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Report on
Geotechnical Assessment

Proposed Residential Development
7 Concord Avenue, Concord West

Prepared for
F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd
Floridana Pty Ltd

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Executive Summary

This report presents the results of a geotechnical assessment undertaken by Douglas Partners Pty Ltd (DP) for a proposed residential development at 7 Concord Avenue, Concord West. The assessment was commissioned by Mr Joe D'Agostino of F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd and was undertaken in accordance with DP's proposal SYD150744 dated 26 June 2015 Eton Consulting Pty Ltd, the planning consultants for the development, acted as the project manager for this work.

It is understood that the proposed development will include three buildings, ranging in height from 3 to 8 storeys, with a common one level basement and associated access driveways.

The geotechnical model developed for the site from previous investigations is broadly summarised as filling and natural soils (including soft soils) to depths of up to 5 m overlying shale that progressively increases in strength. The groundwater monitoring indicates that the groundwater table varies from 1.0 m to 4.3 m below surface levels and probably flows to the west.

The assessment compiled existing available information on subsurface conditions and provides geotechnical advice for the preliminary planning and design of the excavations, retaining walls, foundations, pavements and floor slabs.

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Report on Geotechnical Assessment
Proposed Residential Development
7 Concord Avenue, Concord West

1. Introduction

This report presents the results of a geotechnical assessment undertaken by Douglas Partners Pty Ltd (DP) for a proposed residential development at 7 Concord Avenue, Concord West. The assessment was commissioned in an email dated 8 July 2015 by Mr Joe D'Agostino of F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd and was undertaken in accordance with DP's proposal SYD150744 dated 26 June 2015 Eton Consulting Pty Ltd, the planning consultants for the development, acted as the project manager for this work.

It is understood that the proposed development will include three buildings, ranging in height from 3 to 8 storeys, with a common one level basement and associated access driveways. The assessment compiled existing available information on subsurface conditions for the preliminary planning and design of the excavations, retaining walls, foundations and floor slabs. The assessment included a review of available information from previous investigations near the site.

This assessment has been carried out for preliminary design of the proposed structures. Detailed investigation of the site will be required at a later stage to confirm the geological profile and review the recommendations provided within this report.

A contamination assessment has been carried out concurrently by DP. The results of this assessment are reported separately.

2. Previous Work

DP has previously conducted the following investigations and assessments at the site:

- Geotechnical Investigation Report Summary, Building Extension for Fred Hosking Pty Ltd, Station Avenue, Concord West, prepared for J P Cordukes Pty Ltd, 23 July 1990, Project 14042 (DP, 1990);
- Report on Preliminary Geotechnical Investigation, Investigation for Future Development, Station Avenue, Concord West, prepared for Fred Hosking Pty Ltd, December 2007, Project 45146 (DP, 2007b); and
- Report on Phase 1 & 2 Contamination Assessment, 7 Concord Avenue & 202-210 George Street, Concord West, prepared for Fred Hosking Pty Ltd, November 2007, Project 45146A (DP, 2007a).

The results and information contained within these reports, borehole logs and drawings have been considered in the formulation of the geological model of the site and for the preparation of comments provided in this report.

The borehole locations associated with these investigations are shown in Drawing 1, Appendix B.

3. Site Description

The site is located at 7 Concord Avenue, Concord West (Lot 1 in Deposited Plan 219742). The site is an irregular shaped area of 15,014 m^2 (refer to Survey Drawing No. 20936-1 by Project Surveyors dated 29 March 2010), with maximum north-south and east-west dimensions of 200 m and 90 m, respectively.

The site is presently occupied by the following:

- A broadly rectangular, two-storey, mainly brick building occupies the southern two-thirds of the site. In 2007, the building consisted of a factory and associated offices but is now used for entertainment purposes (indoor paintball skirmish and indoor karting);
- Car-parking spaces (on concrete and asphalt surfaces) and strip gardens are located on the southern and eastern sides of the building and are accessible from Station Avenue to the south-east. These areas also included disused underground storage tanks (USTs) and an above-ground storage tank (AST);
- Grass covered area on the western part of the site. In 2007 most of this area was covered with trees; and
- Vacant land to the north covered by concrete slabs with grass growing through the cracks/joints in the concrete and trees around the perimeter.

The site is relatively level with surface levels of RL 4.2 – 4.6 and gradients typically less than 1 degree.

The site is bordered by the following:

- Residential properties to the north and east;
- Concord West Road to the north-east;
- Station Avenue to the south-east;
- A warehouse to the south; and
- Homebush Bay Drive to the west. Powells Creek, a tributary of Homebush Bay, is located approximately 150 m to the west of the site.

4. Regional Topography, Geology and Hydrogeology

Reference to the Sydney 1:100 000 Geological Sheet indicates that the site lies on the boundary of areas indicated as underlain by man-made fill over alluvial and estuarine sediment including silty to peaty quartz sand, silt, and clay (western side); and Ashfield Shale comprising black to dark-grey shale and laminite (eastern side).

According to NSW Acid Sulfate Soil Risk mapping (1994-1998), the site is in an area of "Disturbed Terrain" which typically includes filled areas formed during reclamation of low-lying swamps for urban development. Investigations are required to assess these areas for potential acid sulphate soils.

The site is relatively level (at approximately RL 4.5 m AHD), however, the land to the east slopes up from the site. Powells Creek is approximately 150 m to the west of the site. The inferred groundwater flow at the site is thus is to the west, towards Powells Creek.

According to NSW Office of Water's website, there are three registered groundwater bores located within 500 m of the site, however all three groundwater bores are on the western side of Powells Creek. The three bores were used for monitoring purposes and indicated groundwater levels at depths of 1.8 m to 2.0 m below existing surface levels at the time of investigation.

Reference to the paper "Implication of K-Ar dating of fault gouges in NNE trending faults, Sydney Region" by Och, Offler, Zwingemann and Braybrooke, 2006, indicates the site is located on, or near, the Homebush Bay Fault Zone.

5. Geological Profile

The geotechnical model developed for the site from previous investigations is broadly summarised below and is illustrated on interpreted geological sections through the site on Drawings 2 and 3 in Appendix B:

- Unit 1 - Filling to depths of 0.6 m to 1.6 m (RL 2.7 – 3.7 m AHD) overlying;
- Unit 2 - Soft clays, peaty at some locations, to depths of 0.8 m to 2.5 m (RL 2.0 – 3.5 m AHD); overlying;
- Unit 3 - Residual clays, stiff to hard, to depths of 2.5 m to 4.9 m (RL -0.5 to 1.9 m AHD); overlying;
- Unit 4 - Weathered Shale, extremely low to very low strength, to depths of 4.1 m to 7.6 m (RL -2.7 to -1.4 m AHD); overlying;
- Unit 5 - Shale, low to medium and medium strength with evidence of some faulting; overlying; and
- Unit 6 - Shale, high strength, at depths of 6.5 to 6.6 m (RL -2.3 to 0.1 m AHD) in Bores 104 and 105.

The groundwater levels measured during DP's investigations indicate that the depth to groundwater ranged from 1.0 m to 4.3 m (RL 0.4 – 3.4 m AHD) and groundwater probably flows to the west. Groundwater levels measured in standpipes installed in the bores indicate the level of groundwater ranged from RL 2.0 to 3.6 m AHD. The measurements in the standpipes are considered more reliable than those measured in the test bores during the original investigation.

The presence of soft clays may indicate the presence of an old creekbed(s) running through the site.

Faulting observed in the shale may be associated with the Homebush Bay Fault Zone.

6. Proposed Development

It is understood that the proposed development will include three buildings, ranging in height from 3 to 8 storeys, with a common one level basement and associated access driveways.

The basement will generally be excavated to RL – 0.8 m AHD except at the location of the overland stormwater path where the basement will be excavated to RL – 1.5 m AHD (refer to Drawing 1).

The access driveways will meet Station Avenue to the south and Concord Avenue to the north. Most of the driveway will be above the basement structure.

Working loads for the columns for the structure are estimated by DP to be up to 6000 kN.

7. Comments

7.1 Groundwater and Dewatering

The excavation will extend 3.5 – 5.5 m below the measured groundwater levels so control of groundwater will be required for both temporary and permanent construction.

At this stage, based on the relatively high groundwater level and presence of fill and soft clays, it is probable that a tanked (fully water tight) basement will need to be constructed for the proposed basement. It is possible that a drained basement may be feasible but further testing will need to be carried out to assess the rate and quantity of groundwater inflows into the proposed basement and whether a drained basement is feasible. The choice of retaining wall (discussed in Section 7.3) will be dependent on whether a drained or tanked basement is required.

A tanked basement will need to be designed for uplift pressures from buoyancy forces.

Estimates of the amount of groundwater inflow into the excavation during construction (temporary) or in the long-term (if a drained basement is adopted) will need to be determined for design and to obtain approval from the relevant government authority (at this stage the NSW Department of Primary Industries: Office of Water). Approval for the off-site disposal of groundwater will also be required to the government authority

7.2 Bulk Excavation

Bulk excavation to RL -1.5 m for the proposed basement will predominantly intersect Units 1 to 4 (filling, natural soils, extremely low to very low strength shale) with minor amounts of Unit 5 (low to medium strength) shale.

Excavation within the filling and soils (Units 1 to 3) should be readily achievable by bulldozer blade or hydraulic excavator. Some light to medium ripping assistance or the careful use of rock hammers, grinders or rock saws may be required for layers of ironstone and low strength bands that may be within the weathered rock layer (Unit 4). Some difficulty may be encountered in traversing the soft clays by excavation and piling plant during construction.

Excavation within Unit 5 will require medium to heavy rock breaking equipment. Medium strength rock is expected to have an unconfined compressive strength (UCS) of 6 – 20 MPa. Low productivity during excavation should be expected within such materials. Rock breaking equipment will generally cause noise and vibrations that could disturb surrounding residents.

It should be noted that even when soils within the excavation have been dewatered, the excavated material will have a high water content due to the remaining interstitial water.

All excavated materials will need to be disposed of in accordance with current EPA policies. Under the Waste Avoidance and Resource Recovery Act (NSW EPA, 2001) a waste/fill receiving site must be satisfied that materials received meet the environmental criteria for the proposed land use. This includes filling and virgin excavated natural materials (VENM), such as may be removed from site. Accordingly, environmental testing will need to be carried out to classify spoil prior to disposal. The type and extent of testing undertaken will depend on the final use or destination of the spoil, and requirements of the receiving site.

7.3 Excavation Support

7.3.1 General

The sidewalls of the basement excavation will require temporary shoring support during excavation and permanent retaining wall support as part of the final construction. The type of retaining wall adopted will be dependent on whether a tanked or drained basement is adopted.

Given the presence of filling and soft clays on the site the following methods of retaining support are recommended.

- **Continuous pile wall** – these walls involve the installation of either bored or Continuous Flight Auger (CFA) piles immediately adjacent to each other to provide a continuous pile wall. A continuous pile wall is only considered feasible for drained basements.

  CFA concrete piles are usually used to construct a continuous pile wall as they are unaffected by the high water table and collapsing ground conditions. The CFA rig would need to be powerful enough to drill a socket of adequate length into the underlying medium and high strength shale. CFA piling is a 'blind' piling technique and the piling contractor would need to be responsible for assessment of whether a suitable socket in the medium and high strength shale is achieved.

- **Secant pile walls** – these walls involve the drilling alternate 'soft' concrete piles and then installing intermediate 'hard' concrete piles by cutting into the previously drilled soft piles. This overlap typically ensures that piles are sealed, but even at relatively shallow depths, some misalignment can occur and hence minor gaps appear in the wall. The potential for misalignment on deep secant pile walls is very high but if the secant pile wall can be installed with only slight misalignment at the bottom of the wall a secant pile wall can form a relatively water tight structure with only minor seepage. It may, however, be necessary to also undertake jet grouting if misalignment does occur because the high groundwater pressures near the base of the excavation could mean that it is not feasible to patch minor gaps in the secant pile wall.

CFA piles are normally used for the construction of a secant pile wall.

- **Diaphragm walls** are a lower risk but more expensive type of retaining wall structure and usually provide a neater finish to the inside wall. Diaphragm walls are constructed using a large grab, which excavates the soil in panels, with each panel then being cast using concrete tremmied into an excavation supported by bentonite slurry. The joints between the panels are sealed with a waterstop so that a completely water-tight wall is achieved. The construction is relatively slow but if diaphragm walls are socketed into bedrock then they can also provide a significant load carrying capacity for the structure.

  Diaphragm walls excavated into medium and high strength shale (Units 5 and 6) may probably need the assistance of a hydromill system, or similar. The drilling contractor will need to be consulted with respect to the most appropriate method of installing these walls into rock encountered on-site.

These wall types will require the use of temporary ground anchors or internal propping to provide lateral support during construction. Permanent lateral support would need to be provided by floor slabs.

7.3.2 Temporary Batters

During bulk excavation, the maximum unprotected batter slopes in Table 1 are recommended for the temporary battering of internal excavations of up to 3 m depth. Deeper excavation should incorporate benches or flatter batters.

Table 1: Temporary Batter Slopes

Material Description	Batter Slope (H:V)
Filling and Soft Clays (Units 1 to 2)	3:1[1]
Stiff to hard natural clays (Unit 3)	1.5:[1]
Extremely low and very low strength shale (Unit 4)	1:1[1]
Low and medium strength shale (Unit 5)	0.5:1[1]

Note: 1 Subject to geotechnical inspection every 1.5 m drop of excavation to check for unfavourable jointing and determine if flatter batters or stabilisation measures are required.

7.3.3 Design of Lateral Support

The design of retaining walls should take due account of both lateral earth pressures and surcharges acting on the walls.

The earth pressure coefficients and bulk unit weights in Table 2 are suggested for the design of a single anchored/propped wall using a triangular pressure distribution.

Table 2: Design Parameters for Retaining Structures

Strata	Earth Pressure Coefficients			
	Bulk Unit Weight, (kN/m^3)	'Active' K_a	'At Rest' K_o	Passive[1&2]
Filling and Soft Clays (Units 1 and 2)	18	0.5	0.6	NA
Residual Clays – Stiff to Hard (Unit 3)	20	0.3	0.5	NA
Extremely low and very low strength shale (Unit 4)	22	0.25	0.3	400 kPa
Low and medium strength shale (Unit 5)	23	0.15	0.2	2000 kPa[3]
High strength shale (Units 6)	24	NA	NA	6000 kPa[3]

Note: 1. Only applicable below bulk excavation level.
2. Ultimate Values
3. Subject to further core drilling to confirm the level and strength of this unit across the site

The active earth pressure coefficient, $K_{a,}$ to be used for estimating soil pressures is for a flexible wall allowing minor lateral or outward "tilting" movement. Where it is necessary to limit movement near other structures it is suggested that the wall be designed for K_0 (lateral earth pressure coefficients "at rest") conditions in combination with an analytical approach that considers the excavation and propping or anchoring sequence.

Wall design undertaken using the parameters given in Table 2 assumes the following:

- A level surface behind the top of the excavation;
- Retaining walls will need to allow for hydrostatic pressures from the ground surface level if drainage is not installed or maintained;
- Construction traffic and other surcharge loadings (e.g. stacked materials) are not applied at the crest of the retaining walls, for a distance of say 5 m behind the wall/shoring (otherwise the resultant additional lateral loads need to be considered); and
- Passive resistance may be developed in Units 4, 5 or 6 from beneath one pile diameter below the bulk excavation level or below the base of any adjacent localised excavation. The passive pressures calculated are ultimate values to which an appropriate factor of safety (say 3) should be incorporated so as to limit the movement that otherwise is required to develop full passive pressure.

If a multi-anchored wall is adopted the design for lateral earth pressures for system may be based on a uniform rectangular earth pressure distribution. The following earth pressure distributions are considered appropriate:

- Units 1 to 3 = 5H kPa (where H= height of the layer to be retained in m);
- Units 1 to 3 = 8H kPa (where lateral movements are to be limited);
- Units 4 & 5 = 2H kPa; and
- Units 4 & 5 = 4H kPa (where lateral movements are to be limited).

The design of temporary and permanent support will need to consider the possibility that 45° joints in the shale (Units 4 and 5) will daylight near the base of the excavation leading to large wedges of rock requiring support by the temporary and permanent retaining structures. Sufficient anchoring of the shoring wall should be undertaken to prevent movements along 45° joints, even though there is a low probability that a joint would run the full length and height of the excavation. It is suggested that design be carried out such that the support system has a factor of safety of 1.2 against the ultimate sliding force along the most unfavourable 45° joint.

The support system would typically comprise anchors spaced over the rock face. These anchors should have their bond lengths behind the projected 45° line from the bulk excavation level and should provide sufficient force to resist the movement of a wedge of rock projected at 45° from just below the anchor to the ground surface. The frictional resistance of the wedge along the joint may be calculated assuming an angle of friction of 20°. Additional anchors may be required to increase the factor of safety if large wedges are observed during excavation.

The final or detailed design of retaining walls is normally undertaken using interactive computer programs such as WALLAP, PLAXIS or FLAC, which can take due regard of soil-structure interaction during the progressive stages of wall construction, anchoring and bulk excavation.

7.4 Ground Anchors

Temporary ground anchors will be required for the lateral restraint of most boundary shoring walls greater than 3 m height until such time that the walls are permanently strutted by the building floor slabs. The anchors should preferably have their bond length within weathered (or stronger) rock.

Suggested allowable bond stresses for the design of temporary ground anchors for the support of piled wall systems are given in Table 3.

Table 3: Bond Stresses for Temporary Anchor Design

Material Description	Ultimate Bond Stress (kPa)
Extremely low and very low strength shale (Unit 4)	100
Low and medium strength shale (Unit 5)	400
High strength shale (Unit 6)	1000

Ground anchors should be designed to have a free length that extends beyond an imaginary line drawn upwards at an angle of 45° from the toe of the wall. The minimum free length should be 3 m. After installation, each anchor should be proof loaded to 125% of the design working load and locked-off at about 80% of the working load. Periodic checks should be carried out during the construction phase to ensure that the lock-off load is maintained and not lost due to creep effects or other causes. The above parameters are based on the assumption that the anchor holes are clean and thoroughly flushed, with grouting and other installation procedures carried out carefully and in accordance with normal good anchoring practice. The successful anchoring contractor should be required to demonstrate that design bond values are achievable with the proposed anchor construction methods.

Approval should be sought from the Council and adjacent property owners where rock anchors extend below neighbouring properties, roads or public access areas. Care should be taken to prevent damaging buried services.

7.5 Foundations

7.5.1 General

It is anticipated that extremely low to very low strength shale (Unit 4) or low to medium strength and medium strength shale (Unit 5) will be exposed at the Bulk Excavation Level (BEL). It is recommended that all footing loads be transferred to a consistent stratum to achieve uniform founding conditions so as to avoid potential differential settlement across the site. A combination of shallow foundations and piles are therefore recommended over the basement area to uniformly found on the Unit 5 shale. Alternatively, if higher bearing pressures are required, then piled footings founding on Unit 6 may be adopted. The drilling contractor will need to use appropriate piling plant that can penetrate bands of high strength and very high strength ironstone layers so that drilling can then continue to the required bearing stratum.

Where piles are drilled it is recommended that either cased bored piles or continuous flight auger (CFA) piles be adopted due to the potential inflow of groundwater.

7.5.2 Design Parameters

The maximum recommended bearing pressures and shaft adhesions for the various units are provided in Table 4.

Table 4: Maximum Foundation Design Parameters

Material	Working (Allowable) Stress Design Values		Limit (Ultimate) State Design Values		Elastic Modulus (MPa)
	End Bearing Pressure (kPa)	Shaft Adhesion (kPa)	End Bearing Pressure (kPa)	Shaft Adhesion (kPa)	
Extremely low and very low strength shale (Unit 4)	700	50	3000	150	150
Low and medium strength shale (Unit 5)	3500	350	30000	600	1000
High strength shale (Unit 6)[4]	6000	800	60000	800	2000

Notes:

1. Ultimate parameters mobilized at large settlements (i.e. >5% of footing width)
2. Allowable pressures for “Working Stress Design Values” are based on a ‘limiting settlement’ of 1% of the footing diameter or width.
3. All shaft adhesion parameters are based on adequately clean and rough sockets of category “R2”, or better.
4. The adoption of these design parameters should be subject to further core drilling

The foundation design parameters presented in Table 5 assume that footings are clean at the base and free of loose debris prior to concrete placement.

For uplift or tension loading, 50% of the above shaft adhesion parameters may be adopted for design purposes. In addition to traditional 'piston pull-out' or sidewall slip failure mechanisms, the uplift capacity should be checked for 'cone pull-out' failure modes. This should be based on an assumed cone angle of 90°. Uplift capacity for groups of piles will need to consider interaction between piles, which will generally lead to a lesser capacity than the sum of the capacity of individual piles in the group.

The design of footings is usually governed by settlement criteria and performance rather than the ultimate bearing capacity or Ultimate Limit State condition. The Serviceability limit should be assessed, for normal 'static' load cases, using the elastic modulus values given in Table 5. This modulus value is appropriate for the anticipated working stress values or strain expected under serviceability loading.

It is recommended that all footing excavations be inspected by an experienced geotechnical engineer or engineering geologist.

7.6 Seismic Design

In accordance with Section 4 of the Earthquake Loading Standard, AS1170.4 - 2007 the site is assessed to have a Site Sub-Soil Class of "C_e".

7.7 Vibrations

During excavation it will be necessary to use appropriate methods and equipment to keep ground vibrations within acceptable limits. The standards detailed in the Appendix D are considered appropriate for management of ground vibrations.

Provisional Allowed Vibration Limit

From current information it is considered that the structures adjacent to the site can withstand vibration levels higher than those required to maintain the comfort of their occupants. A human comfort criterion is therefore indicated and the peak particle velocity in any direction i (PPVi), is proposed as the control parameter. It is recommended that a Provisional Allowed Vibration Limit of 8.0 mm/sec PPVi be set during normal working hours, at foundation level of the potentially affected building/s.

Excavation Plant

DP maintains a database of vibration trial results which can provide guidance for the selection of plant. Trial data is dependent on site conditions and equipment, hence actual vibration levels may differ from predictions and a specific trial is recommended at the commencement of rock excavation. The database suggests that buffer distances within the ranges shown in Table 5 should be maintained between excavation plant and adjacent buildings. These estimates should be examined in relation to the distances between adjacent buildings and the proposed excavation footprint, in order to select suitable plant.

Table 5: Approximate Buffer Distances for Excavation Plant

Excavation Plant	Buffer Distance	
	(from trial maxima)[1]	(from trial averages)
Provisional Allowed Vibration Limit:	8 mm/s PPVi	
Likely equivalent maximum Vector Sum PPV	11 mm/s VSPPV	
Ripper on 20 t Excavator	2.5 m	0.9 m
Rock Hammer < 500 kg Operating Weight	5.6 m	2.2 m
Rock Hammer 501 – 1000 kg Operating Weight	6.3 m	2.6 m
Rock Hammer 1001 – 2000 kg Operating Weight	9.7 m	4.3 m
Rock Hammer >2000 kg Operating Weight	6.2 m	4.3 m

Note: 1 Smaller distances may be determined from individual trials, as indicated by those from trial averages

It is recommended that building condition (dilapidation) surveys of adjacent buildings be undertaken prior to commencement of excavation and that the building foundation types and conditions be determined where possible, so as to assess the maximum acceptable vibration level for prevention of damage and to provide evidence in the event of any damage claims.

7.8 Pavements and Working Platforms

For the preparation of the subgrade for pavements, where formed on the existing ground, the following subgrade preparation measures are recommended:

- Remove all filling and any organic/deleterious materials;
- Proof-roll the exposed surface using a minimum 10 tonne smooth drum roller in non-vibratory mode. The surface should be rolled a minimum of six times with the last two passes observed by an experienced geotechnical engineer to detect any 'soft spots';
- Any unsuitable materials identified during proof rolling should be removed as directed by the geotechnical engineer. The presence of soft clay layers at the pavement subgrade level will require either over excavation and replacement (refer below) or the use of geosynthetic layers to bridge over the soft layers (as to be determined by the geotechnical engineer on-site);
- Any new filling should be placed in layers of 300 mm maximum loose thickness and compacted to the following standards:
  - General Fill – compaction of fill should be to a density ratio of between 98% and 102% relative to Standard compaction;
  - Within 0.2 m of pavement subgrade levels – compaction of fill should be to a density ratio of between 100% and 103% relative to Standard compaction;

  Moisture contents should be maintained within 2% of Standard optimum moisture content if the filling exhibits clay-like properties;

- The select fill should be free of oversize particles (>100 mm) and deleterious material. Clays and ripped shale won from elsewhere on-site are generally considered suitable for re-use as fill up to subgrade level; and
- Density testing of the filling should be carried out as defined in AS3798 "Guidelines for Earthworks for Commercial and Residential Developments".

Areas of loose filling and soft clays are not expected to provide a suitable working platform for any piling rigs or cranes accessing the site prior to bulk excavation. In these areas either removal and replacement or placement of a bridging layer are expected.

Existing concrete slabs and pavements may be retained to assist with working platforms, however, the suitability of the slabs/pavements can only be determined once the rig dimensions and applied loadings are known.

A working platform assessment of the near surface soils will be required once the proposed rig or crane dimensions and loadings are known.

7.9 Floor Slabs

The ground floor slab at the lowest level of the basement is expected to be used for carparking and hence will probably only be lightly loaded. Most of the base of the excavation will expose shale (Unit 4), which will provide adequate support for a slab-on-grade. The final surface should be trimmed and scraped clean of debris etc.

If a drained basement is adopted it is recommended that a gravel layer be provided beneath the floor slab and should slope towards the sump pit to allow sub-floor drainage.

7.10 Further Work

The information presented within this report is considered sufficient to proceed with preliminary design suitable for rezoning and Development Application purposes. The following further work is recommended prior to construction and detailed design:

1) Additional test boreholes at several locations across the proposed basement footprint. This investigation should include diamond core drilling to at least 4 m below the bulk excavation level in all boreholes and intersect the high strength shale (Unit 6);
2) Installation of additional groundwater monitoring standpipes for the subsequent permeability testing and monitoring of groundwater levels. Modelling of groundwater inflows will also be required; and
3) Preliminary Waste Classification Assessment of material proposed to be transported off site in accordance with the appropriate guidelines.

8. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at 7 Concord Avenue, Concord West in accordance with DP's proposal dated 26 June 2015 and acceptance received from Mr Joe D'Agostino of F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd dated 8 July 2015. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk.

This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk

assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About this Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

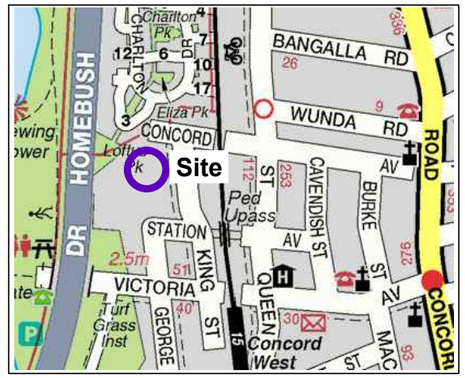
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

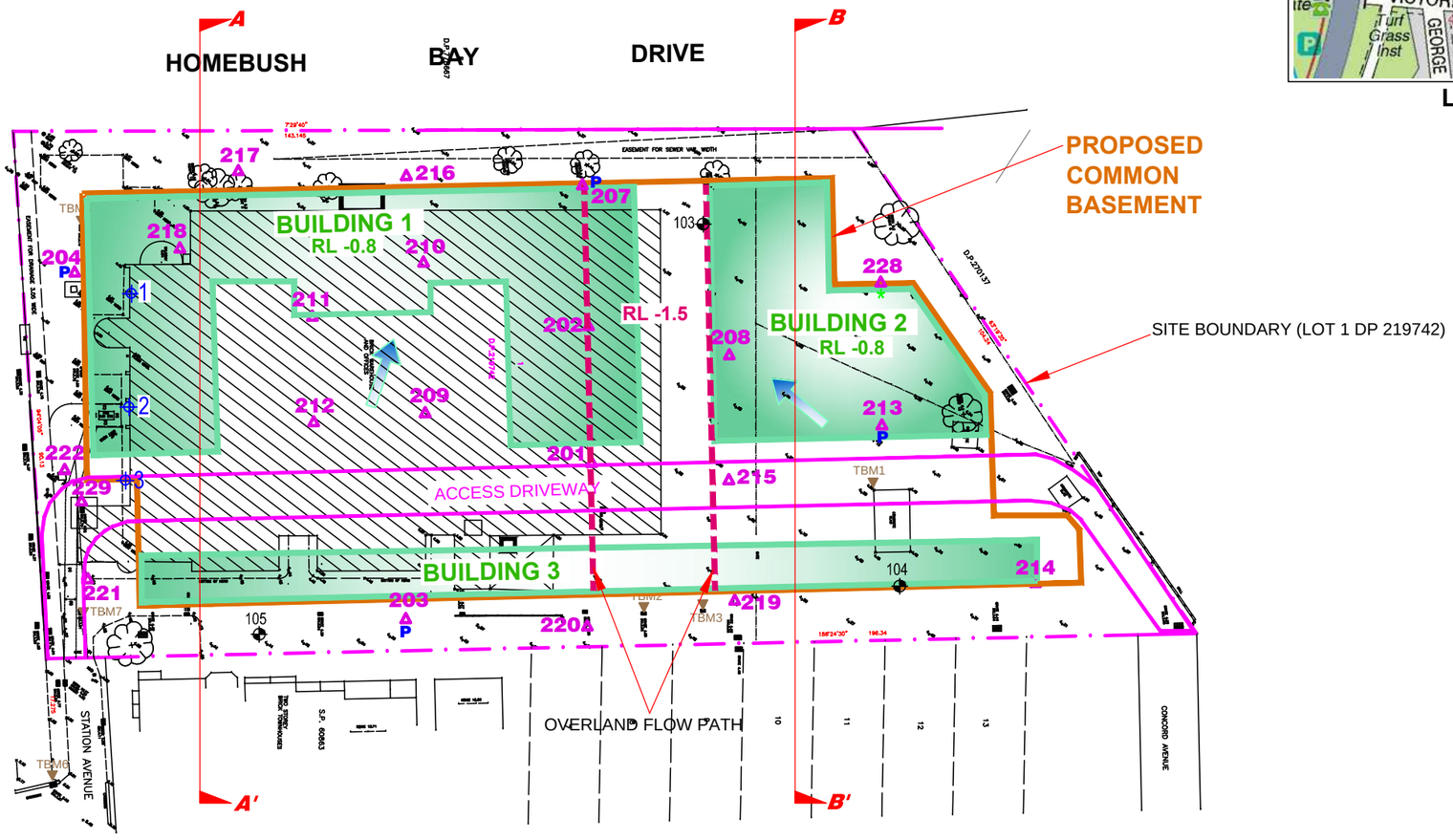
The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Drawings



Locality Plan



LEGEND

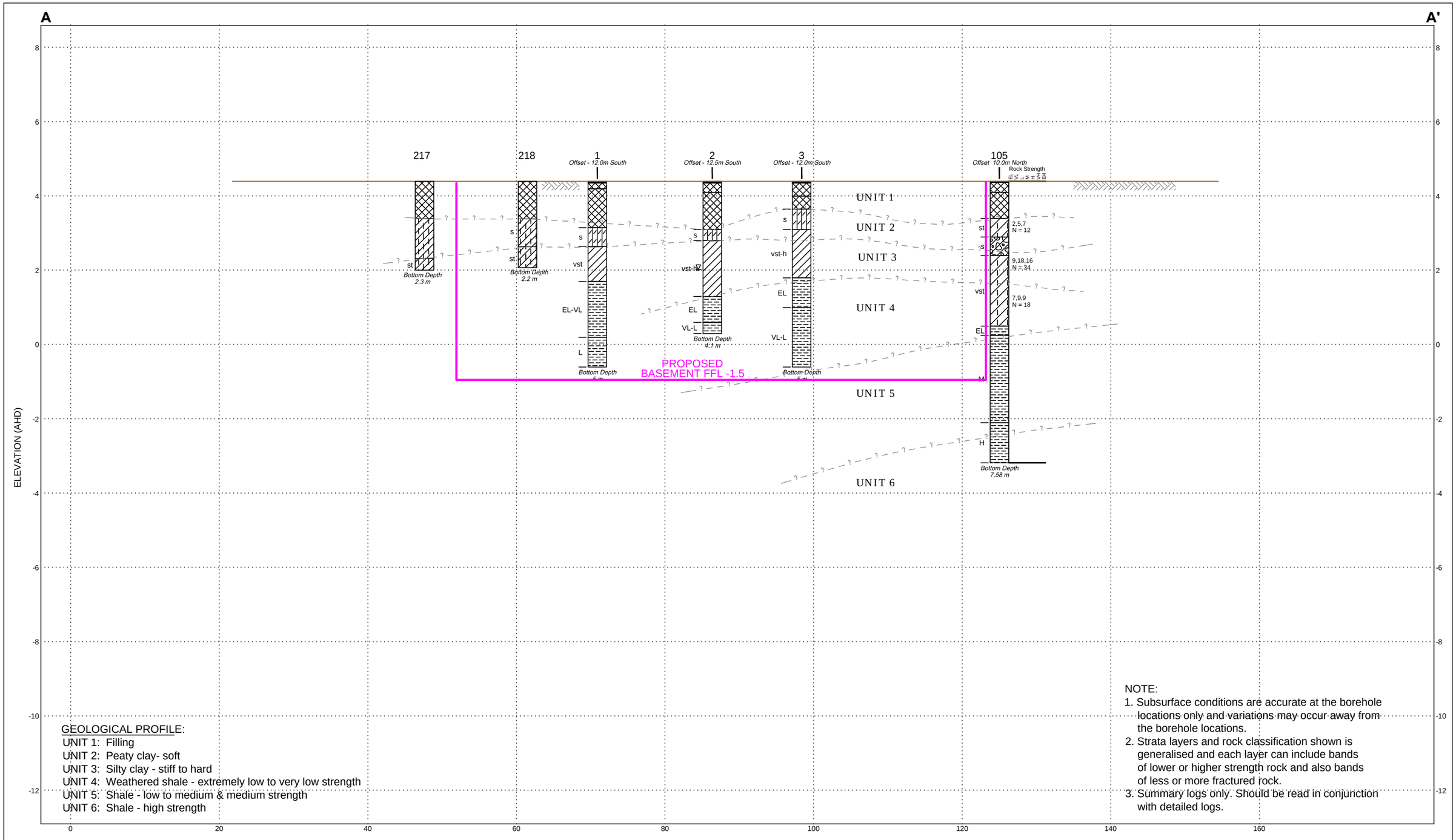
- PREVIOUS TEST BORE LOCATION (DP, 1990)
- TEST BORE LOCATION (DP, 2007b)
- TEST BORE LOCATION (DP, 2007a)
- HAND AUGER ONLY AT TEST BORE 228
- INFERRED GROUNDWATER FLOW DIRECTION
- TEMPORARY BENCH MARK (TBM)
- PIEZOMETER INSTALLED AT TEST BORE LOCATION

0 10 20 30 40 50 75 100m

1:1000 @ A3

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: F.T.D. Holdings (Concord West) Pty Ltd & Floridana Pty Ltd		TITLE: **Location of Test Bores**	PROJECT No: 84964.00
OFFICE: Sydney	DRAWN BY: PSCH	**Geotechnical Assessment**	DRAWING No: 1
SCALE: 1:1000 @ A3	DATE: 17.11.2015	**7 Concord Avenue, CONCORD WEST**	REVISION: 0



GEOLOGICAL PROFILE:
UNIT 1: Filling
UNIT 2: Peaty clay- soft
UNIT 3: Silty clay - stiff to hard
UNIT 4: Weathered shale - extremely low to very low strength
UNIT 5: Shale - low to medium & medium strength
UNIT 6: Shale - high strength

NOTE:
1. Subsurface conditions are accurate at the borehole locations only and variations may occur away from the borehole locations.
2. Strata layers and rock classification shown is generalised and each layer can include bands of lower or higher strength rock and also bands of less or more fractured rock.
3. Summary logs only. Should be read in conjunction with detailed logs.

DISTANCE ALONG PROFILE (m)

LEGEND

- Asphaltic Concrete
- Filling
- Clayey Silt
- Clay
- Shale
- Silty Clay
- Gravelly Clay

ROCK STRENGTH
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High

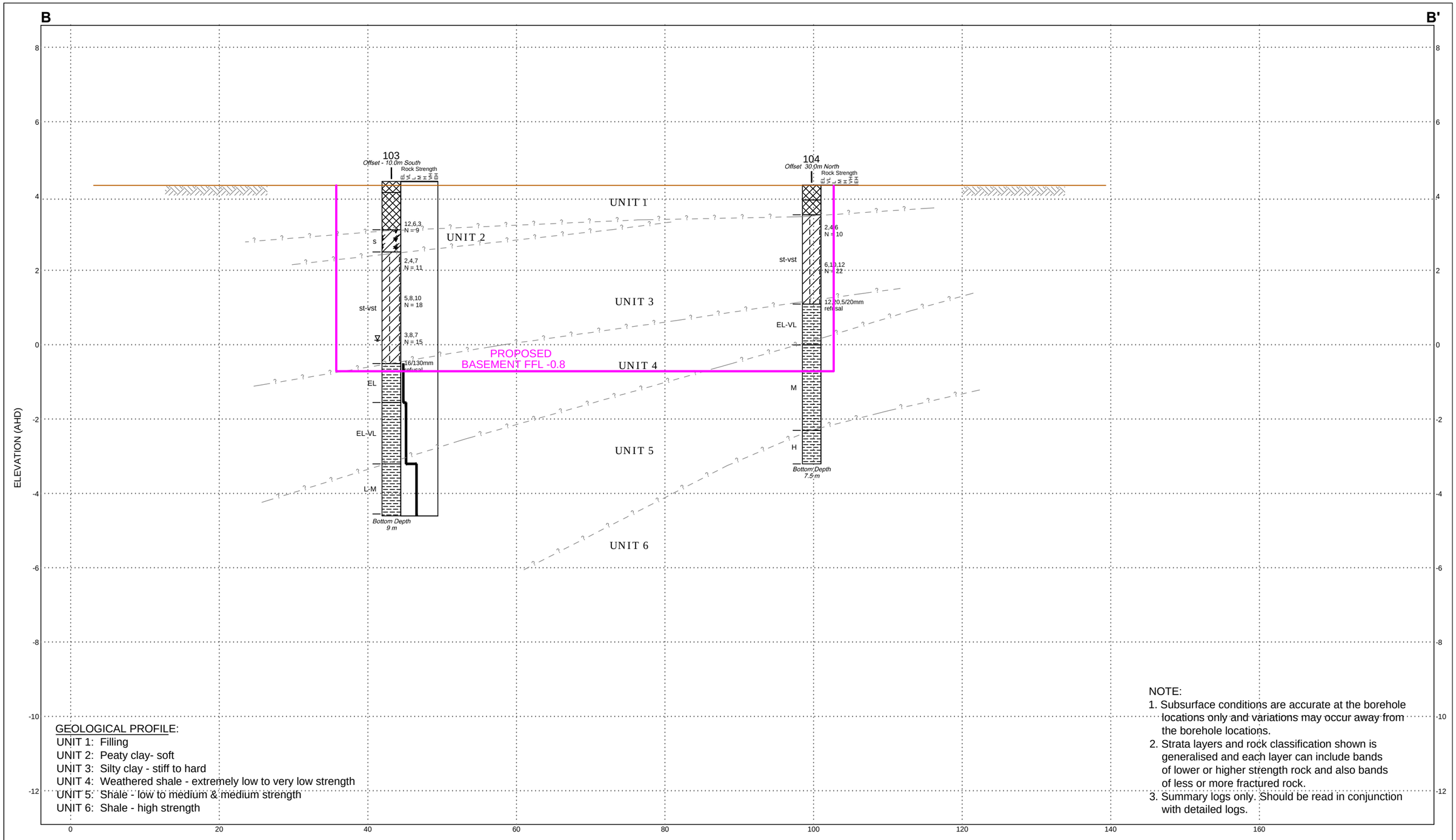
SOIL CONSISTENCY
vs - very soft
s - soft
f - firm
st - stiff
vst - very stiff
h - hard
vl - very loose
l - loose
md - medium dense
d - dense
vd - very dense

TESTS / OTHER
N - Standard penetration test value
▽ - Water level

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd	TITLE:	**Cross-section A-A'**
OFFICE:	Sydney	DRAWN BY:	GRB/LD	**Proposed Development**
SCALE:	1:500 (H) 1:100 (V) @ A3	DATE:	20.11.2015	**7 Concord Avenue, Concord West**

PROJECT No:	84964.00
DRAWING No:	2
REVISION:	0



GEOLOGICAL PROFILE:
UNIT 1: Filling
UNIT 2: Peaty clay- soft
UNIT 3: Silty clay - stiff to hard
UNIT 4: Weathered shale - extremely low to very low strength
UNIT 5: Shale - low to medium & medium strength
UNIT 6: Shale - high strength

NOTE:
1. Subsurface conditions are accurate at the borehole locations only and variations may occur away from the borehole locations.
2. Strata layers and rock classification shown is generalised and each layer can include bands of lower or higher strength rock and also bands of less or more fractured rock.
3. Summary logs only. Should be read in conjunction with detailed logs.

LEGEND
- Filling
- Peaty Clay
- Silty Clay
- Shale

DISTANCE ALONG PROFILE (m)

ROCK STRENGTH
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High

SOIL CONSISTENCY
vs - very soft
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f - firm
st - stiff
vst - very stiff
h - hard
vl - very loose
l - loose
md - medium dense
d - dense
vd - very dense

TESTS / OTHER
N - Standard penetration test value
▽ - Water level

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: F.T.D.Holdings (Concord West) Pty Ltd and Floridana Pty Ltd		TITLE: **Cross-section B-B'**	PROJECT No: 84964.00
OFFICE: Sydney	DRAWN BY:	**Proposed Development**	DRAWING No: 3
SCALE: 1:500 (H) 1:100 (V) @ A3	DATE: 20.11.2015	**7 Concord Avenue, Concord West**	REVISION: 0

Appendix C

Results of Previous Field Work

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

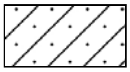
Soils


Topsoil

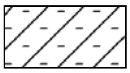

Peat


Clay

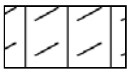

Silty clay

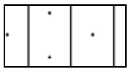

Sandy clay

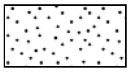

Gravelly clay

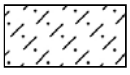

Shaly clay

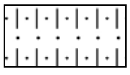

Silt


Clayey silt


Sandy silt

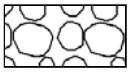

Sand

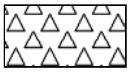

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

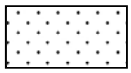

Talus

Sedimentary Rocks

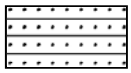

Boulder conglomerate

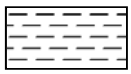

Conglomerate


Conglomeratic sandstone

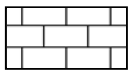

Sandstone


Siltstone


Laminite

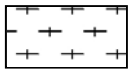

Mudstone, claystone, shale

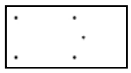

Coal


Limestone

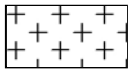
Metamorphic Rocks

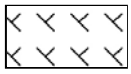

Slate, phyllite, schist

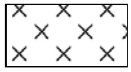

Gneiss

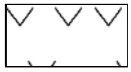

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

DOUGLAS PARTNERS PTY LTD

INVESTIGATIONS FOR FUTURE DEVELOPMENT, CONCORD WEST

BORE 101 PROJECT 45146 SEP 2007

BOREHOLE LOG

CLIENT: Fred Hoskings Pty Ltd
PROJECT: Investigation For Future Development
LOCATION: Station Avenue, Concord West

SURFACE LEVEL: 4.4 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 45146
DATE: 18 Sep 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, D - Drill Break)	Type	Core Rec. %	RQD %	Test Results & Comments
	0.13	CONCRETE										
	0.3	FILLING - brown sand filling, moist							A			
	0.8	FILLING - poorly compacted, brown gravelly clay filling with some bricks and sandstone fragments, moist				▼			A			
	1.2	PEATY CLAY - soft, black peaty clay with some organic matter, saturated							S			0,2,3 N = 5
		SILTY CLAY - stiff to very stiff, light grey mottled orange, slightly sandy, silty clay with some ironstone gravel, humid							A			
									S			4,7,8 N = 15
									S			7,9,13 N = 22
	3.5	SHALE - extremely low strength, grey shale with ironstone						Note: Unless otherwise stated, rock is fractured along rough, ironstained planar bedding planes or joints dipping 0°- 10°				
	4.3	SHALE - very low and very low to low strength, highly to slightly weathered, fractured to slightly fractured, grey shale						4.36-4.96m: B0°- 10°, ironstained 5.05m: J85° 5.3-6.8m: fault zone 5.6m: micro fault 5.6-5.8m: micro faults	C	100	66	PL(A) = 0.8MPa
	5.22	SHALE - medium strength, fresh stained then fresh, fractured and faulted, grey shale with some sandstone laminae						6.05m: J85°- 90° 6.16m: J60°- 90° slickensided 6.27m: micro fault 6.32m: J75° 6.36m: fault 60° 6.76-6.8m: crushed rock 6.88m: J85°				PL(A) = 0.4MPa
	6.9	SHALE - high strength, fresh, slightly fractured, grey shale with some sandstone laminae						7.2m: J60° clay smear 7.35m: J85°				PL(A) = 3MPa
	7.43	Bore discontinued at 7.43m										

RIG: Multi-Access Rig **DRILLER:** Traccess **LOGGED:** Boyd/Islam **CASING:** HQ to 4.5m

TYPE OF BORING: Solid flight auger (100mm) to 4.3m; NMLC-Coring to 7.43m

WATER OBSERVATIONS: Free groundwater observed at 0.8m

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: GRB
Date: 16/10/07

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INVESTIGATIONS FOR FUTURE DEVELOPMENT, CONCORD WEST
BORE 102 PROJECT 45146 SEP 2007
4
CONCORD WEST 45146 BH102.
START CORING 4.25m
5
6
CORE LOSS 250mm.
7
END CORE 7.25m
4.25 - 7.25 M

BOREHOLE LOG

CLIENT: Fred Hoskings Pty Ltd
PROJECT: Investigation For Future Development
LOCATION: Station Avenue, Concord West

SURFACE LEVEL: 6.7 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 45146
DATE: 18 Sep 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, D - Drill Break)	Type	Core Rec. %	RQD %	Test Results & Comments
	0.11	CONCRETE										
	0.2	FILLING - yellow brown, medium grained sand filling, moist							A			
		FILLING - poorly compacted, orange brown gravelly clay filling, humid (possibly natural from 1.5m)							A			
									S			2,2,2 N = 4
	1.8	SILTY CLAY - very stiff, light grey mottled orange, slightly sandy silty clay with some ironstone gravel, humid							A			
									S			11,13,11 N = 24
									S			10,11,14 N = 25
	3.8	SHALE - extremely low strength, grey shale						Note: Unless otherwise stated, rock is fractured along ironstained planar bedding planes or joints dipping 0°- 10°				
	4.25	SHALE - very low and low strength, highly and moderately weathered, fractured, grey shale						Fragmented in parts (possibly by drilling) 4.93m: J25° 5.05m: J85°- 90°	C	100	21	
	5.3	SHALE - medium strength, moderately to slightly weathered, highly fractured, grey brown shale						5.6m: J30° ironstained 5.72m: J85°				PL(A) = 0.5MPa
	6.0							6m: CORE LOSS: 250mm 6.12m: J85°	C	81	59	
	6.55	SHALE - high strength, fresh stained, slightly fractured, grey shale						6.5m: J75° 6.6m: J75° 6.95m: J45° 7.05m: J45°				PL(A) = 1.1MPa
	7.25	Bore discontinued at 7.25m										

RIG: Multi-Access Rig **DRILLER:** Traccess **LOGGED:** Boyd/Islam **CASING:** HQ to 4.3m

TYPE OF BORING: Solid flight auger (100mm) to 4.25m; NMLC-Coring to 7.25

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: GRB
Date: 16/10/07

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DOUGLAS PARTNERS PTY LTD

INVESTIGATIONS FOR FUTURE DEVELOPMENT, CONCORD WEST

BORE 103 PROJECT 45146 SEP 2007

BOREHOLE LOG

CLIENT: Fred Hoskings Pty Ltd
PROJECT: Investigation For Future Development
LOCATION: Station Avenue, Concord West

SURFACE LEVEL: 4.4 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 45146
DATE: 18 Sep 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, D - Drill Break)	Type	Core Rec. %	RQD %	Test Results & Comments
	0.3	FILLING - well compacted, brown and grey gravelly sand filling with some clay, humid							A			
		FILLING - variably compacted, red, yellow brown, grey gravelly clay filling with some ironstone gravel and timber pieces at 1.0-1.3m depth, damp							A			
	1.3	PEATY CLAY - soft, black peaty clay, moist							S			12,6,3 N = 9
	1.9	SILTY CLAY - stiff to very stiff, light grey mottled orange silty clay, moist							A			
									S			2,4,7 N = 11
									S			5,8,10 N = 18
		- saturated from 4.3m				▼			S			3,8,7 N = 15
	4.9	SHALE - extremely low strength, grey mottled orange shale						Note: Unless otherwise stated, rock is fractured along rough ironstained planar bedding planes or joints dipping 0°- 10°	S			16/130mm refusal
	5.95	SHALE - extremely low to very low strength, extremely to highly weathered, grey brown shale						5.95-7.6m: extremely to highly weathered, obscuring discontinuities	C	100	0	
	7.6	SHALE - low to medium strength, moderately to slightly weathered, highly fractured to fractured, grey brown shale						7.72m: B0°- 5°, 10mm clay 7.78m: J85° smooth 8.04m: J30° smooth 8.4m: J30°	C	100	41	PL(A) = 0.3MPa PL(A) = 0.3MPa
	9.0	Bore discontinued at 9.0m						8.85-8.95m: fragmented				

RIG: Multi-Access Rig **DRILLER:** Traccess **LOGGED:** Boyd/Islam **CASING:** HQ to 6.0m
TYPE OF BORING: Solid flight auger (100mm) to 5.95m; NMLC-Coring to 9.0m
WATER OBSERVATIONS: Free groundwater observed at 4.3m whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: GRB
Date: 16/10/07

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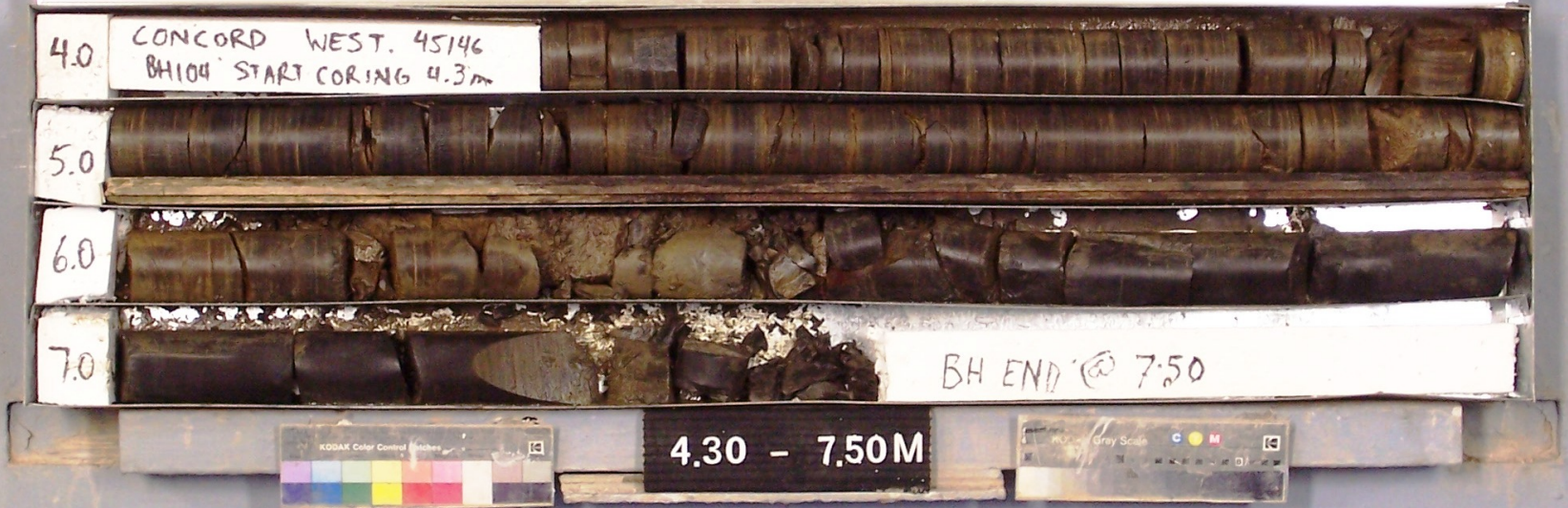
INVESTIGATIONS FOR FUTURE DEVELOPMENT, CONCORD WEST

BORE 104 PROJECT 45146 SEP 2007



BOREHOLE LOG

CLIENT: Fred Hoskings Pty Ltd
PROJECT: Investigation For Future Development
LOCATION: Station Avenue, Concord West

SURFACE LEVEL: 4.3 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 45146
DATE: 18 Sep 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear D - Drill Break)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0.4	FILLING - well compacted, brown and grey recycled concrete, gravel and sand filling, humid							A			
	0.8	FILLING - poorly compacted, red brown mottled grey gravelly clay filling with some concrete fragments, humid							A*			
		SILTY CLAY - stiff to very stiff, light grey mottled orange and red slightly sandy silty clay, humid							S			2,4,6 N = 10
									S			6,10,12 N = 22
	3.2	SHALE - extremely low to very low strength, grey mottled orange shale						Note: Unless otherwise stated, rock is fractured along rough, ironstained planar bedding planes or joints dipping 0°- 10°	S			12,20,5/20mm refusal
	4.3	SHALE - medium strength, fresh stained, fractured, grey brown shale with some sandstone laminae						4.3-5.19m: B0° ironstained & clay veneer 5.1m: J25° 5.35m: J25° 5.6m: J40° 5.77m: J20° 5.8m: J20° 5.9m: J45° 6.1m: J20° 6.16-6.56m: J70°- 90° 6.56m: J30° smooth 6.68-6.85m: J80° 7.26m: J75°	C	100	77	PL(A) = 0.8MPa PL(A) = 0.7MPa PL(A) = 1.4MPa
	6.6	SHALE - high strength, fresh, slightly fractured, dark grey shale										
	7.5	Bore discontinued at 7.5m										

RIG: Multi-Access Rig **DRILLER:** Traccess **LOGGED:** Boyd/Islam **CASING:** HQ to 4.3m

TYPE OF BORING: Solid flight auger (100mm) to 4.3m; NMLC-Coring to 7.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *Duplicate sample Z-180907 collected

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: GRB
Date: 16/10/07

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DOUGLAS PARTNERS PTY LTD

INVESTIGATIONS FOR FUTURE DEVELOPMENT, CONCORD WEST

BORE 105 PROJECT 45146 SEP 2007

4.15 - 7.58M

BOREHOLE LOG

CLIENT: Fred Hoskings Pty Ltd
PROJECT: Investigation For Future Development
LOCATION: Station Avenue, Concord West

SURFACE LEVEL: 4.4 AHD
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 45146
DATE: 18 Sep 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear D - Drill Break)	Type	Core Rec. %	RQD %	Test Results & Comments
	0.03	ASPHALTIC CONCRETE							A			
	0.3	FILLING - well compacted, dark grey slightly clayey, sandy gravel filling (roadbase). Gravel of slag with some ash, humid							A			
	1.0	FILLING - variably compacted, brown gravelly clay filling, with a trace of brick fragments, moist							S			2,5,7 N = 12
	1.5	SILTY CLAY - stiff, light grey slightly sandy silty clay with ironstone gravel, wet							A			
	2.0	GRAVELLY CLAY - soft, brown black gravelly clay, saturated (possibly peat layer)							S			9,18,16 N = 34
		SILTY CLAY - very stiff, light grey slightly sandy silty clay, moist						Note: Unless otherwise stated, rock is fractured along rough ironstained planar bedding planes or joints dipping 0°- 10°	S			7,9,9 N = 18
	3.9	SHALE - extremely low strength, grey mottled orange shale										
	4.15	SHALE- medium strength, moderately to slightly weathered, highly fractured to fractured, grey brown shale with some sandstone laminae						4.15-4.6m: B0° ironstained 4.67m: J25° healed 4.81m: J35° 5.34m: J40° 5.64m: J60°	C	100	66	PL(A) = 0.5MPa PL(A) = 0.8MPa
	6.5	SHALE - high strength, fresh, slightly fractured, grey shale with some sandstone laminae						6.04m: J35° 6.12-6.30m: J75°- 85° rough, irregular 6.33-6.50m: J25°- 35° with micro faults 6.76m: J45° 6.81m: J50° 6.92m: J85° 7.15m: J45° 7.43m: B0° 10mm clay	C	100	100	PL(A) = 1.4MPa
	7.58	Bore discontinued at 7.58m							C	100	98	PL(A) = 1.3MPa

RIG: Multi-Access Rig **DRILLER:** Traccess **LOGGED:** Boyd/Islam **CASING:** HQ to 4.4m

TYPE OF BORING: Solid flight auger (100mm) to 4.2m; NMLC-Coring to 7.58m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: GRB
Date: 16/10/07

Douglas Partners
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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.52 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 201
PROJECT No: 45146A
DATE: 09 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.15	CONCRETE							
		FILLING - brown clay filling with some sand, silt and trace gravel		A	0.2		PID=2ppm		
					0.5				
	0.8	PEATY CLAY - soft, black peaty clay with trace gravel, moist							
	1.0	SILTY CLAY - soft, brown silty clay, with trace ironstone gravel, moist		A	1.0		PID<1ppm		
					1.5				
		- saturated from 2.0m to 2.5m						▼	
	2.5	SILTY CLAY - stiff to very stiff, mottled brown and grey silty clay, moist		A	2.5		PID=2ppm		
					2.8				
	3.0	Bore discontinued at 3.0m - target depth reached							

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.15m then 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 2.0m whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: DW
Date: 15/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.48 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 202
PROJECT No: 45146A
DATE: 09 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.14	CONCRETE							
		FILLING - brown sandy clay filling, with trace silt and gravel			0.2				
				A			PID<1ppm		
					0.5				
				A			PID=2ppm		
	1.0	Bore discontinued at 1.0m - refusal on concrete			1.0				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.14m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

Douglas Partners
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BOREHOLE LOG

CLIENT:	Fred Hosking Pty Ltd	**SURFACE LEVEL:** 4.42 AHD^	**BORE No:** 203
PROJECT:	Phase 1 and 2 Contamination Assessment	**EASTING:**	**PROJECT No:** 45146A
LOCATION:	7 Concord Avenue & 202-210 George Street Concord West	**NORTHING:**	**DATE:** 09 Oct 07
		DIP/AZIMUTH: 90°/--	**SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.07	ASPHALTIC CONCRETE							Gatic cover
	0.15	FILLING - brown and grey clayey gravel filling with some sand (roadbase)							Concrete
		FILLING - light brown silty clay filling, with trace gravel and brick pieces		A	0.2		PID<1ppm		
					0.5				Bentonite
	0.8	PEATY CLAY - soft, black peaty clay with trace rootlets, moist		A	0.8		PID=2ppm		
	1.0	SILTY CLAY - soft, grey silty clay with trace gravel, moist to wet		A	1.0		PID=3ppm	22-10-07	
	1.3	SILTY CLAY - stiff to very stiff, mottled red and grey silty clay with trace ironstone gravel, moist			1.3				
					1.5				Backfilled with gravel
				A*			PID<1ppm		
					2.0				
					2.5				Machine slotted PVC screen
				A			PID<1ppm		
					3.0				
									End cap
	4.3	Bore discontinued at 4.3m - refusal on weathered shale							

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.07m then 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.1m whilst augering. Groundwater measured at 1.16m bgl on 22/10/07

REMARKS: *BD1-091007 blind replicate 1.5-1.0m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: A.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.39 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 204
PROJECT No: 45146A
DATE: 09 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.05	ASPHALTIC CONCRETE							Gatic cover
		FILLING - brown gravelly sand filling with trace silty clay and concrete pieces (roadbase)		A	0.1		PID<1ppm		Concrete
	0.3	FILLING - mottled brown and grey clay filling, with trace gravel			0.3				
					0.5				Bentonite
				A			PID=3ppm	▼ 22-10-07	
1	1.0	PEATY CLAY - soft, black peaty clay with trace of organic matter, moist		A	1.0		PID<1ppm		Backfilled with gravel
	1.2	SILTY CLAY - soft, grey silty clay, moist		A	1.2		PID=2ppm		
	1.4	SILTY CLAY - soft, grey silty clay with some shell fragments, wet to saturated		A	1.4 1.5		PID=2ppm		Machine slotted PVC screen
	1.9	SILTY CLAY - stiff to very stiff, brown and grey silty clay, with trace sand and gravel, moist		A	1.9		PID<1ppm		
2	2.5	Bore discontinued at 2.5m - refusal on weathered shale			2.2				End cap
3									
4									

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.4m whilst augering. Groundwater measured at 0.76m bgl on 22/10/07

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: A.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT:	Fred Hosking Pty Ltd	**SURFACE LEVEL:** 4.69 AHD^	**BORE No:** 205
PROJECT:	Phase 1 and 2 Contamination Assessment	**EASTING:**	**PROJECT No:** 45146A
LOCATION:	7 Concord Avenue & 202-210 George Street Concord West	**NORTHING:**	**DATE:** 09 Oct 07
		DIP/AZIMUTH: 90°/--	**SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.16	CONCRETE							Gatic cover Concrete
	0.25	FILLING - yellow grey sand filling							
		FILLING - brown and grey clay filling, with trace gravel		A	0.3 0.5		PID<1ppm		Bentonite
	0.6	PEATY CLAY - soft, dark grey peaty clay, wet - strong hydrocarbon odour at 0.6m to 1.5m		A	0.6		PID=5ppm	22-10-07	Backfilled with gravel
				A	1.0		PID=5ppm		
	1.5	SILTY CLAY - soft to firm, brown and grey silty clay - moist to wet from 1.5m to 2.0m - mild hydrocarbon odour at 1.5m to 2.0m		A	1.5 2.0		PID=4ppm		Machine slotted PVC screen
		- stiff to very stiff from 2.5m to 3.2m		A	2.5 3.0		PID=4ppm		End cap
	3.2	Bore discontinued at 3.2m - refusal on weathered shale							

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.16m then 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 0.6m whilst augering. Groundwater measured at 0.74m bgl on 22/10/07

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 5.62 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 206
PROJECT No: 45146A
DATE: 09 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - brown silty sand filling, with trace roots (leaves on garden surface)		A	0.0		PID<1ppm		
	0.5	FILLING - mottled yellow and grey clay filling		A	0.5		PID=2ppm		
	1.0				1.0				
	1.5	FILLING - brown clay filling, with trace of gravel		A	1.5		PID<1ppm		
	2.0				2.0				
	2.5	SILTY CLAY - soft, grey brown silty clay, moist		A*	2.5		PID=3ppm	▼	
	2.7	SILTY CLAY - stiff, mottled grey and brown silty clay, with trace gravel, wet		A	2.7		PID=1ppm		
	3.0	Bore discontinued at 3.0m - target depth reached			3.0				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 2.7m whilst augering

REMARKS: *BD2-091007 blind replicate of 206/2.5-2.7m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: A-L
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.28 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 207
PROJECT No: 45146A
DATE: 09 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown silty clay filling, with some gravel and trace sand and rootlets (grass surface)		A	0.0		PID<1ppm		Gatic cover; Concrete
				A	0.5		PID=1ppm		Bentonite
	1.0	FILLING - brown clay filling		A	1.0		PID<1ppm		Backfilled with gravel
	1.6	PEATY CLAY - soft, black peaty clay, moist			1.5				
	1.7	SILTY CLAY - stiff to very stiff, mottled red brown and grey silty clay, moist		A*	1.7		PID=1ppm		
					2.0			22-10-07	
					3.0		- insufficient soil from auger to sample from depths of 3.0m & 4.0m		Machine slotted PVC screen
	4.3	Bore discontinued at 4.3m - target depth reached							End cap

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering. Groundwater measured at 2.16m bgl on 22/10/07

REMARKS: *BD3-091007 blind replicate of 207/1.7-2.0m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.47 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 208
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING - grey sandy gravel filling, with some concrete pieces, trace plastic and roots		A	0.0 0.1		PID=1ppm		
		FILLING - yellow brown sandy clay filling, with trace gravel		A	0.2		PID<1ppm		
				A	0.5		PID<1ppm		
	1.1	SILTY CLAY - soft, dark grey and brown silty clay, moist to wet			1.0 1.1			▼	
				A			PID=3ppm		
	1.6	Bore discontinued at 1.6m - target depth reached			1.6				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.1m whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: A.V
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.53 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 209
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.15	CONCRETE							
	0.2	FILLING - yellow sand filling			0.2				
		FILLING - brown grey clay filling, with trace sand and gravel		A			PID=1ppm		
		- slight hydrocarbon odour from 0.5m to 1.0m			0.5				
				A			PID=3ppm		
	1				1.0				1
	1.2	PEATY CLAY - soft, black peaty clay, moist			1.2				
		- slight odour of organic matter		A			PID=3ppm		
					1.5				
	1.7	SILTY CLAY - stiff to very stiff, mottled red and grey silty clay, moist			1.7				
				A			PID=2ppm		
	2 2.0	Bore discontinued at 2.0m			2.0				2
		- target depth reached							
	3								3
	4								4

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.15m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: P. L
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.57 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 210
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.16	CONCRETE							
		FILLING - grey sandy clay filling, with trace gravel			0.2				
				A			PID=2ppm		
					0.7				
				A			PID<1ppm		
	1.2	Bore discontinued at 1.2m - refusal on ironstone probably in filling			1.2				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.16m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▽ Water level

CHECKED
Initials: A.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.49 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 211
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.16	CONCRETE							
		FILLING - yellow sand filling		A	0.2		PID<1ppm		
	0.4	FILLING - brown grey clay filing, with trace sand and gravel			0.4				
					0.5				
				A			PID=2pm		
					1.0				
	1.3	PEATY CLAY - soft, black peaty clay, moist - slight odour of organic matter		A	1.3		PID=3ppm		
					1.5				
	1.7	SILTY CLAY - stiff to very stiff, red and grey silty clay		A	1.7		PID=2ppm		
	2.0	Bore discontinued at 2.0m - target depth reached			2.0				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.16m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⧗ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.57 AHD^ **BORE No:** 212
EASTING: **PROJECT No:** 45146A
NORTHING: **DATE:** 10 Oct 07
DIP/AZIMUTH: 90°/-- **SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.15	CONCRETE							
		FILLING - yellow sand filling			0.2				
	0.35	FILLING - brown and grey clay filling, with some sand and gravel		A			PID=2ppm		
	0.5	FILLING - concrete rubble filling?			0.5		- no auger returns at 0.5m-0.7m		
	0.7	Bore discontinued at 0.7m - refusal on concrete rubble filling?							

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.15m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: RJ
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.22 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 213
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING - grey sand filling, with some concrete fragments and trace gravel and wire		A	0.0		PID<1ppm		Gatic cover; Concrete
		FILLING - grey and brown clay filling, with trace gravel		A	0.2		PID<1ppm		Bentonite; Backfilled with gravel
	0.7	PEATY CLAY - soft, black peaty clay, moist to wet		A	0.5 / 0.7		PID=2ppm		
	1.1	SILTY CLAY - stiff to very stiff, red brown and grey silty clay, damp		A*	1.0 / 1.1		PID=2ppm	22-10-07 ▼	
				A	1.5		PID<1ppm		Machine slotted PVC screen
					2.0				
	2.7	- trace gravel from 2.6m to 2.7m							End cap
	2.9	SHALE - extremely low to very low strength, grey brown shale							
		Bore discontinued at 2.9m - refusal on weathered shale							

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering. Groundwater measured at 1.08m bgl on 22/10/07

REMARKS: *BD2-101007 blind replicate of 213/1.1-1.5m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.4 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 214
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0								
		FILLING - grey sand filling with some clay and concrete fragments, trace gravel and rootlets		A	0.0		PID=1ppm		
	0.2	FILLING - brown clay filling with trace gravel, sand and rootlets		A	0.2		PID<1ppm		
	0.5				0.5				
	0.8	PEATY CLAY - soft, black peaty clay - very slight organic matter odour		A	0.8 1.0		PID=2ppm		
	1.2	SILTY CLAY - stiff, grey silty clay, humid		A	1.2		PID=3ppm		
	1.5	Bore discontinued at 1.5m - target depth reached			1.5				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.51 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 215
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	FILLING - grey sand filling with some gravel, concrete fragments and trace clay			0.1				
		FILLING - grey sand filling, with some gravel and clay		A			PID=1ppm		
	0.3	FILLING - brown and grey clay filling, with trace sand			0.3				
					0.5				
				A			PID<1ppm		
					1.0				
	1.1	PEATY CLAY - soft, black peaty clay, moist			1.1				
	1.2	SILTY CLAY - stiff, grey and red silty clay, moist		A	1.2		PID=1ppm		
				A			PID<1ppm		
	1.7	Bore discontinued at 1.7m - target depth reached			1.7				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.V
Date: 25/10/07

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BOREHOLE LOG

CLIENT:	Fred Hosking Pty Ltd	**SURFACE LEVEL:** 4.38 AHD^	**BORE No:** 216
PROJECT:	Phase 1 and 2 Contamination Assessment	**EASTING:**	**PROJECT No:** 45146A
LOCATION:	7 Concord Avenue & 202-210 George Street Concord West	**NORTHING:**	**DATE:** 10 Oct 07
		DIP/AZIMUTH: 90°/--	**SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0								
		FILLING - mottled orange brown and grey clay filling with trace of sand, fibre cement fragment, timber and rootlets		A	0.3		PID<1ppm A216/0.3m fibre cement sample from 0.3m		
	0.5	FILLING - grey clay filling, with trace of gravel		A	0.5		PID=3ppm		
	1.0	SILTY CLAY - soft, grey silty clay with trace gravel, sand and rootlets, moist (possibly filling)		A	1.0		PID=2ppm		
		- wet to saturated from 1.5m to 2.4m - organic matter odour from 1.5m to 2.0m		A	1.5		PID=3ppm		
					2.0		PID=1ppm	▼	
	2.4	SILTY CLAY - stiff, mottled red and grey silty clay, with trace of gravel		A	2.5		PID=2ppm		
	3.0	Bore discontinued at 3.0m - target depth reached			3.0				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 2.0m whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT:	Fred Hosking Pty Ltd	**SURFACE LEVEL:** 4.42 AHD^	**BORE No:** 217
PROJECT:	Phase 1 and 2 Contamination Assessment	**EASTING:**	**PROJECT No:** 45146A
LOCATION:	7 Concord Avenue & 202-210 George Street Concord West	**NORTHING:**	**DATE:** 10 Oct 07
		DIP/AZIMUTH: 90°/--	**SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown and grey clay filling, with some gravel and trace of sand		A	0.0		PID<1ppm		
				A	0.5		PID=2ppm		
	1.0	SILTY CLAY - moist, brown silty clay, with trace of gravel and sand		A	1.0		PID=3ppm		
		- wet at 1.8m			1.5			▼	
	2.0	SILTY CLAY - stiff, mottled red and grey silty clay, moist		A*	2.0		PID=4ppm		
	2.3	Bore discontinued at 2.3m - target depth reached			2.3				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.8m whilst augering

REMARKS: *BD3-101007 blind replicate of 217/2.0-2.3m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.V
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.44 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 218
PROJECT No: 45146A
DATE: 10 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.05	ASPHALTIC CONCRETE							
		FILLING - mottled grey, brown and red clay filling with some sand, trace gravel and roots		A	0.1		PID=3ppm		
	0.25	FILLING - yellow brown sand filling, with some gravel and trace of clay			0.2				
					0.4				
				A			PID=3ppm		
	0.7	FILLING - brown clay filling, with trace gravel			0.7				
				A*			PID<1ppm		
	1.0	PEATY CLAY - soft, black peaty clay, moist			1.0				
				A			PID=2ppm		
	1.2	SILTY CLAY - soft, dark grey silty clay, moist			1.2				
					1.3				
				A			PID=2ppm		
					1.5				
	1.7	SILTY CLAY - stiff, mottled grey and brown silty clay, damp							
					2.0				
				A			PID=2ppm		
	2.2	Bore discontinued at 2.2m - target depth reached			2.2				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD4-101007 blind replicate of 218/0.7-1.0m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⫢ Water level

CHECKED
Initials: [illegible]
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.42 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 219
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.15	CONCRETE							
		FILLING - brown clay filling, with some gravel and trace sand		A	0.2		PID<1ppm		
	0.4	FILLING - mottled brown and grey clay filling, with trace of gravel			0.4				
				A	0.5		PID=2ppm		
	0.9	PEATY CLAY - soft, black peaty clay, moist - slight organic matter odour		A	0.9		PID=4ppm		
	1.1	SILTY CLAY - soft, grey silty clay, moist			1.1				
	1.2	SILTY CLAY - stiff, mottled grey and brown silty clay, with trace of gravel, moist - wet at 1.5m to 1.7m		A	1.2		PID=2ppm	▼	
	1.7	Bore discontinued at 1.7m - target depth reached			1.7				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (120mm diameter) to 0.15 then 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.5m whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D. W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.3 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 220
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.17	CONCRETE							
4	0.3	FILLING - dark grey sand filling, with some clay and trace gravel		A	0.2 0.3		PID<1ppm		
		FILLING - mottled brown and grey clay filling, with trace gravel		A	0.5		PID<1ppm		
	0.6	PEATY CLAY - soft, black clay, moist - organic matter odour		A	0.6		PID=2ppm		
	0.8	SILTY CLAY - soft, brown and grey silty clay, moist			0.8				
1		- wet at 1.0m to 1.3m		A			PID=1ppm	▼	1
3	1.3	SILTY CLAY - stiff, mottled red brown and grey clay, with trace ironstone gravel			1.3				
				A*	1.5		PID=1ppm		
	1.9	Bore discontinued at 1.9m - target depth reached			1.9				
2									2
2									
									3
1									
									4
0									

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.17 then100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.0m whilst augering

REMARKS: *BD1-111007 blind replicate of 220/1.5-1.9m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U,	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.V
Date: 25/10/07

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BOREHOLE LOG

CLIENT:	Fred Hosking Pty Ltd	**SURFACE LEVEL:** 4.45 AHD^	**BORE No:** 221
PROJECT:	Phase 1 and 2 Contamination Assessment	**EASTING:**	**PROJECT No:** 45146A
LOCATION:	7 Concord Avenue & 202-210 George Street Concord West	**NORTHING:**	**DATE:** 11 Oct 07
		DIP/AZIMUTH: 90°/--	**SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	FILLING - brown silty sand filling with trace clay, gravel and rootlets (garden surface)			0.1				
		FILLING - brown gravelly sand filling with trace of silt, clay and timber		A			PID=2ppm		
					0.5				
		- strong hydrocarbon odour from 0.8m to 1.7m							
	1	- stained grey from 1.0m to 1.7m			1.0			▼	1
				A			PID=8ppm		
					1.2				
				A			PID=9ppm		
	1.7	Bore discontinued at 1.7m			1.7				
		- refusal on unknown object							
	2								2
	3								3
	4								4

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.0m whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.V
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.43 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 222
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.05	ASPHALTIC CONCRETE							
	0.15	FILLING - brown clayey sand, with trace of gravel							
		FILLING - brown, orange and grey clay filling, with some gravel and trace sand		A	0.2		PID=3ppm		
					0.5				
	0.8	FILLING - yellow sand filling, with trace clay		A	0.8		PID=2ppm		
	1.0	SILTY CLAY - soft, grey silty clay, moist		A*	1.0		PID=2ppm	▼	
		- wet at 1.2m to 1.3m							
	1.3	SILTY CLAY - stiff, mottled grey and brown clay, humid		A	1.3		PID=4ppm		
	1.5	Bore discontinued at 1.5m - target depth reached			1.5				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.2m whilst augering

REMARKS: *BD2-111007 blind replicate of 222/1.0-1.3m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: R.V
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.41 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 223
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.12	CONCRETE							
	0.2	FILLING - brown sand filling, with trace gravel			0.2				
		FILLING - brown sandy clay filling, with some gravel		A			PID<1ppm		
					0.5				
				A			PID=2ppm	▼	
					1.0				
	1.1	SILTY CLAY - soft, grey silty clay, wet							
	1.2	SILTY CLAY - stiff, brown and grey silty clay, moist			1.2				
				A			PID<1ppm		
	1.5	Bore discontinued at 1.5m - target depth reached			1.5				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.12m then 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 0.9m whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.44 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 224
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.16	CONCRETE							
	0.25	FILLING - yellow sand filling							
		FILLING - yellow and dark grey sand filling with some gravel, clay and trace of roots			0.3				
				A	0.5		PID<1ppm		
				A	1.0		PID=2ppm	▼	
	1.2	PEATY CLAY - soft, mottled grey and brown peaty clay, moist to wet		A	1.2		PID=1ppm		
	1.4	SILTY CLAY - stiff, mottled grey and brown silty clay, moist			1.4				
				A*	1.6		PID<1ppm		
	2.0	Bore discontinued at 2.0m - target depth reached			2.0				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.16m then 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 1.0m whilst augering

REMARKS: *BD3-111006 blind replicate of 224/1.6-2.0m. ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U$_x$	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials: AW
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.41 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 225
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.16	CONCRETE							
		FILLING - yellow and orange sand filling		A	0.2		PID<1ppm		
					0.5				
	0.9	PEATY CLAY - stiff, brown and black peaty clay, moist		A	0.9		PID=2ppm		
	1.2	SILTY CLAY - soft, grey silty clay, with trace of shell fragments			1.2				
				A	1.3		PID<1ppm		
	1.7	SILTY CLAY - stiff, mottled grey and red brown silty clay, with trace of sand			1.5				
					2.0				
				A			PID=2ppm		
	2.5	Bore discontinued at 2.5m - target depth reached			2.5				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.16m then100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ⫢ Water level

CHECKED
Initials:
Date: 25/10/07

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BOREHOLE LOG

CLIENT:	Fred Hosking Pty Ltd	**SURFACE LEVEL:** 5.46 AHD^	**BORE No:** 226
PROJECT:	Phase 1 and 2 Contamination Assessment	**EASTING:**	**PROJECT No:** 45146A
LOCATION:	7 Concord Avenue & 202-210 George Street Concord West	**NORTHING:**	**DATE:** 11 Oct 07
		DIP/AZIMUTH: 90°/--	**SHEET** 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.15	CONCRETE							
		FILLING - yellow and grey clay filling, with trace silt and sand		A*	0.2 0.5		PID=2ppm		
	0.7	Bore discontinued at 0.7m - refusal on timber/tree stump							

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.15m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD4-111007 blind replicate of 226/0.2-0.5m. ^Benchmark obtained from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▽ Water level

CHECKED
Initials: D.W
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 5.54 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 227
PROJECT No: 45146A
DATE: 11 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.17	CONCRETE							
	0.3	FILLING - yellow sand filling, with trace of gravel - some cobble sized concrete and rock pieces at 0.25m		A	0.2 0.3		PID=1ppm		
	0.5	FILLING - white sandstone boulder filling		A			PID<1ppm		
		FILLING - brown and grey sand filling, with some gravel and trace of silt		A	0.5		PID=2ppm		
				A	1.0		PID=2ppm		
	1.7				1.5				
		SILTY CLAY - soft, dark grey silty clay, moist		A	1.7		PID=2ppm		
	2.0	SILTY CLAY - soft, brown grey silty clay, moist			2.0				
	2.4	SILTY CLAY - stiff, mottled orange brown and grey silty clay, with trace gravel, damp		A	2.4		PID=2ppm		
	2.6	Bore discontinued at 2.6m - target depth reached			2.6				

RIG: Bobcat **DRILLER:** S Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Concrete coring (150mm diameter) to 0.17m then 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: ^Benchmark obtained from survey plan provided by client
Important Note: Soil strengths were determined subjectively in the field and are not to be used for geotechnical purposes

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▽ Water level

CHECKED
Initials: A.L
Date: 25/10/07

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BOREHOLE LOG

CLIENT: Fred Hosking Pty Ltd
PROJECT: Phase 1 and 2 Contamination Assessment
LOCATION: 7 Concord Avenue & 202-210 George Street Concord West

SURFACE LEVEL: 4.47 AHD^
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 228
PROJECT No: 45146A
DATE: 15 Oct 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	FILLING - brown silty clay filling, with some sand and trace gravel, cobble sized rock pieces, metal pieces, tile fragments and bone		A	0.0		PID<1ppm		
	0.12	FILLING - mottled grey and yellow clay filling, with some rock fragments			0.1				
		Bore discontinued at 0.12m - refusal in filling							

RIG: Hand tools
DRILLER: DW
LOGGED: DW
CASING: Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: ^Benchmark obtained from survey plan provided by client

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▽ Water level

CHECKED
Initials: P.V
Date: 25/10/07

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Appendix D

Vibration Notes

Ground Vibration

Ground vibration can be described by measurement of the acceleration, velocity or displacement of the ground particles at one or more locations. Triaxial geophone sensors for example can measure the peak velocities of radial, transverse or vertical particle motion (designated PPVr, PPVt and PPVz respectively and PPVi for any directional component) within selected sample periods and peak velocities can also be determined in the resultant direction of particle motion, from calculations of instantaneous vector sums throughout the sample period. Vector sum velocities are designated VSPPV, or in many cases simply PPV.

There are three aspects of vibration which need to be assessed:

1. Effects on structures
2. Effects on architectural finishes
3. Effects on humans

Numerous standards and guidelines exist worldwide which provide a basis for these assessments. Their focus varies from structural damage to human comfort and from transient to intermittent to continuous vibrations. Most provide guideline vibration limits for protection against damage or human discomfort, however these limits are not always consistent and application of a particular standard or guideline should be based on the expected type of vibration, the types and conditions of the potentially affected buildings and the potential for discomfort of their occupants.

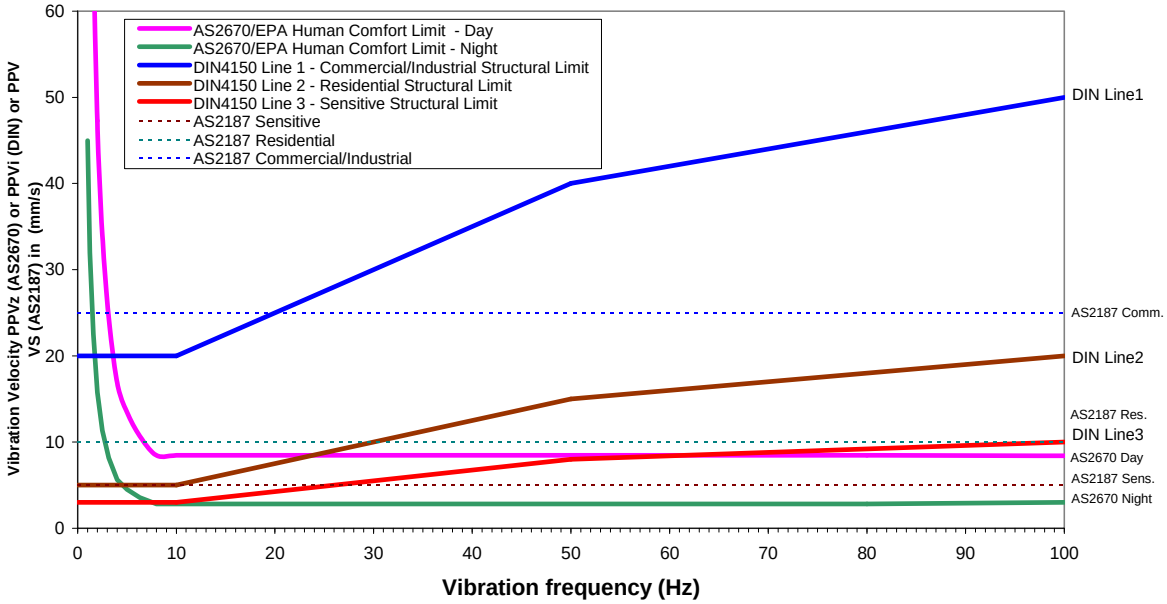
Both the guideline and the vibration limits should be determined on a case by case basis and the adopted limits (damage and human comfort or the lower of the two) may differ from the guideline values, according to the experience of the vibration consultant, due to the sensitivity of the building or the activities of its occupants. Some applicable guidelines are summarised in the graph on the following page.

Depending on site conditions, proposed works, results of building condition surveys and on-site vibration trials (indicating vibration attenuation rates and dominant vibration frequencies of excavation plant), the standards, guidelines and limits discussed below are considered appropriate for management of ground vibrations generated during rock excavation.

Effects on Structures

The German Standard DIN4150-3-1999 “Structural vibration – effects of vibrations on structures”, recommends that ground vibration at foundation level of residential buildings, in good condition bearing on sound rock foundations, be limited to 5 - 15 - 20 mm/s PPVi (at vibration frequencies of 10 - 50 - 100 Hz typical of excavation plant), in order to reduce the potential for structural damage. Higher limits (20 - 40 - 50 mm/s PPVi) and lower limits (3 - 8 -10 mm/s PPVi) are recommended for commercial/industrial and sensitive buildings respectively. From DP experience where buildings are bearing on loose sand, maximum vibration levels should be significantly reduced to the order of 5 to 7 mm/s VSPPV to reduce the risk of vibration-induced sand densification and settlement.

Guidelines for Evaluating the Effects of Intermittent or Impulsive and Short Term Vibrations on Human Comfort and Structures (Based on AS2670.2/EPA ENCM Ch174 and DIN4150)



Effects on Architectural Finishes

It has been found from experience that even with buildings bearing on rock, vibration levels as low as 10 mm/s VSPPV may cause minor defects such as cracks through rendering, cornices and skirtings. Management of vibration may require a lowering of structural damage criteria to this architectural damage criterion, or negotiations with owners of affected buildings.

Effects on Humans

Ground vibration can be strongly perceptible to humans at levels above 2.5 mm/s VSPPV and can be disturbing at levels above 5 mm/s VSPPV. Complaints from residents and building occupants are sometimes received when levels are as low as 1 mm/s VSPPV. The Australian Standard AS2670.2-1990 “Evaluation of human exposure to whole-body vibrations – continuous and shock induced vibrations in buildings (1-80 Hz)” indicates an acceptable day time limit of 8 mm/s PPVz for human comfort. Management of vibration may require a lowering of damage criteria to this human comfort criterion, or negotiations with occupants of affected buildings.

Vibration Dosage

A vibration limit based on a particle velocity allows real time control of excavation using warning systems (e.g. flashing lights) attached to vibration monitors. Occasional exceedances (vibration levels exceeding the allowed limit) are not damaging or disturbing and can be allowed but frequent exceedances should be avoided by changes in excavation methods. The difference between occasional and frequent is difficult to gauge on site but can be assessed using recorded vibration data, on the basis of experience or by application of a vibration dosage criterion.

A vibration dosage value (VDV) can be used to assess the effect of intermittent vibrations (e.g. from bursts of rock hammering) on humans over a defined period. Acceptable dosages (generally VDVz for vertical vibrations found most disturbing by humans) have been defined for occupants of residential, commercial and industrial buildings ("Assessing Vibration: a technical guideline", Department of Environment and Conservation, 2006). Estimates of VDV (eVDV) can be calculated from recorded vibration data and can be compared with recommended maxima of 0.4, 0.8 and 1.6 $m/s^{1.75}$ for residential, commercial and industrial locations respectively, to assess the need to change excavation methods to restore human comfort.

The vibration dosage guideline does not relate VDV to structural damage however it is considered that if the VDV is acceptable from a human comfort viewpoint, vibrations leading to that VDV would be unlikely to cause damage to the corresponding residential, commercial or industrial structure.

Management of vibrations may require addition of these vibration dosage criteria to other human comfort or damage criteria, if the frequency of vibration exceedances becomes difficult to assess on site or by experienced-based data review.