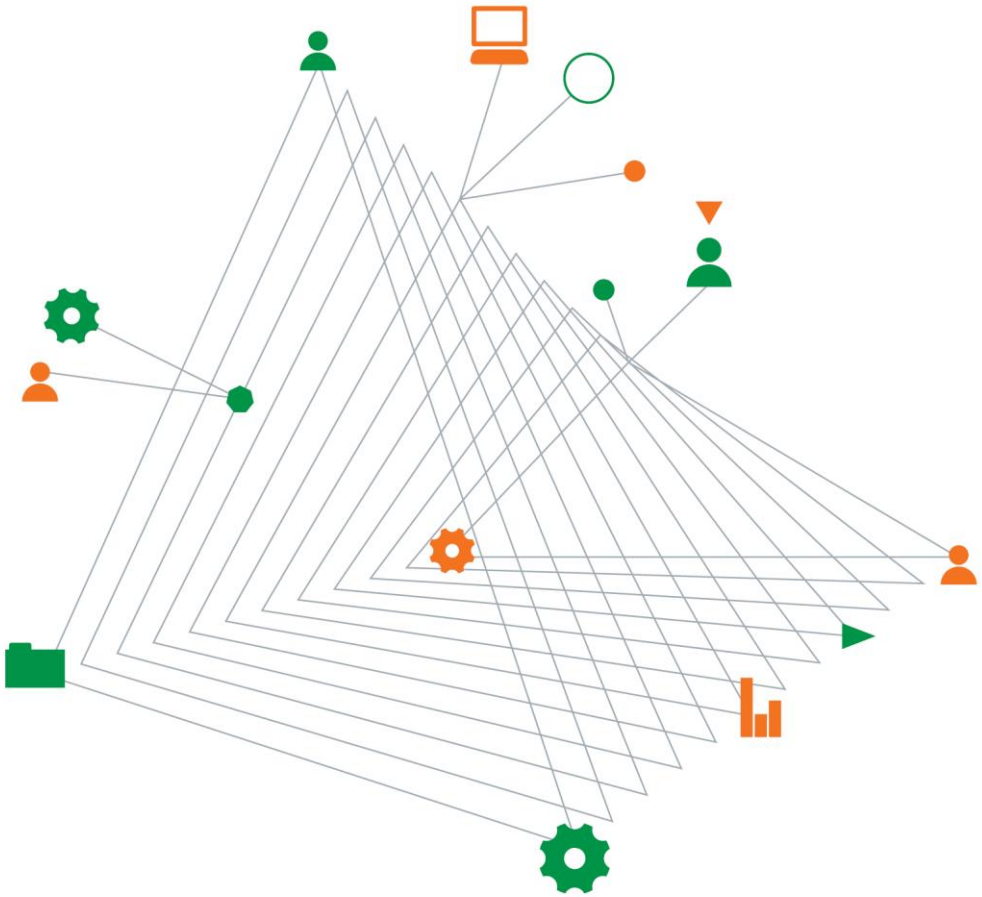
Hugh Green Limited

Geotechnical Completion Report on Donegal Stud Stage 9 at 80 Drumbuoy Drive, Flat Bush, Auckland

Project No GENZAUCK16856AA

4 August 2017



Experience comes to life when it is powered by expertise

Donegal Stud Stage 9 at 80 Drumbuoy Drive, Flat Bush, Auckland

Hugh Green Limited
Donegal Stud
C/- Harrison Grierson Consultants Limited
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Prepared by
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Our Reference: GENZAUCK16856AA

4 August 2017

Dear Matthew

RE: Geotechnical Completion Report for Residential Subdivision at Donegal Stud Stage 9, 80 Drumbuoy Drive, Flat Bush, Auckland

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

It has been prepared in accordance with instructions received from Harrison Grierson Consultants 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 you require any further clarification on any aspects of this report, please do not hesitate to contact the undersigned.

For and on behalf of Coffey

Kah-Weng Ho
Senior Principal

Quality information

Revision history

Revision	Description	Date	Author	Reviewer	Signatory
0	Final	04/08/2017	RB	KWH	KWH

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Final	1	PDF	Hugh Green Limited	04/08/2017
Final	1	PDF	Auckland Council	04/08/2017
Final	1	Original	Coffey Geotechnics (NZ) Limited	04/08/2017

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Appendices

1. Introduction and Description of Subdivision

This Geotechnical Completion Report (GCR) has been prepared for Hugh Green Limited as part of the documentation required to be submitted to the Auckland Council following residential subdivisional development.

It contains our Suitability Statement, relevant test data and the Harrison Grierson Consultants Limited as-built plan set relating to Stage 9 of the Donegal Stud Residential Subdivision as follows:

Table 1: Harrison Grierson Consultants Limited As-Built Plans

Title	Reference No.	Date
Stage 9 Finished Level Contours As-Built Plan	139707-AB200 Rev A	31 July 2017
Stage 9 Earthworks Cut and Fill As-Built Plan	139707-AB210 Rev A	31 July 2017
Stage 9 Earthworks Minimum Floor Level As-Built Plan	139707-AB301 Rev A	26 July 2017
Stage 9 Earthworks Pavement As-Built Plan Sheet 1	139707-AB330 Rev A	26 July 2017
Stage 9 Earthworks Pavement As-Built Plan Sheet 2	139707-AB331 Rev A	26 July 2017
Stage 9 Earthworks Pavement As-Built Plan Sheet 3	139707-AB332 Rev A	26 July 2017
Stage 9 Earthworks Pavement As-Built Plan Sheet 4	139707-AB333 Rev A	26 July 2017
Stage 9 Earthworks Services As-Built Plan	139707-AB550 Rev A	26 July 2017

This report covers the construction period early-August 2016 to mid-November 2016. It is intended to be used for certification purposes for:

- 53 residential lots numbered 1 to 53; and
- 6 new roads named Road 1 to Road 6.

Stage 9 of the subdivision is located at 80 Drumbuoy Drive and as can be seen on the cut fill as-built plan, most of the lots have been partly or totally affected by filling, to a maximum depth of up to approximately 2.5 metres.

2. Related Reports

Geotechnical Reports prepared on the subject land by this consultancy are as a follows:

- Geotechnical Investigation Report on Donegal Stud subdivision, reference GENZNEWP15126; dated 26 May 2011;
- Geotechnical Completion Report on Donegal Stud Stage 4, reference GENZAUCK15126AC, dated 11 November 2013;
- Geotechnical Completion Report on Donegal Stud Stage 6, reference GENZAUCK15126AF, dated 16 June 2014;
- Geotechnical Investigation Report on 62 Thomas Road, Flat Bush, reference GENZNEWP16403, dated 18 December 2014;
- Geotechnical Completion Report on Donegal Stud Stage 7, reference GENZAUCK15126AG-AB, dated 22 October 2015; and

- Geotechnical Completion Report on Donegal Stud Stage 8, reference GENZAUCK16403AA, dated 6 December 2016.

The conclusions and recommendations of those documents (where relevant) have been reviewed during the preparation of this report.

3. Earthworks Operations

3.1. Plant

The main items of plant used by the Contractor, HEB Contractors Limited were:

- 2 x Motor scrapers;
- 1 x Bulldozer and scoop;
- 1 x Bulldozer;
- 1 x Moxy Dump Truck;
- 4 x Excavators;
- 3 x Tractor;
- 1 x Water Cart;
- 1 x loader;
- 1 x 825 Caterpillar Sheep Foot compactors;
- 1 x Grader; and
- 2 x Vibrating Drum Rollers.

3.2. Construction Programme

Earthworks operations for Stage 9 commenced in early November 2016 with the construction of a temporary silt pond just beyond the western boundary of the development area. Prior to the formation of the pond (and all subsequent temporary silt ponds) the existing topsoil was removed from its footprint. During this phase of works, areas containing soft alluvial deposits (namely the western side of the pond) were undercut by approximately 0.5m. The excavated materials were then replaced with compacted Soft Pit Run rock (SPR). Filling to form the pond bunds commenced shortly after the completion of the undercut. Enabling works then expanded to include the construction of the western temporary silt ponds located within Lot 36 and immediately south of Lot 36 (below Road 4).

By mid-November 2016 the enabling works were completed. At this time topsoil stripping commenced and during this period, numerous stockpiles of topsoil, building debris and clay were uplifted and removed off site. By late November the majority of the stockpiles and topsoil had been removed and earthworks then focussed on the construction of the fill batter adjacent to Road 2. A bench was formed at the toe of the slope prior to the placement of filling to form the batter. Once the bench was formed, filling sourced from the down cutting of lots was placed to an Engineer certified standard until design subgrade levels were achieved.

By early December 2016 the, construction of Road 2 fill batter was complete and topsoil was re-spread over the batter face. At this time the fill area located between Road 1 and Road 3 was placed and compacted. However, due to soft subgrade the required compaction criteria could not be

achieved and the fill materials within Lots 6, 7, 15 and 16 were undercut by approximately 0.6m. The excavated materials were then reconditioned and replaced to an engineer certified standard.

By mid to late December 2016 bulk earthworks to form Lots 1 to 36 were mostly complete apart from the trimming of the internal accessways to subgrade level. At this time installation of site services commenced in the north western corner of the site and continued steadily toward Lot 26. Internal roads were then trimmed to design subgrade level as the installation of services progressed toward the east.

Earthworks recommenced in early January 2017 after the Christmas holiday period with the stripping of topsoil and removal of stockpiles comprised of unsuitable material. Topsoil stripping and stockpile removal was initially focussed on the northern slopes below and encompassing Road 4 road reserve. The removal of materials in this area revealed uncertified filling that was most likely placed to form a pre-existing farm track. This material was then uplifted and the toe of the slope benched ready to receive engineer certified filling.

Due to portions of Road 4 containing engineer certified fill embankments with typical slope gradients exceeding 1(V):2.5(H), biaxial geogrid was placed parallel to the face of the embankment, every 0.5m lift. Geogrid was included in the embankment design to provide additional strength and to prevent any adverse effects related to long term soil creep from occurring. Construction of the engineer fill batter commenced shortly thereafter.

By mid- January 2017 earthworks to construct a Soft-Pit-Run (SPR) engineer certified fill embankment near the intersection of Road 4 and Road 5. The initial works focussed on removing the soft saturated alluvial deposits from the toe of the proposed embankment to provide a stable foundation. An undercut up to 2m below the existing ground level was conducted to remove the weak materials and to expose weathered moderately dense sand commonly associated with the East Coast Bays transition to bedrock.

By late January 2017 the undercut had been backfilled with SPR compacted to an engineer certified standard. At this time two underfill drains comprised of a 160mm perforated drain coil surrounded by drainage metal and then fully wrapped in geotextile were installed in shallow trenches at the toe and into the natural subsoils forming the slope behind the SPR fill embankment.

SPR was the placed over the trenches and then construction of the engineer fill embankment commenced. Due to the slopes in this portion of the embankment exceeding 1(V):1.5(H) biaxial geogrid was placed parallel to the face of the embankment, every 0.5m lift. The geogrid was added to prevent shallow slumping from occurring in the face of the embankment.

Construction of the SPR batter continued until late January 2017 when the surface of the SPR was approximately 1m below design subgrade level. At this time the fill material was substituted with cohesive clay fill so that uniformity of Road 4 subgrade could be maintained. Once the final batter gradients had been formed the stabilised embankments were covered with topsoil.

From early February2017 the installation of site services and the formation of Roads 4, 5 and 6 became the focus of the site earthworks operations. By late April 2017 the bulk of the site services had been installed and the temporary stormwater pond to the north of Road 4 was prepared for backfilling so that a stormwater outlet structure and associated pipework could be constructed.

The preparation works involved the removal of any soft saturated alluvial deposits from within the pond as well as the removal of any soft and unduly weak deposits of alluvium from the toe of the pond batter adjacent to the stream. Due to the soft materials at the location of the toe an approximately 1m deep undercut was performed to provide a hard base for the filling to be compacted on. Once the undercut was backfilled with SPR, filling of the pond and construction of the batter commenced.

The installation of outlet structure and associated pipework commenced once the fill level reached the design subgrade level. Filling over the pipework and formation of the final batter commenced once the outlet structure and associated pipework were installed.

By early May 2017 the earthworks to construct the embankment over the stormwater outlet and pipework was complete. At this time work to construct a gabion basket retaining wall along the crest of Road 4 SPR embankment commenced.

The enabling works for the gabion basket wall involved the removal of the surface layer of clay fill placed over the SPR that was within the footprint of the proposed retaining wall. GAP40 hardfill was then placed over the SPR and compacted with a 500kg vibrating plate compactor to an engineer certified standard. Construction of the gabion basket retaining wall commenced once the base had been formed.

The remainder of Road 4 was formed once the construction gabion basket retaining was completed.

4. Quality Assurance and Controls

4.1. Inspections

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

- Topsoil stripping;
- Mucking out of the gully areas prior to the placement of fill materials to ascertain that all mullock and soft inorganic subsoils had been removed to our satisfaction;
- Silt pond stripping and subsequent preparation prior to backfilling to ensure that all soft unsuitable material had been removed;
- Placement of geogrid in mechanically stabilised batters;
- Observed bulk cut to fill operations; and
- Observe the removal of unsuitable fill.

4.2. Quality Control Criteria

4.2.1. Compaction

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

Specification details were as follows:

Minimum Shear Strength and Maximum Air Voids Method

Table 2: Minimum Shear Strength and Maximum Air Voids Method

(a)	Air Voids Percentage	
	(As defined in NZS 4402)	
	General Fill	
	Average value less than	10%
	Maximum single value	12%
	Maximum value	

(b)	Undrained Shear Strength	
	(Measured by Pilcon shear vane - calibrated using NZGS 2001 method)	
	General fill	
	Average value not less than	140 kPa
	Minimum single value	120 kPa

Table 3: Clegg Impact Value (CIV) Testing

(a)	Clegg Impact Value	
	(As defined in ATSM D 5874-2002)	
	4.5kg Clegg	
	Average value less than	25
	Minimum single value	20

4.3. Quality Assurance Testing

4.3.1. Compaction

Regular insitu density, strength and water content tests were carried out on all areas of the filling at or in excess of the frequency recommended by NZS 4431. For completeness all testing undertaken during the 2016 to 2017 earthworks construction season are appended herein.

Testing conducted on the initial layers on SRP filling placed for the stability undercut at the toe of Embankment D, (as shown on the attached Geotechnical Building Zones and Engineered Embankments Plan) failed to meet the required standard. This was due to saturation of the SPR from high groundwater levels. However, as an added check, the materials was proof rolled with a 8 tonne compactor and deemed suitable

5. Project Evaluation

5.1. Restricted Building Area

The appended Geotechnical Building Zone and Engineer Certified Embankments plan (Figure 1, Appendix D) shows areas requiring specific foundation design (Specific Design Zone A) due to the allotments containing or being immediately adjacent to slope gradients greater than 1(V):4(H).

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

5.2. Bearing Capacity and Settlement of Building Foundations

Following the completion of earthworks operations, we returned to the site on 18 May 2017 and 26 May 2017 and drilled a series of hand auger boreholes at appropriate natural ground locations in order to evaluate likely foundation options for future building development. Topsoil depths on each lot were also assessed at this time.

At current subgrade levels all filled and undisturbed natural ground has a geotechnical ultimate bearing capacity of 300 kPa within the influence of conventional shallow residential building foundation loads.

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

5.3. Expansive Soils

Two sets of Expansive soil tests were carried out on samples selected from within the zone of likely influence of shallow building foundations in Stage 9 development area.

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

All test results are IANZ (International Accreditation New Zealand) endorsed and full details are appended.

The AS 2870 Site Class for this subdivision is M (moderate), and is based on the laboratory results together with our visual-tactile assessment and local knowledge. Specific design alternatives for this Site Class are presented in the Suitability Statement.

5.4. Lot Gradients

The stability of the critical areas of the site, including the steep batters in the vicinity of Road 4 and adjacent to Lots 26 and 36 to 37 have been assessed for potential circular failure under worst case scenario groundwater conditions. The soil parameters selected were based on assumed realistic conditions.

For Lots 26 and 36 to 37, the appended stability analyses demonstrates that factors of safety against instability in excess of 1.5 (under prevailing groundwater conditions) and in excess of 1.3 (under elevated groundwater conditions), refer Appendix D. We consider that these results are satisfactory and are therefore satisfied that these lots are not subject to the hazards described in section 71(3) of the Building Act.

However, slope gradients immediately adjacent to the south eastern boundaries of Lots 26 and 36 to 37 contain slope gradients steeper than 1V:4H (14 degrees). Slope gradients steeper than 1V:4H are susceptible to a natural process known as soil creep and as a result two geotechnical zones have been introduced, refer Figure 1, Appendix D.

For Road 4 SPR embankment, our stability analyses demonstrated that the required factor of safety against instability of 1.5 under prevailing groundwater conditions was achievable whereas, the required factor of 1.3 under of safety under elevated groundwater conditions could not be achieved. Therefore underfill drains were installed beneath and behind the SPR embankment to provide control over the groundwater regime in this area. As an added measure, biaxial geogrid was placed every 0.5m lift to provide additional strength to the embankment.

Stability assessments conducted on Road 2 and Road 4 engineer fill embankments (reported on in our geotechnical investigation report, dated 29 July 2016) returned stability assessments in excess of the required criteria under prevailing and elevated groundwater conditions. However, as an added measure, the engineer fill embankment for Road 4 was reinforced with biaxial geogrid placed parallel to the batter face every 0.5m lift.

Details of the resulting building and earthworks restrictions within the geotechnical zones and adjacent, are presented in the Suitability Statement.

5.5. Fill Induced Settlement

As a result of our pre-fill inspections and quality control testing, we are of the opinion that induced differential settlements beneath or within the certified filling due to its imposed weight should be insignificant with respect to conventional NZS 3604 residential building developments.

5.6. Vegetation Cover

Wherever practical on sloping land beyond building platform areas all existing grass cover should be maintained and even supplemented with new plantings. Any vegetation cleared beyond the immediate area of building platforms for temporary construction purposes should be replanted replaced as soon as possible.

The contribution of appropriate vegetation cover to overall sediment and erosion control should not be underestimated.

5.7. Stormwater Controls

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

5.8. Service Trenches

As is normal on all subdivisions, building developments involving foundations within a 45 degree zone of influence from pipe inverts will require engineering input. However, it is unlikely to be an issue for Stage 8 based on the as-built plans.

5.9. Road Subgrades

Dynamic Cone Penetrometer (DCP) testing was undertaken at regular intervals on the road subgrades and the results were subsequently forwarded to Harrison Grierson Consultants Limited for pavement design purposes. We understand that all of Road 4 was undercut by 300mm and the undercut was then replaced with GAP65 hardfill.

5.10. Underfill Drains

During the construction of Road 4 SPR fill embankment two perforated underfill drains were placed under the toe of the SPR embankment and extending back into the natural soils forming the existing slopes to tap groundwater seepages prior to filling, as required by NZS 4431.

These drains were intended to intercept localised groundwater seepages and springs during earthworks and to help provide general control over groundwater levels. They are buried beneath 0.5 to 2.5m depth of engineered filling placed during the construction season of 2016 to 2017. In the event of any foundation solutions being constructed in the 45 degree zone of influence of these drains, they must be endorsed by an Engineer to ensure they do not compromise the function of the drains.

5.11. Topsoil

Topsoil depths in likely building platform areas were checked by the drilling of a borehole in the approximate centre of each of the lots. Our findings, which are indicative only and subject to variation at other locations, show that likely topsoil depths are between 200 mm and 400 mm.

5.12. Contractor's Work

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

(i) The approved Contract drawings and design details,

(ii) The approved Contract specifications,

(iii) Authorised Variations to (i) and (ii) during the execution of the works,

(iv) The conditions of Resource, Earthworks and Building Consents where applicable,

(v) The relevant Coffey Geotechnics reports, recommendations and site instructions,

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

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

I, Kah-Weng Ho, of Coffey Geotechnics (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 Developer as the Geotechnical Engineer on Stage 9 of the Donegal Stud residential subdivision, Flat Bush.
2. The extent of preliminary investigations carried out to date are described in Geotechnical Investigation Report, reference GENZAUCK16856AA, dated 29 July 2016. The conclusions and recommendations of that document have been re-evaluated in the preparation of this report. Details of the results of all tests carried out are appended.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
    a. The earth fills shown on the appended Harrison Grierson Consultants Limited Cut-Fill As-Built Plan have been placed in compliance with NZS 4431 and related documents.
    b. The land encompassing Lot 26 and Lots 36 and 77 have been categorised into two Geotechnical Zones, namely Zone A and Zone B, as shown on the Geotechnical Building Zones and Engineered Embankments Plan in Appendix D. Specific comments on these zones are provided in (c) and (d) below.
    c. Subject to the geotechnical limitations, restrictions, recommendations and expansive soil requirements set out below, the finished ground within the land classified as **'Zone A'** on the appended Geotechnical Zonation Plan is considered suitable for the construction of conventional light industrial buildings , as described in sub-section (h) below.
    d. **'Zone B'** on the appended Geotechnical Zonation Plan is considered suitable for future building construction and earthworks provided that piling of the leading edge foundations is undertaken. The structural designer should attend to all details of pile spacing, diameter and load capacity and must also ensure that the design allows for any differential movement that may occur between the piled and unpiled portions of the dwelling.

e. A geotechnical ultimate bearing capacity of 300 kPa may be assumed for shallow foundation design on all lots.

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

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

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

g. The assessed AS 2870:2011 expansive site Class for all lots is M (moderate).

h. Subject to the geotechnical recommendations and expansive soil assessment associated with 3(b), 3(c) 3(d) and 3(e) above:

   (i) The cut, filled and original ground within residential lot boundaries is generally suitable for residential buildings constructed in accordance with NZS 3604 (that incorporates specific foundation and associated structural design on account of the expansive soils site class) and related documents.

   (ii) On all lots foundation design may be carried out in accordance with AS 2870:2011 (Class M) or alternatively, a specific foundation and structural design may be undertaken by a Chartered Professional Engineer who should allow for expansive soil effects in the design. The minimum recommended foundation depth below cleared ground level following topsoil removal and benching of building platform areas is 600mm for NZS3604 type strip and pad foundations.

4. Road subgrades have been formed having due regard for slope stability and settlement, although CBR values will likely vary between natural and filled ground as is to be expected.

7. Limitations

The as-built plans and the professional opinion contained within this report are furnished to the Auckland Council and Hugh Green Limited for their purposes alone on the express condition that they 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.

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

For and on behalf of Coffey

Prepared By:

Ray Berry
Senior Engineering Geologist

Authorised By:

Kah-Weng Ho
Senior Principal

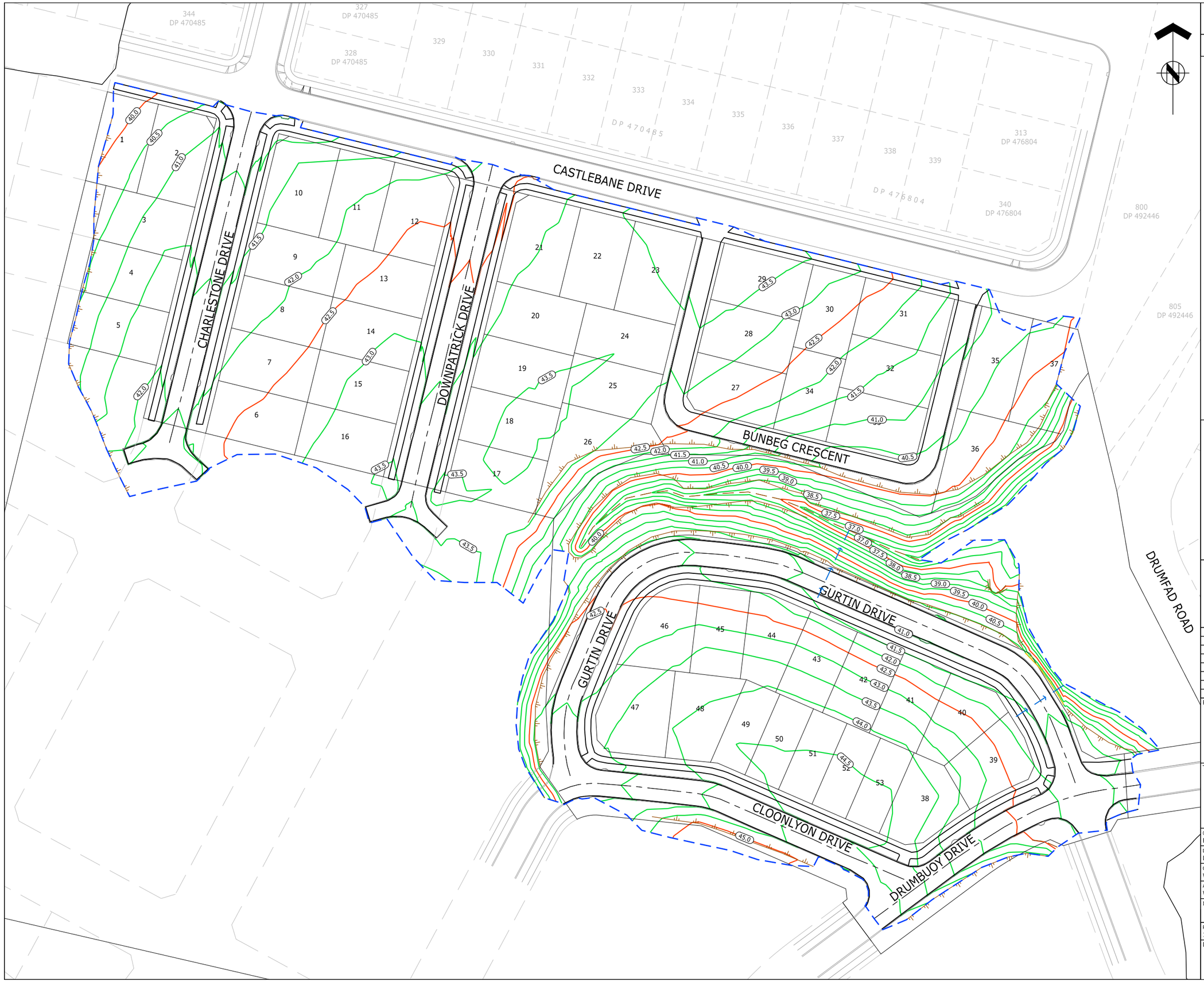
Table 4: Suitability Statement Summary

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870:2011 Class
1	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
2	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
3	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
4	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
5	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
6	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
7	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
8	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
9	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
10	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
11	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
12	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
13	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
14	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
15	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
16	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
17	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
18	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
19	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
20	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
21	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
22	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
23	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870:2011 Class
24	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
25	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
26	Specific site investigation, foundation design and construction inspections required in Building Zone B as shown on Geotechnical Building Zone & Engineered Embankments Plan (Figure 1, Appendix D) due to slope gradients greater than 1 in 4 and due to the potential for adverse effects to foundations from long term soil creep. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
27	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
28	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
29	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
30	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
31	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
32	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
33	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
34	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
35	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
36	Specific site investigation, foundation design and construction inspections required in Building Zone B as shown on Geotechnical Building Zone & Engineered Embankments Plan (Figure 1, Appendix D) due to slope gradients greater than 1 in 4 and due to the potential for adverse effects to foundations from long term soil creep. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
37	Specific site investigation, foundation design and construction inspections required in Building Zone B as shown on Geotechnical Building Zone & Engineered Embankments Plan (Figure 1, Appendix D) due to slope gradients greater than 1 in 4 and due to the potential for adverse effects to foundations from long term soil creep. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
38	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870:2011 Class
39	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
40	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
41	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
42	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
43	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
44	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
45	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
46	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
47	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
48	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
49	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
50	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
51	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
52	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
53	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M

Appendix A – Harrison Grierson Consultants Limited As-Built Plans



ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

NOTES:

1. ORIGIN OF LEVELS
   S 66 SO 48643
   RL 54.50m
2. ORIGIN OF COORDINATES
   S 66 SO 48643
   5905356.71mN
   1770941.22mE

LEGEND:

- 42.5 — CONTOUR MAJOR
- 43.0 — CONTOUR MINOR
- TOP OF RETAINING WALL
- BOTTOM OF RETAINING WALL
- TOP OF BANK
- BOTTOM OF BANK
- EXTENT OF EARTHWORKS
- 100Ø NOVACOIL UNDERFILL DRAIN

ENGINEERING APPROVAL
ENG 51364

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 28.07.2017

Name: WILLIAM JOHN FREDERICK PLATTS

Phone: 09-917-5000

Email: w.platts@harrisongrierson.com

AUCKLAND OFFICE
DILWORTH HOUSE 71 GREAT SOUTH ROAD
NEWMARKET AUCKLAND 1051
T +64 9 917 5000
W www.harrisongrierson.com

REF	REVISIONS	BY	DATE
A	AS-BUILT	WJP	28.07.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

STAGE 9
FINISHED LEVEL CONTOUR
AS-BUILT PLAN

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: DXK	DATE: 07.2017	SIGNED:	PLOT DATE: 31.07.17
CHECKED: WJP	DATE: 28.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 28.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: 1:500-A1 1:1000-A3	A1
DRAWING No: 139707-AB200		REV A

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

NOTES:

1. ORIGIN OF LEVELS
   S 66 SO 48643
   RL 54.50m

2. ORIGIN OF COORDINATES
   S 66 SO 48643
   5905356.71mN
   1770941.22mE

LEGEND:

- CUT AREA
- FILL AREA
- -1.0 CUT CONTOUR
- 1.0 FILL CONTOUR
- EXTENT OF EARTHWORKS

ENGINEERING APPROVAL
ENG 51364

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 28.07.2017

Name: WILLIAM JOHN FREDERICK PLATTS

Phone: 09-917-5000

Email: w.platts@harrisongrierson.com

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REF	REVISIONS	BY	DATE
A	AS-BUILT	WJP	28.07.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

STAGE 9
EARTHWORKS CUT & FILL
AS-BUILT PLAN

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: DXK	DATE: 07.2017	SIGNED:	PLOT DATE: 31.07.17
CHECKED: WJP	DATE: 28.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 28.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: 1:500-A1 1:1000-A3	A1
DRAWING No: 139707-AB210		REV A

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

NOTES:

1. ORIGIN OF LEVELS
   S 66 SO 48643
   RL 54.50m
2. ORIGIN OF COORDINATES
   S 66 SO 48643
   5905356.71mN
   1770941.22mE
3. ALL PAVEMENT COVERED IN 35mm HOTMIX (MIX 10)

LEGEND:

- 300mm GAP 65 (UNDERCUT)
  200 AP 65 (SUBBASE)
  150mm AP 40 (BASE)
- 200mm AP 65 (SUBBASE)
  150mm AP 40 (BASE)
- CONCRETE JOAL
  175mm (25 MPa) CONCRETE
  100mm AP 40 (BASE)
- CONCRETE FOOTPATH
  100mm (20 MPa) CONCRETE
  100mm AP 40 (BASE)
- PRAM CROSSING
- GRASS BERM
- GABION BASKET
- MANARC RESIDENTIAL VEHICLE CROSSING
- ROADSIDE BARRIER

ENGINEERING APPROVAL
ENG 51364

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER
Date: 26.07.2017
Name: WILLIAM JOHN FREDERICK PLATTS
Phone: 09-917-5000
Email: w.platts@harrisongrierson.com

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DILWORTH HOUSE 71 GREAT SOUTH ROAD
NEWMARKET AUCKLAND 1051
T +64 9 917 5000
W www.harrisongrierson.com

A	AS-BUILT	WJP	26.07.17
REF	REVISIONS	BY	DATE

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

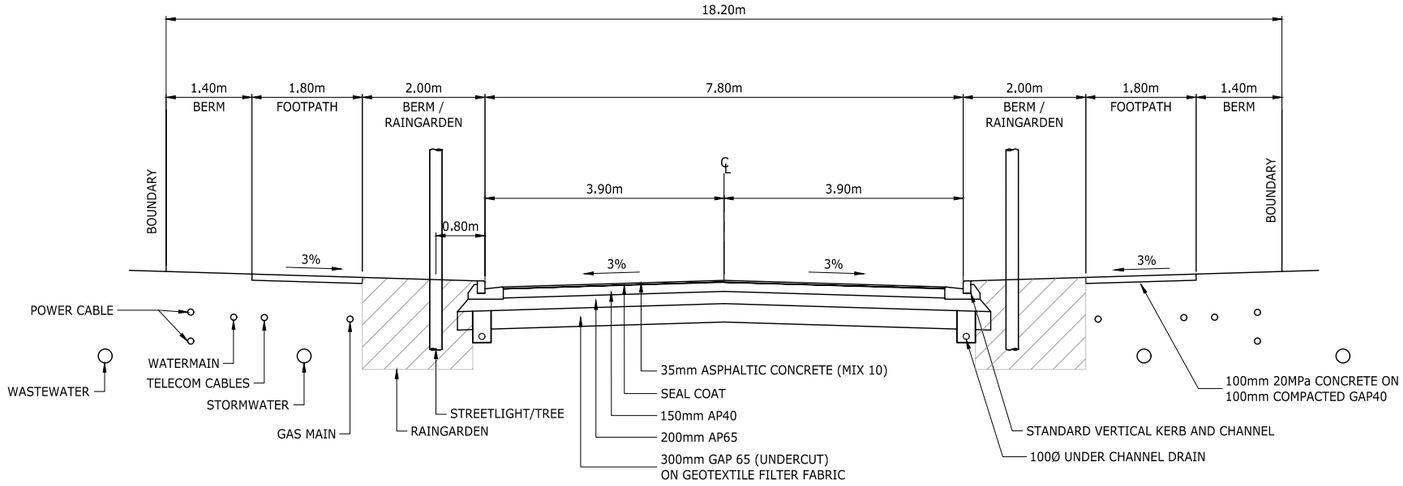
TITLE:

STAGE 9
MINIMUM FLOOR LEVEL
AS-BUILT PLAN

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: BB	DATE: 05.2017	SIGNED:	PLOT DATE: 26.07.17
CHECKED: WJP	DATE: 26.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 26.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

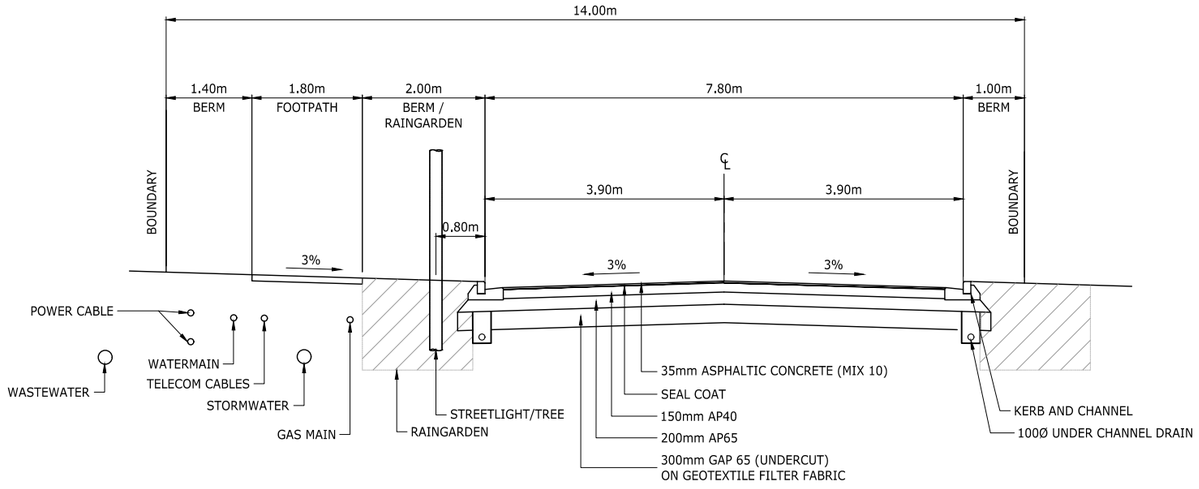
PROJECT No: 1050-139707-01	SCALES: 1:500-A1 1:1000-A3	A1
DRAWING No: 139707-AB301		REV A



1 / AB301 CROSS SECTION (LOCAL ROAD)

SCALE 1:50-A1, 1:100-A3

DOWNPATRICK DRIVE (CH 100 -CH 131.3)
DOWNPATRICK DRIVE (CH 27.6 - CH 60)
CHARLESTOWN DRIVE (CH 100 - CH 130)



2 / AB301 CROSS SECTION (PARK EDGE ROAD)

SCALE 1:50-A1, 1:100-A3

GURTIN DRIVE (CH 0 -CH 182)
GURTIN DRIVE (CH 200 - CH 236.2)

ENGINEERING APPROVAL
ENG 51364

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 26.07.2017

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REF	REVISIONS	BY	DATE
A	AS-BUILT	WJP	26.07.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

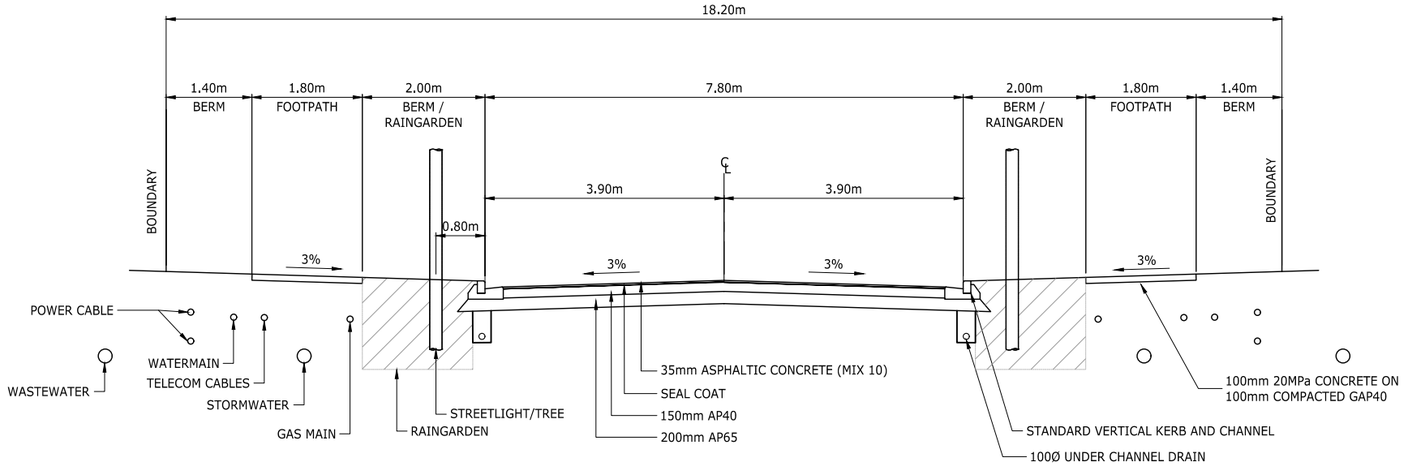
STAGE 9
PAVEMENT AS-BUILT SECTIONS
SHEET 1 OF 4

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: BB	DATE: 07.2017	SIGNED:	PLOT DATE: 26.07.17
CHECKED: WJP	DATE: 26.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 26.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: AS SHOWN	A1

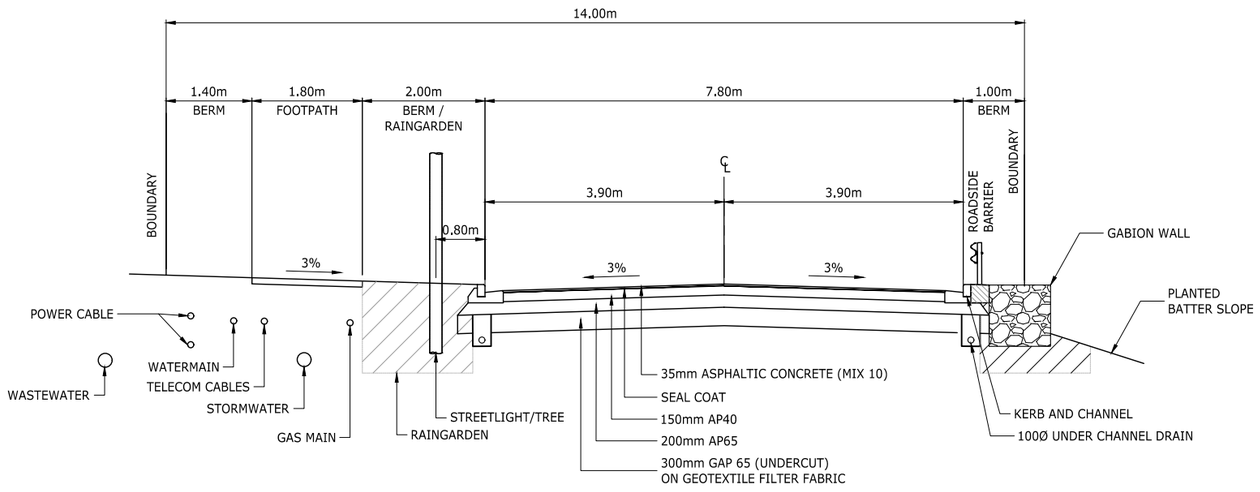
DRAWING No: 139707-AB330 REV A



3 / AB301 CROSS SECTION (LOCAL ROAD)

SCALE 1:50-A1, 1:100-A3

DOWNPATRICK DRIVE (CH 60 -CH 100)
CHARLESTOWN DRIVE (CH 27.6 - CH 100)



4 / AB301 CROSS SECTION (PARK EDGE ROAD)

SCALE 1:50-A1, 1:100-A3

GURTIN DRIVE (CH 182 -CH 200)

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

ENGINEERING APPROVAL
ENG 51364

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- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 26.07.2017

Name: WILLIAM JOHN FREDERICK PLATTS

Phone: 09-917-5000

Email: w.platts@harrisongrierson.com

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REF	REVISIONS	BY	DATE
A	AS-BUILT	WJP	26.07.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

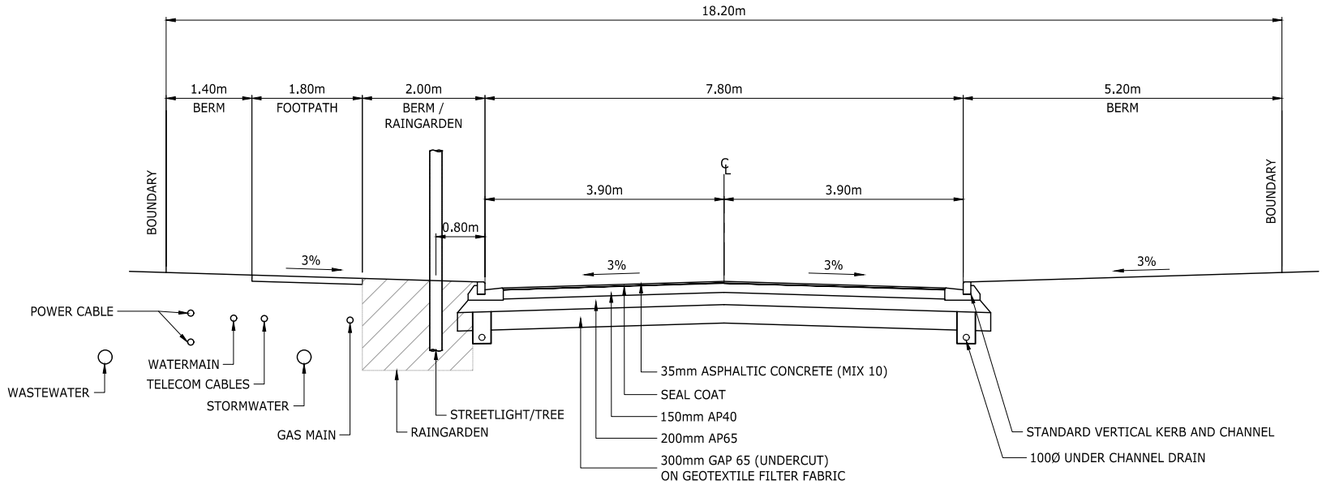
STAGE 9
PAVEMENT AS-BUILT SECTIONS
SHEET 2 OF 4

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: BB	DATE: 07.2017	SIGNED:	PLOT DATE: 26.07.17
CHECKED: WJP	DATE: 26.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 26.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: AS SHOWN	A1

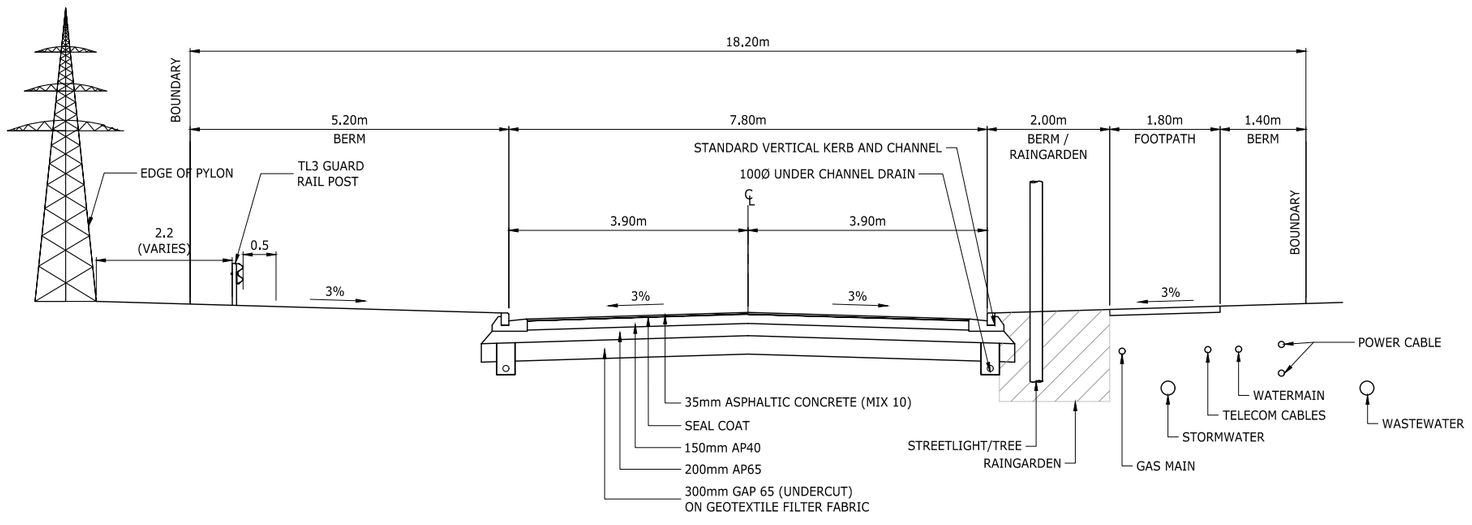
DRAWING No: 139707-AB331 REV A



5 AB301 CROSS SECTION (LOCAL ROAD)

SCALE 1:50-A1 1:100-A3

DRUMBUOY DRIVE (CH 26.1 - CH 92.4)
CLOONLYON DRIVE (CH 33.3 - CH 108.6)



6 AB301 CROSS SECTION (LOCAL ROAD)

SCALE 1:50-A1 1:100-A3

CLOONLYON DRIVE (CH 0 -CH 33.3)
DRUMBUOY DRIVE (CH 92.4 - CH 112.6)

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

ENGINEERING APPROVAL
ENG 51364

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- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 26.07.2017

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A	AS-BUILT	WJP	26.07.17
REF	REVISIONS	BY	DATE

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

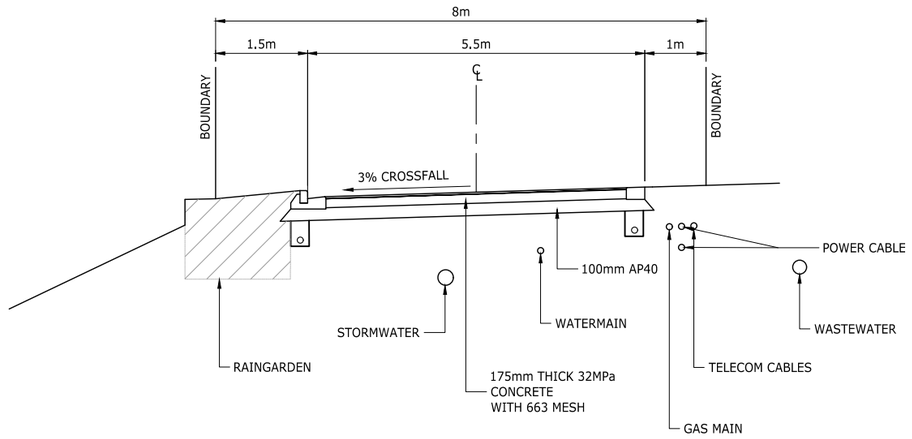
STAGE 9
PAVEMENT AS-BUILT SECTIONS
SHEET 3 OF 4

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: BB	DATE: 07.2017	SIGNED:	PLOT DATE: 26.07.17
CHECKED: WJP	DATE: 26.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 26.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: AS SHOWN	A1

DRAWING No: 139707-AB332 REV A



7 / AB301 CROSS SECTION (JOAL)

SCALE 1:50-A1, 1:100-A3

BUNBEG CRESCENT (CH 9.1 -CH 182.3)

ENGINEERING APPROVAL
ENG 51364

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 26.07.2017

Name: WILLIAM JOHN FREDERICK PLATTS

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A	AS-BUILT	WJP	26.07.17
REF	REVISIONS	BY	DATE

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

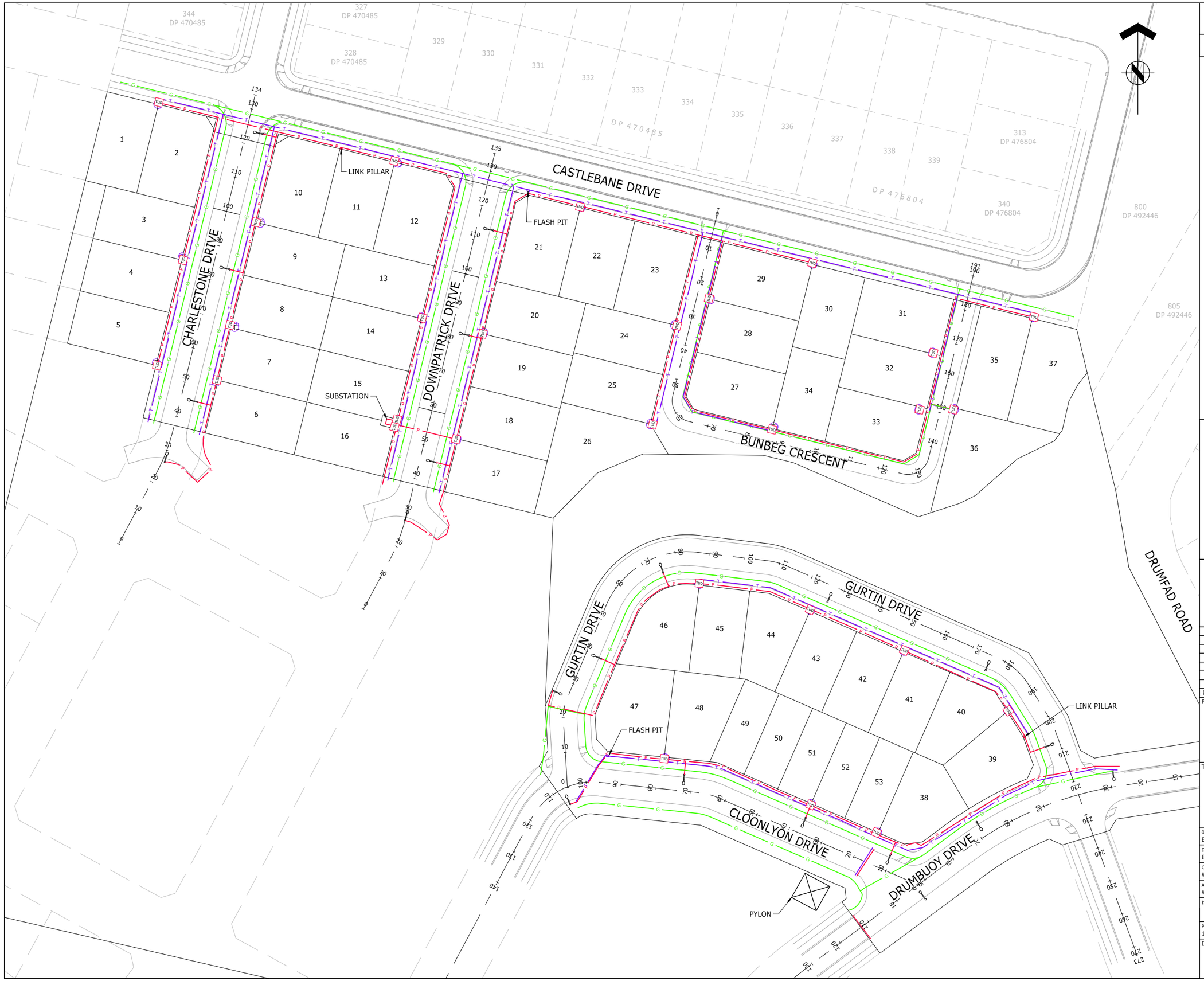
STAGE 9
PAVEMENT AS-BUILT SECTIONS
SHEET 4 OF 4

ORIGINATOR: EXC	DATE: 07.2016	SIGNED:	PLOT BY: BKB
DRAWN: BB	DATE: 07.2017	SIGNED:	PLOT DATE: 26.07.17
CHECKED: WJP	DATE: 26.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 26.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: AS SHOWN	A1

DRAWING No: 139707-AB333 REV A



ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

NOTES:

1. ORIGIN OF LEVELS
   S 66 SO 48643
   RL 54.50m

2. ORIGIN OF COORDINATES
   S 66 SO 48643
   5905356.71mN
   1770941.22mE

LEGEND:

- G — NEW GAS PIPE
- P — NEW POWER
- T — NEW TELECOM
- TUD — NEW POWER TUD
- T — NEW TELECOM PLINTH
- NEW STREETLIGHT

ENGINEERING APPROVAL
ENG 51364

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±10mm.

Signed: .....
CHARTERED PROFESSIONAL ENGINEER

Date: 19.07.2017

Name: WILLIAM JOHN FREDERICK PLATTS

Phone: 09-917-5000

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W www.harrisongrierson.com

REF	REVISIONS	BY	DATE
A	AS-BUILT	WJP	19.07.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

STAGE 9
SERVICES AS-BUILT

ORIGINATOR: EXC	DATE: 07.2017	SIGNED:	PLOT BY: BKB
DRAWN: BB	DATE: 07.2017	SIGNED:	PLOT DATE: 08.08.17
CHECKED: WJP	DATE: 19.07.17	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 19.07.17	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS-BUILT

PROJECT No: 1050-139707-01	SCALES: 1:500-A1 1:1000-A3	A1
DRAWING No: 139707-AB550		REV A

Appendix B – Classification Test Data

East Tamaki Laboratory

Coffey Services (NZ) Limited

144A Cryers Road, East Tamaki NZ 2013
PO Box 58877, Botany, Manukau NZ 2163

Phone: +64 9 272 3375
Fax: +64 9 272 3378

coffey
A TETRA TECH COMPANY

Material Test Report

Report No: ETAM17S-04253-1
Issue No: 1

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

Principal: Ray Berry
Project No.: 773-ETAM00071AA
Project Name: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.: As Below **TRN:** -

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura
(Senior Technician)
IANZ Accredited Laboratory Number:105
Date of Issue: 26/05/2017

Sample Details

Sample ID: ETAM17S-04253
Client Sample: -
Date Sampled: 18/05/2017
Source: Unknown (Sampled by Client)
Material: Disturbed Soil
Specification: No Specification
Sampling Method: Unknown (Not IANZ Endorsed)
Project Location: Donegal Stud Stage 9, Flat Bush
Sample Location: Lot 9 / Lot 14
0.40 - 0.80 m

Test Results

Description	Method	Result	Limits
Liquid Limit	NZS 4402:1986 Test 2.2	83	
Plastic Limit	NZS 4402:1986 Test 2.3	Not Tested	
Plasticity Index	NZS 4402:1986 Test 2.4	Not Tested	
Linear Shrinkage	NZS 4402:1986 Test 2.6	18	
Curling		No	
Cracking		No	
Sample History		Natural state	
Fraction Tested		Passing 425µm sieve	
Date Tested		24/05/2017	
Moisture Content (%)	NZS 4402:1986 Test 2.1	32.0	
Date Tested		23/05/2017	

Comments

Work Order: ETAM17W01874
Tested By: CP

East Tamaki Laboratory

Coffey Services (NZ) Limited

144A Cryers Road, East Tamaki NZ 2013
PO Box 58877, Botany, Manukau NZ 2163

Phone: +64 9 272 3375
Fax: +64 9 272 3378

coffey
A TETRA TECH COMPANY

Material Test Report

Report No: ETAM17S-04254-1
Issue No: 1

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

Principal: Ray Berry
Project No.: 773-ETAM00071AA
Project Name: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.: As Below **TRN:** -

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura
(Senior Technician)
IANZ Accredited Laboratory Number:105
Date of Issue: 26/05/2017

Sample Details

Sample ID: ETAM17S-04254
Client Sample: -
Date Sampled: 18/05/2017
Source: Unknown (Sampled by Client)
Material: Disturbed Soil
Specification: No Specification
Sampling Method: Unknown (Not IANZ Endorsed)
Project Location: Donegal Stud Stage 9, Flat Bush
Sample Location: Lot 39
0.40 - 0.80 m

Test Results

Description	Method	Result	Limits
Liquid Limit	NZS 4402:1986 Test 2.2	99	
Plastic Limit	NZS 4402:1986 Test 2.3	Not Tested	
Plasticity Index	NZS 4402:1986 Test 2.4	Not Tested	
Linear Shrinkage	NZS 4402:1986 Test 2.6	20	
Curling		No	
Cracking		No	
Sample History		Natural state	
Fraction Tested		Passing 425µm sieve	
Date Tested		24/05/2017	
Moisture Content (%)	NZS 4402:1986 Test 2.1	31.7	
Date Tested		23/05/2017	

Comments

Work Order: ETAM17W01874
Tested By: CP

Appendix C - Field Density Test Summary Sheets

Coffey Services NZ Ltd
144A Cryers Road, East Tamaki, Auckland 2103
PO Box 58877, Botany, Manukau, Auckland 2163
t +64 92723575 f +92723576
www.coffey.com

coffey
A TETRA TECH COMPANY

Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 1/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m³)	Oven Water Content (%)	Dry Density (t/m³)	Solid Density	Air Voids (%)
22/11/2016	ETAM16W03909	FP	1	Fill	Silty CLAY	Refer to plan	-	-	-	1770415	5905657	-	-	150	750mm below FL	215+	215+	215+	159	1.84	31.9	1.40	2.70	3.7
22/11/2016	ETAM16W03909	FP	2	Fill	Silty CLAY	Refer to plan	-	-	-	1770399	5905665	-	-	150	750mm below FL	215+	215+	163	UTP	1.84	30.8	1.41	2.70	4.4
22/11/2016	ETAM16W03909	FP	3	Fill	Silty CLAY	Refer to plan	-	-	-	1770377	5905664	-	-	150	650mm below FL	191	215+	145	154	1.76	41.9	1.24	2.70	1.9

Coffey Services NZ Ltd
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SITE PLAN

NOT TO SCALE

Project No: 773-ETAM00071AA
Work Order No: ETAM16W03909
Page No:

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Batter

Tested by: FP
Date tested: 22/11/2016

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Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 1/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m³)	Oven Water Content (%)	Dry Density (t/m³)	Solid Density	Air Voids (%)
23/11/2016	ETAM16W03911	AB	4	Fill	Silty CLAY	Road 2	-	-	-	1770402	5905666	-	-	150	~1.0m to subgrade	152	168	172	204	1.86	27.8	1.46	2.70	5.5
23/11/2016	ETAM16W03911	AB	5	Fill	Silty CLAY	Road 2	-	-	-	1770379	5905664	-	-	150	~1.5m to subgrade	148	191	164	172	1.79	31.9	1.36	2.70	6.5

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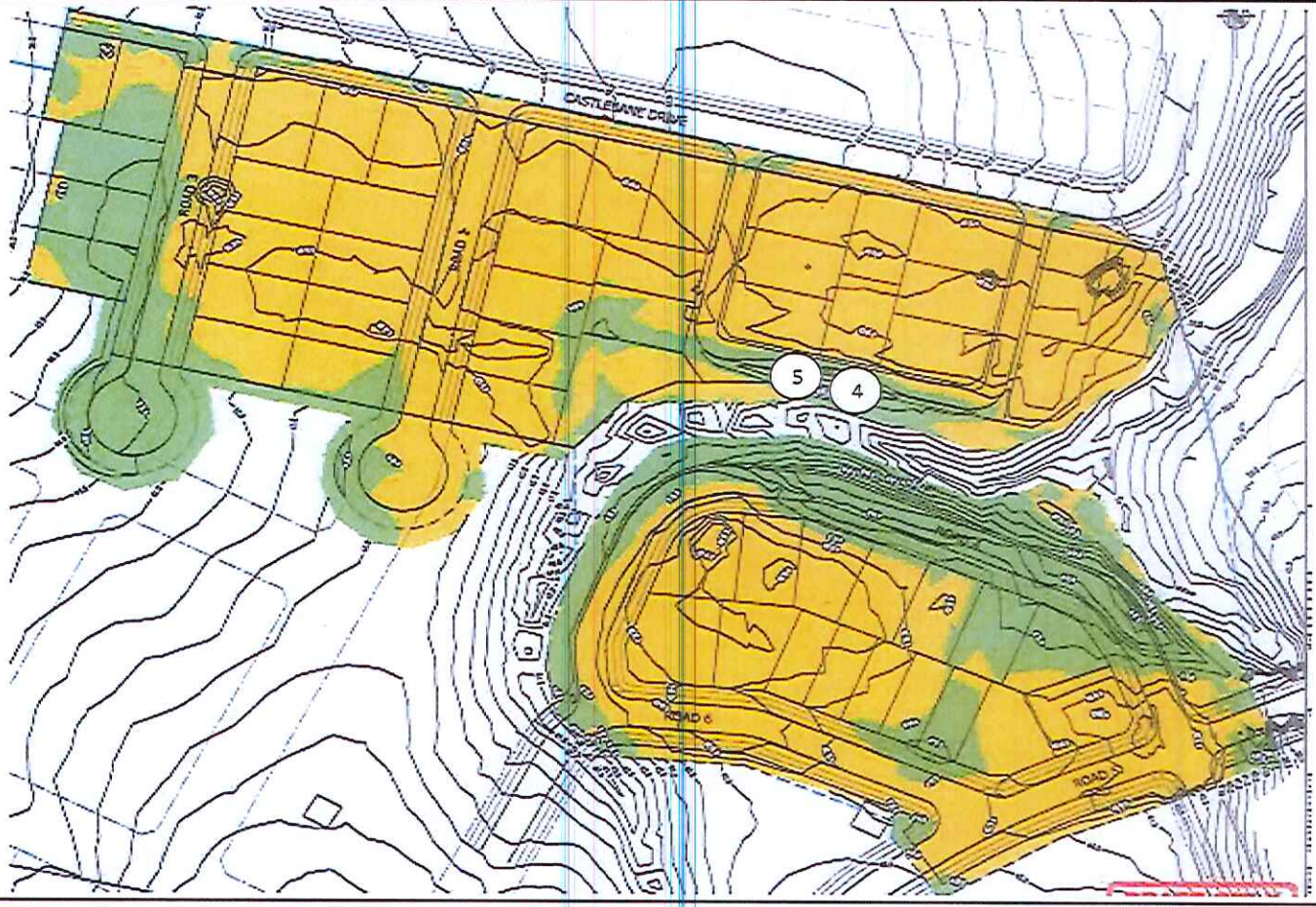
Project No:	**773-ETAM00071AA**
Work Order No:	ETAM16W03911
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 2

Tested by: AB

Date tested: 23/11/2016



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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 1/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m³)	Oven Water Content (%)	Dry Density (t/m³)	Solid Density	Air Voids (%)
24/11/2016	ETAM16W03961	FP	6	Fill	Silty CLAY	Batter	-	-	-	1770396	5905670	-	-	150	FL	177	196	216	UTP	1.74	30.0	1.34	2.70	10.6
24/11/2016	ETAM16W03961	FP	7	Fill	Silty CLAY	Batter	-	-	-	1770371	5905668	-	-	150	FL	154	193	204	216	1.75	43.4	1.22	2.70	1.8

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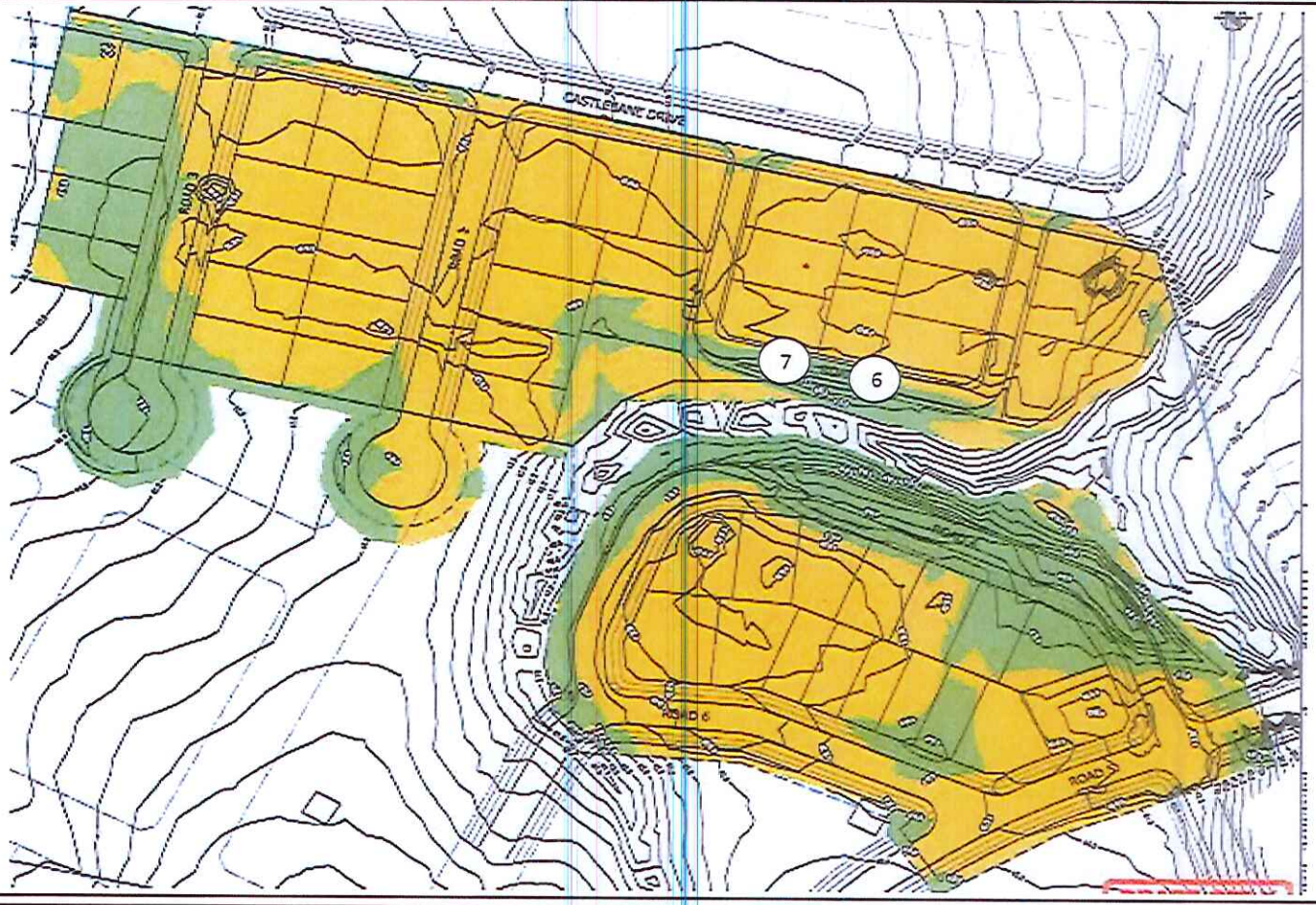
Project No: 773-ETAM00071AA
Work Order No: ETAM16W03961
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Batter

Tested by: FP
Date tested: 24/11/2016



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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 5/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
29/11/2016	ETAM16W04063	AB + JBG	8	Fill	Silty CLAY	General Fill	-	-	-	1770214	5905690	-	-	150	1.0m to subgrade	191	195	218+	UTP	1.80	25.3	1.43	2.70	10.6
29/11/2016	ETAM16W04063	AB + JBG	9	Fill	Silty CLAY	General Fill	-	-	-	1770210	5905682	-	-	150	1.0m to subgrade	177	UTP	UTP	UTP	1.69	35.4	1.25	2.70	9.7

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM16W04063
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: AB + JBG
Date tested: 29/11/2016

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 7/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
30/11/2016	ETAM16W04106	FP + JBG	10	Fill	Silty CLAY	General Fill	-	-	-	1770211	5905617	-	-	150	1.0m to subgrade. Retest of No. 9 field result	UTP	UTP	UTP	229+	1.92	25.3	1.53	2.70	4.4

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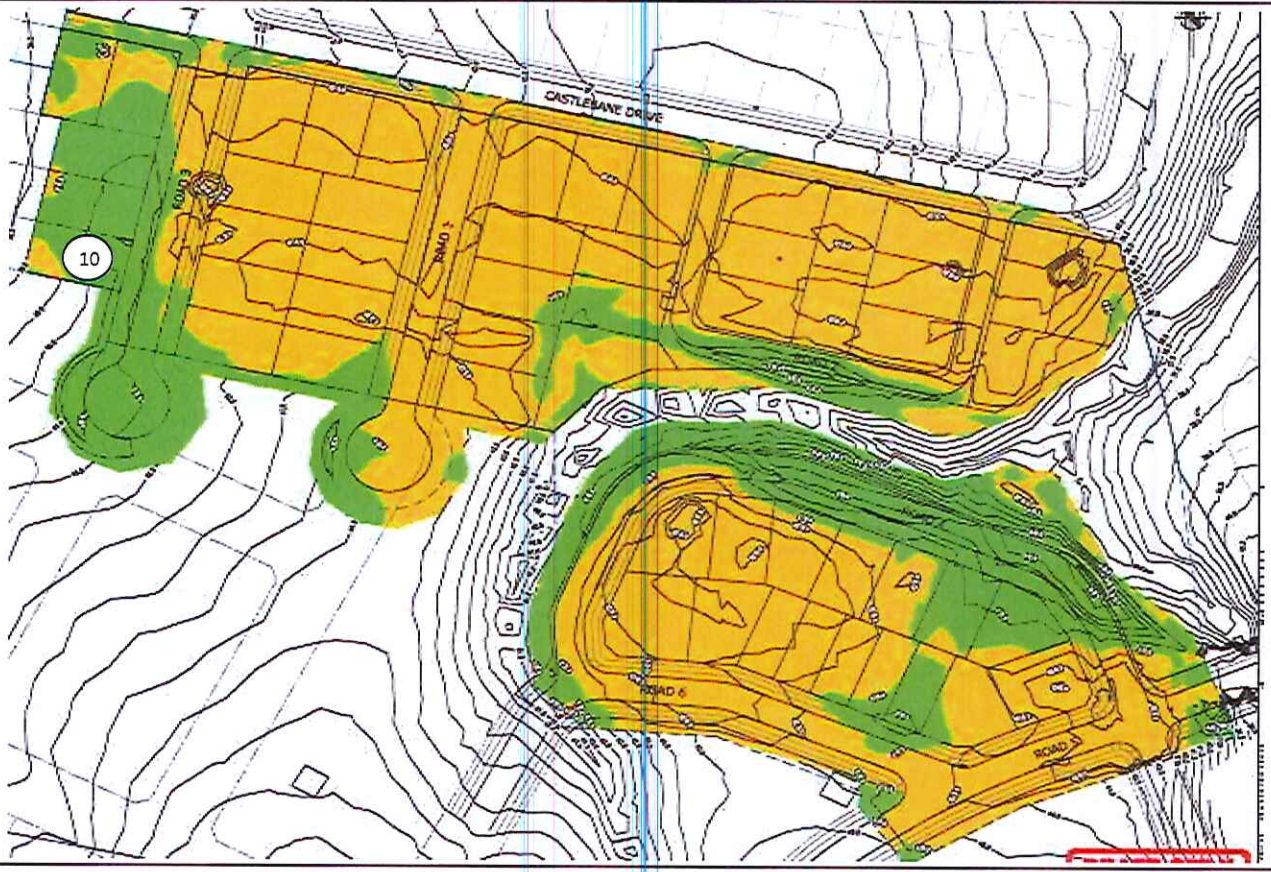
Project No: 773-ETAM00071AA
Work Order No: ETAM16W04106
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: FP and JBG
Date tested: 30/11/2016



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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 9/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
1/12/2016	ETAM16W04187	AB	11	Subgrade	Silty CLAY	Roadway Fill	-	-	-	1770391	5905668	-	-	150		215	190	175	182	1.76	36.4	1.29	2.70	5.2
1/12/2016	ETAM16W04187	AB	12	Fill	Silty CLAY	General Fill	-	-	-	1770213	5905695	-	-	150	Retest of No. 8 area	167	175	197	204	1.78	39.7	1.28	2.7	2.2

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SITE PLAN

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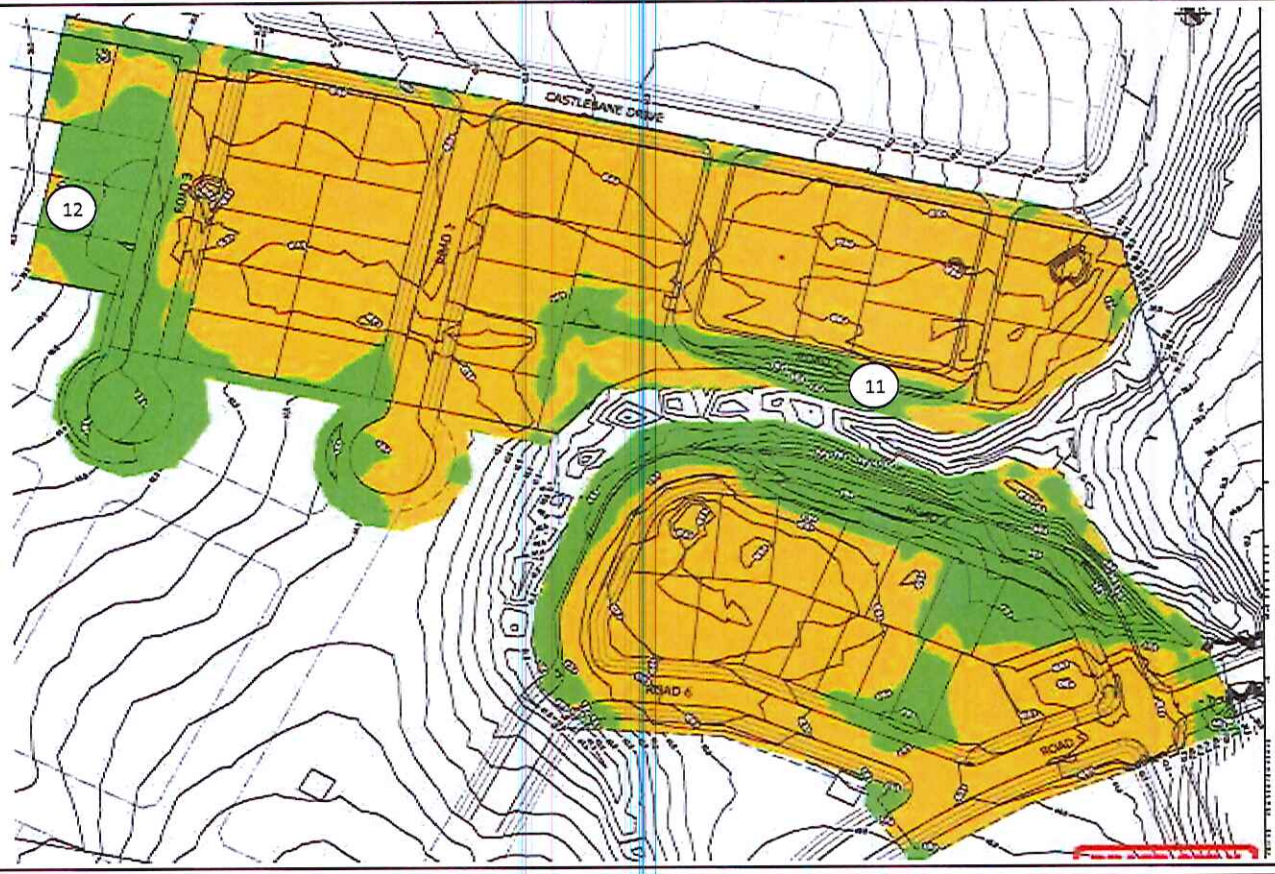
Project No: 773-ETAM00071AA
Work Order No: ETAM16W04187
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: AB
Date tested: 1/12/2016



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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Wiri

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 9/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
2/12/2016	ETAM16W04188	JBG	13	Fill	CLAY	General Fill	-	-	-	1770214	5905690	-	-	150		UTP	UTP	UTP	UTP	1.97	22.0	1.61	2.7	4.8
2/12/2016	ETAM16W04188	JBG	14	Fill	CLAY	General Fill	-	-	-	1770396	5905670	-	-	150		212	216	229+	185	1.78	41.0	1.27	2.7	1.3

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SITE PLAN

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Project No:	**773-ETAM00071AA**
Work Order No:	ETAM16W04187
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: FP and JBG

Date tested: 2/12/2016

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c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 12/12/2016

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

Date	Work Order No:	Tested by	Test No.	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
5/12/2016	ETAM16W004183	JBG	15	BTW Lot 1 - 16	-	-	-	1770200	5905689	-	-	150		UTP	229+	UTP	UTP	1.77	33.6	1.32	2.7	6.7
5/12/2016	ETAM16W004183	JBG	16	BTW Lot 1 - 16	-	-	-	1770217	5905698	-	-	150		229+	UTP	229+	177	1.84	29.9	1.42	2.7	5.1

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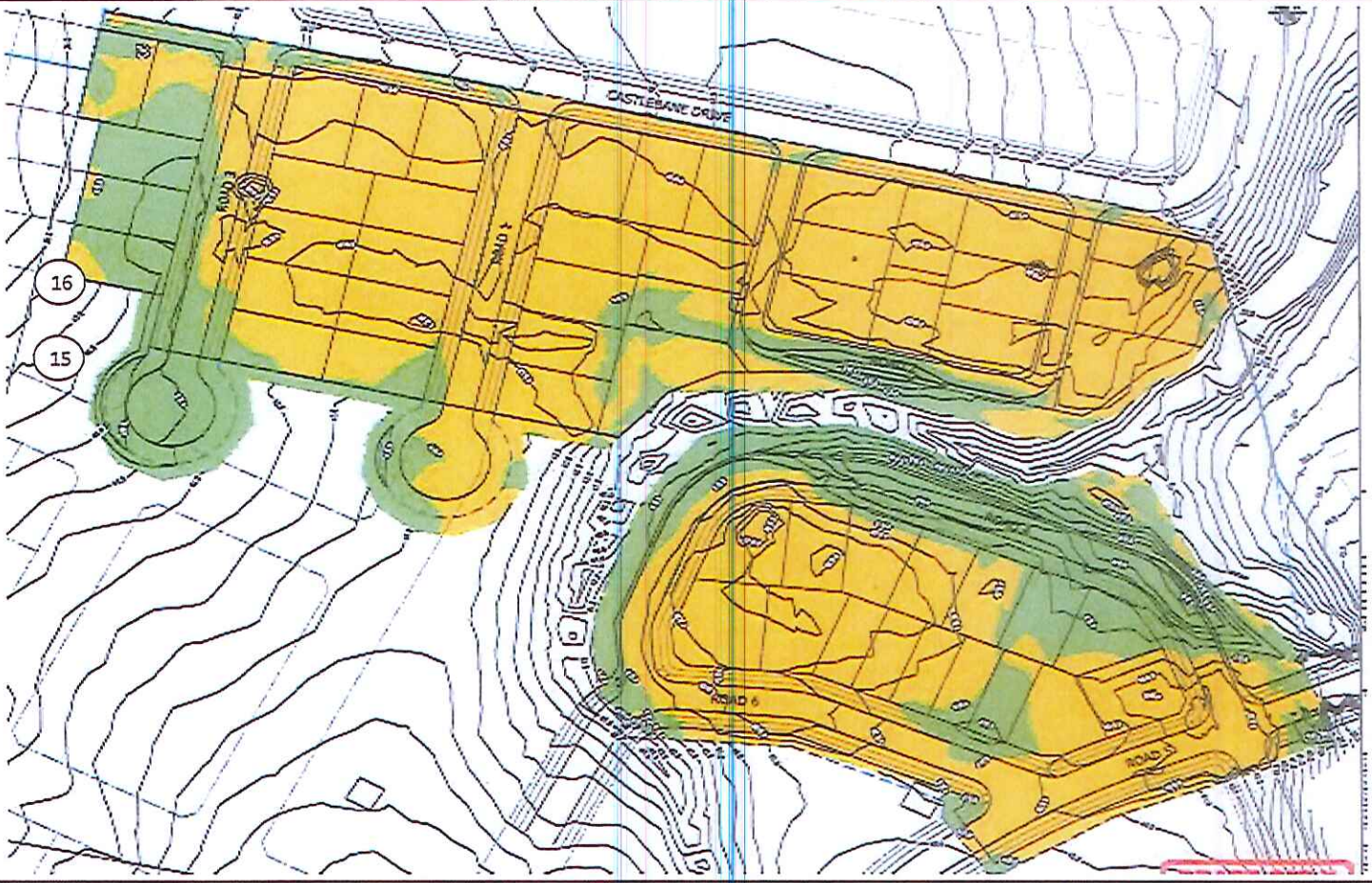
Project No: 773-ETAM00071AA
Work Order No: ETAM16W04183
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: JBG
Date tested: 5/12/2016



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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 12/12/2016

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

Date	Work Order No:	Tested by	Test No.	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
7/12/2016	ETAM16W04214	JBG	17	Fill area	-	-	-	1770219	5905687	-	-	150	0.4m below FL. Engineers pass advised	UTP	229+	UTP	UTP	1.78	27.2	1.40	2.7	10
7/12/2016	ETAM16W04214	JBG	18	Fill area	-	-	-	1770228	5905719	-	-	150	0.4m below FL	UTP	UTP	UTP	UTP	1.76	19.1	1.47	2.7	17

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Project No: 773-ETAM00071AA
Work Order No: ETAM16W04214
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: JBG
Date tested: 7/12/2016

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 13/12/2016

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

Date	Work Order No:	Tested by	Test No.	Location	Chainage (m)	Offset (m)	Offset from	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
9/12/2016	ETAM16W04319	JBG	19	Fill area	-	-	-	1770228	5905719	-	-	150	Retest of No. 18	UTP	UTP	UTP	UTP	2.05	13.8	1.80	2.7	8.4

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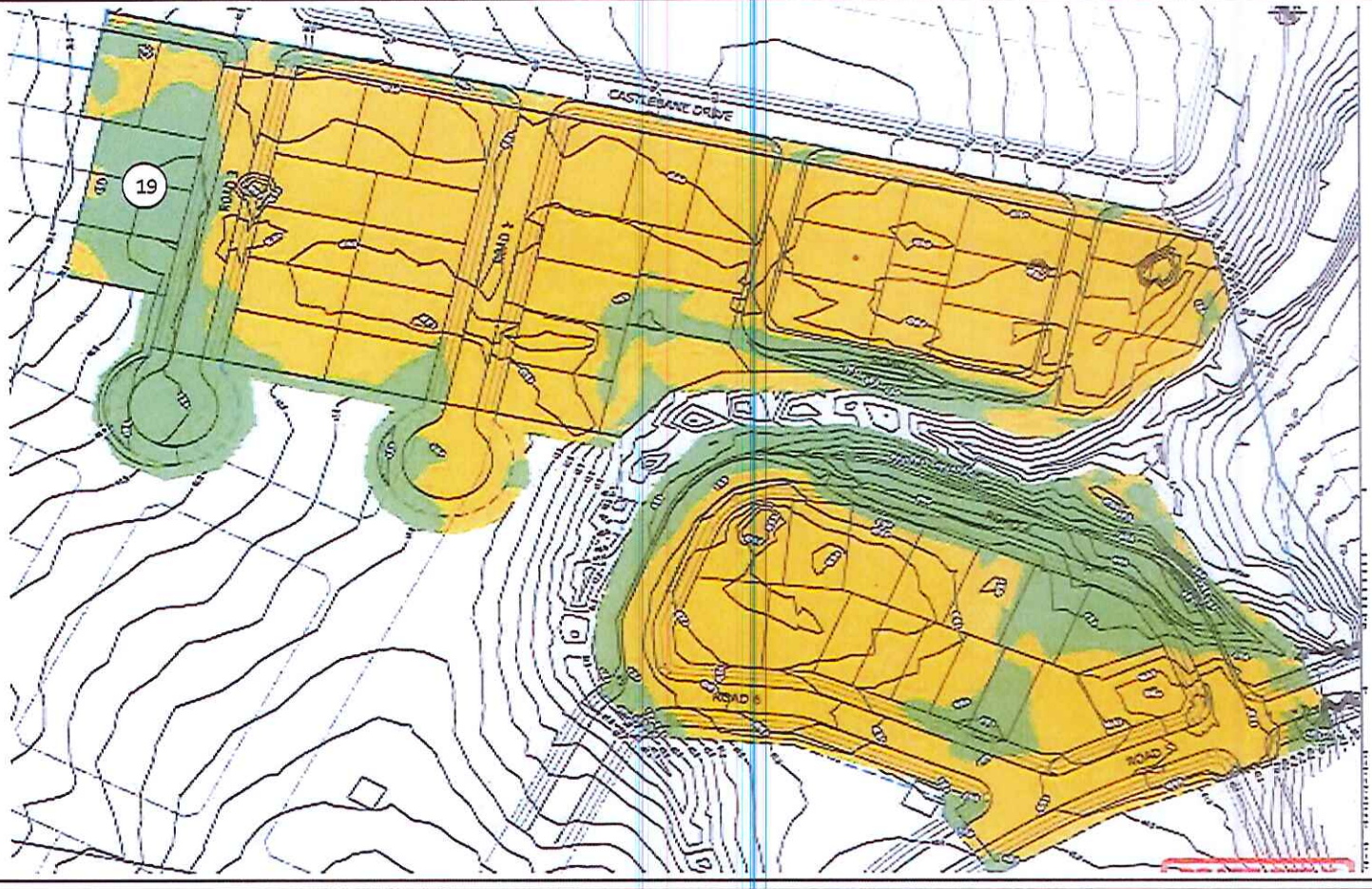
Project No: 773-ETAM00071AA
Work Order No: ETAM16W04319
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Refer to plan

Tested by: JBG
Date tested: 9/12/2016



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c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 29/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
14/12/2016	ETAM16W04399	JBG	20	Fill	Soil	Pond A	1770515	5905511	-	-	150	-	196	216	216	177	1.78	32.0	1.35	2.7	6.7
14/12/2016	ETAM16W04399	JBG	21	Fill	Soil	Pond A	1770461	5905622	-	-	150	-	158	136	136	133	1.82	30.8	1.39	2.7	5.4

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM16W04399
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Pond A

Tested by: JBG
Date tested: 14/12/2016

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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 29/12/2016

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
20/12/2016	ETAM16W04557	JBG	22	Fill	CLAY	Undercut, west end	1770283	5905656	-	-	150	0.1m below FL	196	229+	UTP	UTP	1.88	25.3	1.50	2.7	6.4
20/12/2016	ETAM16W04557	JBG	23	Fill	CLAY	Undercut, west end	1770250	5905670	-	-	150	0.5m below FL	UTP	UTP	UTP	UTP	1.89	26.2	1.50	2.7	5.3

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Project No:	**773-ETAM00071AA**
Work Order No:	ETAM16W04557
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Western undercut fill area

Tested by: JBG

Date tested: 20/12/2016

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c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 16/01/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
12/01/2017	ETAM17W00125	AB	**24**	Fill	Silty CLAY	General fill	1770409	5905637	-	-	150	~2.0m below FL	UTP	UTP	UTP	UTP	1.86	26.6	1.47	2.7	6.4
12/01/2017	ETAM17W00125	AB	**25**	Fill	Silty CLAY	General fill	1770375	5905645	-	-	150	~1.5m below FL	UTP	UTP	UTP	UTP	1.79	25.7	1.42	2.7	11

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Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W00125
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: General fill

Tested by: AB

Date tested: 12/01/2017

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c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 16/01/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m^3)	Air Voids (%)
13/01/2017	ETAM17W00126	JBG	**26**	Fill	Silty CLAY	General Fill	1770402	5905636	-	-	150	2.5m below FL	UTP	UTP	UTP	UTP	1.69	36.8	1.23	2.7	9
13/01/2017	ETAM17W00126	JBG	**27**	Fill	Silty CLAY	General Fill	1770432	5905627	-	-	150	2.5m below FL	UTP	UTP	UTP	UTP	1.71	39.7	1.22	2.7	6.1

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00126
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: General fill

Tested by: JBG
Date tested: 13/01/2017

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 05/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
17/01/2017	ETAM17W00201	JBG	**28**	Fill	Clay	Road 4, parallel to creek	1770401	5905641	-	-	150	2.0m above base of fill	UTP	UTP	UTP	UTP	1.74	35.1	1.29	2.7	6.9
17/01/2017	ETAM17W00201	JBG	**29**	Fill	Clay	Road 4, parallel to creek	1770420	5905630	-	-	150	2.0m above base of fill	UTP	UTP	UTP	UTP	1.68	40.7	1.19	2.7	7.3

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00201
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 4, parallel to creek

Tested by: JBG
Date tested: 17/0/2017

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c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 05/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
18/01/2017	ETAM17W00231	JBG	**30**	Fill	Silty CLAY	Road 4, parallel to creek	1770416	5905627	-	-	150	1.0m below FL	UTP	UTP	UTP	UTP	1.83	25.2	1.46	2.7	9.1
18/01/2017	ETAM17W00231	JBG	**31**	Fill	Silty CLAY	Road 4, parallel to creek	1770406	5905625	-	-	150	1.0m below FL	UTP	UTP	UTP	UTP	1.93	27.3	1.52	2.7	2.3

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00231
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 4, parallel to stream

Tested by: JBG
Date tested: 18/01/2017

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 02/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
19/01/2017	ETAM17W00256	JBG	32	Fill	Silty CLAY	Road 4, parallel to creek	1770404	5905633	-	-	150	-	UTP	UTP	UTP	UTP	1.89	22.9	1.54	2.7	7.7
19/01/2017	ETAM17W00256	JBG	33	Fill	Silty CLAY	Road 4, parallel to creek	1770423	5905625	-	-	150	-	UTP	UTP	UTP	UTP	1.84	29.9	1.42	2.7	5.3

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00256
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Road 4, parallel to stream

Tested by: JBG
Date tested: 19/01/2017

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 10/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
20/01/2017	ETAM17W00274	JBG	**34**	Fill	Silty CLAY	Road 4, parallel to creek	1770434	5905611	-	-	150		UTP	UTP	UTP	UTP	1.70	34.0	1.27	2.7	10
20/01/2017	ETAM17W00274	JBG	**35**	Fill	Silty CLAY	Road 4, parallel to creek	1770409	5905623	-	-	150		UTP	UTP	UTP	UTP	1.82	33.6	1.36	2.7	3.6

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00274
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 4, parallel to stream

Tested by: JBG
Date tested: 20/01/2017

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 10/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
23/01/2017	ETAM17W00323	JBG	36	Fill	Silty CLAY	Road 4, parallel to creek	1770413	5905627	-	-	150		UTP	UTP	UTP	UTP	1.84	33.2	1.38	2.7	3.2
23/01/2017	ETAM17W00323	JBG	37	Fill	Silty CLAY	Road 4, parallel to creek	1770431	5905617	-	-	150		UTP	UTP	UTP	UTP	1.96	30.5	1.51	2.7	0.0

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SITE PLAN

NOT TO SCALE

Project No: 773-ETAM00071AA
Work Order No: ETAM17W00323
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 4, parallel to stream

Tested by: JBG
Date tested: 23/01/2017

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 25/01/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
24/01/17	ETAM17W00354	AB	38	Fill	Silty CLAY	General fill	1770469	5905595	-	150		UTP	UTP	UTP	UTP	1.82	35.9	1.34	2.7	2.2
24/01/17	ETAM17W00354	AB	39	Fill	Silty CLAY	General fill	1770450	5905604	-	150		UTP	UTP	UTP	UTP	1.81	35.1	1.34	2.7	3.4

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Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W00354
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: General fill

Tested by: AB

Date tested: 24/01/2017

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Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 17/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m^3)	Air Voids (%)
25/01/2017	ETAM17W00339	JBG	**40**	Fill	Silty CLAY	Road 4, parallel to creek	1770430	5905630	-	-	150		161	177	206	UTP	1.89	26.9	1.49	2.7	4.6
25/01/2017	ETAM17W00339	JBG	**41**	Fill	Silty CLAY	Road 4, parallel to creek	1770425	5905607	-	-	150		UTP	UTP	UTP	UTP	1.77	42.6	1.24	2.7	1.2

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SITE PLAN

NOT TO SCALE

Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W00339
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 4 fill area

Tested by: JBG

Date tested: 25/01/2017

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Client:	Coffey Services NZ Ltd (Auckland)	**PROJECT CODE:**	773-ETAM00071AA
Address	PO Box 8261, Symonds Street, Auckland 1150	Page:	1 of 2
Attention:	Ryan Hayes		
c.c:	Matt Illingworth		
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH		
Location:	Flat Bush		

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 17/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
26/01/2017	ETAM17W00366	JBG	**42**	Fill	Silty CLAY	Road 4, parallel to creek	1770466	5905596	-	-	150		UTP	UTP	UTP	UTP	1.90	28.5	1.48	2.7	3.1
26/01/2017	ETAM17W00366	JBG	**43**	Fill	Silty CLAY	Road 4, parallel to creek	1770458	5905604	-	-	150		UTP	UTP	UTP	UTP	1.87	29.4	1.44	2.7	4.0

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00366
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Road 4, parallel to creek

Tested by: JBG
Date tested: 26/01/2017

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Client: Coffey Services NZ Ltd (Auckland)

Address PO Box 8261, Symonds Street, Auckland 1150

Attention: Ray Berry

c.c: Matt Illingworth

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 05/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m^3)	Air Voids (%)
27/01/17	ETAM17W00390	AB	**44**	Fill	Silty CLAY	Silt pond backfill	1770450	5905663	-	-	150	0.4m from base of fill	146	152	141	128	1.90	26.4	1.50	2.7	4.5
27/01/17	ETAM17W00390	AB	**45**	Fill	Silty CLAY	Silt pond backfill	1770451	5905661	-	-	150	0.4m from base of fill	157	132	141	146	1.90	24.7	1.52	2.7	6.1

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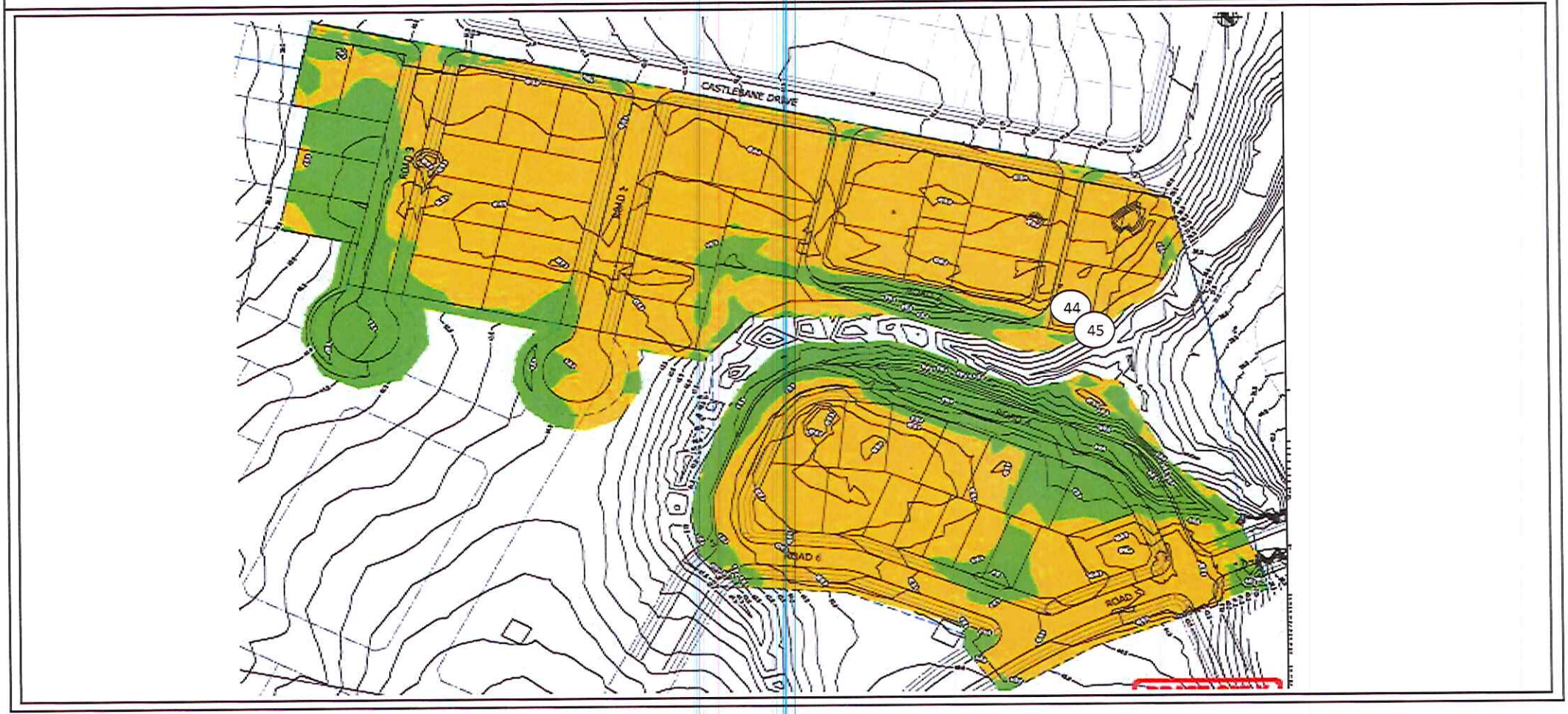
Project No: 773-ETAM00071AA
Work Order No: ETAM17W00390
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Silt Pond

Tested by: AB
Date tested: 27/01/2017



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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 05/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
27/01/17	ETAM17W00400	AB	**46**	Fill	Silty CLAY	Silt pond backfill	1770454	5905660	-	-	150	1.5m to subgrade	152	141	UTP	UTP	1.88	29.1	1.46	2.7	3.7
27/01/17	ETAM17W00400	AB	**47**	Fill	Silty CLAY	Silt pond backfill	1770453	5905664	-	-	150	2.0m to subgrade	182	162	190	175	1.90	26.1	1.51	2.7	4.7

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W00400
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Silt Pond

Tested by: AB
Date tested: 27/01/2017

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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 05/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	Comments	Field Shear Strength in kPa UTP = Unable to penetrate				Wet Density (t/m^3)	Oven Water Content (%)	Dry Density (t/m^3)	Solid Density (t/m^3)	Air Voids (%)
31/01/17	ETAM17W00404	AB	48	Fill	Silty CLAY	Silt pond backfill	1770452	5905666	-	-	150	0.6m to subgrade	UTP	UTP	UTP	UTP	1.90	25.1	1.52	2.7	5.8
31/01/17	ETAM17W00404	AB	49	Fill	Silty CLAY	Silt pond backfill	1770448	5905671	-	-	150	at subgrade	UTP	UTP	UTP	UTP	1.90	24.1	1.53	2.7	6.3

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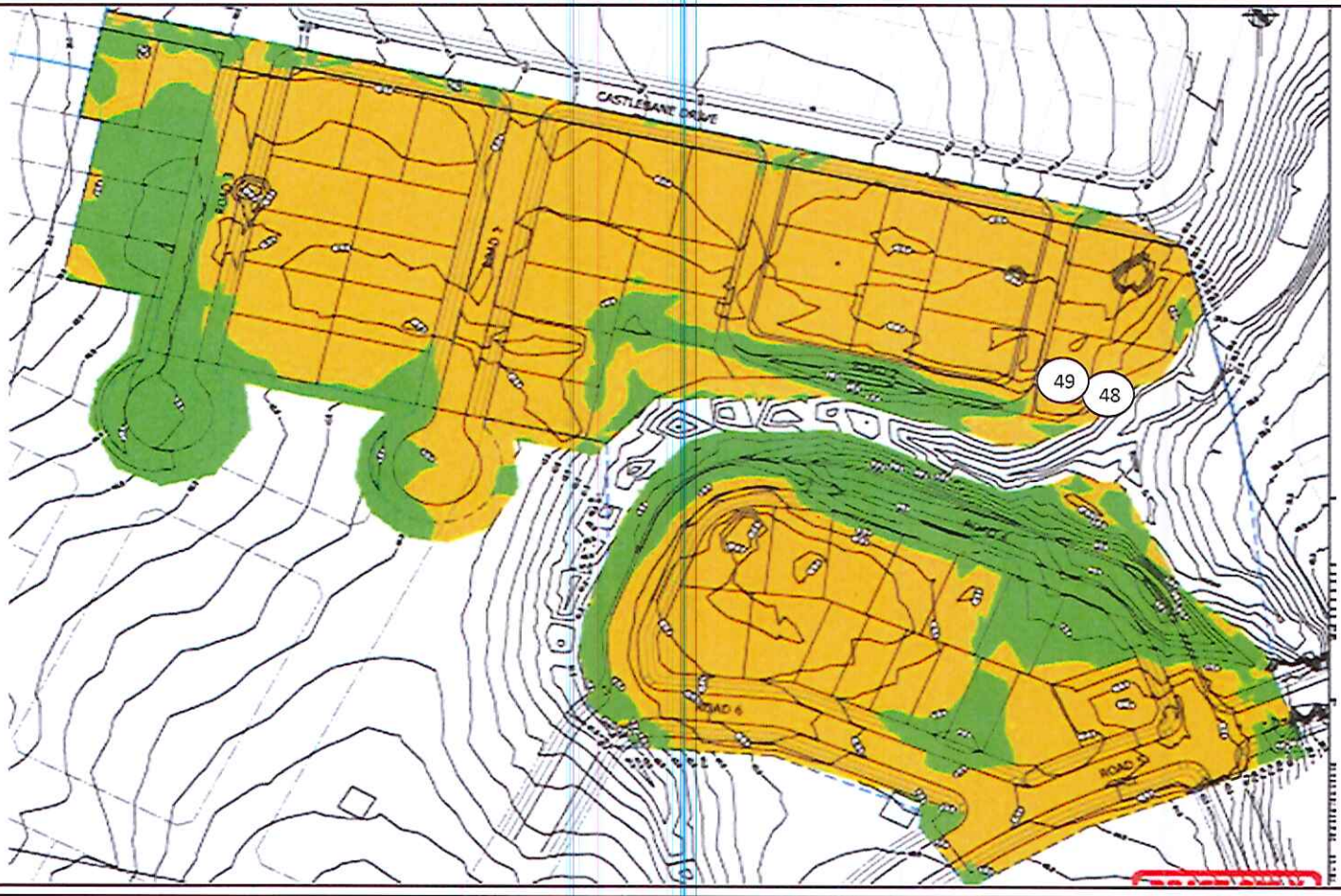
Project No: 773-ETAM00071AA
Work Order No: ETAM17W00404
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Silt pond backfill

Tested by: AB
Date tested: 31/01/17



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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ryan Hayes
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 17/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
2/02/2017	ETAM17W00485	JBG	**50**	Fill	Silty CLAY	North east, fill area	1770468	5905674	-	-	150	0.2m below FL	UTP	UTP	UTP	UTP	1.99	19.8	1.66	2.7	5.6
2/02/2017	ETAM17W00485	JBG	**51**	Fill	Silty CLAY	North east, fill area	1770459	5905671	-	-	150	0.2m below FL	UTP	UTP	UTP	UTP	1.90	27.5	1.49	2.7	3.7

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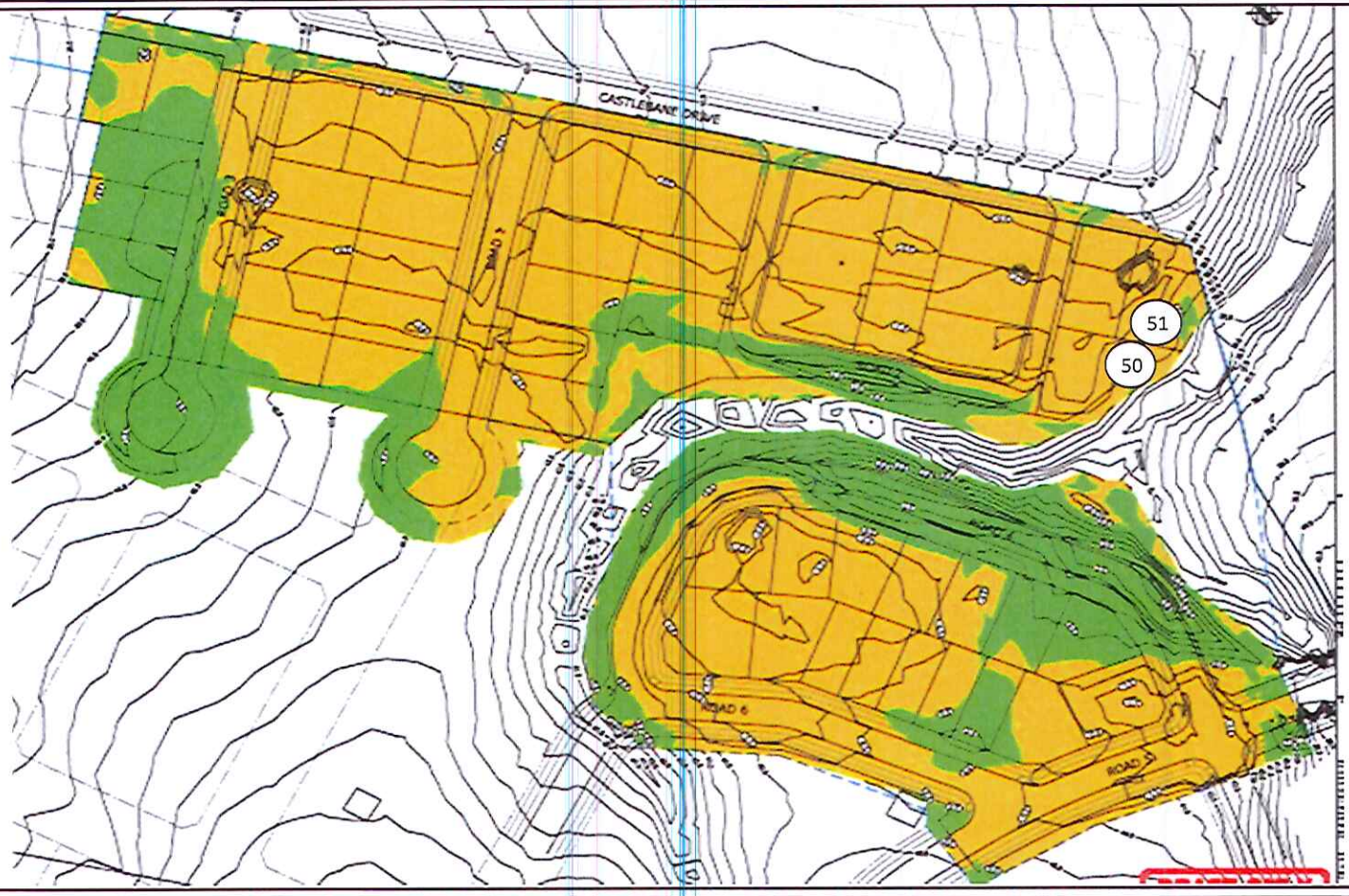
Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W00485
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Northeast fill area

Tested by: JBG

Date tested: 2/2/2017



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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 15/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
3/02/2017	ETAM17W00549	JBG	52	Fill	Clay	North east, batter	1770454	5905654	-	-	150	1.5m below FL. *Field nuc water content applied	173	196	UTP	UTP	1.78	*34.2	1.32	2.7	5.7
3/02/2017	ETAM17W00549	JBG	53	Fill	Clay	North east, batter	1770472	5905677	-	-	150	1.5m below FL. *Field nuc water content applied	158	154	196	UTP	1.75	*34.4	1.30	2.7	7.0

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SITE PLAN

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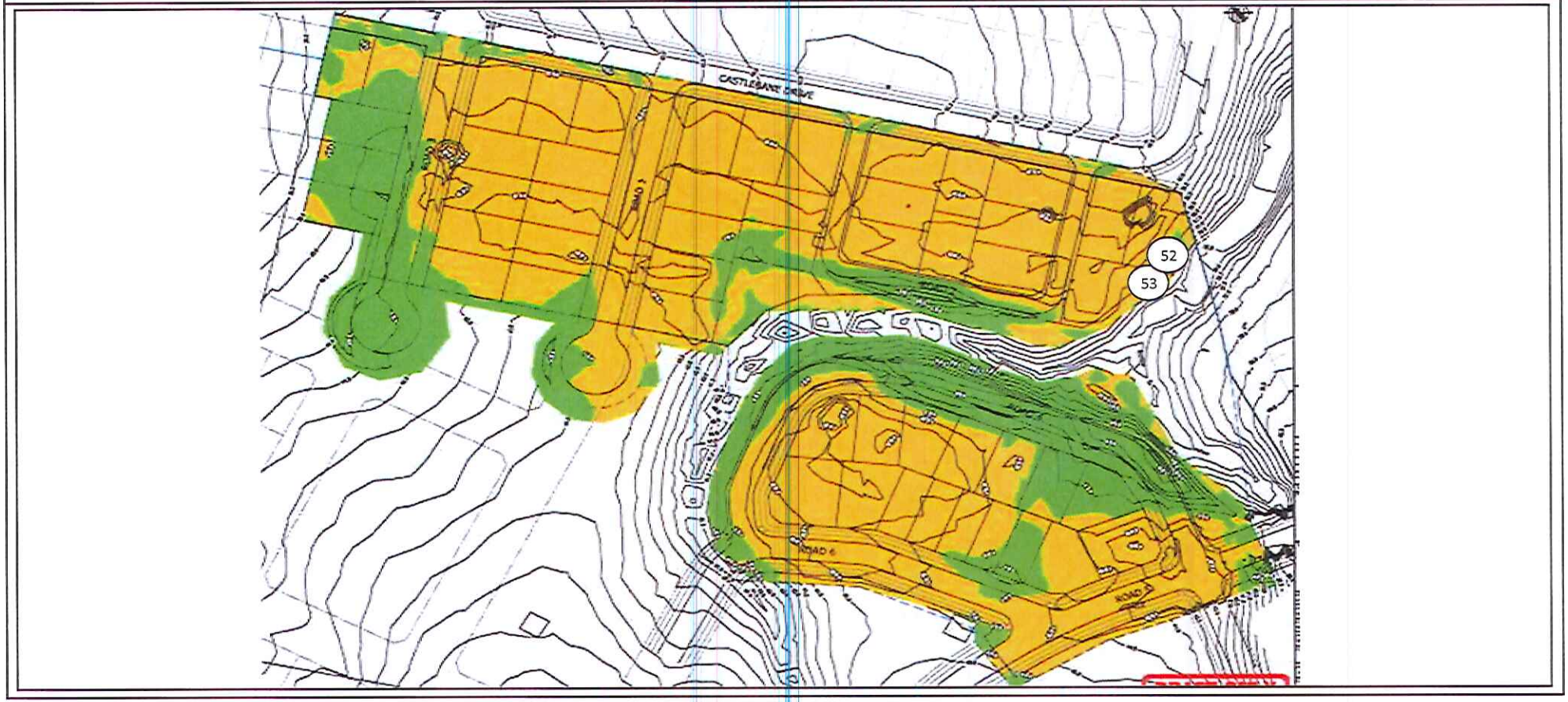
Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W00549
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Northeast batter

Tested by: JBG

Date tested: 3/02/2017



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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

IANZ ACCREDITED LABORATORY

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

Approved Signatory: James McKelvey

Issue date: 22/02/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	Lane	RL	Test Depth (mm) *FL = Finished level	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)	Air Voids (%)
13/02/2017	ETAM17W00634	JBG	54	Fill	Silty CLAY	Road 3 fill area	1770208	5905699	-	-	150	0.15m to subgrade	UTP	UTP	UTP	UTP	1.95	22.1	1.60	2.7	5.3
13/02/2017	ETAM17W00634	JBG	55	Fill	Silty CLAY	Road 3 fill area	1770222	5905728	-	-	150	0.15m to subgrade	UTP	UTP	UTP	UTP	1.92	20.0	1.60	2.7	8.9
13/02/2017	ETAM17W00634	JBG	56	Fill	Silty CLAY	Road 3, LOT fill	1770227	5905665	-	-	150	0.15m to subgrade	UTP	UTP	UTP	UTP	1.89	23.9	1.52	2.7	7.1
13/02/2017	ETAM17W00634	JBG	57	Fill	Silty CLAY	Road 3, LOT fill	1770221	5905668	-	-	150	0.15m to subgrade	UTP	UTP	UTP	UTP	1.94	24.1	1.57	2.7	4.2

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SITE PLAN

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Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W00634
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Road 3 and LOT fill

Tested by: JBG

Date tested: 13/02/2017

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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Cesar Pura

Issue date: 01/05/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
27/04/17	ETAM17W01623	AB	**58**	Fill	Silty CLAY	Pond A	1770450	5905620	37.50	150		152	146	146	132	1.75	38.1	1.27	2.7	4.8
27/04/17	ETAM17W01623	AB	**59**	Fill	Silty CLAY	Pond A	1770453	5905629	37.50	150		190	204	182	217+	1.89	26.8	1.49	2.7	5.1

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SITE PLAN

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Project No: 773-ETAM00071AA
Work Order No: ETAM17W01623
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Pond A

Tested by: AB
Date tested: 27/04/2017

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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Eric Paton

Issue date: 03/05/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
28/04/17	ETAM17W01654	LW	60	Fill	Silty CLAY	Pond Backfill	1770453	5905622	38.30	150		219	223	240	211	1.86	30.6	1.43	2.7	3.5

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NOT TO SCALE

Project No: 773-ETAM00071AA
Work Order No: ETAM17W01654
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Pond Backfill

Tested by: LW
Date tested: 28/04/2017

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www.coffey.com

Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

Approved Signatory: Pritpal Singh

Issue date: 08/05/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
3/05/17	ETAM17W01712	AB	**61**	Fill	Clay	Pipeline (Above)	1770441	5905624	-	150	At top of culvert pipe	136	141	146	141	1.86	28.7	1.45	2.7	4.8
3/05/17	ETAM17W01712	AB	**62**	Fill	Silty CLAY	Pipeline (Above)	1770457	5905617	-	150	At top of culvert pipe	175	152	157	182	1.96	26.7	1.55	2.7	1.5

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SITE PLAN

NOT TO SCALE

Project No: 773-ETAM00071AA
Work Order No: ETAM17W01712
Page No: 2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location: Pipeline

Tested by: AB
Date tested: 3/05/2017

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Client:	Coffey Services NZ Ltd (Auckland)
Address	PO Box 8261, Symonds Street, Auckland 1150
Attention:	Ray Berry
c.c:	Matt Illingworth
Project:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Location:	Flat Bush

PROJECT CODE: 773-ETAM00071AA

Page: 1 of 2

IANZ ACCREDITED LABORATORY

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

E. Paton

Approved Signatory: Eric Paton

Issue date: 16/05/2017

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

Date	Work Order No:	Tested by	Test No.	Layer	Material tested	Location	Easting	Northing	RL	Test Depth (mm) FL = Finished level	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)	Air Voids (%)
5/05/17	ETAM17W01726	AB	63	Subgrade	Silty CLAY	Roadway Fill	1770466	5905600	-	150		152	141	157	141	1.87	30.6	1.43	2.7	3.3
5/05/17	ETAM17W01726	AB	64	Subgrade	Silty CLAY	Pipeline Fill	1770454	5905613	-	150		152	162	157	175	1.79	35.7	1.32	2.7	4.0

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SITE PLAN

NOT TO SCALE

Project No:	**773-ETAM00071AA**
Work Order No:	ETAM17W01726
Page No:	2 of 2

Project: 773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH

Location: Roadway fill and Pipeline fill

Tested by: AB

Date tested: 5/05/2017

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Report No: ND:ETAM17W00232
Issue No: 2
This report replaces all previous issues of report no 'ND:ETAM17W00232'.

Nuclear Density Report

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

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

IANZ ACCREDITED LABORATORY

Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	Retaining wall fill, CH 00m = Northern edge of fill
Tested By:	Alistair Brown
Date Tested:	18/01/2017
Time Tested:	08:00
Material:	Run of Pit
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 7.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
10	2.0	Eastern edge of fill	1.5m from *BOF	0	8.5	2.19	2.02	106.9
20	2.0	Eastern edge of fill	1.5m from *BOF	0	9.0	2.24	2.06	108.9

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.
Minimum Dry Density is assumed
*BOF = Base of Fill

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Nuclear Density Report

Report No: ND:ETAM17W00233
Issue No: 2
This report replaces all previous issues of report no 'ND:ETAM17W00233'.

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

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

IANZ ACCREDITED LABORATORY

Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	Road 4 CH 00m = Culvert wall, northbound
Tested By:	Jock Barns-Graham
Date Tested:	18/01/2017
Time Tested:	11:30
Material:	SPR
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 7.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
10	1.5	Silt fence	0	9.0	2.14	1.97	104.2

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.
Minimum Dry Density is assumed

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Nuclear Density Report

Report No: ND:ETAM17W00258
Issue No: 3
This report replaces all previous issues of report no 'ND:ETAM17W00258'.

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

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

IANZ ACCREDITED LABORATORY

Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	Road 4, SPR fill area by the stream Ch 00m = Culvert wall, northbound
Tested By:	Jock Barns-Graham
Date Tested:	19/01/2017
Time Tested:	08:00
Material:	SPR
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 7.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
22	1.5	Silt fence	0	7.5	2.20	2.05	108.3

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.
Minimum Dry Density is assumed

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Report No: ND:ETAM17W00286
Issue No: 4
This report replaces all previous issues of report no 'ND:ETAM17W00286'.

Nuclear Density Report

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

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

IANZ ACCREDITED LABORATORY

Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	SPR embankment, CH 00m = Northern edge of SPR embankment
Tested By:	Alistair Brown
Date Tested:	20/01/2017
Time Tested:	13:45
Material:	SPR
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 5.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
5	1.5	Embankment edge	3.0m to FL	0	7.0	1.99	1.86	98.2
15	1.5	Embankment edge	3.0m to FL	0	6.5	2.03	1.91	101.1
25	1.5	Embankment edge	3.0m to FL	0	7.5	2.07	1.93	101.9

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.

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Nuclear Density Report

Report No: ND:ETAM17W00324
Issue No: 3
This report replaces all previous issues of report no 'ND:ETAM17W00324'.

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

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

IANZ ACCREDITED LABORATORY

E. Paton

Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	Road 4 - SPR fill beside the stream, Refer to plan
Tested By:	Jock Barns-Graham
Date Tested:	23/01/2017
Time Tested:	08:30
Material:	SPR
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 5.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
24	2.0	Culvert wall	0	8.5	1.90	1.75	92.7
34	2.0	Culvert wall	0	9.0	2.04	1.87	99.1
40	2.0	Culvert wall	0	8.5	1.97	1.81	95.8

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.
Minimum Dry Density and Optimum Moisture Content are assumed

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Nuclear Density Report

Report No: ND:ETAM17W00355
Issue No: 2
This report replaces all previous issues of report no 'ND:ETAM17W00355'.

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.
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Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	Stream abutment, CH 00m = Northern edge of abutment
Tested By:	Alistair Brown
Date Tested:	24/01/2017
Time Tested:	08:00
Material:	SPR
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 5.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Layer	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
5	1.5	Edge of abutment	2.5m to FL	0	6.5	2.02	1.89	100.2
15	1.5	Edge of abutment	2.5m to FL	0	7.5	2.04	1.90	100.8
25	1.5	Edge of abutment	2.5m to FL	0	6.5	2.03	1.90	100.6

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.
Minimum Dry Density and Optimum Moisture Content are assumed

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Nuclear Density Report

Report No: ND:ETAM17W00367
Issue No: 2
This report replaces all previous issues of report no 'ND:ETAM17W00367'.

Client:	Coffey Services (NZ) Limited (Auckland) PO Box 8261, Symonds Street Auckland 1150
Principal:	Ray Berry
Project No.:	773-ETAM00071AA
Project Name:	773-GENZAUCK16856AA - DONEGAL STUD STAGE 9 FLAT BUSH
Lot No.:	- **TRN:** -

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

IANZ ACCREDITED LABORATORY

Approved Signatory: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number:105
Date of Issue: 20/06/2017

Testing Details

Site Tested:	Road 4, SPR fill area, CH 00m = Culvert wall, northbound
Tested By:	Julia Vaka
Date Tested:	26/01/2017
Time Tested:	07:45
Material:	Soft Pit Run
Field Methods:	NZS 4407:2015 Test 4.3

Compaction Target Details

Material Sample ID:	External
MDD Method:	~
Max. Dry Density:	1.89 t/m³ @ 7.5 %
Min. Dry Density (t/m³):	1.80
Solid Density Type:	

Test Results

Chainage (m)	Offset (m)	Offset From	Probe Depth (mm)	Moisture (%)	Wet Density (t/m³)	Dry Density (t/m³)	Relative Compaction (%)
28	2	Edge of works	0	13.5	2.11	1.86	98.2
34	2	Edge of works	0	12.5	2.12	1.89	99.8
40	2	Edge of works	0	12.0	2.07	1.85	98.0

Comments

~ Test was conducted externally and is not accredited by this laboratory.
Minimum Dry Density is assumed
Percentage of Relative Compaction calculations are not IANZ endorsed as part of this report.

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Coffey Services (NZ) Limited

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Report No: CLEG:ETAM17W00324
Issue No:1
This report replaces all previous issues of report no. 'CLEG:ETAM17W00324'

Clegg Impact Value Test Report

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

Principal: Ray Berry
Project No.: 773-ETAM00071AA
Project Name: 773-GENZAUCK16856AA - DONEGAL STUD STAGE
Lot No.: - **TRN:** -

IANZ ACCREDITED 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 Accredited Laboratory Number: 105
Date of Issue: 10/02/2017

Site Details

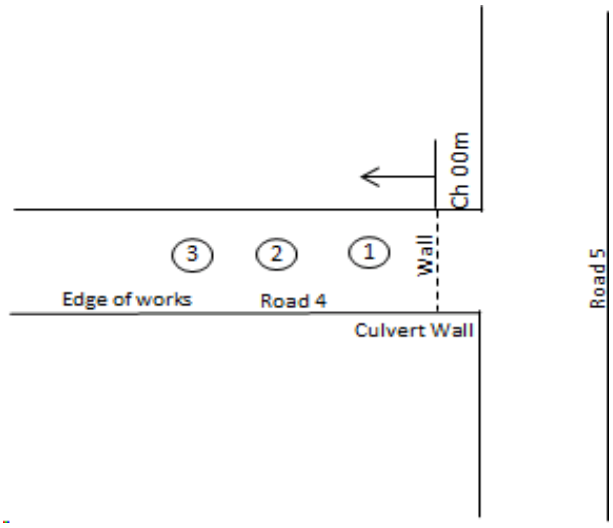
Work Order ID: ETAM17W00324
Sample ID: ETAM17S-00605 To ETAM17S-00607
Material: Kaipara- Brookby Quarry SPR
Project Location: Road 4 - SPR fill beside the stream, Refer to plan
Start Location: Refer to plan
Date Sampled: 23/01/2017
Sampled by: Jock Barns-Graham

General Test Information

Test Method: Clegg Impact Value [ASTM D5874-2002] *
Hammer Mass (kg): 4.50

Test Results

Test No.	Chainage (m)	Offset (m)	Offset from	CIV	Comments
1	24	2.0	Culvert wall	18	
2	34	2.0	Culvert wall	14	
3	40	2.0	Culvert wall	16	



Not to scale

Comments:

CIV=Clegg Impact Value

Form Number: R016 Issue Date: 09/08/2016

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Report No: CLEG:ETAM17W00340
Issue No:1
This report replaces all previous issues of report no. 'CLEG:ETAM17W00340'

Clegg Impact Value Test Report

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

Principal: Ray Berry
Project No.: 773-ETAM00071AA
Project Name: 773-GENZAUCK16856AA - DONEGAL STUD STAGE
Lot No.: - **TRN:** -

IANZ ACCREDITED 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: Eric Paton
(Laboratory Manager)
IANZ Accredited Laboratory Number: 105
Date of Issue: 17/02/2017

Site Details

Work Order ID: ETAM17W00340
Sample ID: ETAM17S-00622 To ETAM17S-00624
Material: Kaipara- Brookby Quarry SPR
Project Location: Road 4 - SPR fill area, Refer to plan-retest from 23/1/17
Start Location: Refer to plan
Date Sampled: 25/01/2017
Sampled by: Jock Barns-Graham

General Test Information

Test Method: Clegg Impact Value [ASTM D5874-2002] *
Hammer Mass (kg): 4.50

Test Results

Test No.	Chainage (m)	Offset (m)	Offset from	CIV	Comments
1	24	2.0	Edge of works	24	
2	34	2.0	Edge of works	20	
3	40	2.0	Edge of works	25	

Not to scale

Comments:

CIV=Clegg Impact Value

Form Number: R016 Issue Date: 09/08/2016

East Tamaki Laboratory
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Report No: CLEG:ETAM17W00367
Issue No:1
This report replaces all previous issues of report no. 'CLEG:ETAM17W00367'

Clegg Impact Value Test Report

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

Principal: Ray Berry
Project No.: 773-ETAM00071AA
Project Name: 773-GENZAUCK16856AA - DONEGAL STUD STAGE
Lot No.: - **TRN:** -

IANZ ACCREDITED 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: James McKelvey
(Senior Technician)
IANZ Accredited Laboratory Number: 105
Date of Issue: 1/02/2017

Site Details

Work Order ID: ETAM17W00367
Sample ID: ETAM17S-00685 To ETAM17S-00687
Material: Soft Pit Run
Project Location: Road 4
Start Location: Culvert wall, northbound
Date Sampled: 26/01/2017
Tested by: Jock Barns-Graham

General Test Information

Test Method: Clegg Impact Value [ASTM D5874-2002] *
Hammer Mass (kg): 4.50

Test Results

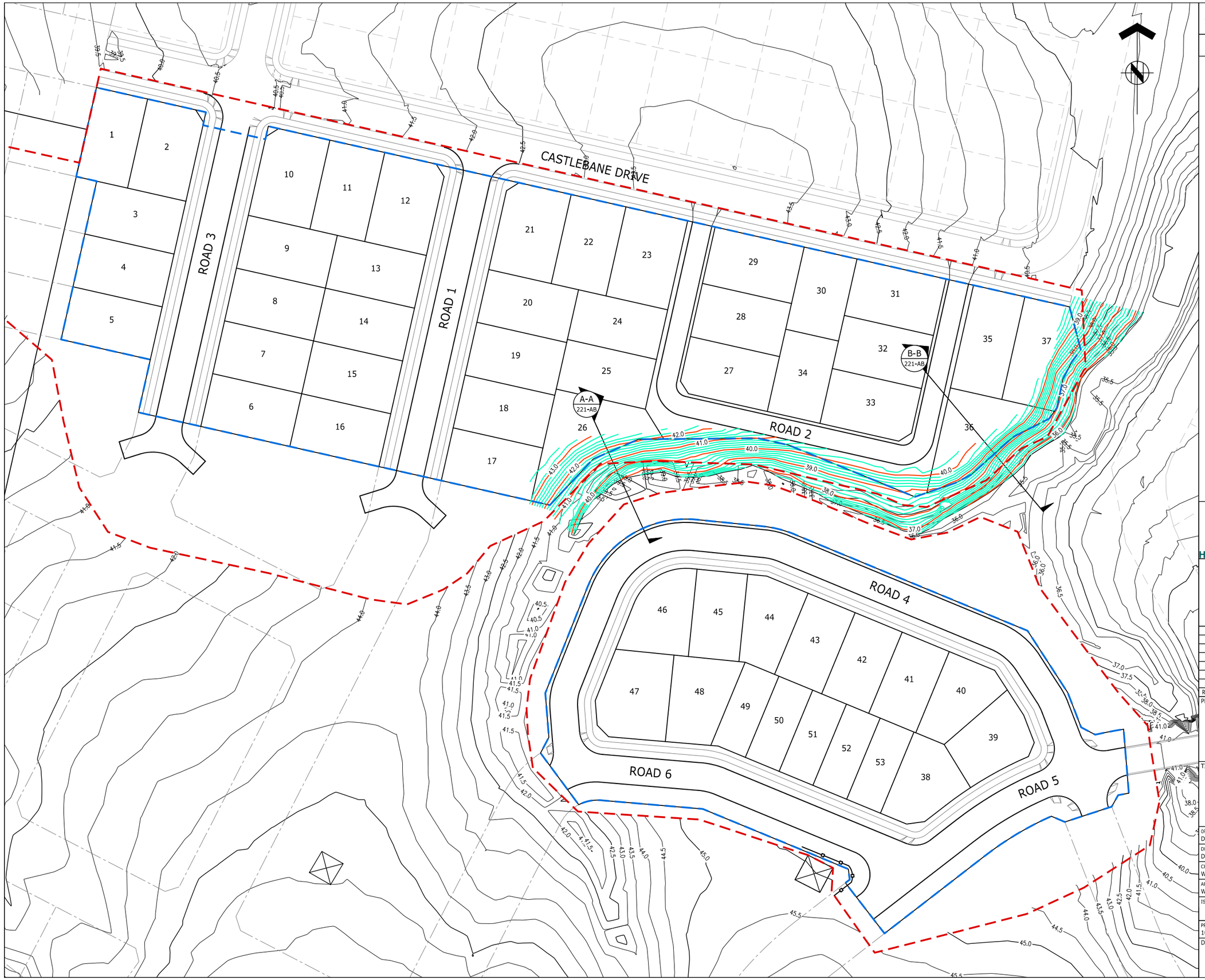
Test No.	Chainage (m)	Offset (m)	Offset from	CIV	Comments
1	28	2.0	Edge of works	20	
2	34	2.0	Edge of works	24	
3	40	2.0	Edge of works	26	

Comments:

CIV=Clegg Impact Value

Form Number: R016 Issue Date: 09/08/2016

Appendix D – Stability Analysis Test Results and Geotechnical Building Zone



LEGEND:

- AS-BUILT SURFACE SHOWN AT 0.5m INTERVALS
- EXISTING CONTOURS SHOWN AT 0.5m INTERVALS
- EXTENT OF PROPOSED EARTHWORKS

HUGH GREEN LIMITED

HUGH GREEN GROUP

AUCKLAND OFFICE
DILWORTH HOUSE 71 GREAT SOUTH ROAD
NEWMARKET AUCKLAND 1051
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W www.harrisongrierson.com

REF	REVISIONS	BY	DATE
1	AS BUILT	DXK	09.05.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

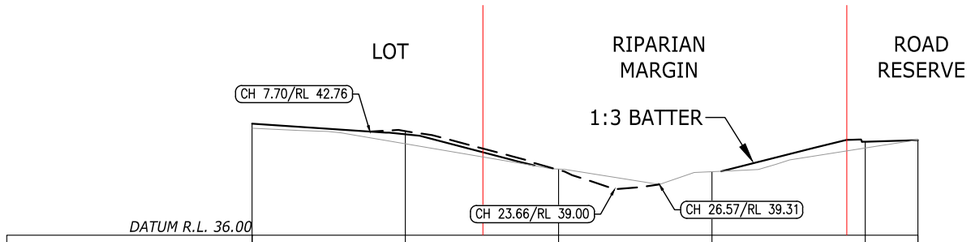
TITLE:

DESIGN CONTOURS (STREAM BANK)
LONGITUDINAL SECTION LOCATIONS

ORIGINATOR: DXK	DATE: 09.05.17	SIGNED:	PLOT BY: DXK
DRAWN: DXK	DATE: 09.05.17	SIGNED:	PLOT DATE: 10.08.17
CHECKED: WJP	DATE: 05.2017	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 05.2017	SIGNED:	SURVEY DATE:

ISSUE STATUS: AS BUILT

PROJECT No: 1050-139707-01	SCALES: 1:500 (A1) 1:1000 (A3)	A1
DRAWING No: 139707-220-AB		REV 1



PROPOSED LEVELS	43.27	42.58			42.10	42.20	
EXISTING LEVELS	42.98	41.96	40.31	40.14	41.68	42.20	
CHAINAGE	0.00	10.00	20.00	30.00	40.00	**43.44**	

A-A
LONGITUDINAL SECTION BETWEEN 0.00 AND 43.44

SECTION A-A

SCALE HOR 1:200
VER 1:200

PROPOSED LEVELS	41.09	40.71	40.42	39.86	37.15		
EXISTING LEVELS	42.29	42.13	41.65	39.49	36.78	35.63	36.48
CHAINAGE	0.00	10.00	20.00	30.00	40.00	50.00	56.94

B-B
LONGITUDINAL SECTION BETWEEN 0.00 AND 56.94

SECTION B-B

SCALE HOR 1:200
VER 1:200

LEGEND:

- INDICATES AS-BUILT GROUND SURFACE
- INDICATES DESIGN GROUND SURFACE
- INDICATES EXISTING GROUND SURFACE

HUGH GREEN GROUP

HUGH GREEN LIMITED

AUCKLAND OFFICE
DILWORTH HOUSE 71 GREAT SOUTH ROAD
NEWMARKET AUCKLAND 1051
T +64 9 917 5000
W www.harrisongrierson.com

REF	REVISIONS	BY	DATE
2	SCALE UPDATED	DXK	18.05.17
1	AS BUILT	DXK	09.05.17

PROJECT:

DONEGAL STUD
80 DRUMBUOY DRIVE
FLAT BUSH

TITLE:

DESIGN CONTOURS (STREAM BANK)
LONGITUDINAL SECTION PROFILES

ORIGINATOR: DXK	DATE: 09.05.17	SIGNED:	PLOT BY: DXK
DRAWN: DXK	DATE: 09.05.17	SIGNED:	PLOT DATE: 10.08.17
CHECKED: WJP	DATE: 05.2017	SIGNED:	SURVEY BY:
APPROVED: WJP	DATE: 05.2017	SIGNED:	SURVEY DATE:

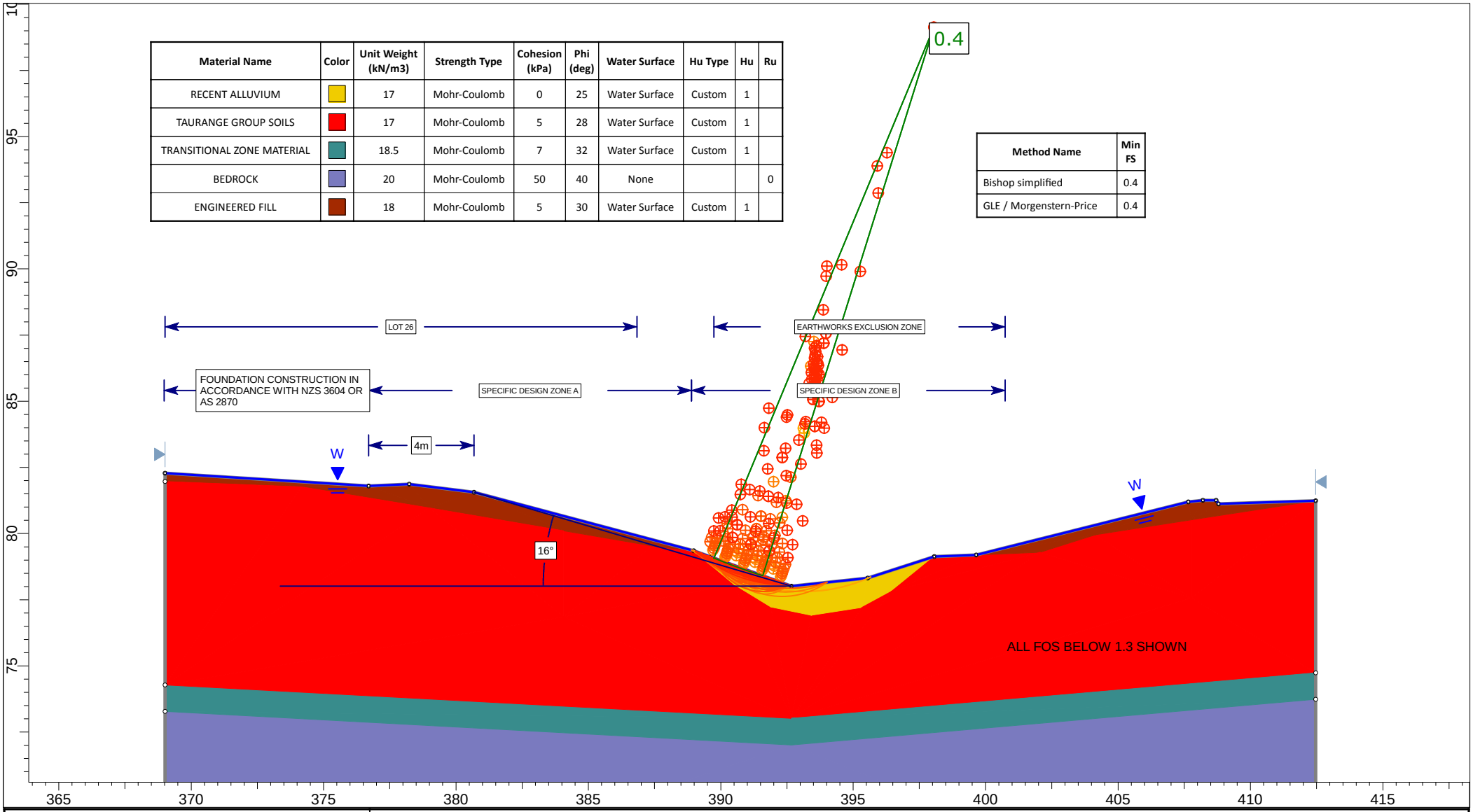
ISSUE STATUS: AS BUILT

PROJECT No: 1050-139707-01
SCALES: 1:200 H 1:200 V (A1) 1:400 H 1:400 V (A3)
A1

DRAWING No: 139707-221-AB
REV 2

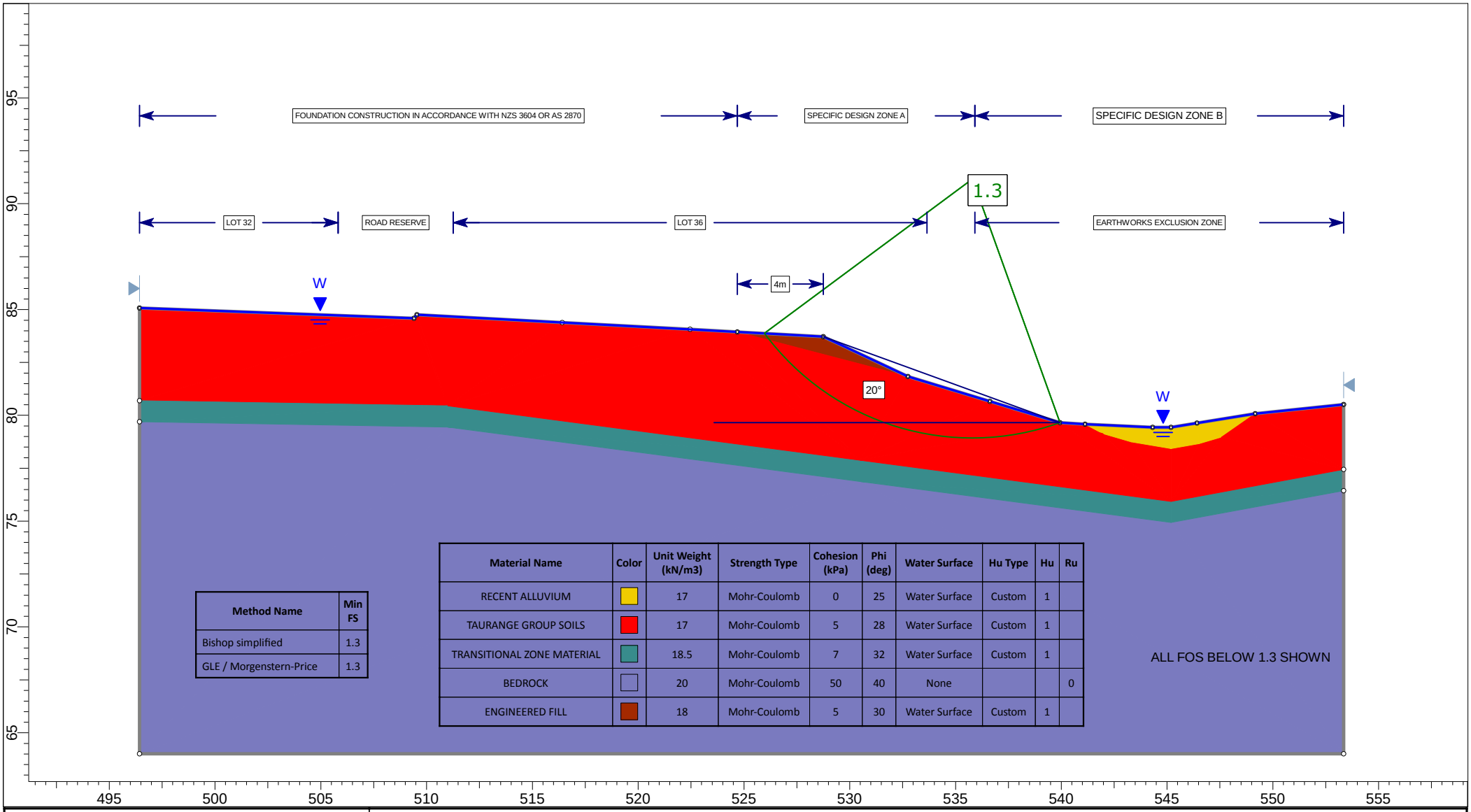
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
RECENT ALLUVIUM		17	Mohr-Coulomb	0	25	Water Surface	Custom	1	
TAURANGE GROUP SOILS		17	Mohr-Coulomb	5	28	Water Surface	Custom	1	
TRANSITIONAL ZONE MATERIAL		18.5	Mohr-Coulomb	7	32	Water Surface	Custom	1	
BEDROCK		20	Mohr-Coulomb	50	40	None			0
ENGINEERED FILL		18	Mohr-Coulomb	5	30	Water Surface	Custom	1	

Method Name	Min FS
Bishop simplified	0.4
GLE / Morgenstern-Price	0.4



SLIDEINTERPRET 7.018

Project	DONEGAL STUD STAGE 9		
Analysis Description	CROSS SECTION AA MODIFIED SLOPE FULLY SATURATED GROUNDWATER CONDITIONS		
Drawn By	RB	*Scale* 1:200	*Company* HUGH GREEN LIMITED
Date	17/05/2017, 1:40:56 p.m.		*File Name* 16856AA XSAA MDSLP FSAT.slim



Method Name	Min FS
Bishop simplified	1.3
GLE / Morgenstern-Price	1.3

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
RECENT ALLUVIUM		17	Mohr-Coulomb	0	25	Water Surface	Custom	1	
TAURANGE GROUP SOILS		17	Mohr-Coulomb	5	28	Water Surface	Custom	1	
TRANSITIONAL ZONE MATERIAL		18.5	Mohr-Coulomb	7	32	Water Surface	Custom	1	
BEDROCK		20	Mohr-Coulomb	50	40	None			0
ENGINEERED FILL		18	Mohr-Coulomb	5	30	Water Surface	Custom	1	

SLIDEINTERPRET 7.018

Project	DONEGAL STUD STAGE 9		
Analysis Description	CROSS SECTION BB MODIFIED SLOPE FULLY SATURATED GROUNDWATER CONDITIONS		
Drawn By	RB	*Scale* 1:250	*Company* HUGH GREEN LIMITED
Date	17/05/2017, 3:15:04 p.m.		*File Name* 16856AA XSBB MDSLP FSAT.slim

LEGEND

A — **ZONE A** -FOUNDATION CONSTRUCTION IN ACCORDANCE WITH NZS 3604 OR AS 2870 DESIGN STANDARDS AND DOCUMENTS FOR LIGHT WEIGHT TIMBER FRAMED HOUSES.

B — **ZONE B** -SPECIFIC DESIGN ZONE A- LAND HAVING GRADIENTS OF 1(V):4(H). NO BUILDING AND NO EARTHWORKS SHOULD TAKE PLACE WITHIN THIS ZONE UNLESS ENDORSED BY SPECIFIC SITE INVESTIGATION AND FOUNDATION DESIGN TO ASSESS SLOPE STABILITY AND THE POTENTIAL FOR SOIL CREEP ON SLOPES EQUAL TO OR GREATER THAN 1(V);4(H). THE LIKELY OUTCOME BEING PILED LEADING EDGE FOUNDATIONS DESIGNED TO RESIST LATERAL SOIL LOADS.

C — ENGINEER CERTIFIED MECHANICALLY STABILISED (GEOGRID) EARTH EMBANKMENT (SLOPE GRADIENTS EXCEEDING 1(V):2.5(H))

D — ENGINEER CERTIFIED MECHANICALLY STABILISED (GEOGRID) SOFT-PIT-RUN (SPR) EMBANKMENT (SLOPE GRADIENTS EXCEEDING 1(V):1.5(H))

E — ENGINEER CERTIFIED EARTH EMBANKMENT (SLOPE GRADIENTS NOT EXCEEDING 1(V):2.5(H))

BASE SOURCE: HARRISON GRIERSON DRAWING NUMBER 139707-AB200-REV A, 31.07.17

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

0 20.0 40.0 60.0
Horizontal Scale (metres)
0 20.0 40.0 60.0
Vertical Scale (metres)

drawn	RB
approved	KWH
date	03/08/17
scale	1:1000
original size	A3

coffey
A TETRA TECH COMPANY

client: HUGH GREEN LIMITED

project: DONEGAL STUD STAGE 9
FLAT BUSH
AUCKLAND

title: GEOTECHNICAL BUILDING ZONES & ENGINEERED EMBANKMENTS

project no: 773-GENZAUCK16856AA | figure no: 1 | rev: A

Appendix E – Producer Statement (PS4)

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Auckland 1010
PO Box 8261, Symonds Street
Auckland 1150
New Zealand

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f: +64 9 307 2654

coffey.com

4 August 2017

Our ref: GENZAUCK16856AA

Hugh Green Limited
Donegal Stud
C/- Harrison Grierson Consultants Limited
PO Box 5760
Wellesley Street
Auckland 1051

Attention: Mr W Platts

Dear Will

Earthworks Inspections for Construction of Road 2 and Road 4 Engineer Fill Embankments and Road 4 Gabion Basket Retaining Wall Foundation, Donegal Stud Residential Subdivision, Stage 9 at 80 Drumbuoy Drive, Flat Bush

This is to confirm that we visited the above site on several occasions from November 2016 and May 2017 to observe the earthworks to construct the reinforced engineer certified fill embankments and Gabion basket retaining wall foundations for Road 2 and Road 4 of the proposed Donegal Stud Residential Subdivision, Stage 9.

During our visits we noted that topsoil had been stripped from the area to be earthworked. By late November construction of the fill batter adjacent to Road 2 commenced. At this time a bench was formed at the toe of the slope to enable the placement of filling to form the Embankment (Embankment E). Once the bench was formed, filling sourced from the down cutting of lots was placed to an Engineer certified standard until design subgrade levels were achieved.

Earthworks to construct the reinforced engineer fill embankment (Embankment C) commenced in early January 2017. The removal of topsoil at the toe of this area revealed uncertified filling that was most likely placed to form a pre-existing farm track. This material was then uplifted and the toe of the slope benched ready to receive engineer certified filling. Due to typical design slope gradients exceeding 1(V):2.5(H) (at Embankment C), biaxial geogrid was placed parallel to the face of the embankment, every 0.5m lift to provide additional strength and to prevent long term soil creep from causing adverse effects related to building foundations.

By mid- January 2017 earthworks to construct a Soft-Pit-Run (SPR) engineer certified fill embankment (Embankment D) near the intersection of Road 4 and Road 5 commenced. The initial works focussed on removing the soft saturated alluvial deposits from the toe of the proposed embankment to provide

a stable foundation. An undercut of up to 2m below the existing ground level was conducted to remove the weak materials and to expose weathered moderately dense sand commonly associated with the East Coast Bays transition to bedrock.

The undercut was then backfilled with SPR compacted to an engineer certified standard. At this time two underfill drains comprised of a 160mm perforated drain coil surrounded by drainage metal and then fully wrapped in geotextile were installed in shallow trenches at the toe and into the natural subsoils forming the slope behind the SPR fill embankment. Due to the slopes in this portion of the embankment exceeding 1(V):1.5(H) biaxial geogrid was placed parallel to the face of the embankment, every 0.5m lift. The geogrid was added to prevent shallow slumping from occurring in the face of the embankment.

Construction of the SPR batter continued until late January 2017 when the surface of the SPR was approximately 1m below design subgrade level. At this time the fill material was substituted with cohesive clay fill so that uniformity of Road 4 subgrade could be maintained. Once the final batter gradients had been formed the stabilised embankments were covered with topsoil.

By early May 2017 work to construct a gabion basket retaining wall along the crest of Road 4 SPR embankment commenced. The enabling works for the gabion basket wall involved the removal of the surface layer of clay fill placed over the SPR that was within the footprint of the proposed retaining wall. GAP40 hardfill was then placed over the SPR and compacted with a 500kg vibrating plate compactor to an engineer certified standard. Construction of the gabion basket retaining wall commenced once the base had been formed.

On the basis of our site observations and insitu soils testing, we are satisfied that the ground conditions exposed during the construction were generally consistent with those encountered in our investigation boreholes and those that formed the basis of the recommendations contained in our Geotechnical Investigation Report reference GENZAUCK16856AA, dated 29 July 2016, and in our later Road 4 Embankments memo reference GENZAUCK16856AA, dated 18 January 2017.

For and on behalf of Coffey

Prepared By:

Ray Berry
Senior Engineering Geologist

Reviewed / Authorised By:

Kah-Weng Ho
Senior Principal

Attachments - Producer Statement – Construction Review (PS4)
Road 4 Embankment Recommendations Memorandum, dated 18 January 2017
Road 4 Stability Analysis Test Results

Building Code Clause(s) B1 STRUCTURE

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

ISSUED BY: COFFEY GEOTECHNICS (NZ) LIMITED
(Construction Review Firm)

TO: HUGH GREEN LIMITED
(Contractor)

TO BE SUPPLIED TO: AUCKLAND COUNCIL
(Building Consent Authority)

IN RESPECT OF: ROAD 4 REINFORCED ENGINEER FILL EMBANKMENT DESIGN / CONSTRUCTION & GABION BASKET RETAINING WALL FOUNDATION
(Description of Building Work)

AT: NO. 80 DRUMBUOY DRIVE, FLAT BUSH
(Address)
LOT 900 **DP** 492446 **SO** -

COFFEY GEOTECHNICS (NZ) LIMITED has been engaged by HUGH GREEN LIMITED
(Construction Review Firm) *(Contractor)*
To provide ☐CM1 ☐CM2 ☐CM3 ☐CM4 ☐CM5 *(Engineering Categories)* or ☐ observation as per agreement with owner/developer

or ☒other OBSERVATION OF SITE PREPARATION, EARTHWORKS, STABILITY UNDERCUTS, PLACEMENT OR GEOGRID, COMPACTION OF HARDFILL, AND GABION BASKET RETAINING WALL FOUNDATIONS, AS PER COFFEY LETTER DATED 2 JULY 2017, REFERENCE GENZAUCK16856AA

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

Authorised instructions / variation(s) No. N/A (copies attached)

or by the attached Schedule ☐ have been issued during the course of works.
On the basis of ☒this ☐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 ☒Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) B1 STRUCTURE 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, KAH-WENG HO am: ☒CPEng No. 45290
(Name of Construction Review Professional)
☐Reg Arch No.
I am a Member of: ☒IPENZ ☐NZIA and hold the following qualifications: BE (Hons)
The Construction Review Firm issuing this statement hold a current policy of Professional Indemnity Insurance no less than $200,000*.
The Construction Review Firm is a member of ACENZ :☐

SIGNED BY: KAH-WENG HO **ON BEHALF OF** COFFEY GEOTECHNICS (NZ) LIMITED
Date:

10 AUGUST 2017 Signature: 

Note: This statement shall only be relied upon by the Building Consent Authority names 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.*

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