

4 March 2019

Ref No: J01132 (Rev. 1)

Karaka & Drury Limited

Attention: Mr M Tollemache

Dear Mark

RE: Preliminary Geotechnical Appraisal Report for Auranga B2 Re-zoning Concept, Drury

Lander Geotechnical Consultants Limited have been engaged by Karaka & Drury Limited to undertake a desktop study of geotechnical conditions within a study area delineated by the red boundary on attached Figure 01 and also depicted on the attached McKenzie and Co drawings.

1 SCOPE AND OBJECTIVES

Our brief principally relates to the preparation of a Preliminary Geotechnical Appraisal Report (PGAR), in order to support a comprehensive structure planning process and subsequent plan change application.

More specifically, our scope of work for the PGAR comprises:

- Summary of the main topographical features present, soil types and underlying geology, areas of obvious historic land modification (e.g. fill), and potential constraints to future urban development
- The results of previous Lander Geotechnical preliminary geotechnical field investigations held on our database to assess the nature, bearing qualities and relative uniformity of the subsoils to the depths likely to be affected by any future land development works and future building loads
- Preparation of a PGAR presenting the findings of this preliminary work

In preparing this report, Lander Geotechnical have reviewed the following previous plan variation/geotechnical investigation reports:

- Lander Geotechnical Consultants Limited, Preliminary Geotechnical Appraisal Report, Auranga Bay Development, Bremner Road, Drury, reference J00137, dated 19 January 2016
- Lander Geotechnical Consultants Limited, Preliminary Geotechnical Appraisal Report, Auranga Development B1, Drury, reference J00557, dated 17 February 2017
- Lander Geotechnical Consultants Limited, Preliminary Geotechnical Appraisal Report, Auranga Development B2a and B2b, Drury, reference J00557, dated 17 February 2017
- Lander Geotechnical Consultants Limited, Preliminary Geotechnical Appraisal Report, Auranga Development B3, Drury, reference J00557, dated 17 February 2017

In addition, Lander Geotechnical Consultants Limited have been retained as geotechnical consultants since the commencement of the Auranga development and have undertaken detailed studies on

many properties with the Auranga A zone (currently under construction) to support various Resource Consent applications and have drawn upon our experience here.

2 SITE SPECIFIC APPRAISAL FOR THE AURANGA STUDY AREA

2.1 Site Description

2.1.1 General

The study area ("the site") comprises a number of separate properties, the legal descriptions and respective areas of each are able to be ascertained from Council's GIS database if required. The site is bounded by Great South Road to the east, Karaka Road to the south and plan change areas A and B to the north and west.

The majority of the site is in pasture or used for commercial activities. There are numerous dwellings and ancillary structures across the site associated with the current land uses.

The topography of the site is characterised by broad undulations and rolling terrain. There were no obvious signs of large scale instability or land modifications as a result of our preliminary work.

2.2 Desktop Review

2.2.1 General

As already mentioned, a desktop review has been carried out of previous Lander Geotechnical boreholes within the Auranga development (Bremner Road, Jesmond Road, Burberry Road and Karaka Road) and also of relevant geotechnical records from the New Zealand Geotechnical Database (NZGD - drillers logs and borehole logs). This review has found that these generally similar ground conditions are encountered across the site. Further details outlined below:

2.2.2 Geology

The geology of the area is covered in a 1:250,000 scale map by Schofield (1967) and in numerous Auckland Regional Water Board groundwater resource publications, although not in great detail.

Better descriptions of the soils encountered on similar terrain to the north of the site are presented in Kermode (1991, 1992) and these have been used below:

- The site is underlain by the Puketoka Formation of the Tauranga Group sedimentary lithology (Late Pliocene – Early Pleistocene epoch). In summary, these deposits comprise terrace alluvium (clays, silts, sands, pumiceous silts and organic deposits) overlain in places by weathered volcanic ash.
- The Puketoka Formation consists of undifferentiated, mainly pumiceous deposits of light-grey to orange-brown, well sorted (some graded, bedded 2-200mm), mud, sand and gravel comprising angular to well-rounded rhyolite pumice clasts and weathered rock derived from, the hinterland. Minor beds comprise white, pumiceous silt and clay, and black peat with rich organic clay. The deposits are very soft to soft, and weather to very soft, variously coloured clays, to depths as much as 10m. The formation is possibly up to 60m thick (however Lander Geotechnical's observations of other study areas nearby to the north would suggest such a thickness may not exist here). More specifically, within the surrounding areas the following ground conditions are evident from our desktop study:

- Near surface ground (i.e. upper 17m, as determined from NZGD drillers logs) generally comprises inorganic, firm to very stiff (generally stiff to very stiff) clays and silts. Hand auger boreholes carried out by Lander Geotechnical (up to 5m depth) have found these soils to generally comprise clays and silts with some sand.
- In general, silts and sands are prevalent below the upper layers of clays and silts (i.e. beyond 17m) and are recorded to significant depths (for example, Waitemata Group rock is present at 98.5m near Jesmond Road). In particular, a recent investigation carried out at 370 Karaka Road (located approximately 1.5km south-west of the subject site) found conditions in general agreement with closer boreholes, particularly to the presence of medium dense sands (i.e. indicating consistency of stratum within the wider area). Although sandier soils are generally found below clays/silts, local variations in stratigraphy do occur and in places sandier deposits are present near-surface.
- Of particular significance is the presence of clayey/silty organic and organic stained lenses. Peat is also noted in places. Organic soils are recorded within boreholes from surface level (0.0m) to depths of 9m and generally comprise beds of approximately 1-1.5m. Deposits closer to the surface are often associated with recent gully deposits (mullock) and are confined to the inverts and banks of gullies within these areas. Within the boreholes carried out by Lander Geotechnical, these deposits are often prevalent from 0.7m to 3.5m.
- Geological maps also show deposits of the South Auckland Volcanic Field lava and ash/tuff deposits to the south and east of the site. These deposits typically comprise fine-grained and coarse-grained, porphyritic, olivine basalt, basanite and hawaiite lava flows. These materials typically weather from a basaltic parent rock to orange and brown clays, silts and sands with various amounts of manganese content. The presence of South Auckland Volcanic Field deposits is consistent with the findings of previous hand augers carried out by Lander Geotechnical which show in some locations a mantle of volcanic materials over the upper 1-2m.

2.3 Preliminary Investigation Findings

Our fieldwork that forms the basis for this PGAR consists of relevant testing that was undertaken between July 2015 and February 2017 (refer section 2 of this report). These tests were selected for this PGAR as they are either within or near to the boundary of the proposed Auranga B2 re-zoning area. It involved the drilling of the following tests indicated on the appended site plan (Figure 01).

- 26 hand augers (HA) to depths of up to 5.0m
- 4 Trial Pits (TP) to depths of up to 4.0m.
- 1 SDMT to a depth of 21.0m.

A summary of findings of these tests are as follows:

- Topsoil was encountered at most borehole locations and ranged between 100mm and 400mm in thickness, averaging approximately 200mm. A deeper topsoil profile was identified in HA2017-15 to a depth of 600mm.
- The natural subsoils investigated by our boreholes predominantly consisted of stiff to hard, inorganic orange, brown, grey and yellow clayey silts, silty clays, silts and clays, with occasional sand and limonite inclusions. Organic and manganese inclusions were encountered in several boreholes.

- Organic soils were encountered in HA2017-18 and TP3 (2017) and comprised stiff to hard, black, organic clays fibrous peat from 1.4m-2.1m depth and 2.2m-4.0m (base of TP), respectively.
- Filling was identified in HA's 2017-15 and 2017-18. The fill consisted of an inorganic, stiff to very stiff, grey, orange and brown clayey silt. A moderately thin layer was encountered in 2017-15 from 0.6m to 0.8m depth that was underlain by a 200mm thick buried topsoil. A deeper fill profile was encountered within 2017-18 from 0.1m to 1.4m depth. No filling was detected at our other borehole locations although in farm environments the presence of old offal pits or rubbish pits can never be discounted.
- Vane shear strengths within the natural ground were between 60kPa and UTP (unable to penetrate), however, shear vanes were generally very stiff (>100kPa). Sensitivities to disturbance were typically in the range 1.5 – 5 (insensitive to sensitive).
- Groundwater was encountered within ten of the test locations between depths of 1.5m and 4.9m. Groundwater was not encountered in our other borehole locations and could be reasoned for by the dry summer period at the time of the investigations. A summary of the groundwater levels measured is presented in Table 1 and is also shown on Figure 01.
- The SDMT test inferred approximately 7m of stiff to very stiff clays and silts, with increasingly sandier materials below this. These results are consistent with both the borehole testing previously carried out by Lander Geotechnical and also the borehole logs reviewed within the surrounding area (refer section 3.2).
- Percolation tests P1, P2 and P3 returned percolation results of 0.24, 0.05 and 0.04 L/m²/min respectively. P4 was not tested due to a high standing water level following pre-soaking, indicating very slow percolation at this location. All four tests were carried out outside of the B2 re-zoning area, however, of these tests, P4 was the closest to the boundary of the B2 area.

Table 1. Measured Hand Auger and Trial Pit Groundwater Levels.

| Borehole No. | Land Use Area** | Depth Encountered (m) | Standing GWL (m) |
|--------------|---------------------|-----------------------|------------------|
| HA 2015 – 14 | Outside B2 Area | 2.0 | 1.2 |
| HA2015 - 15 | Outside B2 Area | 1.5 | 1.0 |
| HA2015 - 67 | Outside B2 Area | 4.0 | 4.2 |
| HA2015 - 68 | Outside B2 Area | 2.7 | 2.7 |
| HA2015 - 70 | Outside B2 Area | 3.0 | 3.0 |
| HA2015 - 71 | Outside B2 Area | 4.9 | 4.9 |
| HA2017 - 14 | B2 Town Centre Zone | 1.8 | 2.0 |
| HA2017 - 15 | B2 Town Centre Zone | 2.2 | 2.2 |
| HA2017- 18 | Outside B2 Area | 1.8 | 1.8 |
| TP2017 - 03 | Outside B2 Area | 3.4 | *NE |

Note: groundwater levels have only been displayed for boreholes where groundwater was encountered. The remaining tests did not encounter groundwater over the depths drilled on the date of testing.

**NE = Groundwater not observed at the end of testing.*

*** Refer McKenzie and Co drawing 003, Rev A, Project No. 1823-PC2B for land use area references.*

2.4 Earthquake Risk and Liquefaction Potential

Based on our knowledge of the Hingaia Peninsula (directly to the north, across the tidal river) and the Auranga A area (immediately to the north-east), the general area is reportedly a low risk from earthquake occurrence. According to previous studies at Hingaia (which are considered to be applicable here), the Drury, Glenbrook, Karaka and Wairoa faults are reportedly the closest active faults and are located within approximately 5km of the study area.

- Development of the site should take into account earthquake risk and the design of future building foundations would likely need to include seismic loadings, as would be the case elsewhere in Auckland. Based on our experience at the Hingaia Peninsula just to the north, which is in the same geology and of similar topography, liquefaction potential is considered to be low risk in this local geology.

2.5 Geotechnical Considerations

2.5.1 Existing Filling

Filling was identified within HA's 2017-15 (within the site) and 2017-18 (beyond the site to the south-east) and could be associated with the sites current land use. In farm environments discreet areas of filling may also exist in areas that are not apparent at this stage, and there may also be filling

associated with platforms containing the existing dwellings and ancillary structures within the study area.

- The hand auger boreholes drilled in the filling identified to date were able to penetrate through the layer to the underlying natural ground. However, further investigations will be required to enable the layer to be fully quantified during a subsequent investigation phase (e.g. during the Resource / Subdivision Consent phase(s)). Generally speaking, we expect such fill areas will be contained in relatively localised areas and subject to contamination assessments (if required), could probably be dealt with on-site during subdivision construction works (e.g. by remediating such materials to meet engineering specifications).

2.5.2 Foundations for Buildings

2.5.2.1 Residential Construction

Where inorganic natural ground is present, bearing capacity is expected to be in accordance with the limitations imposed by NZS3604 (i.e. 300 kPa geotechnical ultimate). However, as is evident from the borehole findings to date the natural soils can contain pockets of weaker ground and/ or lenses of organics.

- Softer ground or lenses of organics can pose constraints to NZS3604 building foundations and residential end use, necessitating remediation during earthworks construction or specifically designed foundation solutions (e.g. “raft” foundations). Lander Geotechnical’s experience in the delivery of hundreds of building platforms to the north (in the Hingaia area) indicates only a small proportion of lots may be affected by soft ground or organic soils, but in due course more intensive physical site investigations associated with the subdivision consent(s) will substantiate this risk.
- The soils are likely to fall within AS2870 Class M to H expansive site class, and this is subject to laboratory testing of soil samples collected during later more intensive investigation for the Resource Consent phases. Foundation design for end users will need to mitigate adverse effects from expansive soils.

2.5.2.2 Multi-Storey Construction

The geology within the Auranga area should not preclude construction of non-NZ3604 type construction associated with multi-storey and/or commercial buildings (e.g. within the proposed town centre). It is foreseeable that a combination of specifically designed raft and/or pile foundation system will be required to resist seismic loadings and/or mitigate bearing capacity/settlement issues. This is a specific investigation and design consideration.

2.5.3 Earthworks and Infrastructure

The natural deposits encountered across the site are typically of high strength and have good engineering characteristics for foundations and earthwork handling. Inorganic soils of relatively stiff to very stiff strength will be identified, although organic lenses and weaker sensitive layers are apparent in these materials.

- The identified materials can be sensitive to disturbance during earthworks and repetitive trafficking from heavy machinery, and some boreholes displayed isolated lenses that would have these characteristics. Careful site management and/ or subsoil drainage have been effective in minimising subgrade degradation issues on recent large residential developments in similar geology at the Hingaia area to the north. The deeper deposits in particular is likely to require conditioning prior to placement as filling as insitu moisture contents will likely be higher than those required for optimum compaction.

- Deep trenches are prone to collapse especially where ground water conditions change rapidly and the materials are less cohesive, but this risk can be minimised by appropriate shoring or battering as required by legislation and safe construction practices.
- Road subgrades are prone to degradation once exposed to the elements, but is normally dealt with by engineering design (e.g. subgrade improvement via undercutting and replacement, or lime stabilising, construction sequencing to reduce subgrade exposure time, etc.).
- High allophane content is associated with the surficial ash derived soils and appropriate earthworks methodologies specific to subsequent Resource Consent subdivisional plans should be recommended to mitigate any problems associated with the placement and compaction of these soils, if this mineralogy is present.
- Underfill drainage is usually adopted to control natural groundwater springs in the various drainage features that may be modified during development. They generally pose no constraints to end use if they are buried deep within engineered fills, or if this is not possible they can be aligned to site boundaries to avoid future building platforms.

3 CONCLUSIONS

The Auranga B2 re-zoning area comprises topography and ground conditions that are reasonably well understood geotechnically. Precedence in this type of geology has been set via the large residential developments in the Hingaia area just north of the study area, and more recently Auranga A to the immediate north-east which is currently under intensive residential subdivision construction. Provided there is due consideration to prevailing or perceived geotechnical issues during detailed site investigations for Resource Consent, then the study area as defined herein is considered suitable for re-zoning to future urban use.

4 RECOMMENDATIONS

The assessments presented in this report are based on a desktop review and visual inspections, plus a limited number of shallow borehole tests on the prevailing landform.

It is recommended that:

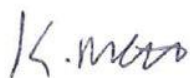
- To support future development (i.e. Resource Consent / Subdivision design), further physical geotechnical site investigations that are commensurate with subdivision and earthworks scheme(s) should be undertaken to substantiate ground conditions and address any geotechnical constraints. Such investigations are expected to comprise (but are not limited to) hand auger boreholes, trial pits using a hydraulic excavator in pre-existing fill areas, and soil sampling.
- Appropriate laboratory soil testing is undertaken to characterise engineering and earthworks handling properties, compressibility, permeability and susceptibility to erosion or dispersion. Experience with such testing at Auranga A suggests no major issues are likely to arise in this regard.

5 LIMITATIONS

This report has been prepared solely for the use of our client, Karaka & Drury Limited, its professional advisers and the relevant Territorial Authorities in relation to the specific project described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity. All future owners of this property should seek professional geotechnical advice to satisfy themselves as to its on-going suitability for their intended use.

For and on behalf of Lander Geotechnical Consultants Limited

Prepared by:



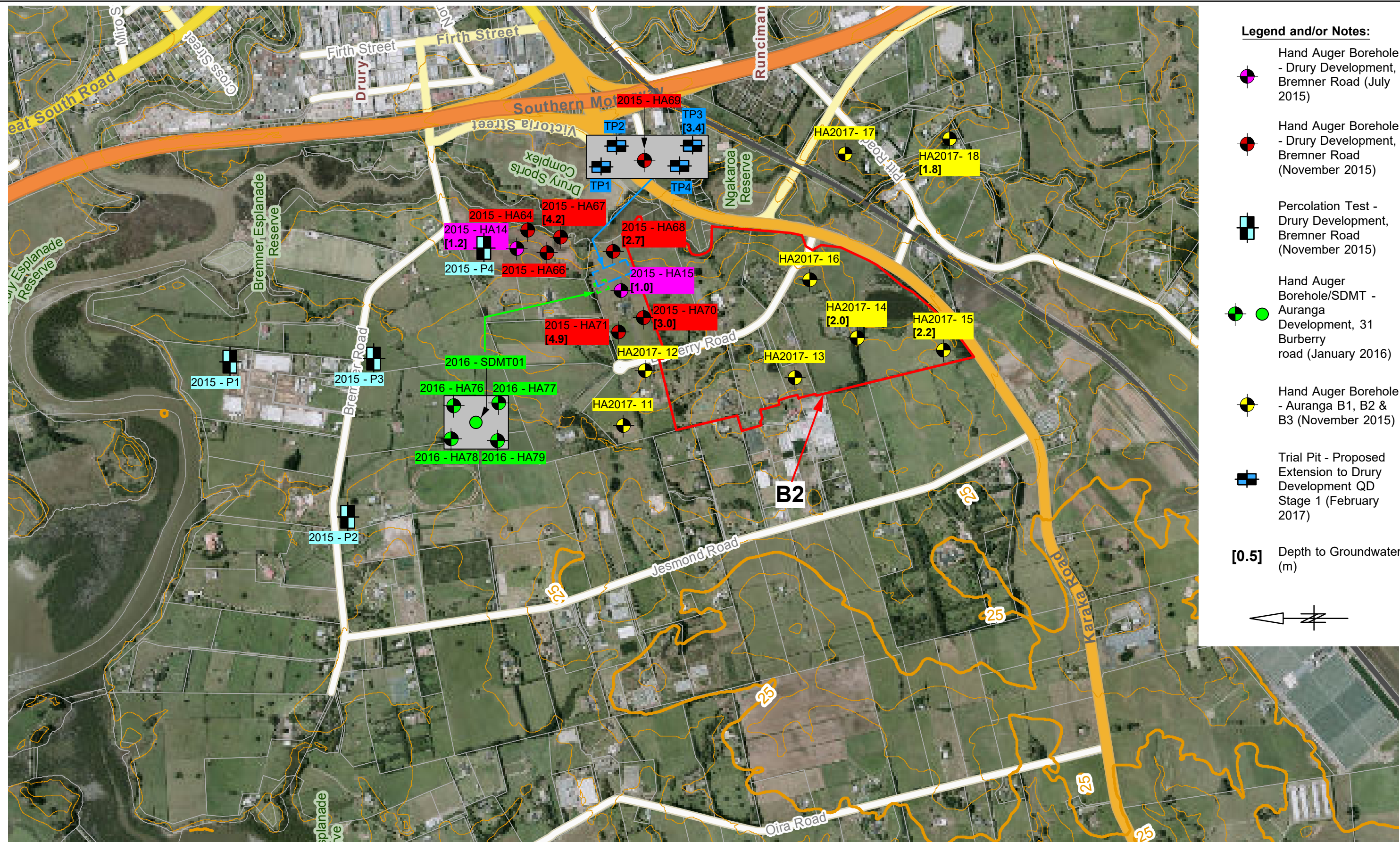
K. Meffan
Engineering Geologist

Reviewed and Authorised by:









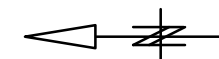
S.G. Lander
Principal Geotechnical Engineer
CMEngNZ, CPeng, IntPE(NZ)

Attachments: Auranga B2 Re-zoning concept plan drawings (McKenzie and Co)
Site Plan (Figure 01)
Field Investigation Data (from previous work)





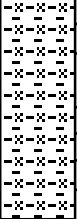


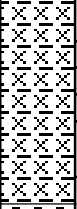
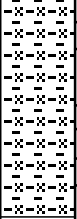
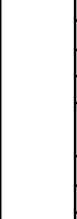
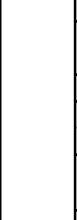
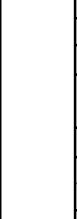
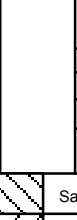
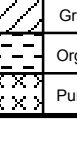














Legend and/or Notes:

-  Hand Auger Borehole - Drury Development, Bremner Road (July 2015)
-  Hand Auger Borehole - Drury Development, Bremner Road (November 2015)
-  Percolation Test - Drury Development, Bremner Road (November 2015)
-  Hand Auger Borehole/SDMT - Auranga Development, 31 Burberry road (January 2016)
-  Hand Auger Borehole - Auranga B1, B2 & B3 (November 2015)
-  Trial Pit - Proposed Extension to Drury Development QD Stage 1 (February 2017)
- [0.5]** Depth to Groundwater (m)



BASE PLAN SOURCE: LGCL SITE PLAN, REF. J00557, DRAWN 16.02.17

| | | | | | | | | | | | |
|----------|-------------|-------|----------|------|---|---------------|----------|--|-------------|-------------------------------|------------|
| revision | description | drawn | approved | date | <div><div><div>0200400600</div><div>Horizontal Scale (metres)</div></div><div><div>0200400600</div><div>Vertical Scale (metres)</div></div></div> | drawn | KM | <div></div> | client: | KARAKA AND DRURY LIMITED | |
| | | | | | | approved | SL | | project: | AURANGA DEVELOPMENT B2, DRURY | |
| | | | | | | date | 04/03/19 | | title: | SITE PLAN | |
| | | | | | | scale | 1:10000 | | project no: | J01132 | figure no: |
| | | | | | | original size | A3 | | | | 01 |



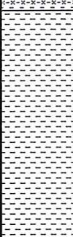

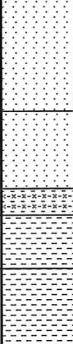

















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|---|--|---------------------------------|----|-------------------------------------|---------|---|-----------|---|---------------------------------|---|--|---|
| Client : KARAKA & DRURY CONSULTANT LTD | | | | Auger Borehole No. 2015 - 14 | | | | | | | | |
| Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY | | | | Sheet 14 of 18 | | | | | | | | |
| Job Number: J00137 | | | | Vane Head: 307 | | Logged By: TT | | Processor : TT | | Date: 30.07.15 | | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | |
| | | Description: Refer to site plan | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | |
| TOPSOIL | | | | | |  | | | | | | |
| silty CLAY, brown/orange. Very stiff, moist, high plasticity, moderately sensitive [ASH DEPOSITS] | | | | | |  | 0.5 | | 154/67 | 2.3 | | |
| clayey SILT, brown/orange. Hard, moist, medium plasticity, with major black carbonaceous inclusions becoming grey/brown streaked brown/orange | | | | | |  | 1.0 |  | 229+ | | | |
| becoming wet, insensitive | | | | | |  | 1.5 | | 229/141 | 1.6 | | |
| silty CLAY, grey streaked brown/orange. Stiff, wet, high plasticity, insensitive [PUKETOKA FORMATION] | | | | | |  | 2.0 | | UTP | | | |
| becoming slightly silty CLAY, grey, with minor orange mottles | | | | | |  | 2.5 | | 97/64 | 1.5 | | |
| EOB at 3.0m. Target Depth. | | | | | |  | 3.0 | | 71/48 | 1.5 | | |
| | | | | | |  | 3.5 | | | | | |
| | | | | | |  | 4.0 | | | | | |
| | | | | | |  | 4.5 | | | | | |
| | | | | | | | 5.0 | | | | | |
| | | | | | | | 5.5 | | | | | |
| | | | | | | | 6.0 | | | | | |
|  | | Comments: | | Borehole Diameter: | Topsoil |  | Sand |  | Sandstone |  | Plutonic |  |
| | | Groundwater encountered 2.0m | | 50mm | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | UTP = unable to penetrate. | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | EOB = end of borehole. | | | Silt |  | Pumice |  | Volcanic |  | | |

| | | | | | | | | | | | | | | |
|---|--|--|----|-------------|--|-------------------------------------|------------------|-----------------------------|--|-------------------------|---|-----------------------|----------|--|
| Client : KARAKA & DRURY CONSULTANT LTD | | | | | | Auger Borehole No. 2015 - 15 | | | | | | | | |
| Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY | | | | | | Sheet 15 of 18 | | | | | | | | |
| Job Number: J00137 | | | | | | Vane Head: 307 | | Logged By: TT | | Processor : TT | | Date: 30.07.15 | | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | |
| | | Description: Refer to site plan | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | | |
| TOPSOIL | | | | | | | | | | | | | | |
| clayey SILT, brown/orange. Very stiff, moist, medium plasticity, moderately sensitive [ASH DEPOSITS] | | | | | | | 0.5 | | 172/74 | 2.3 | | | | |
| becoming insensitve becoming grey/brown streaked brown/orange | | | | | | | 1.0 | | 166/87 | 1.9 | | | | |
| becoming wet | | | | | | | | | | | | | | |
| becoming hard, moderately sensitive, with some red/brown mottling | | | | | | | 1.5 | | 211/97 | 2.2 | | | | |
| becoming grey and red/brown mottled brown/orange becoming very stiff | | | | | | | 2.0 | | 198/93 | 2.1 | | | | |
| silty CLAY, orange streaked grey. Very stiff, wet, high plasticity, insensitive [PUKETOKA FORMATION] | | | | | | | | | | | | | | |
| becoming grey, with occasional red/orange and orange mottling | | | | | | | 2.5 | | 172/109 | 1.6 | | | | |
| becoming orange streaked grey | | | | | | | | | | | | | | |
| EOB at 3.0m. Target Depth. | | | | | | | 3.0 | | 135/87 | 1.6 | | | | |
| | | | | | | | 3.5 | | | | | | | |
| | | | | | | | 4.0 | | | | | | | |
| | | | | | | | 4.5 | | | | | | | |
| | | | | | | | 5.0 | | | | | | | |
| | | | | | | | 5.5 | | | | | | | |
| | | | | | | | 6.0 | | | | | | | |
| Comments: Groundwater encountered 1.5m UTP = unable to penetrate. EOB = end of borehole. | | | | | | Borehole Diameter: | Topsoil | | Sand | | Sandstone | | Plutonic | |
| | | | | | | 50mm | Fill | | Gravel | | Siltstone | | No Core | |
| | | | | | | Checked: | Clay | | Organic | | Limestone | | | |
| | | | | | | | Silt | | Pumice | | Volcanic | | | |

| | | | | | | | | | | | | | |
|--|--|--|----|---------------------------|---------|-------------------------------------|------------------|-----------------------------|--|--------------------------|---|--------------------------|--|
| Client : KARAKA & DRURY CONSULTANT LTD | | | | | | Auger Borehole No. 2015 - 64 | | | | | | | |
| Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY | | | | | | Sheet 64 of 71 | | | | | | | |
| Job Number: J00137 | | | | | | Vane Head: 1750 | | Logged By: GB | | Processor : GB | | Date: 18.11.15 | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | |
| | | Description: Refer to site plan | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | |
| TOPSOIL | | | | | | [Pattern] | | | | | | | |
| silty CLAY, light brown mottled dark brown. Very stiff, dry, low plasticity with some well cemented manganese oxide gravel inclusions becoming extra sensitive | | | | | | [Pattern] | 0.5 | | 104/ 13 | 8.0 | | | |
| clayey SILT, brown mottled black. Very stiff, damp, low plasticity, with some manganese oxide inclusions | | | | | | [Pattern] | | | | | | | |
| silty CLAY, dark brown mottled light brown. Very stiff, moist, medium plasticity, with minor manganese oxide inclusions | | | | | | [Pattern] | 1.0 | | 186+ | | | | |
| becoming orange brown, with trace manganese oxide inclusions | | | | | | [Pattern] | | | | | | | |
| becoming moderately sensitive | | | | | | [Pattern] | 1.5 | | 155/ 45 | 3.4 | | | |
| becoming orange brown streaked light grey, with minor manganese oxide inclusions | | | | | | [Pattern] | 2.0 | | 108/ 45 | 2.4 | | | |
| becoming orange/ brown mottled light grey | | | | | | [Pattern] | | | | | | | |
| becoming slightly silty CLAY | | | | | | [Pattern] | 2.5 | | 89/ 42 | 2.1 | | | |
| becoming stiff | | | | | | [Pattern] | | | | | | | |
| EOB at 3.0m. Target Depth. | | | | | | [Pattern] | 3.0 | | 58/ 28 | 2.1 | | | |
| | | | | | | [Pattern] | 3.5 | | | | | | |
| | | | | | | [Pattern] | 4.0 | | | | | | |
| | | | | | | [Pattern] | 4.5 | | | | | | |
| | | | | | | [Pattern] | 5.0 | | | | | | |
| | | | | | | [Pattern] | 5.5 | | | | | | |
| | | | | | | [Pattern] | 6.0 | | | | | | |
| | | Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | Borehole Diameter: | Topsoil | [Pattern] | Sand | [Pattern] | Sandstone | [Pattern] | Plutonic | [Pattern] | |
| | | | | 50mm | Fill | [Pattern] | Gravel | [Pattern] | Siltstone | [Pattern] | No Core | [Pattern] | |
| | | | | Checked: | Clay | [Pattern] | Organic | [Pattern] | Limestone | [Pattern] | | | |
| | | | | T T | Silt | [Pattern] | Pumice | [Pattern] | Volcanic | [Pattern] | | | |

| | | | | | | | |
|--|----|----|-------------|---|------------------|----------------------|---------------------------------|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2015 - 66 Sheet 66 of 71 | | | |
| | | | | Vane Head: 946 | Logged By: AB | Processor : GB | Date: 18.11.15 |
| Borehole Location: | mN | mE | Ground R.L. | | | | |
| Description: Refer to site plan | | | | | | | |
| SOIL DESCRIPTION | | | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual |
| TOPSOIL | | | | [Pattern] | | | |
| silty CLAY, orange streaked dark brown. Hard, moist, medium plasticity, with trace rootlet inclusions | | | | [Pattern] | 0.5 | | 215+ |
| at 0.5m, becoming orange/brown, without rootlet inclusions | | | | [Pattern] | | | |
| with sandy, orange limonite silt inclusions | | | | [Pattern] | 1.0 | | UTP |
| becoming very stiff, moderately sensitive | | | | [Pattern] | 1.5 | | 184/ 49 3.8 |
| becoming orange mottled yellow/ brown, with major limonite silt inclusions | | | | [Pattern] | 2.0 | | 196/ 95 2.1 |
| becoming pink/ red and orange mottled grey | | | | [Pattern] | | | |
| with minor fine sand | | | | [Pattern] | 2.5 | | 130/ 69 1.9 |
| becoming insensitive | | | | [Pattern] | | | |
| becoming pink/ red and orange streaked grey | | | | [Pattern] | 3.0 | | 100/ 69 1.5 |
| EOB at 3.0m. Target Depth | | | | [Pattern] | | | |
| | | | | [Pattern] | 3.5 | | |
| | | | | [Pattern] | 4.0 | | |
| | | | | [Pattern] | 4.5 | | |
| | | | | [Pattern] | 5.0 | | |
| | | | | [Pattern] | 5.5 | | |
| | | | | [Pattern] | 6.0 | | |

| | | | | | | | | | | |
|--|--|--------------------|---------|-----------|---------|-----------|-----------|-----------|----------|-----------|
| | Comments: | Borehole Diameter: | Topsoil | [Pattern] | Sand | [Pattern] | Sandstone | [Pattern] | Plutonic | [Pattern] |
| | Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | 50mm | Fill | [Pattern] | Gravel | [Pattern] | Siltstone | [Pattern] | No Core | [Pattern] |
| | | Checked: | Clay | [Pattern] | Organic | [Pattern] | Limestone | [Pattern] | | |
| | | TT | Silt | [Pattern] | Pumice | [Pattern] | Volcanic | [Pattern] | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--|---|--|-----------------------|--|--|--|--|--|--|--|---|--|--|--|---|--|--|--|---------------------|--|--|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2015 - 67 Sheet 67 of 71 | | | | | | | | | | | | | | | | | | | | | |
| | | | | Vane Head: 1900 | | Logged By: MVC | | Processor : GB | | Date: 19.11.15 | | | | | | | | | | | | | | | |
| Borehole Location: mN mE Ground R.L. Description: Refer to site plan | | | | Legend | | Depth (m) | | Standing Water Level | | Vane Shear(kPa) peak / residual | | Soil Sensitivity | | Sample and Laboratory / Other Test Details | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | |
| silty CLAY, orange/ brown mottled brown. Hard, dry, medium plasticity becoming moist, high plasticity becoming moderately sensitive | | | |  | | 0.5 1.0 | | 203/ 86 UTP | | 2.4 | |  | | Sample 1 Disturbed 0.5-1.0m | | | | | | | | | | | |
| fine sandy CLAY, orange/ brown mottled grey. Very stiff, moist, medium plasticity, moderately sensitive becoming slightly fine sandy CLAY, orange streaked light grey, high plasticity, with minor orange limonite staining becoming hard | | | |  | | 1.5 2.0 | | 178/ 80 208+ | | 2.2 | |  | | Sample 2 Disturbed 1.5-2.0m | | | | | | | | | | | |
| fine SAND, orange mottled yellow/ brown. Loose, moist, non plastic, with some orange limonite staining slightly clayey fine SAND, orange/ brown mottled yellow/ brown. Very stiff, moist, low plasticity, sensitive silty CLAY, orange/ brown. Very stiff, moist, high plasticity CLAY, grey. Stiff, wet, high plasticity, moderately sensitive gravelly CLAY, with some fine sand, grey. Stiff, wet, medium plasticity | | | |  | | 2.5 3.0 | | 156/ 37 86/ 36 | | 4.2 2.4 | |  | | Sample 3 Disturbed 2.5-3.0m | | | | | | | | | | | |
| sandy CLAY, with trace fine gravel inclusions, dark green/ grey. Hard, wet, high plasticity, with blue/ grey clast inclusions fine SAND, dark blue/ grey. Medium dense, wet, non plastic becoming saturated | | | |  | | 3.5 4.0 4.5 | | UTP UTP UTP | | | | | | | | | | | | | | | | | |
| EOB at 5.0m. Target Depth. | | | | | | 5.0 5.5 6.0 | | UTP | | | | | | | | | | | | | | | | | |
|  | | | | Comments: Groundwater encountered 4.0m. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: 50mm Checked: TT | | Topsoil Fill Clay Silt | |     | | Sand Gravel Organic Pumice | |     | | Sandstone Siltstone Limestone Volcanic | |     | | Plutonic No Core | |   | |


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|--|--|--|--|--|--|--|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2015 - 68 Sheet 68 of 71 | | | |
| Vane Head: 946 Logged By: AB Processor : GB Date: 19.11.15 | | | | | | | |
| Borehole Location: mN mE Ground R.L. Description: Refer to site plan | | | | | | | |
| SOIL DESCRIPTION | | | | | | | |
| TOPSOIL silty CLAY, dark brown. Hard, moist, medium plasticity, with trace rootlet inclusions becoming orange/ brown streaked grey, without trace rootlet inclusions with trace limonite silt inclusions becoming very stiff, moderately sensitive becoming grey mottled orange brown, with some limonite silt inclusions becoming orange streaked grey becoming yellow/brown and orange streaked grey, with some fine sand sandy CLAY, grey. Stiff, moist, high plasticity, insensitive, with trace limonite silt inclusions CLAY, light grey. Very stiff, moist, high plasticity, extra sensitive sandy CLAY, dark grey. Very stiff, moist, high plasticity, extra sensitive slightly clayey SAND, dark grey. Very stiff, moist, low to medium plasticity SAND, dark brown and black. Medium dense, moist, no plasticity, with some decayed organic wood inclusions EOB at 3.0m. Target Depth. | | | | Legend Depth (m) Standing Water Level Vane Shear(kPa) peak / residual Soil Sensitivity Sample and Laboratory / Other Test Details | | | |
| silty CLAY, dark brown. Hard, moist, medium plasticity, with trace rootlet inclusions becoming orange/ brown streaked grey, without trace rootlet inclusions with trace limonite silt inclusions becoming very stiff, moderately sensitive becoming grey mottled orange brown, with some limonite silt inclusions becoming orange streaked grey becoming yellow/brown and orange streaked grey, with some fine sand sandy CLAY, grey. Stiff, moist, high plasticity, insensitive, with trace limonite silt inclusions CLAY, light grey. Very stiff, moist, high plasticity, extra sensitive sandy CLAY, dark grey. Very stiff, moist, high plasticity, extra sensitive slightly clayey SAND, dark grey. Very stiff, moist, low to medium plasticity SAND, dark brown and black. Medium dense, moist, no plasticity, with some decayed organic wood inclusions EOB at 3.0m. Target Depth. | | | | 0.5 215+ 1.0 196/ 61 3.2 1.5 175/ 67 2.6 2.0 64/ 38 1.7 2.5 169/ 12 14 3.0 UTP 3.5 4.0 4.5 5.0 5.5 6.0 | | | |
| Comments: Groundwater encountered 2.7m. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: 50mm Checked: TT | | | |
| LANDER geotechnical | | | | Topsoil Sand Sandstone Plutonic Fill Gravel Siltstone No Core Clay Organic Limestone Silt Pumice Volcanic | | | |





















| | | | | | | | | | | | | |
|--|----|----|-------------|---|------------------|----------------------|---------------------------------|------------------|--|-----------|----------|-----------|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2015 - 69 Sheet 69 of 71 | | | | | | | | |
| | | | | Vane Head: 946 | Logged By: AB | Processor : GB | Date: 19.11.15 | | | | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | |
| Description: Refer to site plan | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | |
| TOPSOIL | | | | [Pattern] | | | | | | | | |
| silty CLAY, dark orange/ brown. Hard, moist, high plasticity | | | | [Pattern] | | | | | | | | |
| clayey SILT, orange. Very stiff, moist, medium to low plasticity, moderately sensitive, with trace limonite staining | | | | [Pattern] | 0.5 | | UTP | | | | | |
| | | | | [Pattern] | 1.0 | | 199/ 89 | 2.2 | | | | |
| silty CLAY, orange. Very stiff, moist, high plasticity, moderately sensitive, with trace limestone | | | | [Pattern] | 1.5 | | 187/ 74 | 2.5 | | | | |
| becoming hard | | | | [Pattern] | 2.0 | | 215+ | | | | | |
| becoming mottled gray, yellow/ brown and orange | | | | [Pattern] | 2.5 | | 162/ 77 | 2.1 | | | | |
| becoming red streaked grey | | | | [Pattern] | 3.0 | | 161/ 74 | 2.2 | | | | |
| EOB at 3.0m. Target Depth | | | | [Pattern] | | | | | | | | |
| | | | | [Pattern] | 3.5 | | | | | | | |
| | | | | [Pattern] | 4.0 | | | | | | | |
| | | | | [Pattern] | 4.5 | | | | | | | |
| | | | | [Pattern] | 5.0 | | | | | | | |
| | | | | [Pattern] | 5.5 | | | | | | | |
| | | | | [Pattern] | 6.0 | | | | | | | |
| <div style="display: flex; align-items: center;"> <div> Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. </div> </div> | | | | Borehole Diameter: | Topsoil | [Pattern] | Sand | [Pattern] | Sandstone | [Pattern] | Plutonic | [Pattern] |
| | | | | 50mm | Fill | [Pattern] | Gravel | [Pattern] | Siltstone | [Pattern] | No Core | [Pattern] |
| | | | | Checked: | Clay | [Pattern] | Organic | [Pattern] | Limestone | [Pattern] | | |
| | | | | TT | Silt | [Pattern] | Pumice | [Pattern] | Volcanic | [Pattern] | | |

[illegible]

| | | | | | | | | | |
|---|----|----|-------------|---|-------------------|----------------------|---------------------------------|------------------|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2015 - 71 Sheet 71 of 71 | | | | | |
| | | | | Vane Head: 1900 | Logged By: MVC | Processor : GB | Date: 19.11.15 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| Description: Refer to site plan | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL | | | | | | | | | |
| silty CLAY, orange/ brown mottled grey/ brown. Very stiff, moist, high plasticity, moderately sensitive, with trace rootlet inclusions | | | | | | | | | |
| becoming orange/ brown mottled light brown | | | | 0.5 | | | 163/ 68 | 2.4 | Sample 1 Disturbed 0.5-1.0m |
| becoming slightly silty CLAY, light brown streaked light grey | | | | 1.0 | | | 166/ 73 | 2.3 | |
| becoming orange/ brown streaked light grey, with minor limonite staining and inclusions | | | | 1.5 | | | 166/ 76 | 2.2 | |
| becoming orange/ brown streaked grey | | | | 2.0 | | | 208+ | | Sample 2 Disturbed 1.5-2.0m |
| becoming grey streaked yellow/ brown, hard | | | | 2.5 | | | 144/ 80 | 1.8 | |
| becoming yellow/ brown streaked grey | | | | 3.0 | | | 125/ 73 | 1.7 | Sample 3 Disturbed 2.5-3.0m |
| becoming very stiff, insensitive | | | | 3.5 | | | 111/ 61 | 1.8 | |
| CLAY, light grey streaked yellow/ brown. Very stiff, moist, high plasticity, insensitive | | | | 4.0 | | | 122/ 47 | 2.6 | |
| slightly silty CLAY, light grey streaked yellow/ brown. Very stiff, moist, high plasticity, insensitive | | | | 4.5 | | | 135/ 49 | 2.8 | |
| becoming moderately sensitive becoming wet | | | | 5.0 | | ▽ | 68/ 27 | 2.5 | |
| becoming yellow/ brown streaked light grey | | | | 5.5 | | | | | |
| becoming orange/ brown specked light grey, with trace limonite staining | | | | 6.0 | | | | | |
| becoming stiff | | | | | | | | | |
| EOB at 5.0m. Target Depth. | | | | | | | | | |
| <div style="display: flex; align-items: center;"> <div> Comments: Groundwater encountered 4.9m. UTP = unable to penetrate. EOB = end of borehole. </div> </div> | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | +++++ |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | TT | Silt | Pumice | Volcanic | | |
| | | | | | | | | | |

[illegible]

| | | | | | | | | | |
|--|---------------------------------|----|-------------|---|------------------|----------------------|----------------------------------|------------------|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : AURANGA DEVELOPMENT, 31 BURBERRY ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2016 - 77 Sheet 77 of 79 | | | | | |
| | | | | Vane Head: 1750 | Logged By: TT | Processor : TT | Date: 28.01.16 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear (kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| | Description: Refer to site plan | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL | | | | | | | | | |
| silty CLAY, yellow/brown. Hard, moist, medium plasticity, with some manganese oxide inclusions | | | | | 0.5 | | UTP | | |
| clayey SILT, brown/orange. Very stiff, dry to moist, low to medium plasticity, sensitive | | | | | 1.0 | | 183/37 | 4.9 | |
| becoming light brown/orange, moderately sensitive | | | | | 1.5 | | 183/74 | 2.5 | |
| silty CLAY, light grey streaked light brown/orange. Hard, moist, medium plasticity, with trace sand inclusions, with minor limonite silt inclusions | | | | | 2.0 | | UTP | | |
| becoming grey streaked orange | | | | | 2.5 | | 186+ | | |
| becoming orange and red/orange streaked grey, high plasticity | | | | | 3.0 | | 183/96 | 1.9 | |
| becoming very stiff | | | | | 3.5 | | 181/106 | 1.7 | |
| becoming slightly silty CLAY | | | | | 4.0 | | 149/96 | 1.6 | |
| becoming light grey mottled light orange | | | | | 4.5 | | 157/96 | 1.6 | |
| becoming insensitive | | | | | 5.0 | | 162/98 | 1.7 | |
| becoming red/pink mottled light grey | | | | | | | | | |
| becoming light grey mottled light orange | | | | | | | | | |
| becoming red/pink mottled light grey | | | | | | | | | |
| EOB at 5.0m. Target Depth. Scala Penetrometer Test commenced to 5.9m. | | | | | | | | | |
| | | | | | 5.5 | | | | |
| | | | | | 6.0 | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | A13 | Silt | Pumice | Volcanic | | |

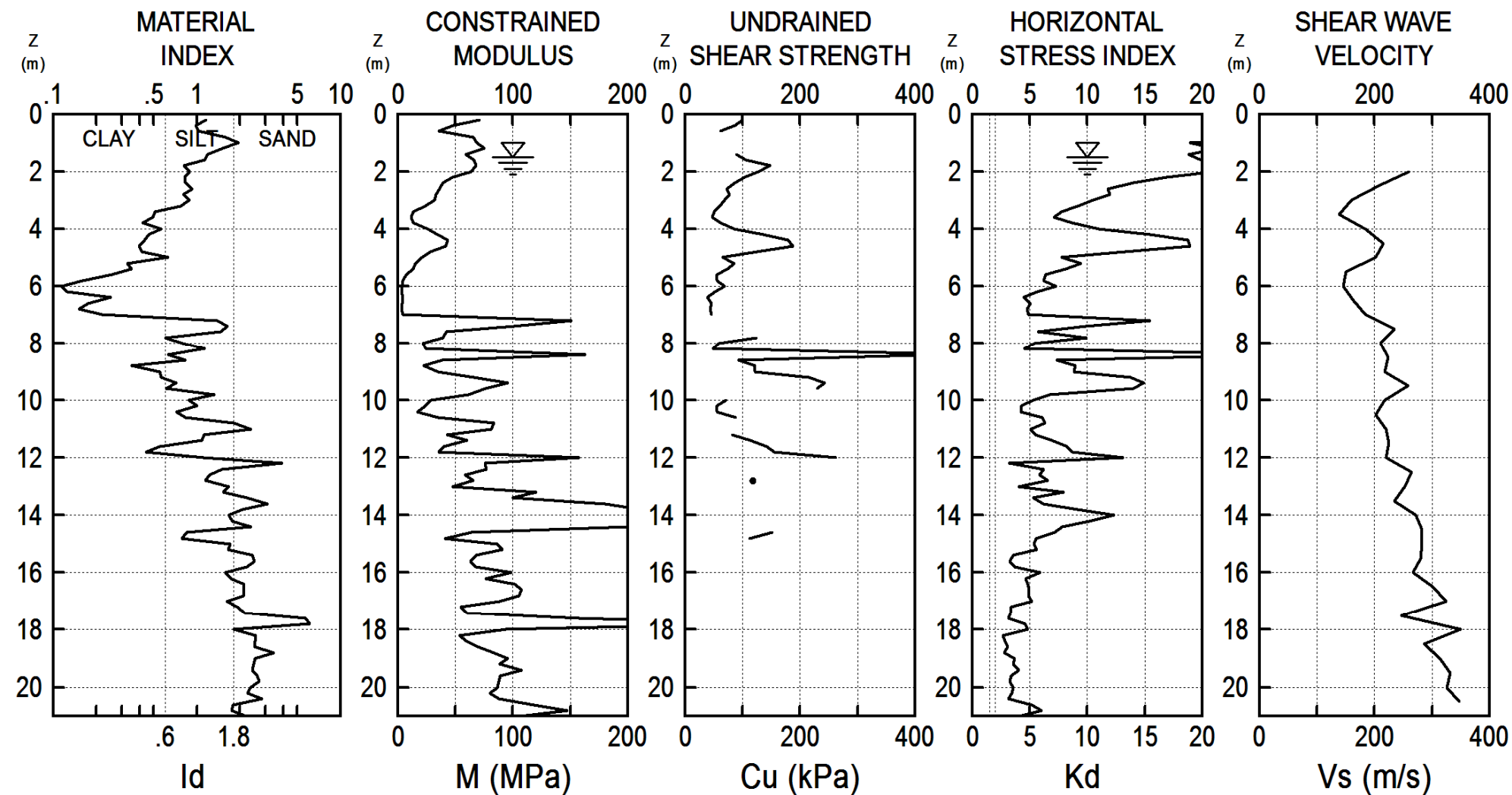
| | | | | | | | | | | | | | | | |
|--|--|-----------------------------|--|--|--|-------------------------|--|-----------------------------|--|--|--|-------------------------|--|---|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : AURANGA DEVELOPMENT, 31 BURBERRY ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2016 - 78 Sheet 78 of 79 | | | | | | | | | | | |
| | | | | Vane Head: 1750 | | Logged By: TT | | Processor : TT | | Date: 28.01.16 | | | | | |
| Borehole Location: | | mN mE Ground R.L. | | Legend | | Depth (m) | | Standing Water Level | | Vane Shear(kPa) peak / residual | | Soil Sensitivity | | Sample and Laboratory / Other Test Details | |
| Description: Refer to site plan | | | | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | | | |
| TOPSOIL | | | |  | | | | | | | | | | | |
| silty CLAY, yellow/brown. Very stiff, moist, medium plasticity | | | |  | | 0.5 | | 186+ | | | | | | | |
| becoming yellow/brown streaked brown/orange | | | |  | | 1.0 | | 93/19 | | 4.9 | | | | | |
| becoming stiff, sensitive | | | |  | | 1.5 | | 186+ | | | | | | | |
| becoming grey/brown streaked brown/orange | | | |  | | 2.0 | | 173/82 | | 2.1 | | | | | |
| becoming very stiff becoming red and grey streaked light brown/orange | | | |  | | 2.5 | | 186+ | | | | | | | |
| becoming moderately sensitive becoming orange streaked light grey, high plasticity | | | |  | | 3.0 | | 154/96 | | 1.6 | | | | | |
| becoming insensitive | | | |  | | 3.5 | | 149/93 | | 1.6 | | | | | |
| CLAY, light orange streaked light grey. Very stiff, moist, high plasticity, insensitive | | | |  | | 4.0 | | 157/77 | | 2.0 | | | | | |
| becoming moderately sensitive | | | |  | | 4.5 | | 186+ | | | | | | | |
| silty CLAY, orange streaked grey/yellow. Very stiff, moist, high plasticity | | | |  | | 5.0 | | 154/64 | | 2.4 | | | | | |
| becoming grey | | | |  | | 5.5 | | | | | | | | | |
| at 5.0m, becoming moderately sensitive | | | |  | | 6.0 | | | | | | | | | |
| EOB at 5.0m. Target Depth. Scala Penetrometer Test commenced to 5.9m. | | | |  | | 6.5 | | | | | | | | | |
| | | | |  | | 7.0 | | | | | | | | | |
| | | | |  | | 7.5 | | | | | | | | | |
| | | | |  | | 8.0 | | | | | | | | | |
| | | | |  | | 8.5 | | | | | | | | | |
| | | | |  | | 9.0 | | | | | | | | | |
| | | | |  | | 9.5 | | | | | | | | | |
| | | | | | | 10.0 | | | | | | | | | |
| | | | | | | 10.5 | | | | | | | | | |
| | | | | | | 11.0 | | | | | | | | | |
| | | | | | | 11.5 | | | | | | | | | |
| | | | | | | 12.0 | | | | | | | | | |
| | | | | | | 12.5 | | | | | | | | | |
| | | | | | | 13.0 | | | | | | | | | |
| | | | | | | 13.5 | | | | | | | | | |
| | | | | | | 14.0 | | | | | | | | | |
| | | | | | | 14.5 | | | | | | | | | |
| | | | | | | | | | | | | | | | |

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|--|----|----|-------------|---|------------------|----------------------|----------------------------------|------------------|--|--|----------|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : AURANGA DEVELOPMENT, 31 BURBERRY ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2016 - 79 Sheet 79 of 79 | | | | | | | | |
| | | | | Vane Head: 1750 | Logged By: TT | Processor : TT | Date: 28.01.16 | | | | | |
| Borehole Location: | mN | mE | Ground R.L. | | | | | | | | | |
| Description: Refer to site plan | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | Legend | Depth (m) | Standing Water Level | Vane Shear (kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | |
| TOPSOIL | | | | | | | | | | | | |
| silty CLAY, yellow/brown. Very stiff, moist, medium plasticity, sensitive becoming brown/orange | | | | | 0.5 | | 173/32 | 5.4 | | | | |
| becoming red/brown streaked light brown/orange | | | | | 1.0 | | 183/35 | 5.2 | | | | |
| becoming light brown/orange streaked grey, high plasticity, with occasional red/brown mottles | | | | | 1.5 | | 186+ | | | | | |
| becoming slightly silty CLAY, orange streaked grey, without red/brown mottles | | | | | 2.0 | | 186+ | | | | | |
| becoming light grey streaked light orange, insensitive | | | | | 2.5 | | 186+ | | | | | |
| CLAY, light orange mottled light grey. Very stiff, moist, high plasticity, moderately sensitive, with occasional red/orange streaking | | | | | 3.0 | | 170/90 | 1.9 | | | | |
| silty CLAY, orange mottled grey. Very stiff, moist, high plasticity, moderately sensitive, with trace limonite inclusions | | | | | 3.5 | | 154/104 | 1.5 | | | | |
| becoming medium plasticity, with some limonite silt inclusions | | | | | 4.0 | | 162/80 | 2.0 | | | | |
| becoming light grey, without limonite silt inclusions | | | | | 4.5 | | 173/66 | 2.6 | Scala Penetrometer Test (blows/100mm) | | | |
| EOB at 5.0m. Target Depth. Scala Penetrometer Test commenced to 5.9m. | | | | | 5.0 | | 186+ | | 6 6 9 8 8 9 8 8 9 | | | |
| | | | | | 5.5 | | | | | | | |
| | | | | | 6.0 | | | | | | | |
| <div style="display: flex; align-items: center;"> <div> Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. </div> </div> | | | | Borehole Diameter: | Topsoil | | Sand | | Sandstone | | Plutonic | |
| | | | | 50mm | Fill | | Gravel | | Siltstone | | No Core | |
| | | | | Checked: | Clay | | Organic | | Limestone | | | |
| | | | | AB | Silt | | Pumice | | Volcanic | | | |

Ground Investigation Ltd
16-006

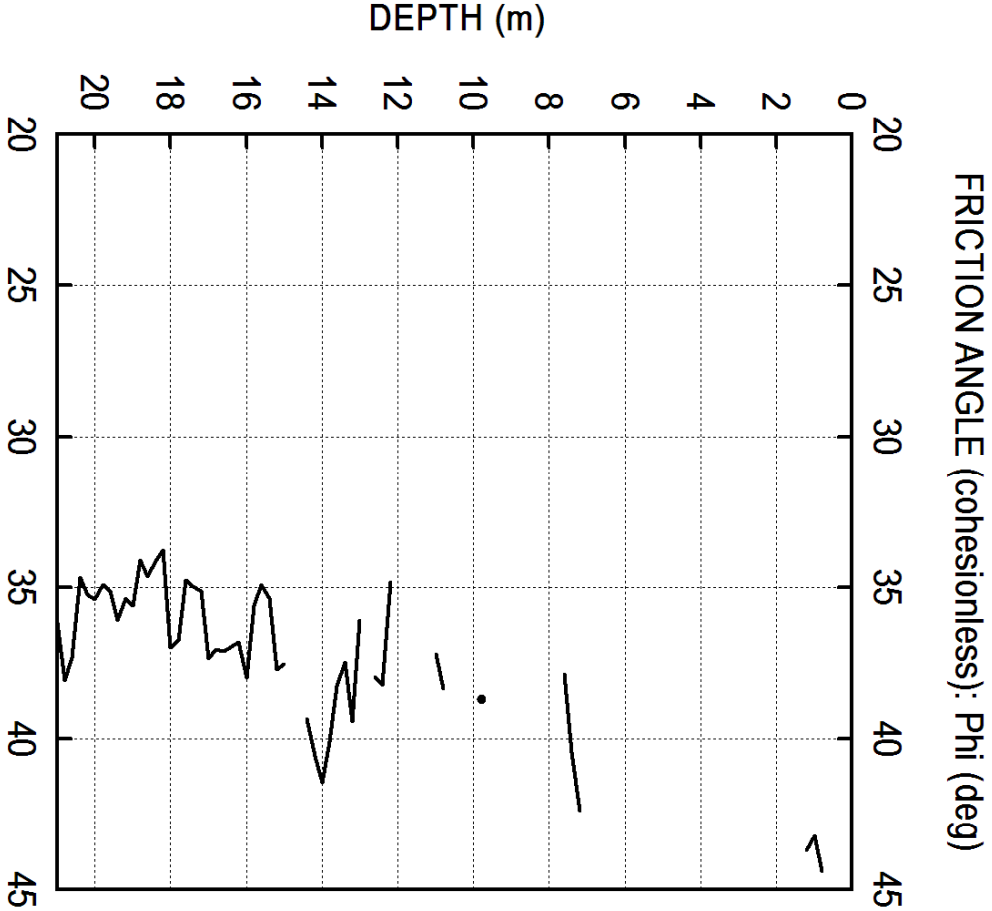
Lander Geotechnical
31 Burberry Rd

TEST
SDMT-01
28 JAN 2016

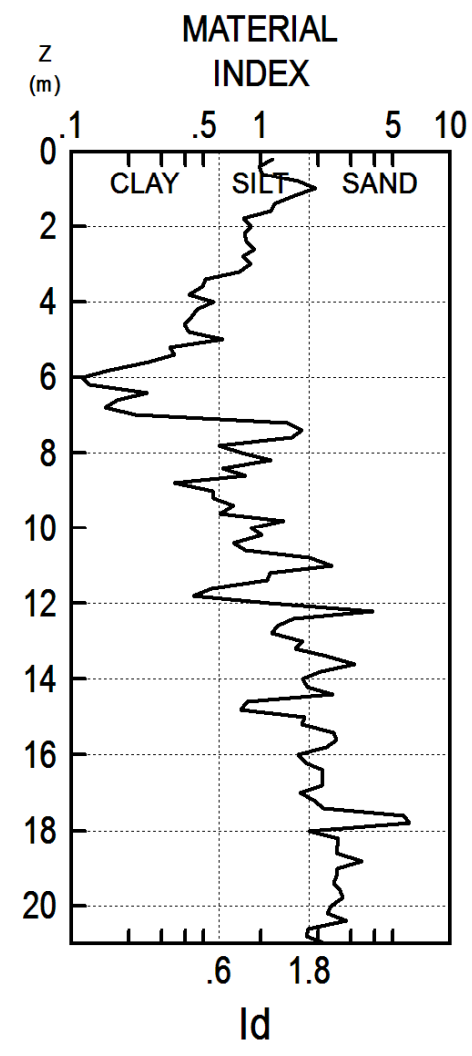
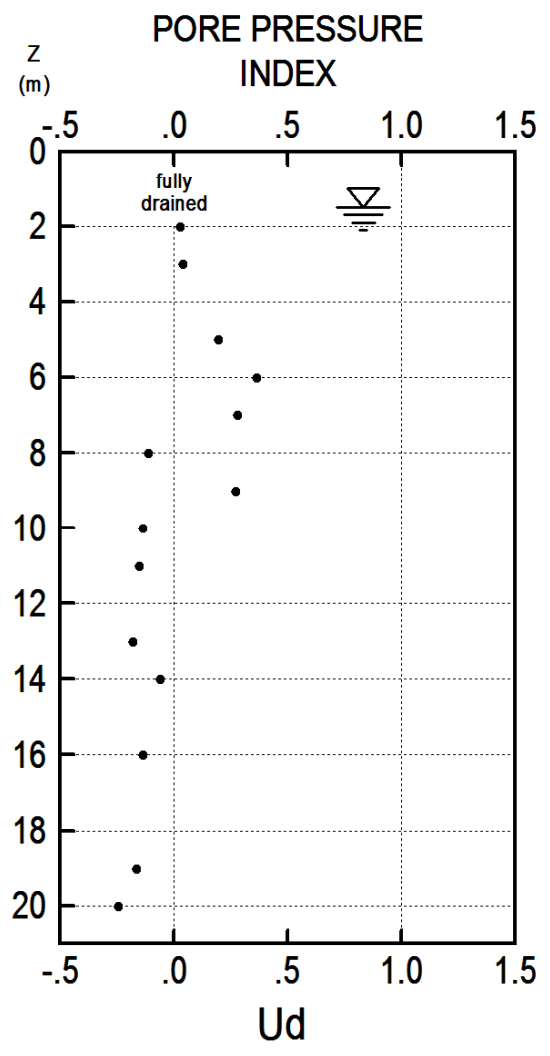
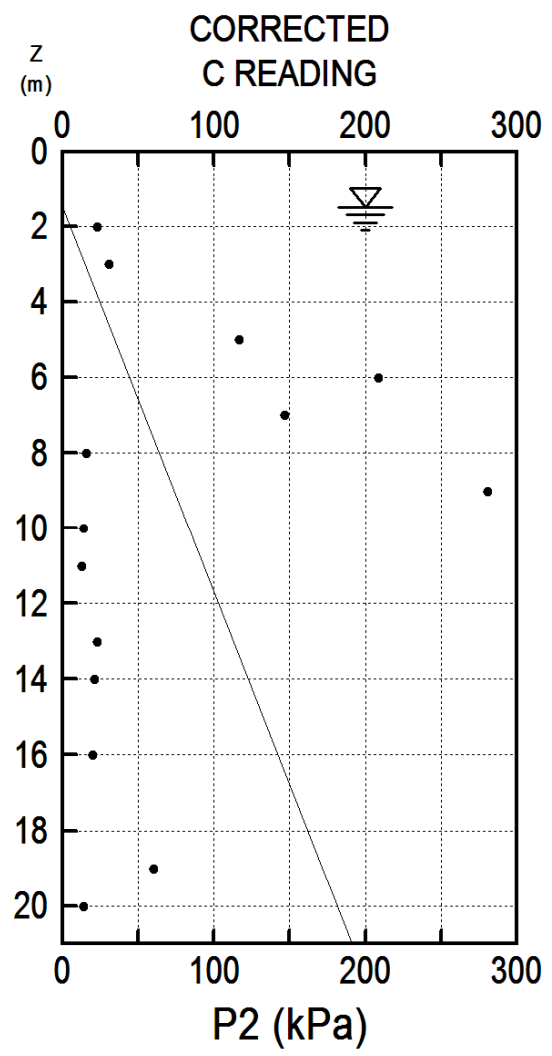


| | | |
|-------------------------------------|---------------------|----------------|
| Ground Investigation Ltd | Lander Geotechnical | TEST |
| 16-006 | 31 Burberry Rd | SDMT-01 |
| INTERPRETED GEOTECHNICAL PARAMETERS | | 28 JAN 2016 |

DILATOMETER TEST (D M T)



| | |
|---------------------------------------|---------------------|
| Ground Investigation Ltd | Lander Geotechnical |
| 16-006 | 31 Burberry Rd |
| INTERPRETED GEOTECHNICAL PARAMETERS | |
| TEST SDMT-01 28 JAN 2016 | |



| SDMT-01 | | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|--------------------------|--|--|---|-----------------------------------|
| 28 JAN 2016 | | Z = Depth Below Ground Level | Phi = Safe floor value of Friction Angle | DeltaA = 10 kPa |
| Ground Investigation Ltd | | Po,P1,P2 = Corrected A,B,C readings | Ko = In situ earth press. coeff. | DeltaB = 69 kPa |
| Lander Geotechnical | | Id = Material Index | M = Constrained modulus (at Sigma') | GammaTop = 17.0 kN/m ³ |
| 16-006 | | Ed = Dilatometer Modulus | Cu = Undrained shear strength | FactorEd = 34.7 |
| 31 Burberry Rd | | Ud = Pore Press. Index = (P2-Uo) / (Po-Uo) | Ocr = Overconsolidation ratio | ZMCal = 0.0 kPa |
| | | Gamma = Bulk unit weight | (OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | ZMAB = 0.0 kPa |
| | | Sigma' = Effective overb. stress | | ZMC = 0.0 kPa |
| | | Uo = Pore pressure | | Zabs = 0.0 m |
| | | | | Zw = 1.5 m |

WaterTable at 1.50 m

Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m ³) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | SDMT-01 DESCRIPTION |
|----------|------------|------------|------------|-------------|-------------|-------------|-------------------------------|-----------------|-------------|------|-------|-------------|-------|-----|-------|--------------|------------|-------------|------------------------|
| 0.2 | 388 | 883 | | 377 | 814 | | 17.7 | 3 | 0 | 1.16 | >99.9 | 15.2 | | 6.6 | >99.9 | | 70.9 | 99 | SILT |
| 0.4 | 357 | 762 | | 351 | 693 | | 17.7 | 7 | 0 | 0.98 | 50.6 | 11.9 | | 4.6 | >99.9 | | 47.9 | 87 | SILT |
| 0.6 | 292 | 653 | | 288 | 584 | | 16.7 | 10 | 0 | 1.03 | 27.5 | 10.3 | | 3.3 | 59.9 | | 35.5 | 61 | SILT |
| 0.8 | 370 | 978 | | 354 | 909 | | 17.7 | 14 | 0 | 1.57 | 25.6 | 19.3 | | | | 44 | 65.4 | | SANDY SILT |
| 1.0 | 348 | 1035 | | 328 | 966 | | 18.6 | 17 | 0 | 1.95 | 18.9 | 22.2 | | | | 43 | 68.7 | | SILTY SAND |
| 1.2 | 471 | 1193 | | 449 | 1124 | | 17.7 | 21 | 0 | 1.50 | 21.3 | 23.4 | | | | 44 | 75.4 | | SANDY SILT |
| 1.4 | 478 | 1077 | | 462 | 1008 | | 17.7 | 25 | 0 | 1.18 | 18.8 | 18.9 | | 2.7 | 33.0 | | 58.7 | 89 | SILT |
| 1.6 | 559 | 1216 | | 540 | 1147 | | 19.1 | 27 | 1 | 1.13 | 19.9 | 21.1 | | 2.8 | 36.0 | | 66.3 | 105 | SILT |
| 1.8 | 738 | 1371 | | 720 | 1302 | | 19.1 | 29 | 3 | 0.81 | 24.7 | 20.2 | | 3.1 | 50.7 | | 67.8 | 148 | SILT |
| 2.0 | 669 | 1295 | 13 | 652 | 1226 | 23 | 19.1 | 31 | 5 | 0.89 | 21.0 | 19.9 | 0.03 | 2.9 | 39.1 | | 63.8 | 128 | SILT |
| 2.2 | 571 | 1083 | | 559 | 1014 | | 17.7 | 33 | 7 | 0.82 | 16.9 | 15.8 | | 2.5 | 27.9 | | 47.3 | 104 | SILT |
| 2.4 | 499 | 960 | | 490 | 891 | | 17.7 | 34 | 9 | 0.83 | 14.0 | 13.9 | | 2.3 | 20.9 | | 39.3 | 86 | SILT |
| 2.6 | 441 | 893 | | 432 | 824 | | 17.7 | 36 | 11 | 0.93 | 11.8 | 13.6 | | 2.0 | 15.9 | | 36.1 | 72 | SILT |
| 2.8 | 467 | 888 | | 460 | 819 | | 17.7 | 37 | 13 | 0.80 | 11.9 | 12.5 | | 2.0 | 16.3 | | 33.2 | 77 | SILT |
| 3.0 | 432 | 856 | 21 | 425 | 787 | 31 | 17.7 | 39 | 15 | 0.88 | 10.5 | 12.6 | 0.04 | 1.9 | 13.3 | | 32.0 | 68 | SILT |
| 3.2 | 391 | 740 | | 388 | 671 | | 17.7 | 41 | 17 | 0.76 | 9.1 | 9.8 | | 1.7 | 10.7 | | 23.7 | 60 | CLAYEY SILT |
| 3.4 | 344 | 582 | | 346 | 513 | | 16.7 | 42 | 19 | 0.51 | 7.8 | 5.8 | | 1.6 | 8.3 | | 13.0 | 51 | SILTY CLAY |
| 3.6 | 326 | 550 | | 329 | 481 | | 16.7 | 44 | 21 | 0.49 | 7.1 | 5.3 | | 1.5 | 7.2 | | 11.3 | 46 | SILTY CLAY |
| 3.8 | 409 | 642 | | 411 | 573 | | 16.7 | 45 | 23 | 0.42 | 8.7 | 5.6 | | 1.7 | 9.9 | | 13.2 | 62 | SILTY CLAY |
| 4.0 | 536 | 888 | | 532 | 819 | | 17.7 | 46 | 25 | 0.56 | 11.0 | 9.9 | | 1.9 | 14.3 | | 25.7 | 85 | SILTY CLAY |
| 4.2 | 771 | 1175 | | 765 | 1106 | | 18.6 | 48 | 26 | 0.46 | 15.4 | 11.8 | | 2.4 | 24.3 | | 34.5 | 135 | SILTY CLAY |
| 4.4 | 969 | 1432 | | 960 | 1363 | | 18.6 | 50 | 28 | 0.43 | 18.8 | 14.0 | | 2.7 | 33.0 | | 43.3 | 179 | SILTY CLAY |
| 4.6 | 1012 | 1458 | | 1004 | 1389 | | 18.6 | 51 | 30 | 0.40 | 18.9 | 13.4 | | 2.7 | 33.4 | | 41.5 | 188 | SILTY CLAY |
| 4.8 | 742 | 1100 | | 738 | 1031 | | 17.7 | 53 | 32 | 0.42 | 13.3 | 10.2 | | 2.2 | 19.2 | | 28.1 | 125 | SILTY CLAY |
| 5.0 | 461 | 795 | 107 | 458 | 726 | 117 | 17.7 | 55 | 34 | 0.63 | 7.7 | 9.3 | 0.20 | 1.6 | 8.3 | | 20.8 | 65 | CLAYEY SILT |
| 5.2 | 564 | 809 | | 566 | 740 | | 17.7 | 56 | 36 | 0.33 | 9.4 | 6.0 | | 1.8 | 11.2 | | 14.7 | 86 | CLAY |
| 5.4 | 504 | 739 | | 506 | 670 | | 17.7 | 58 | 38 | 0.35 | 8.1 | 5.7 | | 1.6 | 8.9 | | 13.0 | 73 | SILTY CLAY |
| 5.6 | 414 | 586 | | 419 | 517 | | 16.7 | 59 | 40 | 0.26 | 6.4 | 3.4 | | 1.4 | 6.1 | | 6.9 | 56 | CLAY |
| 5.8 | 411 | 547 | | 418 | 478 | | 16.7 | 61 | 42 | 0.16 | 6.2 | 2.1 | | 1.3 | 5.8 | | 4.2 | 55 | CLAY |
| 6.0 | 488 | 616 | 199 | 496 | 547 | 209 | 16.7 | 62 | 44 | 0.11 | 7.3 | 1.8 | 0.37 | 1.5 | 7.5 | | 3.9 | 69 | CLAY |
| 6.2 | 398 | 520 | | 406 | 451 | | 15.7 | 64 | 46 | 0.13 | 5.7 | 1.6 | | 1.3 | 5.1 | | 3.0 | 51 | CLAY |
| 6.4 | 330 | 478 | | 337 | 409 | | 16.7 | 65 | 48 | 0.25 | 4.5 | 2.5 | | 1.1 | 3.5 | | 4.2 | 39 | CLAY |
| 6.6 | 376 | 510 | | 383 | 441 | | 16.7 | 66 | 50 | 0.17 | 5.0 | 2.0 | | 1.2 | 4.2 | | 3.6 | 46 | CLAY |
| 6.8 | 364 | 489 | | 372 | 420 | | 15.7 | 67 | 52 | 0.15 | 4.7 | 1.7 | | 1.1 | 3.9 | | 2.9 | 44 | CLAY |
| 7.0 | 380 | 528 | 137 | 387 | 459 | 147 | 16.7 | 69 | 54 | 0.22 | 4.8 | 2.5 | 0.28 | 1.1 | 4.0 | | 4.4 | 46 | CLAY |
| 7.2 | 1198 | 2700 | | 1137 | 2631 | | 20.6 | 70 | 56 | 1.38 | 15.4 | 51.8 | | | | 42 | 150.9 | | SANDY SILT |
| 7.4 | 817 | 2009 | | 771 | 1940 | | 19.1 | 72 | 58 | 1.64 | 9.9 | 40.6 | | | | 40 | 100.9 | | SANDY SILT |
| 7.6 | 504 | 1173 | | 484 | 1104 | | 17.7 | 74 | 60 | 1.46 | 5.7 | 21.5 | | | | 38 | 42.2 | | SANDY SILT |
| 7.8 | 824 | 1333 | | 812 | 1264 | | 19.1 | 76 | 62 | 0.60 | 9.9 | 15.7 | | 1.8 | 12.2 | | 39.1 | 123 | CLAYEY SILT |
| 8.0 | 487 | 882 | 6 | 481 | 813 | 16 | 17.7 | 77 | 64 | 0.79 | 5.4 | 11.5 | -0.11 | 1.2 | 4.7 | | 21.6 | 59 | CLAYEY SILT |
| 8.2 | 430 | 893 | | 421 | 824 | | 17.7 | 79 | 66 | 1.14 | 4.5 | 14.0 | | 1.1 | 3.5 | | 23.9 | 48 | SILT |
| 8.4 | 2295 | 3675 | | 2240 | 3606 | | 20.6 | 81 | 68 | 0.63 | 26.9 | 47.4 | | 3.3 | 58.0 | | 163.0 | 458 | CLAYEY SILT |

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m ³) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | SDMT-01 DESCRIPTION |
|----------|------------|------------|------------|-------------|-------------|-------------|-------------------------------|-----------------|-------------|------|------|-------------|-------|-----|------|--------------|------------|-------------|------------------------|
| 8.6 | 691 | 1250 | | 677 | 1181 | | 19.1 | 83 | 70 | 0.83 | 7.3 | 17.5 | | 1.5 | 7.6 | | 38.3 | 92 | SILT |
| 8.8 | 830 | 1162 | | 827 | 1093 | | 17.7 | 85 | 72 | 0.35 | 8.9 | 9.2 | | 1.7 | 10.3 | | 22.0 | 121 | SILTY CLAY |
| 9.0 | 844 | 1324 | 271 | 834 | 1255 | 281 | 18.6 | 86 | 74 | 0.55 | 8.8 | 14.6 | 0.27 | 1.7 | 10.2 | | 34.6 | 121 | SILTY CLAY |
| 9.2 | 1306 | 2031 | | 1284 | 1962 | | 18.6 | 88 | 76 | 0.56 | 13.7 | 23.5 | | 2.2 | 20.3 | | 65.9 | 215 | SILTY CLAY |
| 9.4 | 1450 | 2441 | | 1414 | 2372 | | 20.6 | 90 | 77 | 0.72 | 14.9 | 33.2 | | 2.3 | 23.0 | | 95.6 | 243 | CLAYEY SILT |
| 9.6 | 1391 | 2216 | | 1364 | 2147 | | 20.6 | 92 | 79 | 0.61 | 14.0 | 27.2 | | 2.3 | 20.8 | | 76.6 | 230 | CLAYEY SILT |
| 9.8 | 747 | 1622 | | 717 | 1553 | | 19.1 | 94 | 81 | 1.31 | 6.8 | 29.0 | | | | 39 | 61.4 | | SANDY SILT |
| 10.0 | 602 | 1107 | 4 | 591 | 1038 | 14 | 17.7 | 96 | 83 | 0.88 | 5.3 | 15.5 | -0.14 | 1.2 | 4.6 | | 28.9 | 71 | SILT |
| 10.2 | 509 | 985 | | 499 | 916 | | 17.7 | 97 | 85 | 1.01 | 4.2 | 14.5 | | 1.0 | 3.2 | | 23.8 | 55 | SILT |
| 10.4 | 510 | 875 | | 506 | 806 | | 17.7 | 99 | 87 | 0.72 | 4.2 | 10.4 | | 1.0 | 3.2 | | 16.9 | 55 | CLAYEY SILT |
| 10.6 | 712 | 1273 | | 698 | 1204 | | 19.1 | 101 | 89 | 0.83 | 6.0 | 17.6 | | 1.3 | 5.6 | | 35.0 | 88 | SILT |
| 10.8 | 784 | 1976 | | 738 | 1907 | | 19.6 | 102 | 91 | 1.81 | 6.3 | 40.6 | | | | 38 | 83.7 | | SILTY SAND |
| 11.0 | 668 | 1933 | 3 | 619 | 1864 | 13 | 19.6 | 104 | 93 | 2.37 | 5.0 | 43.2 | -0.15 | | | 37 | 81.0 | | SILTY SAND |
| 11.2 | 695 | 1393 | | 674 | 1324 | | 19.1 | 106 | 95 | 1.12 | 5.4 | 22.6 | | 1.2 | 4.8 | | 42.8 | 82 | SILT |
| 11.4 | 877 | 1729 | | 848 | 1660 | | 19.1 | 108 | 97 | 1.08 | 6.9 | 28.2 | | 1.5 | 7.0 | | 60.2 | 113 | SILT |
| 11.6 | 1019 | 1573 | | 1005 | 1504 | | 18.6 | 110 | 99 | 0.55 | 8.2 | 17.3 | | 1.6 | 9.1 | | 39.8 | 142 | SILTY CLAY |
| 11.8 | 1085 | 1575 | | 1074 | 1506 | | 18.6 | 112 | 101 | 0.44 | 8.7 | 15.0 | | 1.7 | 9.9 | | 35.3 | 155 | SILTY CLAY |
| 12.0 | 1660 | 3305 | | 1592 | 3236 | | 20.6 | 114 | 103 | 1.10 | 13.1 | 57.1 | | 2.2 | 18.8 | | 157.2 | 262 | SILT |
| 12.2 | 534 | 1990 | | 475 | 1921 | | 19.6 | 116 | 105 | 3.91 | 3.2 | 50.2 | | | | 35 | 75.7 | | SAND |
| 12.4 | 876 | 1992 | | 834 | 1923 | | 19.1 | 118 | 107 | 1.50 | 6.2 | 37.8 | | | | 38 | 76.8 | | SANDY SILT |
| 12.6 | 836 | 1726 | | 805 | 1657 | | 19.1 | 120 | 109 | 1.22 | 5.8 | 29.5 | | | | 38 | 58.1 | | SANDY SILT |
| 12.8 | 937 | 1881 | | 904 | 1812 | | 19.1 | 122 | 111 | 1.15 | 6.5 | 31.5 | | 1.4 | 6.3 | | 65.5 | 117 | SILT |
| 13.0 | 643 | 1515 | 13 | 613 | 1446 | 23 | 19.1 | 123 | 113 | 1.66 | 4.1 | 28.9 | -0.18 | | | 36 | 47.3 | | SANDY SILT |
| 13.2 | 1171 | 2696 | | 1109 | 2627 | | 20.6 | 125 | 115 | 1.53 | 7.9 | 52.7 | | | | 39 | 120.0 | | SANDY SILT |
| 13.4 | 852 | 2359 | | 791 | 2290 | | 19.6 | 127 | 117 | 2.23 | 5.3 | 52.0 | | | | 37 | 99.6 | | SILTY SAND |
| 13.6 | 1028 | 3482 | | 919 | 3413 | | 21.1 | 129 | 119 | 3.12 | 6.2 | 86.5 | | | | 38 | 180.3 | | SILTY SAND |
| 13.8 | 1435 | 3896 | | 1326 | 3827 | | 21.1 | 132 | 121 | 2.08 | 9.2 | 86.8 | | | | 40 | 209.9 | | SILTY SAND |
| 14.0 | 1896 | 4604 | 11 | 1775 | 4535 | 21 | 20.6 | 134 | 123 | 1.67 | 12.3 | 95.8 | -0.06 | | | 41 | 258.5 | | SANDY SILT |
| 14.2 | 1612 | 4003 | | 1506 | 3934 | | 20.6 | 136 | 125 | 1.76 | 10.2 | 84.2 | | | | 41 | 211.8 | | SANDY SILT |
| 14.4 | 1316 | 3845 | | 1204 | 3776 | | 21.1 | 138 | 127 | 2.39 | 7.8 | 89.3 | | | | 39 | 202.9 | | SILTY SAND |
| 14.6 | 1162 | 2050 | | 1132 | 1981 | | 19.1 | 140 | 129 | 0.85 | 7.1 | 29.5 | | 1.5 | 7.3 | | 63.7 | 152 | SILT |
| 14.8 | 937 | 1604 | | 918 | 1535 | | 19.1 | 142 | 130 | 0.78 | 5.5 | 21.4 | | 1.2 | 4.9 | | 40.7 | 112 | CLAYEY SILT |
| 15.0 | 958 | 2286 | | 906 | 2217 | | 19.1 | 144 | 132 | 1.70 | 5.4 | 45.5 | | | | 38 | 86.7 | | SANDY SILT |
| 15.2 | 1002 | 2362 | | 948 | 2293 | | 19.1 | 146 | 134 | 1.65 | 5.6 | 46.7 | | | | 38 | 90.6 | | SANDY SILT |
| 15.4 | 708 | 1990 | | 658 | 1921 | | 19.6 | 148 | 136 | 2.42 | 3.5 | 43.8 | | | | 35 | 68.2 | | SILTY SAND |
| 15.6 | 673 | 1913 | | 625 | 1844 | | 19.6 | 150 | 138 | 2.51 | 3.2 | 42.3 | | | | 35 | 62.9 | | SILTY SAND |
| 15.8 | 749 | 2009 | | 700 | 1940 | | 19.6 | 152 | 140 | 2.22 | 3.7 | 43.0 | | | | 36 | 68.1 | | SILTY SAND |
| 16.0 | 1104 | 2542 | 10 | 1046 | 2473 | 20 | 19.1 | 154 | 142 | 1.58 | 5.9 | 49.5 | -0.14 | | | 38 | 98.5 | | SANDY SILT |
| 16.2 | 917 | 2183 | | 868 | 2114 | | 19.1 | 156 | 144 | 1.72 | 4.6 | 43.2 | | | | 37 | 76.6 | | SANDY SILT |
| 16.4 | 969 | 2582 | | 902 | 2513 | | 19.6 | 158 | 146 | 2.13 | 4.8 | 55.9 | | | | 37 | 101.8 | | SILTY SAND |
| 16.6 | 1007 | 2682 | | 937 | 2613 | | 19.6 | 159 | 148 | 2.12 | 4.9 | 58.2 | | | | 37 | 107.5 | | SILTY SAND |
| 16.8 | 1007 | 2660 | | 938 | 2591 | | 19.6 | 161 | 150 | 2.10 | 4.9 | 57.3 | | | | 37 | 105.2 | | SILTY SAND |
| 17.0 | 1051 | 2428 | | 996 | 2359 | | 19.1 | 163 | 152 | 1.61 | 5.2 | 47.3 | | | | 37 | 88.3 | | SANDY SILT |
| 17.2 | 752 | 1844 | | 711 | 1775 | | 19.6 | 165 | 154 | 1.91 | 3.4 | 36.9 | | | | 35 | 54.6 | | SILTY SAND |
| 17.4 | 751 | 1956 | | 705 | 1887 | | 19.6 | 167 | 156 | 2.15 | 3.3 | 41.0 | | | | 35 | 60.3 | | SILTY SAND |
| 17.6 | 825 | 3788 | | 691 | 3719 | | 19.6 | 169 | 158 | 5.68 | 3.1 | 105.1 | | | | 35 | 157.2 | | SAND |
| 17.8 | 1163 | 5801 | | 945 | 5732 | | 21.1 | 171 | 160 | 6.10 | 4.6 | 166.1 | | | | 37 | 302.8 | | SAND |
| 18.0 | 1058 | 2564 | | 997 | 2495 | | 19.1 | 173 | 162 | 1.79 | 4.8 | 52.0 | | | | 37 | 94.0 | | SANDY SILT |
| 18.2 | 672 | 1879 | | 626 | 1810 | | 19.6 | 175 | 164 | 2.56 | 2.6 | 41.1 | | | | 34 | 53.6 | | SILTY SAND |
| 18.4 | 715 | 1999 | | 665 | 1930 | | 19.6 | 177 | 166 | 2.54 | 2.8 | 43.9 | | | | 34 | 59.7 | | SILTY SAND |
| 18.6 | 777 | 2173 | | 721 | 2104 | | 19.6 | 179 | 168 | 2.50 | 3.1 | 48.0 | | | | 35 | 69.1 | | SILTY SAND |
| 18.8 | 748 | 2473 | | 676 | 2404 | | 19.6 | 181 | 170 | 3.42 | 2.8 | 60.0 | | | | 34 | 83.5 | | SAND |
| 19.0 | 919 | 2635 | 50 | 847 | 2566 | 60 | 19.6 | 183 | 172 | 2.54 | 3.7 | 59.6 | -0.17 | | | 36 | 95.7 | | SILTY SAND |
| 19.2 | 893 | 2522 | | 825 | 2453 | | 19.6 | 185 | 174 | 2.50 | 3.5 | 56.5 | | | | 35 | 88.1 | | SILTY SAND |
| 19.4 | 1011 | 2845 | | 933 | 2776 | | 19.6 | 187 | 176 | 2.43 | 4.1 | 63.9 | | | | 36 | 107.5 | | SILTY SAND |
| 19.6 | 886 | 2560 | | 816 | 2491 | | 19.6 | 189 | 178 | 2.62 | 3.4 | 58.1 | | | | 35 | 89.0 | | SILTY SAND |
| 19.8 | 871 | 2553 | | 801 | 2484 | | 19.6 | 191 | 180 | 2.71 | 3.3 | 58.4 | | | | 35 | 87.8 | | SILTY SAND |
| 20.0 | 932 | 2542 | 4 | 865 | 2473 | 14 | 19.6 | 193 | 181 | 2.35 | 3.5 | 55.8 | -0.24 | | | 35 | 86.8 | | SILTY SAND |
| 20.2 | 917 | 2434 | | 855 | 2365 | | 19.6 | 195 | 183 | 2.25 | 3.4 | 52.4 | | | | 35 | 79.8 | | SILTY SAND |

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m ³) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | SDMT-01 DESCRIPTION |
|----------|------------|------------|------------|-------------|-------------|-------------|-------------------------------|-----------------|-------------|------|-----|-------------|----|----|-----|--------------|------------|-------------|------------------------|
| 20.4 | 867 | 2586 | | 795 | 2517 | | 19.6 | 197 | 185 | 2.82 | 3.1 | 59.8 | | | | 35 | 87.7 | | SILTY SAND |
| 20.6 | 1287 | 3104 | | 1210 | 3035 | | 20.6 | 199 | 187 | 1.78 | 5.1 | 63.3 | | | | 37 | 118.4 | | SANDY SILT |
| 20.8 | 1485 | 3568 | | 1395 | 3499 | | 20.6 | 201 | 189 | 1.75 | 6.0 | 73.0 | | | | 38 | 147.1 | | SANDY SILT |
| 21.0 | 1104 | 2929 | | 1027 | 2860 | | 21.1 | 203 | 191 | 2.19 | 4.1 | 63.6 | | | | 36 | 107.0 | | SILTY SAND |

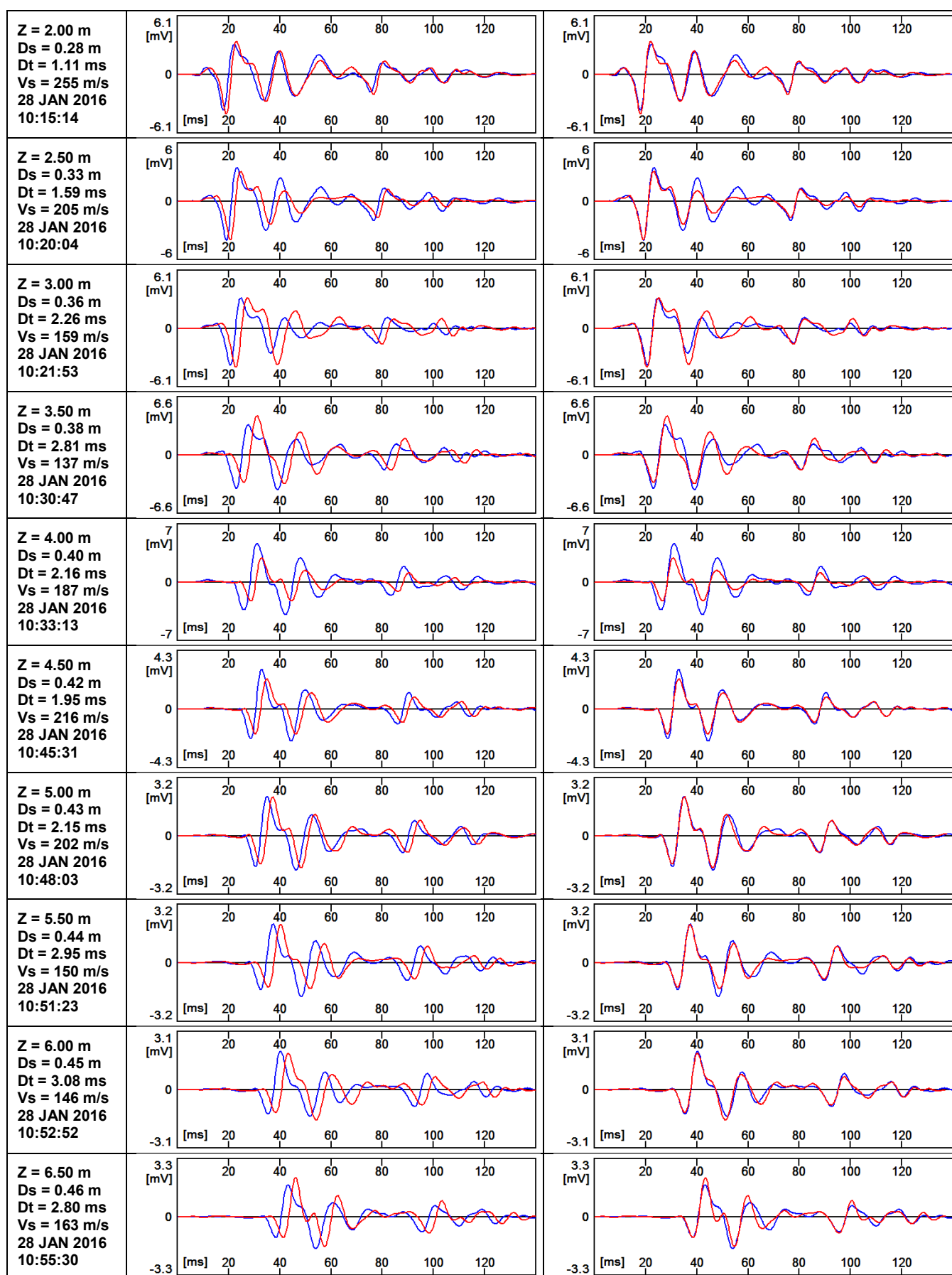
SDMT-01 - Tabular data: Vs, Go, Vs Repeatability

Each Vs value in the 'Vs Repeatability' column corresponds to a distinct energization.

| Z | Vs | Go | Rho | Vs Repeatability | Var Coeff. |
|-------|-------|-------|----------------------|------------------|------------|
| [m] | [m/s] | [MPa] | [kg/m ³] | [m/s] | [%] |
| 2.00 | 260 | 132 | 1950 | 255,265 | 1.92 |
| 2.50 | 208 | 77.9 | 1800 | 205,210 | 1.23 |
| 3.00 | 160 | 46.1 | 1800 | 159,161 | 0.63 |
| 3.50 | 138 | 32.4 | 1700 | 137,138 | 0.51 |
| 4.00 | 184 | 60.9 | 1800 | 187,180 | 1.92 |
| 4.50 | 215 | 87.8 | 1900 | 216,214 | 0.47 |
| 5.00 | 202 | 73.4 | 1800 | 202,202 | 0.00 |
| 5.50 | 150 | 39.4 | 1750 | 150,151 | 0.47 |
| 6.00 | 146 | 36.2 | 1700 | 146,145 | 0.48 |
| 6.50 | 163 | 45.2 | 1700 | 163,163 | 0.00 |
| 7.00 | 184 | 57.6 | 1700 | 184,184 | 0.00 |
| 7.50 | 234 | 103 | 1875 | 233,234 | 0.30 |
| 8.00 | 210 | 79.4 | 1800 | 211,210 | 0.34 |
| 8.50 | 224 | 102 | 2025 | 224,225 | 0.32 |
| 9.00 | 218 | 90.3 | 1900 | 218,219 | 0.32 |
| 9.50 | 259 | 141 | 2100 | 259,259 | 0.00 |
| 10.00 | 218 | 85.5 | 1800 | 219,217 | 0.46 |
| 10.50 | 202 | 76.5 | 1875 | 203,202 | 0.35 |
| 11.00 | 220 | 96.8 | 2000 | 220,219 | 0.32 |
| 11.50 | 225 | 97.5 | 1925 | 225,225 | 0.00 |
| 12.00 | 220 | 102 | 2100 | 219,219,221 | 0.45 |
| 12.50 | 264 | 136 | 1950 | 264,264 | 0.00 |
| 13.00 | 252 | 124 | 1950 | 253,252 | 0.28 |
| 13.50 | 235 | 115 | 2075 | 235,235 | 0.00 |
| 14.00 | 272 | 155 | 2100 | 271,274 | 0.58 |
| 14.50 | 282 | 163 | 2050 | 280,284 | 0.71 |
| 15.00 | 282 | 155 | 1950 | 282,282 | 0.00 |
| 15.50 | 280 | 157 | 2000 | 279,280 | 0.25 |
| 16.00 | 267 | 139 | 1950 | 269,265 | 0.75 |
| 16.50 | 302 | 182 | 2000 | 304,301 | 0.52 |
| 17.00 | 324 | 205 | 1950 | 324,324 | 0.00 |
| 17.50 | 247 | 122 | 2000 | 243,249,247,250 | 1.09 |
| 18.00 | 350 | 239 | 1950 | 355,345 | 1.43 |
| 18.50 | 286 | 164 | 2000 | 286,287 | 0.25 |
| 19.00 | 314 | 197 | 2000 | 314,315 | 0.23 |
| 19.50 | 332 | 220 | 2000 | 336,329 | 1.06 |
| 20.00 | 326 | 213 | 2000 | 331,322 | 1.39 |
| 20.50 | 348 | 248 | 2050 | 348,348 | 0.00 |

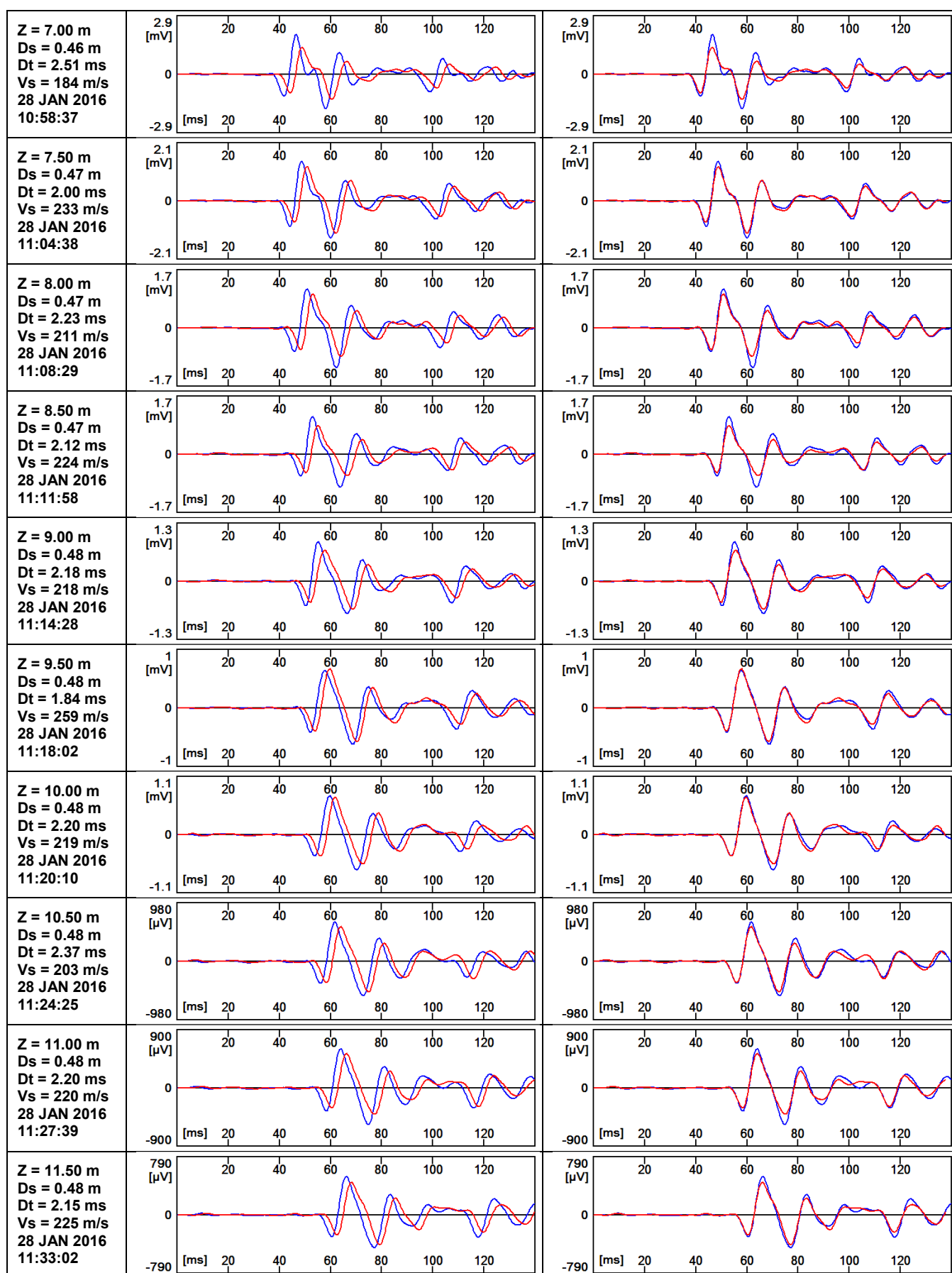
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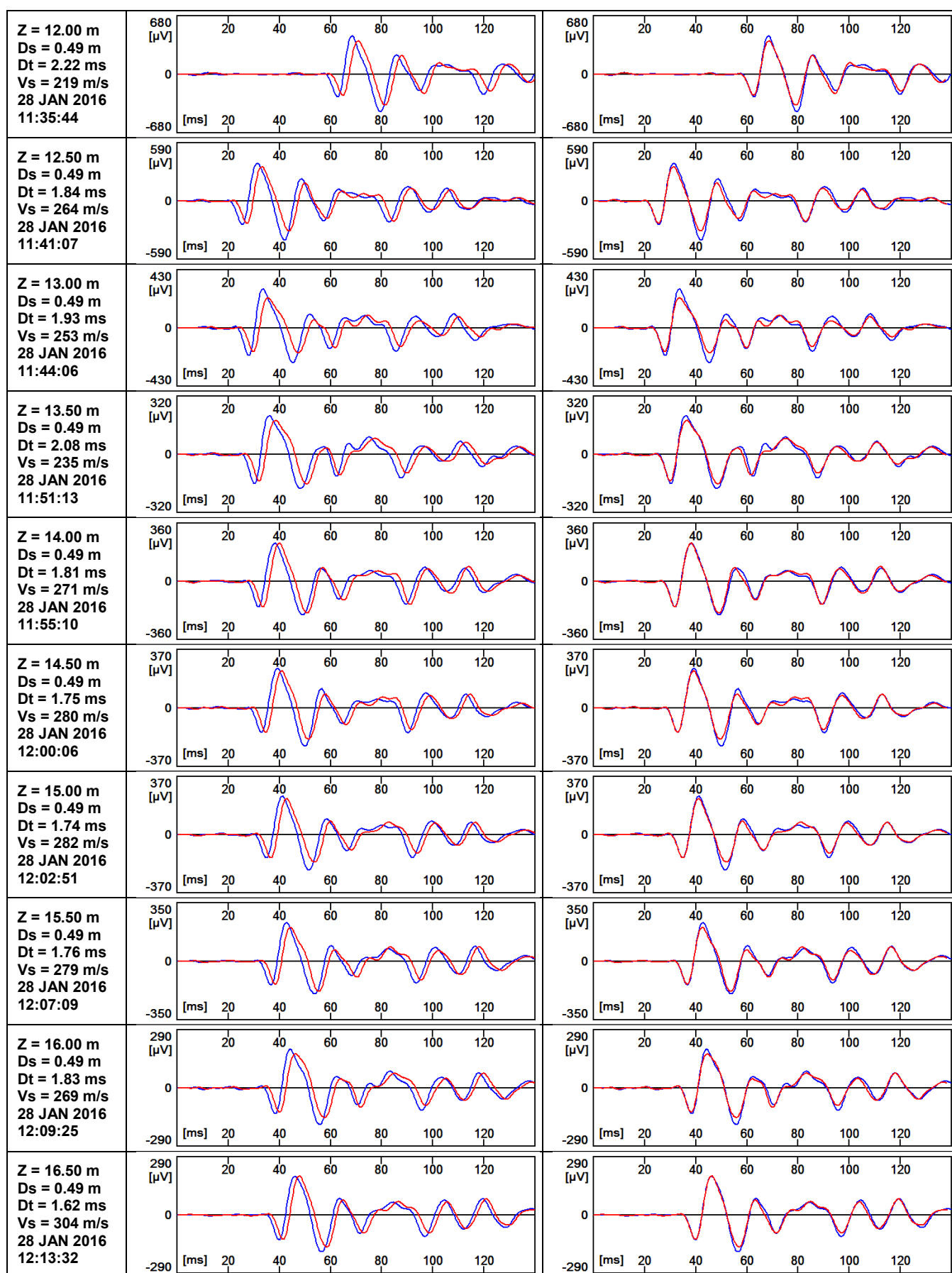
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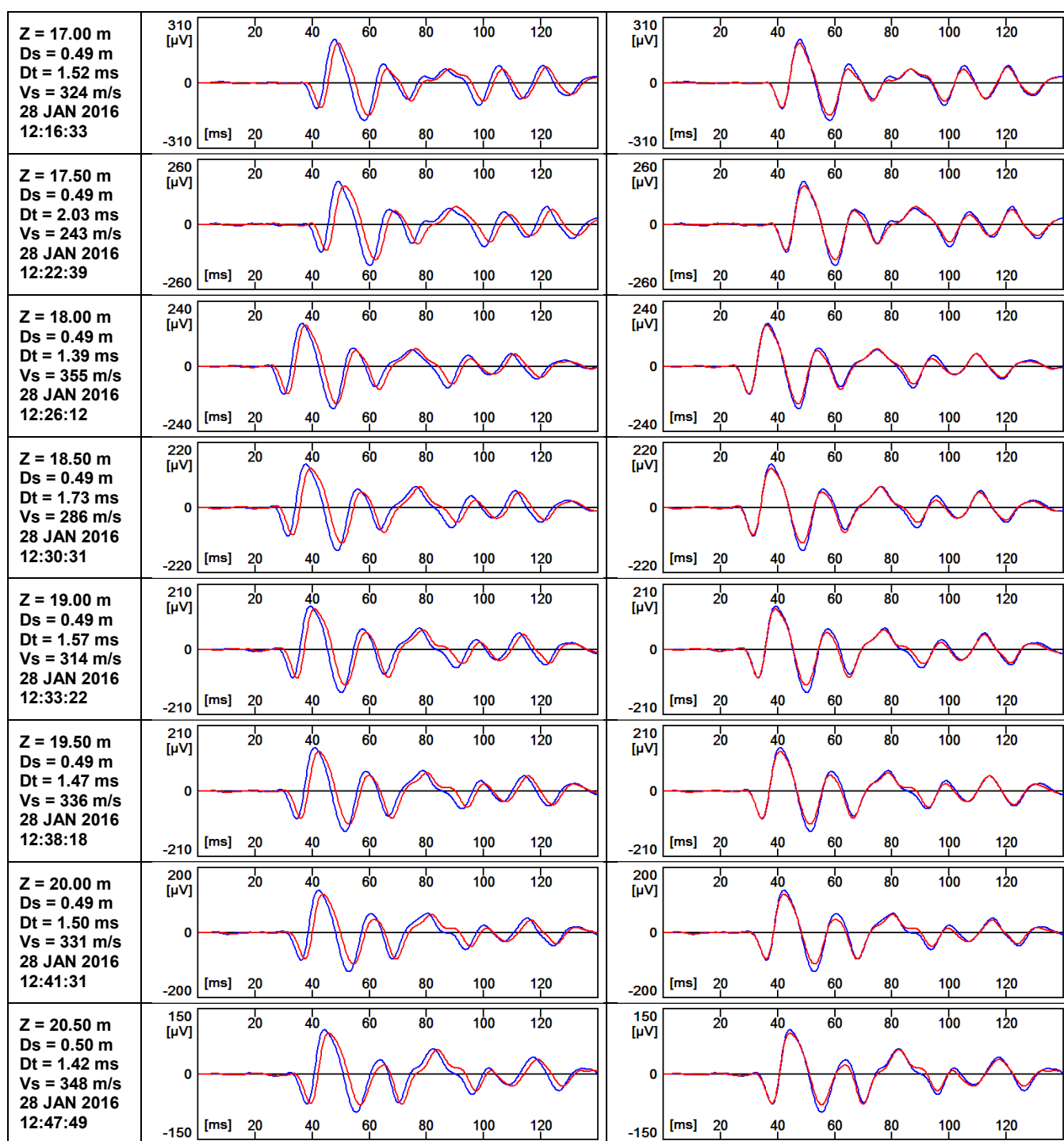
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













RE-PHASED



















RECORDED

RE-PHASED



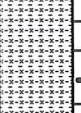





















| | | | | | | | | | | | | |
|--|----|----|-------------|---|-------------------------|---|--|---|---|---|----------|---|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 08 Sheet 8 of 28 | | | | | | | | |
| | | | | Vane Head: 1750 | Logged By: AB | Processor : GB | Date: 25.01.17 | | | | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | |
| Description: Refer to site plan | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | |
| TOPSOIL | | | | | | | | | | | | |
| silty CLAY, dark orange/ brown. Very stiff, moist to dry, medium plasticity, moderately sensitive [NATURAL] | | | | | 0.5 | | 164/ 47 | 3.5 | | | | |
| SILT, light orange. Loose, moist to dry, no plasticity with occasional pink streaking | | | | | 1.0 | | 181+ | | | | | |
| becoming moderately sensitive | | | | | 1.5 | | 155/ 71 | 2.2 | | | | |
| silty CLAY, brown/ grey. Very stiff, moist, medium to high plasticity, with minor limonite silt inclusions and staining | | | | | 2.0 | | 181+ | | | | | |
| becoming orange/ brown, medium plasticity | | | | | 2.5 | | 153/ 80 | 1.9 | | | | |
| becoming insensitive becoming streaked orange/ pink and yellow/ grey | | | | | 3.0 | | 138/ 60 | 2.6 | | | | |
| at 3.0m, becoming moderately sensitive EOB at 3.0m. Target Depth. | | | | | 3.5 | | | | | | | |
| | | | | | 4.0 | | | | | | | |
| | | | | | 4.5 | | | | | | | |
| | | | | | 5.0 | | | | | | | |
| | | | | | 5.5 | | | | | | | |
| | | | | | 6.0 | | | | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: 50mm | Topsoil |  | Sand |  | Sandstone |  | Plutonic |  |
| | | | | | Fill |  | Gravel |  | Siltstone |  | No Core |  |
| | | | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | | |  | Silt |  | Pumice |  | Volcanic |  | | |


| | | | | | | | | | |
|--|----|----|-------------|---|------------------|----------------------|---------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 09 Sheet 9 of 28 | | | | | |
| | | | | Vane Head: 307 | Logged By: JL | Processor : GB | Date: 26.01.17 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| Description: Refer to site plan | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL clayey SILT, dark orange. Hard, dry to moist, low plasticity [NATURAL] | | | | | | | | | |
| becoming moist | | | | | 0.5 | | UTP | | |
| becoming very stiff, moderately sensitive | | | | | 1.0 | | UTP | | |
| becoming yellow/orange | | | | | 1.5 | | 114/ 57 | 2.0 | |
| becoming insensitive | | | | | 2.0 | | 112/ 56 | 2.0 | |
| EOB at 3.0m. Target Depth. | | | | | 2.5 | | 130/106 | 1.2 | |
| | | | | | 3.0 | | 174/106 | 1.6 | |
| | | | | | 3.5 | | | | |
| | | | | | 4.0 | | | | |
| | | | | | 4.5 | | | | |
| | | | | | 5.0 | | | | |
| | | | | | 5.5 | | | | |
| | | | | | 6.0 | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | TT | Silt | Pumice | Volcanic | | |






| | | | | | | | | | | | | |
|---|--|--|------|---|---------|---|------------------|---|--|---|---|---|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 10 Sheet 10 of 28 | | | | | | | | |
| | | | | Vane Head: 1750 | | Logged By: AB | | Processor : GB | | Date: 26.01.17 | | |
| Borehole Location: | | mN Description: Refer to site plan | | mE Ground R.L. | | | | | | | | |
| SOIL DESCRIPTION | | | | | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | |
| TOPSOIL | | | | | | | | | | | | |
| silty CLAY, orange/ brown. Very stiff, moist, medium plasticity [NATURAL] | | | | | | | | | | | | |
| becoming brown | | | | | | | 0.5 | | 181+ | | | |
| becoming light yellow/ brown | | | | | | | 1.0 | | 181+ | | | |
| becoming brown streaked grey, high plasticity | | | | | | | | | | | | |
| becoming insensitive | | | | | | | 1.5 | | 159/ 93 | 1.7 | | |
| | | | | | | | 2.0 | | 144/ 84 | 1.7 | | |
| becoming brown, medium plasticity | | | | | | | | | | | | |
| becoming moderately sensitive | | | | | | | 2.5 | | 138/ 63 | 2.2 | | |
| EOB at 3.0m. Target Depth. | | | | | | | 3.0 | | 173/ 65 | 2.7 | | |
| | | | | | | | 3.5 | | | | | |
| | | | | | | | 4.0 | | | | | |
| | | | | | | | 4.5 | | | | | |
| | | | | | | | 5.0 | | | | | |
| | | | | | | | 5.5 | | | | | |
| | | | | | | | 6.0 | | | | | |
|  | | Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | Borehole Diameter: 50mm | Topsoil |  | Sand |  | Sandstone |  | Plutonic |  |
| | | | Fill |  | Gravel |  | Siltstone |  | No Core | | | |
| | | Checked:  | Clay |  | Organic |  | Limestone |  | | | | |
| | | | Silt |  | Pumice |  | Volcanic |  | | | | |


| | | | | | | | | | |
|--|----|----|-------------|--|------------------|----------------------|------------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 11 Sheet 11 of 28 | | | | | |
| | | | | Vane Head: 1750 | Logged By: AB | Processor : GB | Date: 25.01.17 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| Description: Refer to site plan | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL | | | | [Pattern] | | | | | |
| SILT, orange/ brown. Loose, dry, no plasticity, sensitive [NATURAL] becoming light orange | | | | [Pattern] | 0.5 | | 179/ 34 | 5.3 | |
| silty CLAY, orange/ brown mottled light orange. Very stiff, moist, medium plasticity becoming red/ pink mottled orange becoming red/ pink | | | | [Pattern] | 1.0 | | 181+ | | |
| | | | | [Pattern] | 1.5 | | 181+ | | |
| | | | | [Pattern] | 2.0 | | 181+ | | |
| becoming pink/ red mottled orange/ brown | | | | [Pattern] | 2.5 | | 181+ | | |
| becoming orange/ brown | | | | [Pattern] | 3.0 | | 181+ | | |
| EOB at 3.0m. Target Depth. | | | | [Pattern] | 3.5 | | | | |
| | | | | [Pattern] | 4.0 | | | | |
| | | | | [Pattern] | 4.5 | | | | |
| | | | | [Pattern] | 5.0 | | | | |
| | | | | [Pattern] | 5.5 | | | | |
| | | | | [Pattern] | 6.0 | | | | |
| <div style="display: flex; align-items: center;"> <div> Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. </div> </div> | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | TT | Silt | Pumice | Volcanic | | |

| | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|---|--|---|--|---|--|---|--|---|--|---|--|-----------------|--|---|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 12 Sheet 12 of 28 | | | | | | | | | | | | | | | | | |
| | | | | Vane Head: 1750 | | Logged By: AB | | Processor : GB | | Date: 25.01.17 | | | | | | | | | | | |
| Borehole Location: mN mE Ground R.L. | | Description: Refer to site plan | | Legend | | Depth (m) | | Standing Water Level | | Vane Shear(kPa) peak / residual | | Soil Sensitivity | | Sample and Laboratory / Other Test Details | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | | | | | | | | | |
| TOPSOIL | | | |  | | | | | | | | | | | | | | | | | |
| clayey SILT, dark brown streaked orange/ brown. Very stiff, dry, low plasticity, with minor limonite silt inclusions, with topsoil leeching to 0.5m [NATURAL] | | | |  | | 0.5 | | | | 181+ | | | | | | | | | | | |
| silty CLAY, mottled orange and grey. Very stiff, moist, medium plasticity, insensitive, with minor limonite silt inclusions and staining at 0.8m, becoming orange streaked grey becoming cream/ grey, high plasticity | | | |  | | 1.0 | | | | 152/ 87 | | 1.7 | | | | | | | | | |
| becoming moderately sensitive | | | |  | | 1.5 | | | | 105/ 53 | | 2.0 | | | | | | | | | |
| becoming blue/ grey | | | |  | | 2.0 | | | | 152/103 | | 1.5 | | | | | | | | | |
| becoming insensitive becoming orange streaked blue/ grey, with trace fine sand | | | |  | | 2.5 | | | | 159/107 | | 1.5 | | | | | | | | | |
| without fine sand | | | |  | | 3.0 | | | | 135/ 73 | | 1.8 | | | | | | | | | |
| EOB at 3.0m. Target Depth. | | | |  | | 3.0 | | | | | | | | | | | | | | | |
| | | | | | | 3.5 | | | | | | | | | | | | | | | |
| | | | | | | 4.0 | | | | | | | | | | | | | | | |
| | | | | | | 4.5 | | | | | | | | | | | | | | | |
| | | | | | | 5.0 | | | | | | | | | | | | | | | |
| | | | | | | 5.5 | | | | | | | | | | | | | | | |
| | | | | | | 6.0 | | | | | | | | | | | | | | | |
|  | | Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | Borehole Diameter: 50mm | | Topsoil | |  | | Sand | |  | | Sandstone | |  | | Plutonic | |  | |
| | | | | Fill | |  | | Gravel | |  | | Siltstone | |  | | No Core | | | | | |
| | | | | Clay | |  | | Organic | |  | | Limestone | |  | | | | | | | |
| | | | | Silt | |  | | Pumice | |  | | Volcanic | |  | | | | | | | |

| | | | | | |
|---|---------------------|----------------------|---------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED | | | | | |
| Project Location : AURANGA B1, B2 & B3, DRURY | | | | | |
| Job Number: J00557 | | | | | |
| Borehole Location: | mN | mE | Ground R.L. | | |
| Description: | Refer to site plan | | | | |
| SOIL DESCRIPTION | | | | | |
| TOPSOIL | | | | | |
| slightly clayey SILT, orange. Very stiff, dry, no to low plasticity, moderately sensitive [NATURAL] | | | | | |
| becoming moist | | | | | |
| silty CLAY, orange. Very stiff, moist, medium plasticity, insensitive becoming high plasticity with minor manganese oxide, with minor limonite staining with some manganese oxide, with some limonite staining | | | | | |
| slightly silty CLAY, orange. Very stiff, moist to wet, high plasticity, insensitive, with minor limonite staining at 2.1m, becoming orange streaked light grey, with major limonite staining, with some manganese oxide inclusions at 2.3m, becoming wet becoming sensitive | | | | | |
| at 3.0m, becoming insensitive EOB at 3.0m. Target Depth. | | | | | |
| Vane Head: 307 | Logged By: JL/AB | Processor : GB | Date: 25.01.17 | | |
| Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| [diagonal hatching pattern] | -0.5 | | 177/ 57 | 3.1 | |
| [cross-hatch pattern] | -1.0 | | 162/ 60 | 2.7 | |
| [horizontal dashes pattern] | -1.5 | | 129/ 74 | 1.7 | |
| [vertical dashes pattern] | -2.0 | | 140/ 72 | 1.9 | |
| [dotted pattern] | -2.5 | | 123/ 48 | 2.6 | |
| [stippled pattern] | -3.0 | | 116/ 77 | 1.5 | |
| | -3.5 | | | | |
| | -4.0 | | | | |
| | -4.5 | | | | |
| | -5.0 | | | | |
| | -5.5 | | | | |
| | -6.0 | | | | |
| | | | | | |
| Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | | |
| Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| 50mm | Fill | Gravel | Siltstone | No Core | |
| Checked: | Clay | Organic | Limestone | | |
| T T | Silt | Pumice | Volcanic | | |





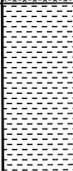
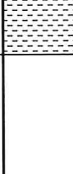
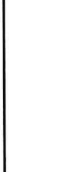
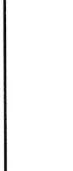
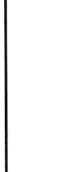
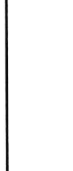

















| | | | | | | | | | |
|---|----|----|-------------|--|------------------|----------------------|------------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 14 Sheet 14 of 28 | | | | | |
| | | | | Vane Head: 1900 | Logged By: JL | Processor : GB | Date: 25.01.17 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| Description: Refer to site plan | | | | | | | | | |
| | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL | | | | | | | | | |
| silty CLAY with some fine sand, orange. Very stiff, moist, medium plasticity, moderately sensitive [NATURAL] becoming orange streaked light grey | | | | | 0.5 | | 153/ 40 | 3.8 | |
| becoming wet, high plasticity, insensitive, with some limonite staining, without fine sand | | | | | 1.0 | | 132/ 79 | 1.7 | |
| fine sandy SILT with some clay, light grey. Stiff, wet, low plasticity, sensitive, with minor limonite staining | | | | | 1.5 | | 58/ 13 | 4.5 | |
| fine SAND, light orange/ grey. Loose, saturated, no plasticity, sensitive becoming dark grey becoming moderately sensitive | | | | | 2.0 | ▽ | 126/ 22 | 5.7 | |
| at 3.0m, becoming sensitive EOB at 3.0m. Target Depth. | | | | | 2.5 | | 123/ 43 | 2.9 | |
| | | | | | 3.0 | | 176/ 39 | 4.5 | |
| | | | | | 3.5 | | | | |
| | | | | | 4.0 | | | | |
| | | | | | 4.5 | | | | |
| | | | | | 5.0 | | | | |
| | | | | | 5.5 | | | | |
| | | | | | 6.0 | | | | |
|  Comments: Groundwater encountered 1.8m. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | TT | Silt | Pumice | Volcanic | | |
| | | | | | | | | | |















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|--|----|----|-------------|---|--|-----------------------------------|---------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 15 Sheet 15 of 28 | | | | | |
| | | | | Vane Head: 1900 | Logged By: JL | Processor : GB | Date: 25.01.17 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| Description: Refer to site plan | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL clayey SILT, mottled orange and light grey. Very stiff, dry, low plasticity, sensitive [FILL] BURIED TOPSOIL clayey SILT, light grey. Very stiff, moist, low plasticity [NATURAL] silty CLAY with some fine sand, orange mottled light grey. Very stiff, moist, medium plasticity, insensitive, with minor limonite staining with some limonite staining becoming high plasticity, with major fine sand, with minor limonite staining silty fine SAND, blue/ grey. Loose, wet, no plasticity, with minor limonite staining clayey SILT with some fine sand, brown/ grey. Hard, saturated, low plasticity becoming dark grey EOB at 3.0m. Target Depth. | | | |  0.5  1.0  1.5 2.0  2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 | 151/ 22 UTP 120/ 65 123/ 65 208+ | 6.9 1.8 1.9 | | | |
|  | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | ++++++ |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | ++++++ |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | TT | Silt | Pumice | Volcanic | | |
| | | | | Comments: Groundwater encountered 2.2m. UTP = unable to penetrate. EOB = end of borehole. | | | | | |


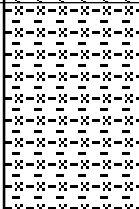
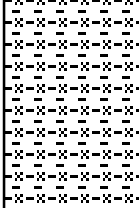
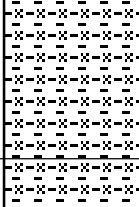
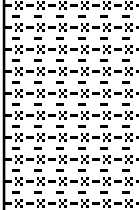
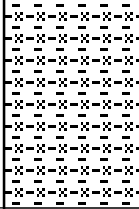

















| | | | | | | | | | |
|--|----|----|-------------|--|------------------|----------------------|------------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 16 Sheet 16 of 28 | | | | | |
| | | | | Vane Head: 1900 | Logged By: JL | Processor : TT | Date: 25.01.17 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| Description: Refer to site plan | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL | | | | | | | | | |
| clayey SILT, dark orange. Hard, dry to moist, low plasticity [NATURAL] | | | | | 0.5 | | UTP | | |
| becoming wet, medium plasticity | | | | | 1.0 | | UTP | | |
| becoming light orange | | | | | 1.5 | | 96/27 | 3.6 | |
| becoming stiff, moderately sensitive | | | | | 2.0 | | 107/40 | 2.7 | |
| becoming very stiff | | | | | 2.5 | | UTP | | |
| becoming hard, with some limonite staining | | | | | 3.0 | | UTP | | |
| EOB at 3.0m. Target Depth. | | | | | 3.5 | | | | |
| | | | | | 4.0 | | | | |
| | | | | | 4.5 | | | | |
| | | | | | 5.0 | | | | |
| | | | | | 5.5 | | | | |
| | | | | | 6.0 | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | JL | Silt | Pumice | Volcanic | | |


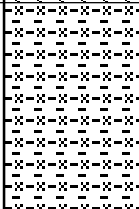

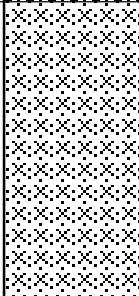
















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|--|----|----|-------------|--|------------------|----------------------|---------------------------------|------------------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 17 Sheet 17 of 28 | | | | | |
| | | | | Vane Head: 1750 | Logged By: DR | Processor : TT | Date: 07.02.17 | | |
| Borehole Location: | mN | mE | Ground R.L. | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details |
| SOIL DESCRIPTION | | | | | | | | | |
| TOPSOIL | | | | | | | | | |
| SILT, orange/brown. Very stiff, dry, no plasticity, with trace limonite staining [NATURAL] | | | | | 0.5 | | 181+ | | |
| with some limonite staining, with trace carbonaceous inclusions | | | | | | | | | |
| slightly clayey SILT, brown. Very stiff, moist, low plasticity, with some carbonaceous inclusions | | | | | 1.0 | | 181+ | | |
| clayey SILT, light grey mottled brown. Very stiff, moist, medium plasticity, insensitive, with some limonite staining | | | | | 1.5 | | 152/87 | 1.7 | |
| at 1.4m, with major carbonaceous inclusions | | | | | | | | | |
| fine sandy CLAY, light brown/grey mottled brown. Very stiff, wet, medium plasticity, moderately sensitive, with minor limonite staining, with trace black staining | | | | | 2.0 | | 143/73 | 2.0 | |
| becoming insensitive | | | | | 2.5 | | 103/71 | 1.5 | |
| CLAY, orange mottled light brown/grey. Very stiff, wet, high plasticity, insensitive, with some limonite staining, with trace black staining | | | | | 3.0 | | 101/87 | 1.2 | |
| EOB at 3.0m. Target Depth. | | | | | | | | | |
| | | | | | 3.5 | | | | |
| | | | | | 4.0 | | | | |
| | | | | | 4.5 | | | | |
| | | | | | 5.0 | | | | |
| | | | | | 5.5 | | | | |
| | | | | | 6.0 | | | | |
| <div style="display: flex; align-items: center;"> <div> Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. </div> </div> | | | | Borehole Diameter: | Topsoil | Sand | Sandstone | Plutonic | |
| | | | | 50mm | Fill | Gravel | Siltstone | No Core | |
| | | | | Checked: | Clay | Organic | Limestone | | |
| | | | | JL | Silt | Pumice | Volcanic | | |


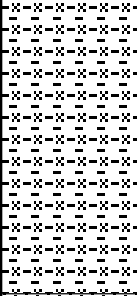
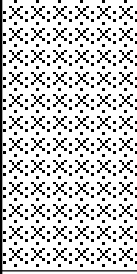
















| | | | | | | | | | | | | | |
|---|--|--|--|--|-----------|----------------------|---------------------------------|-----------------------|--|-----------------------|--|----------|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 18 Sheet 18 of 28 | | | | | | | | | |
| Borehole Location: mN mE Ground R.L. Description: Refer to site plan | | | | Vane Head: 1750 | | Logged By: DR | | Processor : TT | | Date: 07.02.17 | | | |
| SOIL DESCRIPTION | | | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | | |
| TOPSOIL slightly clayey SILT, dark grey and orange mottled light brown. Very stiff, moist, low plasticity, insensitive, with some limonite staining [FILL] becoming wet becoming stiff | | | | 0.5 | | | 114/60 | 1.9 | | | | | |
| organic CLAY, black mottled dark grey. Stiff, wet to saturated, high plasticity, insensitive, with trace limonite staining [NATURAL] becoming saturated | | | | 1.0 | | | 75/44 | 1.7 | | | | | |
| amorphous PEAT, black. Very stiff, saturated, high plasticity, moderately sensitive | | | | 1.5 | | | 73/56 | 1.3 | | | | | |
| CLAY, brown mottled grey. Very stiff, saturated, high plasticity, with trace limonite staining | | | | 2.0 | | | 125/59 | 2.1 | | | | | |
| clayey SILT, orange mottled light brown. Very stiff, wet, medium plasticity, moderately sensitive, with some limonite staining | | | | 2.5 | | | 149/60 | 2.5 | | | | | |
| EOB at 3.0m. Target Depth. | | | | 3.0 | | | 152/63 | 2.4 | | | | | |
| | | | | 3.5 | | | | | | | | | |
| | | | | 4.0 | | | | | | | | | |
| | | | | 4.5 | | | | | | | | | |
| | | | | 5.0 | | | | | | | | | |
| | | | | 5.5 | | | | | | | | | |
| | | | | 6.0 | | | | | | | | | |
| | | Comments: Groundwater encountered 1.8m UTP = unable to penetrate. EOB = end of borehole. | | Borehole Diameter: 50mm | | Topsoil | | Sand | | Sandstone | | Plutonic | |
| | | | | Fill | | Gravel | | Siltstone | | No Core | | | |
| | | | | Clay | | Organic | | Limestone | | | | | |
| | | | | Silt | | Pumice | | Volcanic | | | | | |


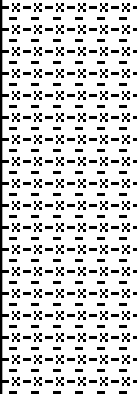
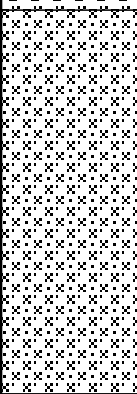




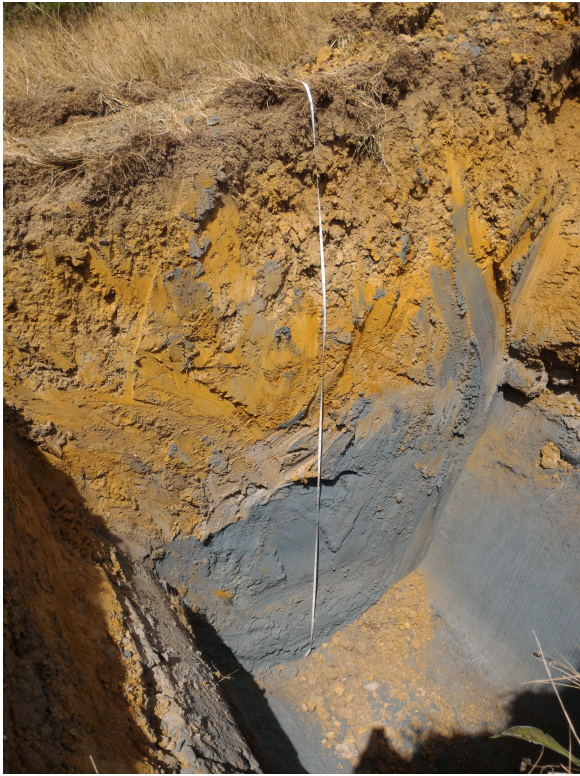













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|--|--|--|-----------|--|---------|---|------------------|---|--|---|---|---|
| Client : KARAKA & DRURY LIMITED | | | | Auger Borehole No. HA2017- 19 | | | | | | | | |
| Project Location : AURANGA B1, B2 & B3, DRURY | | | | Sheet 19 of 28 | | | | | | | | |
| Job Number: J00557 | | | | Vane Head: 1900 | | Logged By: GB | | Processor : TT | | Date: 07.02.17 | | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | |
| | | Description: Refer to site plan | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | |
| TOPSOIL | | | |  | | | | | | | | |
| silty CLAY, orange/brown mottled brown/grey. Very stiff, dry, medium plasticity, sensitive [NATURAL] at 0.5m, becoming moist, high plasticity | | | |  | | 0.5 | | 120/30 | 4.0 | | | |
| becoming mottled orange/brown and grey, moderately sensitive | | | |  | | 1.0 | | 105/49 | 2.1 | | | |
| becoming slightly silty CLAY, grey mottled brown | | | |  | | | | | | | | |
| becoming insensitive, with minor decayed wood inclusions | | | |  | | 1.5 | | 116/73 | 1.6 | | | |
| without decayed wood inclusions | | | |  | | 2.0 | | 111/86 | 1.3 | | | |
| CLAY, orange/brown mottled grey. Very stiff, moist, high plasticity, insensitive | | | |  | | 2.5 | | 125/101 | 1.2 | | | |
| EOB at 3.0m. Target Depth. | | | |  | | 3.0 | | 119/82 | 1.5 | | | |
| | | | |  | | 3.5 | | | | | | |
| | | | |  | | 4.0 | | | | | | |
| | | | |  | | 4.5 | | | | | | |
| | | | |  | | 5.0 | | | | | | |
| | | | | | | 5.5 | | | | | | |
| | | | | | | 6.0 | | | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: | Topsoil |  | Sand |  | Sandstone |  | Plutonic |  |
| | | | | 50mm | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | | |  | Silt |  | Pumice |  | Volcanic |  | | |

| | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|----------------------|--|---|--|-----------------------|--|---|--|--|--|---|--|---|--|---|--|
| Client : KARAKA & DRURY LIMITED Project Location : AURANGA B1, B2 & B3, DRURY Job Number: J00557 | | | | Auger Borehole No. HA2017- 20 <div style="text-align: right;">Sheet 20 of 28</div> | | | | | | | | | | | | | | | | | |
| | | | | Vane Head: 1900 | | Logged By: GB | | Processor : TT | | Date: 07.02.17 | | | | | | | | | | | |
| Borehole Location: | | mN | | mE | | Ground R.L. | | Legend | | Depth (m) | | Standing Water Level | | Vane Shear(kPa) peak / residual | | Soil Sensitivity | | Sample and Laboratory / Other Test Details | | | |
| Description: Refer to site plan | | | | | | | | | | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | | | | | | | | | |
| TOPSOIL | | | | | | | | | | 0.0 | | | | | | | | | | | |
| silty CLAY, brown/orange mottled brown. Very stiff, dry, medium plasticity, sensitive [NATURAL] | | | | | | | | | | 0.5 | | | | 135/22 | | 6.1 | | | | | |
| becoming orange/brown mottled light grey, moist | | | | | | | | | | 1.0 | | | | 120/44 | | 2.7 | | | | | |
| becoming high plasticity, moderately sensitive | | | | | | | | | | 1.5 | | | | 125/96 | | 1.3 | | | | | |
| becoming slightly silty CLAY, insensitive, with trace limonite staining | | | | | | | | | | 2.0 | | | | 116/73 | | 1.6 | | | | | |
| becoming light grey/brown | | | | | | | | | | 2.5 | | | | 126/82 | | 1.5 | | | | | |
| CLAY, grey. Very stif, moist, high plasticity, insensitive, with trace limonite staining | | | | | | | | | | 3.0 | | | | 178/107 | | 1.7 | | | | | |
| clayey SILT, dark grey. Very stiff, moist, medium plasticity, insensitive | | | | | | | | | | 3.5 | | | | | | | | | | | |
| EOB at 3.0m. Target Depth. | | | | | | | | | | 4.0 | | | | | | | | | | | |
| | | | | | | | | | | 4.5 | | | | | | | | | | | |
| | | | | | | | | | | 5.0 | | | | | | | | | | | |
| | | | | | | | | | | 5.5 | | | | | | | | | | | |
| | | | | | | | | | | 6.0 | | | | | | | | | | | |
|  | | Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | Borehole Diameter: 50mm | | Topsoil | |  | | Sand | |  | | Sandstone | |  | | Plutonic | |  | |
| | | | | Checked: JL | | Fill | |  | | Gravel | |  | | Siltstone | |  | | No Core | | | |
| | | | | | | Clay | |  | | Organic | |  | | Limestone | |  | | | | | |
| | | | | | | Silt | |  | | Pumice | |  | | Volcanic | |  | | | | | |











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|--|--|------------------------------------|----|--------------------|---|---|-------------|---|------------------|---|----------|-----|
| <div>Client :KARAKA & DRURY CONSULTANT LIMITED</div> <div>Project Location :PROPOSED EXTENSION TO DRURY DEVELOPMENT QD STAGE 1, DRURY</div> <div>Job Number:J00137</div> | | | | | <div>Trial Pit No. TP1</div> <div>Sheet 1 of 4</div> <div>Vane Head: 946</div> <div>Logged By: MVC</div> <div>Processor : MVC</div> <div>Date: 15.02.17</div> | | | | | | | |
| Stratigraphy | Pit Location: | mN | mE | Ground R.L. 14.089 | Legend | Depth (m) | Groundwater | Vane Dial Reading | Soil Sensitivity | Sample and Laboratory Test Details | | |
| | | Description: Refer to site plan | | | | | | | | | | |
| | SOIL DESCRIPTION | | | | | | | | | | | |
| ASH DEPOSITS | TOPSOIL | | | |  | | | | | | | |
| | silty CLAY, orange/brown. Hard, dry, medium to high plasticity | | | |  | 0.5 | | UTP | | | | |
| | becoming insensitive | | | |  | 1.0 | | UTP | | | | |
| ALLUVIUM | becoming light yellow/grey | | | |  | 1.5 | | | | | | |
| | silty CLAY, pink streaked light grey. Very stiff, moist, high plasticity | | | |  | 2.0 | | 216/117 | 1.9 | | | |
| | becoming slightly silty CLAY, light range mottled light grey | | | |  | 2.5 | | | | | | |
| | becoming insensitive | | | |  | 3.0 | | 142/73 | 1.9 | | | |
| |  | | | |  | 3.5 | | | | | | |
| | | | | |  | 4.0 | | 111/57 | 1.9 | | | |
| EOTP at 4.0m. Target Depth. | | | | | | 4.5 | | | | | | |
| | | | | | | 5.0 | | | | | | |
| | | | | | | 5.5 | | | | | | |
| | | | | | | 6.0 | | | | | | |
| <div></div> | | Comments: groundwater not observed | | Excavator Used: | Topsoil |  | Sand |  | Sandstone |  | Plutonic | +++ |
| | | | | 23T | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | | | | Silt |  | Pumice |  | Volcanic |  | | |















| | | | | | | | | | | | | | | | | | |
|--|--|----|----|-------------------|--|-------------------|---|-------------------|---|------------------------------------|---|----------|-----|--|--|--|--|
| Client : KARAKA & DRURY CONSULTANT LIMITED | | | | | Trial Pit No. TP2 | | | | | | | | | | | | |
| Project Location : PROPOSED EXTENSION TO DRURY DEVELOPMENT QD STAGE 1, DRURY | | | | | Sheet 2 of 4 | | | | | | | | | | | | |
| Job Number: J00137 | | | | | Vane Head: 946 | Logged By: MVC | Processor : MVC | Date: 15.02.17 | | | | | | | | | |
| Stratigraphy | Pit Location: | mN | mE | Ground R.L. 4.768 | Legend | Depth (m) | Groundwater | Vane Dial Reading | Soil Sensitivity | Sample and Laboratory Test Details | | | | | | | |
| | Description: Refer to site plan | | | | | | | | | | | | | | | | |
| | SOIL DESCRIPTION | | | | | | | | | | | | | | | | |
| ALLUVIUM | TOPSOIL | | | |  | | | | | | | | | | | | |
| | silty CLAY, mottled light orange and light grey. Very stiff, moist, high plasticity | | | |  | 0.5 | | | | | | | | | | | |
| | becoming moderately sensitive | | | |  | 1.0 | 165/48 | 3.4 | | | | | | | | | |
| | fine sandy SILT with minor clay, light grey. Hard, moist, low plasticity, with trace limonite staining | | | |  | 1.5 | | | | | | | | | | | |
| | | | | |  | 2.0 | | | | | | | | | | | |
| | <div>EOTP at 2.3m. Target Depth.</div>  | | | |  | 2.5 | | | | | | | | | | | |
| UTP | | | | | | | | | | | | | | | | | |
| | | | | | | 3.0 | | | | | | | | | | | |
| | | | | | | 3.5 | | | | | | | | | | | |
| | | | | | | 4.0 | | | | | | | | | | | |
| | | | | | | 4.5 | | | | | | | | | | | |
| | | | | | | 5.0 | | | | | | | | | | | |
| | | | | | | 5.5 | | | | | | | | | | | |
| | | | | | | 6.0 | | | | | | | | | | | |
| <div>Comments: groundwater not observed</div> | | | | | Excavator Used: | Topsoil |  | Sand |  | Sandstone |  | Plutonic | +++ | | | | |
| | | | | | 23T | Fill |  | Gravel |  | Siltstone |  | No Core | | | | | |
| | | | | | Checked: | Clay |  | Organic |  | Limestone |  | | | | | | |
| | | | | | | Silt |  | Pumice |  | Volcanic |  | | | | | | |















| | | | | | | | | | | | | | |
|--|--|---------------------------------|----|-------------------|---|-----------|---|-------------------|---|------------------------------------|---|----------|-----|
| <div>Client :KARAKA & DRURY CONSULTANT LIMITED</div> <div>Project Location :PROPOSED EXTENSION TO DRURY DEVELOPMENT QD STAGE 1, DRURY</div> <div>Job Number:J00137</div> | | | | | <div>Trial Pit No. TP3</div> <div>Sheet 3 of 4</div> <div><div>Vane Head:946</div><div>Logged By:MVC</div><div>Processor :MVC</div><div>Date:15.02.17</div></div> | | | | | | | | |
| Stratigraphy | Pit Location: | mN | mE | Ground R.L. 3.801 | Legend | Depth (m) | Groundwater | Vane Dial Reading | Soil Sensitivity | Sample and Laboratory Test Details | | | |
| | | Description: Refer to site plan | | | | | | | | | | | |
| | SOIL DESCRIPTION | | | | | | | | | | | | |
| ALLUVIUM | TOPSOIL | | | |  | | | | | | | | |
| | becoming moist | | | |  | 0.5 | | | | | | | |
| | fine sandy SILT, orange mottled light grey. Medium-dense, moist, no plasticity | | | |  | 1.0 | | UTP | | | | | |
| | over-consolidated, fibrous PEAT, black. Medium-dense, moist, no plasticity | | | |  | 1.5 | | UTP | | | | | |
| |  | | | | | 2.0 | | UTP | | | | | |
| | | | | | | 2.5 | | UTP | | | | | |
| | | | | | | 3.0 | | UTP | | | | | |
| | | | | | | 3.5 | | UTP | | | | | |
| | EOTP at 4.0m. Target Depth. | | | |  | 4.0 | | UTP | | | | | |
| | | | | | | 4.5 | | | | | | | |
| | | | | | | 5.0 | | | | | | | |
| | | | | | | 5.5 | | | | | | | |
| | | | | | | 6.0 | | | | | | | |
| <div><div>Comments: groundwater seepage at 3.4m; no standing groundwater table</div></div> | | | | | Excavator Used: | Topsoil |  | Sand |  | Sandstone |  | Plutonic | +++ |
| | | | | | | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | | | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | | | | | Silt |  | Pumice |  | Volcanic |  | | |

| | | | | | | | | | | | | |
|--|---|------------------------------------|----|-------------------|---|---|-------------|---|------------------|---|----------|-----|
| <div>Client :KARAKA & DRURY CONSULTANT LIMITED</div> <div>Project Location :PROPOSED EXTENSION TO DRURY DEVELOPMENT QD STAGE 1, DRURY</div> <div>Job Number:J00137</div> | | | | | <div>Trial Pit No. TP4</div> <div>Sheet 4 of 4</div> <div><div>Vane Head:946</div><div>Logged By:MVC</div><div>Processor :MVC</div><div>Date:15.02.17</div></div> | | | | | | | |
| Stratigraphy | Pit Location: | mN | mE | Ground R.L. 6.767 | Legend | Depth (m) | Groundwater | Vane Dial Reading | Soil Sensitivity | Sample and Laboratory Test Details | | |
| | | Description: Refer to site plan | | | | | | | | | | |
| | SOIL DESCRIPTION | | | | | | | | | | | |
| ALLUVIUM | TOPSOIL | | | |  | | | | | | | |
| | silty CLAY, light grey mottled orange. Very stiff, moist, high plasticity, sensitive | | | |  | 0.5 | | | | | | |
| | becoming light grey | | | |  | 1.0 | | 171/42 | 4.1 | | | |
| | silty FINE SAND with trace clay, orange flecked dark blue/grey. Hard, moist, low to no plasticity | | | |  | 1.5 | | | | | | |
| | without clay, becoming dark blue/grey, medium dense | | | |  | 2.0 | | UTP | | | | |
| | | | | |  | 2.5 | | | | | | |
| | EOTP at 3.0m. Target Depth. | | | |  | 3.0 | | UTP | | | | |
| |  | | | | | 3.5 | | | | | | |
| | | | | | | 4.0 | | | | | | |
| | | | | | | 4.5 | | | | | | |
| | | | | | | 5.0 | | | | | | |
| | | | | | | 5.5 | | | | | | |
| | | | | | | 6.0 | | | | | | |
|  | | Comments: groundwater not observed | | Excavator Used: | Topsoil |  | Sand |  | Sandstone |  | Plutonic | +++ |
| | | | | 23T | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | | | | Silt |  | Pumice |  | Volcanic |  | | |

| | | | | | | | | | | | | | | |
|--|--|--|----|-------------|--|-------------------------------------|------------------|---------------------------------|--|-----------------------------|---|--------------------------|----------|--|
| Client : KARAKA & DRURY CONSULTANT LTD | | | | | | Auger Borehole No. 2015 - P1 | | | | | | | | |
| Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY | | | | | | Sheet 1 of 4 | | | | | | | | |
| Job Number: J00137 | | | | | | Vane Head: 946 | | Logged By: AB | | Processor : GB | | Date: 18.11.15 | | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | |
| | | Description: Refer to site plan | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | | |
| TOPSOIL | | | | | | | | | | | | | | |
| silty CLAY, dark brown/ grey. Very stiff, moist, high plasticity, with minor rootlet inclusions | | | | | | | | | | | | | | |
| at 0.4m, becoming light brown/ grey, moderately sensitive, without rootlet inclusions | | | | | | | 0.5 | | 175/ 46 | 3.2 | | | | |
| at 0.5m, becoming moderately sensitive | | | | | | | | | | | | | | |
| at 0.6m, becoming orange/ brown mottled grey | | | | | | | | | | | | | | |
| becoming slightly silty CLAY, with trace limonite staining | | | | | | | 1.0 | | 107/46 | 2.3 | | | | |
| becoming stiff, insensitive | | | | | | | | | | | | | | |
| with minor limonite silt inclusions | | | | | | | 1.5 | | 95/ 49 | 1.9 | | | | |
| becoming very stiff, wet, moderately sensitive | | | | | | | 2.0 | | 107/ 49 | 2.2 | | | | |
| EOB at 2.0m. Target Depth. | | | | | | | | | | | | | | |
| | | | | | | | 2.5 | | | | | | | |
| | | | | | | | 3.0 | | | | | | | |
| | | | | | | | 3.5 | | | | | | | |
| | | | | | | | 4.0 | | | | | | | |
| | | | | | | | 4.5 | | | | | | | |
| | | | | | | | 5.0 | | | | | | | |
| | | | | | | | 5.5 | | | | | | | |
| | | | | | | | 6.0 | 00 | 0.0 | | | | | |
| <div></div> <div>Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole.</div> | | | | | | Borehole Diameter: | Topsoil | | Sand | | Sandstone | | Plutonic | |
| | | | | | | 50mm | Fill | | Gravel | | Siltstone | | No Core | |
| | | | | | | Checked: | Clay | | Organic | | Limestone | | | |
| | | | | | | | Silt | | Pumice | | Volcanic | | | |

| | | | | | | | | | | | | | |
|--|--|-----------------------------|--|--|--|--|--|---------------------------------|---|---|---|---------------------|--|
| Client : KARAKA & DRURY CONSULTANT LTD Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY Job Number: J00137 | | | | Auger Borehole No. 2015 - P2 Sheet 2 of 4 | | | | | | | | | |
| | | | | Vane Head: 307 | | Logged By: TT | | Processor : GB | | Date: 18.11.15 | | | |
| Borehole Location: | | mN mE Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear (kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | | | |
| Description: Refer to site plan | | | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | |
| TOPSOIL silty CLAY, yellow/ brown. Very stiff, moist, medium plasticity, with trace limonite inclusions at 0.4m, becoming grey mottled yellow/ brown at 0.5m, becoming hard, moderately sensitive becoming orange streaked grey, with some fine sand EOB at 1.0m. Target Depth. | | | |  | 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 | 221/ 84 172/ 87 00 | 2.6 2.0 0.0 | | | | | | |
|  | | | | Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | Borehole Diameter: 50mm Checked: TT | | Topsoil Fill Clay Silt |     | Sandstone Siltstone Limestone Volcanic |     | Plutonic No Core | |

| | | | | | | | | | | | | | |
|--|--|--|-----------|-------------------------------------|--|----------------------|---|-----------------------------|---|-------------------------|---|-----------------|---|
| Client : KARAKA & DRURY CONSULTANT LTD | | | | Auger Borehole No. 2015 - P3 | | | | | | | | | |
| Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY | | | | Sheet 3 of 4 | | | | | | | | | |
| Job Number: J00137 | | | | Vane Head: 307 | | Logged By: TT | | Processor : GB | | Date: 18.11.15 | | | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | | |
| | | Description: Refer to site plan | | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | | |
| TOPSOIL | | | | | | | | | | | | | |
| silty CLAY. orange streaked grey. Very stiff, moist, medium plasticity, moderately sensitive | | | | | | 0.5 | | 172/ 77 | 2.2 | | | | |
| becoming slightly silty CLAY, high plasticity | | | | | | | | | | | | | |
| becoming insensitive | | | | | | 1.0 | | 111/ 64 | 1.7 | | | | |
| with some limonite silt inclusions | | | | | | | | | | | | | |
| CLAY, with minor fine sand, grey. Very stiff, moist, high plasticity, insensitive, with trace limonite silt inclusions | | | | | | 1.5 | | 154/117 | 1.3 | | | | |
| EOB at 2.0m. Target Depth. | | | | | | 2.0 | | 128/ 77 | 1.7 | | | | |
| | | | | | | 2.5 | | | | | | | |
| | | | | | | 3.0 | | | | | | | |
| | | | | | | 3.5 | | | | | | | |
| | | | | | | 4.0 | | | | | | | |
| | | | | | | 4.5 | | | | | | | |
| | | | | | | 5.0 | | | | | | | |
| | | | | | | 5.5 | | | | | | | |
| | | | | | | 6.0 | | 00 | 0.0 | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: 50mm | | Topsoil |  | Sand |  | Sandstone |  | Plutonic |  |
| | | | | | | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | | | | | Clay |  | Organic |  | Limestone |  | | |
| | | | | | | Silt |  | Pumice |  | Volcanic |  | | |
| | | | | Checked: TT | | | | | | | | | |

| | | | | | | | | | | | | |
|--|--|--|-----------|-------------------------------------|----------------|---|------------------|---|--|---|---|---|
| Client : KARAKA & DRURY CONSULTANT LTD | | | | Auger Borehole No. 2015 - P4 | | | | | | | | |
| Project Location : DRURY DEVELOPMENT, BREMNER ROAD, DRURY | | | | Sheet 4 of 4 | | | | | | | | |
| Job Number: J00137 | | | | Vane Head: 1900 | | Logged By: MVC | | Processor : GB | | Date: 18.11.15 | | |
| Borehole Location: | | mN | mE | Ground R.L. | | Legend | Depth (m) | Standing Water Level | Vane Shear(kPa) peak / residual | Soil Sensitivity | Sample and Laboratory / Other Test Details | |
| | | Description: Refer to site plan | | | | | | | | | | |
| SOIL DESCRIPTION | | | | | | | | | | | | |
| TOPSOIL | | | | | | | | | | | | |
| silty CLAY with minor fine sand, orange/ brown. Hard, dry, high plasticity becoming orange/ brown streaked brown/ grey | | | | | | | 0.5 | 208+ | | | | |
| EOB at 1.0m. Target Depth. | | | | | | | 1.0 | UTP | | | | |
| | | | | | | | 1.5 | | | | | |
| | | | | | | | 2.0 | | | | | |
| | | | | | | | 2.5 | | | | | |
| | | | | | | | 3.0 | | | | | |
| | | | | | | | 3.5 | | | | | |
| | | | | | | | 4.0 | | | | | |
| | | | | | | | 4.5 | | | | | |
| | | | | | | | 5.0 | | | | | |
| | | | | | | | 5.5 | | | | | |
| | | | | | | | 6.0 | | | | | |
|  Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. | | | | Borehole Diameter: | Topsoil |  | Sand |  | Sandstone |  | Plutonic |  |
| | | | | 50mm | Fill |  | Gravel |  | Siltstone |  | No Core | |
| | | | | Checked: | Clay |  | Organic |  | Limestone |  | | |
| | | | | TT | Silt |  | Pumice |  | Volcanic |  | | |

STORMWATER PERCOLATION TEST

| | | | |
|-----------|-------------------------------|---------|----------|
| Client: | KARAKA & DRURY CONSULTANT LTD | Job No: | J00137 |
| Location: | BREMNER ROAD FIRST STAGE QD | Date: | 20.11.15 |
| | | Page | 1 of 2 |

| | | | |
|----------|----|----------|---------|
| Hole No: | P1 | Diameter | 0.1 (m) |
|----------|----|----------|---------|

| | | | |
|-----------|--------------------|--------|----------|
| Location: | Refer to Site Plan | Depth: | 1.19 (m) |
|-----------|--------------------|--------|----------|

| | |
|------------------------------------|-----|
| Weather conditions preceding test: | Dry |
|------------------------------------|-----|

| | |
|------------------------|-----------------------|
| Details of presoaking: | Presoaked on 18.11.15 |
|------------------------|-----------------------|

| Time of Test (hr.min) | Time Interval (min) | Depth Reading (m) | Water Depth (m) | Cum Time (min) |
|--------------------------|------------------------|----------------------|--------------------|-------------------|
| 09:29 | - | 0.065 | 1.125 | 0 |
| 09:30 | 1 | 0.165 | 1.025 | 1 |
| 09:32 | 2 | 0.210 | 0.980 | 3 |
| 09:35 | 3 | 0.285 | 0.905 | 6 |
| 09:39 | 4 | 0.350 | 0.840 | 10 |
| 09:45 | 6 | 0.416 | 0.774 | 16 |
| 10:22 | 37 | 0.711 | 0.479 | 53 |
| 10:52 | 30 | 0.855 | 0.335 | 83 |
| 11:22 | 30 | 0.939 | 0.251 | 113 |
| 11:25 | 3 | 0.212 | 0.978 | 116 |
| 11:55 | 30 | 0.535 | 0.655 | 146 |
| 12:25 | 30 | 0.725 | 0.465 | 176 |
| 12:55 | 30 | 0.831 | 0.359 | 206 |
| 13:25 | 30 | 0.923 | 0.267 | 236 |
| 13:32 | 7 | 0.160 | 1.030 | 243 |
| 13:33 | 1 | 0.183 | 1.007 | 244 |
| 13:34 | 1 | 0.201 | 0.989 | 245 |
| 13:37 | 3 | 0.242 | 0.948 | 248 |
| 13:41 | 4 | 0.290 | 0.900 | 252 |
| 13:47 | 6 | 0.354 | 0.836 | 258 |
| 14:29 | 42 | 0.645 | 0.545 | 300 |
| 14:36 | 7 | 0.125 | 1.065 | 307 |
| 14:37 | 1 | 0.145 | 1.045 | 308 |
| 14:38 | 1 | 0.161 | 1.029 | 309 |
| 14:41 | 3 | 0.195 | 0.995 | 312 |
| 14:45 | 4 | 0.232 | 0.958 | 316 |
| 14:51 | 6 | 0.301 | 0.889 | 322 |

| | |
|-------------|----------------------------|
| Test | P1 |
| Gradient | 0.0028 m/min |
| Percolation | 0.24 L/m ² /min |



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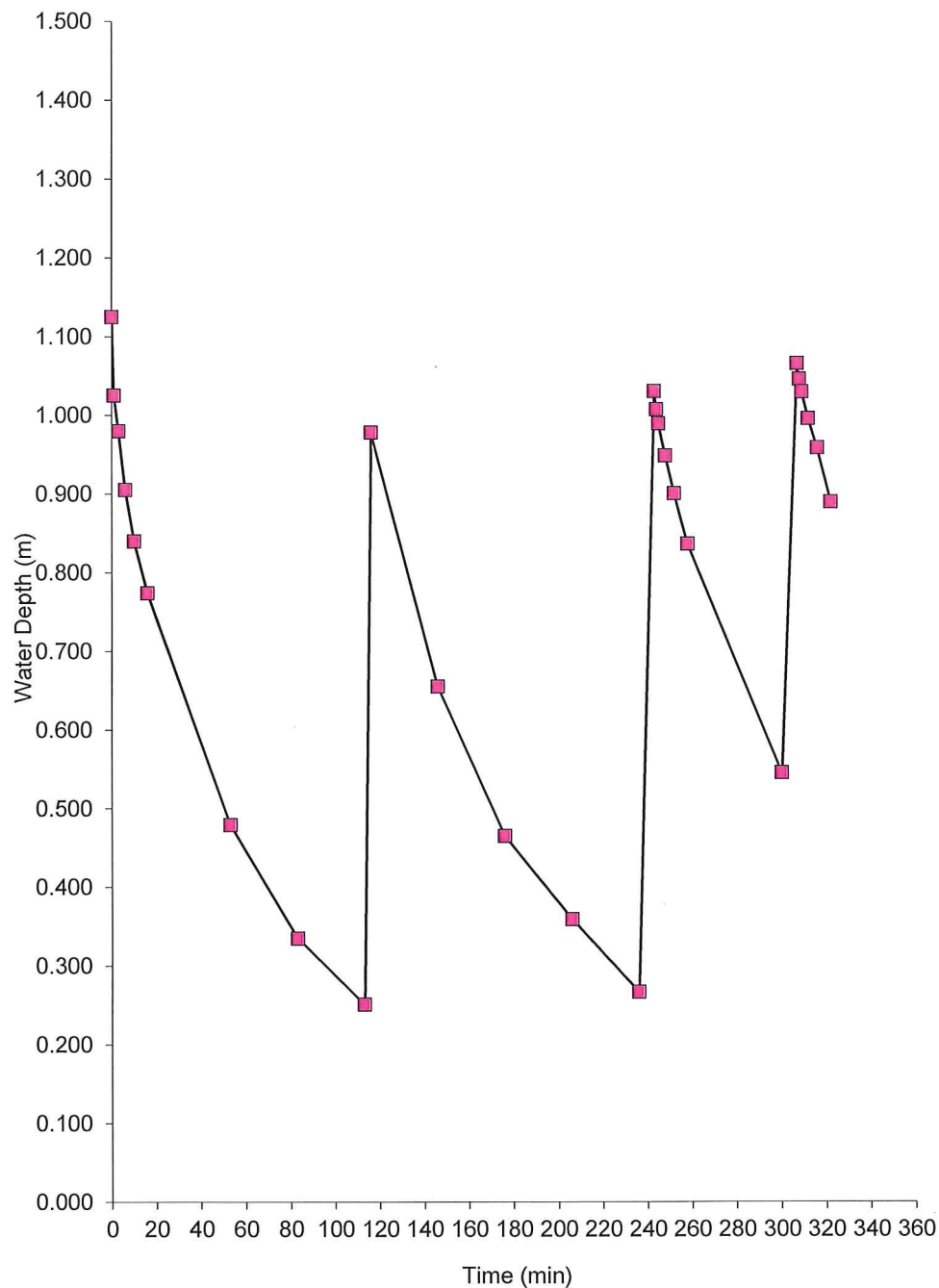
Operator: AB/MVC

Checked: *AB*

STORMWATER PERCOLATION TEST

| | | | |
|-----------|-------------------------------|-----------|----------|
| Client: | KARAKA & DRURY CONSULTANT LTD | Job No: | J00137 |
| Location: | BREMNER ROAD FIRST STAGE QD | Date: | 20.11.15 |
| | 0 | Page | 2 of 2 |
| Hole No: | P1 | Diameter: | 0.1 (m) |
| Location: | Refer to Site Plan | Depth: | 1.19 (m) |

Water Depth vs Time



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Checked:

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STORMWATER PERCOLATION TEST

| | | |
|---------------------------------------|----------------|--|
| Client: KARAKA & DRURY CONSULTANT LTD | Job No: J00137 | |
| Location: BREMNER ROAD FIRST STAGE QD | Date: 20.11.15 | |
| | Page: 1 of 2 | |

| | | |
|-------------|-------------------|--|
| Hole No: P2 | Diameter: 0.1 (m) | |
|-------------|-------------------|--|

| | | |
|------------------------------|-----------------|--|
| Location: Refer to Site Plan | Depth: 0.75 (m) | |
|------------------------------|-----------------|--|

| | |
|------------------------------------|-----|
| Weather conditions preceding test: | Dry |
|------------------------------------|-----|

| | |
|------------------------|-----------------------|
| Details of presoaking: | Presoaked on 18.11.15 |
|------------------------|-----------------------|

| Time of Test (hr.min) | Time Interval (min) | Depth Reading (m) | Water Depth (m) | Cum Time (min) |
|--------------------------|------------------------|----------------------|--------------------|-------------------|
| 10:02 | - | 0.020 | 0.730 | 0 |
| 10:03 | 1 | 0.045 | 0.705 | 1 |
| 10:04 | 1 | 0.075 | 0.675 | 2 |
| 10:07 | 3 | 0.100 | 0.650 | 5 |
| 10:11 | 4 | 0.123 | 0.627 | 9 |
| 10:15 | 4 | 0.145 | 0.605 | 13 |
| 10:45 | 30 | 0.234 | 0.516 | 43 |
| 11:15 | 30 | 0.279 | 0.471 | 73 |
| 11:45 | 30 | 0.314 | 0.436 | 103 |
| 12:15 | 30 | 0.346 | 0.404 | 133 |
| 12:45 | 30 | 0.373 | 0.377 | 163 |
| 13:15 | 30 | 0.397 | 0.353 | 193 |
| 13:51 | 36 | 0.421 | 0.329 | 229 |

| | |
|-------------|----------------------------|
| Test | P2 |
| Gradient | 0.0007 m/min |
| Percolation | 0.05 L/m ² /min |



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Checked: *AB*

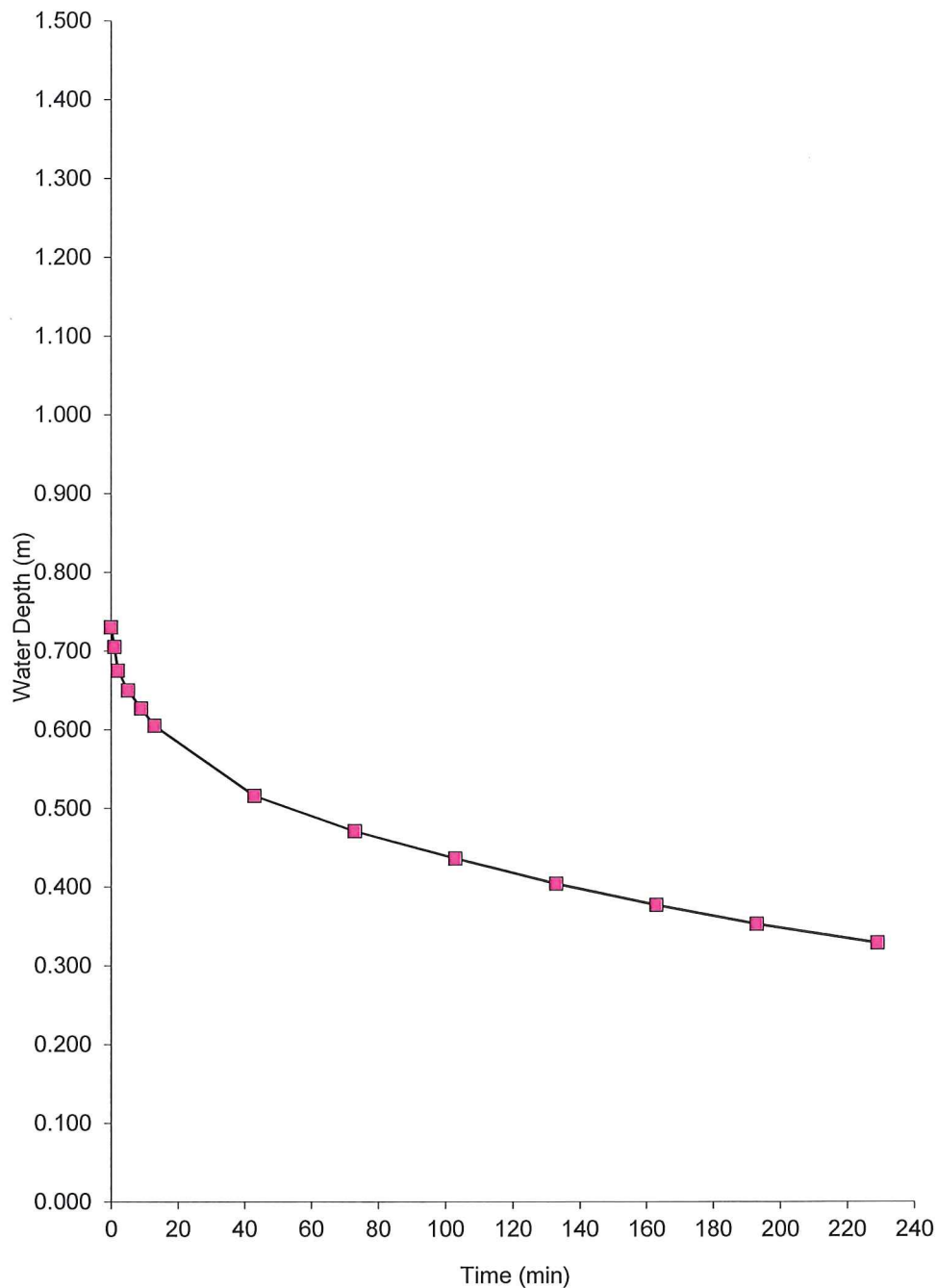
STORMWATER PERCOLATION TEST

| | | | |
|-----------|-------------------------------|---------|----------|
| Client: | KARAKA & DRURY CONSULTANT LTD | Job No: | J00137 |
| Location: | BREMNER ROAD FIRST STAGE QD | Date: | 20.11.15 |
| | 0 | Page | 2 of 2 |

| | | | |
|----------|----|-----------|---------|
| Hole No: | P2 | Diameter: | 0.1 (m) |
|----------|----|-----------|---------|

| | | | |
|-----------|--------------------|--------|----------|
| Location: | Refer to Site Plan | Depth: | 0.75 (m) |
|-----------|--------------------|--------|----------|

Water Depth vs Time



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STORMWATER PERCOLATION TEST

| | | | |
|-----------|-------------------------------|---------|----------|
| Client: | KARAKA & DRURY CONSULTANT LTD | Job No: | J00137 |
| Location: | BREMNER ROAD FIRST STAGE QD | Date: | 20.11.15 |
| | | Page | 1 of 2 |

| | | | |
|----------|----|----------|---------|
| Hole No: | P3 | Diameter | 0.1 (m) |
|----------|----|----------|---------|

| | | | |
|-----------|--------------------|--------|----------|
| Location: | Refer to Site Plan | Depth: | 1.05 (m) |
|-----------|--------------------|--------|----------|

| | |
|------------------------------------|-----|
| Weather conditions preceding test: | Dry |
|------------------------------------|-----|

| | |
|------------------------|-----------------------|
| Details of presoaking: | Presoaked on 18.11.15 |
|------------------------|-----------------------|

| Time of Test (hr.min) | Time Interval (min) | Depth Reading (m) | Water Depth (m) | Cum Time (min) |
|--------------------------|------------------------|----------------------|--------------------|-------------------|
| 10:24 | - | 0.025 | 1.025 | 0 |
| 10:25 | 1 | 0.050 | 1.000 | 1 |
| 10:26 | 1 | 0.085 | 0.965 | 2 |
| 10:29 | 3 | 0.120 | 0.930 | 5 |
| 10:32 | 3 | 0.160 | 0.890 | 8 |
| 10:36 | 4 | 0.195 | 0.855 | 12 |
| 10:39 | 3 | 0.225 | 0.825 | 15 |
| 11:02 | 23 | 0.345 | 0.705 | 38 |
| 11:08 | 6 | 0.360 | 0.690 | 44 |
| 11:54 | 46 | 0.475 | 0.575 | 90 |
| 12:24 | 30 | 0.525 | 0.525 | 120 |
| 12:54 | 30 | 0.575 | 0.475 | 150 |
| 13:24 | 30 | 0.600 | 0.450 | 180 |
| 13:54 | 30 | 0.630 | 0.420 | 210 |
| 14:23 | 29 | 0.650 | 0.400 | 239 |

| | |
|-------------|----------------------------|
| Test | P3 |
| Gradient | 0.0007 m/min |
| Percolation | 0.04 L/m ² /min |



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Operator: AB/MVC

Checked:

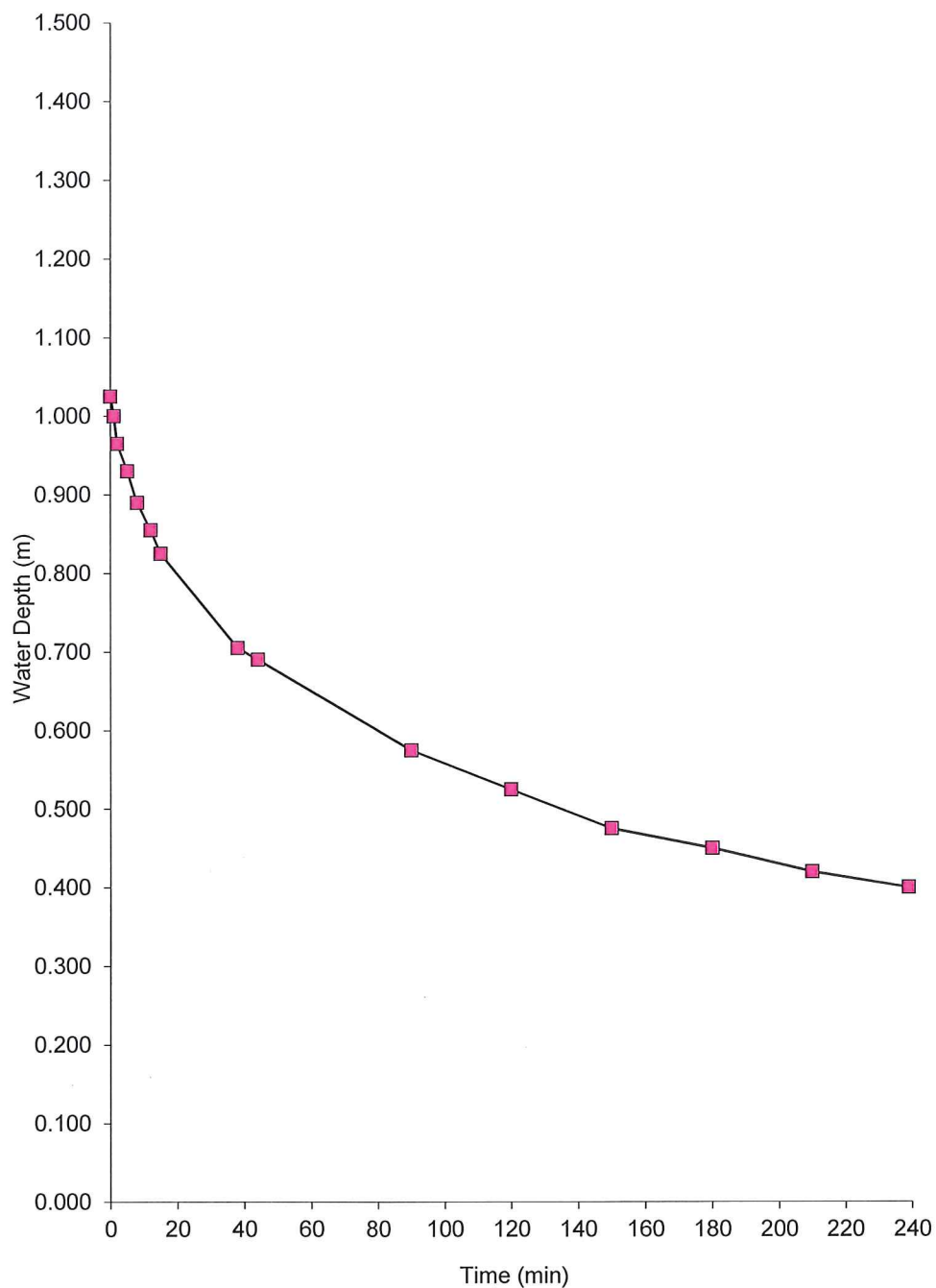
STORMWATER PERCOLATION TEST

| | |
|---------------------------------------|----------------|
| Client: KARAKA & DRURY CONSULTANT LTD | Job No: J00137 |
| Location: BREMNER ROAD FIRST STAGE QD | Date: 20.11.15 |
| 0 | Page 2 of 2 |

| | | | |
|-------------|-----------|-----|-----|
| Hole No: P3 | Diameter: | 0.1 | (m) |
|-------------|-----------|-----|-----|

| | | | |
|------------------------------|--------|------|-----|
| Location: Refer to Site Plan | Depth: | 1.05 | (m) |
|------------------------------|--------|------|-----|

Water Depth vs Time



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Checked: AB