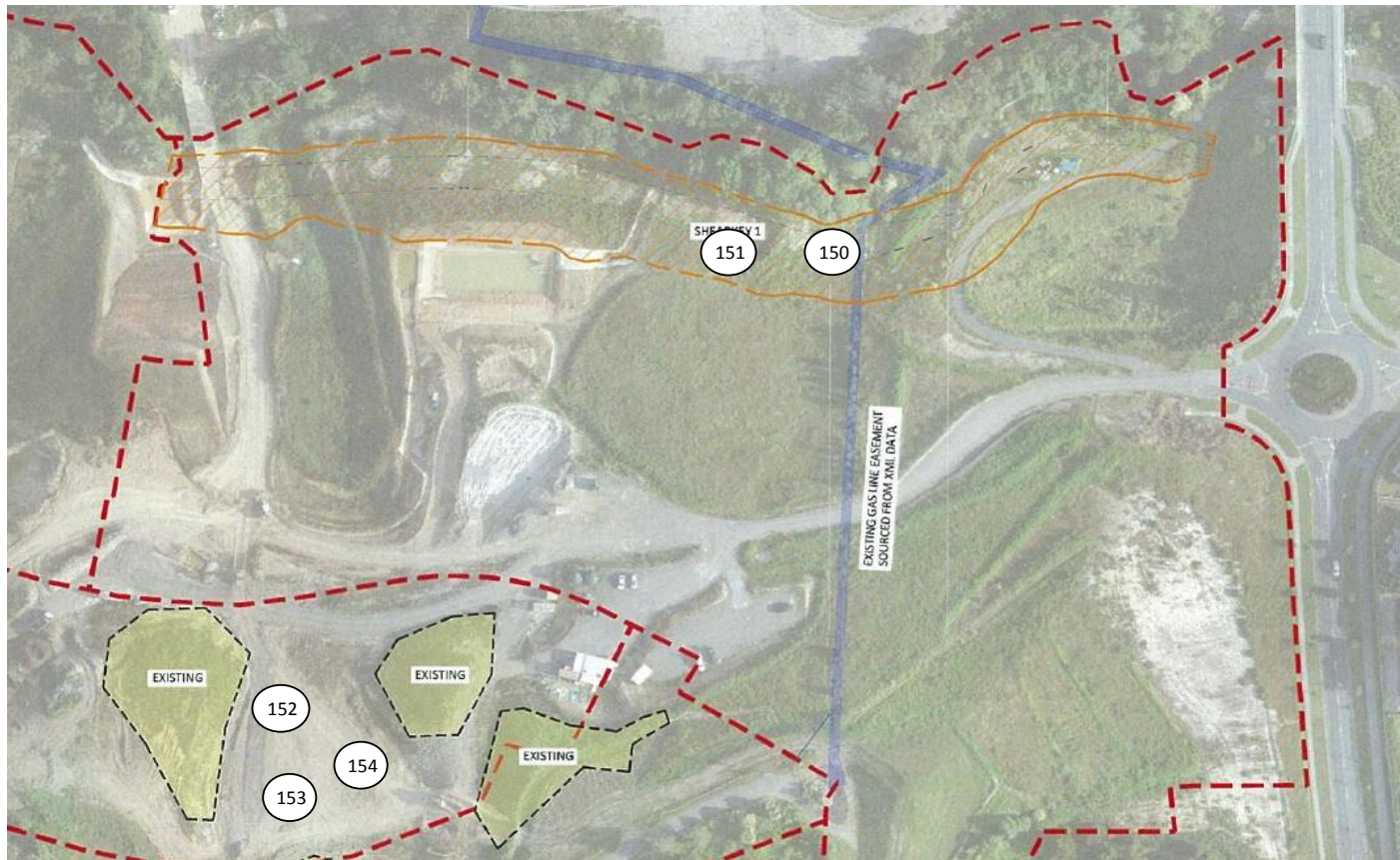
Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 14/02/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa	<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; justify-content: space-between; align-items: center; padding-top: 10px;"> <div style="text-align: center;">  <p><b>IANZ</b> ACCREDITED LABORATORY</p> </div> <div style="text-align: center;"> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 21/02/2020</p> </div> </div>																			
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1); Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
18/02/2020	20W00350	TR	158	Fill	Silty CLAY	Refer to plan	1749239	5949032	12.34	150		UTP	UTP	202	202	1.83	30.3	1.41	2.70	5
18/02/2020	20W00350	TR	159	Fill	Silty CLAY	Refer to plan	1749259	5949014	12.61	150		202	202	202	UTP	1.83	30.0	1.41	2.70	6
18/02/2020	20W00350	TR	160	Fill	Silty CLAY	Refer to plan	1749285	5949017	11.10	150		162	176	182	185	1.84	30.2	1.41	2.70	5
18/02/2020	20W00350	TR	161	Fill	Silty CLAY	Shearkey 1	1749333	5949026	4.60	150		185	182	198	173	1.74	32.7	1.31	2.70	9
18/02/2020	20W00350	TR	162	Fill	Silty CLAY	Shearkey 1	1749317	5949027	4.75	150		162	182	173	185	1.80	32.3	1.36	2.70	6



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00350

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

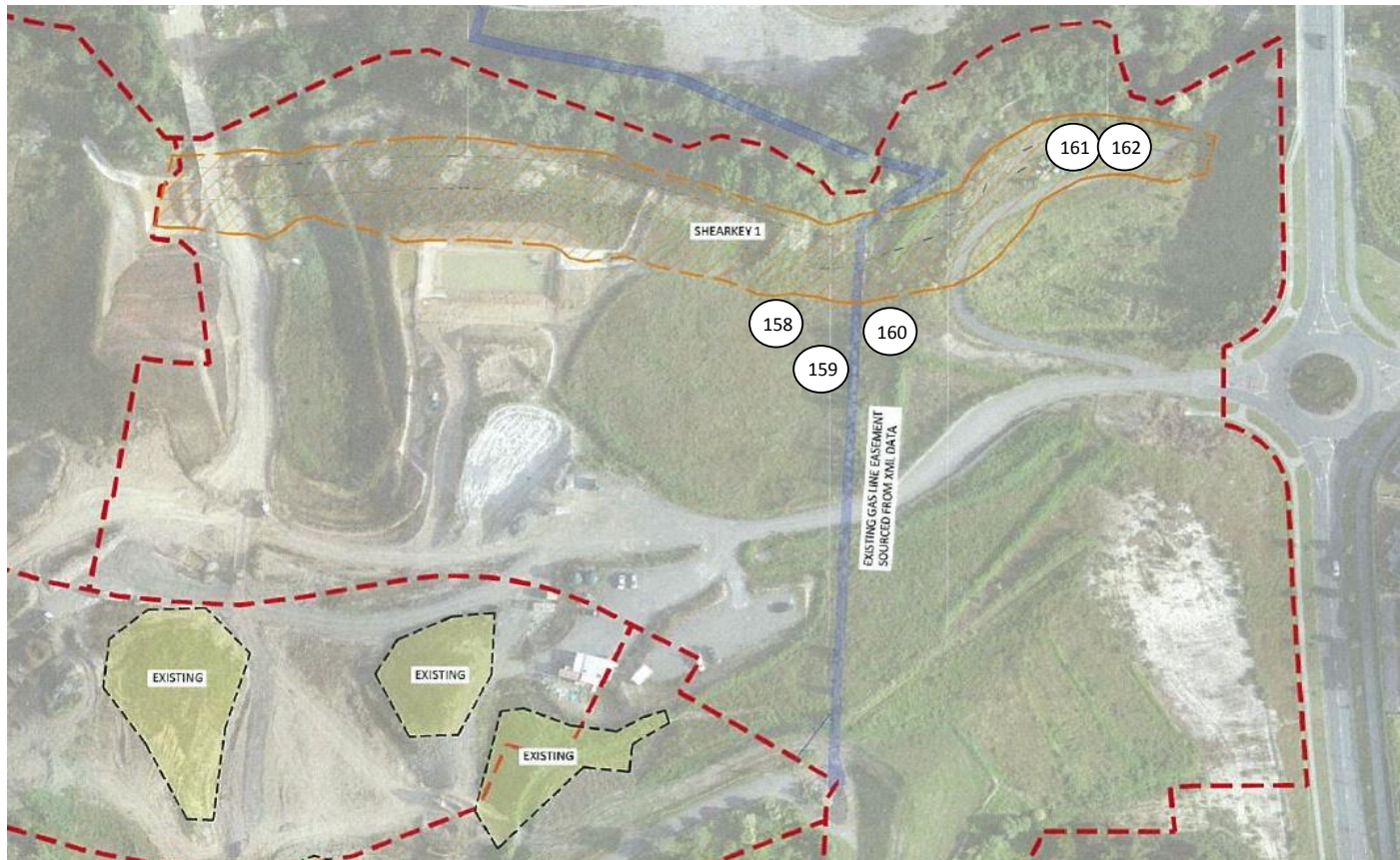
**Location:** As below


Tested by:

TR

Date tested:

18/02/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland)											<b>PROJECT CODE:</b> 773-ETAM00991AA									
<b>Address</b> PO Box 8261, Symonds Street, Auckland 1150											<b>Page:</b> 1 of 2									
<b>Attention:</b> Stephen Parkes											<div><div><div>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</div></div><div><div>Approved Signatory:</div><div>Cesar Pura</div></div><div><div>Issue date:</div><div>11/03/2020</div></div></div>									
<b>c.c:</b> -																				
<b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6																				
<b>Location:</b> Access off Arran Drive, Orewa																				
Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m³)	Oven Water Content (%)	Dry Density (T/m³)	Solid Density (T/m³) Assumed	Air Voids (%)
3/03/2020	20W00471	TR	199	Fill	Silty CLAY	Gully 1	1749203	5948910	26.40	150		181+	181+	181+	142	1.88	31.4	1.43	2.70	2
3/03/2020	20W00471	TR	200	Fill	Silty CLAY	Gully 1	1749198	5948894	26.40	150		181+	181+	148	155	1.85	30.8	1.41	2.70	4
3/03/2020	20W00471	TR	201	Fill	Silty CLAY	Gully 1	1749176	5948900	2.70	150		181+	181+	181+	UTP	1.86	32.6	1.41	2.70	2
3/03/2020	20W00471	TR	202	Fill	Gravelly CLAY	Shearkey 1	1749311	5949009	12.90	150		UTP	UTP	UTP	UTP	1.85	24.1	1.49	2.70	9
3/03/2020	20W00471	TR	203	Fill	Silty CLAY	Shearkey 1	1749331	5949012	10.90	150		181+	181+	UTP	UTP	1.88	28.5	1.46	2.70	4

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00471

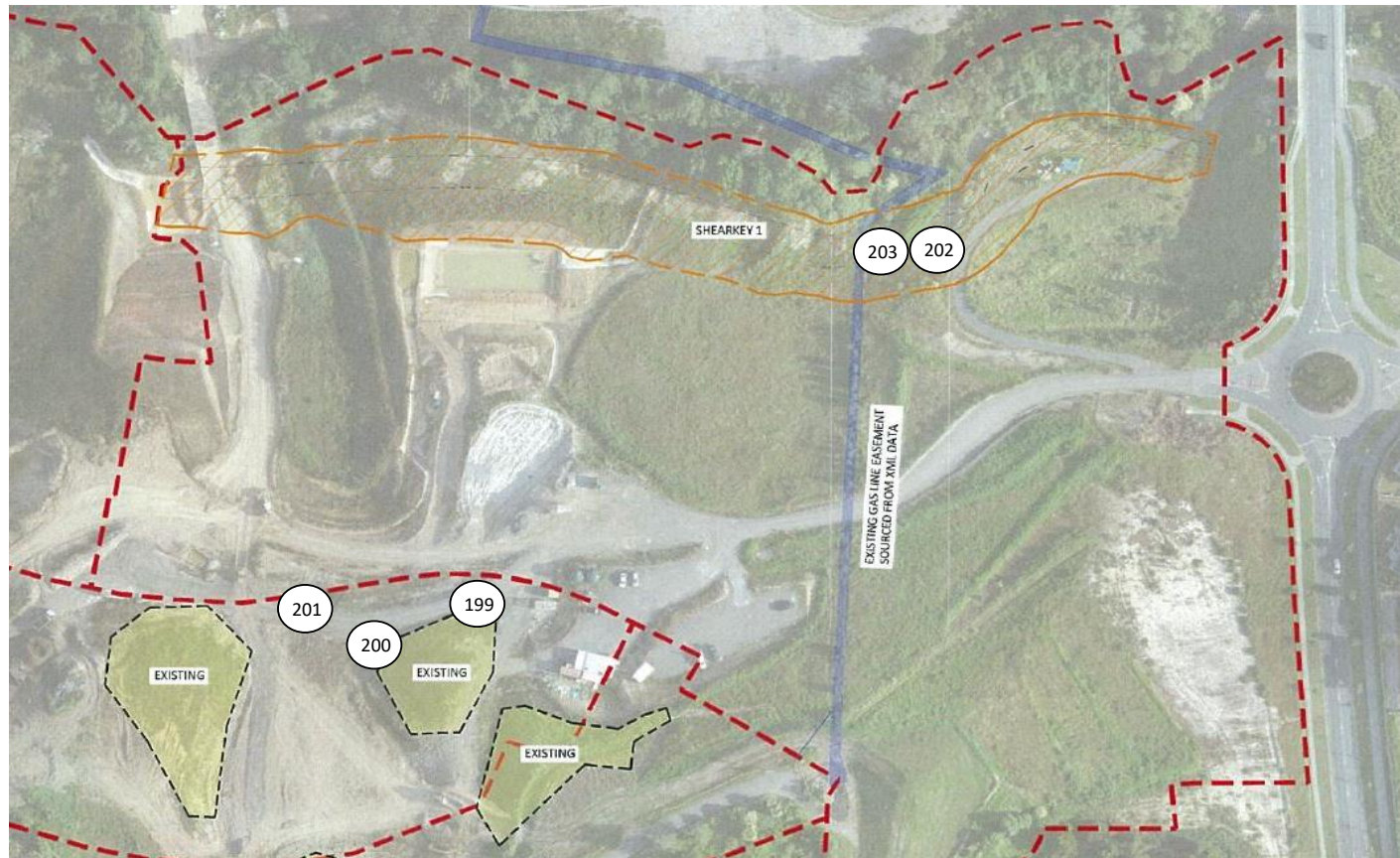
Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6


**Location:** As below

Tested by: TR

Date tested: 3/03/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;">  <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 20px; text-align: right;"> <p>Approved Signatory: Cesar Pura Issue date: 20/03/2020</p> </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
6/03/2020	20W00496	LW	210	Fill	Clayey SILT	Behind Wall 700	1749311	5949004	12.05	150		UTP	UTP	UTP	UTP	1.89	24.1	1.52	2.70	7
6/03/2020	20W00496	LW	211	Fill	Clayey SILT	Behind Wall 700	1749328	5949002	11.99	150		UTP	UTP	UTP	UTP	1.89	22.8	1.54	2.70	8
6/03/2020	20W00496	LW	212	Fill	Clayey SILT	Behind Wall 700	1749328	5949008	12.05	150		UTP	UTP	UTP	UTP	1.90	29.0	1.47	2.70	3
6/03/2020	20W00496	LW	213	Fill	Clayey SILT	General Fill	1749221	5948909	27.30	150		UTP	UTP	UTP	UTP	1.85	27.6	1.45	2.70	7
6/03/2020	20W00496	LW	214	Fill	Clayey SILT	General Fill	1749180	5948886	28.10	150		UTP	UTP	UTP	UTP	1.89	28.2	1.47	2.70	4

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00496

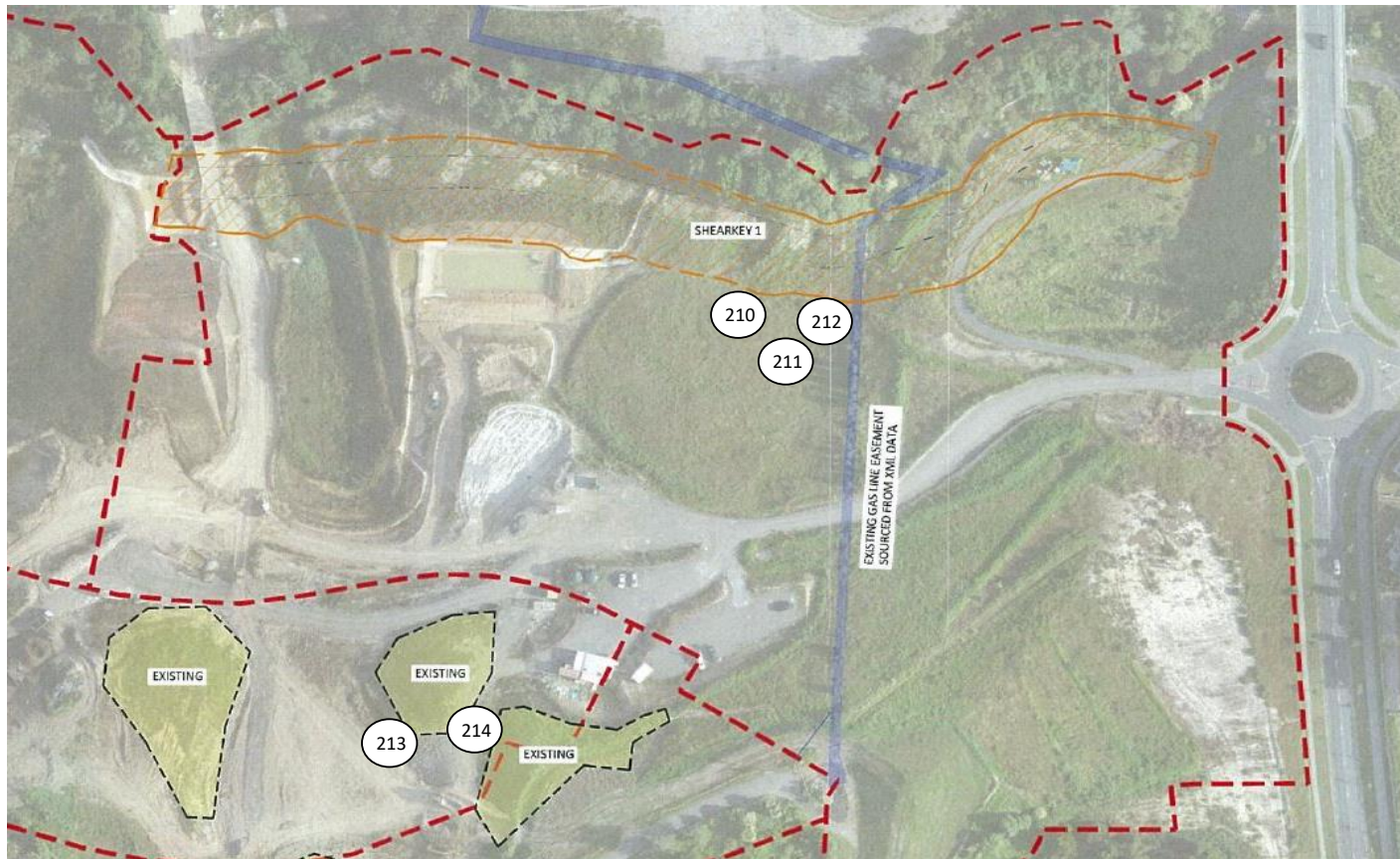
Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 6/03/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa											<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; align-items: center;"> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="margin-left: 100px; text-align: right;"> <p>Approved Signatory: Cesar Pura Issue date: 23/03/2020</p> </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																					
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)	
12/03/2020	20W00562	TR	225	Fill	Silty CLAY	Gully 1	1749197	5948887	29.30	150		181+	181+	169	155	1.84	33.2	1.38	2.70	3	
12/03/2020	20W00562	TR	226	Fill	Silty CLAY	Gully 1	1749196	5948902	29.40	150		148	169	155	181+	1.90	25.6	1.51	2.70	5	
12/03/2020	20W00562	TR	227	Fill	Silty CLAY	Gully 1	1749175	5948893	29.60	150		UTP	UTP	181+	181+	1.86	36.6	1.36	2.70	0	
12/03/2020	20W00562	TR	228	Fill	Silty CLAY	Undercut 5	1749249	5948992	12.60	150		148	155	170	175	1.82	33.2	1.36	2.70	4	
12/03/2020	20W00562	TR	229	Fill	Silty CLAY	Undercut 5	1749205	5948998	13.40	150		UTP	UTP	181+	181+	1.84	32.7	1.39	2.70	3	
12/03/2020	20W00562	TR	230	Fill	Gravelly CLAY	Wall 306	1749382	5948937	19.12	150		UTP	UTP	UTP	UTP	1.77	29.8	1.37	2.70	9	
12/03/2020	20W00562	TR	231	Fill	Gravelly CLAY	Wall 306	1749386	5948908	19.65	150		UTP	UTP	181+	181+	1.76	37.2	1.28	2.70	5	



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00562

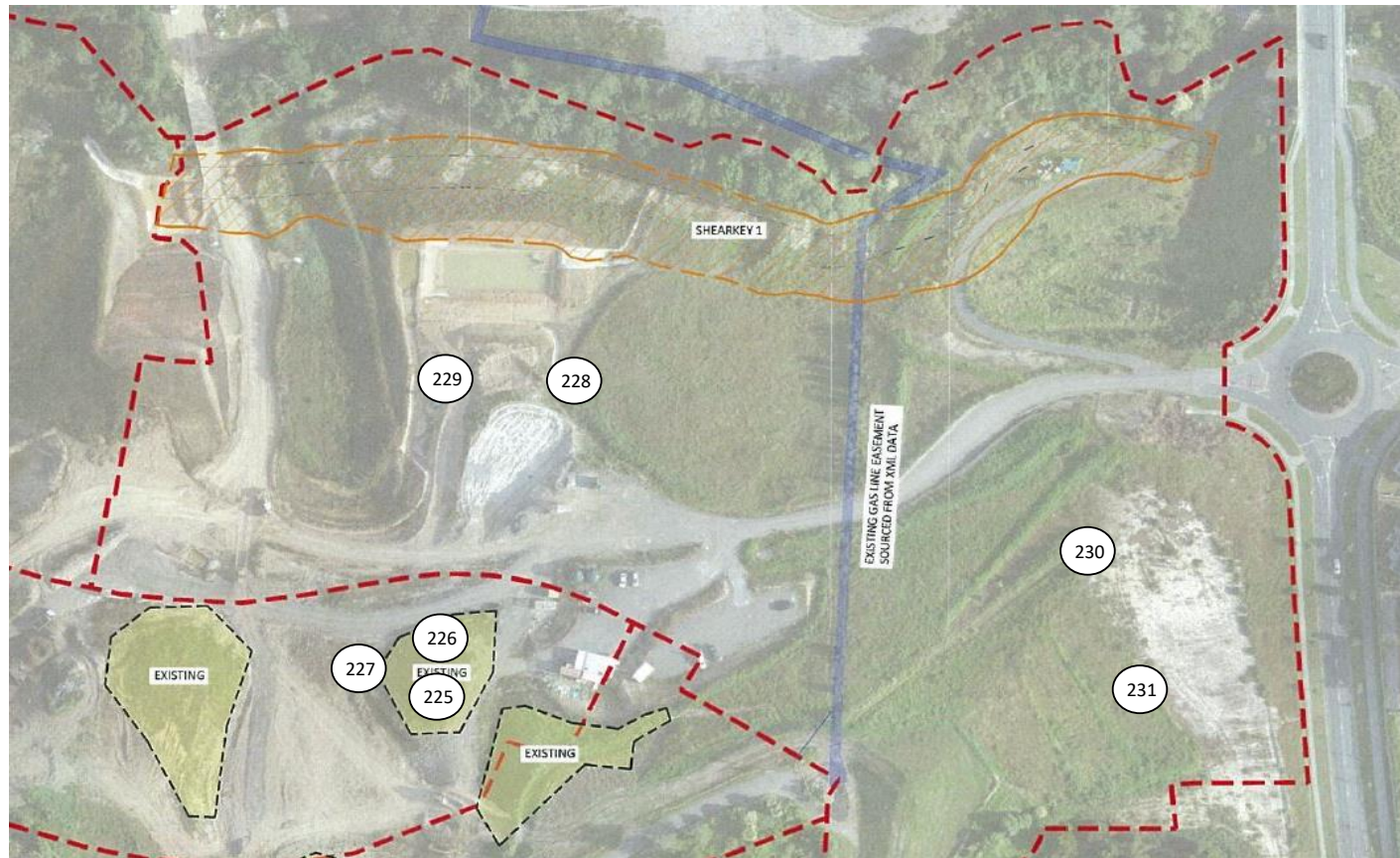
Page No: 2 of 2



**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: TR

Date tested: 12/03/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa	<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2  All tests reported herein have been performed in accordance with the laboratory's scope of accreditation <div style="text-align: right;">   <b>Approved Signatory:</b> Cesar Pura  <b>Issue date:</b> 23/03/2020       </div>
--	--

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

Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
13/03/2020	20W00570	MP	232	Fill	Silty CLAY	Wall 306	391586	831736	21.27	150		157	UTP	120	171	1.73	41.4	1.22	2.70	4
13/03/2020	20W00570	MP	233	Fill	Silty CLAY	Wall 306	391572	831752	21.38	150		UTP	UTP	UTP	163	1.77	41.3	1.25	2.70	2
13/03/2020	20W00570	MP	234	Fill	Silty CLAY	Undercut 5	391423	831826	13.90	150		UTP	UTP	UTP	UTP	1.90	24.9	1.52	2.70	6
13/03/2020	20W00570	MP	235	Fill	Silty CLAY	Undercut 5	391384	831825	14.80	150		UTP	UTP	UTP	UTP	1.93	24.0	1.55	2.70	5

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00570

Page No: 2 of 2

**Project:** 773-AKLGE-206639 - 773-Millwater-Orewa Precinct 6



**Location:** As below

Tested by: MP

Date tested: 13/03/2020





<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa												<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 1 <div style="display: flex; align-items: center; justify-content: space-between; padding: 10px;"> <div style="text-align: center;">  <p><b>IANZ</b> ACCREDITED LABORATORY</p> </div> <div style="font-size: small;"> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Joanna Jones Issue date: 26/05/2020</p> </div> </div>											
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																							
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)	
21/05/2020	20W00804	LW	261	Fill	Clayey SILT	Shear Key 1	150		1749304	5949026	6.56	150		157	163	144	148	1.87	32.2	1.41	2.70	2	
21/05/2020	20W00804	LW	262	Fill	Clayey SILT	Shear Key 1	150		1749288	5949032	6.54	150		174	166	183+	183+	1.88	29.6	1.45	2.70	3	

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00804

Page No: 2 of 2



**Project:** 8

**Location:** As below

Tested by: LW

Date tested: 21/05/2020



<b>Client:</b> Coffey Services NZ Ltd (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c.:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6 <b>Location:</b> Access off Arran Drive, Orewa										<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2 <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>ACCREDITED LABORATORY</p> </div> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: Cesar Pura Issue date: 3/06/2020</p> </div> </div>										
<b>Test method:</b> Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
22/05/2020	20W00820	LW	263	Fill	Clayey SILT	Shear Key 1	1749300	5949027	7.02	150		UTP	UTP	UTP	UTP	1.89	29.9	1.46	2.70	2
22/05/2020	20W00820	LW	264	Fill	Clayey SILT	Shear Key 1	1749288	5949032	7.09	150		UTP	UTP	UTP	UTP	1.85	29.5	1.43	2.70	5



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W00820

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6


**Location:** As below

Tested by: LW

Date tested: 22/05/2020





<b>Client:</b>	Coffey Services (NZ) Limited (Auckland)	<b>PROJECT CODE:</b>	773-ETAM00991AA
<b>Address</b>	PO Box 8261, Symonds Street, Auckland 1150	<b>Page:</b>	1 of 2
<b>Attention:</b>	Stephen Parkes	<div><div>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</div><div>Approved Signatory: Cesar Pura</div><div>Issue date: 23/11/2020</div></div>	
<b>c.c:</b>	-		
<b>Project:</b>	773-AKLGE206639 - 773-Millwater-Orewa Precinct 6		
<b>Location:</b>	Access off Arran Drive, Orewa		

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

Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa				Wet Density (T/m³)	Oven Water Content (%)	Dry Density (T/m³)	Solid Density (T/m³) Assumed	Air Voids (%)
												UTP = Unable to penetrate								
20/11/2020	20W01795	LW	284	Fill	Clayey SILT	Refer to plan	1749118	5948998	16.78	150		147	164	151	177+	1.87	36.9	1.37	2.70	0
20/11/2020	20W01795	LW	285	Fill	Clayey SILT	Refer to plan	1749146	5949010	15.88	150		140	147	161	171	1.86	33.1	1.40	2.70	2

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W01795

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below


Tested by: LW

Date tested: 20/11/2020







<b>Client:</b>	Coffey Services (NZ) Limited (Auckland)	<b>PROJECT CODE:</b>	773-ETAM00991AA
<b>Address</b>	PO Box 8261, Symonds Street, Auckland 1150	<b>Page:</b>	1 of 2
<b>Attention:</b>	Stephen Parkes	<div><div>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</div></div> <div>Approved Signatory: Cesar Pura</div> <div>Issue date: 25/11/2020</div>	
<b>c.c:</b>	-		
<b>Project:</b>	773-AKLGE206639 - 773-Millwater-Orewa Precinct 6		
<b>Location:</b>	Access off Arran Drive, Orewa		

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

Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa				Wet Density (T/m³)	Oven Water Content (%)	Dry Density (T/m³)	Solid Density (T/m³) Assumed	Air Voids (%)
												UTP = Unable to penetrate								
23/11/2020	20W01810	LW	286	Fill	Clayey SILT	Refer to plan	1749170	5949015	16.08	150		UTP	UTP	UTP	UTP	1.91	29.0	1.48	2.70	2
23/11/2020	20W01810	LW	287	Fill	Clayey SILT	Refer to plan	1749148	5949011	16.38	150		UTP	UTP	UTP	UTP	1.87	27.5	1.47	2.70	5
23/11/2020	20W01810	LW	288	Fill	Clayey SILT	Refer to plan	1749127	5948997	16.98	150		UTP	UTP	UTP	UTP	1.87	25.9	1.48	2.70	7

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W01810

Page No: 2 of 2



**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 23/11/2020



<b>Client:</b> Coffey Services (NZ) Limited (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  <b>Location:</b> Access off Arran Drive, Orewa	<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2  <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  <p>Accredited IANZ LABORATORY No:105</p> </div> <div> <p>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</p> </div> <div style="text-align: right;">   <p>Approved Signatory: James McKelvey  Issue date: 4/12/2020</p> </div> </div>
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Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
												UTP = Unable to penetrate								
2/12/2020	20W01858	LW	289	Fill	Clayey SILT	Refer to plan	1749079	5949055	-	150	Shear key	158+	158+	144	140	1.88	31.0	1.43	2.70	2
2/12/2020	20W01858	LW	290	Fill	Clayey SILT	Refer to plan	1749076	5949065	-	150	Shear key	140	149	144	158	1.89	31.0	1.44	2.70	2
2/12/2020	20W01858	LW	291	Fill	Clayey SILT	Refer to plan	1749286	5949027	7.80	150	Retaining Wall 700	UTP	UTP	UTP	UTP	1.90	28.8	1.48	2.70	3
2/12/2020	20W01858	LW	292	Fill	Clayey SILT	Refer to plan	1749257	5949039	7.80	150	Retaining Wall 700	UTP	UTP	UTP	UTP	1.91	30.8	1.46	2.70	1



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM20W01858

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below



Tested by:

LW

Date tested:

2/12/2020



<b>Client:</b> Coffey Services (NZ) Limited (Auckland) <b>Address:</b> PO Box 8261, Symonds Street, Auckland 1150 <b>Attention:</b> Stephen Parkes <b>c.c:</b> - <b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  <b>Location:</b> Access off Arran Drive, Orewa	<b>PROJECT CODE:</b> 773-ETAM00991AA <b>Page:</b> 1 of 2  <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div> All tests reported herein have been performed in accordance with the laboratory's scope of accreditation </div> <div style="text-align: right;">   Approved Signatory: James McKelvey  Issue date: 7/12/2020 </div> </div>
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**Test method:** Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.

Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (T/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (T/m <sup>3</sup> )	Solid Density (T/m <sup>3</sup> ) Assumed	Air Voids (%)
4/12/2020	20W01867	SC	<b>295</b>	Fill	Clayey SILT	Refer to plan	1749077	5949050	-	150	Shear key	153	153	153	153	1.84	29.8	1.42	2.70	5
4/12/2020	20W01867	SC	<b>296</b>	Fill	Clayey SILT	Refer to plan	1749090	5949054	-	150	Shear key	153	153	153	143	1.88	31.1	1.43	2.70	2
4/12/2020	20W01867	SC	<b>297</b>	Fill	Clayey SILT	Refer to plan	1749182	5948965	-	150		170	170	170	170	1.89	31.4	1.43	2.70	2
4/12/2020	20W01867	SC	<b>298</b>	Fill	Clayey SILT	Refer to plan	1749174	5948951	-	150		170	170	170	170	1.87	29.6	1.44	2.70	4

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM20W01867

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by:

SC


Date tested:

4/12/2020







<b>Client:</b>	Coffey Services (NZ) Limited (Auckland)	<b>PROJECT CODE:</b>	773-ETAM00991AA
<b>Address</b>	PO Box 8261, Symonds Street, Auckland 1150	<b>Page:</b>	1 of 2
<b>Attention:</b>	Stephen Parkes	<div><div>All tests reported herein have been performed in accordance with the laboratory's scope of accreditation</div><div>Approved Signatory: Cesar Pura</div><div>Issue date: 14/12/2020</div></div>	
<b>c.c:</b>	-		
<b>Project:</b>	773-AKLGE206639 - 773-Millwater-Orewa Precinct 6		
<b>Location:</b>	Access off Arran Drive, Orewa		

Test method: Test Methods in accordance with: Shear Strength (using field Shear vane in accordance with NZGS 2001): Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1): Moisture contents and dry densities are corrected against oven dried moisture content testing.																				
Date	Work Order No: ETAM...	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL(m)	Probe Test Depth (mm)	Comments	Field Shear Strength in kPa				Wet Density (T/m³)	Oven Water Content (%)	Dry Density (T/m³)	Solid Density (T/m³) Assumed	Air Voids (%)
												UTP = Unable to penetrate								
12/12/2020	20W01927	LW	304	Fill	Clayey SILT	Retaining Wall 700	1749255	5949038	9.00	150		158+	158+	UTP	UTP	1.90	26.1	1.51	2.70	5
12/12/2020	20W01927	LW	305	Fill	Clayey SILT	Retaining Wall 700	1749284	5949026	9.00	150		UTP	UTP	UTP	158+	1.89	26.8	1.49	2.70	5
12/12/2020	20W01927	LW	306	Fill	Clayey SILT	Retaining Wall 700	1749304	5949018	9.00	150		UTP	UTP	UTP	UTP	1.91	26.6	1.50	2.70	4
12/12/2020	20W01927	LW	307	Fill	Clayey SILT	Shear Key	1749044	5949075	-	150		UTP	UTP	UTP	UTP	1.92	28.4	1.50	2.70	2
12/12/2020	20W01927	LW	308	Fill	Clayey SILT	Shear Key	1749046	5949065	-	150		UTP	UTP	UTP	UTP	1.89	29.3	1.46	2.70	3
12/12/2020	20W01927	LW	309	Fill	Clayey SILT	Retaining Wall 311	1749290	5948976	-	150	1.0m from base of wall, CH 140	158+	158+	158+	149	1.87	31.5	1.42	2.70	3
12/12/2020	20W01927	LW	310	Fill	Clayey SILT	Retaining Wall 311	1749309	5948976	-	150	1.0m from base of wall, CH 160	140	158+	158+	154	1.89	31.0	1.44	2.70	2

## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM20W01927

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 12/12/2020



**Report No: EFIL:ETAM20W01960**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM20W01960*

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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}




 Approved Signatory: Cesar Pura  
 Senior Technician

IANZ Site Number: 105

Date of Issue: 18/12/2020

# Earthworks Fill Report

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
14/12/2020	ETAM20W01960	LW	311	1.89	28.6	1.47	2.70	3	UTP	UTP	UTP	UTP	Retaining Wall 311, CH100	-	-	-	Clayey SILT	0.5m below top of Blocks
14/12/2020	ETAM20W01960	LW	312	1.91	30.1	1.46	2.70	2	UTP	UTP	UTP	UTP	Retaining Wall 311, CH150	-	-	-	Clayey SILT	0.5m below top of Blocks
14/12/2020	ETAM20W01960	LW	313	1.93	29.6	1.49	2.70	1	UTP	UTP	UTP	UTP	Retaining Wall 311, CH170	-	-	-	Clayey SILT	0.5m below top of Blocks
14/12/2020	ETAM20W01960	LW	314	1.83	31.6	1.39	2.70	4	158+	158+	158+	144	Shear Key	1749070	5949059	-	Clayey SILT	-
14/12/2020	ETAM20W01960	LW	315	1.87	30.0	1.44	2.70	4	140	154	149	158	Shear Key	1749077	5949063	-	Clayey SILT	-
14/12/2020	ETAM20W01960	LW	316	1.83	29.9	1.41	2.70	6	UTP	UTP	UTP	UTP	Gully 1 above RW 311	1749190	5948966	-	Clayey SILT	0.6m below top of Blocks
14/12/2020	ETAM20W01960	LW	317	1.90	30.2	1.46	2.70	2	UTP	UTP	UTP	UTP	Gully 1 above RW 311	1749175	5948949	-	Clayey SILT	0.3m below top of Blocks

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM20W01960

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 14/12/2020



# Earthworks Fill Report

**Report No: EFIL:ETAM20W01962**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM20W01962*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
 (This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
 Senior Technician  
 IANZ Site Number: 105  
 Date of Issue: 18/12/2020

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1);

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
15/12/2020	ETAM20W01962	LW	318	1.87	28.6	1.46	2.70	5	UTP	UTP	UTP	UTP	Shear Key	1749053	5949067	6.5	Clayey SILT	
15/12/2020	ETAM20W01962	LW	319	1.91	29.1	1.48	2.70	2	UTP	UTP	UTP	UTP	Shear Key	1749060	5949068	6.8	Clayey SILT	
15/12/2020	ETAM20W01962	LW	320	1.85	26.7	1.46	2.70	7	158+	158+	158+	158+	Gully 1	1749139	5948974	-	Clayey SILT	At finished level
15/12/2020	ETAM20W01962	LW	321	1.92	28.7	1.50	2.70	2	158+	158+	158+	158+	Gully 1	1749110	5948963	-	Clayey SILT	At finished level

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM20W01962

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 15/12/2020





# Earthworks Fill Report

**Report No: EFIL:ETAM20W01963**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM20W01963*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 18/12/2020

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001);Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1);

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
16/12/2020	ETAM20W01963	LW	322	1.87	37.2	1.36	2.70	0	158+	158+	158+	158+	Gully 2	1749071	5949068	8.5	Clayey SILT	
16/12/2020	ETAM20W01963	LW	323	1.89	36.1	1.39	2.70	0	158+	158+	158+	158+	Gully 2	1749051	5949066	8.6	Clayey SILT	
16/12/2020	ETAM20W01963	LW	324	1.90	32.5	1.43	2.70	0	UTP	UTP	158+	158+	Shear Key	1749091	5949049	7.0	Clayey SILT	
16/12/2020	ETAM20W01963	LW	325	1.91	33.3	1.44	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749081	5949031	7.0	Clayey SILT	
16/12/2020	ETAM20W01963	LW	326	1.88	33.9	1.41	2.70	0	UTP	UTP	UTP	UTP	Gully 1	1749127	5948956	-	Clayey SILT	0.8m below finished level
16/12/2020	ETAM20W01963	LW	327	1.92	34.5	1.43	2.70	2	UTP	UTP	UTP	UTP	Gully 1	1749128	5948930	-	Clayey SILT	0.8m below finished level

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM20W01963

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 16/12/2020





# Earthworks Fill Report

**Report No: EFIL:ETAM20W01998**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM20W01998*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 22/12/2020

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001);Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
21/12/2020	ETAM20W01998	LW	334	1.85	37.6	1.35	2.70	0	140	154	158	158	Retaining Wall 700	1749263	5949036	9.50	Clayey SILT	
21/12/2020	ETAM20W01998	LW	335	1.84	33.8	1.38	2.70	3	158+	158+	144	154	Retaining Wall 700	1749299	5949020	9.50	Clayey SILT	
21/12/2020	ETAM20W01998	LW	336	1.88	37.8	1.36	2.70	0	158+	158+	158+	158+	Shear Key	1749070	5949063	9.60	Clayey SILT	
21/12/2020	ETAM20W01998	LW	337	1.89	23.1	1.54	2.70	8	UTP	UTP	UTP	UTP	Shear Key	1749067	5949050	9.80	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM20W01998

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 21/12/2020



Issue date: 050517

# Earthworks Fill Report

**Report No: EFIL:ETAM21W00030**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00030*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
 {This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
 Senior Technician  
 IANZ Site Number: 105  
 Date of Issue: 11/01/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
7/01/2021	ETAM21W00030	LW	340	2.01	22.6	1.64	2.70	2	UTP	UTP	UTP	UTP	Shear Key	1749065	5949057	10.00	Clayey SILT	
7/01/2021	ETAM21W00030	LW	341	1.90	37.0	1.39	2.70	0	158+	158+	158+	158+	Gully 2	1749079	5949003	10.50	Clayey SILT	
7/01/2021	ETAM21W00030	LW	342	1.90	31.2	1.45	2.70	1	UTP	UTP	UTP	UTP	Retaining Wall 700	1749247	5949039	10.75	Clayey SILT	
7/01/2021	ETAM21W00030	LW	343	1.88	31.7	1.43	2.70	2	UTP	UTP	UTP	UTP	Retaining Wall 700	1749295	5949026	10.70	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00030

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:**

LW

**Date tested:**

7/01/2021





# Earthworks Fill Report

**Report No: EFIL:ETAM21W00038**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00038*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



 Approved Signatory: Cesar Pura  
 Senior Technician

IANZ Site Number: 105

Date of Issue: 13/01/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
11/01/2021	ETAM21W00038	LW	344	1.93	27.8	1.51	2.70	2	UTP	UTP	UTP	UTP	Gully 2	1749081	5949048	10.2	Clayey SILT	
11/01/2021	ETAM21W00038	LW	345	1.90	21.1	1.57	2.70	9	UTP	UTP	UTP	UTP	Gully 2	1749076	5949033	11.0	Clayey SILT	
11/01/2021	ETAM21W00038	LW	346	1.85	30.4	1.42	2.70	4	UTP	UTP	158+	158+	RW 311 Drainage Fill	1749308	5949003	-	Clayey SILT	Base of wall.
11/01/2021	ETAM21W00038	LW	347	1.93	29.1	1.49	2.70	1	UTP	UTP	UTP	UTP	RW 311 Drainage Fill	1749276	5948989	-	Clayey SILT	Base of wall.

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM21W00038

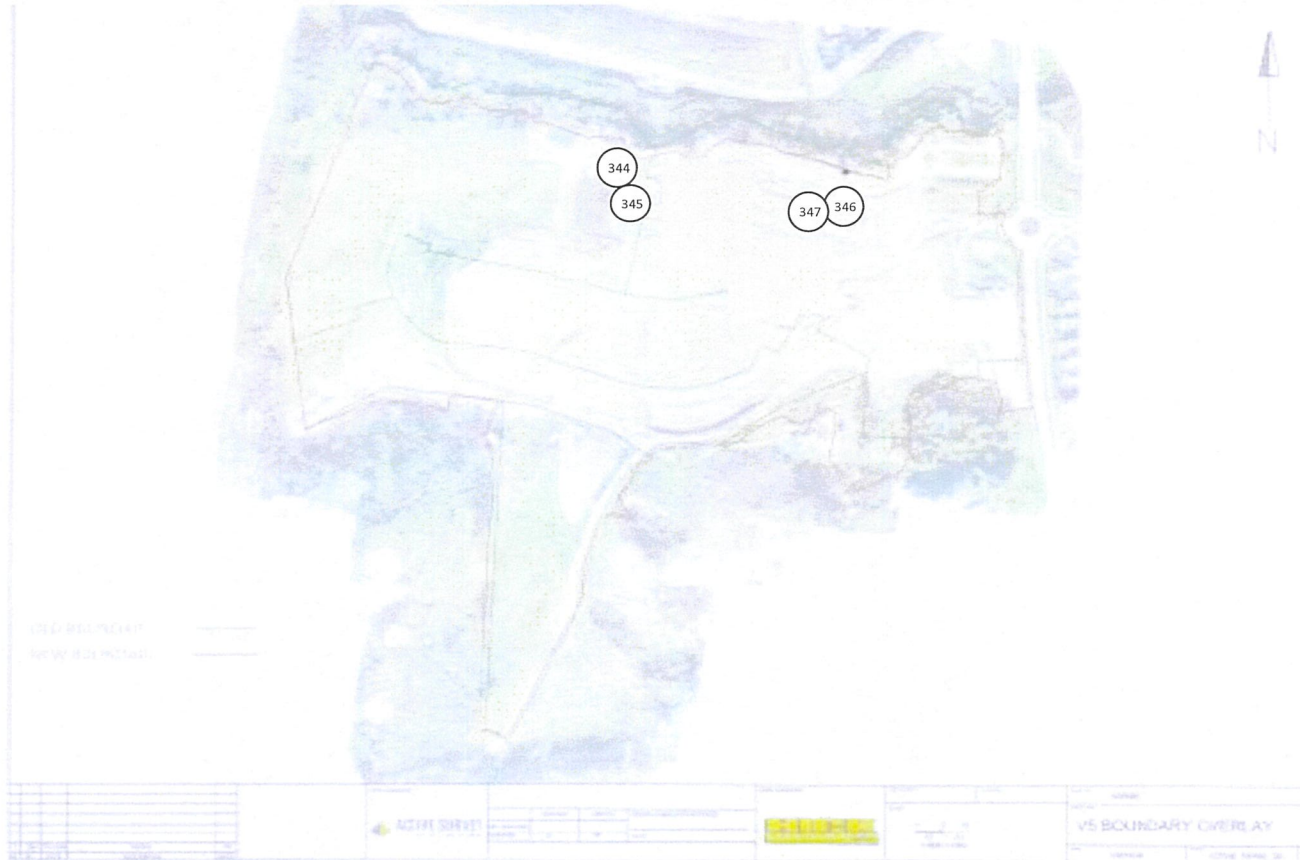
Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 11/01/2021



# Earthworks Fill Report

Report No: EFIL:ETAM21W00049

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00049

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 18/01/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
13/01/2021	ETAM21W00049	LW	350	1.87	30.3	1.44	2.70	3	UTP	UTP	158+	158+	Gully 2	1749075	5949003	14.15	Clayey SILT	
13/01/2021	ETAM21W00049	LW	351	1.98	29.5	1.53	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749056	5949000	14.90	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No: 773-ETAM00991AA**

Work Order No: ETAM21W00049

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by:

LW

Date tested:

13/01/2021



Report No: EFIL:ETAM21W00050

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00050

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}




Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 18/01/2021

## Earthworks Fill Report

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
14/01/2021	ETAM21W00050	LW	352	1.90	35.7	1.40	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749071	5949004	16.80	Clayey SILT	
14/01/2021	ETAM21W00050	LW	353	1.97	25.4	1.57	2.70	2	UTP	UTP	UTP	UTP	Gully 2	1749052	5948993	16.00	Clayey SILT	

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00050

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 14/01/2021





# Earthworks Fill Report

Report No: EFIL:ETAM21W00136

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00136

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 27/01/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
26/01/2021	ETAM21W00136	LW	367	2.00	27.4	1.57	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749011	5949085	7.50	Clayey SILT	
26/01/2021	ETAM21W00136	LW	368	1.98	26.2	1.57	2.70	1	UTP	UTP	UTP	UTP	Shear Key	1749035	5949073	7.80	Clayey SILT	
26/01/2021	ETAM21W00136	LW	369	1.90	38.6	1.37	2.70	0	158+	158+	158+	158+	Shear Key	1749068	5949010	16.32	Clayey SILT	
26/01/2021	ETAM21W00136	LW	370	1.88	36.2	1.38	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749073	5948972	18.93	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00136

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 26/01/2021



# Earthworks Fill Report

**Report No: EFIL:ETAM21W00160**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00160*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



 Approved Signatory: Cesar Pura  
 Senior Technician

IANZ Site Number: 105

Date of Issue: 2/02/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
29/01/2021	ETAM21W00160	LW	377	1.96	30.0	1.51	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749008	5949081	9.80	Clayey SILT	
29/01/2021	ETAM21W00160	LW	378	1.97	34.0	1.47	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749033	5949062	10.00	Clayey SILT	
29/01/2021	ETAM21W00160	LW	379	1.83	31.9	1.38	2.70	5	140	158+	144	154	RE Wall 313	1749440	5948837	-	Clayey SILT	
29/01/2021	ETAM21W00160	LW	380	1.82	32.2	1.38	2.70	5	158+	158+	158+	144	RE Wall 313	1749436	5948869	-	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM21W00160

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 29/01/2021



Issue date: 050517

# Earthworks Fill Report

**Report No: EFIL:ETAM21W00169**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00169*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
 (This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
 Senior Technician  
 IANZ Site Number: 105  
 Date of Issue: 3/02/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
2/02/2021	ETAM21W00169	LW	381	1.91	26.4	1.51	2.70	4	UTP	UTP	UTP	UTP	Retaining Wall 700	1749244	5949042	11.30	Clayey SILT	
2/02/2021	ETAM21W00169	LW	382	1.95	26.4	1.55	2.70	2	UTP	UTP	UTP	UTP	Retaining Wall 700	1749280	5949031	11.20	Clayey SILT	
2/02/2021	ETAM21W00169	LW	383	1.94	27.9	1.51	2.70	2	UTP	UTP	UTP	UTP	Shear Key	1749022	5949066	10.00	Clayey SILT	
2/02/2021	ETAM21W00169	LW	384	1.94	26.1	1.54	2.70	3	UTP	UTP	UTP	UTP	Shear Key	1749038	5949076	10.30	Clayey SILT	
2/02/2021	ETAM21W00169	LW	385	1.94	26.2	1.54	2.70	3	UTP	UTP	UTP	UTP	Gully 2	1749066	5949016	-	Clayey SILT	
2/02/2021	ETAM21W00169	LW	386	1.95	26.6	1.54	2.70	2	UTP	UTP	UTP	UTP	Gully 2	1749078	5949003	-	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00169

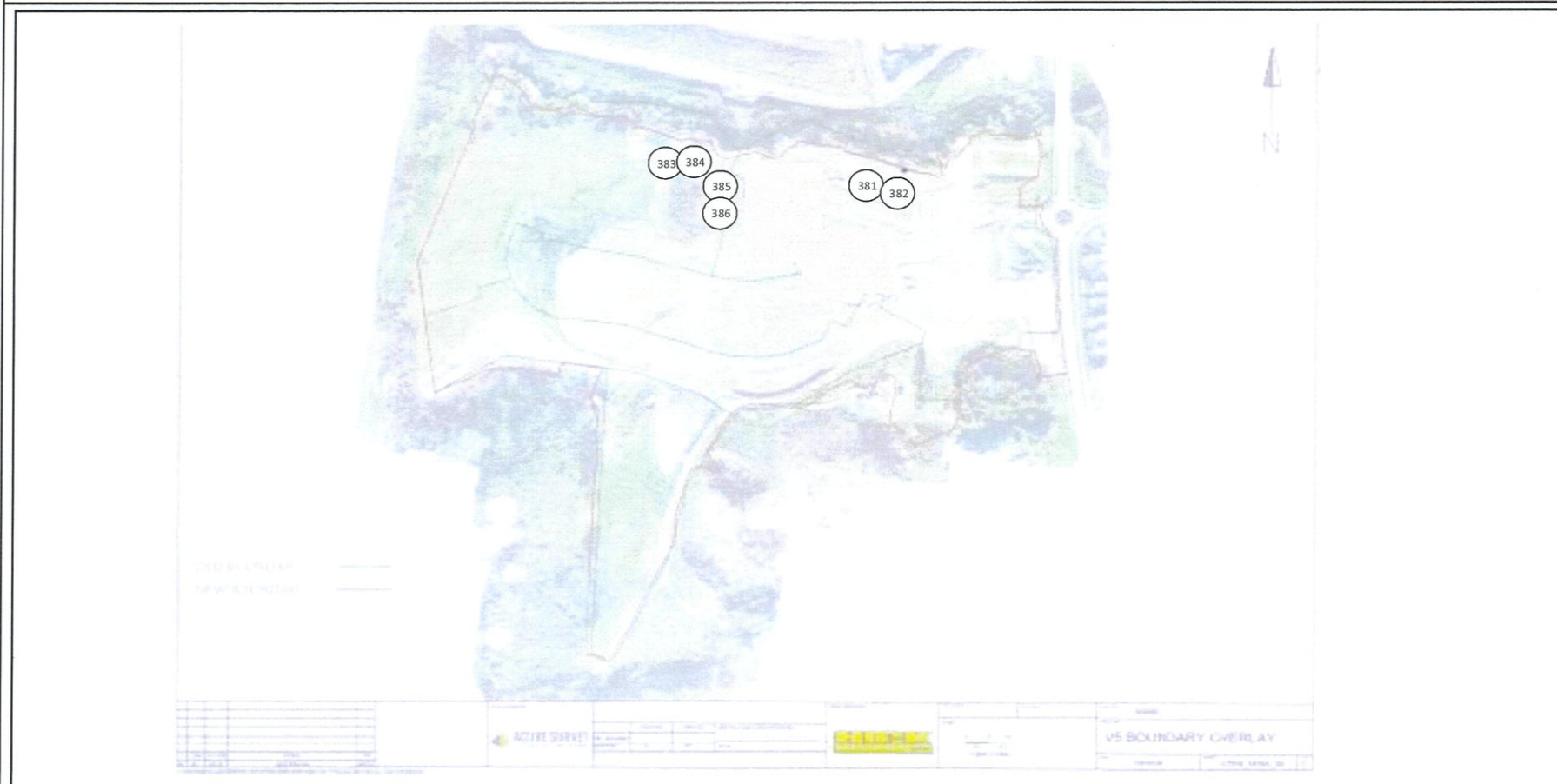
**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 2/02/2021



Issue date: 050517



# Earthworks Fill Report

Report No: EFIL:ETAM21W00195

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00195

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician

IANZ Site Number: 105

Date of Issue: 9/02/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
5/02/2021	ETAM21W00195	LW	397	1.91	32.7	1.44	2.70	0	140	140	158	154	Retaining Wall 306	1749394	5948903	22.50	Clayey SILT	
5/02/2021	ETAM21W00195	LW	398	1.94	29.7	1.49	2.70	0	UTP	UTP	158+	158+	Retaining Wall 306	1749422	5948908	23.80	Clayey SILT	
5/02/2021	ETAM21W00195	LW	399	1.95	42.6	1.37	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749016	5949066	11.00	Clayey SILT	
5/02/2021	ETAM21W00195	LW	400	1.95	35.5	1.44	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749039	5949056	11.50	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00195

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:**

LW

**Date tested:**

5/02/2021



**Report No: EFIL:ETAM21W00248**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00248*

 All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
 (This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



 Approved Signatory: Cesar Pura  
 Senior Technician  
 IANZ Site Number: 105  
 Date of Issue: 24/02/2021

# Earthworks Fill Report

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
22/02/2021	ETAM21W00248	LW	405	1.91	32.6	1.44	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749039	5949058	11.80	Clayey SILT	
22/02/2021	ETAM21W00248	LW	406	1.88	34.0	1.40	2.70	0	UTP	UTP	UTP	UTP	Shear Key	1749063	5949061	11.90	Clayey SILT	
22/02/2021	ETAM21W00248	LW	407	1.94	33.1	1.46	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749104	5949039	12.65	Clayey SILT	
22/02/2021	ETAM21W00248	LW	408	1.91	44.2	1.45	2.70	0	158+	158+	UTP	UTP	Gully 2	1749048	5949013	14.80	Clayey SILT	
22/02/2021	ETAM21W00248	LW	409	1.96	31.3	1.49	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749062	5948988	16.20	Clayey SILT	
22/02/2021	ETAM21W00248	LW	410	1.79	44.2	1.24	2.70	0	140	144	132	154	Retaining Wall 306	1749407	5948897	26.30	Silty CLAY	
22/02/2021	ETAM21W00248	LW	411	1.79	43.0	1.25	2.70	0	140	158	154	154	Retaining Wall 306	1749429	5948899	26.50	Silty CLAY	
22/02/2021	ETAM21W00248	LW	412	1.80	40.7	1.28	2.70	0	144	158	144	140	Retaining Wall 306	1749438	5948888	26.80	Silty CLAY	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00248

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:**

LW

**Date tested:**

22/02/2021



# Earthworks Fill Report

Report No: EFIL:ETAM21W00273

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00273

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 26/02/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
25/02/2021	ETAM21W00273	LW	418	1.96	32.5	1.48	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749044	5949055	14.06	Clayey SILT	
25/02/2021	ETAM21W00273	LW	419	1.92	32.4	1.45	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749065	5949059	14.98	Clayey SILT	
25/02/2021	ETAM21W00273	LW	420	1.92	34.0	1.43	2.70	0	158+	158+	158+	UTP	Gully 2	1749106	5949020	16.10	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00273

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:**

LW

**Date tested:**

25/02/2021





## Earthworks Fill Report

**Report No: EFIL:ETAM21W00292**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W00292*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 2/03/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
1/03/2021	ETAM21W00292	LW	425	1.82	37.4	1.33	2.70	1	140	158	144	154	Retaining Wall 311	1749294	5948975	16.50	Clayey SILT	
1/03/2021	ETAM21W00292	LW	426	1.82	40.9	1.29	2.70	0	158+	158+	158+	144	Retaining Wall 311	1749222	5948996	16.40	Clayey SILT	

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

<p><b>SITE PLAN</b></p> <p>NOT TO SCALE</p>	<p><b>Project No:</b> 773-ETAM00991AA</p> <p>Work Order No: ETAM21W00292</p> <p>Page No: 2 of 2</p>
<p><b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6</p> <p><b>Location:</b> As below</p>	
<p>Tested by: LW</p> <p>Date tested: 1/03/2021</p>	

# Earthworks Fill Report

Report No: EFIL:ETAM21W00327

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00327

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 12/03/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
10/03/2021	ETAM21W00327	LW	435	1.97	29.3	1.53	2.70	0	UTP	UTP	UTP	UTP	Gully 2	1749088	5949040	12.80	Clayey SILT	
10/03/2021	ETAM21W00327	LW	436	1.90	28.5	1.48	2.70	3	UTP	UTP	UTP	UTP	Gully 2	1749108	5949033	13.20	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00327

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:**

LW

**Date tested:**

10/03/2021



# Earthworks Fill Report

**Report No: EFIL:ETAM21W00354**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00354*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** -  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
 (This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
 Senior Technician  
 IANZ Site Number: 105  
 Date of Issue: 17/03/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
16/03/2021	ETAM21W00354	LW	437	1.85	43.9	1.29	2.70	0	158+	158+	158+	154	Gully 2	1749076	5948989	-	Silty CLAY	0.8m below finished level
16/03/2021	ETAM21W00354	LW	438	1.84	43.3	1.28	2.70	0	UTP	UTP	158+	144	Gully 2	1749058	5949000	-	Silty CLAY	0.8m below finished level
16/03/2021	ETAM21W00354	LW	439	1.83	38.1	1.33	2.70	1	158+	158+	158+	UTP	North side of Pond	1749077	5949041	-	Silty CLAY	0.5m below finished level
16/03/2021	ETAM21W00354	LW	440	1.93	34.5	1.43	2.70	0	UTP	UTP	UTP	UTP	North side of Pond	1749093	5949033	-	Silty CLAY	0.5m below finished level

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

<p><b>SITE PLAN</b></p> <p>NOT TO SCALE</p>	<p><b>Project No:</b> 773-ETAM00991AA</p> <p><b>Work Order No:</b> ETAM21W00354</p> <p><b>Page No:</b> 2 of 2</p>
<p><b>Project:</b> 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6</p> <p><b>Location:</b> As below</p>	
<p><b>Tested by:</b> LW</p> <p><b>Date tested:</b> 16/03/2021</p>	



# Earthworks Fill Report

Report No: EFIL:ETAM21W00393

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00393

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 24/03/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
19/03/2021	ETAM21W00393	LW	445	1.84	34.1	1.37	2.70	2	140	149	158+	140	Gully 2	1749062	5948988	-	Clayey SILT	0.4m below finished level
19/03/2021	ETAM21W00393	LW	446	1.89	30.6	1.45	2.70	2	136	144	154	154	Gully 2	1749085	5948989	-	Clayey SILT	0.4m below finished level
19/03/2021	ETAM21W00393	LW	447	1.75	42.8	1.23	2.70	2	158+	158+	140	144	North Gully Fill	1749137	5949026	-	Silty CLAY	5.0m below finished level
19/03/2021	ETAM21W00393	LW	448	1.77	40.4	1.26	2.70	3	158+	158+	158+	144	North Gully Fill	1749150	5949031	-	Silty CLAY	5.0m below finished level

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00393

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW  
**Date tested:** 19/03/2021



## Earthworks Fill Report

**Report No: EFIL:ETAM21W00407**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W00407*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician

IANZ Site Number: 105

Date of Issue: 25/03/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
22/03/2021	ETAM21W00407	LW	449	1.84	38.4	1.33	2.70	0	158+	158+	158+	158+	North Fill Area	1749146	5949019	-	Silty CLAY	2.5m below finished level
22/03/2021	ETAM21W00407	LW	450	1.79	36.0	1.32	2.70	4	140	144	140	158	North Fill Area	1749159	5949021	-	Silty CLAY	4.0m below finished level
22/03/2021	ETAM21W00407	LW	451	1.84	37.8	1.33	2.70	0	140	158+	158+	158+	Gully 1	1749255	5948962	-	Silty CLAY	3.0m below finished level
22/03/2021	ETAM21W00407	LW	452	1.88	34.3	1.40	2.70	0	140	144	144	154	Gully 1	1749286	5948950	-	Silty CLAY	3.0m below finished level

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00407

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:**

LW

**Date tested:**

22/03/2021



# Earthworks Fill Report

Report No: EFIL:ETAM21W00413

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00413

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -


**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa

ACCREDITED  
IANZ  
TESTING LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 26/03/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
23/03/2021	ETAM21W00413	LW	453	1.87	37.4	1.36	2.70	0	158+	140	154	144	Gully 1	1749251	5948969	-	Silty CLAY	2.5m below finished level
23/03/2021	ETAM21W00413	LW	454	1.88	36.7	1.37	2.70	0	158+	158+	144	154	Gully 1	1749270	5948956	-	Silty CLAY	2.5m below finished level
23/03/2021	ETAM21W00413	LW	455	1.82	36.5	1.33	2.70	2	140	158+	144	140	North fill area	1749150	5949025	-	Silty CLAY	2.0m below finished level
23/03/2021	ETAM21W00413	LW	456	1.82	36.3	1.34	2.70	2	140	136	144	158+	North fill area	1749180	5949037	-	Silty CLAY	3.5m below finished level

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

**Work Order No:** ETAM21W00413

**Page No:** 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

**Tested by:** LW

**Date tested:** 23/03/2021





# Earthworks Fill Report

**Report No: EFIL:ETAM21W00486**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W00486*

**Client:** Coffey Services (NZ) Limited (Auckland)  
 PO Box 8261, Symonds Street  
 Auckland 1150  
**Principal:** Stephen Parkes  
**cc to:** Ricky Thomson  
**Project No.:** 773-ETAM00991AA  
**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6  
**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
 {This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
 Senior Technician  
 IANZ Site Number: 105  
 Date of Issue: 9/04/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
7/04/2021	ETAM21W00486	LW	471	1.82	32.9	1.37	2.70	4	146	160	149	135	Gully 2	1749046	5948990	-	Silty CLAY	At finished level
7/04/2021	ETAM21W00486	LW	472	1.86	33.0	1.40	2.70	2	147	146	152	164	Gully 2	1749071	5948949	-	Silty CLAY	At finished level
7/04/2021	ETAM21W00486	LW	473	1.87	33.6	1.40	2.70	1	160	179	149	140	Gully 2	1749093	5948967	-	Silty CLAY	1.0m below finished level
7/04/2021	ETAM21W00486	LW	474	1.85	34.2	1.38	2.70	2	146	156	164	150	Gully 2	1749112	5948936	-	Silty CLAY	1.0m below finished level
7/04/2021	ETAM21W00486	LW	475	1.84	32.2	1.39	2.70	4	179+	179+	179+	179+	Pond Backfill	1749393	5949018	-	Silty CLAY	3.0m below finished level
7/04/2021	ETAM21W00486	LW	476	1.85	32.2	1.40	2.70	3	179+	179+	179+	179+	Pond Backfill	1749409	5949015	-	Silty CLAY	3.0m below finished level

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## SITE PLAN

NOT TO SCALE

**Project No:** 773-ETAM00991AA

Work Order No: ETAM21W00486

Page No: 2 of 2

**Project:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Location:** As below

Tested by: LW

Date tested: 7/04/2021



## Earthworks Fill Report

Report No: EFIL:ETAM21W00627

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00627

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -


**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: James McKelvey  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 13/05/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
11/05/2021	ETAM21W00627	LW	00518	1.90	35.0	1.41	2.70	0.0	179+	179+	143	133	Retaining Wall 311	1749210	5948998	18.90	Fill - Clayey SILT	0
11/05/2021	ETAM21W00627	LW	00519	1.86	35.0	1.37	2.70	1.0	179+	179+	179+	146	Retaining Wall 311	1749243	5948991	19.50	Fill - Clayey SILT	0

Comments:



## Earthworks Fill Report

<b>Client:</b>	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
<b>Principal:</b>	Stephen Parkes
<b>cc to:</b>	-
<b>Project No.:</b>	773-ETAM00991AA
<b>Project Name.:</b>	773-AKLGE206639 - 773-Millwater-Orewa Precinct 6
<b>Project Location:</b>	Access off Arran Drive, Orewa

**Report No: EFIL:ETAM21W00627**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W00627*



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

Approved Signatory: James McKelvey  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 13/05/2021

Site Plan - not to scale



# Earthworks Fill Report

Report No: EFIL:ETAM21W00637

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W00637

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: James McKelvey  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 14/05/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
13/05/2021	ETAM21W00637	AK	00520	1.80	32.4	1.36	2.70	5.4	134	168	141	143	Retaining Wall 311	1749332	5948947	-	Fill - CLAY	0
13/05/2021	ETAM21W00637	AK	00521	1.90	31.2	1.45	2.70	1.3	168	168	168	168	Retaining Wall 311	1749273	5948967	-	Fill - CLAY	0
13/05/2021	ETAM21W00637	AK	00522	1.85	31.9	1.40	2.70	3.5	179	179	149	149	Retaining Wall 311	1749207	5948984	-	Fill - CLAY	0

Comments:

## Earthworks Fill Report

**Report No: EFIL:ETAM21W00637**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W00637*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: James McKelvey  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 14/05/2021

### Site Plan - not to scale





# Earthworks Fill Report

**Report No: EFIL:ETAM21W00703**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W00703*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** Ricky Thomson

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura

Senior Technician

IANZ Site Number: 105

Date of Issue: 25/05/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
24/05/2021	ETAM21W00703	AK	523	1.82	39.7	1.30	2.70	0	180	180	153	153	SWMH Drainage Line 103-105	1749345	5949023	10.09	Silty CLAY	
24/05/2021	ETAM21W00703	AK	524	1.96	31.6	1.49	2.70	0	153	153	170	170		1749349	5949028	9.73	Silty CLAY	
24/05/2021	ETAM21W00703	AK	525	1.72	34.3	1.28	2.70	9	153	153	145	178		1749354	5949041	9.12	Silty CLAY	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## Earthworks Fill Report

**Report No: EFIL:ETAM21W00703**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W00703*

**Client:** Coffey Services (NZ) Limited (Auckland)  
PO Box 8261, Symonds Street  
Auckland 1150

**Principal:** Stephen Parkes

**cc to:** Ricky Thomson

**Project No.:** 773-ETAM00991AA

**Project Name.:** 773-AKLGE206639 - 773-Millwater-Orewa Precinct 6

**Project Location:** Access off Arran Drive, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 25/05/2021



## Earthworks Fill Report

Report No: EFIL:ETAM21W01358

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W01358

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** AKLGE206639 - Millwater Precinct 6k, Orewa

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 12/11/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
11/11/2021	ETAM21W01358	LW	546	1.92	29.2	1.49	2.70	2	UTP	UTP	UTP	UTP	RW 701	1749137	5949044	8.00	Clayey SILT	
11/11/2021	ETAM21W01358	LW	547	1.92	26.2	1.52	2.70	4	UTP	UTP	UTP	UTP	RW 701	1749148	5949049	8.05	Clayey SILT	
11/11/2021	ETAM21W01358	LW	548	1.87	34.1	1.40	2.70	1	175	143	149	145	Gully	1748972	5948879	31.75	Clayey SILT	
11/11/2021	ETAM21W01358	LW	549	1.87	35.4	1.38	2.70	0	168	164	140	149	Gully	1749003	5948873	31.65	Clayey SILT	

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## Earthworks Fill Report

Report No: EFIL:ETAM21W01358

Issue No:1

*This report replaces all previous issues of report no. EFIL:ETAM21W01358*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** AKLGE206639 - Millwater Precinct 6k, Orewa

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 12/11/2021



## Earthworks Fill Report

Report No: EFIL:ETAM21W01367

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W01367

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** AKLGE206639 - Millwater Precinct 6k, Orewa

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

*[Signature]*

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 15/11/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
12/11/2021	ETAM21W01367	LW	550	1.84	32.8	1.38	2.70	3	146	140	160	179	RW701	1749133	5949043	8.60	Clayey SILT	
12/11/2021	ETAM21W01367	LW	551	1.81	30.9	1.38	2.70	6	156	164	149	152	RW701	1749143	5949046	8.65	Clayey SILT	

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## Earthworks Fill Report

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** AKLGE206639 - Millwater Precinct 6k, Orewa

**Project Location:** 117 Kowhai Road, Orewa

**Report No:** EFIL:ETAM21W01367

**Issue No:** 1

*This report replaces all previous issues of report no. EFIL:ETAM21W01367*



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 15/11/2021





# Earthworks Fill Report

**Report No: EFIL:ETAM21W01415**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W01415*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 24/11/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001);Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
22/11/2021	ETAM21W01415	LW	556	1.94	29.2	1.50	2.70	0	UTP	UTP	UTP	UTP	Retaining Wall 701	1749132	5949026	8.60	Clayey SILT	
22/11/2021	ETAM21W01415	LW	557	1.95	29.0	1.51	2.70	0	UTP	UTP	UTP	UTP	Retaining Wall 702	1749142	5949029	8.80	Clayey SILT	
22/11/2021	ETAM21W01415	LW	558	1.92	35.9	1.41	2.70	0	179+	179+	179+	164	Gully	1748968	5948880	32.40	Clayey SILT	
22/11/2021	ETAM21W01415	LW	559	1.93	35.5	1.42	2.70	0	179+	179+	156	168	Gully	1748986	5948894	29.60	Clayey SILT	
22/11/2021	ETAM21W01415	LW	560	1.91	36.6	1.40	2.70	0	164	149	140	179	Gully	1749006	5948904	28.50	Clayey SILT	
22/11/2021	ETAM21W01415	LW	561	1.94	34.7	1.44	2.70	0	179+	146	156	164	Gully	1749018	5948919	27.10	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## Earthworks Fill Report

**Report No: EFIL:ETAM21W01415**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W01415*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 24/11/2021



# Earthworks Fill Report

Report No: EFIL:ETAM21W01476

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W01476

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 6/12/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
3/12/2021	ETAM21W01476	LW	572	1.88	32.8	1.41	2.70	1	149	172	175+	175+	Shear Key	1748998	5949081	8.10	Clayey SILT	
3/12/2021	ETAM21W01476	LW	573	1.89	33.3	1.42	2.70	0	175+	175+	175+	164	Shear Key	1748991	5949076	9.30	Clayey SILT	
3/12/2021	ETAM21W01476	LW	574	1.87	31.4	1.42	2.70	3	137	175+	175+	153	Gully	1748976	5948881	31.95	Clayey SILT	
3/12/2021	ETAM21W01476	LW	575	1.84	34.1	1.37	2.70	2	149	160	156	153	Gully	1748995	5948918	29.55	Clayey SILT	
3/12/2021	ETAM21W01476	LW	576	1.93	27.6	1.51	2.70	2	UTP	UTP	175+	175+	Gully	1749072	5948958	26.90	Clayey SILT	
3/12/2021	ETAM21W01476	LW	577	1.91	26.7	1.51	2.70	4	UTP	UTP	UTP	175+	Gully	1749105	5948969	27.10	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## Earthworks Fill Report

**Report No: EFIL:ETAM21W01476**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W01476*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician

IANZ Site Number: 105

Date of Issue: 6/12/2021



**SITE PLAN** (NOT TO SCALE)

## Earthworks Fill Report

**Report No: EFIL:ETAM21W01485**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W01485*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 7/12/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
6/12/2021	ETAM21W01485	LW	578	1.85	28.5	1.44	2.70	6	175+	175+	175+	UTP	Shear Key	1748987	5949075	12.20	Silty CLAY	
6/12/2021	ETAM21W01485	LW	579	1.91	31.3	1.45	2.70	1	UTP	UTP	175+	UTP	Shear Key	1748994	5949082	10.50	Silty CLAY	
6/12/2021	ETAM21W01485	LW	580	1.88	30.6	1.44	2.70	3	UTP	175+	175+	UTP	Manhole Backfill	1749174	5949001	-	Silty CLAY	Base of manhole

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## Earthworks Fill Report

**Report No: EFIL:ETAM21W01485**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W01485*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 7/12/2021



**SITE PLAN** (NOT TO SCALE)



## Earthworks Fill Report

Report No: EFIL:ETAM21W01492

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W01492

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

*[Signature]*

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 8/12/2021

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
7/12/2021	ETAM21W01492	LW	581	1.90	30.9	1.45	2.70	1	149	164	175+	175+	Gully	1748965	5948906	31.60	Clayey SILT	
7/12/2021	ETAM21W01492	LW	582	1.98	27.9	1.55	2.70	0	UTP	UTP	UTP	UTP	Gully	1749002	5948937	30.20	Clayey SILT	
7/12/2021	ETAM21W01492	LW	583	1.92	33.2	1.44	2.70	0	UTP	UTP	175+	175+	Gully	1749063	5948944	27.60	Clayey SILT	
7/12/2021	ETAM21W01492	LW	584	1.87	30.5	1.43	2.70	3	175+	175+	175+	172	Gully	1749084	5948969	27.40	Clayey SILT	
7/12/2021	ETAM21W01492	LW	585	1.90	33.9	1.42	2.70	0	175+	175+	164	153	Shear Key	1748989	5949067	13.00	Clayey SILT	
7/12/2021	ETAM21W01492	LW	586	1.89	36.9	1.38	2.70	0	175+	160	149	164	Shear Key	1748977	5949066	11.60	Clayey SILT	

### Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

## Earthworks Fill Report

**Report No: EFIL:ETAM21W01492**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W01492*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 8/12/2021



**SITE PLAN** (NOT TO SCALE)

# Earthworks Fill Report

**Report No: EFIL:ETAM21W01514**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM21W01514*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Cesar Pura  
Senior Technician

IANZ Site Number: 105

Date of Issue: 13/12/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
10/12/2021	ETAM21W01514	LW	589	1.96	31.8	1.49	2.70	0	UTP	UTP	UTP	UTP	Retaining Wall 701	1749114	5949038	8.60	Clayey SILT	
10/12/2021	ETAM21W01514	LW	590	1.93	33.8	1.44	2.70	0	UTP	UTP	UTP	UTP	Retaining Wall 701	1749129	5949037	8.50	Clayey SILT	
10/12/2021	ETAM21W01514	LW	591	1.90	31.1	1.45	2.70	1	UTP	UTP	175+	175+	Gully	1749063	5948926	29.00	Clayey SILT	
10/12/2021	ETAM21W01514	LW	592	1.94	31.2	1.48	2.70	0	UTP	UTP	175+	175+	Gully	1749080	5948964	27.60	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)



## Earthworks Fill Report

**Report No: EFIL:ETAM21W01514**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W01514*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 13/12/2021



**SITE PLAN** (NOT TO SCALE)

# Earthworks Fill Report

Report No: EFIL:ETAM21W01557

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM21W01557

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 23/12/2021

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
22/12/2021	ETAM21W01557	LW	597	1.88	32.4	1.42	2.70	1	175+	175+	175+	160	Shear Key	1748950	5949089	8.30	Clayey SILT	
22/12/2021	ETAM21W01557	LW	598	1.91	29.9	1.47	2.70	2	175+	175+	175+	175+	Shear Key	1748974	5949084	9.00	Clayey SILT	
22/12/2021	ETAM21W01557	LW	599	1.85	37.5	1.35	2.70	0	175+	175+	175+	175+	Gully	1749022	5948881	29.60	Clayey SILT	
22/12/2021	ETAM21W01557	LW	600	1.86	31.8	1.41	2.70	3	175+	175+	175+	175+	Gully	1749046	5948916	29.20	Clayey SILT	
22/12/2021	ETAM21W01557	LW	601	1.98	31.8	1.50	2.70	0	UTP	UTP	UTP	UTP	Gully	1749098	5948940	28.00	Clayey SILT	
22/12/2021	ETAM21W01557	LW	602	1.96	31.8	1.49	2.70	0	UTP	UTP	UTP	UTP	Gully	1749080	5948970	27.80	Clayey SILT	
22/12/2021	ETAM21W01557	LW	603	1.94	30.1	1.49	2.70	0	UTP	UTP	UTP	UTP	Retaining Wall 701	1749110	5949033	8.80	Clayey SILT	
22/12/2021	ETAM21W01557	LW	604	1.97	29.2	1.52	2.70	0	UTP	UTP	UTP	UTP	Retaining Wall 701	1749119	5949035	9.00	Clayey SILT	

## Comments:

Moisture contents and dry densities are corrected against oven dried moisture content testing. Probe Depth: 150mm; SG= 2.70 T/m3 (Assumed)

**Report No: EFIL:ETAM21W01557**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM21W01557*

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



*[Handwritten signature]*

Approved Signatory: Cesar Pura  
Senior Technician  
IANZ Site Number: 105  
Date of Issue: 23/12/2021

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

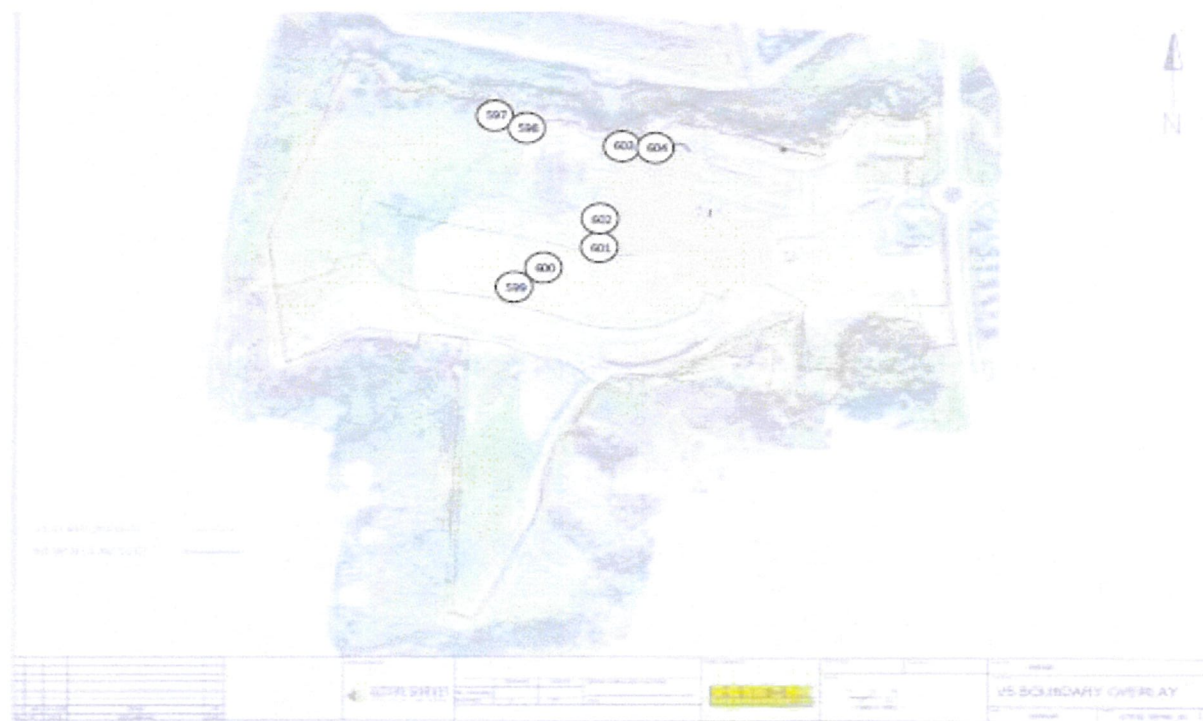
**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



**SITE PLAN** (NOT TO SCALE)



**Report No: EFIL:ETAM22W00017**
**Issue No:1**
*This report replaces all previous issues of report no. EFIL:ETAM22W00017*


All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 14/01/2022

## Earthworks Fill Report

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001);Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2); Water Content Testing (in accordance with NZS 4402:1986 Test 2.1);  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
11/01/2022	ETAM22W00017	LW	611	1.98	27.2	1.55	2.70	0.1	UTP	UTP	UTP	UTP	Gully	1748966	5948916	-	Clayey silt	-
11/01/2022	ETAM22W00017	LW	612	1.96	31.1	1.50	2.70	0.0	UTP	UTP	UTP	UTP	Gully	1748998	5948902	-	Clayey silt	-
11/01/2022	ETAM22W00017	LW	613	1.95	29.5	1.51	2.70	0.0	UTP	UTP	UTP	UTP	Gully	1749052	5948933	-	Clayey silt	-
11/01/2022	ETAM22W00017	LW	614	1.97	30.5	1.51	2.70	0.0	UTP	UTP	UTP	UTP	Gully	1749085	5948972	-	Clayey silt	-
11/01/2022	ETAM22W00017	LW	615	1.97	16.7	1.69	2.70	9.4	UTP	UTP	UTP	UTP	RW701	1749126	5949032	11.0	Clayey silt	-
11/01/2022	ETAM22W00017	LW	616	1.96	21.8	1.61	2.70	5.5	UTP	UTP	UTP	UTP	RW701	1749087	5949036	11.2	Clayey silt	-

**Comments:**

## Earthworks Fill Report

**Report No: EFIL:ETAM22W00017**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00017*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 14/01/2022



**SITE PLAN** (NOT TO SCALE)

**Report No: EFIL:ETAM22W00039**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00039*

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 18/01/2022

## Earthworks Fill Report

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
14/01/2022	ETAM22W00039	LW	625	1.96	27.1	1.54	2.70	1.1	UTP	UTP	175	175	Undercut Area	1749018	5949021	3.0	Clayey Silt	To Finish Level
14/01/2022	ETAM22W00039	LW	626	1.95	25.7	1.55	2.70	2.6	UTP	UTP	UTP	UTP	Gully	1749053	5948923	29	Clayey Silt	-
14/01/2022	ETAM22W00039	LW	627	1.97	26.8	1.55	2.70	1.0	UTP	UTP	UTP	UTP	Gully	1749018	5948903	29.3	Clayey Silt	-

**Comments:**



## Earthworks Fill Report

**Report No: EFIL:ETAM22W00039**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00039*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 18/01/2022



**SITE PLAN** (NOT TO SCALE)

# Earthworks Fill Report

Report No: EFIL:ETAM22W00072

Issue No: 1

This report replaces all previous issues of report no. EFIL:ETAM22W00072

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 26/01/2022

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
19/01/2022	ETAM22W00072	LW	636	1.84	31.9	1.40	2.70	3.7	175	175	175	175	Gully	1749057	5948921	27.05	Silty Clay	-
19/01/2022	ETAM22W00072	LW	637	1.87	32.3	1.42	2.70	1.8	175	175	175	175	Gully	1749048	5948902	28.00	Silty Clay	-
19/01/2022	ETAM22W00072	LW	638	1.83	31.9	1.39	2.70	4.4	175	175	175	175	Gully	1749012	5948897	28.15	Silty Clay	-
19/01/2022	ETAM22W00072	LW	639	1.85	32.3	1.40	2.70	3.2	175	175	175	175	Gully	1748899	5948888	28.60	Silty Clay	-
19/01/2022	ETAM22W00072	LW	640	1.86	29.0	1.44	2.70	4.7	175	175	175	175	RW 701	1749119	5949040	11.00	Silty Clay	-
19/01/2022	ETAM22W00072	LW	641	1.85	28.7	1.44	2.70	5.3	175	175	175	175	RW 701	1749100	5949042	10.8	Silty Clay	-
19/01/2022	ETAM22W00072	LW	642	1.88	24.0	1.52	2.70	7.5	175	175	175	175	RE Wall 604 A	1749090	5949062	8.05	Silty Clay	-
19/01/2022	ETAM22W00072	LW	643	1.89	24.7	1.51	2.70	6.5	175	175	175	175	RE Wall 604 A	1749085	5949067	7.95	Silty Clay	-

Comments:



## Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

# Earthworks Fill Report

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa

**Report No: EFIL:ETAM22W00072**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00072*



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton

Director-Testing

IANZ Site Number: 105

Date of Issue: 26/01/2022



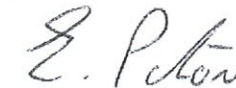


Report No: EFIL:ETAM22W00113

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM22W00113

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}



Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 2/02/2022

## Earthworks Fill Report

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
20/01/2022	ETAM22W00113	LW	644	1.85	40.1	1.32	2.70	0.0	175	175	149	160	Gully	1749034	5948927	28.95	Silty CLAY	-
20/01/2022	ETAM22W00113	LW	645	1.87	42.5	1.31	2.70	0.0	146	140	172	175	Gully	1748977	5948921	29.1	Silty CLAY	-
20/01/2022	ETAM22W00113	LW	646	1.84	42.0	1.30	2.70	0.0	175	175	175	137	Gully	1749009	5948886	29.55	Silty CLAY	-
20/01/2022	ETAM22W00113	LW	647	1.85	44.7	1.28	2.70	0.0	149	164	175	146	Gully	1748991	5948873	30.15	Silty CLAY	-
20/01/2022	ETAM22W00113	LW	648	1.95	26.4	1.54	2.70	2.2	UTP	UTP	UTP	175	RE Wall 604A	1749076	5949073	8.85	Silty CLAY	-
20/01/2022	ETAM22W00113	LW	649	1.89	25.5	1.51	2.70	5.9	175	175	175	UTP	RE Wall 604A	1749077	5949061	8.75	Silty CLAY	-

Comments:

## Earthworks Fill Report

Report No: EFIL:ETAM22W00113

Issue No:1

*This report replaces all previous issues of report no. EFIL:ETAM22W00113*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 2/02/2022





# Earthworks Fill Report

Report No: EFIL:ETAM22W00179

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM22W00179

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

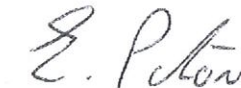
**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 8/02/2022

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
4/02/2022	ETAM22W00179	LW	667	1.86	32.6	1.41	2.70	2.1	149	160	175	175	RE Wall 604A	1749068	5949063	9.7	Silty Clay	-
4/02/2022	ETAM22W00179	LW	668	1.89	32.4	1.43	2.70	0.7	175	175	175	175	RE Wall 604A	1749075	5949054	9.8	Silty Clay	-
4/02/2022	ETAM22W00179	LW	669	1.90	33.3	1.43	2.70	0.0	175	175	175	175	RW 701	1749100	5949041	11.3	Silty Clay	-
4/02/2022	ETAM22W00179	LW	670	1.88	34.8	1.39	2.70	0.1	172	140	149	156	RW 701	1749116	5949042	11.35	Silty Clay	-
4/02/2022	ETAM22W00179	LW	671	1.92	30.8	1.47	2.70	0.3	146	143	153	140	Gully	1748980	5948855	31.3	Silty Clay	-
4/02/2022	ETAM22W00179	LW	672	1.89	29.7	1.46	2.70	2.7	160	175	175	160	Gully	1748990	5948900	29.85	Silty Clay	-
4/02/2022	ETAM22W00179	LW	673	1.95	29.6	1.50	2.70	0.0	175	175	175	175	Gully	1749009	5948909	28.15	Silty Clay	-
4/02/2022	ETAM22W00179	LW	674	1.85	29.4	1.43	2.70	4.8	153	156	140	146	Gully	1749026	5948921	28.05	Silty Clay	-

Comments:





## Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

# Earthworks Fill Report

Report No: EFIL:ETAM22W00179

Issue No:1

*This report replaces all previous issues of report no. EFIL:ETAM22W00179*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



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

(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

Approved Signatory: Eric Paton  
Director-Testing

IANZ Site Number: 105

Date of Issue: 8/02/2022



SITE PLAN (NOT TO SCALE)

**Auckland Laboratory**

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

## Earthworks Fill Report

**Report No: EFIL:ETAM22W00242****Issue No:1***This report replaces all previous issues of report no. EFIL:ETAM22W00242*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 22/02/2022

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
18/02/2022	ETAM22W00242	SC	681	1.77	34.2	1.32	2.70	6.3	188	168	176	184	Ref to plan	1749816	5948951	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	682	1.79	36.2	1.32	2.70	3.7	168	188	188	184	Ref to plan	1749022	5948987	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	683	1.84	30.7	1.41	2.70	4.7	188	188	UTP	UTP	Gully	1748984	5948917	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	684	1.94	26.5	1.53	2.70	2.4	UTP	UTP	188	188	Gully	1749022	5948894	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	685	1.84	41.7	1.30	2.70	0.0	UTP	UTP	UTP	UTP	Silt Pond	1749065	5948937	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	686	1.93	26.5	1.52	2.70	3.2	UTP	UTP	UTP	UTP	Silt Pond	1749109	5948928	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	687	1.86	27.0	1.46	2.70	6.2	UTP	UTP	UTP	UTP	RW 312 Backfill	1749058	5949002	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	688	1.80	31.5	1.37	2.70	6.2	UTP	UTP	UTP	UTP	RW 312 Backfill	1749081	5948998	-	Silty Clay	-
18/02/2022	ETAM22W00242	SC	689	1.73	37.9	1.26	2.70	5.8	146	155	146	160	Stage 1 Rock	1749321	5948750	-	Silty Clay	250mm below F/L

**Comments:**

## Earthworks Fill Report

Report No: EFIL:ETAM22W00242

Issue No:1

*This report replaces all previous issues of report no. EFIL:ETAM22W00242*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 22/02/2022



SITE PLAN (NOT TO SCALE)



**Auckland Laboratory**

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

**Report No: EFIL:ETAM22W00261****Issue No:1***This report replaces all previous issues of report no. EFIL:ETAM22W00261*

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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton

Director-Testing

IANZ Site Number: 105

Date of Issue: 23/02/2022

**Earthworks Fill Report**

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa

**Test Results**

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
22/02/2022	ETAM22W00261	SC	694	1.87	28.4	1.45	2.70	5.0	188	188	168	168	Siltpond Backfill	1749016	5948957	-	Silty Clay	-
22/02/2022	ETAM22W00261	SC	695	1.83	33.2	1.37	2.70	3.5	168	168	168	168	Gully	1749076	5948939	-	Silty Clay	-
22/02/2022	ETAM22W00261	SC	696	1.89	27.5	1.48	2.70	4.3	168	168	188	188	Main Gully	1749025	5948902	-	Silty Clay	-

**Comments:**



## Earthworks Fill Report

### Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

**Report No: EFIL:ETAM22W00261**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00261*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



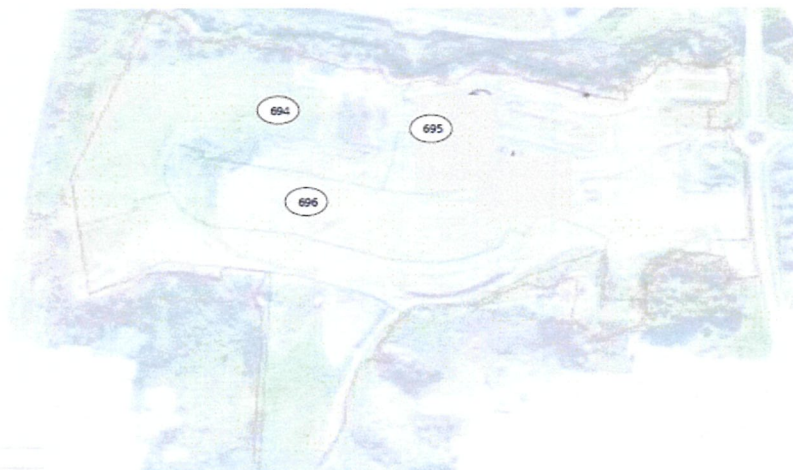
All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
Director-Testing

IANZ Site Number: 105

Date of Issue: 23/02/2022





# Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

## Earthworks Fill Report

Report No: EFIL:ETAM22W00276

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM22W00276

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Liam Walker  
Assistant Manager  
IANZ Site Number: 105  
Date of Issue: 25/02/2022

### Test Results



Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
24/02/2022	ETAM22W00276	SC	700	1.87	30.0	1.44	2.70	3.8	UTP	UTP	168	168	Refer to Plan	1749096	5948920	-	Silty CLAY	RL unavailable
24/02/2022	ETAM22W00276	SC	701	1.76	37.6	1.28	2.70	4.5	146	155	168	146	Silt Pond	1749017	5948946	-	Silty CLAY	RL unavailable
24/02/2022	ETAM22W00276	SC	702	1.79	32.2	1.35	2.70	6.5	146	155	146	155	Silt Pond	1749009	5948975	-	Silty CLAY	RL unavailable
24/02/2022	ETAM22W00276	SC	703	1.87	31.1	1.43	2.70	2.7	168	168	180	180	Gully	1748994	5948873	-	Silty CLAY	RL unavailable
24/02/2022	ETAM22W00276	SC	704	1.87	31.2	1.43	2.70	2.6	160	168	155	160	Gully	1749001	5948917	-	Silty CLAY	RL unavailable

Comments:



## Earthworks Fill Report

<b>Report No: EFIL:ETAM22W00276</b>	
<b>Issue No:1</b>	
<i>This report replaces all previous issues of report no. EFIL:ETAM22W00276</i>	
	All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.
	{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}
	
	Approved Signatory: Liam Walker Assistant Manager
	IANZ Site Number: 105 Date of Issue: 25/02/2022

<b>Client:</b>	Tetra Tech Coffey (NZ) Limited- Auckland Coffey House, Level 4, Teed Street New Market Auckland 1023
<b>Principal:</b>	Stephen Parkes
<b>cc to:</b>	-
<b>Project No.:</b>	773-ETAM01553
<b>Project Name.:</b>	773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA
<b>Project Location:</b>	117 Kowhai Road, Orewa



# Earthworks Fill Report

Report No: EFIL:ETAM22W00341

Issue No:1

This report replaces all previous issues of report no. EFIL:ETAM22W00341

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Liam Walker  
Assistant Manager  
IANZ Site Number: 105  
Date of Issue: 9/03/2022

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
7/03/2022	ETAM22W00341	SC	723	1.90	28.3	1.48	2.70	3.2	208+	208+	208+	UTP	Gully 2	1748981	5948889	-	Silty CLAY	RL unavailable
7/03/2022	ETAM22W00341	SC	724	1.87	29.3	1.45	2.70	4.1	208+	208+	UTP	UTP	Gully 2	1749004	5948916	-	Silty CLAY	RL unavailable
7/03/2022	ETAM22W00341	SC	725	1.90	31.9	1.44	2.70	1.0	188	188	208+	208+	Gully 2	1749060	5948901	-	Silty CLAY	RL unavailable
7/03/2022	ETAM22W00341	SC	726	1.83	29.5	1.42	2.70	5.8	200	200	UTP	UTP	Silt Pond	1749004	5948988	-	Silty CLAY	RL unavailable
7/03/2022	ETAM22W00341	SC	727	1.74	23.0	1.41	2.70	15.3	UTP	UTP	UTP	UTP	A7-A15	1749168	5948985	-	Silty CLAY	At finished level
7/03/2022	ETAM22W00341	SC	728	1.69	25.0	1.35	2.70	16.1	UTP	UTP	UTP	UTP	A15-15B	1749200	5948998	-	Silty CLAY	At finished level
7/03/2022	ETAM22W00341	SC	729	1.68	25.6	1.34	2.70	16.1	UTP	UTP	UTP	UTP	15B-15C	1749220	5948990	-	Silty CLAY	At finished level
7/03/2022	ETAM22W00341	SC	730	1.84	29.5	1.42	2.70	5.5	UTP	UTP	UTP	UTP	15C-15D	1749248	5948982	-	Silty CLAY	At finished level
7/03/2022	ETAM22W00341	SC	731	1.73	23.4	1.40	2.70	15.3	UTP	UTP	UTP	UTP	15-15D	1749275	5948977	-	Silty CLAY	At finished level

Comments:





## Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

**Report No: EFIL:ETAM22W00341**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00341*

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

(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Liam Walker

Assistant Manager

IANZ Site Number: 105

Date of Issue: 9/03/2022

## Earthworks Fill Report

<b>Client:</b>	Tetra Tech Coffey (NZ) Limited- Auckland Coffey House, Level 4, Teed Street New Market Auckland 1023
<b>Principal:</b>	Stephen Parkes
<b>cc to:</b>	-
<b>Project No.:</b>	773-ETAM01553
<b>Project Name.:</b>	773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA
<b>Project Location:</b>	117 Kowhai Road, Orewa







## Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

# Earthworks Fill Report

**Report No: EFIL:ETAM22W00363**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00363*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 14/03/2022

## Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):

Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
10/03/2022	ETAM22W00363	SC	737	1.82	25.2	1.45	2.70	9.7	UTP	UTP	UTP	UTP	A 7 - A 15 Retest	1749168	5948985	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	738	1.84	24.8	1.47	2.70	9.0	UTP	UTP	UTP	UTP	15 A - 15 B	1749200	5948998	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	739	1.89	25.5	1.51	2.70	5.9	UTP	UTP	UTP	UTP	15 B - 15 C	1749220	5948996	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	740	1.93	26.3	1.53	2.70	3.1	UTP	UTP	UTP	UTP	15 C - 15 D	1749275	5948977	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	741	1.95	25.3	1.56	2.70	3.1	UTP	UTP	UTP	UTP	Main Gully Fill	1748979	5948877	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	742	1.89	29.3	1.46	2.70	2.9	UTP	UTP	UTP	UTP	Main Gully Fill	1748992	5948915	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	743	1.85	29.8	1.43	2.70	4.7	168	168	160	160	Main Gully Fill	1749052	5948941	-	Silty Clay	Finished Level
10/03/2022	ETAM22W00363	SC	744	1.84	33.0	1.38	2.70	3.3	146	146	160	160	Silt Pond	1749012	5948961	-	Silty Clay	Finished Level

**Comments:**



## Earthworks Fill Report

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa

### Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

**Report No: EFIL:ETAM22W00363**

**Issue No:1**

*This report replaces all previous issues of report no. EFIL:ETAM22W00363*



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

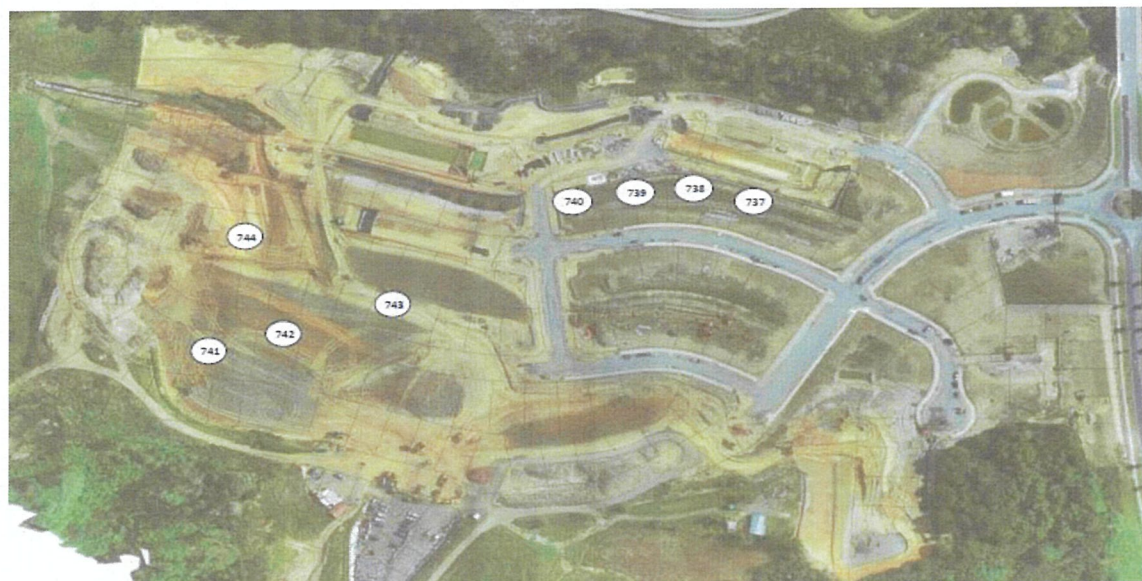
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton

Director-Testing

IANZ Site Number: 105

Date of Issue: 14/03/2022





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01331

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes

Project No.: 773-ETAM01553

Project Name: AKLGE206639 - Millwater Precinct 6k, Orewa

Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 9/11/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage

Tested By: Liam Walker

Date Tested: 5/11/2021

Time Tested: 07:30

Material: GAP 65

Start Route Position:

Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External

MDD Method: ~

Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %

Min. Dry Density (t/m<sup>3</sup>): 2.01

Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
60	0.5	Face of R. Wall	1st Layer	5.8	2.20	2.08	98
50	0.5	Face of R. Wall	1st Layer	4.6	2.11	2.01	95
40	0.5	Face of R. Wall	1st Layer	4.8	2.17	2.07	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01411

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 24/11/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 19/11/2021  
Time Tested: 13:45  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
35	1.0	Face of R. Wall	4th Layer	8.8	2.32	2.14	101
45	1.0	Face of R. Wall	4th Layer	9.0	2.28	2.09	99
55	1.0	Face of R. Wall	4th Layer	8.7	2.36	2.17	103
65	1.0	Face of R. Wall	4th Layer	8.4	2.36	2.18	103

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)

## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01416

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes

Project No.: 773-ETAM01553

Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 24/11/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 22/11/2021  
Time Tested: 09:00  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
45	1.0	Face of R. Wall	5th Layer	7.0	2.17	2.03	96
55	1.5	Face of R. Wall	5th Layer	7.2	2.23	2.08	98
65	1.0	Face of R. Wall	5th Layer	6.7	2.26	2.11	100

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)

## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01435

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 26/11/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 25/11/2021  
Time Tested: 08:45  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
35	0.5	Face of R. Wall	1st Layer	8.1	2.21	2.04	96
30	0.5	Face of R. Wall	1st Layer	8.5	2.21	2.04	96
25	0.5	Face of R. Wall	1st Layer	8.8	2.26	2.08	98
20	0.5	Face of R. Wall	1st Layer	8.9	2.25	2.07	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01450

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes

Project No.: 773-ETAM01553

Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

Lot No.: - TRN: -



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number: 105  
Date of Issue: 30/11/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 29/11/2021  
Time Tested: 14:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
65	1.0	Wall face	7.9	2.28	2.11	100
55	1.5	Wall face	7.9	2.30	2.13	101
45	1.0	Wall face	11.1	2.32	2.09	99

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01478

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 6/12/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 3/12/2021  
Time Tested: 08:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
95	1.0	Wall face	Base Layer	8.1	2.19	2.02	96
80	1.0	Wall face	Base Layer	7.3	2.22	2.07	98
65	1.0	Wall face	Base Layer	7.6	2.25	2.09	99
50	1.0	Wall face	6th Layer	8.2	2.25	2.08	98
35	1.0	Wall face	6th Layer	7.8	2.24	2.08	98
20	1.0	Wall face	6th Layer	9.4	2.28	2.08	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01496

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes

Project No.: 773-ETAM01553

Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 8/12/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 7/12/2021  
Time Tested: 14:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
50	1.0	Wall face	7th Layer	7.9	2.22	2.06	97
35	1.0	Wall face	7th Layer	8.5	2.23	2.05	97
20	1.0	Wall face	7th Layer	9.1	2.27	2.08	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01507

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 9/12/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 8/12/2021  
Time Tested: 09:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
65	1.0	Wall face	3rd Layer	10.2	2.30	2.08	98
80	1.0	Wall face	3rd Layer	9.3	2.26	2.06	97
95	1.0	Wall face	3rd Layer	9.9	2.27	2.07	97

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01525

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 14/12/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 13/12/2021  
Time Tested: 08:00  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
15	1.0	Wall face	Base Layer	10.5	2.31	2.09	99
20	1.0	Wall face	8th Layer	9.6	2.34	2.13	101
35	1.0	Wall face	8th Layer	10.1	2.35	2.13	101
50	1.0	Wall face	8th Layer	11.4	2.26	2.03	96
65	1.0	Wall face	8th Layer	9.6	2.28	2.08	98
80	1.0	Wall face	8th Layer	10.4	2.32	2.10	99
95	1.0	Wall face	8th Layer	9.8	2.35	2.14	101
100	1.0	Wall face	Base Layer	9.9	2.32	2.11	99

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM21W01570

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes

Project No.: 773-ETAM01553

Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

Lot No.: - TRN: -



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

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Cesar Pura  
(Senior Technician)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 30/12/2021

### Testing Details

Site Tested: Retaining Wall 701, as per clients' chainage  
Tested By: Liam Walker  
Date Tested: 23/12/2021  
Time Tested: 13:00  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 6 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
15	1.0	Wall face	8.3	2.22	2.05	97
30	1.0	Wall face	9.0	2.27	2.08	98
45	1.0	Wall face	7.8	2.23	2.06	97
60	1.0	Wall face	8.6	2.32	2.14	101
75	1.0	Wall face	8.2	2.28	2.10	99
90	1.0	Wall face	9.1	2.28	2.09	99

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
As reported by the nuclear gauge  
Depth = 0m (Backscatter)





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00003

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 10/01/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa-RW 701  
Tested By: Liam Walker  
Date Tested: 8/01/2022  
Time Tested: 12:00  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 8.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
95	1	Wall face	Layer 10	7.0	2.30	2.15	102
80	1	Wall face	Layer 10	6.1	2.24	2.11	99
65	1	Wall face	Layer 10	6.8	2.17	2.03	96
50	1	Wall face	Layer 10	8.1	2.32	2.14	101

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00014

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 14/01/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa-RW 701  
Tested By: Liam Walker  
Date Tested: 10/01/2022  
Time Tested: 12:00  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.04  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
35	1	Wall face	10	7.9	2.19	2.03	96
20	1	Wall face	10	8.6	2.26	2.08	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00024

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 14/01/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa-RW701  
Tested By: Liam Walker  
Date Tested: 12/01/2022  
Time Tested: 12:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
10	1	Wall face	8.9	2.20	2.02	95
25	1	Wall face	8.6	2.18	2.01	95
40	1	Wall face	7.9	2.23	2.06	97
55	1	Wall face	7.6	2.26	2.11	99
70	1	Wall face	8.8	2.24	2.06	97
85	1	Wall face	8.9	2.22	2.03	96

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00037

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 18/01/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa  
Tested By: Liam Walker  
Date Tested: 17/01/2022  
Time Tested: 13:15  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
15	1	Wall face	12	8.3	2.26	2.09	99
30	1	Wall face	12	8.5	2.28	2.10	99
45	1	Wall face	12	7.9	2.17	2.01	95
60	1	Wall face	12	8.2	2.22	2.05	97
75	1	Wall face	12	8.0	2.25	2.08	98
90	1	Wall face	12	8.7	2.23	2.05	97

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00114

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 2/02/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa-RW 701  
Tested By: Liam Walker  
Date Tested: 20/01/2022  
Time Tested: 13:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.04  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
10	1	Face of Wall	Layer 13	8.3	2.20	2.04	96
25	1	Face of Wall	Layer 13	8.9	2.26	2.07	98
40	1	Face of Wall	Layer 13	5.7	2.22	2.10	99
55	1	Face of Wall	Layer 13	6.4	2.21	2.08	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00139

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 3/02/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa- RW701 (APCC)  
Tested By: Liam Walker  
Date Tested: 1/02/2022  
Time Tested: 13:00  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
10	1	Wall face	7.6	2.30	2.14	101
20	1	Wall face	8.0	2.21	2.05	97
80	1	Wall face	8.4	2.27	2.10	99
95	1	Wall face	7.8	2.25	2.08	98

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field moistures





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00256

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 23/02/2022

### Testing Details

Site Tested: 117 Kowhai Road, Orewa-RW 701  
Tested By: Salvindra Chandra  
Date Tested: 21/02/2022  
Time Tested: 12:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.12 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.01  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
10	2	Face of Wall	10.2	2.22	2.01	95
20	2.5	Face of Wall	8.5	2.30	2.12	100
30	2	Face of Wall	8.0	2.22	2.05	97
40	3	Face of Wall	7.6	2.17	2.01	95
50	2.5	Face of Wall	9.0	2.18	2.00	95
60	3	Face of Wall	7.0	2.25	2.10	99
70	2.5	Face of Wall	8.5	2.24	2.07	98
80	2.5	Face of Wall	7.0	2.26	2.11	100
90	2.5	Face of Wall	8.1	2.21	2.04	96
100	2.5	Face of Wall	10.9	2.26	2.04	96

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00317

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: - TRN: -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Liam Walker  
(Assistant Manager)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 4/03/2022

### Testing Details

Site Tested: RW701, as per clients chainages  
Tested By: Salvindra Chandra  
Date Tested: 2/03/2022  
Time Tested: 13:00  
Material: GAP65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.1 t/m<sup>3</sup> @ 10.5 %  
Min. Dry Density (t/m<sup>3</sup>): 1.99  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
10	2.0	Wall face	7.0	2.14	2.00	95
20	2.5	Wall face	7.2	2.15	2.01	96
30	2.0	Wall face	6.7	2.12	1.99	95
40	3.0	Wall face	8.2	2.25	2.08	99
50	2.5	Wall face	7.9	2.21	2.05	98
60	2.5	Wall face	8.6	2.22	2.04	97
70	2.5	Wall face	7.0	2.26	2.11	101
80	2.5	Wall face	7.7	2.15	1.99	95
90	2.5	Wall face	7.6	2.22	2.07	98
100	2.5	Wall face	7.6	2.15	2.00	95

### Comments

~ Test was conducted externally and is not accredited by this laboratory.



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00406

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 17/03/2022

### Testing Details

Site Tested: RW 701  
Tested By: Salvindra Chandra  
Date Tested: 15/03/2022  
Time Tested: 13:10  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.1 t/m<sup>3</sup> @ 5.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.00  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
30	2.5	Retaining Wall, *RHS	9.0	2.28	2.09	99
40	3	Retaining Wall, *RHS	8.9	2.21	2.03	97
50	2.5	Retaining Wall, *RHS	7.9	2.19	2.03	97
60	2	Retaining Wall, *RHS	7.5	2.20	2.05	98
70	2.5	Retaining Wall, *RHS	7.7	2.18	2.03	97
80	2	Retaining Wall, *RHS	8.3	2.25	2.08	99
90	2	Retaining Wall, *RHS	8.4	2.21	2.04	97
100	2	Retaining Wall, *RHS	10.6	2.20	1.99	95

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field Moistures





## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM22W00507

Issue No: 1

Client: Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

Principal: Stephen Parkes  
Project No.: 773-ETAM01553  
Project Name: 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA  
Lot No.: TRN:



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
(Director-Testing)  
IANZ Accredited Laboratory Number:105  
Date of Issue: 30/03/2022

### Testing Details

Site Tested: RW 701 (APCC)  
Tested By: Liam Walker  
Date Tested: 29/03/2022  
Time Tested: 13:30  
Material: GAP 65  
Start Route Position:  
Field Methods: NZS 4407:2015 Test 4.3

### Compaction Target Details

Material Sample ID: External  
MDD Method: ~  
Max. Dry Density: 2.1 t/m<sup>3</sup> @ 10.5 %  
Min. Dry Density (t/m<sup>3</sup>): 2.00  
Solid Density Type: Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
25	1.5	Wall face	7.4	2.14	2.00	95
40	1.5	Wall face	8.1	2.19	2.02	96
55	1.5	Wall face	8.5	2.18	2.01	96
70	1.5	Wall face	7.8	2.18	2.02	96
85	1.5	Wall face	7.6	2.15	2.00	95
100	1.5	Wall face	7.2	2.14	1.99	95

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
Field moistures



## Nuclear Density Report

### Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM23W00495

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** - **TRN:** -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Liam Walker  
(Assistant Manager)  
IANZ Accredited Laboratory Number: 105  
Date of Issue: 24/03/2023

### Testing Details

**Site Tested:** Bridge Abutment, refer to plan

**Tested By:** Salvindra Chandra

**Date Tested:** 23/03/2023

**Time Tested:** 11:25

**Material:** ATAP65

**Start Route Position:**

**Field Methods:** NZS 4407:2015 Test 4.3

### Compaction Target Details

**Material Sample ID:** External

**MDD Method:** ~

**Max. Dry Density:** 2.2 t/m<sup>3</sup> @ 5.5 %

**Min. Dry Density (t/m<sup>3</sup>):** 2.09

**Solid Density Type:** Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Lane	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
-	0.5	Centre of footpath	LHS	Subbase	6.1	2.34	2.21	100
-	0.5	Centre of footpath	RHS	Subbase	6.0	2.31	2.18	99
-	0.5	Centre of footpath	LHS	Subbase	5.8	2.34	2.21	101
-	0.5	Centre of footpath	RHS	Subbase	6.2	2.36	2.22	101

### Comments

~ Test was conducted externally and is not accredited by this laboratory.

## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM23W00495

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** -

**TRN:** -

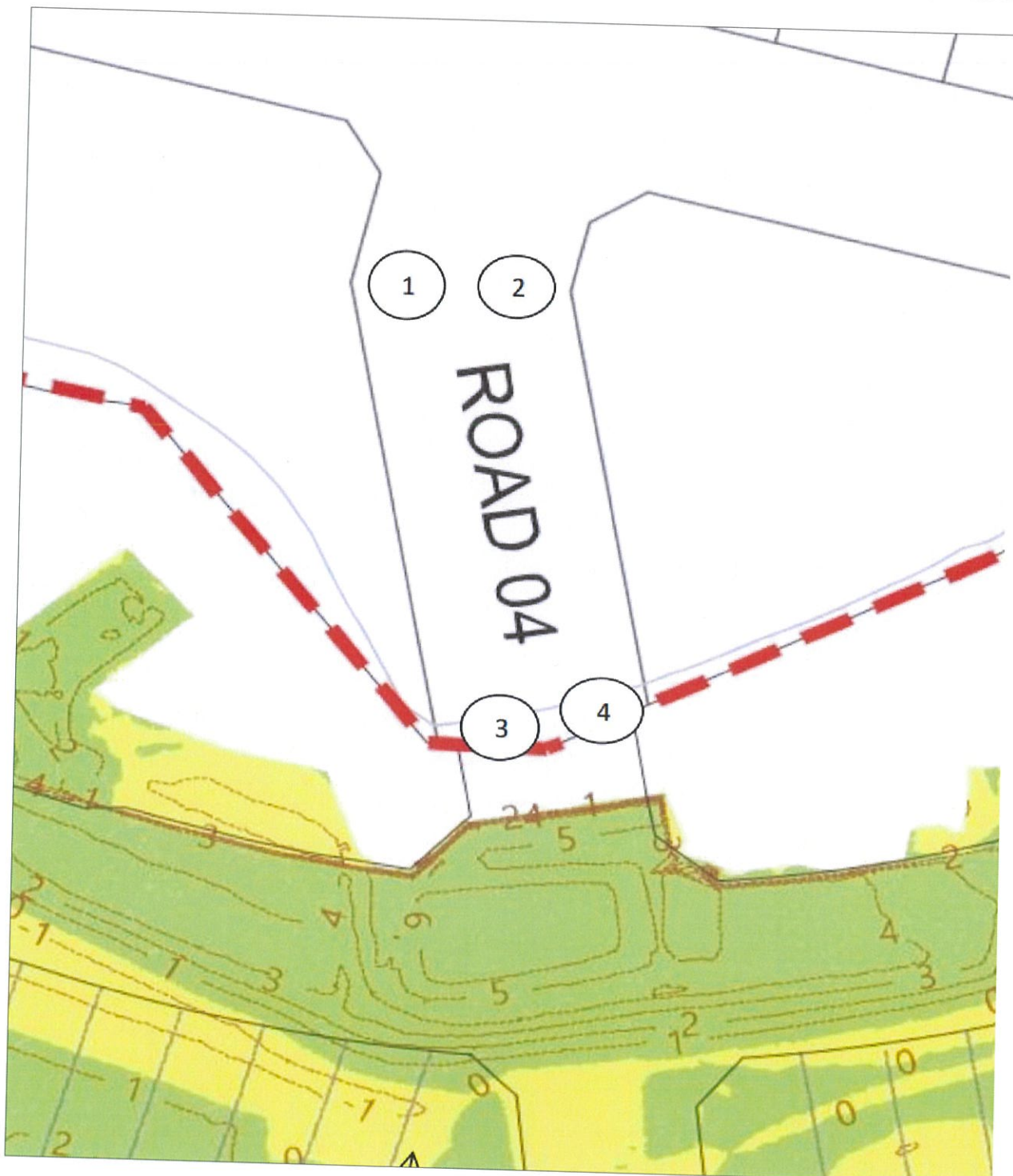


All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

*Walker*

Approved Signatory: Liam Walker  
(Assistant Manager)

IANZ Accredited Laboratory Number: 105  
Date of Issue: 24/03/2023







## Nuclear Density Report

### Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM23W00487

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** -

**TRN:** -

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



Approved Signatory: Liam Walker  
(Assistant Manager)  
IANZ Accredited Laboratory Number: 105  
Date of Issue: 24/03/2023

### Testing Details

**Site Tested:** Bridge Abutment, refer to plan  
**Tested By:** Liam Walker  
**Date Tested:** 22/03/2023  
**Time Tested:** 14:40  
**Material:** ATAP65  
**Start Route Position:**  
**Field Methods:** NZS 4407:2015 Test 4.3

### Compaction Target Details

**Material Sample ID:** External  
**MDD Method:** ~  
**Max. Dry Density:** 2.2 t/m<sup>3</sup> @ 5 %  
**Min. Dry Density (t/m<sup>3</sup>):** 2.09  
**Solid Density Type:** Assumed

### Test Results

Chainage (m)	Offset (m)	Offset From	Lane	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
-	0.5	Centre of footpath	LHS	Subbase	5.0	2.20	2.09	95
-	0.5	Centre of footpath	RHS	Subbase	4.8	2.08	1.98	90
-	0.5	Centre of footpath	LHS	Subbase	4.7	2.12	2.03	92
-	0.5	Centre of footpath	RHS	Subbase	4.6	2.07	1.98	90

### Comments

~ Test was conducted externally and is not accredited by this laboratory.

## Nuclear Density Report

Report No: ND:ETAM23W00487

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** -

**TRN:** -



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)

*Liam Walker*

Approved Signatory: Liam Walker  
(Assistant Manager)

IANZ Accredited Laboratory Number: 105  
Date of Issue: 24/03/2023







## Nuclear Density Report

### Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM23W00139

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** - **TRN:** -

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



*Liam Walker*

Approved Signatory: Liam Walker  
(Assistant Manager)

IANZ Accredited Laboratory Number: 105  
Date of Issue: 8/02/2023

### Testing Details

**Site Tested:** Bridge Abutments  
**Tested By:** Liam Walker  
**Date Tested:** 3/02/2023  
**Time Tested:** 10:00  
**Material:** GAP65  
**Start Route Position:**  
**Field Methods:** NZS 4407:2015 Test 4.3

### Compaction Target Details

**Material Sample ID:** External  
**MDD Method:** ~  
**Max. Dry Density:** 2.12 t/m<sup>3</sup> @ 6 %  
**Min. Dry Density (t/m<sup>3</sup>):** 2.01  
**Solid Density Type:** Assumed

### Test Results

Site No	Chainage (m)	Offset (m)	Offset From	Lane	Layer	Moisture (%)	Wet Density (t/m <sup>3</sup> )	Dry Density (t/m <sup>3</sup> )	Relative Compaction (%)
1	1	1	Centre of footpath	LHS	FL	6.4	2.18	2.05	96
2	1	2	Centre of footpath	RHS	FL	6.9	2.16	2.02	95
3	1	2	Centre of footpath	LHS	FL	6.2	2.29	2.15	102
4	1	1	Centre of footpath	RHS	FL	6.3	2.26	2.13	100

### Comments

~ Test was conducted externally and is not accredited by this laboratory.  
CH00 starts from wall edge  
Tests 1-2 on south side, tests 3-4 on north side  
Refer to photos on next pages



## Nuclear Density Report

Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM23W00139

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** -

**TRN:** -

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

(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



*Walker*

Approved Signatory: Liam Walker  
(Assistant Manager)

IANZ Accredited Laboratory Number: 105  
Date of Issue: 8/02/2023





# geolab<sup>o</sup>

## Nuclear Density Report

### Auckland Laboratory

GeoLab Limited  
333K East Tamaki Road  
Otara Auckland, 2013  
Phone: 027 475 4011

Report No: ND:ETAM23W00139

Issue No: 1

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**Project No.:** 773-ETAM01553

**Project Name:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Lot No.:** -

**TRN:** -

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
(This document may not be altered or reproduced except in full. This report relates only to the positions tested.)



*Liam Walker*

Approved Signatory: Liam Walker  
(Assistant Manager)

IANZ Accredited Laboratory Number: 105  
Date of Issue: 8/02/2023





## Earthworks Fill Report

Report No: EFIL:ETAM22W01845

Issue No:1

*This report replaces all previous issues of report no. EFIL:ETAM22W01845*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.  
{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

*E. Paton*

Approved Signatory: Eric Paton  
Director-Testing  
IANZ Site Number: 105  
Date of Issue: 18/10/2022

### Test Results

Test Methods : Shear Strength (using field Shear vane in accordance with NZS 2001):Nuclear Densometer Testing (in accordance with NZS 4407:2015 Test 4.2): Water Content Testing (in accordance with NZS 4402:1986 Test 2.1):  
Density Calculations (in accordance with NZS 4402:1986 Tests 4.2.7)

Date Sampled	Work Order	Tested By	Test No.	Wet Density t/m <sup>3</sup>	Oven Water Content %	Dry Density t/m <sup>3</sup>	Solid Density t/m <sup>3</sup>	Air Voids %	Field Shear Strength (UTP = Unable to penetrate) kPa				Test Location	Easting	Northing	RL	Material Tested	Comments
10/10/2022	ETAM22W01845	MA	926	1.72	27.5	1.35	2.65	12.1	UTP	UTP	UTP	UTP	Gully 2	1749026	5948903	38.4	Silty Clay	-
10/10/2022	ETAM22W01845	MA	927	1.86	30.7	1.42	2.65	2.9	UTP	UTP	UTP	UTP	Gully 2	1748989	5948904	35.1	Silty Clay	-
10/10/2022	ETAM22W01845	MA	928	1.87	30.5	1.43	2.65	2.5	111	140	163	124	P6 1C Deb	1749194	5949062	7.7	Clay	-

Comments:



## Earthworks Fill Report

Report No: EFIL:ETAM22W01845

Issue No:1

*This report replaces all previous issues of report no. EFIL:ETAM22W01845*

**Client:** Tetra Tech Coffey (NZ) Limited- Auckland  
Coffey House, Level 4, Teed Street  
New Market Auckland 1023

**Principal:** Stephen Parkes

**cc to:** -

**Project No.:** 773-ETAM01553

**Project Name.:** 773-AKLGE206639 - MILLWATER PRECINCT 6K, OREWA

**Project Location:** 117 Kowhai Road, Orewa



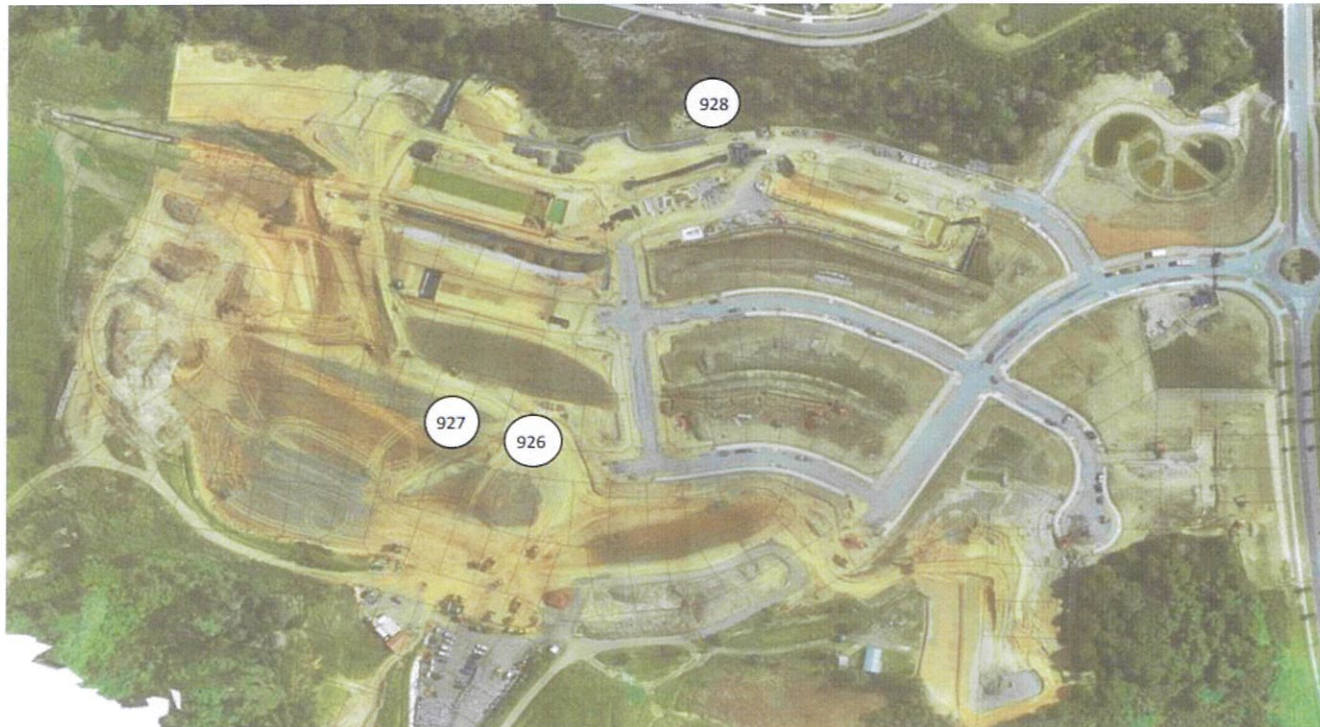
All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.

{This document may not be altered or reproduced except in full. This report relates only to the positions tested.}

Approved Signatory: Eric Paton  
Director-Testing

IANZ Site Number: 105

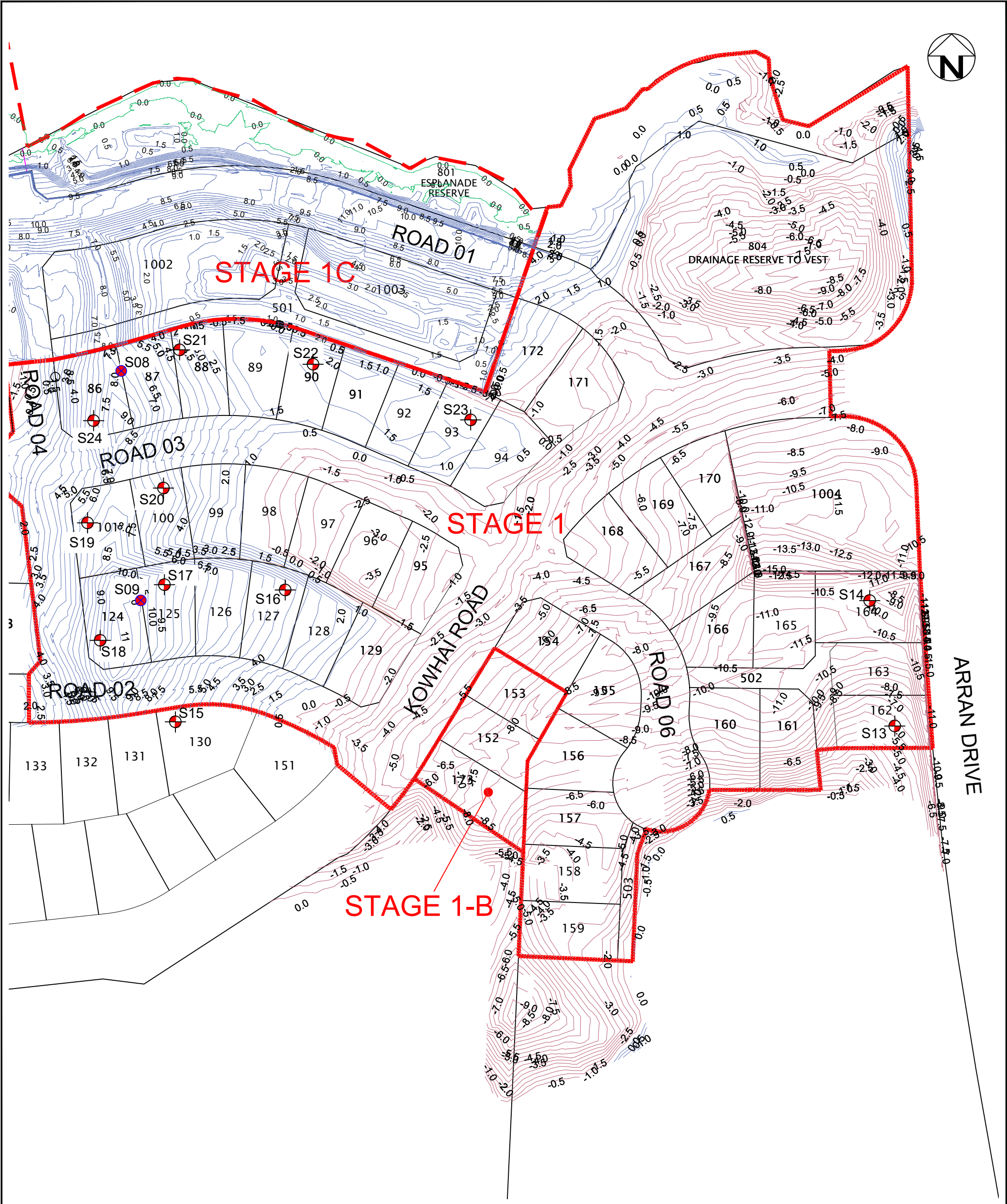
Date of Issue: 18/10/2022





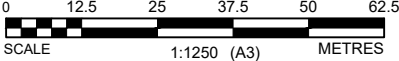



## APPENDIX E: MONITORING RESULTS

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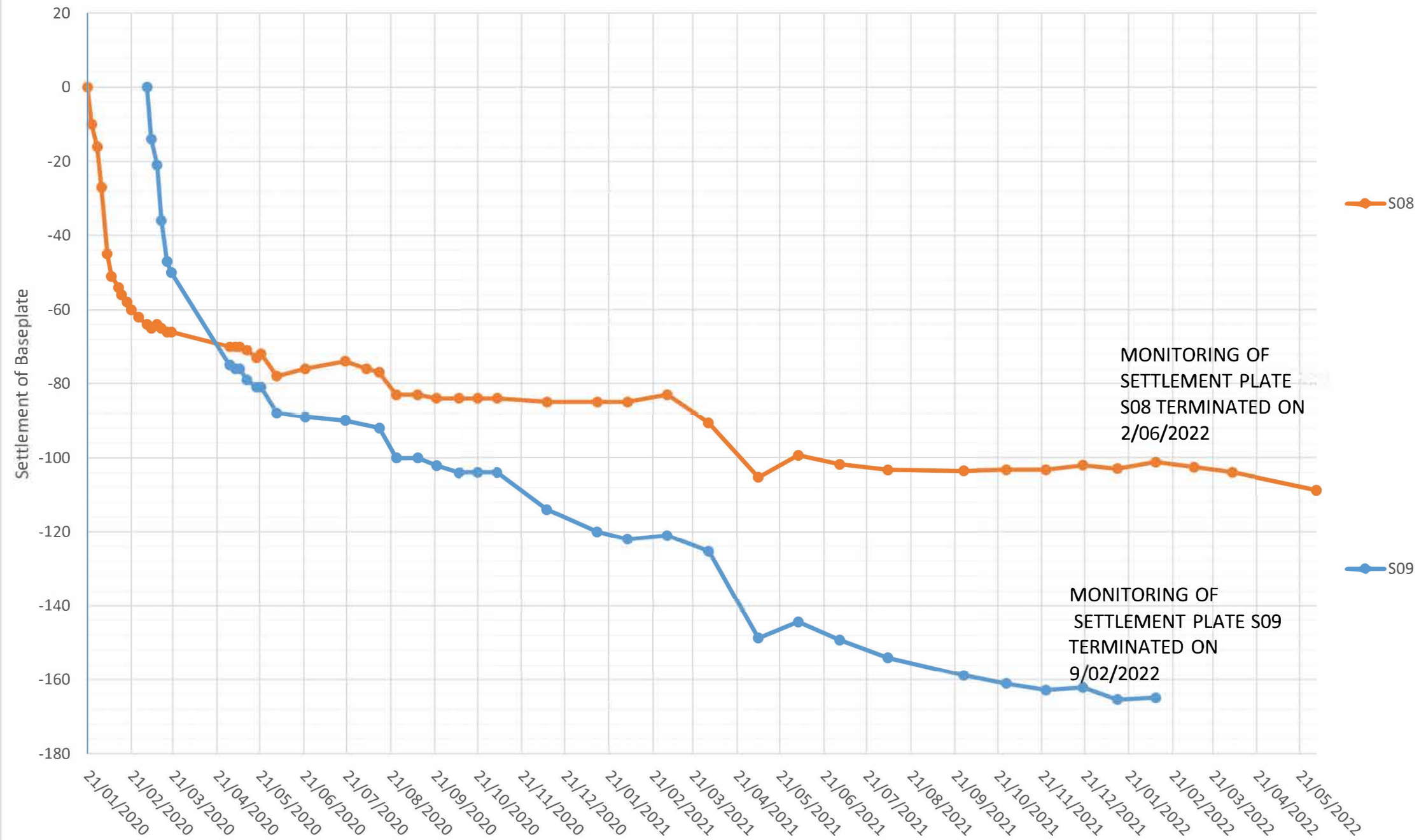




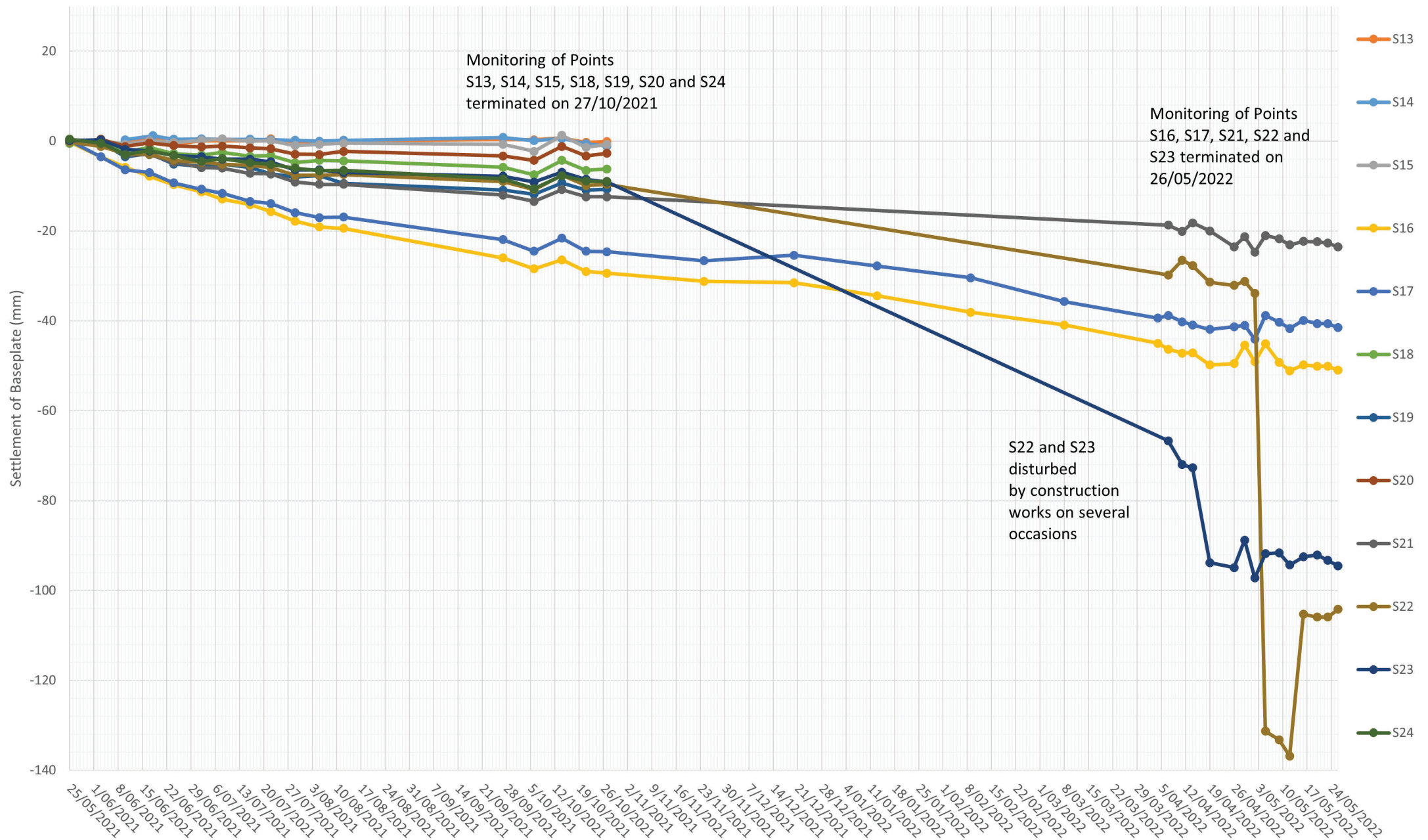
revision	no.	description		drawn	approved	date								
	A	ORIGINAL ISSUE		RZ	SP	31/01/2023								
						<u>LEGEND</u>								
								AS-BUILT CUT CONTOUR				GROUND LEVEL SETTLEMENT MONITORING POINT		
								AS-BUILT FILL CONTOUR				SETTLEMENT BASE PLATES		
				drawn	RZ									
				approved	SP									
				date	31/01/2023									
				scale	AS SHOWN									
				original size	A3									
				client:		WFH PROPERTIES LIMITED								
				project:		MILLWATER PRECINCT 6 - SUBDIVISION STAGE 1								
				title:		SETTLEMENT MONITORING LOCATION PLAN								
				project no:		773-AKLGE206639			figure no:		BK/003		rev: A	



Arran Hill P6 - Settlement of Baseplates (mm)



# Arran Hill P6 - Ground Settlement

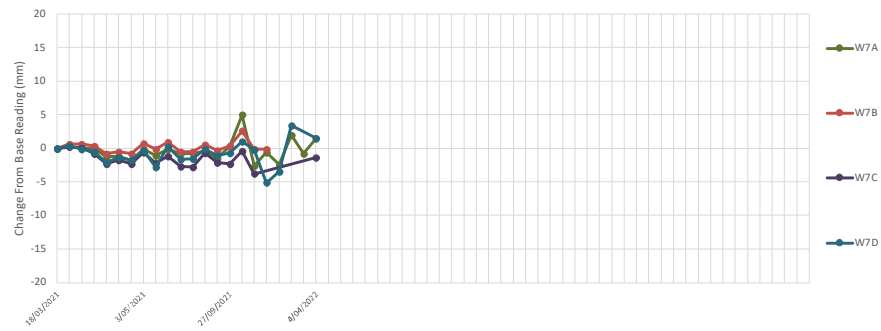




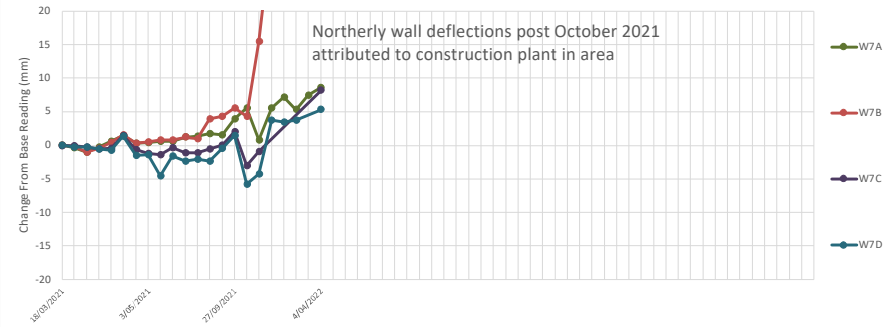




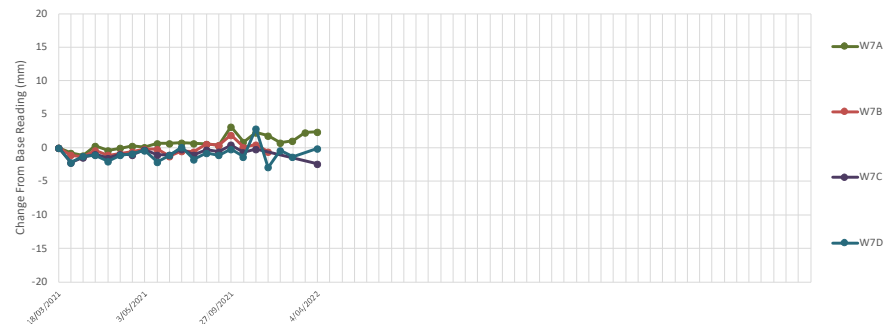
37610 - Arran Hill P6 - Wall 700 - Easting

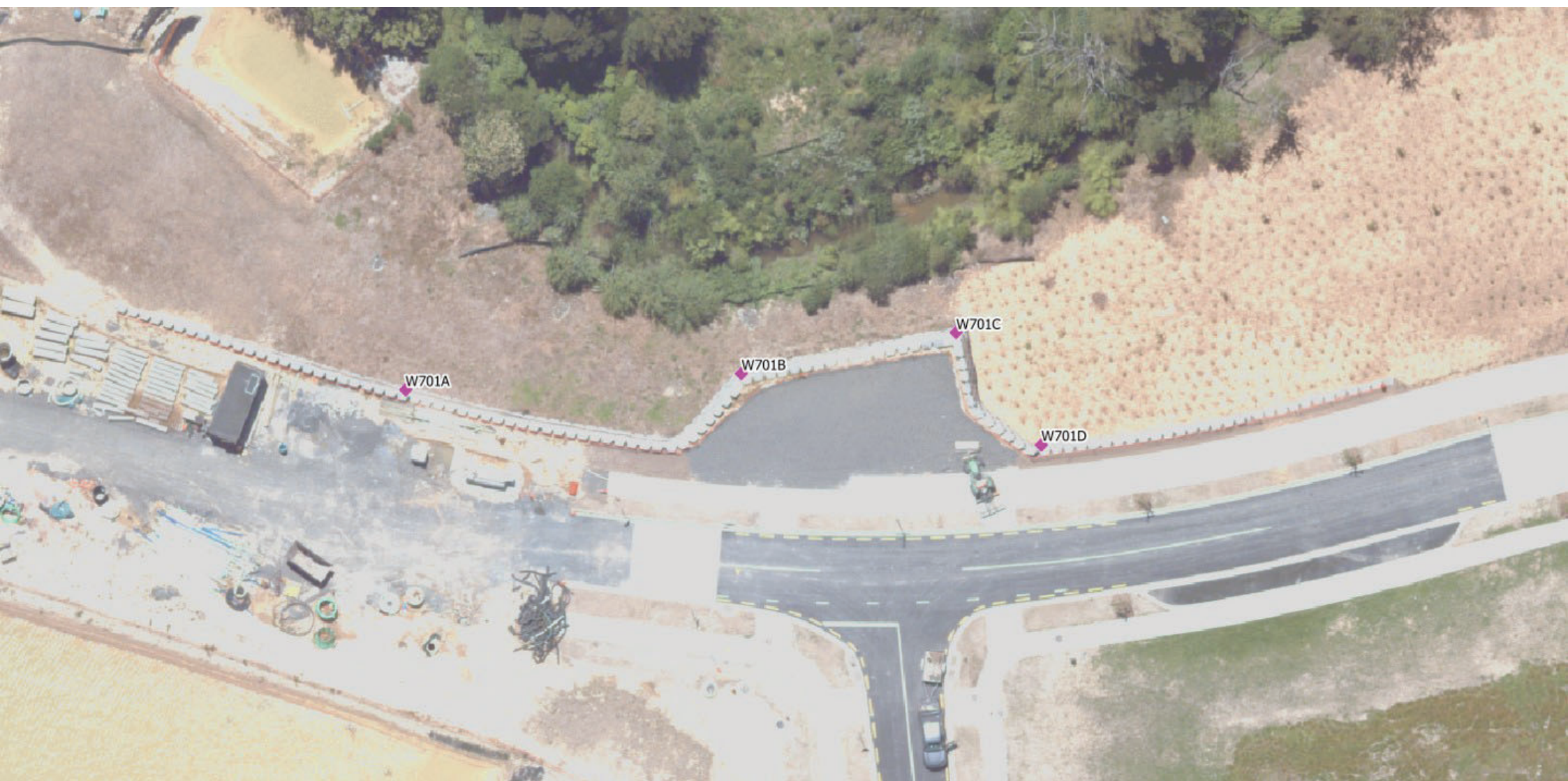


37610 - Arran Hill P6 - Wall 700 - Northing

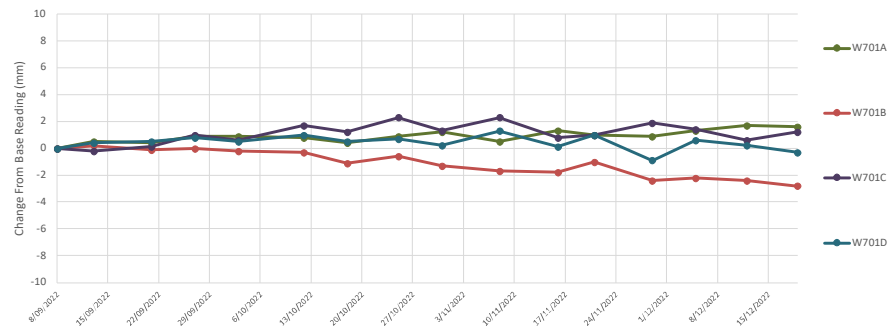


37610 - Arran Hill P6 - Wall 700 - Height

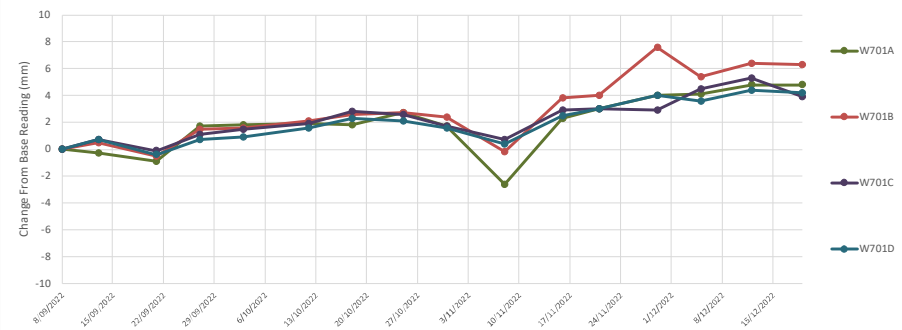




37610 - Arran Hill P6 - Wall 701 - Easting



37610 - Arran Hill P6 - Wall 701 - Northing





## APPENDIX F: PRODUCER STATEMENT – CONSTRUCTION REVIEWS (PS4)

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23 August 2022

Our ref: 773-AKLGE206639-BH

WFH Properties Limited

Attention: WFH Properties

**Geotechnical Observation of Retaining Walls 311 and 312 construction at Millwater Precinct 6, Stage 1 and 2, Orewa West (Building Consent No. BCO10301029-3)**

This letter is to confirm the scope of work relating to the attached Producer Statement (PS4 – Construction Review, Mass Block Wall – Walls 311 and 312, Geotechnical).

Tetra Tech Coffey carried out regular site visits to Millwater between November 2020 and June 2022 to observe the construction of Mass Block retaining walls 311 and 312 within Precinct 6 of the Millwater Subdivisional Development.

Mass Block Wall 311 extended over 188 lineal meters with a maximum retained height of 3.0m, founded on a 2.0m deep, 6.0m wide engineered fill undercut key from chainage 35-170m to maintain adequate global stability factors of safety. Between chainage 0-35m and 170-188, the wall was founded within engineered fill placed in the subdivision fill areas.

Mass Block Wall 312 extended over 171 lineal meters with a maximum retained height of 3.0m, founded on a 2.0m deep and 6.0m wide engineered fill undercut key from chainage 0-40m and 130-155m. Between chainage 40-130 the wall was founded within engineered fill.

During the course of construction, we carried out near daily site visits to observe and test the undrained shear strength of the wall foundation soils, monitor aggregate and clay fill placement and compaction, geogrid and geotextile placement, wall drainage construction, facing block placement and pedestrian barrier installation in accordance with Tetra Tech Coffey's Geotechnical Design Report dated 6 April 2020 (Ref: AKLGE206639-AL Rev.1).

On the basis of our construction observations and in-situ soil and aggregate testing, we are satisfied that the site works undertaken to construct Mass Block Retaining Walls 311 and 312 were in accordance with our Geotechnical Design Report dated 6 April 2020 (Ref: AKLGE206639-AL Rev.1), the ground conditions were also generally consistent with those that formed the basis of the recommendation presented in the report.

Accordingly, we attach our PS4 certificate for the above-mentioned works.

For and on behalf of Tetra Tech Coffey

Prepared By:



**Tasman Lambert Andrews**  
Graduate Engineering Geologist

Reviewed and Authorised By:



**Chris Armstrong**  
Principal Geotechnical Engineer  
CMEngNZ, CPEng

Attachments – Producer Statement - Construction Review (PS4)

Building Code Clause(s).....

## PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

ISSUED BY:.....  
(Construction Review Firm)

TO:.....  
(Owner/Developer)

TO BE SUPPLIED TO:.....  
(Building Consent Authority)

IN RESPECT OF:.....  
(Description of Building Work)

AT:.....  
(Address)

Town/City:..... LOT..... DP..... SO.....  
(Address)

We ..... have been engaged by .....  
(Construction Review Firm)

To provide ☐ CM1 ☐ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ observation as per agreement with  
owner/developer.....

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

in respect of clause(s) ..... of the Building Code for the building work described in

documents relating to Building Consent No. .... and those relating to

Building Consent Amendment(s) Nos. .... issued during the  
course of the works. We have sighted these Building Consents and the conditions of attached to them.

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

On the basis of ☐ this review ☐ these review(s) and information supplied by the contractor during the course of the works  
and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that  
☐ All or ☐ Part only of the building works have been completed in accordance with the relevant requirements of the

Building Consent and Building Consent Amendments identified above, with respect to Clause(s).....  
of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review have  
the necessary competency to do so.

I, ..... am: ☐ CPEng.#  
(Name of Construction Review Professional)

I am a member of: ☐ Engineering New Zealand and hold the following qualifications .....

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than  
\$200,000\*.

The Construction Review Firm is a member of ACE New Zealand: ☐

SIGNED BY.....(Signature).....  
(Name of Construction Review Professional)

ON BEHALF OF ..... Date.....  
(Construction Review Firm)

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

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

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACE NEW ZEALAND AND ENGINEERING NEW ZEALAND



## GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand (now Engineering New Zealand), ACE New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

**PS1 Design** Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

**PS2 Design Review** Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

**PS3 Construction** Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011<sup>2</sup>

**PS4 Construction Review** Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

### Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as Engineering New Zealand (formerly IPENZ), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

### \*Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

### Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers<sup>3</sup>). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

### Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

### Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

### Refer Also:

- 1 Conditions of Contract for Building & Civil Engineering Construction  
NZS 3910: 2013
- 2 NZIA Standard Conditions of Contract SCC 2011
- 3 Guideline on the Briefing & Engagement for Consulting Engineering Services  
(ACE New Zealand/IPENZ 2004)
- 4 PN Guidelines on Producer Statements

[www.acenz.org.nz](http://www.acenz.org.nz)  
[www.engineeringnz.org](http://www.engineeringnz.org)



association of  
consulting and  
engineering



29 November 2022

Our ref: 773-AKLGE206639-BN

WFH Properties Limited

Attention: WFH Properties

**Geotechnical Observation of Retaining Wall 700 construction at Millwater Precinct 6, Stage 1, Orewa West (Building Consent No. BCO10301029-2)**

This letter is to confirm that we visited the above site on numerous occasions between November 2020 and November 2022 to observe the construction of a Mass Block retaining wall within Precinct 6 of the Millwater Subdivision development. This letter and accompanying PS4 covers Mass Block Wall 700.

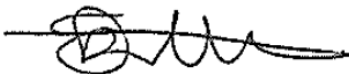
Mass Block Wall 700 extends over 130 linear metres with a maximum retained height of 5.0m, founded on an undercut within the engineered fill placed as part of shear key 1. Founding conditions were consistent with the specifications outlined in Tetra Tech Coffey's Geotechnical Design Report dated 15 April 2021 (Ref: AKLGE206639-AL Rev.2).

During construction, regular site visits were undertaken to observe and test the undrained shear strength of the wall foundation soils, monitor hardfill and clay fill placement and compaction, observe geogrid and geotextile placement, wall drainage construction, facing block placement and pedestrian barrier installation. The aforementioned items were completed in accordance with Tetra Tech Coffey's Geotechnical Design Report dated 15 April 2021 (Ref: AKLGE206639-AL Rev.2).

On the basis of our construction observations, in-situ soil testing, and backfill testing, we are satisfied that the site works undertaken to construct Mass Block Retaining Wall 700 were generally in accordance with our Geotechnical Design Report dated 15 April 2021 (Ref: AKLGE206639-AL Rev.2).

For and on behalf of Tetra Tech Coffey

Prepared By:

**Ethan Potter**  
Engineering Geologist

Reviewed and Authorised By:

**Chris Armstrong**  
Principal Geotechnical Engineer  
CMEng.NZ, CPEng

Attachments – Producer Statement - Construction Review (PS4)

Building Code Clause(s).....

## PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

ISSUED BY:.....  
(Construction Review Firm)

TO:.....  
(Owner/Developer)

TO BE SUPPLIED TO:.....  
(Building Consent Authority)

IN RESPECT OF:.....  
(Description of Building Work)

AT:.....  
(Address)

Town/City:..... LOT..... DP..... SO.....  
(Address)

We ..... have been engaged by .....  
(Construction Review Firm)

To provide ☐ CM1 ☐ CM2 ☐ CM3 ☐ CM4 ☐ CM5 (Engineering Categories) or ☐ observation as per agreement with  
owner/developer.....

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

in respect of clause(s) ..... of the Building Code for the building work described in

documents relating to Building Consent No. .... and those relating to

Building Consent Amendment(s) Nos. .... issued during the  
course of the works. We have sighted these Building Consents and the conditions of attached to them.

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

On the basis of ☐ this review ☐ these review(s) and information supplied by the contractor during the course of the works  
and **on behalf of the firm** undertaking this Construction Review, **I believe on reasonable grounds** that  
☐ All or ☐ Part only of the building works have been completed in accordance with the relevant requirements of the

Building Consent and Building Consent Amendments identified above, with respect to Clause(s).....  
of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review have  
the necessary competency to do so.

I, ..... am: ☐ CPEng.#  
(Name of Construction Review Professional)

I am a member of: ☐ Engineering New Zealand and hold the following qualifications .....

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than  
\$200,000\*.

The Construction Review Firm is a member of ACE New Zealand: ☐

SIGNED BY.....(Signature).....  
(Name of Construction Review Professional)

ON BEHALF OF ..... Date.....  
(Construction Review Firm)

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

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

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACE NEW ZEALAND AND ENGINEERING NEW ZEALAND



## GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand (now Engineering New Zealand), ACE New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

**PS1 Design** Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

**PS2 Design Review** Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

**PS3 Construction** Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011<sup>2</sup>

**PS4 Construction Review** Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

### Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as Engineering New Zealand (formerly IPENZ), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

### \*Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

### Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers<sup>3</sup>). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

### Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

### Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

### Refer Also:

- 1 Conditions of Contract for Building & Civil Engineering Construction  
NZS 3910: 2013
- 2 NZIA Standard Conditions of Contract SCC 2011
- 3 Guideline on the Briefing & Engagement for Consulting Engineering Services  
(ACE New Zealand/IPENZ 2004)
- 4 PN Guidelines on Producer Statements

[www.acenz.org.nz](http://www.acenz.org.nz)  
[www.engineeringnz.org](http://www.engineeringnz.org)



association of  
consulting and  
engineering



18 April 2023

Our ref: 773-AKLGE206639-BQ

WFH Properties Limited

Attention: WFH Properties

**Geotechnical Observation of Timber Boardwalk construction at Millwater Precinct 6, Stage 1C, Orewa West (Building Consent No. BCO10349216)**

This letter is to confirm that we visited the above site on numerous occasions between January and February 2023 to observe the construction of a Timber Boardwalk within Precinct 6 of the Millwater Subdivision development. This letter and accompanying PS4 cover the following items, which are required for compliance as specified in the approved Building Consent:

- Reinforced Concrete Abutments (partial);
- Piles (partial); and
- Geotechnical

During construction, regular site visits were undertaken to observe the ground conditions exposed within the boardwalk pile holes, including confirmation of the end bearing capacity of the soil and rock encountered, and to confirm the pile holes depth, diameter and lateral spacing. All observations were in accordance with the approved consented design documentation.

Additionally, we observed and carried out Nuclear Densometer compaction testing of hardfill placed to support the reinforced concrete abutment sills and confirmed that the integrity of the geogrid reinforcement comprising the underlying bridge abutments was not damaged or compromised by the boardwalk construction works. All Nuclear Densometer Testing of the GAP65 hardfill compaction achieved a minimum of 95% Maximum Dry Density.

On the basis of the construction observations and testing discussed above, we are satisfied the works were in accordance with the approved consent documentation.

For and on behalf of Tetra Tech Coffey

Prepared By:

**Stephen Parkes**  
Associate Engineering Geologist

Reviewed and Authorised By:

**Chris Armstrong**  
Principal Geotechnical Engineer  
CMEng.NZ, CPEng

Attachments – Producer Statement - Construction Review (PS4)

## PRODUCER STATEMENT – PS4

### CONSTRUCTION REVIEW

BUILDING CODE CLAUSE(S): \_\_\_\_\_ JOB NUMBER: \_\_\_\_\_

ISSUED BY: \_\_\_\_\_

(Construction Monitoring Firm)

TO: \_\_\_\_\_

(Owner/Developer)

TO BE SUPPLIED TO: \_\_\_\_\_

(Building Consent Authority)

IN RESPECT OF: \_\_\_\_\_

(Description of Building Work)

AT: \_\_\_\_\_

(Address, Town/City)

LEGAL DESCRIPTION: \_\_\_\_\_ N/A ☐

We have been engaged by the owner/developer referred to above to provide **SELECT ONE level of construction monitoring relating to** the Clause(s) named above of the Building Code for the building work which is covered by PS1(s) issued by \_\_\_\_\_ (Engineering Design Firm) and which is described in the documents relating to the Building Consent No. \_\_\_\_\_ and those relating to Building Consent Amendment(s) No. \_\_\_\_\_ issued during the course of the works, .

We have sighted these Building Consents and the conditions attached to them.

If any of the fields above are too small, please write "refer the Schedule".

Authorised instructions/variation(s) detailed/listed in the Schedule have been issued during the course of the works.

On the basis of these review(s) and information supplied by the contractor during the course of the works and **on behalf of the engineering firm** undertaking this Construction Monitoring, **I believe on reasonable grounds** that the building works covered by the above-mentioned PS1(s) have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above or in the Schedule on page 2, with respect to Clause(s) \_\_\_\_\_ of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review have the necessary competency to do so.

I, (Name of Construction Monitoring Professional) \_\_\_\_\_, am:

- CPEng number \_\_\_\_\_
- I hold the following qualifications \_\_\_\_\_

The Construction Monitoring Firm holds a current policy of Professional Indemnity Insurance no less than \$200,000 The Construction Monitoring Firm Choose an item. a member of ACE New Zealand.

SIGNED BY (Name of Construction Monitoring Professional): \_\_\_\_\_  
(Signature below):



ON BEHALF OF (Construction Monitoring Firm): \_\_\_\_\_ Date: \_\_\_\_\_

**Note:** This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Construction Monitoring Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, is limited to the sum of \$200,000.

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

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**SCHEDULE to PS4**

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below: |

## GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on the Engineering New Zealand website

<https://www.engineeringnz.org/engineer-tools/engineering-documents/producer-statements/>

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects (NZIA), Institution of Professional Engineers New Zealand (now Engineering New Zealand), Association of Consulting and Engineering New Zealand (ACE NZ) in consultation with the Building Officials Institute of New Zealand (BOINZ). The original suite of producer statements has been revised at the date of this form to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with part of the reasonable grounds necessary for the issue of a Building Consent or a Code Compliance Certificate, without necessarily having to duplicate review of design or construction monitoring undertaken by others.

**PS1 DESIGN** Intended for use by a suitably qualified independent engineering design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

**PS2 DESIGN REVIEW** Intended for use by a suitably qualified independent engineering design review professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

**PS3 CONSTRUCTION** Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011<sup>2</sup>

**PS4 CONSTRUCTION REVIEW** Intended for use by a suitably qualified independent engineering construction monitoring professional who either undertakes or supervises construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

### Competence of Engineering Professional

This statement is made by an engineering firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its personnel.

The person signing the Producer Statement on behalf of the engineering firm will have a professional qualification and proven current competence through registration on a national competence-based register such as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand provides additional assurance of the designer's standing within the profession. If the engineering firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent engineering professional".

### Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard practice for the relationship between the BCA and the engineering firm.

### Professional Services during Construction Phase

There are several levels of service that an engineering firm may provide during the construction phase of a project (CM1-CM5 for engineers<sup>3</sup>). The building Consent Authority is encouraged to require that the service to be provided by the engineering firm is appropriate for the project concerned.

### Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

### Refer Also:

- <sup>1</sup> Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
- <sup>2</sup> NZIA Standard Conditions of Contract SCC 2011
- <sup>3</sup> Guideline on the Briefing & Engagement for Consulting Engineering Services (ACE New Zealand/Engineering New Zealand 2004)
- <sup>4</sup> PN01 Guidelines on Producer Statements

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