



# **Geotechnical Completion Report**

**23 & 45 MCQUOIDS ROAD, FLAT BUSH**

**For**

**HUGH GREEN LIMITED**

29 November 2016

Ref No: J00092

Hugh Green Limited  
michael@hgg.co.nz

**Attention: Mr M Crowley**

Dear Michael

**RE: Geotechnical Completion Report for Residential Subdivision at 23 and 45 McQuoids Road,  
Flat Bush**

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 Hugh Green 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 Lander Geotechnical Consultants Limited



**D.A. Tookey**  
Senior Geotechnical Engineer  
MIPENZ. CPEng



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## 1 INTRODUCTION AND DESCRIPTION OF SUBDIVISION

This Geotechnical Completion Report 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 Dodd Civil Consultants Limited as-built plan set relating to the 23 and 45 McQuoids Road Residential Subdivision as follows:

**Table 1: Dodd Civil Consultants Limited As-Built Plans**

Title	Reference No.	Date
Pre-Construction Levels	503/02 – 901 to 902	28/11/2016
Earthworks As-Built Plan	503/02 – 903 to 904	28/11/2016
Cut / Fill As-Built Plan	503/02 – 905 to 906	28/11/2016
Geotech Specific Design Zone	503/02 - 907	28/11/2016
Stormwater As-Built Plans	503/02 – 910 to 916	28/11/2016
Sanitary Sewer As-Built Plans	503/02 – 920 to 927	28/11/2016

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

- 97 residential lots numbered 1 to 97
- 4 new roads named Carrygawley Rd, Lisnoble Rd, Ballinabreen Rd, and Kilcadden Rd
- 1 recreation reserve numbered as lot 100
- 1 drainage reserve numbered as lot 101

This subdivision is located at 23 and 45 McQuoids Road, Flat Bush and as can be seen on the fill as-built plan, a total of 56 of the lots have been partly or totally affected by filling, to a maximum depth of approximately 5m.

## 2 RELATED REPORTS

A Geotechnical Investigation Report on the subject land was prepared by this Consultancy, reference J00092, dated 30 June 2015. The conclusions and recommendations of that report have been reviewed during the preparation of this document.

## 3 EARTHWORKS OPERATIONS

### 3.1 Plant

The main items of plant used by the Contractor, Twomey Construction Limited were:

- 2 x 20ton Excavators
- 2 x CAT 815 Compactor

- 2 x CAT 627 Scraper
- 1 x D5 Bulldozer and Discs

### **3.2 Construction Programme**

Earthworks operations for this subdivision commenced in February 2016 with stripping of the northern portions of the gully that extended through site (starting near Lot 1 and working south east). A subsoil drain with two hiway grade perforated novacoils, drainage aggregate and geotextile wrapped was installed in the base of the gully. A silt pond was then constructed over this area for sediment control purposes.

Through March, earthworks continued up the gully (i.e. to the south east) with the gully being mucked out to competent material, the subsoil drain being installed and then fill being placed. In mid-March the pond in the centre of the site (in the vicinity of Lots 31 to 33) was completely mucked out and the two novacoils were split with one drain following the gully to the south and the other following a tributary gully to the east.

In late March works commenced in the gully adjacent to the southern boundary with muck out being completed and a subsoil drain with a single novacoil being installed. Filling commenced through this area in early April following construction of a silt pond at the western end of the gully.

Stripping of the area adjacent to McQuoids Rd occurred through April and uncontrolled fill was noted through a portion of this area. The fill contained minor roots, gravel and wet clay. These materials were undercut down to natural ground and sorted for reuse in the fill with remaining materials being placed in unsuitable stockpiles.

By May the majority of the earthworks on site were completed and topsoil respread was carried out over the bulk of the site.

Through June to August the two retaining walls and pipe bridge were constructed and silt ponds were backfilled. To ensure adequate conditioning of material lime stabilisation of the fill placed in the south western silt pond was carried out.

## **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 development for:

- gully areas prior to the placement of fill materials to ascertain that all mullock and soft inorganic subsoils had been removed to our satisfaction
- installation of underfill drains through gully alignments
- silt traps prior to backfilling to ensure that all silt had been removed and that the sides of the excavation were benched where necessary
- retaining wall and pipe bridge pile hole excavations (covered in a separate Producer Statement – Construction Review, PS4)

## 4.2 Quality Control Criteria

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

Specification details were as follows:

### 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%

Within 500mm of carriageway subgrade

Average value less than 8%

Maximum single value 10%

(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 110 kPa

Within 500mm of carriage subgrade

Average value not less than 150 kPa

Minimum single value 120 kPa

Note: The average value shall be determined over any ten consecutive tests

## 4.3 Quality Assurance Testing

In-situ density monitoring was carried out as for the general fill areas for quality control as follows:

- Regular in-situ 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.
- Control tests carried out on the filling showed that on several occasions the required compaction standards were not being achieved. Further two marginal tests (tests 33 and 34) were considered acceptable by engineering observation.
- Results of the test failures and marginal passes were relayed to the site foreman and/or his staff, and to the best of our knowledge the affected areas of fill were re-worked as necessary. In each failure case, further testing was carried out until compliance with the standards was achieved.

## **5 PROJECT EVALUATION**

### **5.1 Bearing Capacity and Settlement of Building Foundations**

Following the completion of earthworks operations, we returned to the site and drilled a series of hand auger boreholes at appropriate natural ground locations in order to determine representative finished ground conditions and hence evaluate likely foundation options for future building development.

At current subgrade levels all filled and undisturbed natural ground has a geotechnical ultimate bearing capacity of 300kPa 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.

### **5.2 Expansive Soils**

Four sets of expansive soil tests were carried out on samples selected from around the site and within the zone of likely influence of shallow building foundations.

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

The AS 2870 Site Class for this subdivision is M (moderate) and the characteristic surface ground movement is up to 40mm. Specific design alternatives for this Site Class is presented in the Suitability Statement.

If on-grade floor slab construction takes place during a hot dry summer, slab uplift may be caused if construction occurs on dried out and highly desiccated floor subgrades. Thorough soaking of exposed building platform areas a few days before hardfill placement can help to limit the problem. Careful detailing of construction joints in brittle building elements can also be of benefit but this will depend on the architectural specification for each building.

It is also common knowledge that a wide range of tree and shrub species have high groundwater demands during the summer months. The effects of such demands on expansive soils can be substantial and can lead to differential building settlements well in excess of 25mm, with resulting cracking in wall panels and floor slabs. Accordingly, it is a good housekeeping measure to ensure that high water demand species (such as gum, willow, cypress etc) are not planted in the vicinity of buildings. Minimum recommended distances vary with tree species and specialist advice should be obtained.

### **5.3 Lot Gradients**

Generally, gradients across all lots are relatively low angle (i.e. less than 1V:7H or 8 degrees) and stability conditions across the site have been improved by the earthworks and drainage carried out. It is noted however that gradients of the land within the drainage reserve (Lot 101) and area west of lots 92 to 95 are up to 1V:3H (19 degrees) and building restrictions on Lots 92 to 96 adjacent to these slopes are presented on the Geotech Specific Design Zone plan and in our Suitability Statement, on account of a propensity for long term soil creep.

## **5.4 Fill Induced Settlement**

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

## **5.5 Stormwater Controls**

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

Uncontrolled stormwater discharges onto the ground surface or into soakage pits can cause erosion, scour and/or instability on sloping land and should not be permitted under any circumstances where stability could be compromised.

## **5.6 Service Trenches**

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

## **5.7 Land Drainage**

The appended earthworks as-built plans show the positions of perforated underfill drains that were placed in mucked out gully inverts prior to filling to tap groundwater seepages particularly when land gradients were greater than 1 in 4, as required by NZS 4431.

The drains outlet at wingwalls and rock rip rap associated with the storm water system in the drainage reserves in the locations indicated on the as-built plans.

These drains were intended to intercept localised groundwater seepages and springs during earthworks and to help provide general control over groundwater levels and were installed as a precautionary measure, not as remedial works for any existing instability and therefore they need no specific maintenance. They are typically buried beneath 2m to 5m of filling and as such present no constraints to foreseeable shallow foundations from end uses.

## **5.8 Road Subgrades**

Penetration resistance tests were undertaken at regular interval/ on the road subgrades and the results were subsequently forwarded to Dodd Civil Consultants Limited for pavement design purposes. Areas demonstrating low equivalent CBR values were generally undercut with increased metal depths being the preferred remedial option.

## **5.9 Retaining Walls**

Retaining walls have been utilised to stabilise the site in the recreation reserve (Lot 100) and drainage reserve (Lot 101) in the locations shown on the Earthworks as-built plans. These walls reach a maximum height of approximately 5.5m and were designed and inspected by Dodd Civil Consultants

Limited with ground conditions being confirmed by this Consultancy. A separate Producer Statement – Construction Review (PS4) certifies these walls.

Details of resulting building and earthworks restrictions within the vicinity of these walls are presented on the Geotech Design Zone Plan and in the Suitability Statement.

### **5.10 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 50mm and 400mm.

Site specific findings are presented in the Suitability Statement Summary Table.

### **5.11 Contractor's Work**

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

- (i) The approved Contract drawings and design details,
- (ii) The approved Contract specifications,
- (iii) Authorised Variations to (i) and (ii) during the execution of the works,
- (iv) The conditions of Resource, Earthworks and Building Consents where applicable,
- (v) The relevant Lander Geotechnical Consultants Limited reports, recommendations and site instructions,

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

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

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

1. I am a Chartered Professional Engineer experienced in the field of geotechnical engineering as defined in section 1.2.3 of NZS 4404 and was retained by the Owner/Developer as the Geotechnical Engineer on the 23 and 45 McQuoids Road subdivision.
2. The extent of preliminary investigations carried out to date are described in Geotechnical Investigation Report reference J00092, dated 30 June 2015 and the conclusions and recommendations of that document have been re-evaluated in the preparation of this report. The results of all tests carried out are appended.
3. In my professional opinion, not to be construed as a guarantee, I consider that:
  - (a) The earth fills shown on the appended fill as-built plan have been placed in compliance with NZS 4431, Auckland Council's Code of Practice for Land development and Subdivision, Section 2 Earthworks and Geotechnical Requirements (version 1.6) and related documents.

- (b) The completed earthworks give due regard to land slope and foundation stability considerations within the residential lots, but as shown on the appended Geotech Design Zone plan, Specific Design Zones apply on lots 92 to 96 as they are adjacent to land having gradients steeper than 1V:4H (14 degrees).

No building construction and no earthworks which increases the slope angle or surcharge loading of these areas should take place in these areas or elsewhere if similar gradients exist unless endorsed by specific site investigations, design of all foundations and retaining walls and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics, as such operations may, in certain circumstances, have detrimental effects on overall site stability.

It is envisaged that the outcome of such specific site investigations is that soil creep will need to be addressed. Typically, at least the leading (downslope) edge foundations may need to be piled to a minimum depth of approximately 3m, depending on actual location and building materials. It is anticipated that a geotechnical ultimate bearing capacity of 450 kPa will be available for the specific design of piles in end bearing. Lateral loading due to soil creep should also be considered by the designer.

- (c) A geotechnical ultimate bearing capacity of 300 kPa may be assumed for foundation design on all lots. Where a geotechnical bearing capacity greater than 300 kPa is required, (ie. 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.

- (d) 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 beyond the extent of the trench backfill.

- (e) No building construction, including the construction of additional retaining walls and no earthworks should take place should take place within 6m of the front face of the cantilever pole retaining walls on lot 101 (drainage reserve) or within 3m of the front face of the cantilever pile retaining walls on lots 96 (residential lot) and 100 (recreation reserve), unless endorsed by specific designs and by construction inspections undertaken by a Chartered Professional Engineer experienced in geomechanics to ensure that no additional loads are applied to the walls. Specific site investigation should not be required.

- (f) The assessed AS 2870 expansive site Class for all lots is M (moderate) and the characteristic surface ground movement is up to 40mm.

- (g) Subject to the geotechnical limitations, restrictions, recommendations and expansive soil assessments associated with 3(b), 3(c), 3(d), 3(e) and 3(f) above:



- (i) The filled and undisturbed original ground within residential lot boundaries is generally suitable for residential buildings constructed in accordance with NZS 3604 and related documents.
  - (ii) On all lots foundation design may be carried out in accordance with AS 2870 (Class M) or in accordance with NZS 3604 provided that in this latter case the minimum foundation depth below cleared ground level following topsoil removal and benching of building platform areas is 600mm.
4. Road subgrades and lot accessway subgrades have been formed having due regard for slope stability and settlement, although CBR values do vary between natural and filled ground as is to be expected. It is likely that subgrade CBR's will be significantly lower than 7% within any areas of (non-stabilised) natural ground.

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

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

For and on behalf of Lander Geotechnical Consultants Limited

Prepared By:



**D.A. Tookey**

Senior Geotechnical Engineer  
MIPENZ CPEng, IntPE(NZ)

Authorised By:



**S.G. Lander**

Principal Geotechnical Engineer  
MIPENZ,

**Table 4: Suitability Statement Summary (Refer to Project Evaluation and Suitability Statement For Details)**

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.	250	300	M
2	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
3	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
4	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
5	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
6	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	330	300	M
7	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
8	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	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.	320	300	M
11	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	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.	330	300	M
14	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
15	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	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.	380	300	M
18	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
19	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class
20	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	280	300	M
21	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
22	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
23	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
24	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
25	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
26	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M
27	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
28	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M
29	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
30	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
31	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
32	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	150	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.	350	300	M
35	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
36	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
37	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
38	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
39	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
40	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
41	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
42	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
43	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
44	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	270	300	M
45	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	150	300	M
46	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	170	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.	380	300	M
49	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	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.	350	300	M
52	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
53	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
54	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
55	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
56	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
57	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
58	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
59	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class
60	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
61	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
62	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
63	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
64	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
65	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
66	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
67	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
68	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	400	300	M
69	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
70	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
71	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
72	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
73	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
74	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
75	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
76	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
77	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
78	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
79	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class
80	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
81	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
82	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	250	300	M
83	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	350	300	M
84	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
85	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
86	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M
87	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
88	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M
89	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
90	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M
91	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	50	300	M
92	Specific site investigation, foundation design and construction inspections required in Specific Design Zone area shown hatched on gradient as-built plan due to proximity to 1 in 4 gradient land. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
93	Specific site investigation, foundation design and construction inspections required in Specific Design Zone area shown hatched on gradient as-built plan due to proximity to 1 in 4 gradient land. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
94	Specific site investigation, foundation design and construction inspections required in Specific Design Zone area shown hatched on gradient as-built plan due to proximity to 1 in 4 gradient land. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M

Lot No.	Comments	Topsoil Depth (mm)	Ultimate Bearing (kPa)	AS2870 :2011 Class
95	Specific site investigation, foundation design and construction inspections required in Specific Design Zone area shown hatched on gradient as-built plan due to proximity to 1 in 4 gradient land. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	300	300	M
96	Specific site investigation, foundation design and construction inspections required in Specific Design Zone area shown hatched on gradient as-built plan due to proximity to 1 in 4 gradient land. Specific foundation design and construction inspections in Specific Design Zone due to proximity to cantilever pole wall. Elsewhere, AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	200	300	M
97	AS 2870 foundation design or NZS 3604 with minimum footing depth 600mm.	100	300	M
100	Specific site investigation, foundation design and construction inspections required due to proximity to 1 in 4 gradient land. Specific foundation design and construction inspections in within 6m of cantilever pole wall to avoid overloading wall.	-	n/a	n/a
101	Specific site investigation, foundation design and construction inspections required due to proximity to 1 in 4 gradient land. Specific foundation design and construction inspections in within 3m of cantilever pole wall to avoid overloading wall.	-	n/a	n/a

# Appendix 1

**Dodd Civil Consultants Limited  
As-Built Plan**



I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THIS AS-BUILT PLAN SHOWS THE PRECONSTRUCTION CONTOURS AS SURVEYED BY OTHERS 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 ±20MM.



SIGNED: [Signature]  
 CHARTERED PROFESSIONAL ENGINEER  
 DATE: 23/11/2016  
 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ

1. Refer to DWG 903 for Finished Ground Level contours
2. Refer to DWG 905 for Earthworks Cut/Fill contours



Lot Bdy
Ex Abutting Bdy
Ex Cont (Major)
Ex Cont (Minor)

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WRITTEN PERMISSION FROM DODD CIVIL CONSULTANTS LIMITED

A	Road names	SK	11/16
-	-	-	-
Rev	Description	By	Date
		SIGNED	DATE
Surveyed	PB		05/15
Designed	WM		05/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16



Subdivisions Land Development Land Survey  
Resource Consents Project Management  
Environmental Engineering Structural Engineering

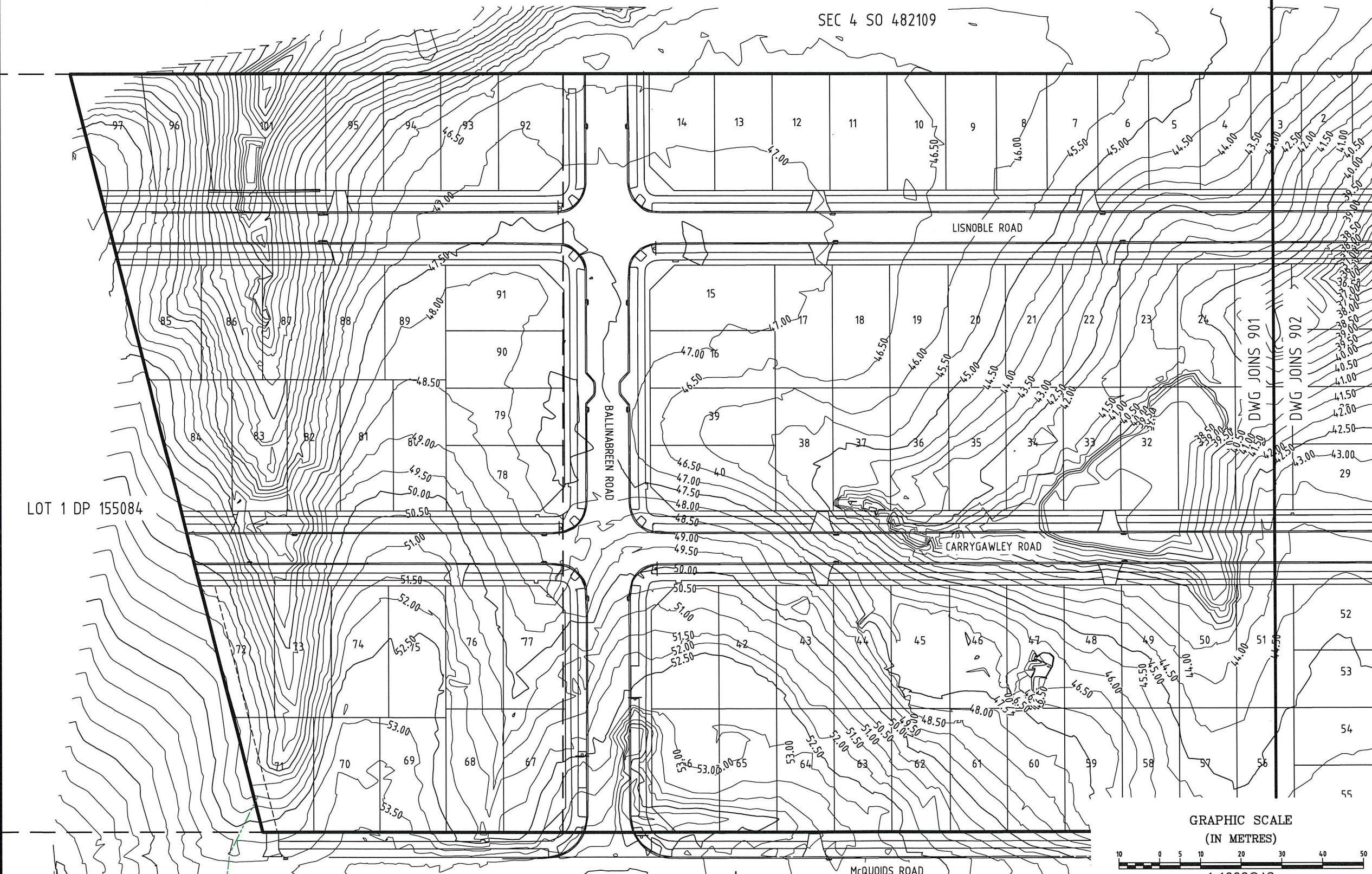
**58 Broadway**  
**Papakura**  
**Ph: 64-9-2965543**  
**www.doddcivil.co.nz**

**P.O. Box 72-543**  
**Auckland NZ**  
**Fax: 64-9-2965534**  
**admin@doddcivil.co.nz**

**PROJECT NAME:**  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
**FOR**  
**HUGH GREEN LIMITED**

**SHEET TITLE:**  
**EARTHWORKS  
PRECONSTRUCTION**

Project Number:	<b>503/02</b>	
Plan No:	<b>901</b>	Rev: <b>A</b>



DATE: 28-Nov-16

PATH: E:\PROJECTS\50302\DWG\ASB\IUT\50302-800.FW.ASB.DWG

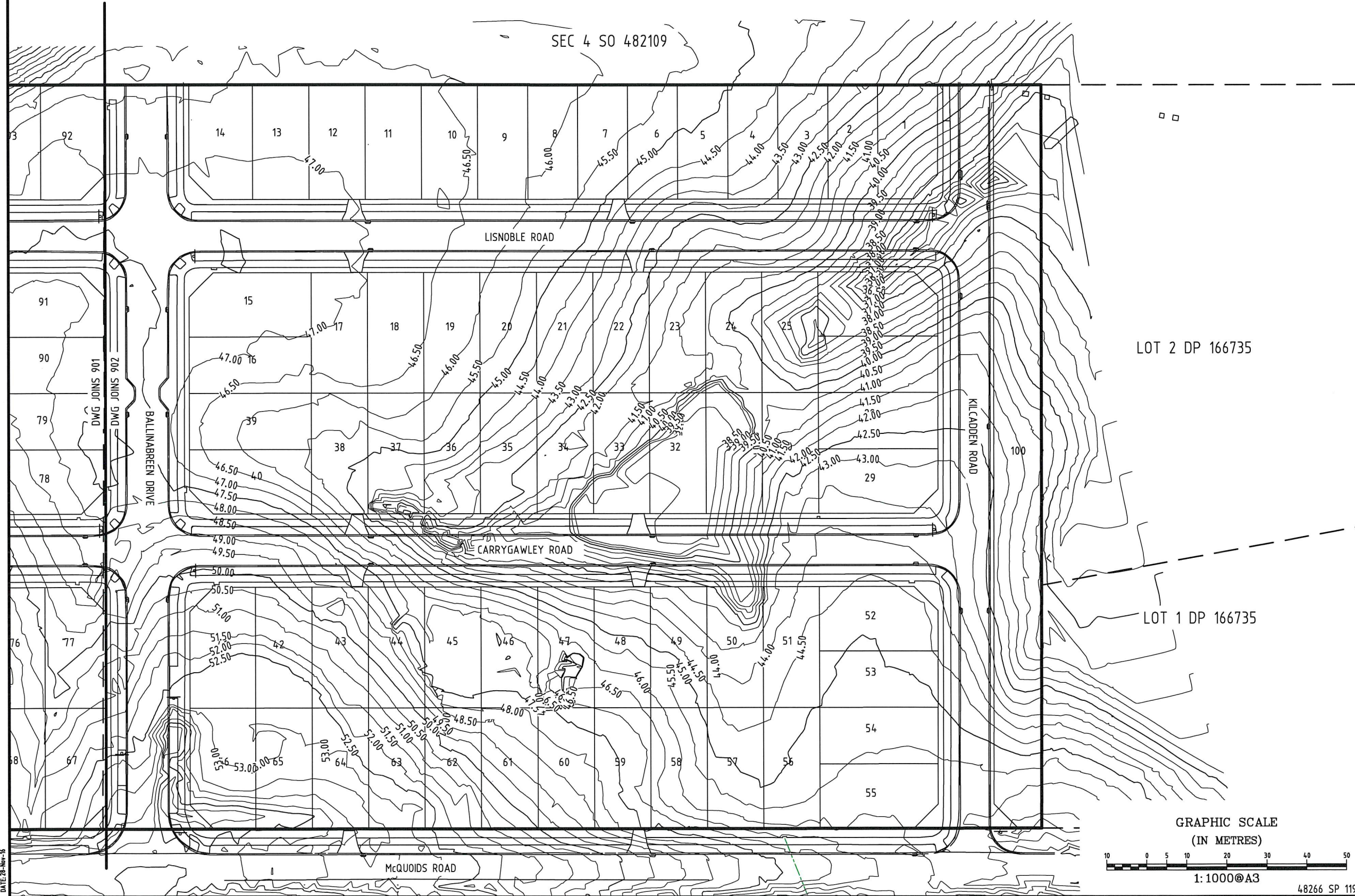


CERTIFICATION

I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THIS AS-BUILT PLAN SHOWS THE PRECONSTRUCTION CONTOURS AS SURVEYED BY OTHERS 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 ±20MM.

SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 23/11/2016  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ



Notes:

- Refer to DWG 904 for Finished Ground Level contours
- Refer to DWG 906 for Earthworks Cut/Fill contours

LEGEND	
	Lot Bdy
	Ex Abutting Bdy
	Ex Cont (Major)
	Ex Cont (Minor)

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Rev	Description	By	Date
A	Road names	SK	11/16
-	-	-	-
Rev	Description	By	Date
Surveyed	PB		05/15
Designed	WM		05/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16



Subdivisions Land Development Land Survey  
Resource Consents Project Management  
Environmental Engineering Structural Engineering

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Ph: 64-9-2965543 Fax: 64-9-2965534  
www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**EARTHWORKS**  
**PRECONSTRUCTION**

Project Number: **503/02**  
Plan No: **902** Rev: **A**

DATE: 28-Nov-16

PATH: F:\PROJECTS\50302\DWG\ASBUILT\50302-900 EW ASB.DWG


48266 SP 11988



CERTIFICATION

I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THIS AS-BUILT PLAN IS AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

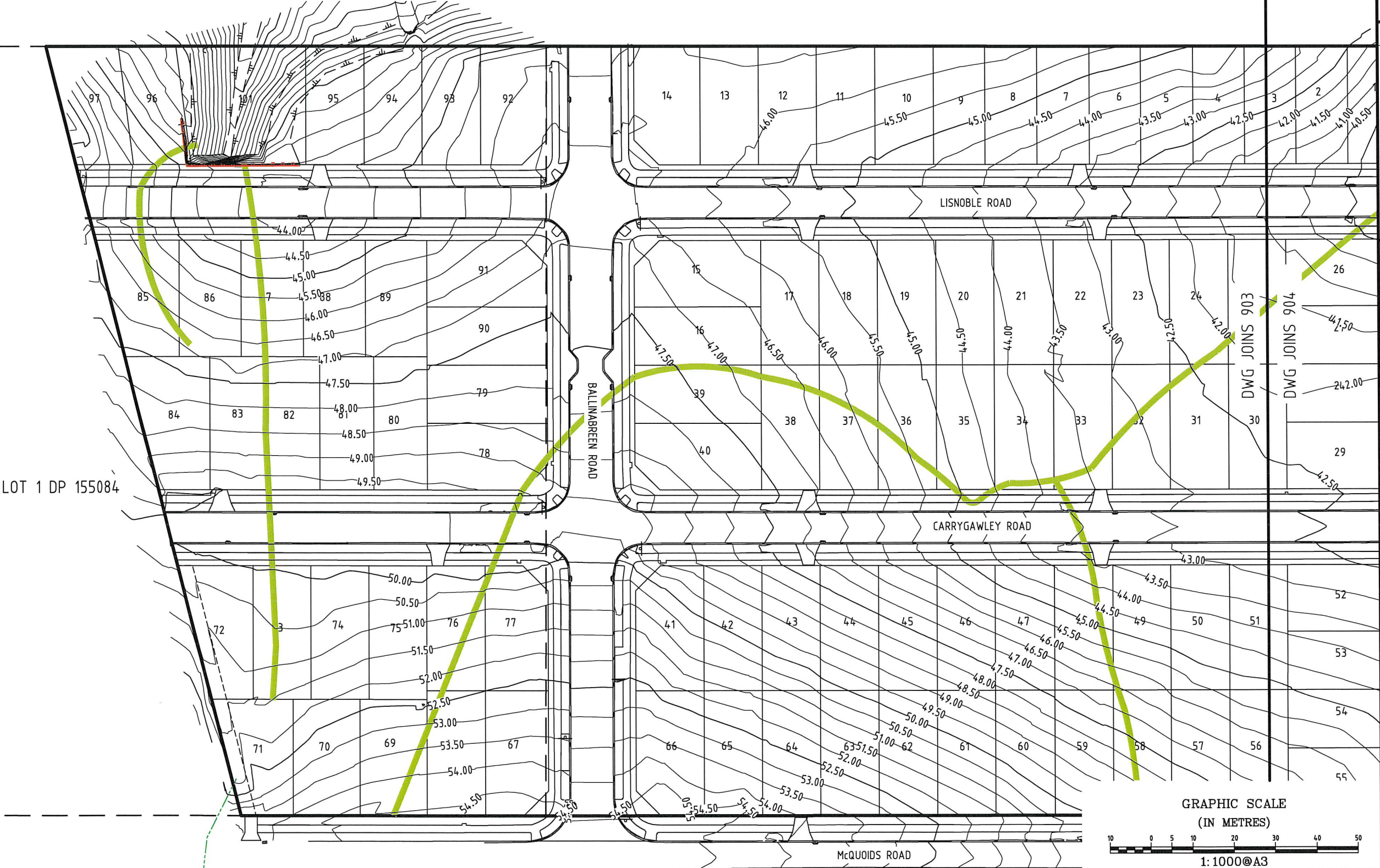
- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ±50MM.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946(MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±20MM.

SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 23/11/2016  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ

Notes:  
1. Refer to DWG 901 for Preconstruction contours  
2. Refer to DWG 905 for Earthworks Cut/Fill contours



SEC 4 SO 482109



LEGEND

	Lot Bdy
	Ex Abutting Bdy
	AB Cont (Major)
	AB Cont (Minor)
	Subsoil drainage
	Retaining Wall

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Rev	Description	By	Date
		SIGNED	DATE
Surveyed	RK		10/16
Designed	WM		05/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16

**DODD CIVIL CONSULTANTS**  
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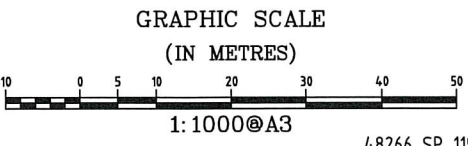
Subdivisions Land Development Land Survey  
Resource Consents Project Management  
Environmental Engineering Structural Engineering

58 Broadway P.O. Box 72-543  
Papakura Auckland NZ  
Ph: 64-9-2965543 Fax: 64-9-2965534  
www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**EARTHWORKS**  
**AS-BUILT PLAN**

Project Number: **503/02**  
Plan No: **903** Rev: **A**






CERTIFICATION

I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THIS AS-BUILT PLAN IS AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

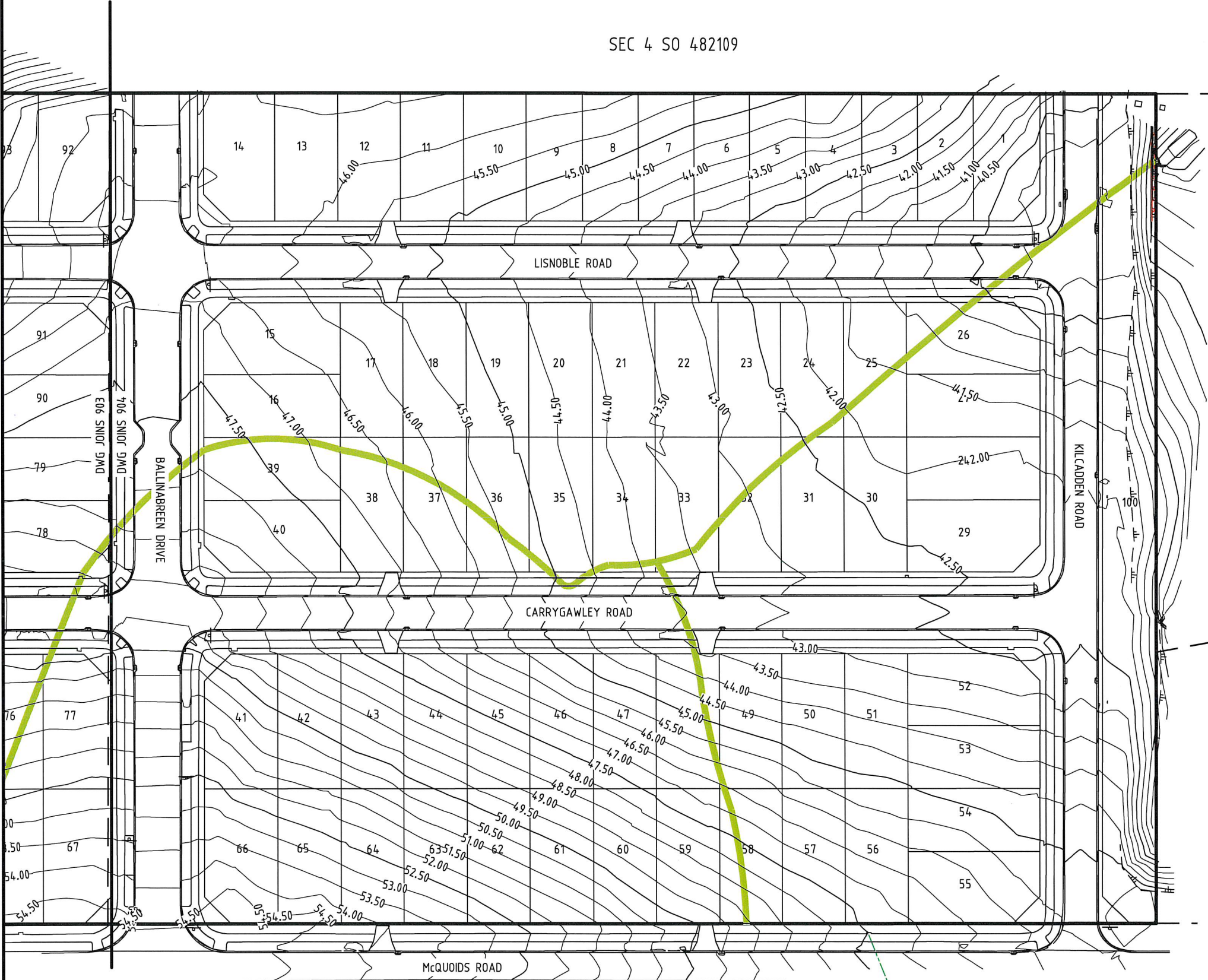
- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN ±50MM.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946(MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±20MM.

SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 23/11/2016  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ

Notes:  
1. Refer to DWG 902 for Preconstruction contours  
2. Refer to DWG 906 for Earthworks Cut/Fill contours



SEC 4 SO 482109



LOT 2 DP 166735

LOT 1 DP 166735

LEGEND

	Lot Bdy
	Ex Abutting Bdy
	AB Cont (Major)
	AB Cont (Minor)
	Subsoil drainage
	Retaining Wall

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A	Road names	SK	11/16
-	-	-	-
Rev	Description	By	Date
		SIGNED	DATE
Surveyed	RK		10/16
Designed	WM		05/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16



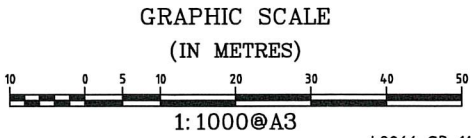
Subdivisions Land Development Land Survey  
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Environmental Engineering Structural Engineering

58 Broadway P.O. Box 72-543  
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www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**EARTHWORKS**  
**AS-BUILT PLAN**

Project Number: **503/02**  
Plan No: **904** Rev: **A**





I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THIS AS-BUILT SHOWS THE DEPTHS OF CUT AND FILL WHICH IS BASED ON PRECONSTRUCTION LEVELS SURVEYED BY OTHERS AND AS-BUILT LEVELS SURVEYED BY DODD CIVIL CONSULTANTS LTD AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN  $\pm 50\text{MM}$ .
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946(MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN  $\pm 20\text{MM}$ .

SIGNED: Tralph  
 CHARTERED PROFESSIONAL ENGINEER  
 DATE: 23/11/2016  
 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ

1. Refer to DWG 901 for Preconstruction contours
2. Refer to DWG 903 for Finished Ground Level contours

_____	Lot Bdy
_____	Ex Abutting Bdy
_____	Cut/Fill Cont

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-	-	-	-
Rev	Description	By	Date
		SIGNED	DATE
Surveyed	RK		10/16
Designed	WM		05/15
Drawn	SK		10/16
Checked		<i>[Signature]</i>	4/16
Approved		<i>[Signature]</i>	11/16



Subdivisions Land Development Land Survey  
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Fax: 64-9-2965534  
admin@doddcivil.co.nz**

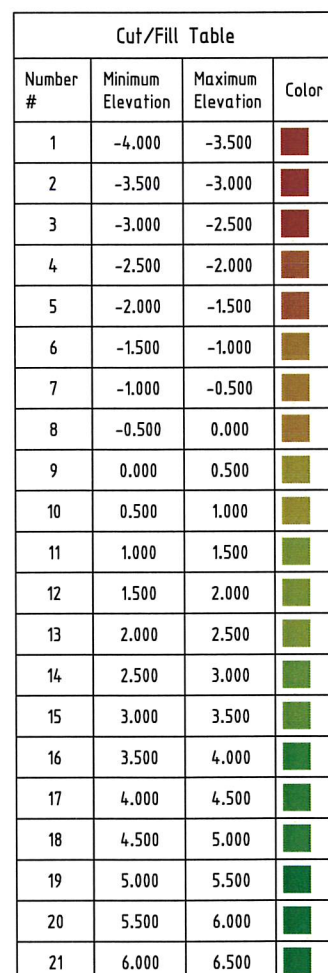
PROJECT NAME:

**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:

**CUT / FILL  
AS-BUILT PLAN**

Project Number:	<b>503/02</b>	
Plan No:	<b>905</b>	Rev: <b>-</b>



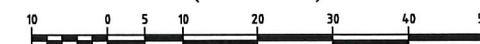
SEC 4 SO 482109

LOT 1 DP 155084

DWG JOINS 905

DWG JOINS 906

GRAPHIC SCALE  
(IN METRES)



1:1000@A3






















48266 SP 11988



I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THIS AS-BUILT SHOWS THE DEPTHS OF CUT AND FILL WHICH IS BASED ON PRECONSTRUCTION LEVELS SURVEYED BY OTHERS AND AS-BUILT LEVELS SURVEYED BY DODD CIVIL CONSULTANTS LTD AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN  $\pm 50\text{MM}$ .
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946(MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN  $\pm 20\text{MM}$ .



SIGNED: Tralph  
 CHARTERED PROFESSIONAL ENGINEER  
 DATE: 23/11/2016  
 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ

Cut/Fill Table			
Number #	Minimum Elevation	Maximum Elevation	Color
1	-4.000	-3.500	
2	-3.500	-3.000	
3	-3.000	-2.500	
4	-2.500	-2.000	
5	-2.000	-1.500	
6	-1.500	-1.000	
7	-1.000	-0.500	
8	-0.500	0.000	
9	0.000	0.500	
10	0.500	1.000	
11	1.000	1.500	
12	1.500	2.000	
13	2.000	2.500	
14	2.500	3.000	
15	3.000	3.500	
16	3.500	4.000	
17	4.000	4.500	
18	4.500	5.000	
19	5.000	5.500	
20	5.500	6.000	
21	6.000	6.500	

1. Refer to DWG 902 for Preconstruction contours
2. Refer to DWG 904 for Finished Ground Level contours

_____	Lot Bdy
_____	Ex Abutting Bdy
_____	Cut/Fill Cont

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WRITTEN PERMISSION FROM DODD CIVIL CONSULTANTS LIMITED

Rev	Description	By	Date
		SIGNED	DATE
Surveyed	RK		10/16
Designed	WM		05/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16



Subdivisions Land Development Land Survey  
Resource Consents Project Management  
Environmental Engineering Structural Engineering

**58 Broadway**  
**Papakura**  
**Ph: 64-9-2965543**  
**www.doddcivil.co.nz**

**P.O. Box 72-543**  
**Auckland NZ**  
**Fax: 64-9-2965534**  
**admin@doddcivil.co.nz**

PROJECT NAME:

**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:

## CUT / FILL AS-BUILT PLAN

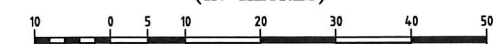
Project Number: 503/02

Plan No: **906** Rev: **-**

DATE: 23-Nov-16

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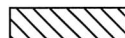

GRAPHIC SCALE  
(IN METRES)



1:1000@A3

48266 SP 11988




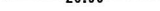




-  - Specific Design Zone - Proximity to land steeper than 1V:4H
-  - Specific Design Zone - Retaining Wall

**Notes:**

1. Refer to DWG 901 for Preconstruction contours
2. Refer to DWG 903 for Finished Ground Level contours

**LEGEND**

	Lot Bdy
	Ex Abutting Bdy
	AB Cont (Major)
	AB Cont (Minor)
	Subsoil drainage
	Retaining Wall

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Rev	Description	By	Date
A	Road names	SK	11/16
-	-	-	-
Rev	Description	By	Date
		SIGNED	DATE
Surveyed	RK		10/16
Designed	WM		05/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16



Subdivisions Land Development Land Survey  
Resource Consents Project Management  
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Ph: 64-9-2965543 Fax: 64-9-2965534  
www.doddcivil.co.nz admin@doddcivil.co.nz

**PROJECT NAME:**

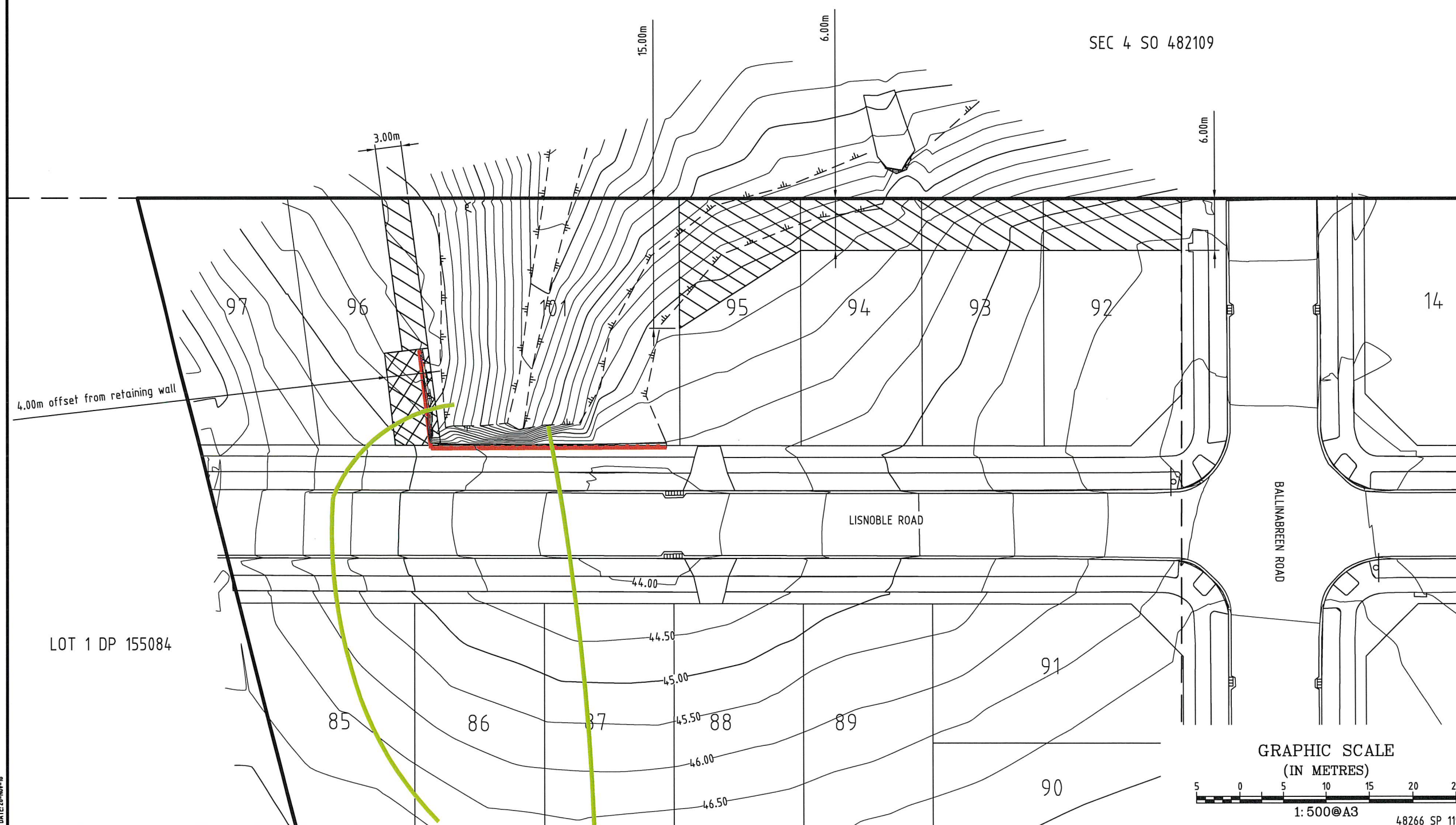
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

**SHEET TITLE:**

**GEOTECH SPECIFIC  
DESIGN ZONE**

Project Number: **503/02**

Plan No: **907** Rev: **A**



DATE: 28-Nov-16



Asbuilt Setout Table		
Name	Northing	Easting
CP A1.1	5905703.39mN	1771811.38mE
CP A1.2	5905705.23mN	1771804.28mE
CP A1.3	5905718.31mN	1771826.97mE
CP A1.4	5905711.22mN	1771825.21mE
CP A6.1	5905621.90mN	1771865.07mE
CP A7.1	5905551.63mN	1771847.55mE
CP B1.1	5905641.26mN	1771788.36mE
CP B1.2	5905639.62mN	1771795.44mE
CP B2.1	5905572.91mN	1771771.35mE
CP B2.2	5905571.11mN	1771778.38mE
CP C1.1	5905685.41mN	1771880.94mE
CP D2.2	5905730.49mN	1771749.34mE
CP D2.3	5905722.74mN	1771735.58mE
CP D2.4	5905724.70mN	1771728.65mE
CP D3.1	5905655.74mN	1771711.41mE
CP D3.2	5905658.55mN	1771719.64mE
CP D4.1	5905591.46mN	1771695.36mE
CP D4.2	5905590.24mN	1771702.56mE
CP F2.1	5905537.83mN	1771660.18mE
CP F2.2	5905547.75mN	1771662.69mE

Asbuilt Setout Table		
Name	Northing	Easting
CP F3.1	5905527.45mN	1771701.76mE
CP F3.2	5905537.31mN	1771704.42mE
CP F4.1	5905521.06mN	1771727.24mE
CP F4.2	5905530.95mN	1771729.70mE
CP F5.1	5905503.45mN	1771754.05mE
CP F6.1	5905509.85mN	1771771.82mE
CP F6.2	5905519.74mN	1771774.39mE
CP F11.1	5905422.60mN	1771815.28mE
CP J1.1	5905501.67mN	1771761.04mE
CP J2.1	5905431.51mN	1771743.46mE
CP J2.2	5905444.05mN	1771739.10mE
DCP D1.1	5905743.30mN	1771728.87mE
DCP D2.1	5905737.84mN	1771720.75mE
DCP G1.2	5905469.71mN	1771664.92mE
DCP G1.3	5905468.76mN	1771672.12mE
SWHW A0	5905735.36mN	1771817.86mE
SWHW D0	5905760.20mN	1771719.03mE
SWHW F0	5905504.92mN	1771635.33mE
SWHW G0	5905454.59mN	1771653.61mE
SWHW K0	5905455.18mN	1771627.26mE

Asbuilt Setout Table		
Name	Northing	Easting
SWMH A1	5905706.65mN	1771815.78mE
SWMH A2	5905699.27mN	1771847.88mE
SWMH A3	5905670.33mN	1771840.45mE
SWMH A3.1	5905617.37mN	1771827.43mE
SWMH A3.2	5905535.19mN	1771807.38mE
SWMH A4	5905663.65mN	1771867.63mE
SWMH A5	5905654.78mN	1771869.36mE
SWMH A6	5905628.80mN	1771863.42mE
SWMH A7	5905560.24mN	1771846.80mE
SWMH B1	5905644.89mN	1771800.10mE
SWMH B2	5905576.40mN	1771783.18mE
SWMH B3	5905543.23mN	1771774.91mE
SWMH C1	5905692.01mN	1771874.18mE
SWMH D1	5905746.11mN	1771726.94mE
SWMH D2	5905732.92mN	1771724.23mE
SWMH D3	5905661.94mN	1771705.92mE
SWMH D4	5905599.72mN	1771690.42mE
SWMH D5	5905565.92mN	1771682.44mE
SWMH E1	5905733.88mN	1771775.91mE
SWMH E2	5905689.26mN	1771765.13mE

Asbuilt Setout Table		
Name	Northing	Easting
SWMH E3	5905634.55mN	1771751.13mE
SWMH E4	5905565.22mN	1771733.78mE
SWMH F1	5905505.33mN	1771639.90mE
SWMH F2	5905537.42mN	1771647.83mE
SWMH F3	5905525.14mN	1771696.87mE
SWMH F4	5905518.46mN	1771723.74mE
SWMH F5	5905513.38mN	1771745.98mE
SWMH F6	5905507.97mN	1771766.12mE
SWMH F7	5905499.66mN	1771800.51mE
SWMH F8	5905493.58mN	1771824.60mE
SWMH F9	5905486.64mN	1771828.78mE
SWMH F10	5905470.35mN	1771823.19mE
SWMH F11	5905423.45mN	1771812.34mE
SWMH G1	5905453.96mN	1771671.28mE
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SWMH G1.1A	5905467.52mN	1771675.18mE
SWMH G2	5905446.92mN	1771700.26mE
SWMH G3	5905476.75mN	1771707.94mE
SWMH J2	5905435.93mN	1771748.10mE
SWMH J3	5905426.98mN	1771782.24mE

Asbuilt Setout Table		
Name	Northing	Easting
SWMH J3.1	5905467.85mN	1771792.56mE
SWMH J4	5905419.66mN	1771781.54mE
SWMH J5	5905419.68mN	1771798.92mE
SWMH K1	5905447.24mN	1771625.25mE

Notes:

LEGEND	
	Lot Bdy Ex Abutting Bdy Ex Stormwater AB Stormwater Ex/AB Manhole Cesspit/Double Cesspit 3.00 x 1.75m Rain Garden Unit

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Rev	Description	By	Date
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Approved			11/16



Subdivisions Land Development Land Survey  
Resource Consents Project Management  
Environmental Engineering Structural Engineering

58 Broadway Papakura P.O. Box 72-543 Auckland NZ  
Ph: 64-9-2965543 Fax: 64-9-2965534  
www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUIDS ROAD**  
**FLATBUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT INDEX PLAN**

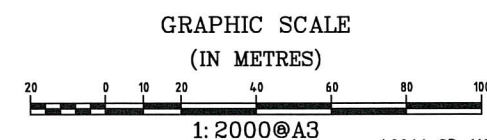
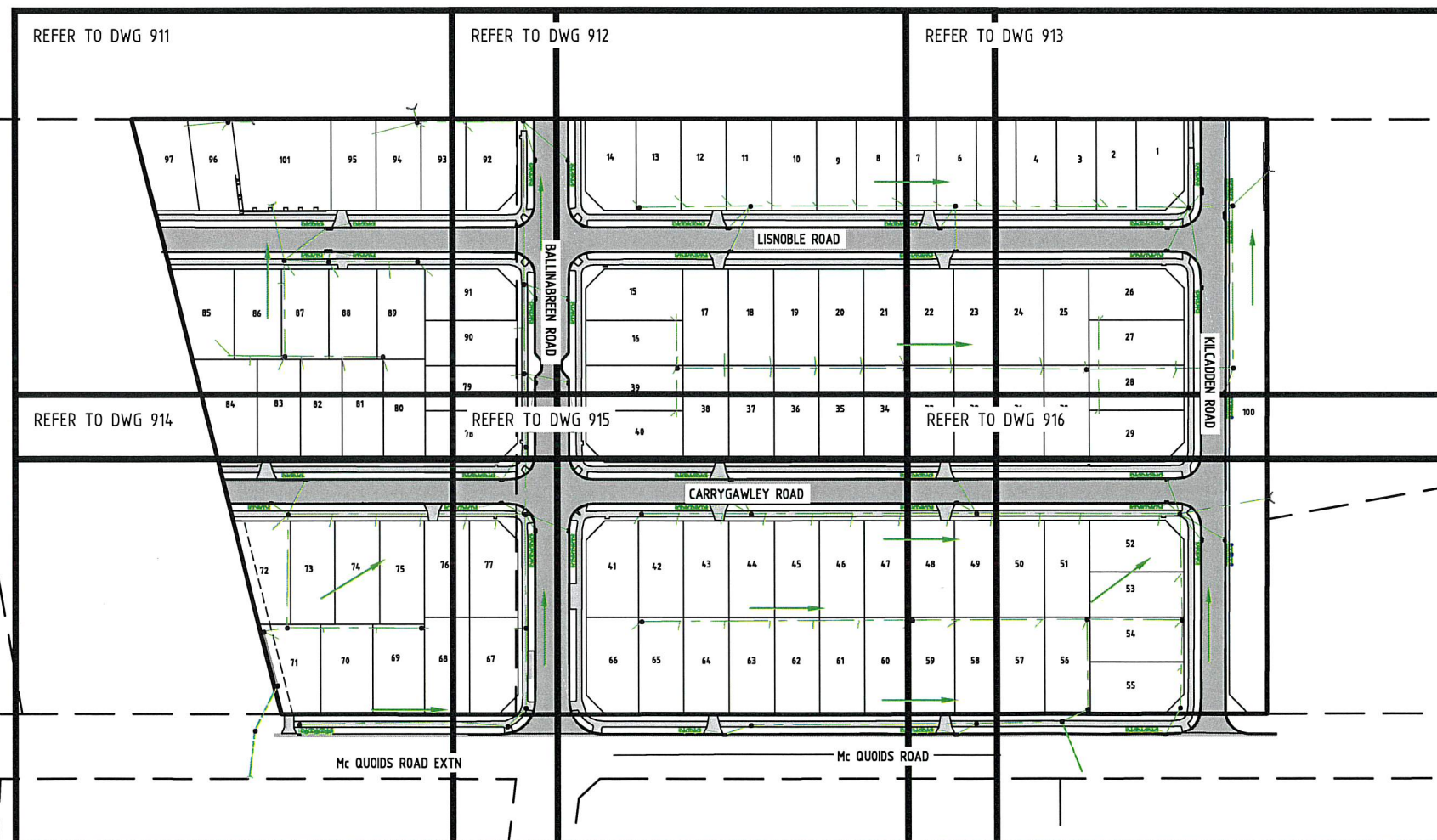
Project Number: **503/02**  
Plan No: **910** Rev: **A**

#### CERTIFICATION

I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THE MANHOLE POSITIONS, SCHEDULE OF CO-ORDINATES, INVERT AND LID LEVELS, AND DISTANCES BETWEEN MANHOLES AND PIPE SIZES ARE CORRECT. CONNECTIONS TO THE LINES HAVE BEEN PLOTTED AND DIMENSIONED FROM INFORMATION SUPPLIED TO US BY THE CONTRACTOR FOR THE WORK.

- 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 ±20MM.

SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2016  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ



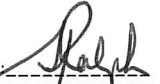
DATE: 28-Nov-16



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 CHARTERED PROFESSIONAL ENGINEER  
 DATE: 28/11/2016  
 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ

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- All pipes are Class 2 RCRRJ unless noted otherwise.
- Works constructed by Twomey Construction.
- Works carried out April - August 2016.
- All private connections are 1.10m below finished ground level to and are 100mmØ uPVC
- Constructed in accordance with Auckland Council standards.
- All cesspit leads are RCRRJ Class 3. Double cesspit leads are 300mmØ and single cesspit leads are 225mmØ.
- All manholes are 1050mmØ unless noted otherwise

## LEGEND

	Lot Bdy
	Ex Abutting Bdy
	Ex Stormwater
	AB Stormwater
	Ex/AB Manhole
	Cesspit/Double Cesspit
	3.00 x 1.75m Rain Garden Unit

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Drawn	SK		10/16
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Approved			11/16



Subdivisions Land Development Land Survey  
 Resource Consents Project Management  
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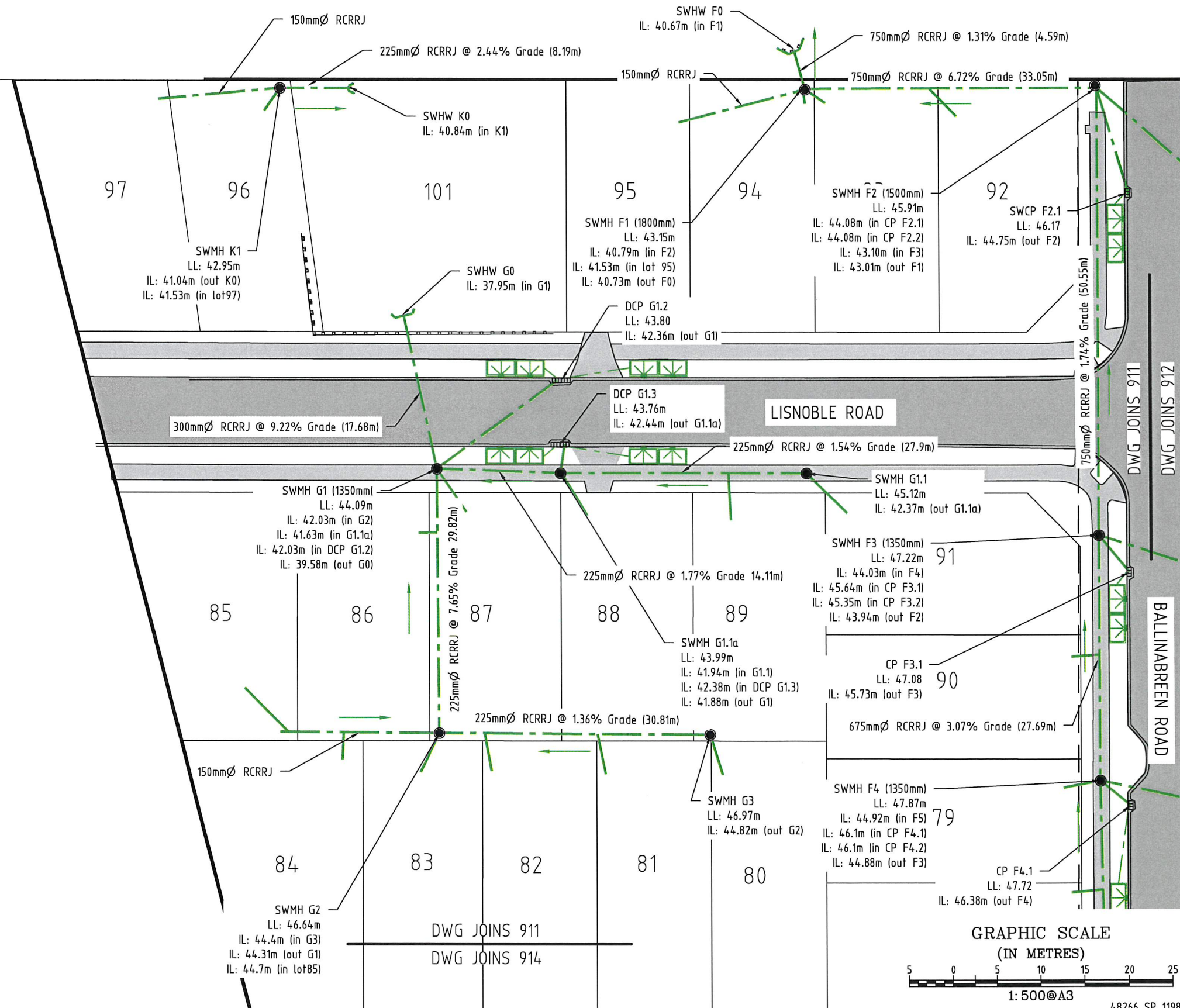
58 Broadway Papakura P.O. Box 72-543 Auckland NZ  
 Ph: 64-9-2965543 Fax: 64-9-2965534  
 www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
 FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT PLAN 1 OF 6**

Project Number: **503/02**

Plan No: **911** Rev: **A**






# CERTIFICATION

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SIGNED:   
 CHARTERED PROFESSIONAL ENGINEER  
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 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ

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## LEGEND

	Lot Bdy
	Ex Abutting Bdy
	Ex Stormwater
	AB Stormwater
	Ex/AB Manhole
	Cesspit/Double Cesspit
	3.00 x 1.75m Rain Garden Unit

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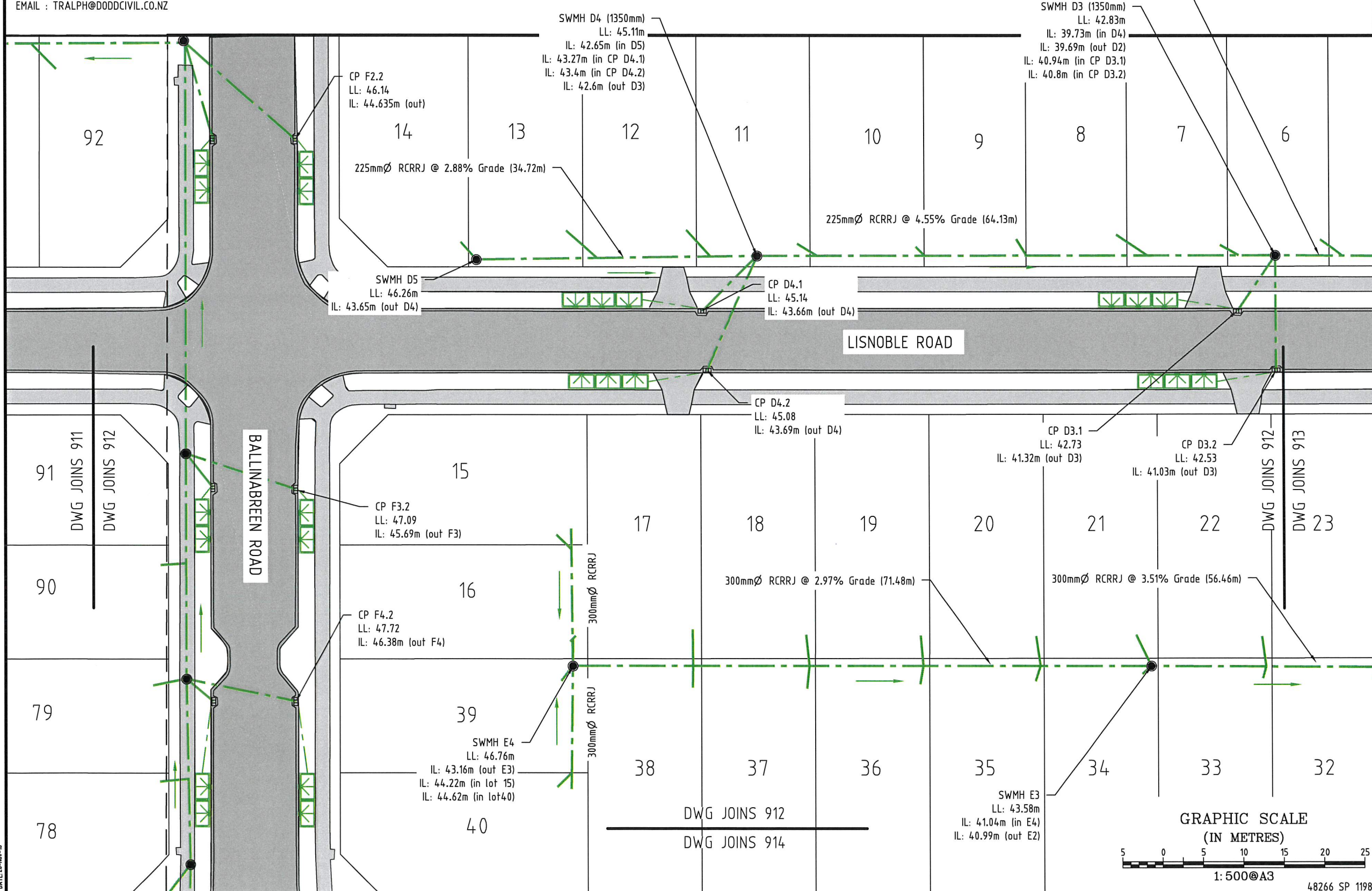
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PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
 FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT PLAN 2 OF 6**

Project Number: **503/02**

Plan No: **912** Rev: **A**



DATE: 28-Nov-16

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SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2016  
CONTACT NUMBER: 296-5543  
EMAIL: TRALPH@DODDCIVIL.CO.NZ

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- All manholes are 1050mmØ unless noted otherwise

## LEGEND

	Lot Bdy
	Ex Abutting Bdy
	Ex Stormwater
	AB Stormwater
	Ex/AB Manhole
	Cesspit/Double Cesspit
	3.00 x 1.75m Rain Garden Unit

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Approved			11/16



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Environmental Engineering Structural Engineering

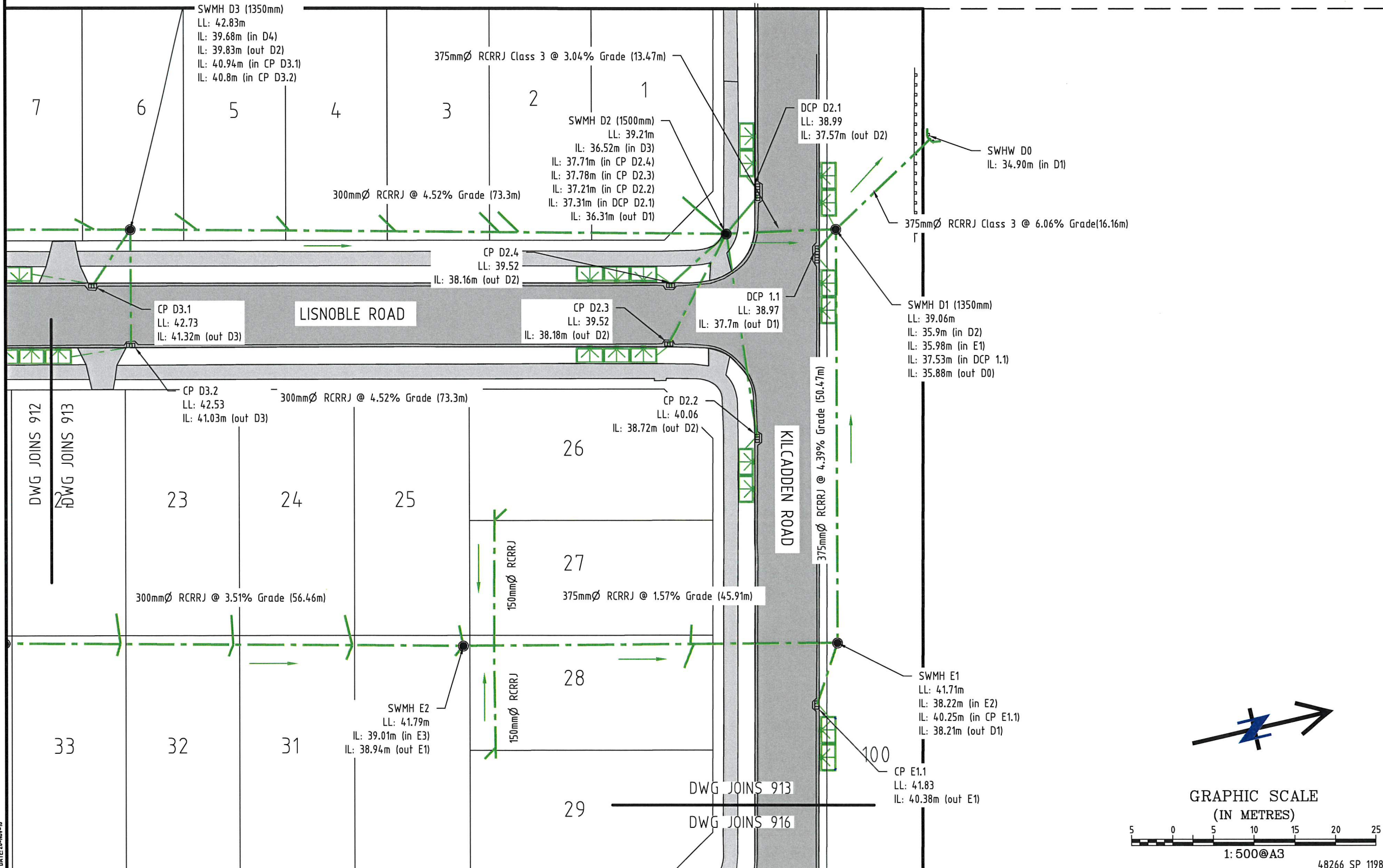
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www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT PLAN 3 OF 6**

Project Number: **503/02**

Plan No: **913** Rev: **A**



DATE: 28-Nov-16


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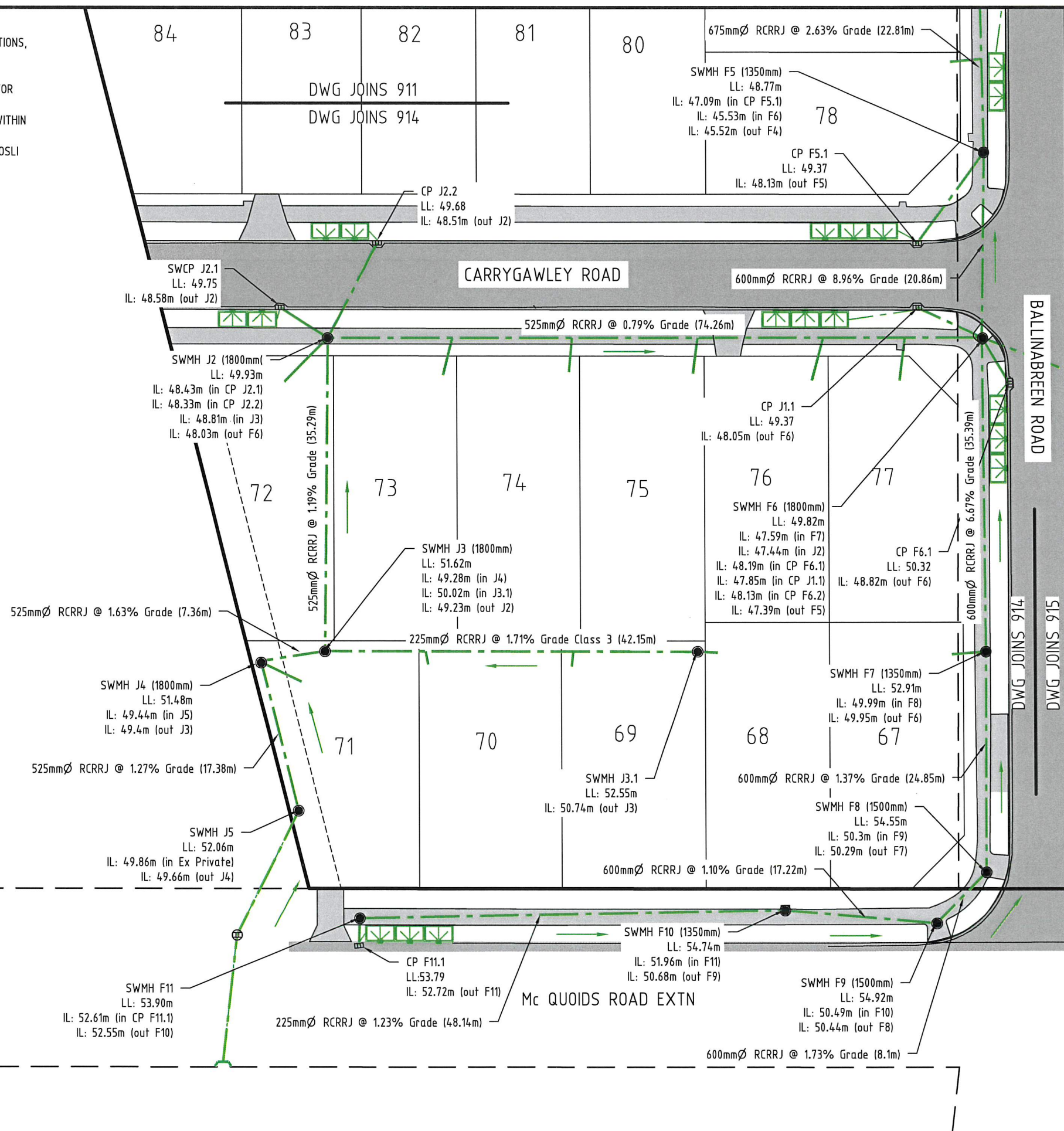


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SIGNED:   
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 DATE: 28/11/2016  
 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ



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- All manholes are 1050mmØ unless noted otherwise.

## LEGEND

	Lot Bdy
	Ex Abutting Bdy
	Ex Stormwater
	AB Stormwater
	Ex/AB Manhole
	Cesspit/Double Cesspit
	3.00 x 1.75m Rain Garden Unit

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Rev	Description	By	Date
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4	Checked	SK	11/16
5	Approved	SK	11/16



Subdivisions Land Development Land Survey  
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 Ph: 64-9-2965543  
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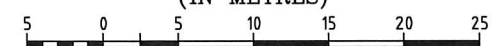
P.O. Box 72-543  
 Auckland NZ  
 Fax: 64-9-2965534  
 admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
 FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT PLAN 4 OF 6**  
 Project Number: **503/02**  
 Plan No: **914** Rev: **A**

GRAPHIC SCALE

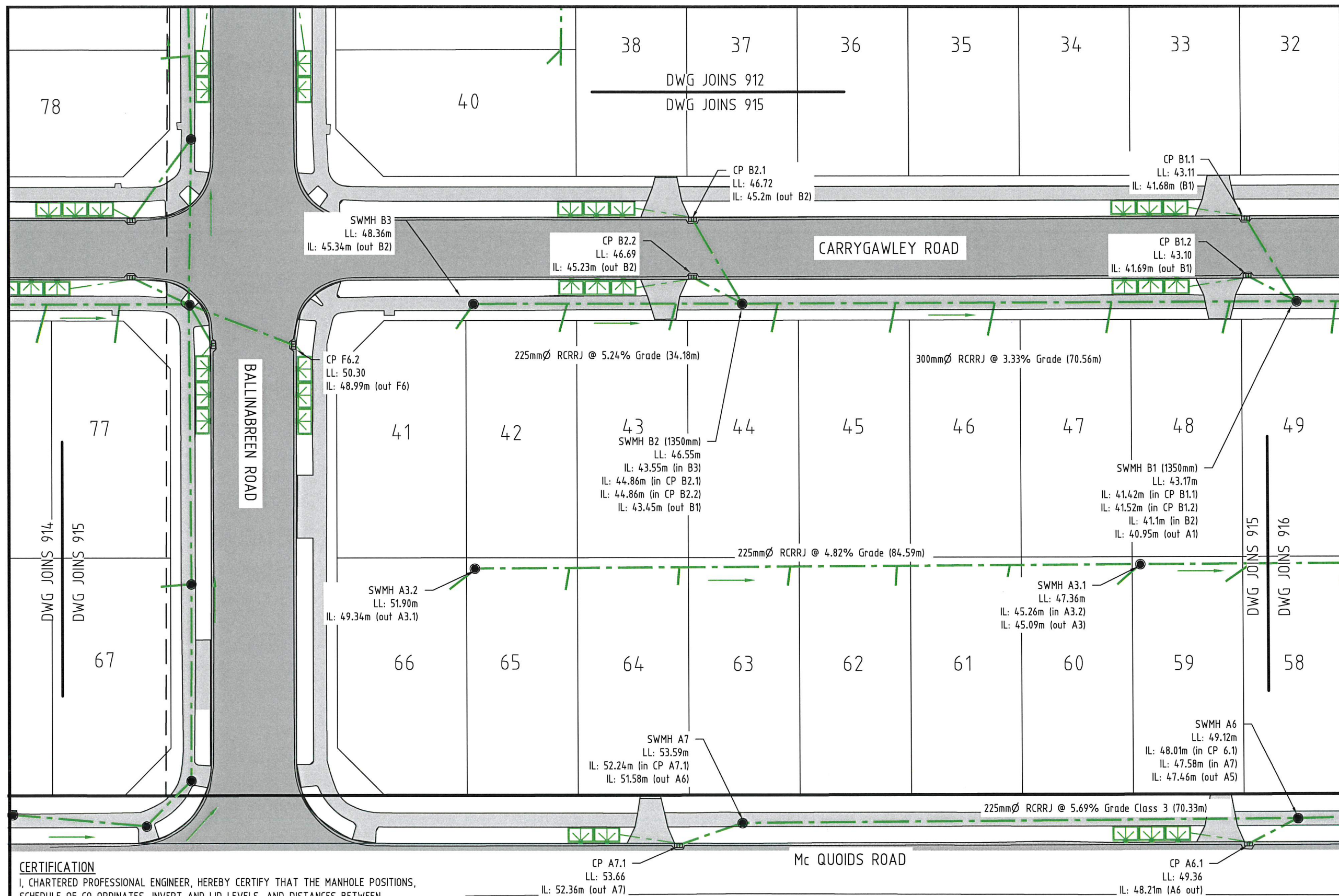
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1: 500@A3

48266 SP 11988





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LEGEND	
	Lot Bdy
	Ex Abutting Bdy
	Ex Stormwater
	AB Stormwater
	Ex/AB Manhole
	Cesspit/Double Cesspit
	3.00 x 1.75m Rain Garden Unit

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PROJECT NAME:  
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**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT PLAN 5 OF 6**

Project Number: **503/02**  
Plan No: **915** Rev: **A**

**CERTIFICATION**

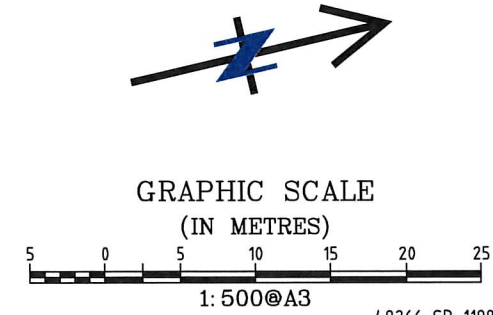
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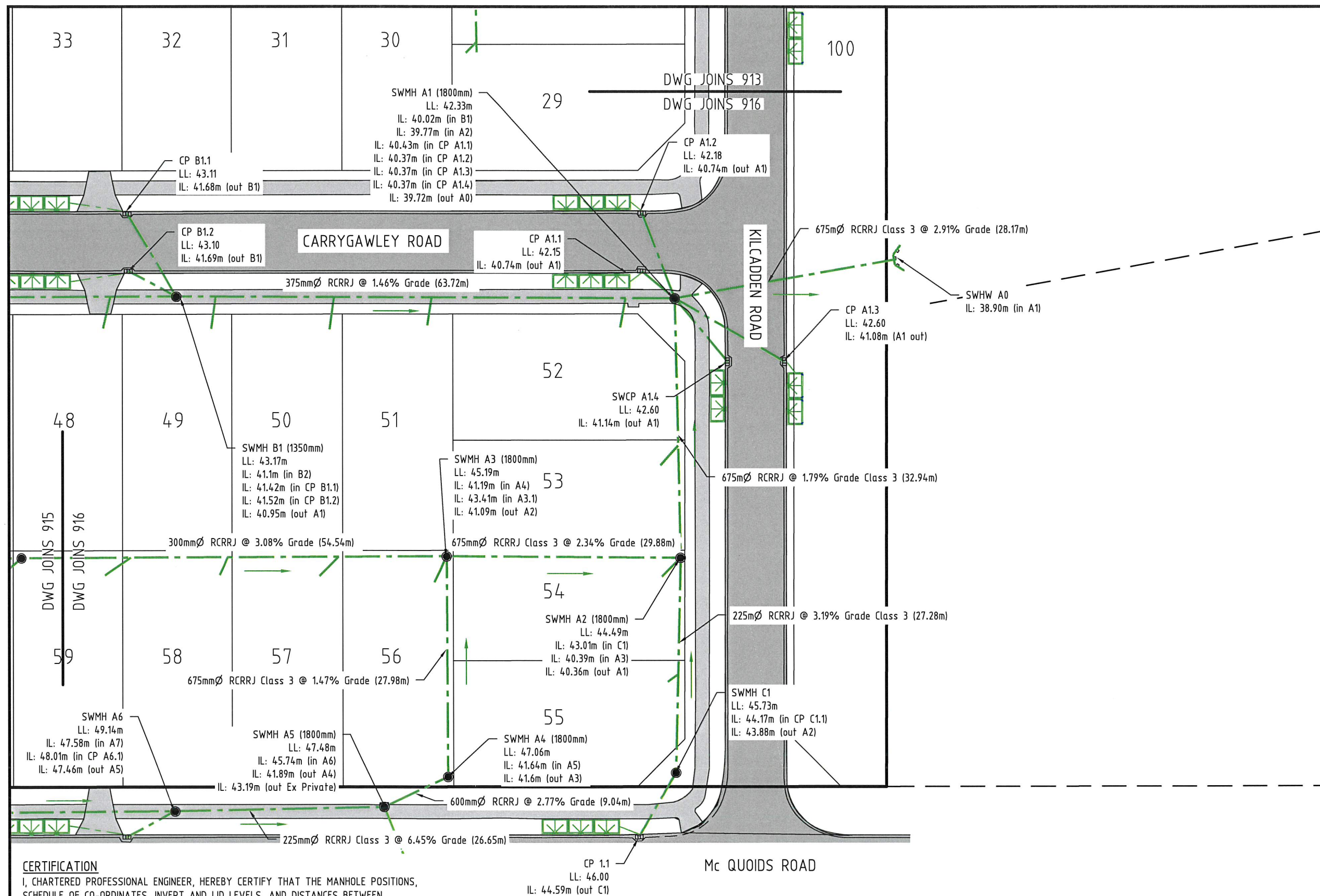
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LEGEND	
	Lot Bdy
	Ex Abutting Bdy
	Ex Stormwater
	AB Stormwater
	Ex/AB Manhole
	Cesspit/Double Cesspit
	3.00 x 1.75m Rain Garden Unit

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www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 MCQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN LIMITED**

SHEET TITLE:  
**STORMWATER**  
**AS-BUILT PLAN 6 OF 6**

Project Number: **503/02**  
Plan No: **916** Rev: **A**

#### CERTIFICATION

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DATE: 28/11/2016  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ



GRAPHIC SCALE  
(IN METRES)

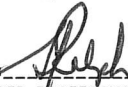


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DATE: 28/11/2016  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ

Asbuilt Setout Table		
Name	Northing	Easting
WWMH 1.1	5905752.41mN	1771702.00mE
WWMH 1.2	5905709.71mN	1771690.82mE
WWMH 1.3	5905702.54mN	1771719.80mE
WWMH 1.4	5905631.62mN	1771702.20mE
WWMH 1.5	5905563.09mN	1771685.08mE
WWMH 1.6	5905492.23mN	1771667.68mE
WWMH 1.7	5905459.26mN	1771659.07mE
WWMH 1.8	5905419.14mN	1771649.14mE
WWMH 2.1	5905691.59mN	1771763.30mE
WWMH 2.2	5905634.98mN	1771749.42mE
WWMH 2.3	5905566.44mN	1771732.25mE
WWMH 2.4	5905490.22mN	1771713.02mE
WWMH 2.5	5905419.36mN	1771695.09mE
WWMH 3.1	5905673.16mN	1771839.27mE
WWMH 3.1.1	5905664.71mN	1771872.81mE
WWMH 3.2	5905596.53mN	1771820.05mE
WWMH 3.3	5905516.45mN	1771800.10mE
WWMH 3.4	5905496.87mN	1771797.55mE
WWMH 3.5	5905419.65mN	1771777.94mE
IC 1	5905758.71mN	1771704.69mE
IC 2	5905793.92mN	1771719.71mE
WWMH A/5	5905799.68mN	1771722.01mE

Notes:

LEGEND	
	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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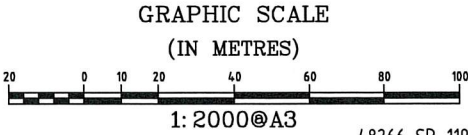
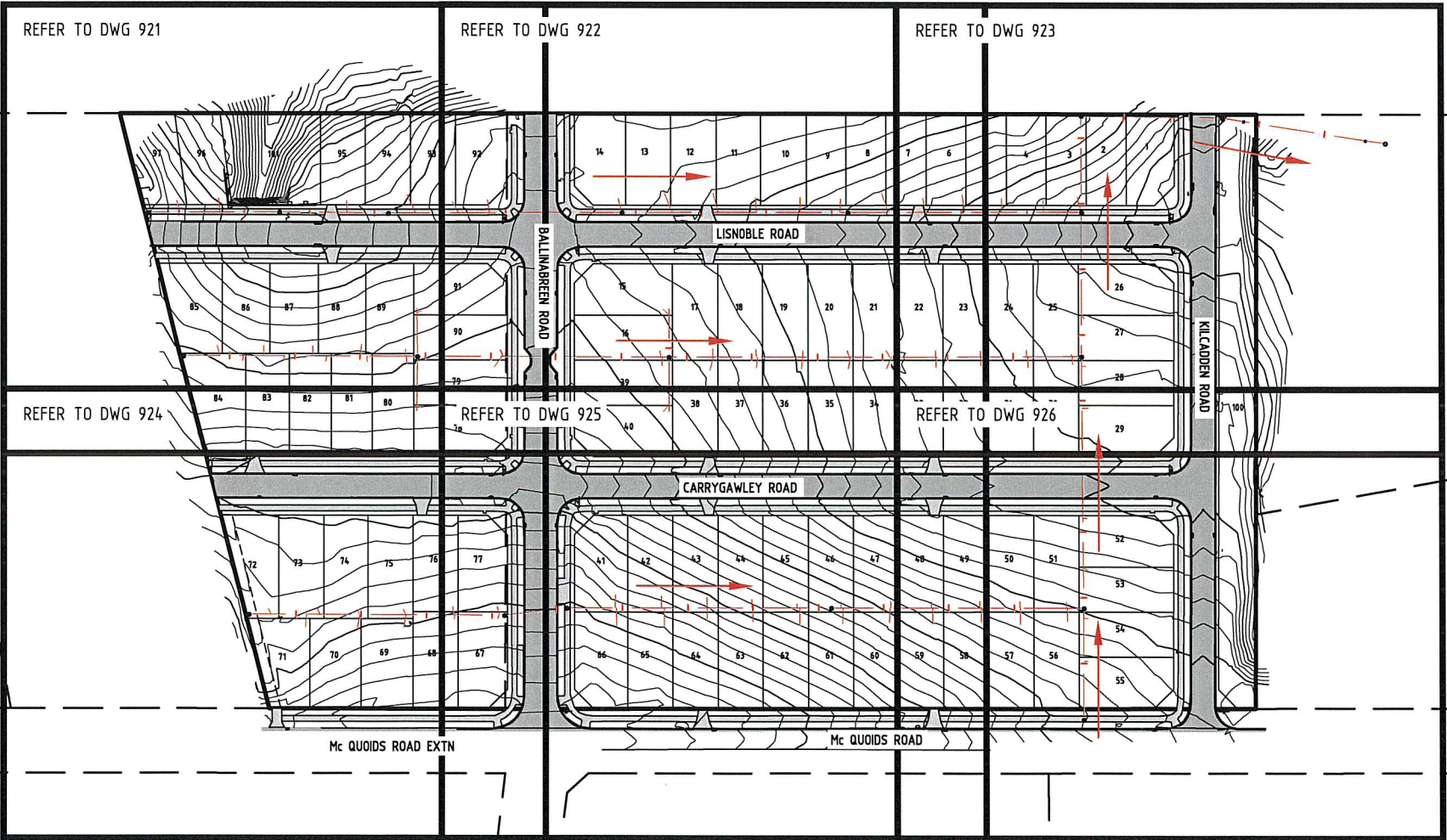
58 Broadway  
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P.O. Box 72-543  
Auckland NZ  
Fax: 64-9-2965534  
admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 McQUIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

SHEET TITLE:  
**WASTE WATER**  
**AS-BUILT INDEX PLAN**

Project Number: **503/02**  
Plan No: **920** Rev: **A**






# CERTIFICATION

I, CHARTERED PROFESSIONAL ENGINEER, HEREBY CERTIFY THAT THE MANHOLE POSITIONS, SCHEDULE OF CO-ORDINATES, INVERT AND LID LEVELS, AND DISTANCES BETWEEN MANHOLES AND PIPE SIZES ARE CORRECT. CONNECTIONS TO THE LINES HAVE BEEN PLOTTED AND DIMENSIONED FROM INFORMATION SUPPLIED TO US BY THE CONTRACTOR FOR THE WORK.






- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD(2000), AND ARE WITHIN  $\pm 50$ MM.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946(MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN  $\pm 20$ MM.

SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2014  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ

## Notes:

- All concrete products manufactured by Hynds.
- Length of pipes shown in brackets.
- All pipes are uPVC SN16 unless noted otherwise.
- Works constructed by Twomey Construction.
- Works carried out April - August 2016.
- All private connections are 1.10m below finished ground level to.
- Constructed in accordance with WaterCare standards.
- All house connections are 100mm $\varnothing$  uPVC SN16 unless noted otherwise.
- All manholes are 1050mm $\varnothing$  unless noted otherwise.
- Watercare standard granular bedding under all pipes

## LEGEND

	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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Approved			4/16



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PROJECT NAME:

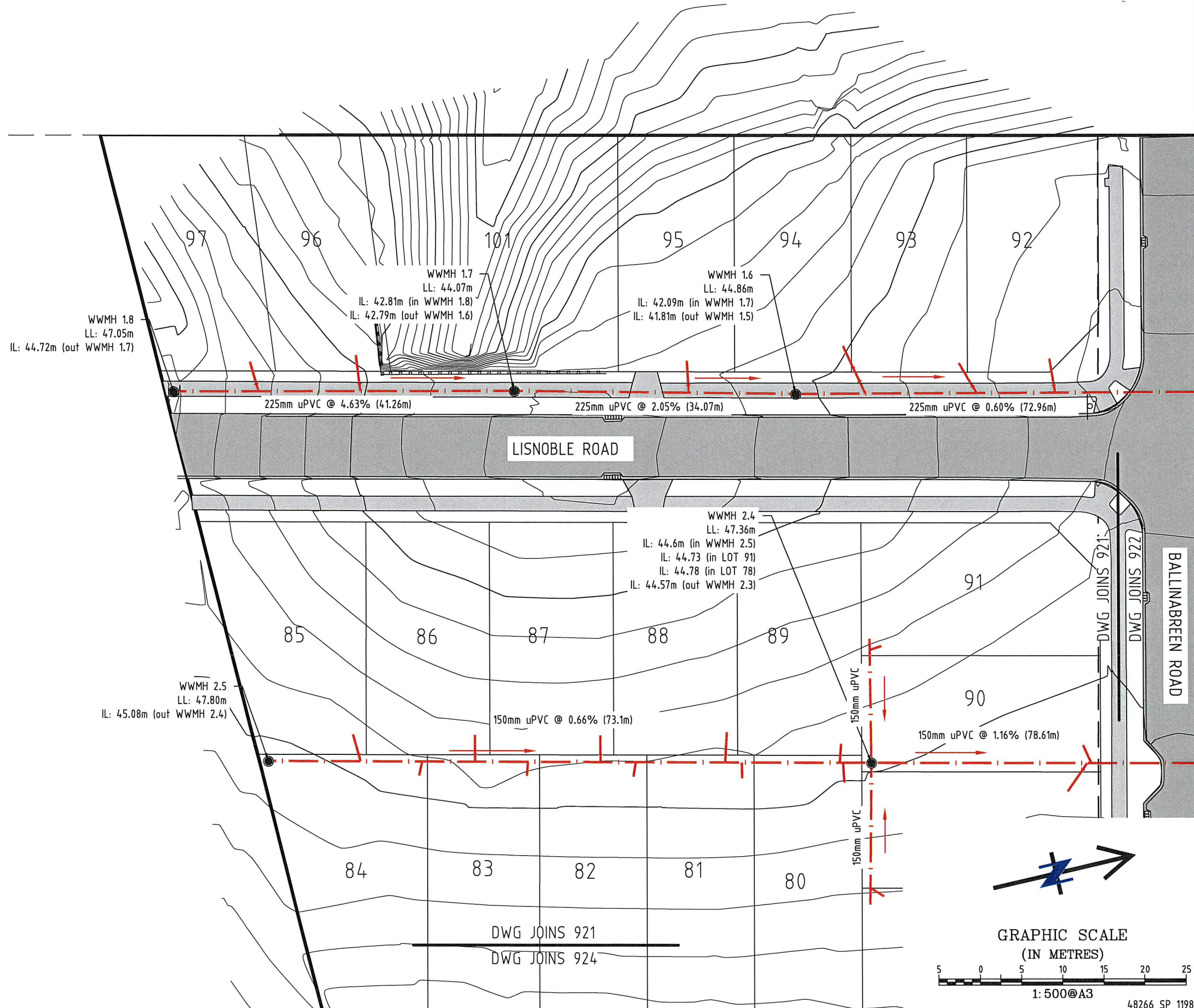
**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

SHEET TITLE:

**WASTE WATER**  
**AS-BUILT PLAN 1 OF 6**

Project Number: **503/02**

Plan No: **921** Rev: **A**






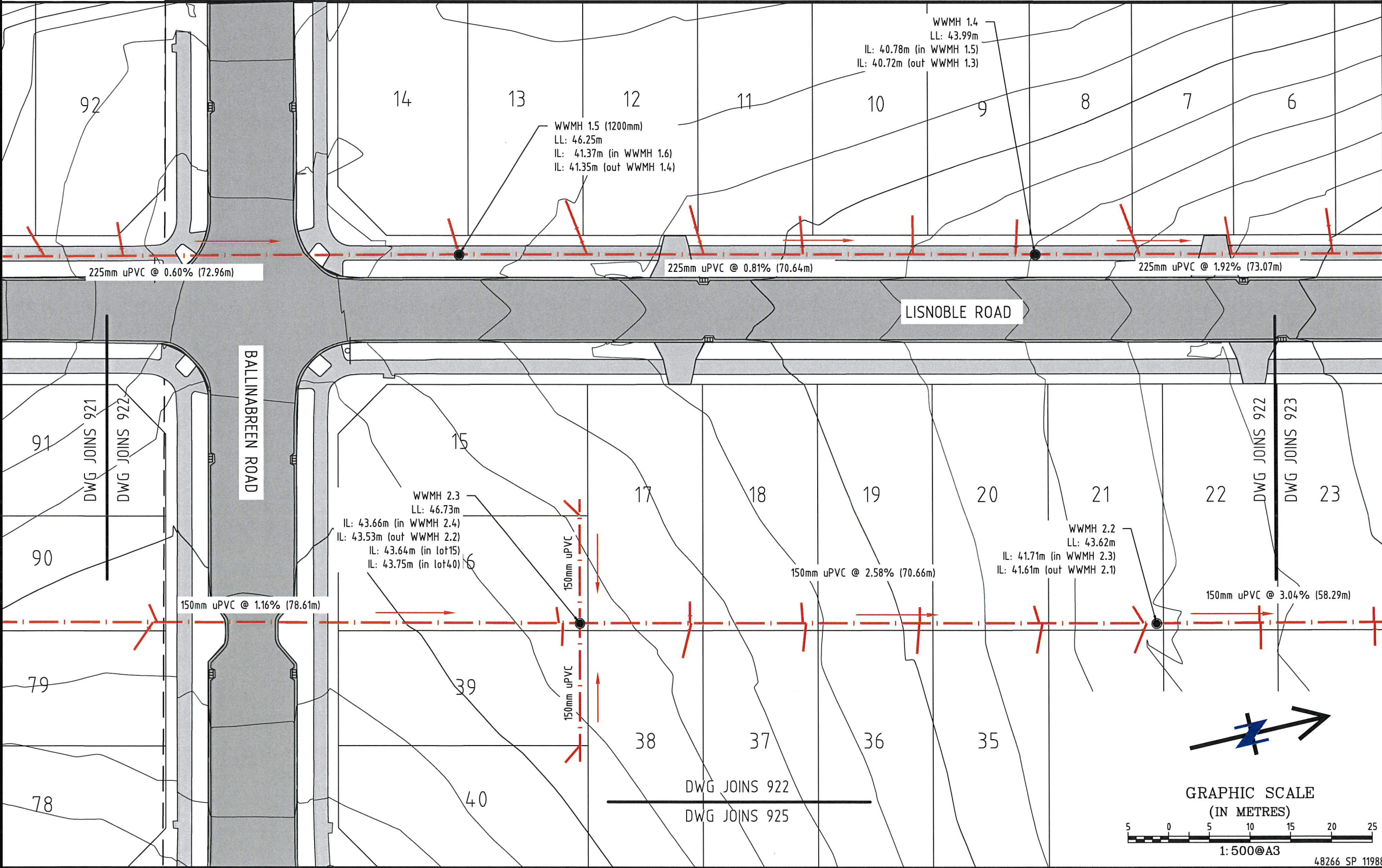
CERTIFICATION

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SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2014  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ

- Notes:
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  3. All pipes are uPVC SN16 unless noted otherwise.
  4. Works constructed by Twomey Construction.
  5. Works carried out April - August 2016.
  6. All private connections are 1.10m below finished ground level to.
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  8. All house connections are 100mmØ uPVC SN16 unless noted otherwise.
  9. All manholes are 1050mmØ unless noted otherwise.
  10. Watercare standard granular bedding under all pipes.



LEGEND

	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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Designed	WM		06/15
Drawn	SK		10/16
Checked			11/16
Approved			11/16



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Environmental Engineering Structural Engineering

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www.doddcivil.co.nz

P.O. Box 72-543  
Auckland NZ  
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admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

SHEET TITLE:  
**WASTE WATER**  
**AS-BUILT PLAN 2 OF 6**

Project Number: **503/02**  
Plan No: **922** Rev: **A**

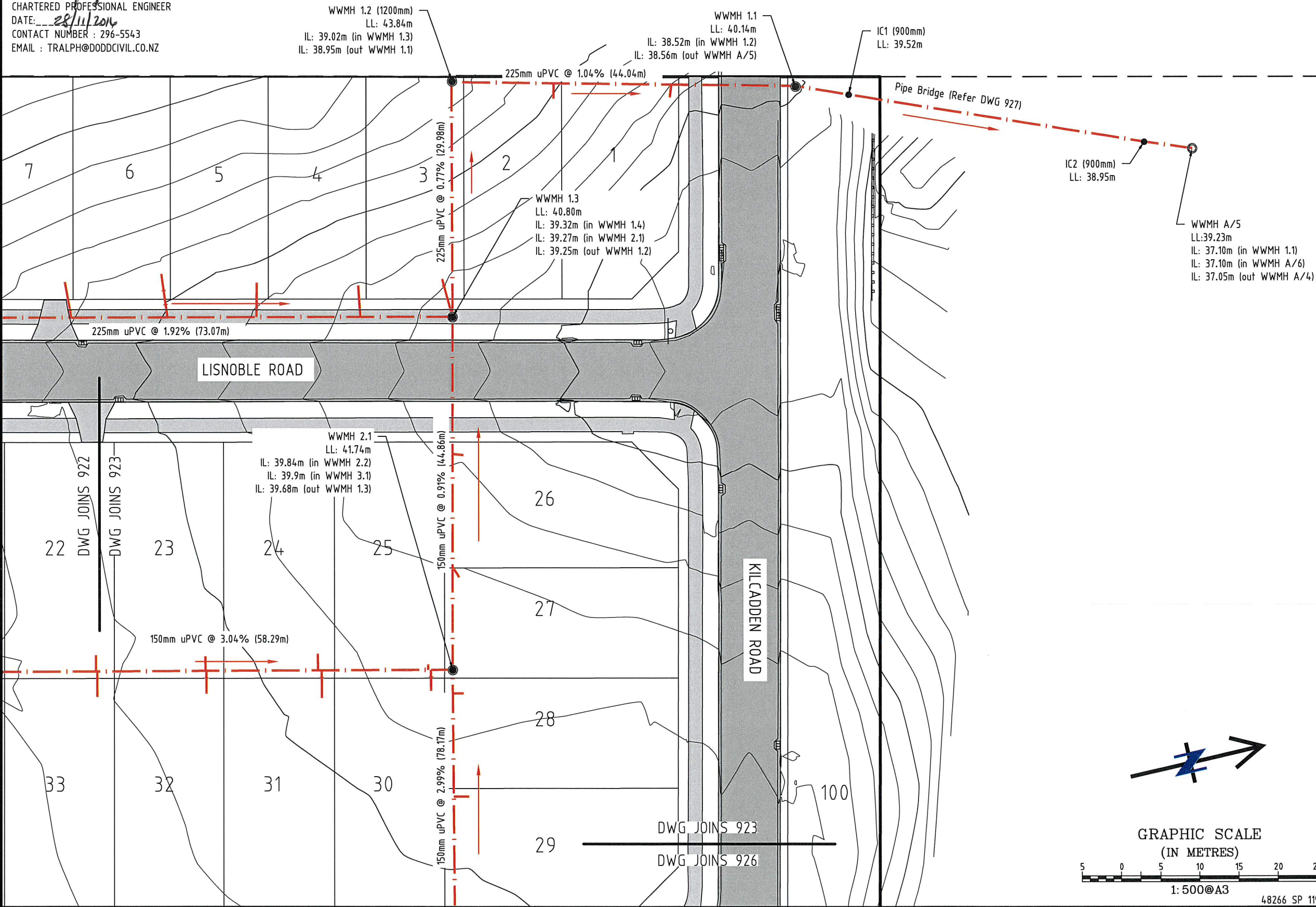


CERTIFICATION

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SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2014  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ



Notes:

- All concrete products manufactured by Hynds.
- Length of pipes shown in brackets.
- All pipes are uPVC SN16 unless noted otherwise.
- Works constructed by Twomey Construction.
- Works carried out April - August 2016.
- All private connections are 1.10m below finished ground level to.
- Constructed in accordance with WaterCare standards.
- All house connections are 100mmØ uPVC SN16 unless noted otherwise.
- All manholes are 1050mmØ unless noted otherwise.
- Watercare standard granular bedding under all pipes.

LEGEND

	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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Checked			11/16
Approved			11/16



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www.doddcivil.co.nz admin@doddcivil.co.nz

PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

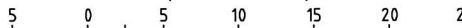
SHEET TITLE:  
**WASTE WATER**  
**AS-BUILT PLAN 3 OF 6**

Project Number: **503/02**

Plan No: **923** Rev: **A**



GRAPHIC SCALE  
(IN METRES)



1: 500@A3


48266 SP 11988

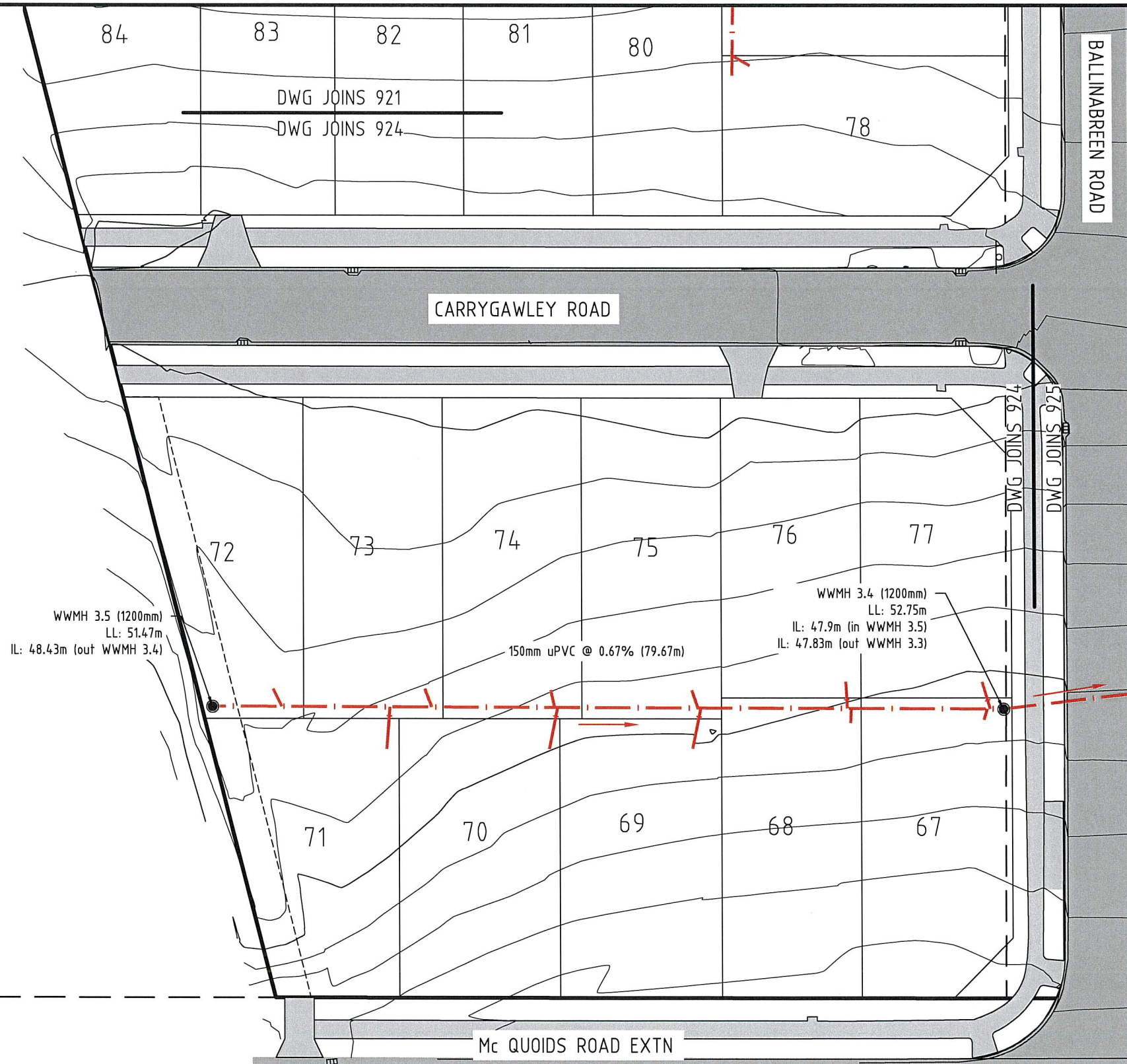


# CERTIFICATION

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SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2014  
CONTACT NUMBER : 296-5543  
EMAIL : TRALPH@DODDCIVIL.CO.NZ



## Notes:

- All concrete products manufactured by Hynds.
- Length of pipes shown in brackets.
- All pipes are uPVC SN16 unless noted otherwise.
- Works constructed by Twomey Construction.
- Works carried out April - August 2016.
- All private connections are 1.10m below finished ground level to.
- Constructed in accordance with WaterCare standards.
- All house connections are 100mmØ uPVC SN16 unless noted otherwise.
- All manholes are 1050mmØ unless noted otherwise.
- Watercare standard granular bedding under all pipes.

## LEGEND

	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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Approved			11/16



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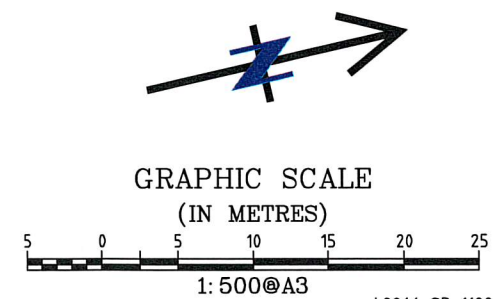
PROJECT NAME:

**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

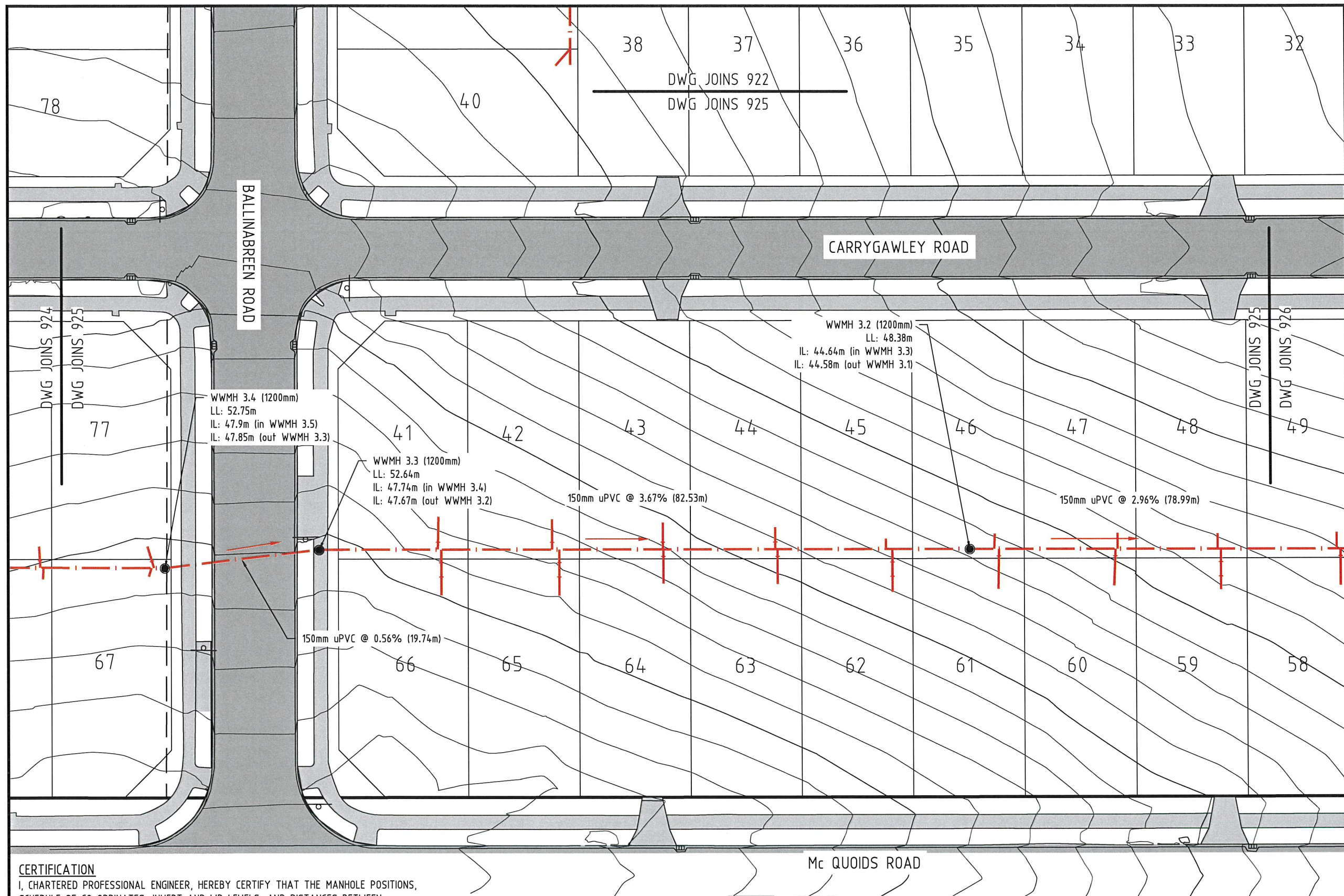
SHEET TITLE:  
**WASTE WATER**  
**AS-BUILT PLAN 4 OF 6**

Project Number: **503/02**

Plan No: **924** Rev: **A**







- Notes:
1. All concrete products manufactured by Hynds.
  2. Length of pipes shown in brackets.
  3. All pipes are uPVC SN16 unless noted otherwise.
  4. Works constructed by Twomey Construction.
  5. Works carried out April - August 2016.
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  7. Constructed in accordance with WaterCare standards.
  8. All house connections are 100mm uPVC SN16 unless noted otherwise.
  9. All manholes are 1050mm unless noted otherwise.
  10. Watercare standard granular bedding under all pipes

LEGEND	
	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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Checked		11/16	
Approved		11/16	



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PROJECT NAME:  
**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

SHEET TITLE:  
**WASTE WATER**  
**AS-BUILT PLAN 5 OF 6**

Project Number: **503/02**

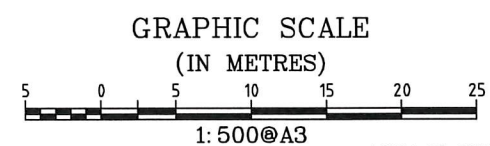
Plan No: **925** Rev: **A**

#### CERTIFICATION

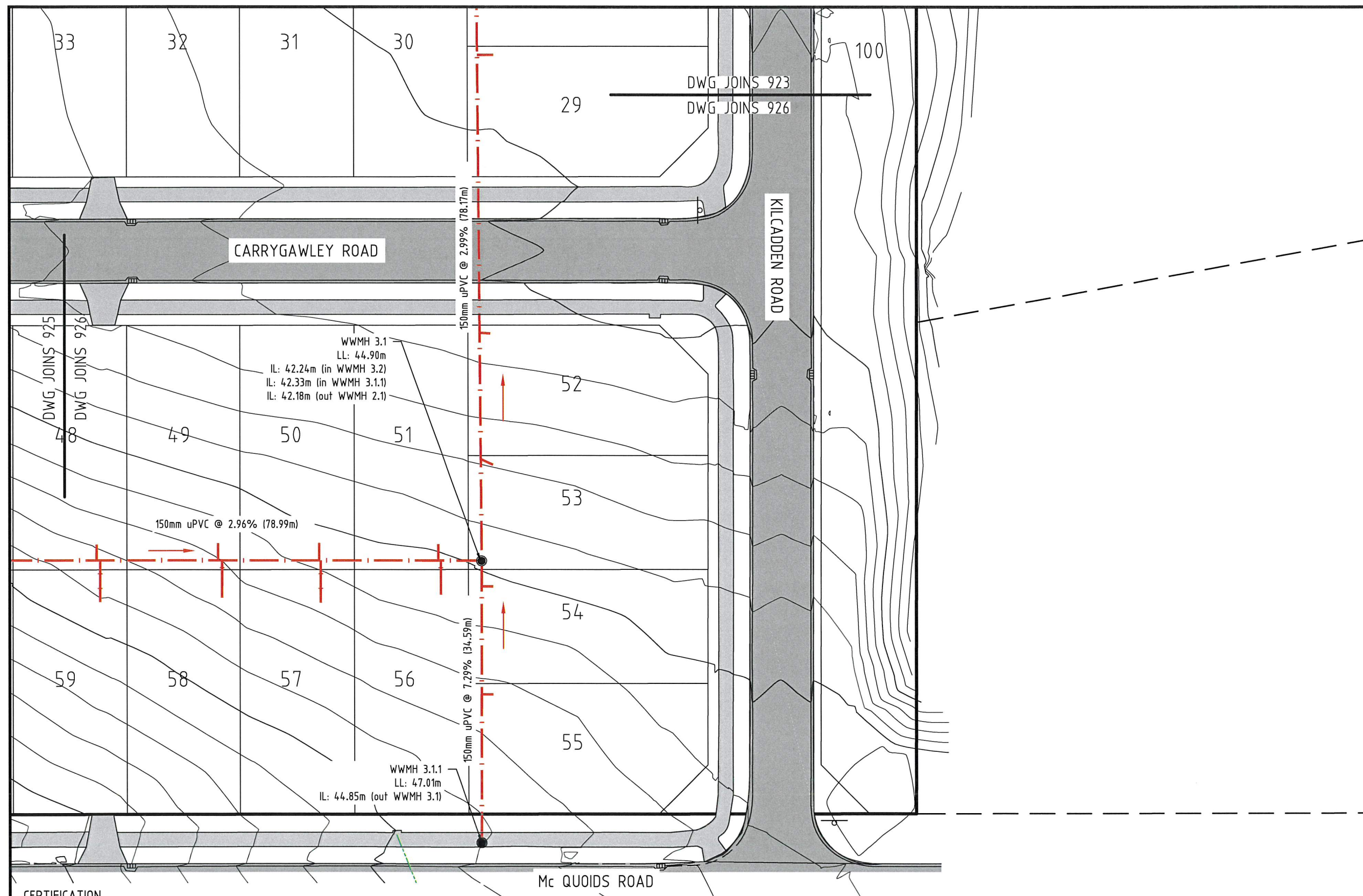
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SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2016  
CONTACT NUMBER: 296-5543  
EMAIL: TRALPH@DODDCIVIL.CO.NZ








#### CERTIFICATION

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SIGNED:   
CHARTERED PROFESSIONAL ENGINEER  
DATE: 28/11/2016  
CONTACT NUMBER: 296-5543  
EMAIL: TRALPH@DODDCIVIL.CO.NZ

#### Notes:

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- Works carried out April - August 2016.
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- Constructed in accordance with WaterCare standards.
- All house connections are 100mm $\varnothing$  uPVC SN16 unless noted otherwise.
- All manholes are 1050mm $\varnothing$  unless noted otherwise.
- Watercare standard granular bedding under all pipes

#### LEGEND

	Ex Bdy
	Ex Abutting Bdy
	Ex Sanitary Sewer
	AB Sanitary Sewer
	Ex/AB Manhole

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Checked			10/16
Approved			11/16



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www.doddcivil.co.nz admin@doddcivil.co.nz

#### PROJECT NAME:

**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

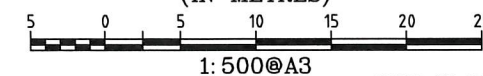
#### SHEET TITLE:

**WASTE WATER**  
**AS-BUILT PLAN 6 OF 6**

Project Number: **503/02**

Plan No: **926** Rev: **A**

GRAPHIC SCALE  
(IN METRES)



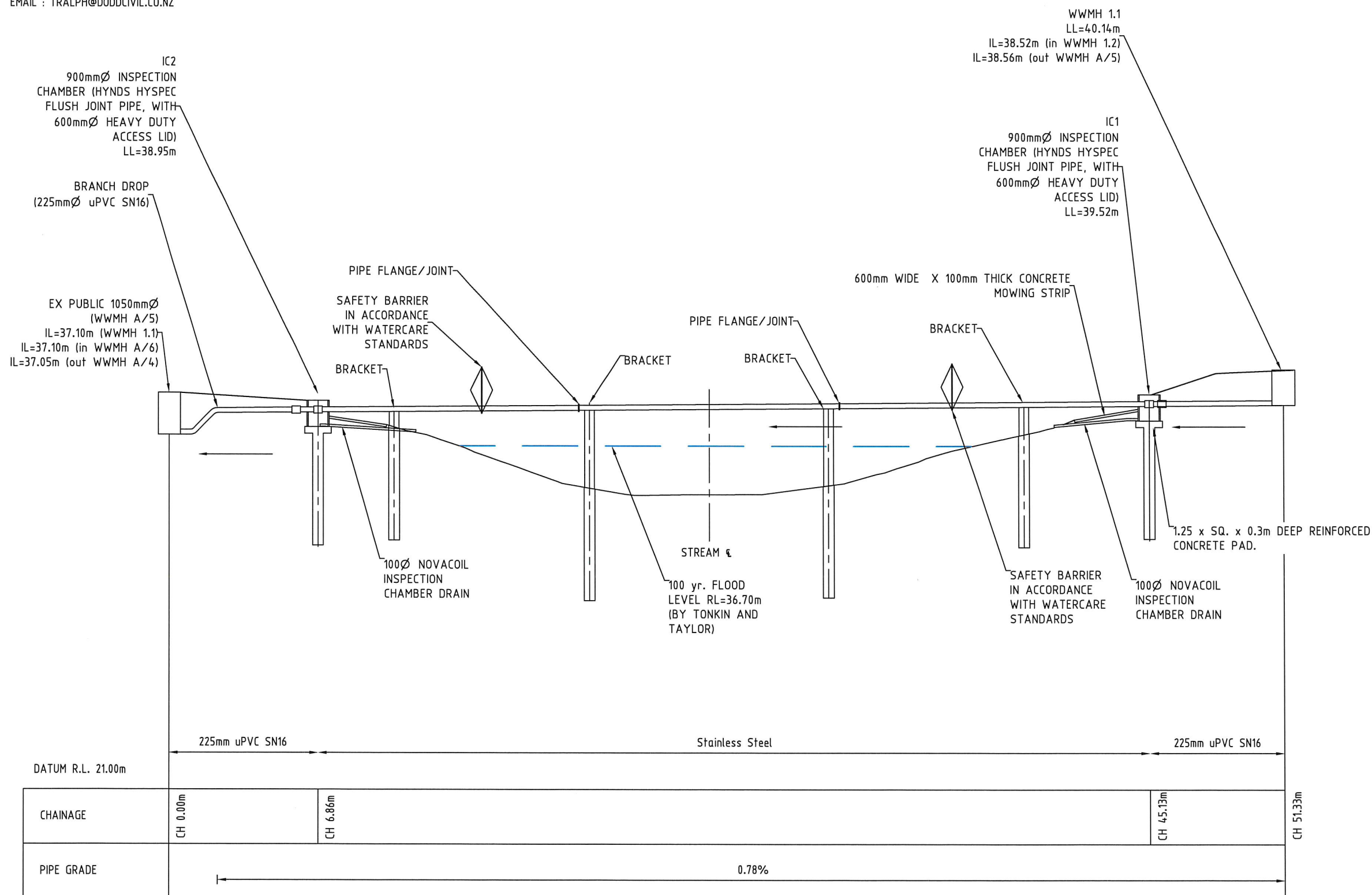
48266 SP 11988



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SIGNED: Tralph  
 CHARTERED PROFESSIONAL ENGINEER  
 DATE: 23/11/2016  
 CONTACT NUMBER : 296-5543  
 EMAIL : TRALPH@DODDCIVIL.CO.NZ





PIPE BRIDGE AS-BUILT  
SCALE 1:200@A3

1. All concrete products manufactured by Hynds.
2. Length of pipes shown in brackets.
3. All uPVC pipes are uPVC SN16 unless noted otherwise.
4. All Stainless Steel Pipes are 219.18mmØ O.D.
5. Works carried out by Twomey Construction.
6. Works conducted in June 2016.
7. Constructed in accordance with WaterCare standards.
8. All manholes are 1050mmØ unless noted otherwise.
9. Refer to As-built Plan 923 for location details.
10. Watercare standard granular bedding under all pipes

### LEGEND

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Approved			11/16



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**www.doddcivil.co.nz**

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PROJECT NAME:

**CONVOY PARK**  
**23 & 45 McQUOIDS ROAD**  
**FLAT BUSH, AUCKLAND**  
FOR  
**HUGH GREEN GROUP**

**SHEET TITLE:**  
**SANITARY SEWER  
PIPE BRIDGE AS-BUILT PLAN**

File Name: 503-02

Plan No: **927** Rev: **-**

# Appendix 2

## Classification Test Data

# CLASSIFICATION TEST RESULTS

Test Methods: NZS 4402:1986 Tests 2.1, 2.2, 2.3, 2.4, 2.6



Tests / comments indicated \* are outside the scope of the laboratory's accreditation

James McKelvey Approved Signatory

JOB NO	GENZETAM01144AA
PROJECT	J00092 - McQuoids Road Flat Bush
CLIENT	Lander Geotechnical Consultants Limited
LOT NO	Lot 58
DEPTH	0.5 - 1.0 m

LAB SAMPLE ID

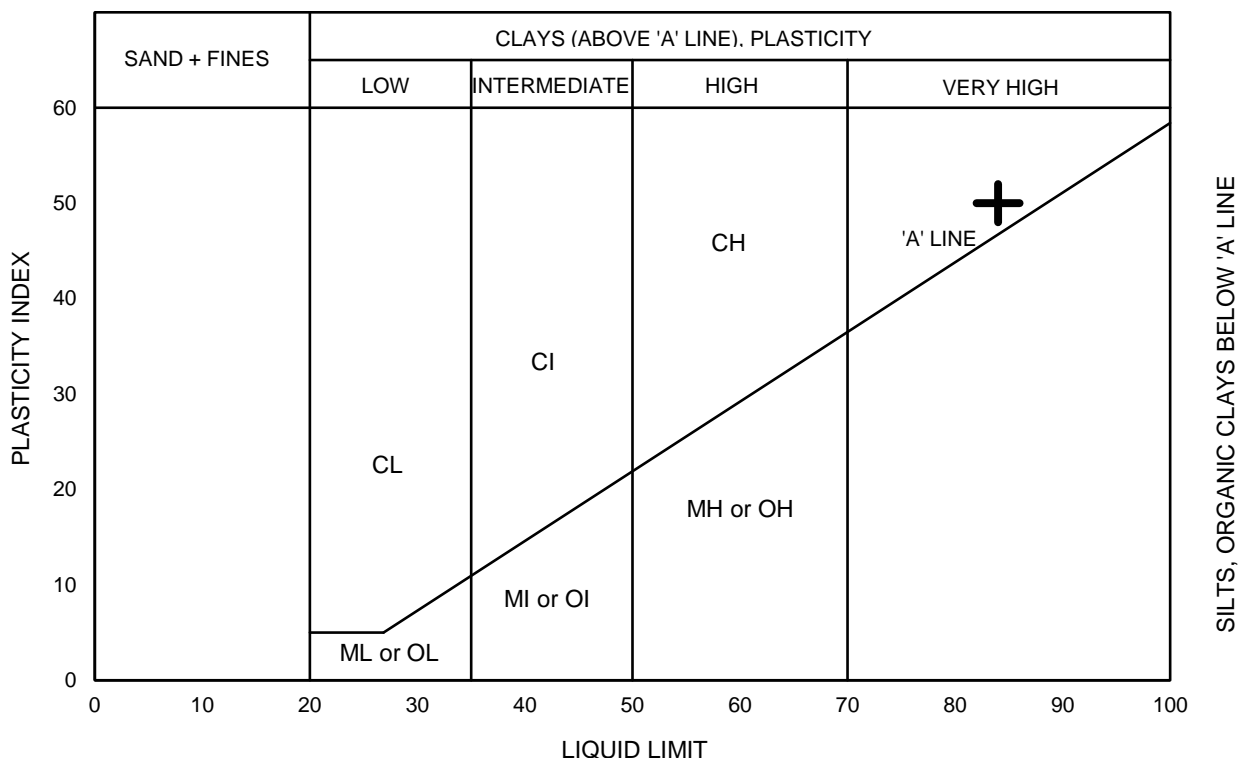
ETAM16S-06376

Prepared from 'As Received' Natural Water Content of 38.0 %

Tests on fraction passing 0.425mm sieve

Liquid Limit	84
Plastic Limit	34
Plasticity Index	50
*Liquidity Index (w-PL)/PI	0.1
Linear Shrinkage	19

CASAGRANDE PLASTICITY CHART



**Coffey Services (NZ) Limited (Lab - East Tamaki)**  
 144A Cryers Road, East Tamaki, Auckland NZ 2013  
 PO Box 58877, Botany, Manukau NZ 2163  
 Phone: +64 9 272 3375, Fax: +64 9 272 3378  
[www.coffey.com](http://www.coffey.com)

DATE 1.8.16

CHECKED JM



# CLASSIFICATION TEST RESULTS

Test Methods: NZS 4402:1986 Tests 2.1, 2.2, 2.3, 2.4, 2.6



Tests / comments indicated \* are outside the scope of the laboratory's accreditation

James McKelvey Approved Signatory

JOB NO

GENZETAM01144AA

PROJECT

J00092 - McQuoids Road

Flat Bush

CLIENT

Lander Geotechnical Consultants Limited

LOT NO

Lot 26

DEPTH

0.5 - 1.0 m

LAB SAMPLE ID

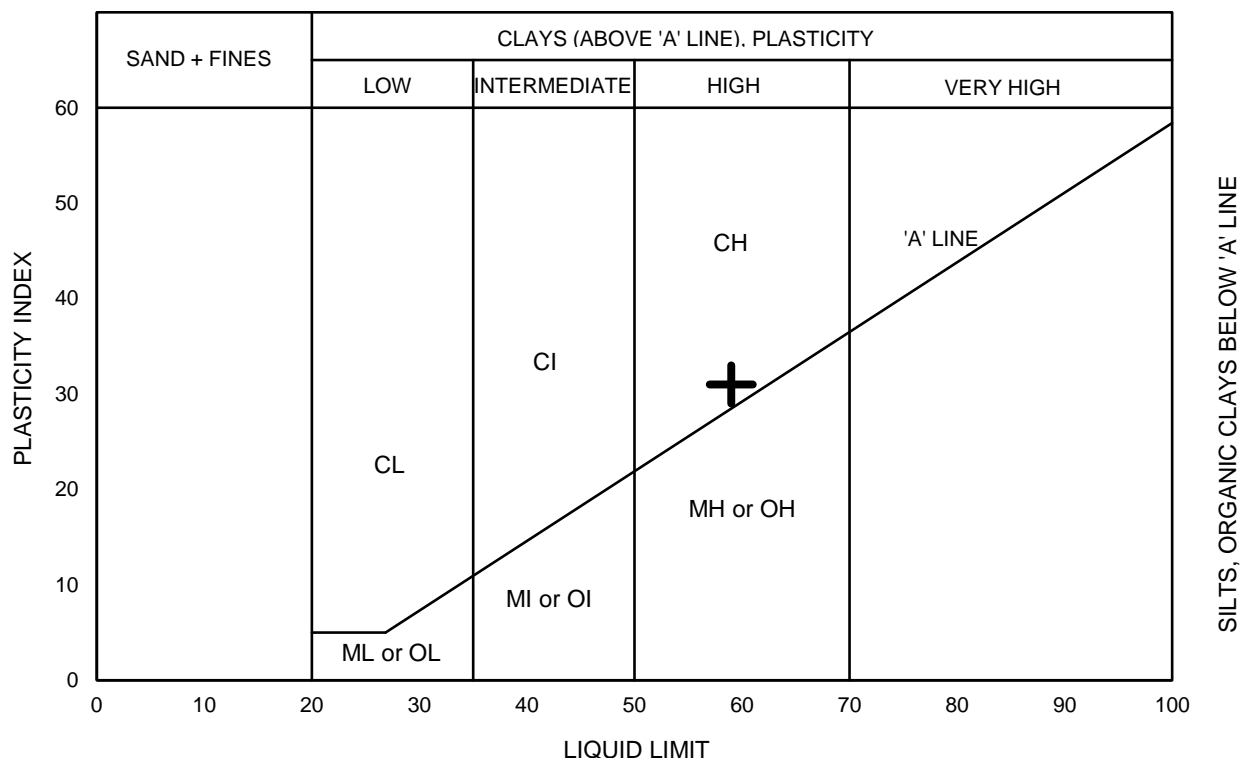
ETAM16S-06377

Prepared from 'As Received' Natural Water Content of 31.4 %

Tests on fraction passing 0.425mm sieve

Liquid Limit	59
Plastic Limit	28
Plasticity Index	31
*Liquidity Index (w-PL)/PI	0.1
Linear Shrinkage	15

CASAGRANDE PLASTICITY CHART



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 PO Box 58877, Botany, Manukau NZ 2163  
 Phone: +64 9 272 3375, Fax: +64 9 272 3378  
 www.coffey.com

DATE 1.8.16

CHECKED JM

# CLASSIFICATION TEST RESULTS

Test Methods: NZS 4402:1986 Tests 2.1, 2.2, 2.3, 2.4, 2.6



Tests / comments indicated \* are outside the scope of the laboratory's accreditation

James McKelvey Approved Signatory

JOB NO	GENZETAM01144AA
PROJECT	J00092 - McQuoids Road
	Flat Bush
CLIENT	Lander Geotechnical Consultants Limited
BOREHOLE NO	HA21
DEPTH	0.5 - 1.0 m

LAB SAMPLE ID

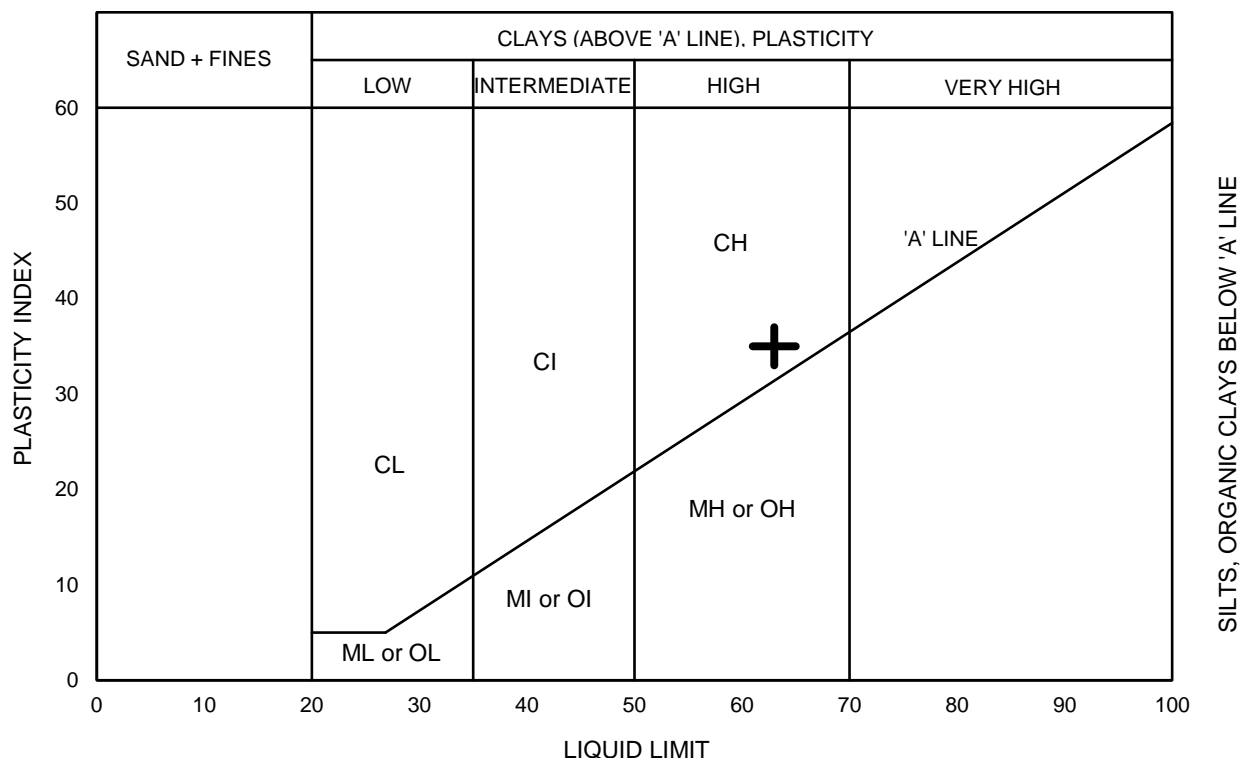
ETAM16S-06378

Prepared from 'As Received' Natural Water Content of 34.2 %

Tests on fraction passing 0.425mm sieve

Liquid Limit	63
Plastic Limit	28
Plasticity Index	35
*Liquidity Index (w-PL)/PI	0.2
Linear Shrinkage	15

CASAGRANDE PLASTICITY CHART



**Coffey Services (NZ) Limited (Lab - East Tamaki)**  
 144A Cryers Road, East Tamaki, Auckland NZ 2013  
 PO Box 58877, Botany, Manukau NZ 2163  
 Phone: +64 9 272 3375, Fax: +64 9 272 3378  
 www.coffey.com

DATE 1.8.16

CHECKED JM

# CLASSIFICATION TEST RESULTS

Test Methods: NZS 4402:1986 Tests 2.1, 2.2, 2.3, 2.4, 2.6



Tests / comments indicated \* are outside the scope of the laboratory's accreditation

James McKelvey Approved Signatory

JOB NO GENZETAM01144AA  
PROJECT J00092 - McQuoids Road  
Flat Bush  
CLIENT Lander Geotechnical Consultants Limited  
BOREHOLE NO HA24  
DEPTH 0.5 - 1.0 m

LAB SAMPLE ID

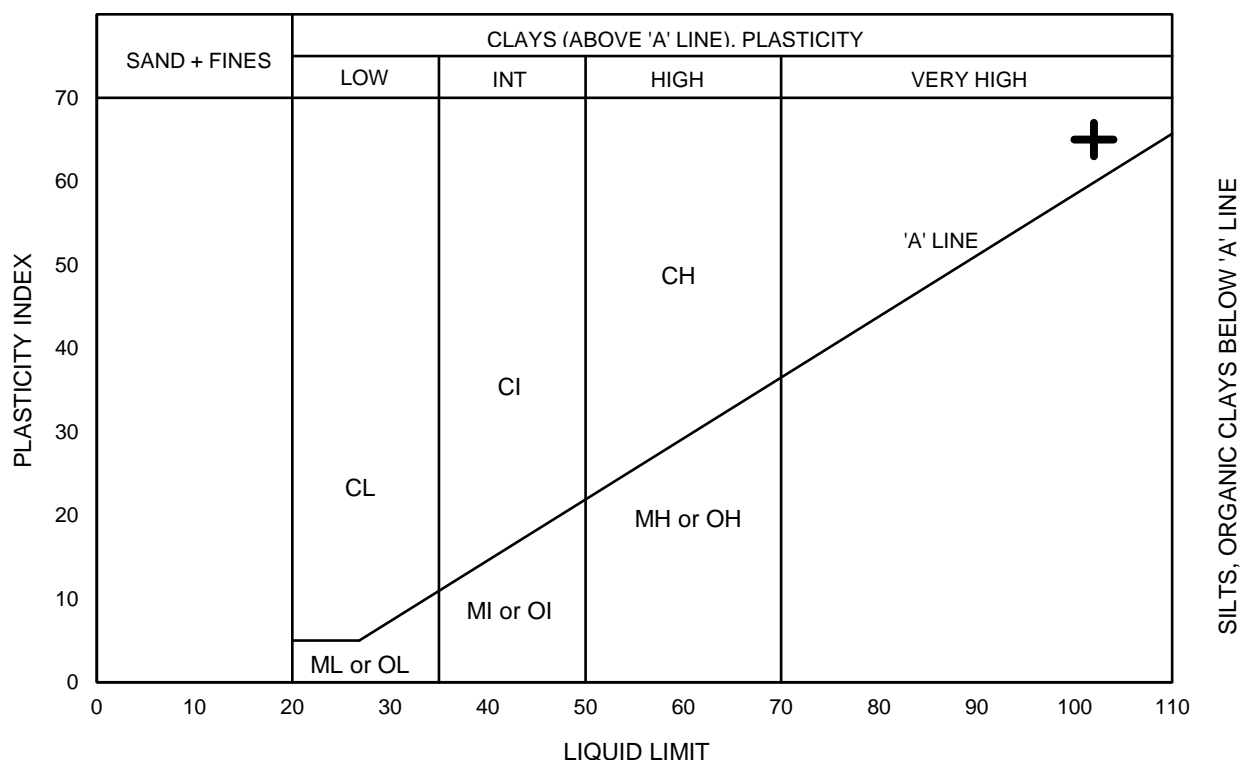
ETAM16S-06379

Prepared from 'As Received' Natural Water Content of 37.2 %

Tests on fraction passing 0.425mm sieve

Liquid Limit 102  
Plastic Limit 37  
Plasticity Index 65  
\*Liquidity Index (w-PL)/PI 0.0  
Linear Shrinkage 21

CASAGRANDE PLASTICITY CHART



**Coffey Services (NZ) Limited (Lab - East Tamaki)**  
144A Cryers Road, East Tamaki, Auckland NZ 2013  
PO Box 58877, Botany, Manukau NZ 2163  
Phone: +64 9 272 3375, Fax: +64 9 272 3378  
www.coffey.com

DATE 1.8.16

CHECKED JM

# Appendix 3

## Field Density Test Summary Sheets

## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** -

**c.c. to:** Dustin Tookey

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: Eric Paton (Laboratory Manager)

Approved Signatory Signature: *E. Paton*

Date of Issue: 20/03/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
8/03/2016	ETAM16W00691	AB	1	1.99	26.4	1.58	2.7	0.0	205	150	UTP	UTP	Pond backfill	1771748	5905707	-	Clay	~1.5m below FL
8/03/2016	ETAM16W00691	AB	2	1.83	33.0	1.37	2.7	3.9	UTP	UTP	UTP	UTP	Pond backfill	1771736	5905726	-	Clay	~2.0m below FL
8/03/2016	ETAM16W00691	AB	3	1.81	37.1	1.32	2.7	2.3	142	146	154	178	Pond wall batter	1771730	5905749	-	Clay	FL
8/03/2016	ETAM16W00691	AB	4	1.86	37.3	1.36	2.7	0.0	216+	216+	216+	216+	Pond wall batter	1771720	5905757	-	Clay	FL
15/03/2016	ETAM16W00846	AB	5	1.83	29.8	1.41	2.7	5.8	UTP	UTP	UTP	UTP	Gully	1771770	5905656	~39	Silty CLAY	
15/03/2016	ETAM16W00846	AB	6	1.71	51.3	1.13	2.7	0.0	183	200	UTP	UTP	Gully	1771777	5905638	~39	Silty CLAY	
17/03/2015	ETAM16W00847	AB	7	1.74	49.5	1.17	2.7	0.0	162	200	192	170	Gully	1771762	5905654	~40	Clay	
17/03/2015	ETAM16W00847	AB	8	1.67	50.3	1.11	2.7	3.0	150	165	216+	216+	Gully	1771771	5905635	~39.5	Clay	
17/03/2015	ETAM16W00847	AB	9	1.79	48.8	1.20	2.7	0.0	154	200	178	183	Gully	1771773	5905617	~40.5	Clay	
17/03/2015	ETAM16W00847	AB	10	1.85	30.3	1.42	2.7	4.6	UTP	UTP	UTP	UTP	Gully	1771786	5905658	~40	Clay	

# SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

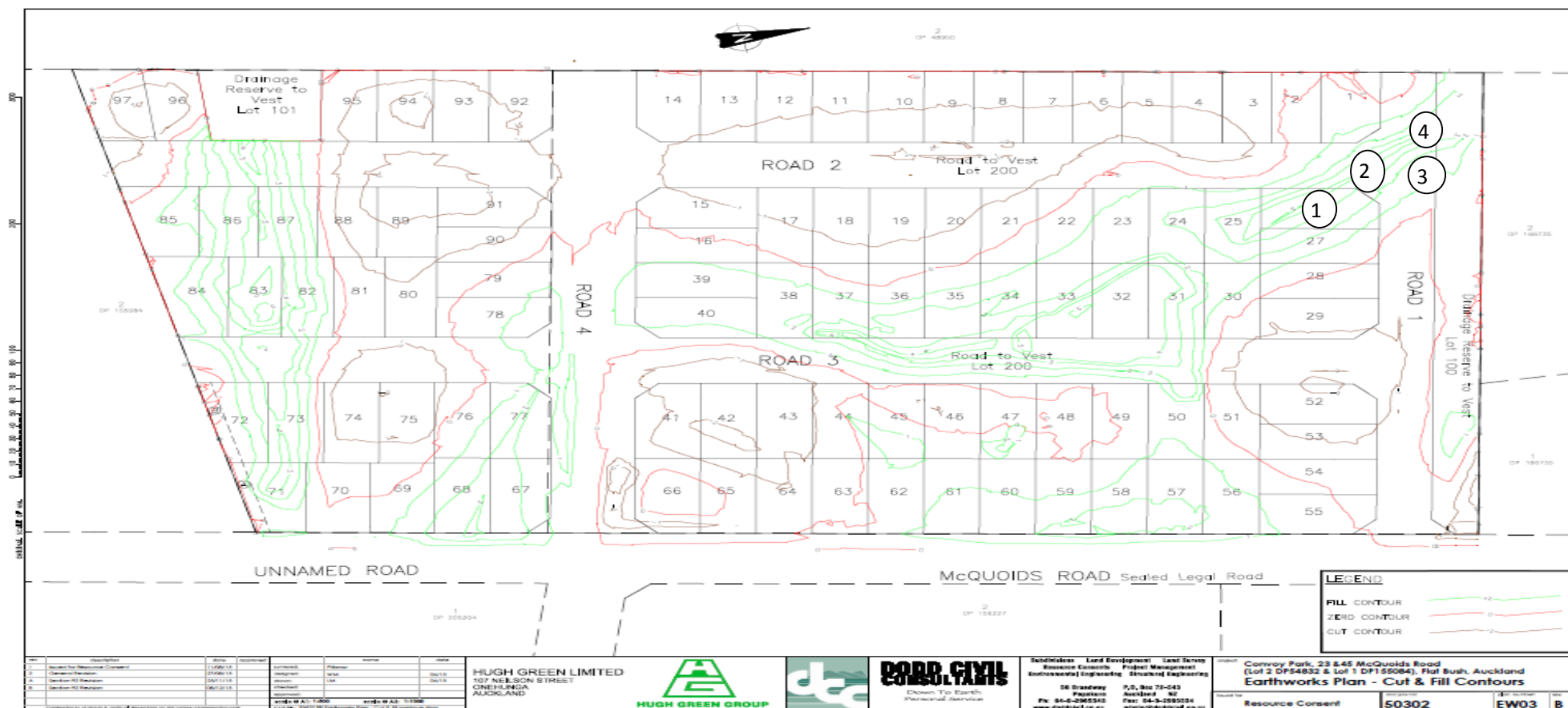
**Work Order No:** ETAM16W00691

**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Flat Bush

**Tested by:** AB  
**Date tested:** 8/03/2016



# SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W00846

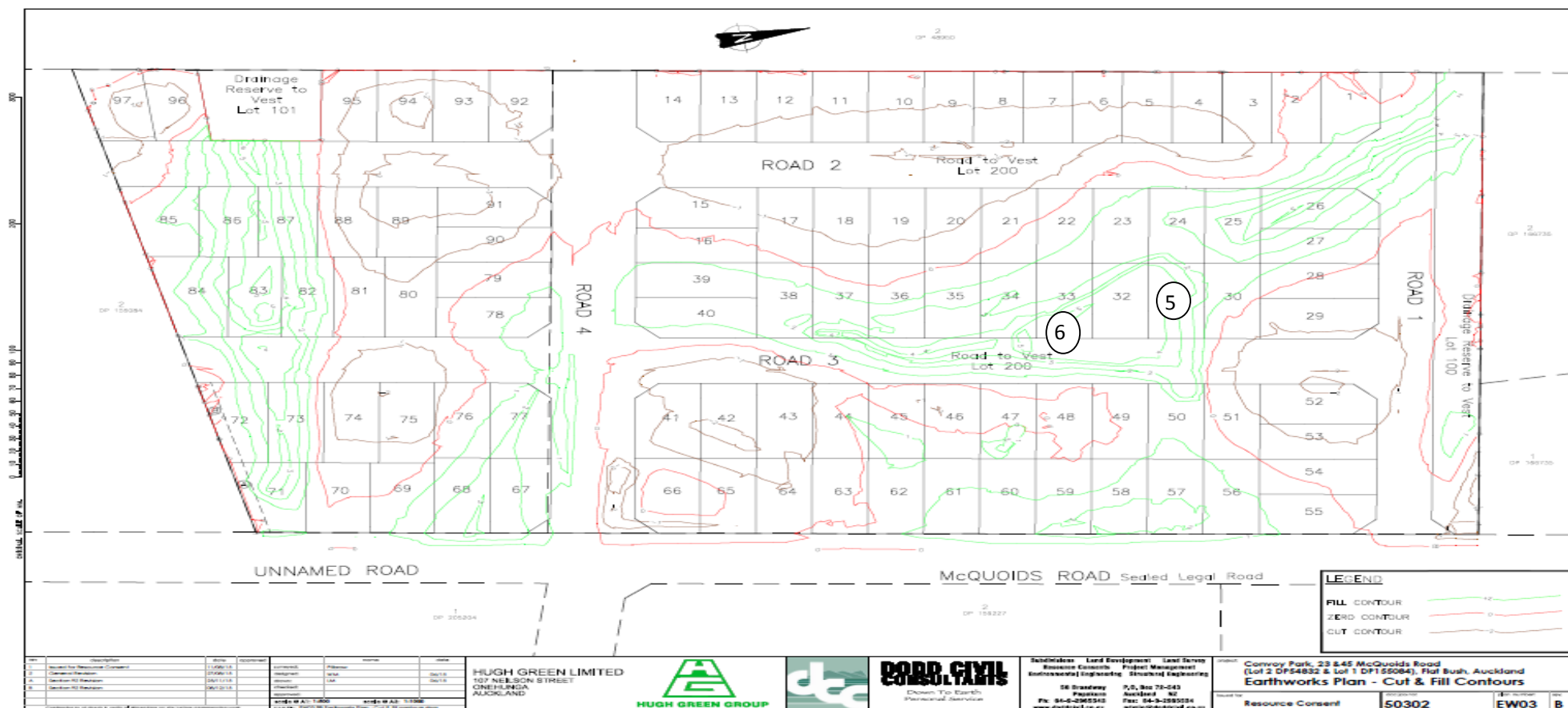
Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Flat Bush

Tested by: AB

Date tested: 15/03/2016



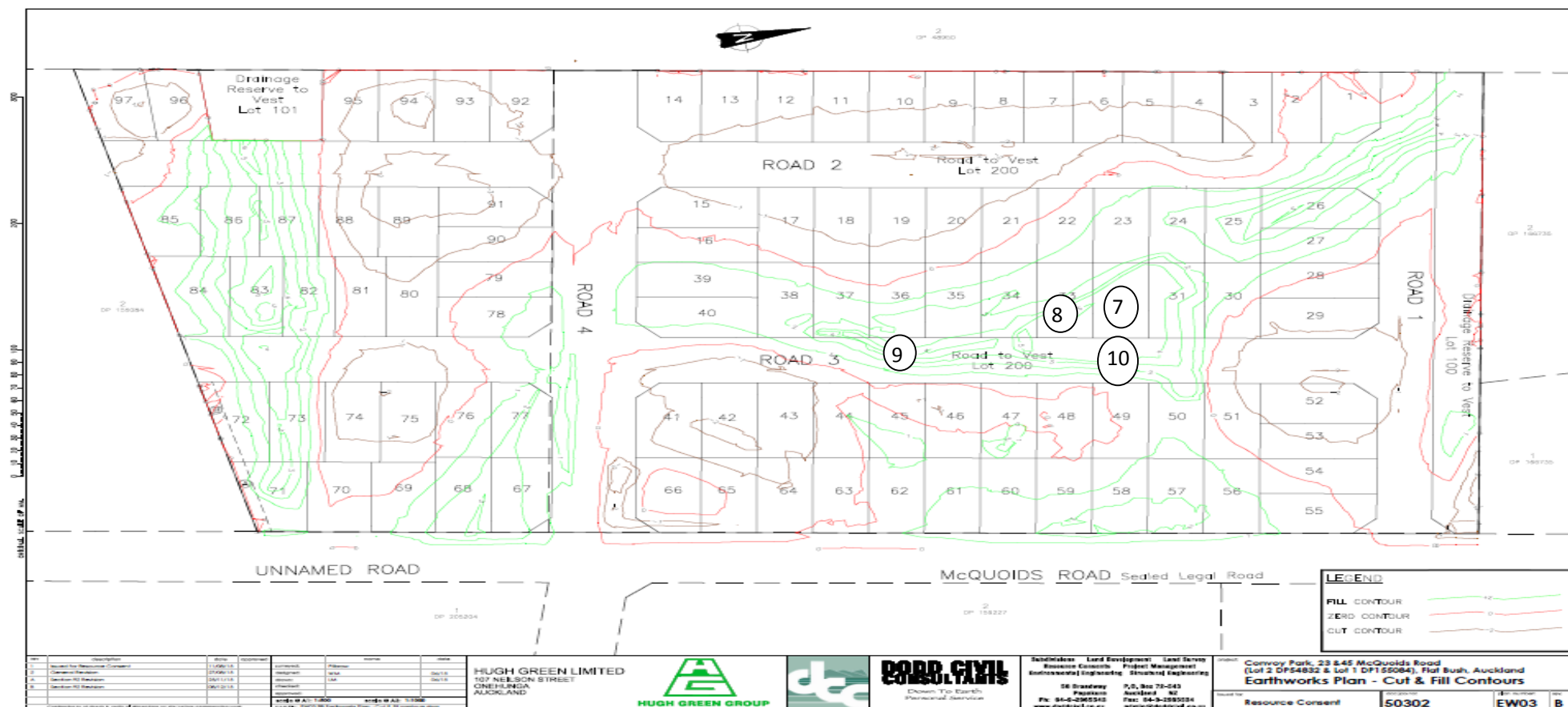
**Project No: GENZETAM01144AA**

Work Order No: ETAM16W00847

Page: 2 of 2

Tested by: AB

Date tested: 17/03/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: Eric Paton (Laboratory Manager)

Approved Signatory Signature: *E. Paton*

Date of Issue: 29/03/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
21/03/2016	ETAM16W00925	AB	11	1.82	44.1	1.27	2.7	0.0	162	158	162	187	Gully	1771790	5905636	40.50	Clay	
21/03/2016	ETAM16W00925	AB	12	1.81	32.0	1.37	2.7	5.6	142	150	146	142	Gully	1771783	5905613	41.00	Clay	
22/03/2016	ETAM16W00935	AB	13	1.79	39.4	1.28	2.7	2.0	148	154	162	178	Gully	1771755	5905657	41.00	Clay	
22/03/2016	ETAM16W00935	AB	14	1.80	38.3	1.30	2.7	1.8	178	187	192	174	Gully	1771701	5905447	-	Clay	~1.0m from base of fill

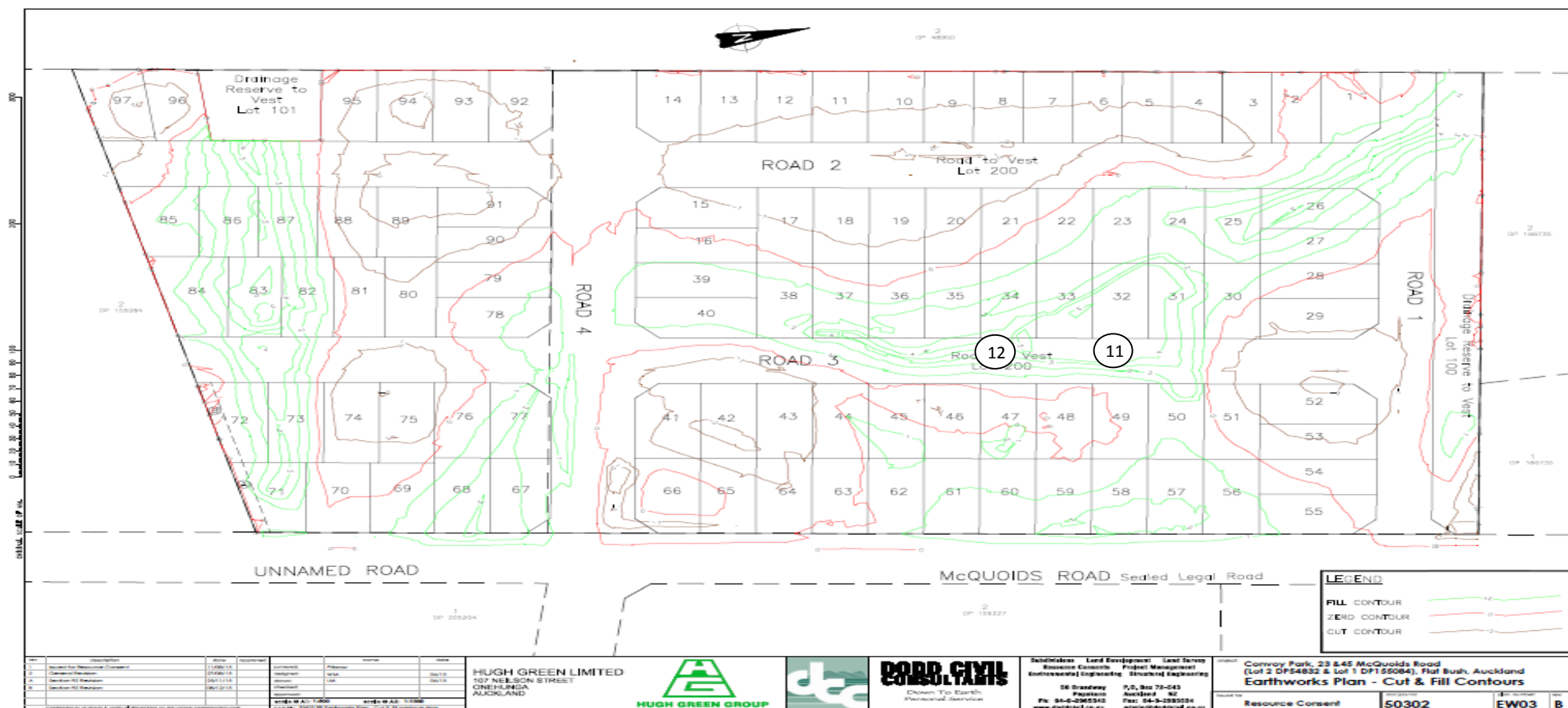
**Project No: GENZETAM01144AA**

Work Order No: ETAM16W00925

Page: 2 of 2

Tested by: AB

Date tested: 21/03/2016



## SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W00935

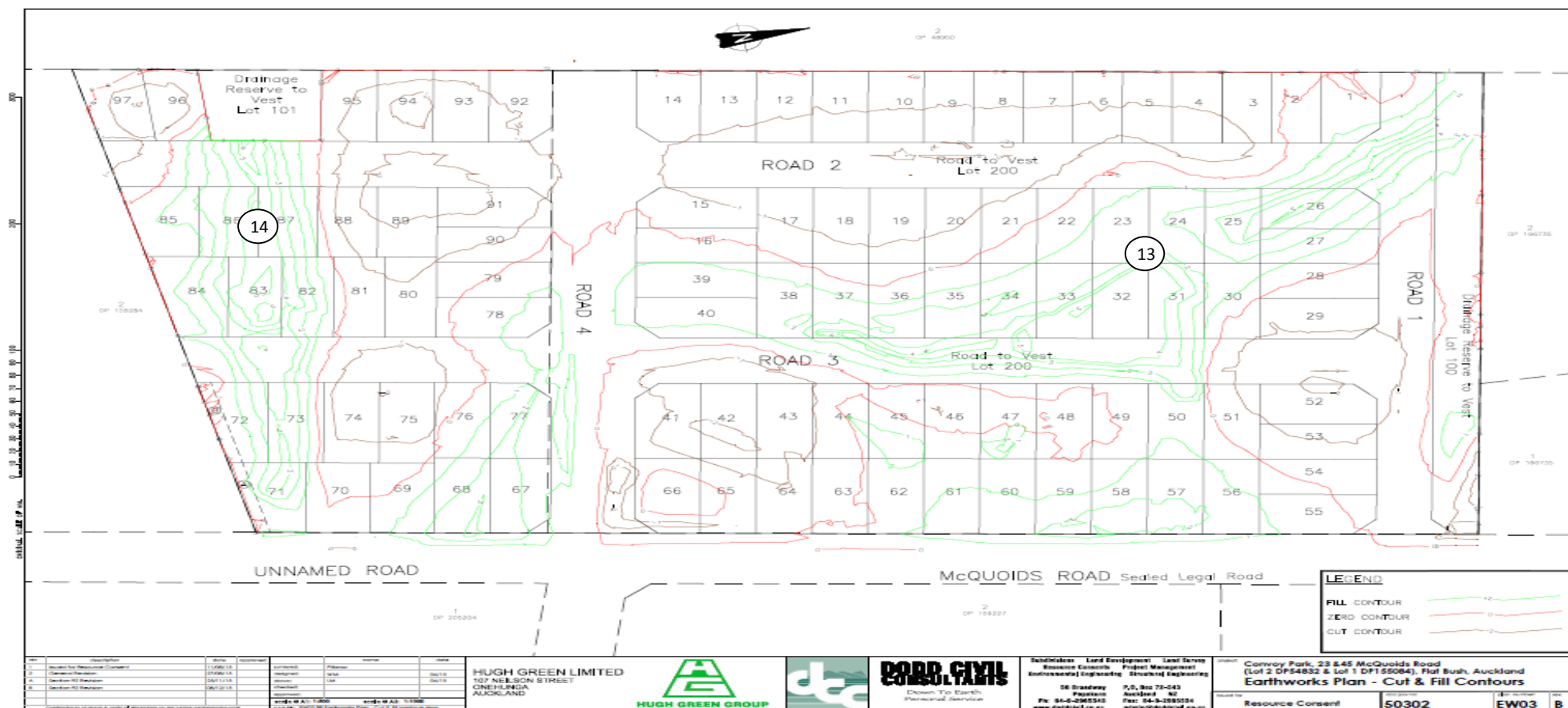
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

**Tested by:** AB

**Date tested:** 22/03/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** Shane Lander

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: Eric Paton (Laboratory Manager)

Approved Signatory Signature: *E. Paton*

Date of Issue: 8/04/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
29/03/2016	ETAM16W00977	AB	15	1.91	44.2	1.32	2.7	0.0	154	165	214	216+	Gully	1771788	5905640	-	Clay	~1.0m to FL
29/03/2016	ETAM16W00977	AB	16	1.91	23.9	1.54	2.7	6.2	162	162	178	165	Gully	1771747	5905515	-	Clay	~1.0m from base of fill
30/03/2016	ETAM16W00997	AB	17	1.70	43.4	1.19	2.7	4.5	146	150	158	150	Gully	1771760	5905581	-	Clay	~2.0m to FL
30/03/2016	ETAM16W00997	AB	18	1.82	34.4	1.35	2.7	3.3	142	154	146	146	Gully	1771744	5905560	-	Clay	~2.0m to FL
31/03/2016	ETAM16W01009	AB	19	1.93	36.4	1.41	2.7	0.0	UTP	UTP	UTP	UTP	Gully	1771782	5905483	-	Clay	~1.5m to FL
31/03/2016	ETAM16W01009	AB	20	1.93	29.6	1.49	2.7	0.6	UTP	UTP	UTP	UTP	Gully	1771804	5905478	-	Clay	~2.0m to FL

# SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W00977

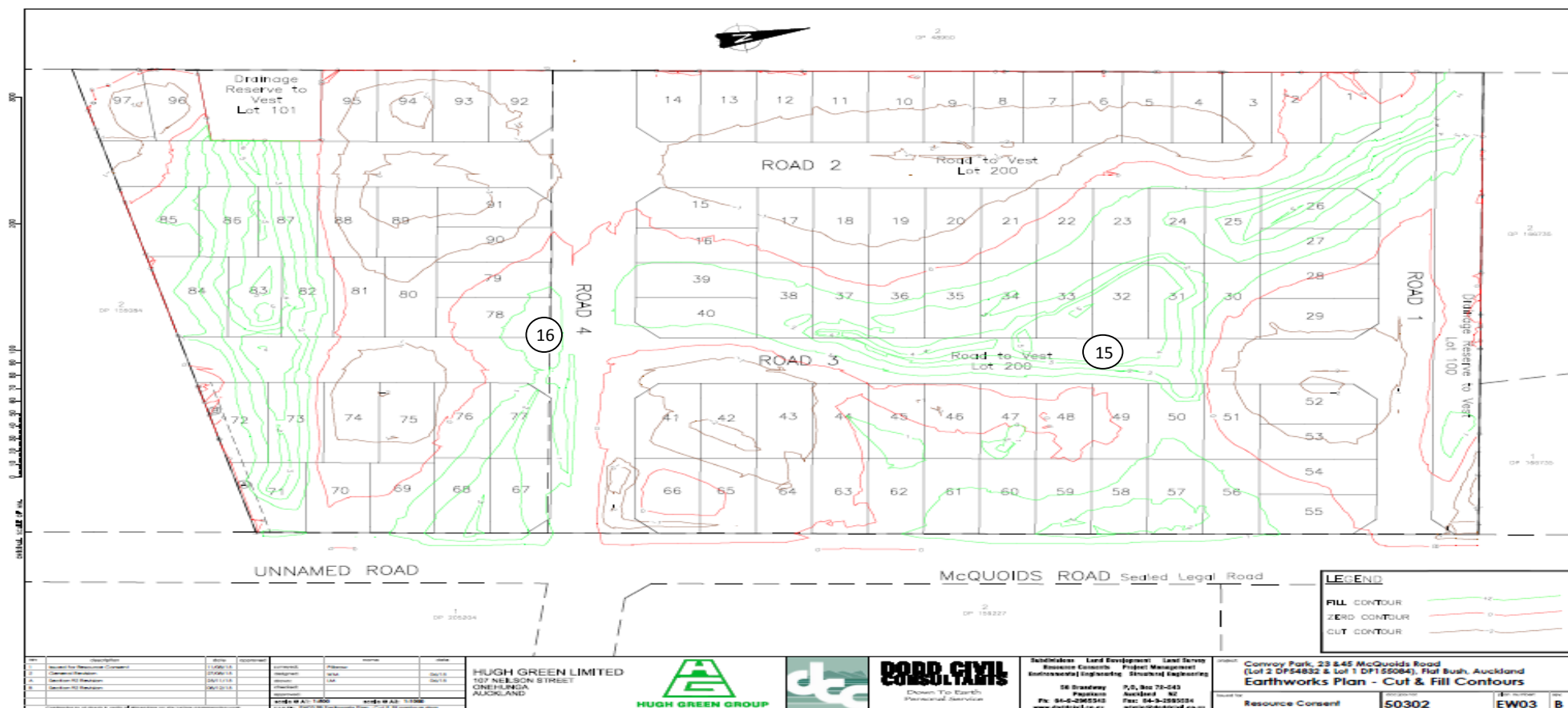
Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

Tested by: AB

Date tested: 29/03/2016



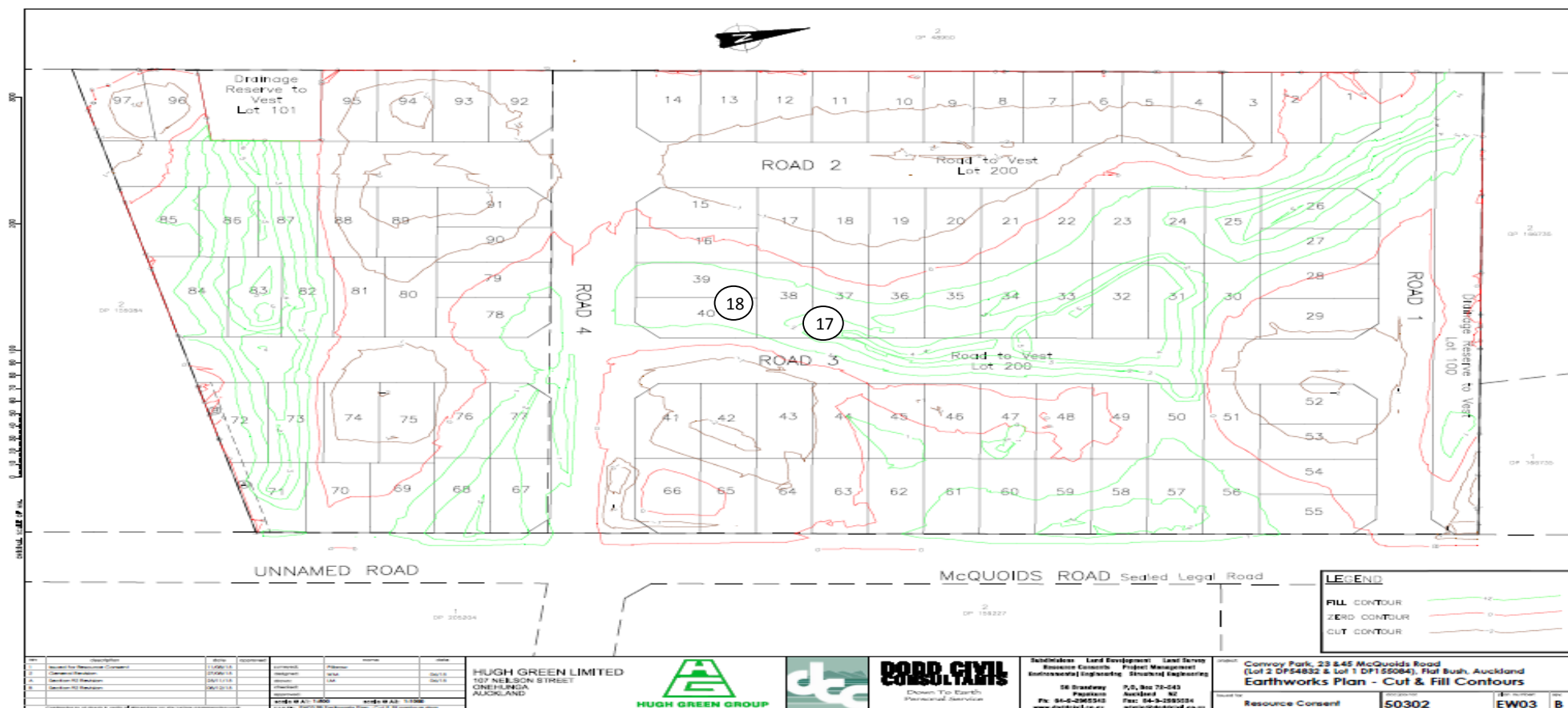
**Project No: GENZETAM01144AA**

Work Order No: ETAM16W00997

Page: 2 of 2

Tested by: AB

Date tested: 30/03/2016





# SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W01009

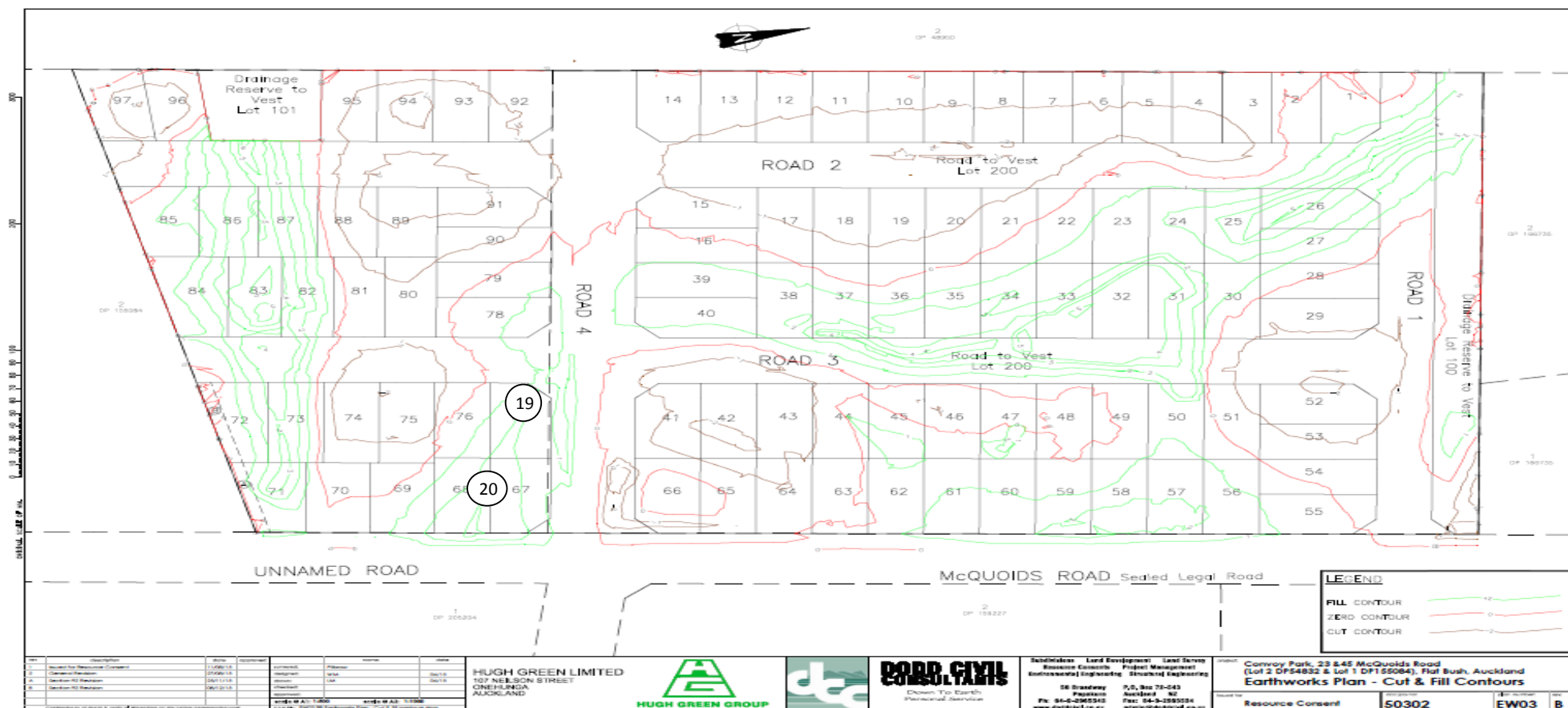
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

**Tested by:** AB

**Date tested:** 31/03/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** Shane Lander

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: Eric Paton (Laboratory Manager)

Approved Signatory Signature: *E. Paton*

Date of Issue: 16/04/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
5/04/2016	ETAM16W01085	AB	21	2.01	18.9	1.69	2.7	5.4	UTP	UTP	UTP	UTP	Gully	1771764	5905501	-	Clayey SILT	0.8m to subgrade
5/04/2016	ETAM16W01085	AB	22	1.78	34.5	1.33	2.7	5.2	146	170	158	165	Gully	1771734	5905442	-	Clayey SILT	1.0m from base of fill
7/04/2016	ETAM16W01154	AB	23	1.82	36.8	1.33	2.7	1.5	UTP	UTP	UTP	UTP	Gully	1771726	5905440	-	Clay	2.5m below FL
7/04/2016	ETAM16W01154	AB	24	1.83	30.5	1.40	2.7	5.4	UTP	UTP	UTP	UTP	Gully	1771754	5905433	-	Clay	3.0m below FL



# SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

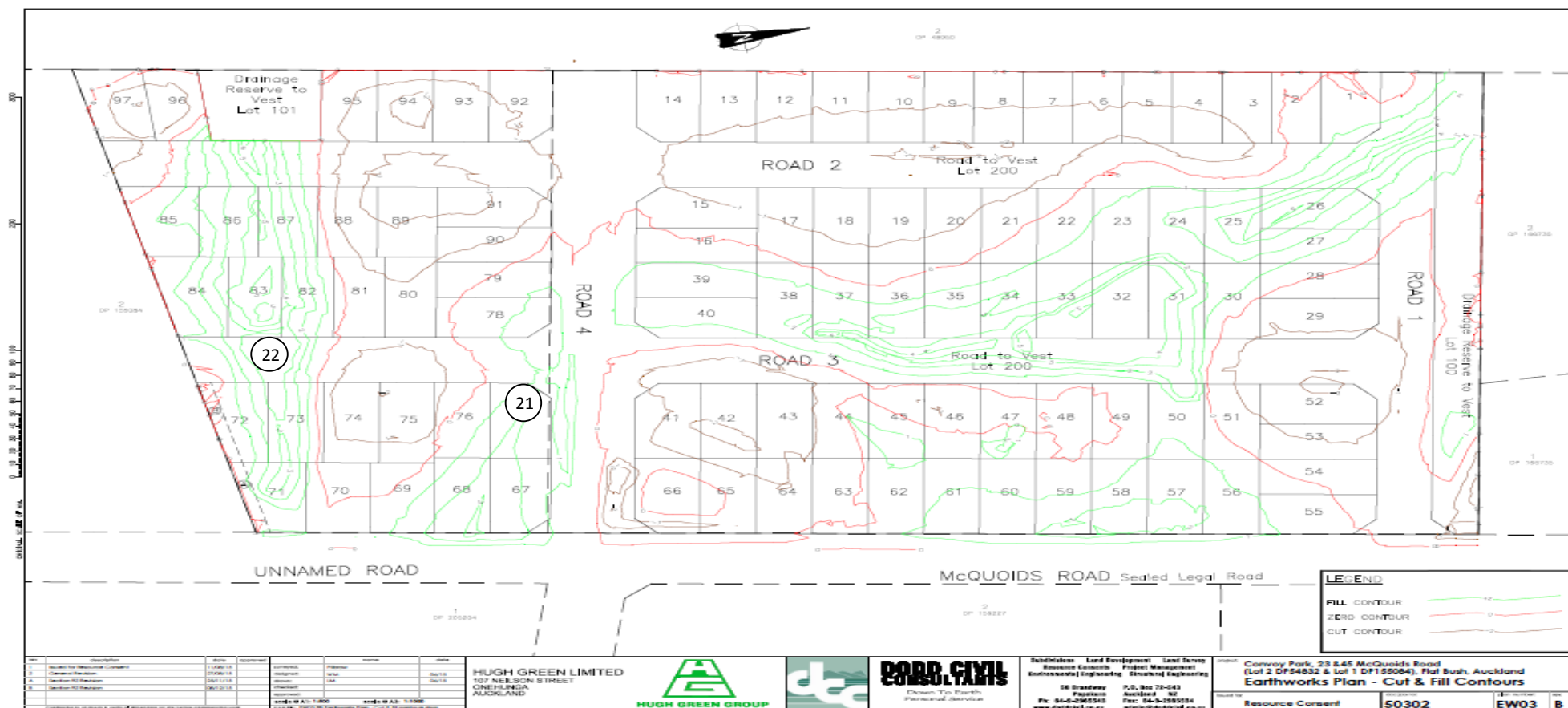
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**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

**Tested by:** AB  
**Date tested:** 5/04/2016



# SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

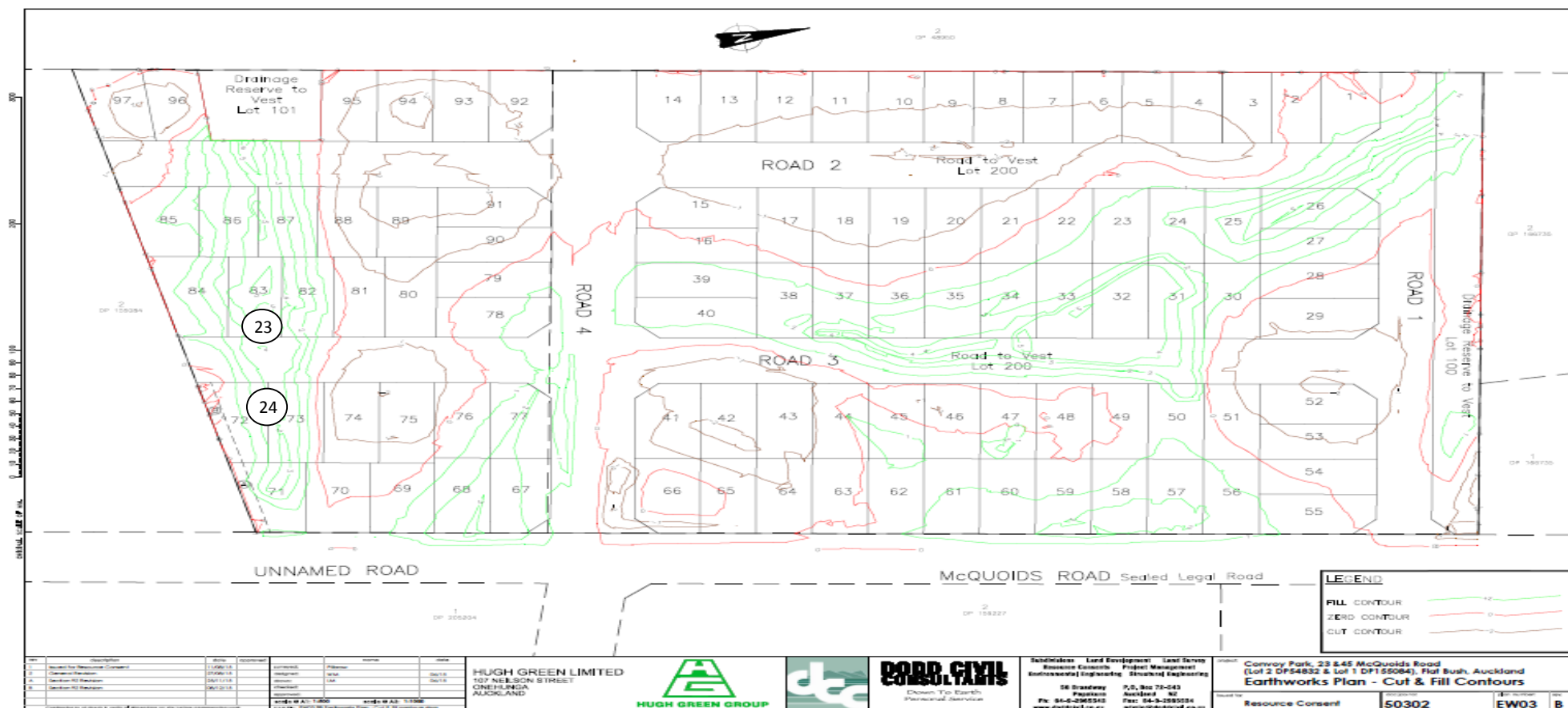
Work Order No: ETAM16W01154

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

Tested by: AB  
Date tested: 7/04/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** Shane Lander

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: Eric Paton (Laboratory Manager)

Approved Signatory Signature: *E. Paton*

Date of Issue: 19/04/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
12/04/2016	ETAM16W01235	AB	25	1.77	35.9	1.30	2.7	4.9	146	154	187	170	Gully	1771733	5905433	-	Clay	0.5m to subgrade
12/04/2016	ETAM16W01235	AB	26	1.80	39.2	1.29	2.7	1.6	142	158	146	146	Gully	1771751	5905437	-	Clay	1.0m to subgrade
12/04/2016	ETAM16W01235	AB	27	1.81	37.4	1.31	2.7	2.1	146	142	154	146	Gully	1771760	5905435	-	Clay	2.5m to subgrade
12/04/2016	ETAM16W01235	AB	28	1.81	37.2	1.32	2.7	2.0	158	150	150	154	Gully	1771780	5905435	-	Clay	2.0m to subgrade
14/04/2016	ETAM16W01237	AB	29	1.79	34.3	1.33	2.7	4.9	146	142	146	158	Gully	1771758	5905438	-	Clay	~1.0m to subgrade
14/04/2016	ETAM16W01237	AB	30	1.77	42.4	1.24	2.7	1.4	150	167	146	154	Gully	1771724	5905440	-	Clay	~0.5m to subgrade
14/04/2016	ETAM16W01236	AB	31	1.90	30.9	1.45	2.7	1.6	142	150	158	154	Gully	1771818	5905660	-	Clay	~2.5m to subgrade
14/04/2016	ETAM16W01236	AB	32	1.91	32.4	1.45	2.7	0.0	142	150	142	146	Gully	1771839	5905656	-	Clay	~3.0m to subgrade
15/04/2016	ETAM16W01238	AB	33	1.82	23.9	1.47	2.7	10.5	142	146	142	154	General fill	1771837	5905660	-	Clay	1.0m to subgrade
15/04/2016	ETAM16W01238	AB	34	1.83	21.4	1.51	2.7	11.7	142	158	154	162	General fill	1771825	5905664	-	Clay	0.5m to subgrade

# SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

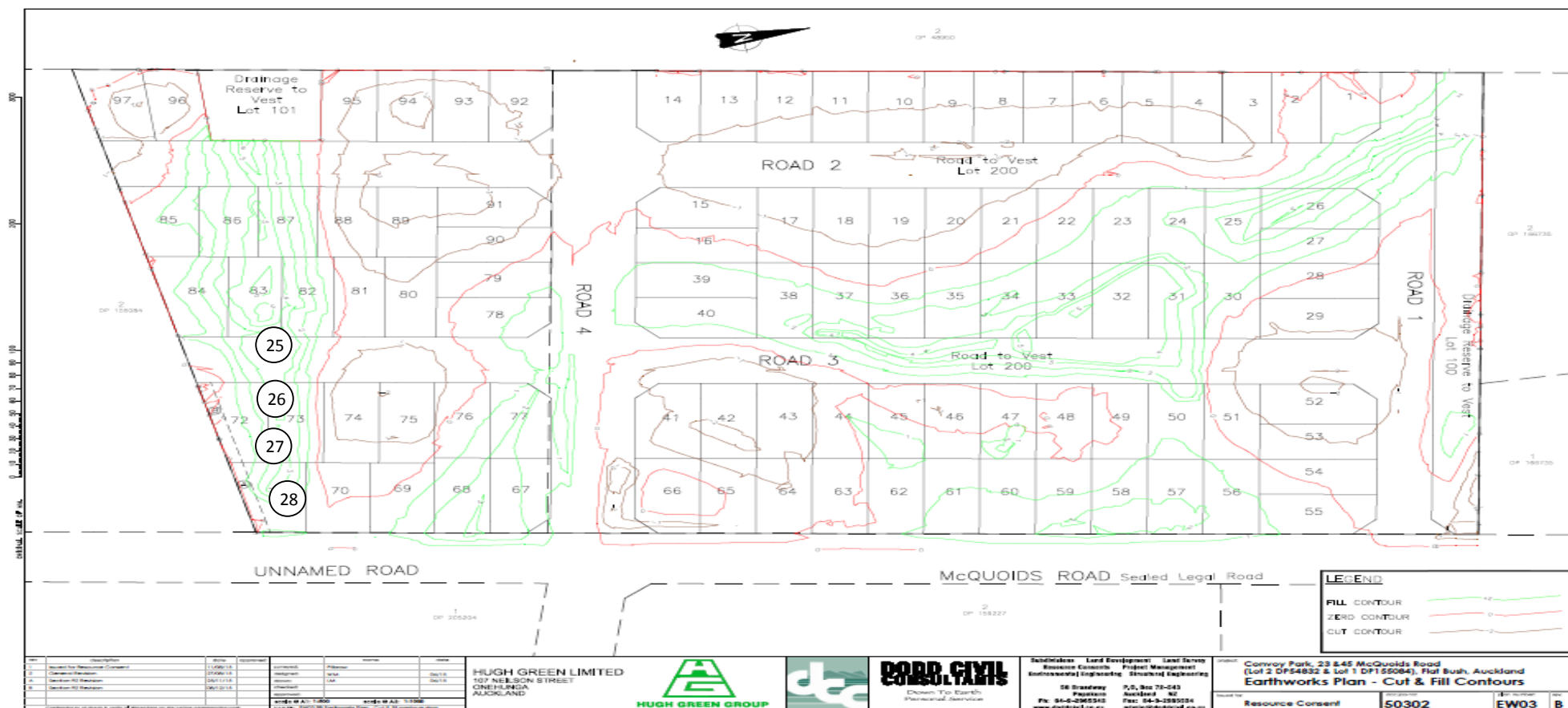
Work Order No: ETAM16W01235

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

Tested by: AB  
Date tested: 12/04/2016





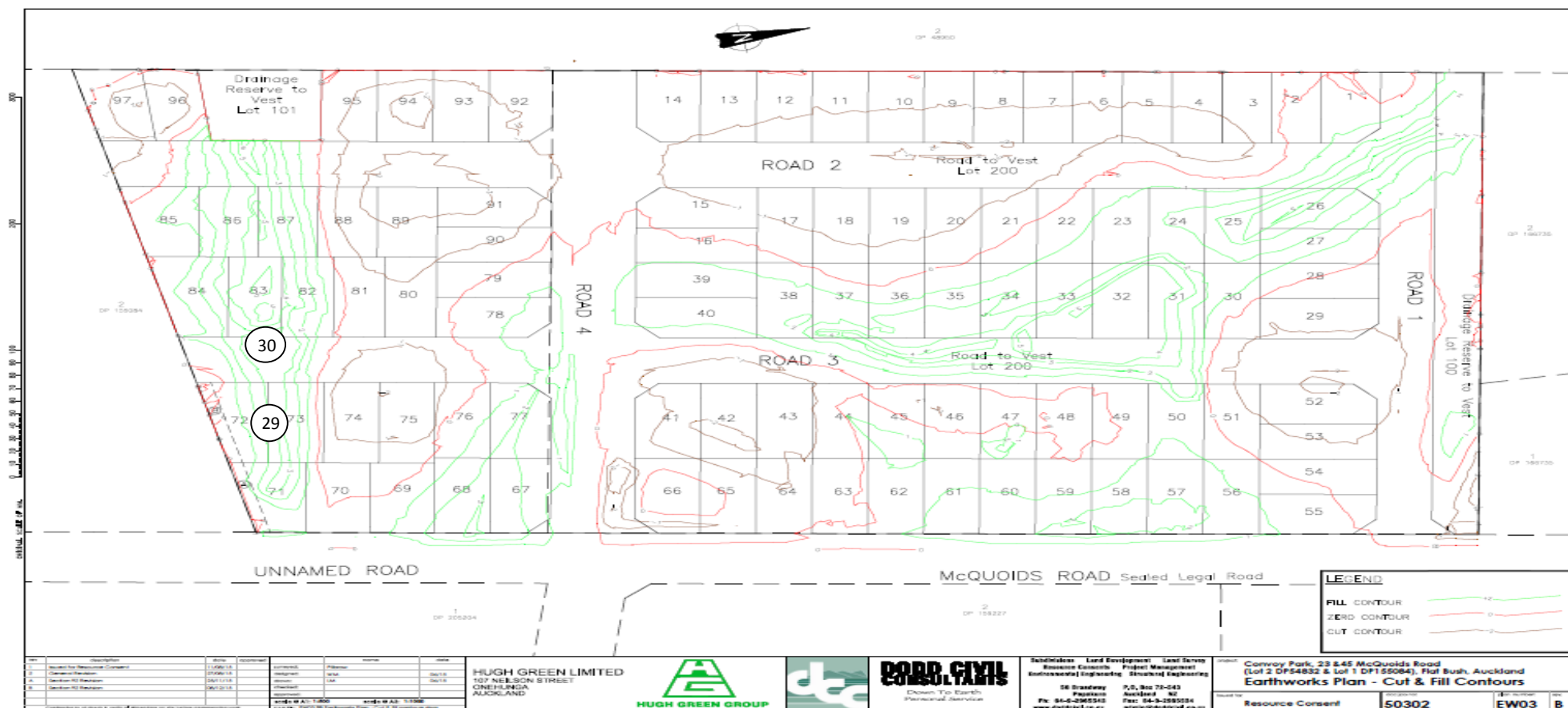
**Project No: GENZETAM01144AA**

Work Order No: ETAM16W01237

Page: 2 of 2

Tested by: AB

Date tested: 14/04/2016



# SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W01236

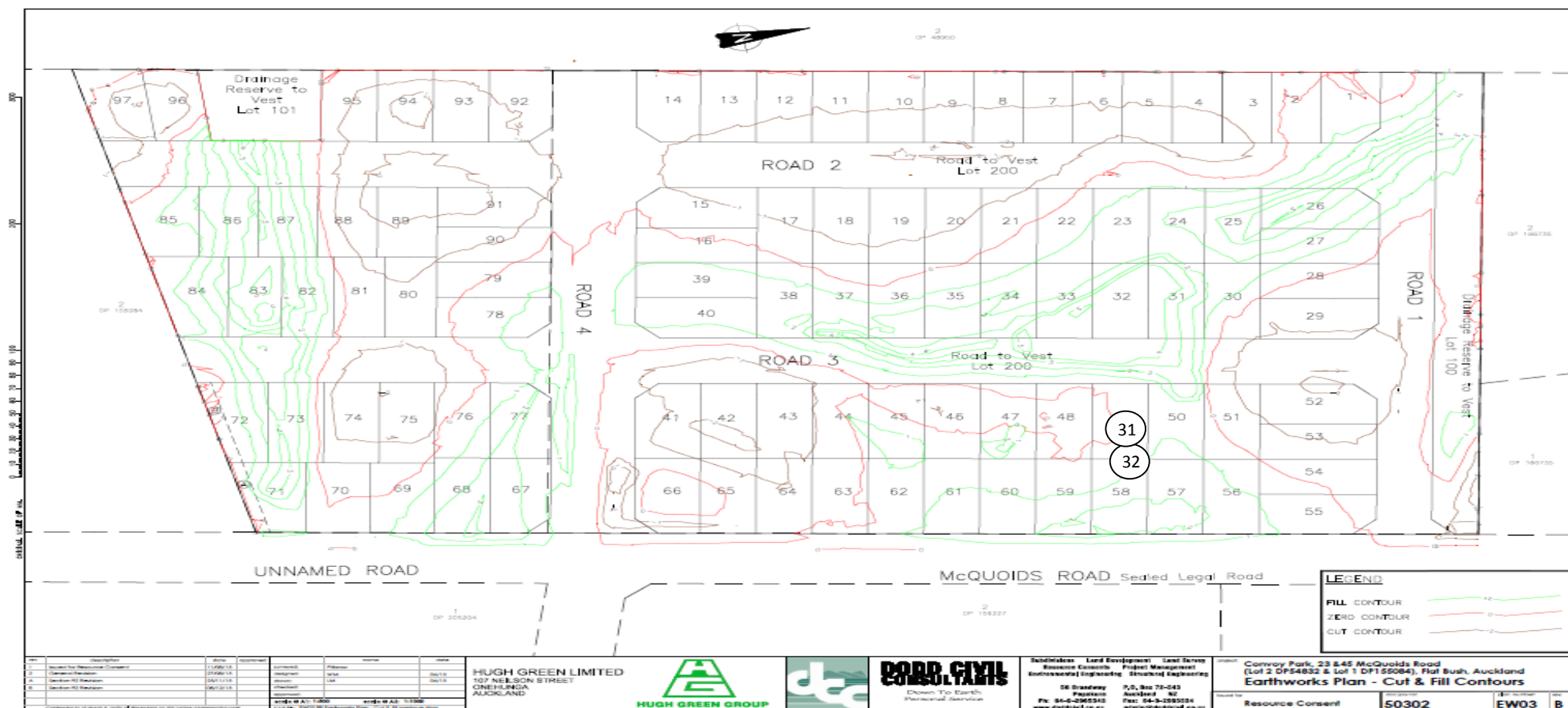
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Gully

**Tested by:** AB

**Date tested:** 14/04/2016





# SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W01238

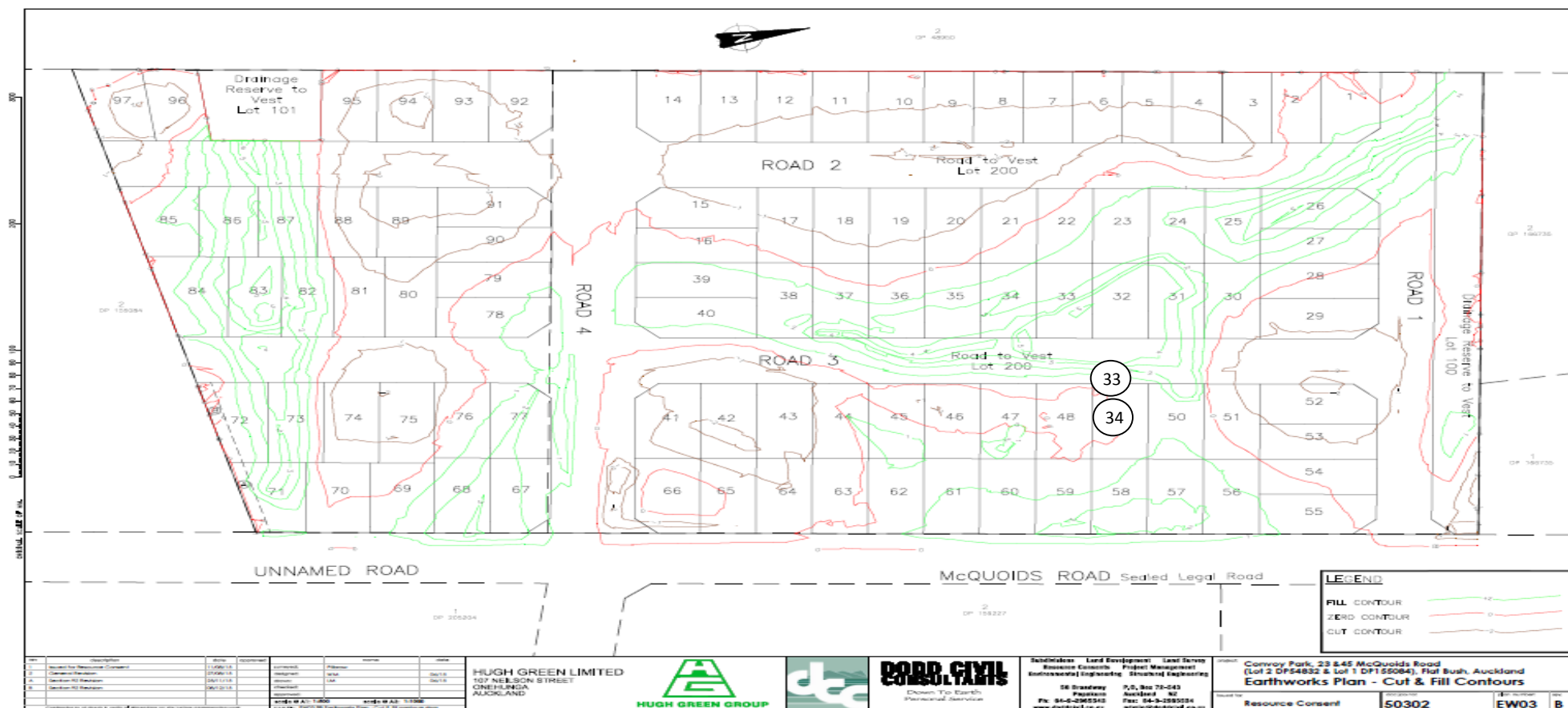
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** General Fill

**Tested by:** AB

**Date tested:** 15/04/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** Shane Lander

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: Eric Paton (Laboratory Manager)

Approved Signatory Signature: *E. Paton*

Date of Issue: 28/04/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
19/04/2016	ETAM16W01298	AB	35	1.93	18.8	1.62	2.7	9.4	UTP	UTP	UTP	UTP	General fill	1771855	5905654	-	Clay	0.3m to subgrade. Coarse aggregate present
19/04/2016	ETAM16W01298	AB	36	2.03	18.2	1.72	2.7	5.2	UTP	UTP	UTP	UTP	General fill	1771854	5905636	-	Clay	0.3m to subgrade. Coarse aggregate present



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 21/06/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
14/06/2016	ETAM16W02023	AB	37	1.94	22.6	1.58	2.7	5.7	UTP	UTP	UTP	UTP	Pond backfill	1771735	5905731	-	Clay	2.0m to FL. Coarse aggregate present
14/06/2016	ETAM16W02023	AB	38	1.88	28.7	1.46	2.7	3.9	172	177	UTP	UTP	Pond backfill	1771748	5905711	-	Clay	2.0m to FL. Coarse aggregate present

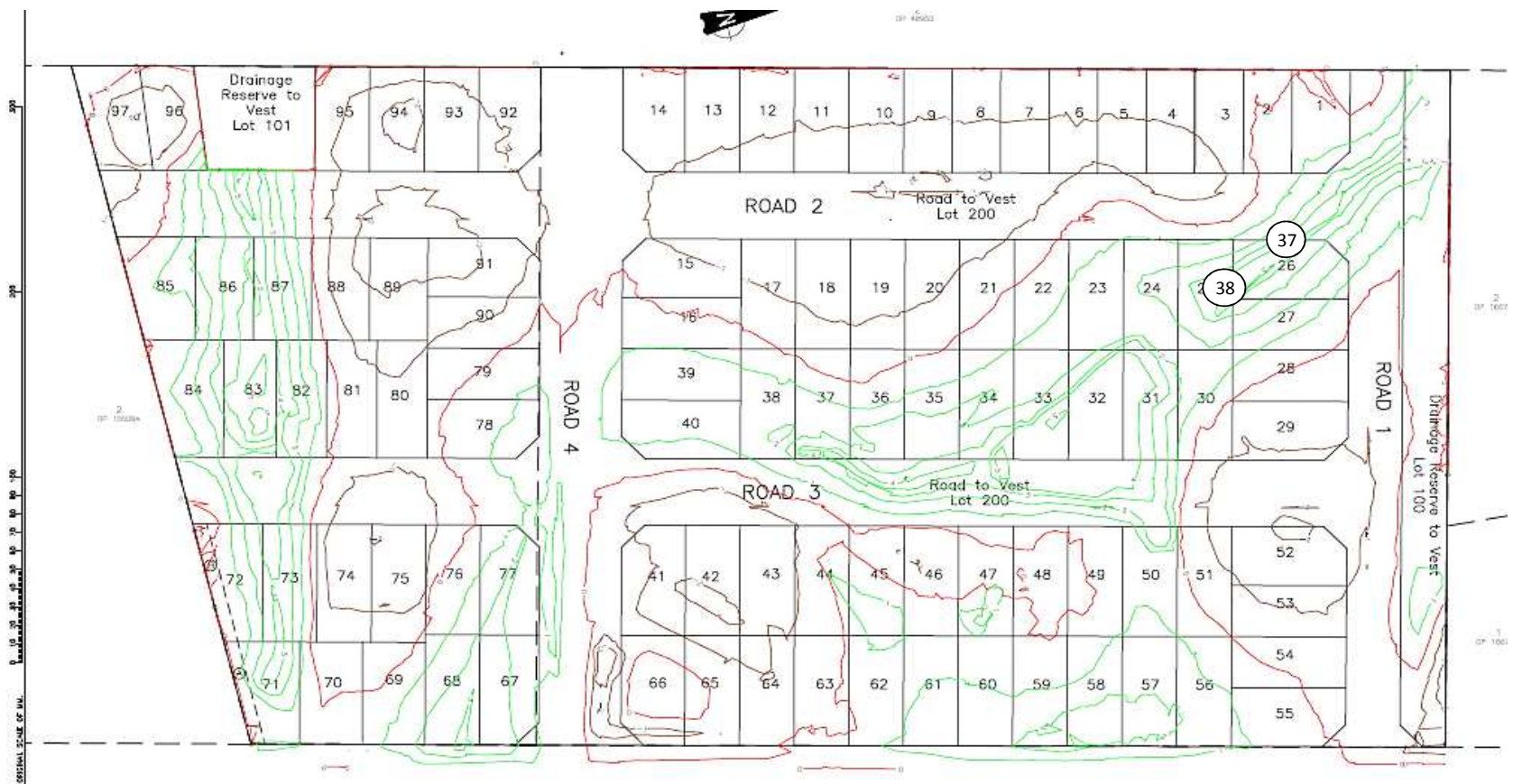
**Project No: GENZETAM01144AA**

Page: 2 of 2

NOT TO SCALE

Tested by: AB

Date tested: 14/06/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 21/06/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
16/06/2016	ETAM16W02087	AB	39	1.93	25.7	1.54	2.7	3.6	156	144	152	168	Pond backfill	1771739	5905722	-	Clay	~1.5m to subgrade, aggregate present
16/06/2016	ETAM16W02087	AB	40	1.94	27.9	1.52	2.7	1.5	148	177	UTP	UTP	Pond backfill	1771728	5905740	-	Clay	~1.5m to subgrade, aggregate present

## SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W02087

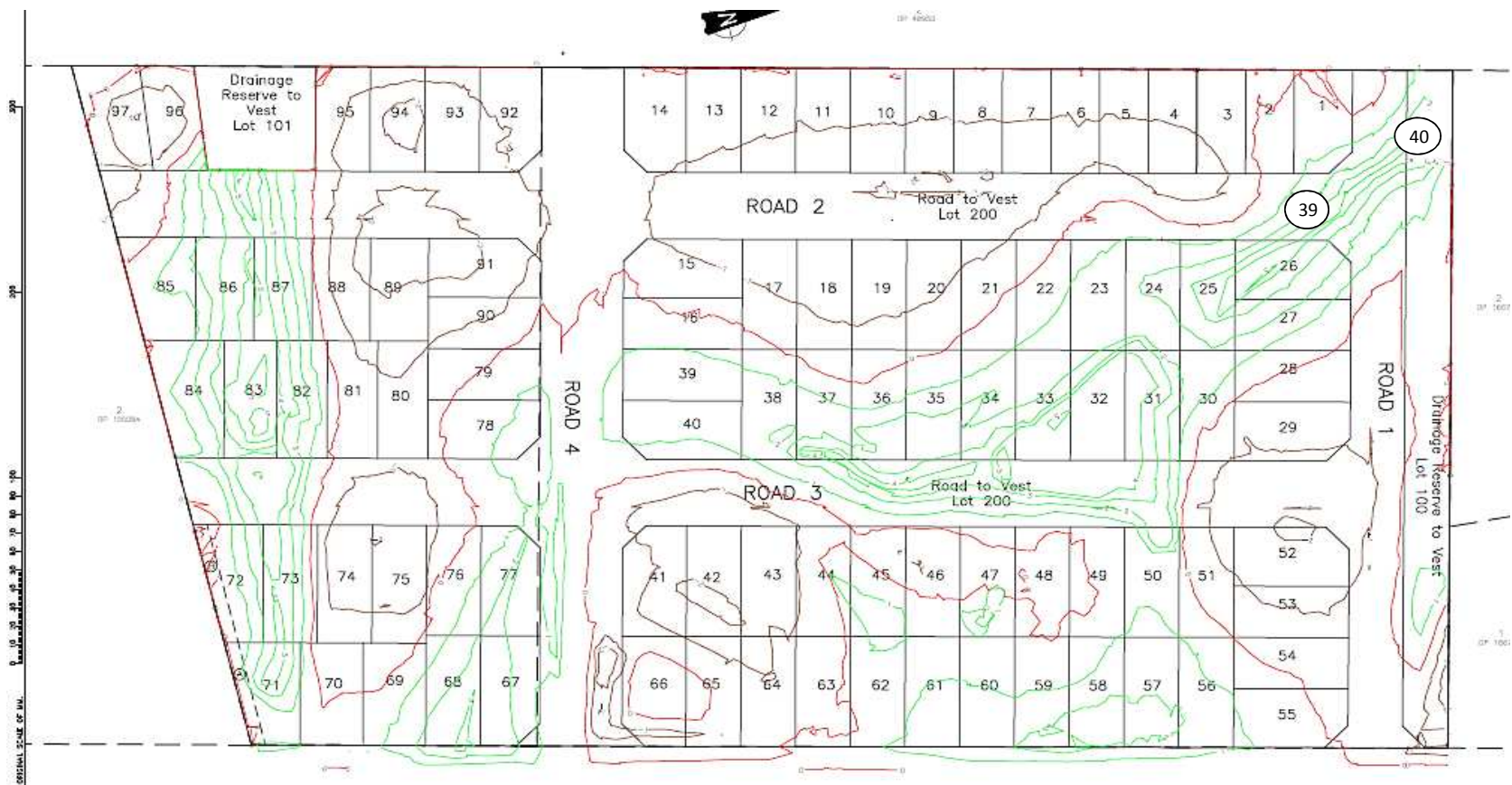
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

**Tested by:** AB

**Date tested:** 16/06/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241  
**Principal:** Dustin Tookey  
**c.c. to:** -  
**Project:** J00092 - McQuoids Road, Flat Bush  
**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 21/06/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
20/06/2016	ETAM16W02096	AB	41	2.08	17.9	1.76	2.7	3.1	191	UTP	UTP	UTP	Pond backfill	1771739	5905707	-	Clay	FL = Finished level ~1.0m to subgrade. Coarse aggregate present
20/06/2016	ETAM16W02096	AB	42	2.09	16.5	1.79	2.7	4.0	UTP	UTP	UTP	UTP	Pond backfill	1771733	5905721	-	Clay	~1.0m to subgrade. Coarse aggregate present

## SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W02096

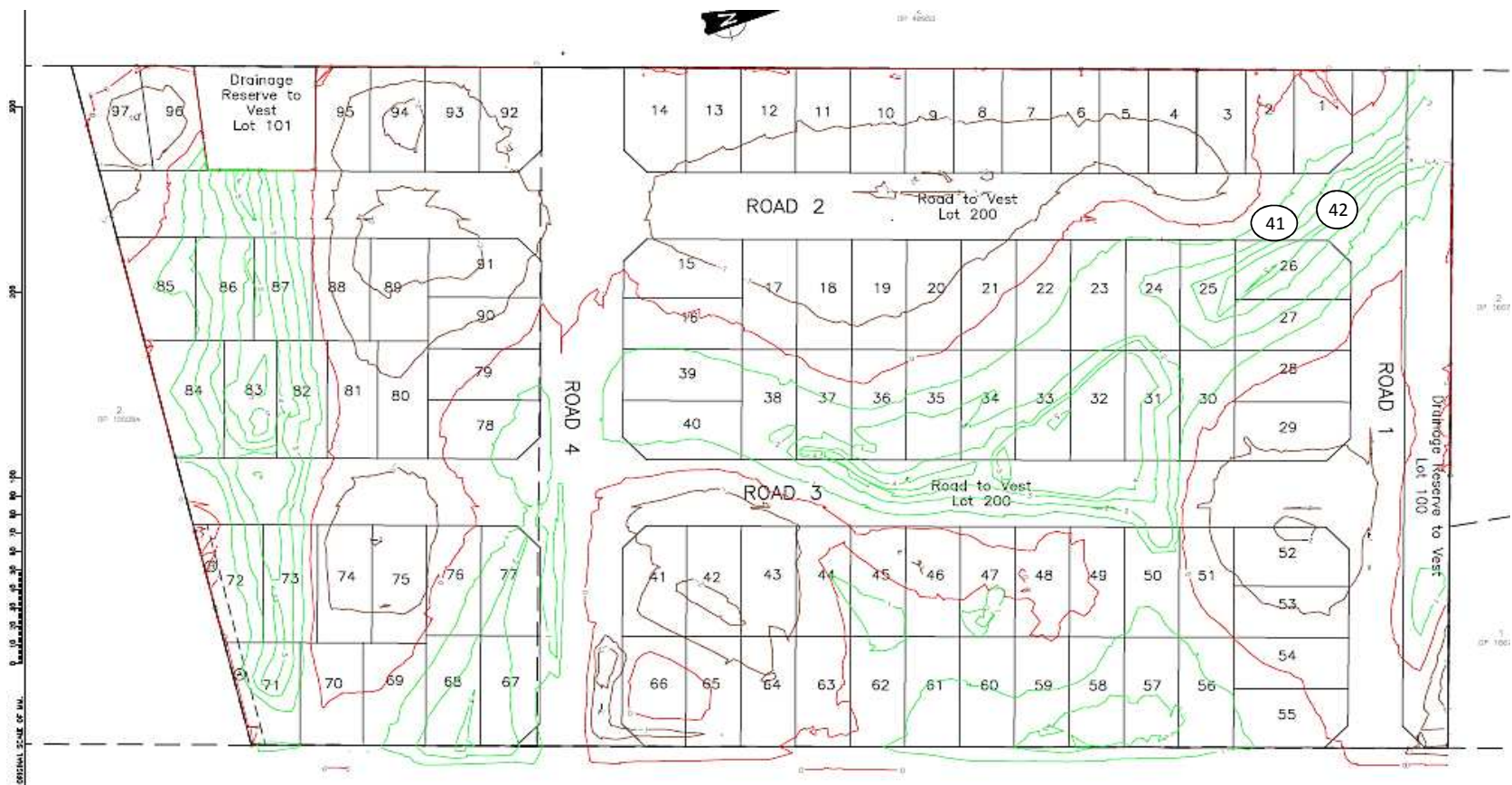
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

**Tested by:** AB

**Date tested:** 20/06/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 23/06/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
21/06/2016	ETAM16W02119	DL	43	2.14	15.9	1.85	2.7	2.1	UTP	UTP	UTP	UTP	Refer to plan	1771757	5905696	-	Clay	FL, aggregate present
21/06/2016	ETAM16W02119	DL	44	2.20	17.4	1.87	2.7	0.0	UTP	UTP	UTP	UTP	Refer to plan	1771758	5905720	-	Clay	FL, aggregate present

## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02119

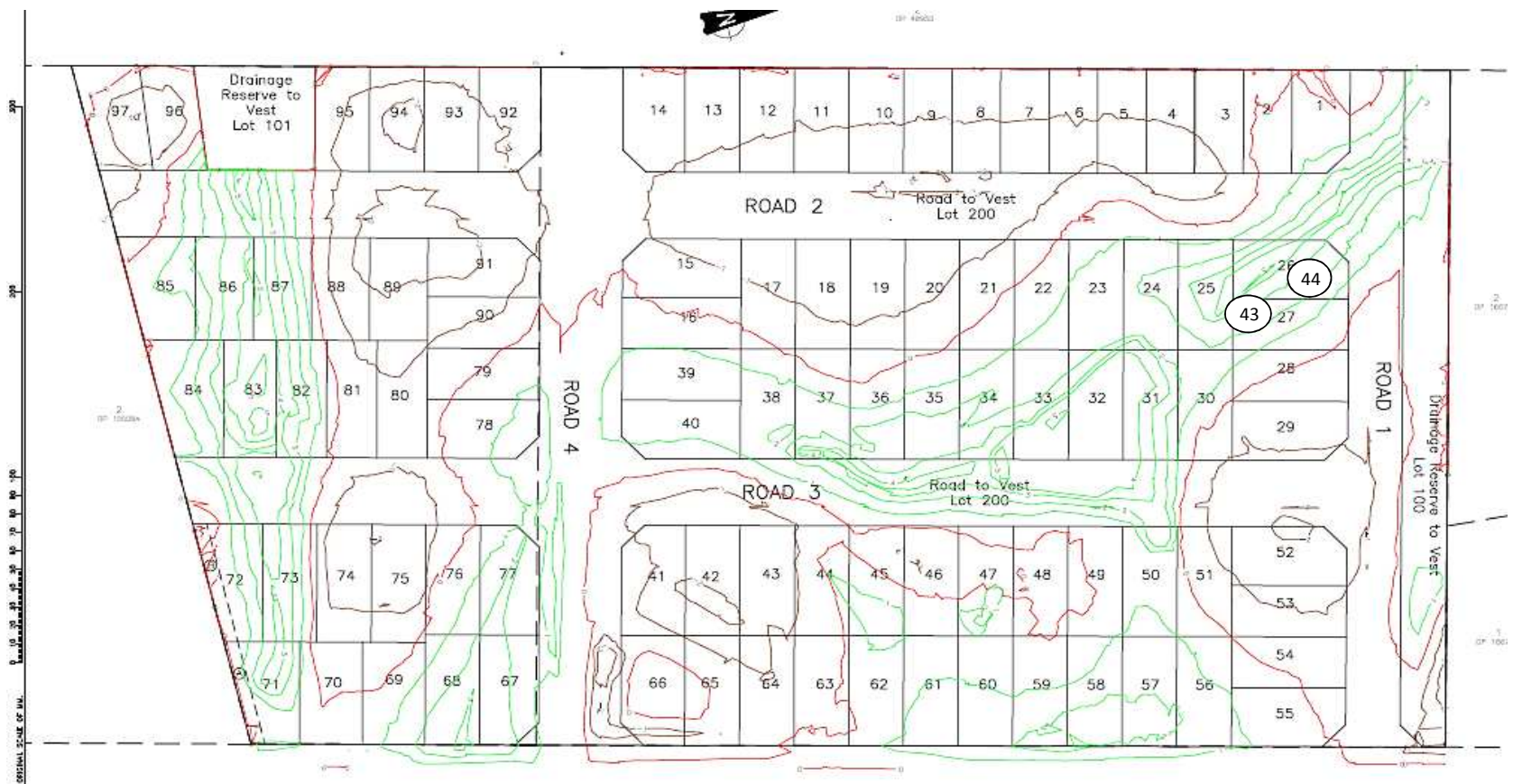
Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Refer to plan

Tested by: AB

Date tested: 21/06/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory:

Approved Signatory Signature: Eric Paton

Date of Issue: 24/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
15/08/2016	ETAM16W02632	FP	45	1.67	39.4	1.20	2.7	8.2	135	139	148	139	Pond backfill	1771676	5905460	41.60	Clay	Retest of no 53 8:20:00 a.m.
15/08/2016	ETAM16W02632	FP	46	1.66	37.3	1.21	2.7	10.1	144	144	148	218+	Pond backfill	1771691	5905447	42.40	Clay	Retest of no 54 8:20:00 a.m.

## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02632

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

Tested by:

FP

Date tested:

15/08/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 17/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
15/08/2016	ETAM16W02643	FP	47	1.76	37.3	1.28	2.7	4.7	144	144	148	148	Pond backfill	1771693	5905448	42.40	Clay	Retest of no. 46 (10:45 am)
15/08/2016	ETAM16W02643	FP	48	1.76	37.8	1.28	2.7	4.2	144	148	148	168	Pond backfill	1771678	5905451	41.60	Clay	Retest of no. 45 (10:45 am)

## SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W02643

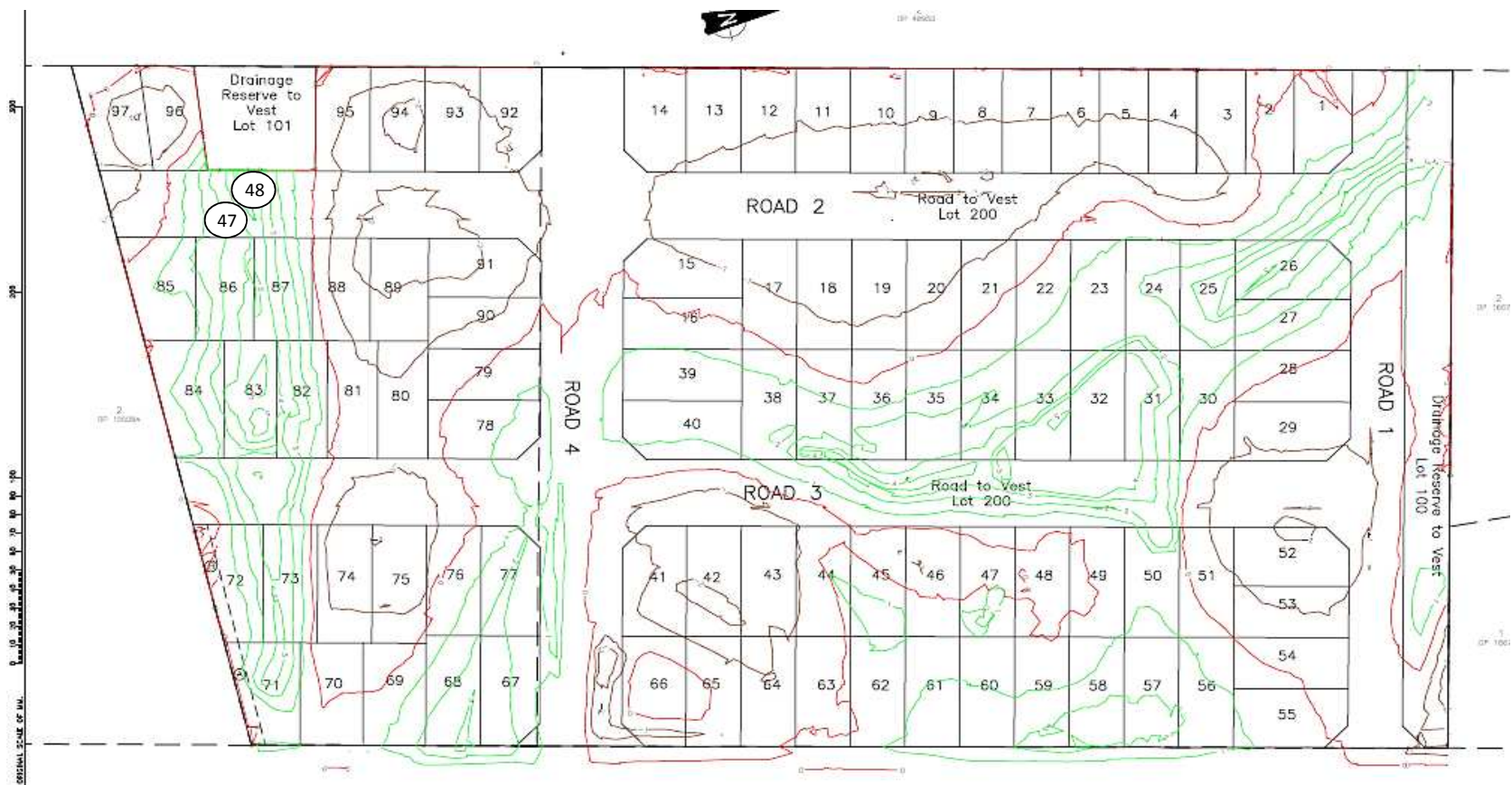
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

**Tested by:** FP

**Date tested:** 15/08/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 18/08/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
15/08/2016	ETAM16W02655	OT	49	1.74	39.4	1.25	2.7	4.6	135	124	124	176	Pond backfill	1771676	5905454	41.90	Fill	Lime Stabilized (1:45 p.m.)
15/08/2016	ETAM16W02655	OT	50	1.77	41.7	1.25	2.7	1.4	90	110	131	117	Pond backfill	1771695	5905448	42.60	Fill	Lime Stabilized (1:45 p.m.)



## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02655

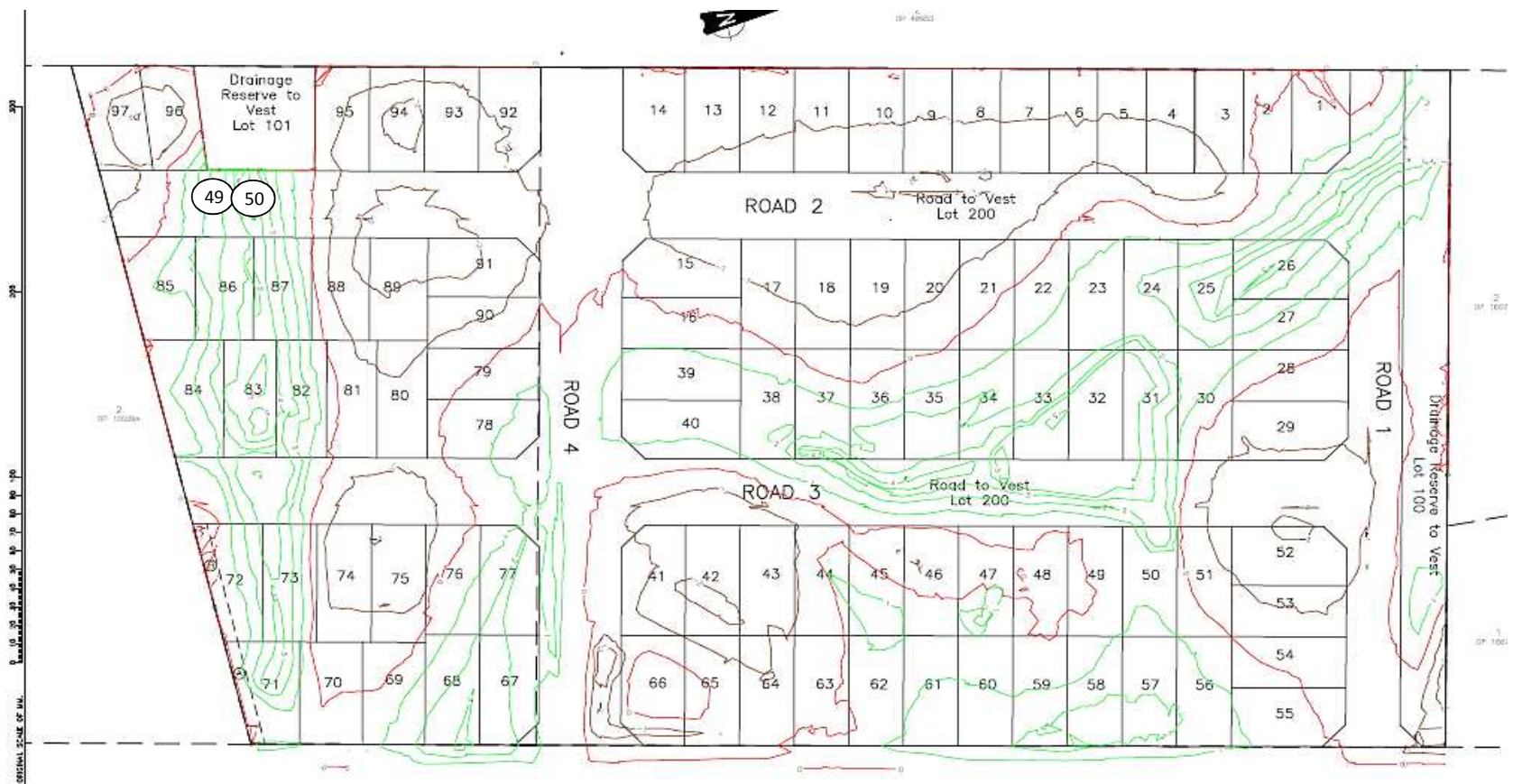
Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

Tested by: OT

Date tested: 15/08/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory: James McKelvey

Approved Signatory Signature:

Date of Issue: 19/08/2016

IANZ Accredited Laboratory Number: 105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
16/08/2016	ETAM16W02656	DL	51	1.92	34.6	1.42	2.7	0.0	203+	203+	203+	203+	Pond backfill	1771676	5905454	-	Clay	Retest of No. 49
16/08/2016	ETAM16W02656	DL	52	1.77	45.8	1.22	2.7	0.0	203+	203+	203+	203+	Pond backfill	1771695	5905448	-	Clay	Retest of No. 50

## SITE PLAN

NOT TO SCALE

**Project No:** GENZETAM01144AA

**Work Order No:** ETAM16W02656

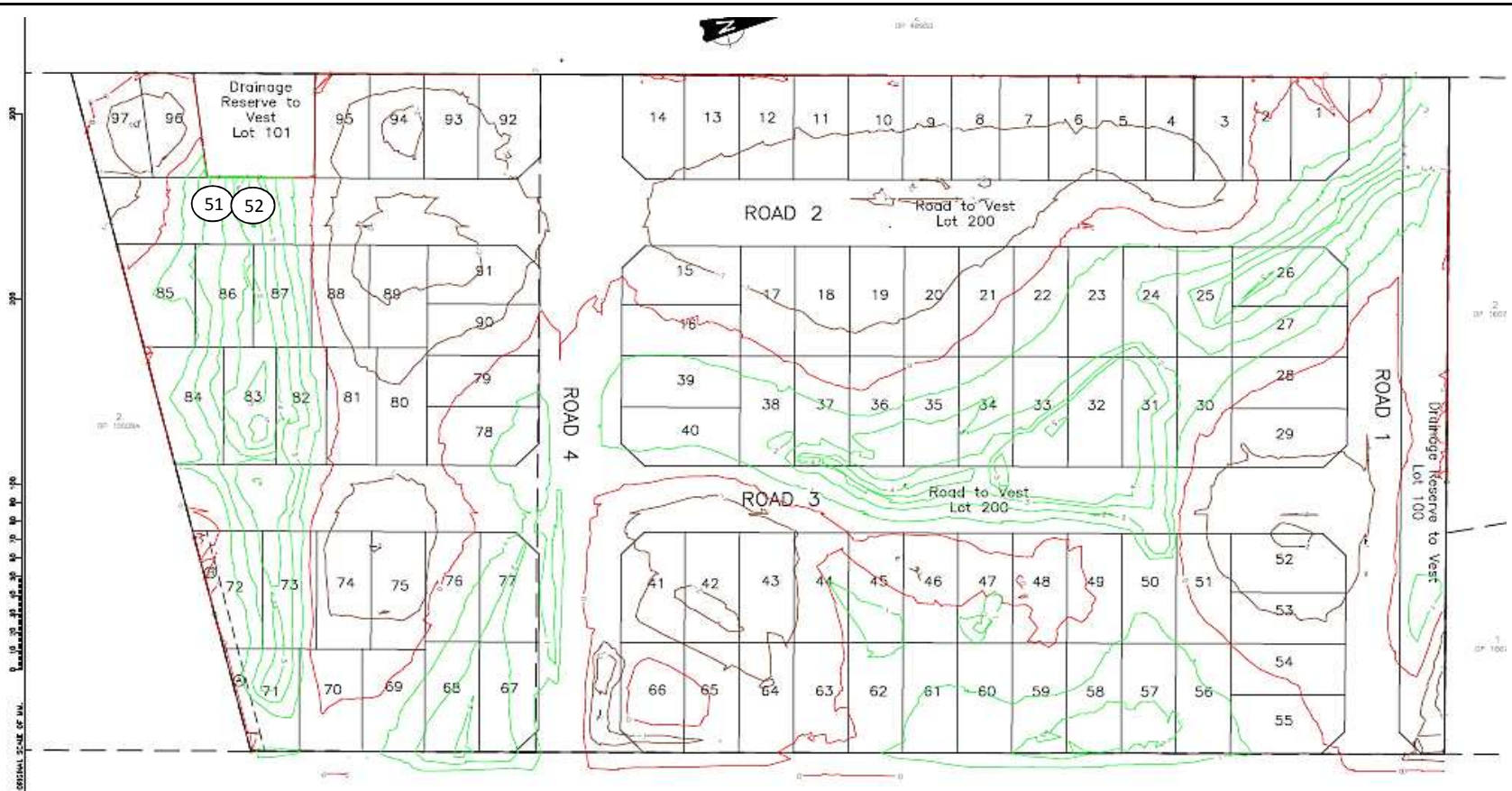
**Page:** 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

**Tested by:** DL

**Date tested:** 16/08/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory:

Approved Signatory Signature: Eric Paton

Date of Issue: 24/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
12/08/2016	ETAM16W02669	DL	53	-	Not tested	Not tested	-	Not tested	60	66	78	82	Pond backfill	-	-	-	Clay	
12/08/2016	ETAM16W02669	DL	54	-	Not tested	Not tested	-	Not tested	82	101	112	123	Pond backfill	-	-	-	Clay	

## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02669

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond Backfill

Tested by:

DL

Date tested:

12/08/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory:

Approved Signatory Signature: Eric Paton

Date of Issue: 24/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
17/08/2016	ETAM16W02704	DL	55	1.93	35.0	1.43	2.7	0.0	209+	209+	209+	209+	Pond backfill	1771687	5905451	42.70	Stabilised Clay	
17/08/2016	ETAM16W02704	DL	56	1.82	34.4	1.35	2.7	3.4	209+	209+	209+	209+	Pond backfill	1771680	5905452	42.00	Stabilised Clay	
17/08/2016	ETAM16W02704	DL	57	1.86	36.7	1.36	2.7	0.0	209+	209+	209+	209+	Pond backfill	1771679	5905446	43.00	Stabilised Clay	
17/08/2016	ETAM16W02704	DL	58	1.79	35.2	1.33	2.7	4.2	209+	209+	209+	209+	Pond backfill	1771692	5905464	42.00	Stabilised Clay	



## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02704

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond backfill

Tested by: DL

Date tested: 17/08/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory:

Approved Signatory Signature: Eric Paton

Date of Issue: 24/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
17/08/2016	ETAM16W02706	DL	59	1.86	34.6	1.38	2.7	0.9	209+	209+	209+	209+	Pond backfill	1771677	5905446	40.00	Stabilised Clay	
17/08/2016	ETAM16W02706	DL	60	1.78	37.2	1.30	2.7	3.5	209+	209+	209+	209+	Pond backfill	1771674	5905445	41.00	Stabilised Clay	
17/08/2016	ETAM16W02706	DL	61	1.95	33.8	1.46	2.7	0.0	209+	209+	209+	209+	Pond backfill	1771694	5905445	40.50	Stabilised Clay	
17/08/2016	ETAM16W02706	DL	62	1.96	33.4	1.47	2.7	0.0	189	195	209+	209+	Pond backfill	1771701	5905453	39.50	Stabilised Clay	

## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02706

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond backfill

Tested by: DL

Date tested: 17/08/2016





## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory:

Approved Signatory Signature: Eric Paton

Date of Issue: 24/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
18/08/2016	ETAM16W02708	DL	63	1.83	38.1	1.32	2.7	0.7	209+	209+	209+	209+	Pond backfill	1771684	5905452	-	Stabilised Clay	0.3m below FL
18/08/2016	ETAM16W02708	DL	64	1.81	30.3	1.39	2.7	6.4	209+	209+	209+	209+	Pond backfill	1771688	5905452	-	Stabilised Clay	0.3m below FL
18/08/2016	ETAM16W02708	DL	65	1.89	37.1	1.38	2.7	0.0	209+	209+	209+	209+	Pond backfill	1771668	5905445	-	Stabilised Clay	1.5m below FL
18/08/2016	ETAM16W02708	DL	66	1.74	39.4	1.25	2.7	4.4	209+	209+	209+	209+	Pond backfill	1771676	5905446	-	Stabilised Clay	1.5m below FL

## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02708

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond backfill

Tested by: DL

Date tested: 18/08/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

**Client:** Lander Geotechnical Consultants Limited  
PO Box 97 385  
Manukau 2241

**Principal:** Dustin Tookey

**c.c. to:** -

**Project:** J00092 - McQuoids Road, Flat Bush

**Project Location:** Flat Bush, Manukau City

**Project No:** GENZETAM01144AA

**Page:** 1 of 2



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

Approved Signatory:

Approved Signatory Signature: Eric Paton

Date of Issue: 24/08/2016

IANZ Accredited Laboratory Number:105

Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
19/08/2016	ETAM16W02710	AB	67	1.84	34.5	1.37	2.7	2.0	204	200	218+	218+	Pond backfill	1771690	5905456	-	Lime stabilised silty CLAY	0.5m below FL
19/08/2016	ETAM16W02710	AB	68	1.86	34.0	1.39	2.7	1.5	186	218+	218+	218+	Pond backfill	1771680	5905442	-	Lime stabilised silty CLAY	0.5m below FL



## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02710

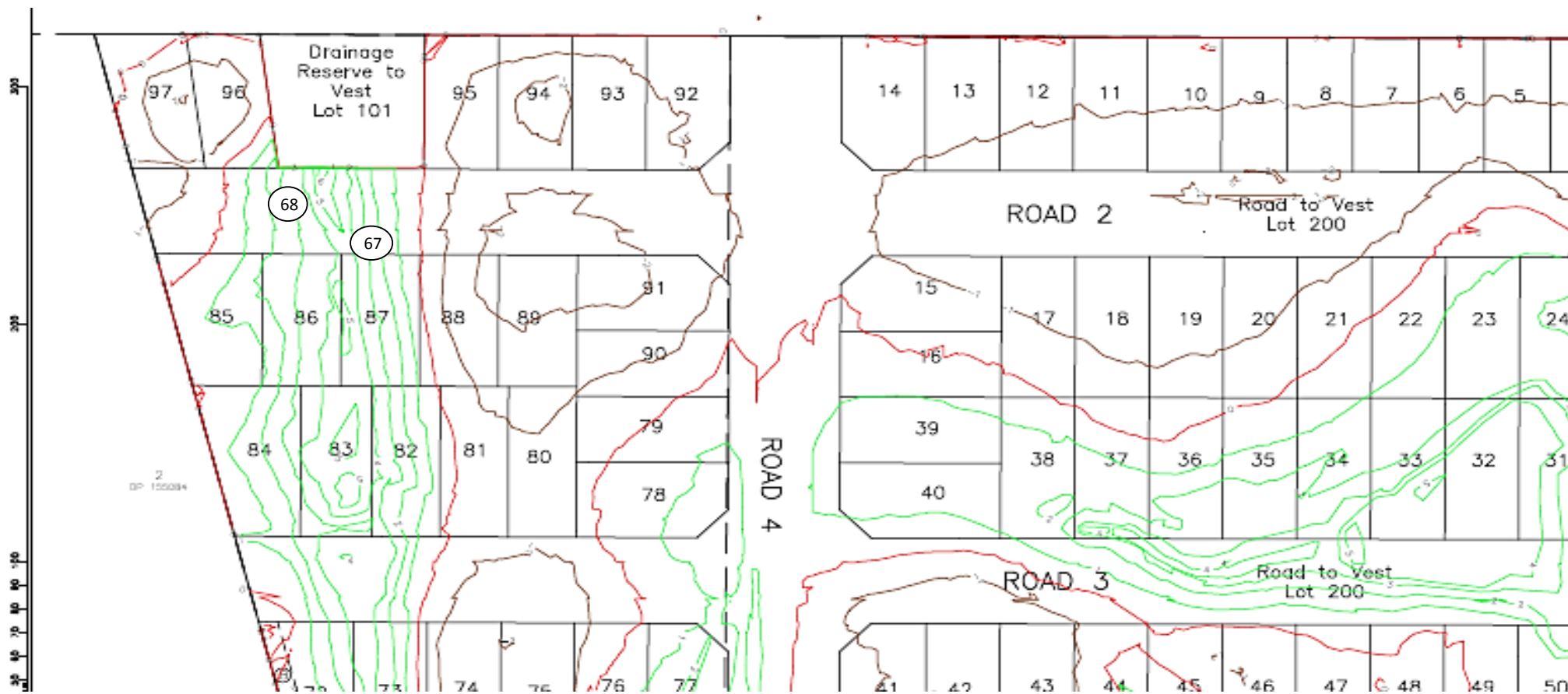
Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond backfill

Tested by: AB

Date tested: 19/08/2016



## EARTHWORKS FILL REPORT

Test Methods : Shear Strength (using field Shear vane in accordance with NZGS 2001); Nuclear Densometer Testing (in accordance with NZS 4407:1991 Test 4.2.1); 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))

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Approved Signatory:

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Date	Work Order :	Tested By	Test No.	Wet Density (t/m <sup>3</sup> )	Oven Water Content (%)	Dry Density (t/m <sup>3</sup> )	Solid Density (t/m <sup>3</sup> )	Air Voids %	Field Shear Strength in kPa (UTP = Unable to penetrate)				Test Location	Easting	Northing	RL (m)	Material Tested	Comments
19/08/2016	ETAM16W02711	AB	69	1.79	32.5	1.35	2.7	5.9	172	164	152	160	Pond backfill	1771666	5905450	-	Lime stabilised silty CLAY	0.2m below FL
19/08/2016	ETAM16W02711	AB	70	1.80	35.2	1.33	2.7	3.8	144	152	168	152	Pond backfill	1771686	5905444	-	Lime stabilised silty CLAY	At FL

## SITE PLAN

NOT TO SCALE

**Project No: GENZETAM01144AA**

Work Order No: ETAM16W02711

Page: 2 of 2

**Project:** J00092- McQuoids Road, Flat Bush

**Location:** Pond backfill

Tested by: AB

Date tested: 19/08/2016

