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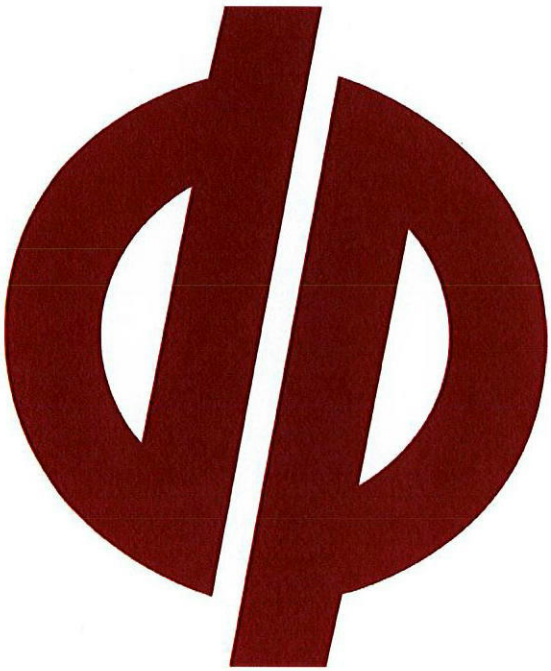
Integrated Practical Solutions

Report on
Preliminary Geotechnical Investigation

Proposed Aged Care Facility
Emerald Street
Emu Plains

Prepared for
UnitingCare Ageing

Project 84503
November 2014



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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.

	Signature	Date
Author		11 November 2014
Reviewer		11 November 2014

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Geotechnics / Environment / Groundwater

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Report on Preliminary Geotechnical Investigation
Proposed Aged Care Facility
Emerald Street, Emu Plains

1. Introduction

This report presents the results of a preliminary geotechnical investigation undertaken by Douglas Partners Pty Ltd (DP) for a proposed aged care facility at 1-11 Emerald Street, Emu Plains. The work was commissioned by Mr John Phillpott of UnitingCare Ageing, and was carried out in accordance with the scope of works outlined in DP's proposal (SYD141066, dated 10 September 2014). The work was commissioned as part of the initial planning for a proposed redevelopment of the site.

It is understood that a new aged care facility is proposed to replace the existing facility and may include up to three above ground residential floor levels with a possible one level basement and associated pavement and landscaping reconfigurations.

A preliminary geotechnical investigation was undertaken to provide information on the subsurface conditions and included the drilling of boreholes, laboratory testing and engineering assessment. Details of the field work and comments relevant to design and construction practice are given herein.

A preliminary contamination assessment was undertaken by DP in conjunction with the geotechnical work. The results of the contamination assessment are presented separately in DP's Report on Preliminary Site Investigation (Project 84503.00, dated November 2014).

2. Site Description

The site is located on the southern side of the Great Western Highway between Emerald Street and Troy Street, Emu Plains. A large commercial development is present opposite the site on the northern side of the Great Western Highway. Residential lots and the Emu Plains Public School border the southern side of the site. Emerald and Troy Streets border the eastern and western sides of the site, respectively.

The site covers an area of approximately 1.8 hectares and is currently occupied by an existing aged care facility that comprises several interconnected single and two-storey residential, health care, religious and administrative buildings with open garden areas scattered throughout. On-site car parking is located on the eastern and western sides of the site via driveways extending from Emerald Street and Troy Street respectively.

The general site topography is relatively flat with site levels essentially consistent across the site, however, landscaping features and garden beds have resulted in some localised undulations. Landscaping comprises mostly grasses amongst a scattering of garden beds.

3. Geology

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is underlain by Quaternary Sediments of the Cranebrook Formation. This is a fluvial deposit comprising various blends of gravel, sand, silt and clay.

4. Field Work Methods

The field work for this investigation was conducted on 26 September 2014 and included:

- Walkover inspection by a geotechnical engineer.
- The drilling of two boreholes (BH1 and BH2) using a truck mounted drill rig fitted with solid flight augers and a tungsten carbide (TC) bit. The bores were drilled to depths of between 3.7 m and 5.2 m to identify the subsurface conditions.
- Standard penetration tests (SPT) carried out at regular depth intervals during auger drilling of the boreholes to assess in situ strength and subsoil consistency.
- Sampling of soils to assist in logging and to provide specimens for laboratory testing of soil plasticity and aggressivity.
- Installation of a standpipe piezometer in borehole BH1 to monitor groundwater levels.

In addition to the above, a further six boreholes (BH3 to BH8) were drilled, two by the same drill rig (BH7 and BH8) and four using hand tools (BH3 to BH6). These boreholes were drilled to assist the environmental assessment and therefore, extend to shallow depth into natural soil, generally to approximately 1 m depth.

The ground surface levels at the borehole locations were interpolated from Vince Morgan Surveyors' Drawing No. 16582T2, dated 20 June 2014. Coordinates for each borehole were recorded using a handheld GPS receiver, which is accurate to approximately 5 m. The borehole locations are shown on Drawing No. 1 in Appendix B.

5. Field Work Results

The subsurface conditions encountered in the boreholes are presented in the borehole logs in Appendix C together with notes defining classification methods and descriptive terms.

A summary of the typical sequence of subsurface conditions encountered in geotechnical boreholes BH1 and BH2 at the site is presented below:

Filling:	Asphaltic concrete at both boreholes to 0.05 m depth. Grey and brown silty fine to coarse sand filling below the asphaltic concrete to 0.3 m. Grey gravelly clay/ripped shale filling below the silty sand filling to 0.7 m in BH2.

Fluvial Sediments: Interbedded layers of very stiff and hard silty clay, silty sandy clay and medium dense and dense silty and clayey sand encountered below the filling layers in both boreholes. Both boreholes refused on inferred coarse river gravels at 5.2 m depth in BH1 and 3.7 m depth in BH2.

No free groundwater was observed during auger drilling in either borehole. A subsequent visit to measure the groundwater in the standpipe piezometer showed no water table present within the standpipe piezometer (i.e. groundwater was below 5.2 m depth). Long-term measurement of the groundwater level is currently being undertaken by way of a dedicated data logger in the piezometer that has been set to record daily groundwater levels. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

6. Laboratory Testing

Soil samples were collected from selected boreholes during the field investigation. Two representative samples of soil collected from BH1 and BH7 were subjected to laboratory Atterberg limits tests in accordance with AS1289.3.1.2, AS1289.3.2.1 and AS1289.3.3.1 and California bearing ratio (CBR) tests in accordance with AS1289.6.1.1. The test results are presented in Appendix D and are summarised in Table 1.

Table 1: Summary of Laboratory Atterberg Limits and CBR Test Results

Borehole	Depth (m)	Soil Description	LL (%)	PL (%)	PI (%)	CBR (%)	Swell (%)
BH1	0.5 – 1.0	Red Silty Clay	24	14	10	7	0.5
BH7	1.0	Brown Silty Clay	24	16	8	-	-

Notes : Where: LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index

In addition, two representative samples collected from boreholes BH1 and BH2 were subjected to a suite of chemical tests including, pH, chlorides (Cl), sulphates (SO_4) and resistivity to assess their potential aggressivity to buried concrete and steel elements. The test results are presented in Appendix D and are summarised in Table 2.

Table 2: Summary of Laboratory Aggressivity Test Results

Borehole	Depth (m)	Soil Description	pH (pH Units)	Chloride (mg/kg)	Sulphate (mg/kg)	Resistivity (ohm m)
BH1	2.5	Silty Clay	6.9	10	80	35
BH2	1.0	Silty Clay	6.9	<10	10	13

7. Proposed Development

It is understood that the proposed development may include up to three above ground levels of residential aged care bed facilities, individual living units and support facilities and associated pavement and landscaping reconfigurations. One basement level is being considered, although not confirmed. The development is currently at the concept design stage.

8. Comments

The following preliminary comments on the design and construction aspects of the proposed development are provided based on the results of the preliminary geotechnical investigation. These comments should be reviewed and updated following more detailed geotechnical investigation of the site and once final details of the development are available.

8.1 Excavation

Although the proposed floor level is expected to lie close to existing ground surface levels options for a single level basement are being considered on the eastern portion of the site. It is assumed for the purposes of this report that excavation will mostly be within natural clayey and sandy soils with a maximum depth of 3 m. Excavation of the soil to this depth should be readily achieved using conventional earthmoving equipment, such as tracked excavators.

It should be noted that any off-site disposal of spoil will generally require assessment for re-use or classification in accordance with current *Waste Classification Guidelines* (NSW Department of Environment, Climate Change and Water, 2008, updated 2009). Please refer to DP's Report on Preliminary Site Investigation (Project 84503.00, dated November 2014) for further advice.

8.2 Site Preparation

Although the proposed development is currently at the concept stage, it is assumed that design finished surface levels for pavements and floor slabs associated with the current site layout will lie close to existing ground surface levels. Accordingly, any earthworks associated with the development are expected to require up to 1 m of cutting and filling.

It is currently anticipated that proposed structures within the site will probably be supported by shallow spread footings founding within natural stiff clay or medium dense sand, or by piles founding on medium dense sand or river gravels, subject to actual column loads. Similarly, pavement support will be provided by shallow soils to depths of about 1 m from existing surface levels. Assuming only relatively shallow earthworks are required, site preparation works should include the reworking of any existing filling and natural soils within the upper 0.3 m of the stripped surface to improve the in situ density and to adjust the moisture condition to within 2% of Standard optimum moisture content (OMC).

Adopting the above approach, DP proposes the following site preparation measures:

- Following the demolition of the existing structures, strip all existing pavement, landscaping and vegetation from the proposed development footprint.
- Further strip any deleterious, soft, wet or highly compressible material, existing unsuitable filling or topsoil material rich in organics or root matter and sort for off-site disposal, or retain for further use as controlled filling or landscaping topsoil, as relevant.
- Proof roll the exposed surface using a minimum 10 tonne smooth drum roller. The surface should be rolled for a minimum of six passes of the roller with the last two passes observed by an experienced geotechnical engineer to detect any 'soft spots'. Remove any additional unsuitable soil identified during proof rolling.
- Compact the exposed base of the rework depth to a minimum dry density ratio of 98%, relative to Standard compaction, maintaining the moisture content of the soils within 2% of Standard OMC.
- Place suitable site materials, or suitable imported filling, within the rework depth in 300 mm maximum thickness layers and compact to a minimum dry density ratio of 98%, relative to Standard compaction, maintaining the moisture content of the filling within 2% of Standard OMC. Place sufficient additional layers of filling to achieve design subgrade/foundation level.
- Where the exposed surface is free of 'soft spots', rip the exposed surface to a depth of 0.3 m and moisture condition the natural soils to within 2% of Standard OMC. The reworked layer and any additional filling should be placed, compacted and moisture conditioned, as outlined above.
- Increase the degree of compaction within the upper 300 mm depth of pavement and floor slab subgrades to a minimum dry density ratio of 100%, relative to Standard compaction, maintaining the same moisture content range.

Density testing of the filling should be carried out under a Level 1 responsibility, as defined in AS3798-2007 Guidelines for Earthworks for Commercial and Residential Developments.

8.3 Batter Slopes and Retaining Walls

During bulk excavation and earthworks, it is recommended that temporary batter slopes do not exceed 1.5H:1V (33 degrees) within the natural clay soils and sands for batters of up to 3 m high. For permanent batters, a maximum grade of 2H:1V (26 degrees) is suggested, reducing to 3H:1V (18 degrees) if maintenance access is required (i.e. mowing, or similar).

For batters and excavations greater than 3 m in depth, temporary and permanent retaining walls are recommended due to the more frequent presence of sandy soils below this depth. Retaining walls may be designed on the basis of an average unit weight of 20 kN/m^3 for the filling and natural soils assuming a triangular earth pressure distribution calculated using an 'active' earth pressure coefficient (K_a) value of 0.3 where some wall movement is acceptable, or an 'at-rest' earth pressure coefficient (K_o) value of 0.5 where wall movement is to be reduced.

A coefficient of passive earth pressure (K_p) equal to 2.0 may be assumed within hard clay, increasing to 3.0 in medium dense sands, to which an appropriate factor of safety must be applied in recognition of the fact that large movements are required to mobilise the full passive resistance.

The pressure distribution given above does not include hydrostatic pressure due to groundwater behind retaining walls, which should be included in the design unless adequate drainage is provided to

prevent the build-up of hydrostatic pressures. Irrespective of drainage, hydrostatic pressures should be accounted for in the design of retaining walls for all wall portions below any actual or potential groundwater level.

The design of batter slopes and retaining walls should account for surcharge loads, including adjacent pavements, access roads, buildings or similar. Design should also consider the effects of plant operating above the excavation and/or retaining wall during construction.

8.4 Footings

8.4.1 Shallow Footings

Lightly loaded structures could be designed for shallow spread footings founded in either reworked "engineered" filling in accordance with Section 8.2 (above) or natural very stiff clay or dense sands. The parameter listed in Table 3 is suggested for shallow footing design.

Table 3: Shallow Footing Design Parameters

Material	Allowable End Bearing Pressure (kPa)
Engineered Filling / Very Stiff Clay (i.e. upper 2 m depth)	200
Dense Sand	500*

Note: * Based on a 1 m square footing embedded 1.0 m below the ground surface

Footings designed in accordance with Table 3 can be expected to undergo settlements of up to 1% of the footing width.

Pad footings founding near excavations (e.g. lift pits, service trenches, or similar) must have all loads transferred to below an influence line inclined upwards at 45 degrees commencing from the lowest and closest side of the excavation or trench base. Pad footings can be deepened to accommodate this load transfer or alternatively pile footings may be used. Pad footings founding above this line should be designed for only 50% of the above tabulated value, subject to specific geotechnical inspection during construction.

It is recommended that pad footing excavations are subjected to geotechnical inspection and dynamic cone penetrometer (DCP) testing during construction to verify that the listed allowable bearing pressure is available.

8.4.2 Deep Footings

Where structures carry larger loads or where shallow footings are not appropriate, deeper pile footings founding on the river gravel/cobble layer can be utilised. It is considered that continuous flight auger (CFA) piles are most appropriate for the site conditions. The use of uncased bored piles is not recommended due to the increased potential for the pile excavation to collapse during drilling and the possible high inflow rates of groundwater at depth within the pile excavation. The parameters listed in Table 4 are suggested for the preliminary design of pile foundations founded below 3 m depth.

Table 4: Preliminary Pile Design Parameters

Material	Allowable Shaft Adhesion (kPa)	Allowable End Bearing Pressure[1] (kPa)
Natural Very Stiff Clays	20	300
Medium Dense Sands	20	1000
River Gravel/Cobble Layer	Nil	1200

Note: 1 End bearing pressures assume a minimum pile length to diameter ratio of 4.

The shaft adhesion value has been deliberately reduced to account for the probable use of CFA piles. Settlements of up to 1% of the pile diameter can be expected when adopting the parameters listed in Table 4.

8.5 Soil Aggressivity

Provided the samples analysed represent that broader soils present at the site, then the soil conditions can be considered as being non-aggressive to buried concrete elements, although mildly aggressive to buried steel elements (refer to resistivity test results). The laboratory test results were compared to the criteria listed within Australian Standard AS2159 (2009) for Soil Conditions A (high permeability sands and gravel in groundwater).

8.6 Pavements

Subject to earthworks and final condition of the soils within the upper 1 m of design subgrade level, engineered filling and natural subgrades at this site can be assigned a preliminary design CBR value of 5%, which is slightly less than the laboratory test results to account for variations in the natural soils. To maintain this design value, or any other amended/alternate design CBR value, it will be necessary to prepare the subgrade soils into a well compacted condition that is free of significant adverse long-term or differential settlements and/or deflection under service loading.

The pavement designer should consider the following:

- The loads applied to the various pavements over their design life, including normal road vehicle pavements, commercial in-service truck loads and possibly construction machinery loads.
- The magnitude and frequency of load repetitions of the various vehicles using each pavement.
- The need to provide edge constraints to the pavement, particularly along the crest of batters, immediately behind retaining walls and along the edge of landscaped areas.
- The position and grading of subsurface drainage lines, particularly with reference to pavement edges and internal landscaped openings.
- Pavement surface gradients and water flow to drainage lines. DP notes that the site is relatively flat, therefore, one-way cross fall pavements may be beneficial.
- The backfilling and compaction of service trenches, particularly below heavily loaded pavements.
- The ability of any filled subgrade to carry the load of the pavement.

In addition, a regular and long-term inspection and maintenance programme of the pavement should be adopted by the operator of the pavement. This maintenance program should be primarily aimed at limiting the amount of moisture infiltrating to the subgrade (e.g. inspecting drainage lines and repairing as required, maintaining construction joints and sealing or repairing cracks as they develop).

8.7 Drainage

Surface and subsoil drainage should be incorporated into the pavement and floor slab designs to prevent the ingress of moisture into the pavement and sub-floor working platform layers and any subsequent weakening of the pavement and subgrade layers. Subsoil drains should be installed at 0.6 m depth below pavement subgrades along the perimeters of all pavements, including internal openings (e.g. garden beds, or similar).

9. Additional Investigations

Prior to the construction of the new aged care facility, further geotechnical investigations should be undertaken to determine the consistency of the geotechnical conditions across the site, including the depth to the preferred founding stratum. DP envisages a further four boreholes drilled to refusal on the underlying river gravels, together with appropriate ongoing monitoring of groundwater levels, and a programme of laboratory tests to confirm site classification.

10. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for the proposed aged care facility development at 1-11 Emerald Street, Emu Plains in accordance with DP's proposal SYD141066, dated 10 September 2014. The work was carried out in accordance with DP's standard conditions of engagement. The report has been prepared for UnitingCare Ageing for the specific project and purpose as described in the report. It should not be used for other projects, other sites or by a third party. DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are considered to be indicative of the sub-surface conditions on the site only to the depths investigated at the specific sampling and/or testing locations, and only 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 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 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

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

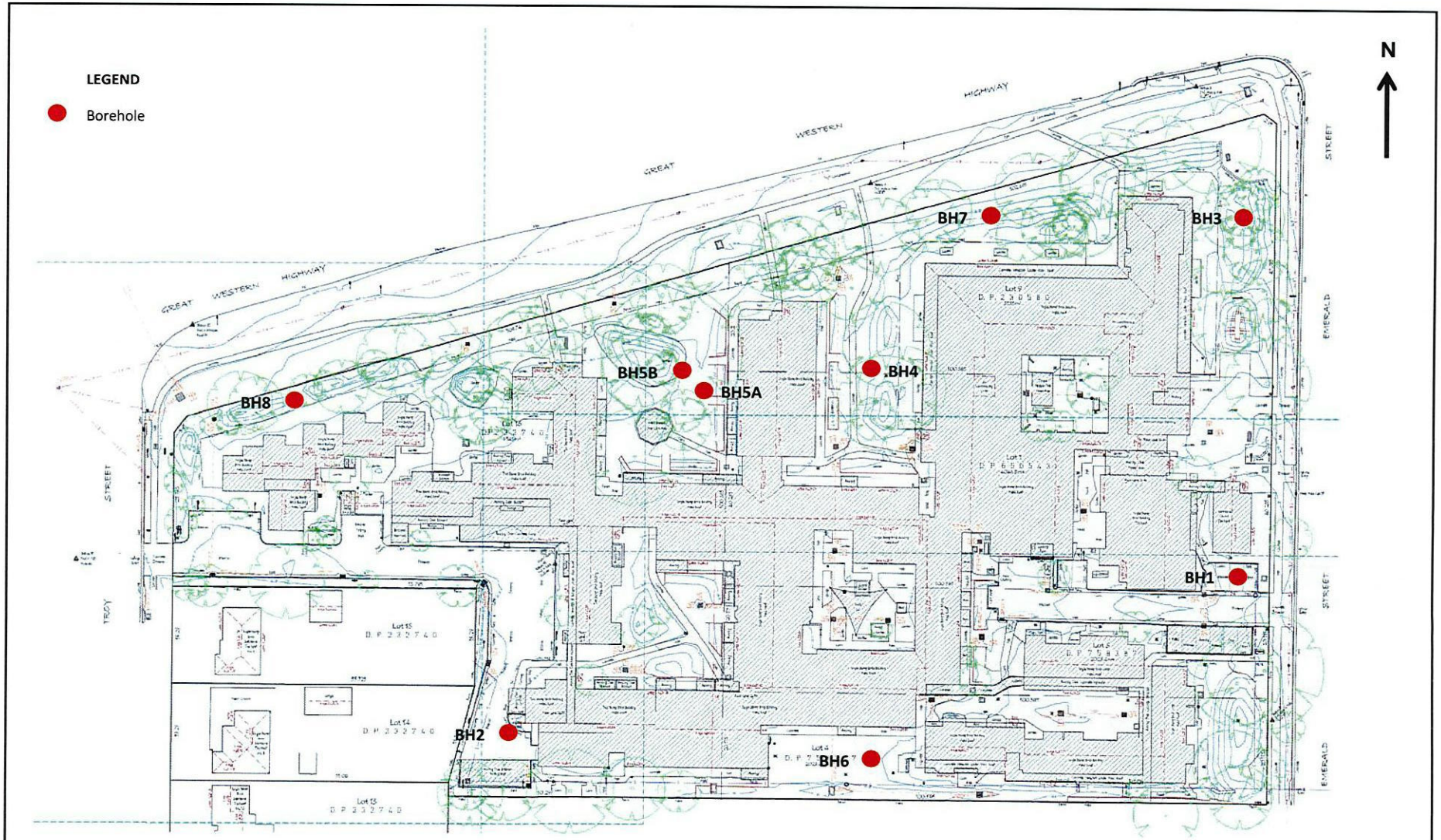
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate 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

Drawing No. 1 - Borehole Location Plan



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Uniting Care Ageing OFFICE: Sydney DATE: 10 Nov 2014	**Borehole Location Plan** **Proposed Aged Care Facility** **1 - 11 Emerald Street, Emu Plains**	PROJECT No: 84503.00 DWG No: 1 REVISION: 0

Appendix C

Results of Field Work

Sampling Methods

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

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.

Symbols & Abbreviations

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

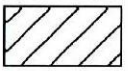

Concrete

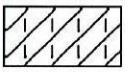

Filling

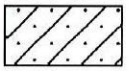
Soils


Topsoil

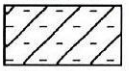

Peat


Clay

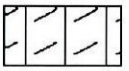

Silty clay

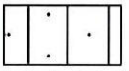

Sandy clay

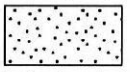

Gravelly clay

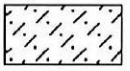

Shaly clay

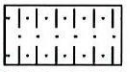

Silt


Clayey silt


Sandy silt


Sand

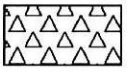

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

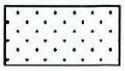

Talus

Sedimentary Rocks

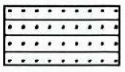

Boulder conglomerate

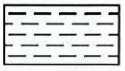

Conglomerate


Conglomeratic sandstone

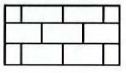

Sandstone


Siltstone

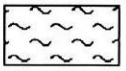

Laminite

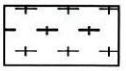

Mudstone, claystone, shale

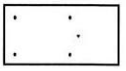

Coal


Limestone

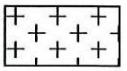
Metamorphic Rocks

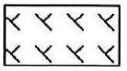

Slate, phyllite, schist

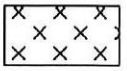

Gneiss

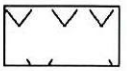

Quartzite

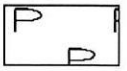
Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.8*
EASTING: 283146
NORTHING: 6262605
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 84503
DATE: 26/9/2014
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							
	0.3	FILLING - brown, silty, fine to coarse sand filling with trace basalt gravel, humid		E/D	0.2		PID<1		
		SILTY CLAY - very stiff, red silty clay with trace fine to medium sand (MC<<PL)			0.5				
	1			E/D			PID<1		1
					1.0				
				S			8,13,15 N = 28		
					1.45				
	1.8	SILTY SAND - medium dense, red-brown, slightly clayey, silty, fine to medium sand, damp							
	2								2
					2.5				
				S			4,6,10 N = 16 PID<1		
	3				2.95				3
	4				4.0				4
				S			10,17,18 N = 35 PID<1		
	4.4	SILTY SANDY CLAY - hard, brown, silty sandy clay (MC<<PL)			4.45				
	5								5
	5.2	Bore discontinued at 5.2m - refusal on river gravel							
	6								6
	7								7
	8								8
	9								9

RIG: DT 100 **DRILLER:** SS **LOGGED:** JE **CASING:** Uncased

TYPE OF BORING: Auger to termination

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.4**
EASTING: 283006
NORTHING: 6262595
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 84503
DATE: 26/9/2014
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		E/D	0.0		PID<1		
	0.3	FILLING - grey, silty, fine to medium sand with trace fine to medium basalt gravel, humid			0.2				
	0.7	FILLING - grey, gravelly clay filling, fine to medium angular shale gravel (MC<<PL)		E/D	0.5		PID<1		
	1	SAND - dense, light grey, fine to medium sand with trace silt, humid		E/D S*	1.0		PID<1 8/20mm refusal		
	1.9	CLAYEY SAND - dense, orange-brown, slightly silty, clayey fine to medium sand, damp		S	2.5		25/100mm refusal PID<1		
	3.7	Bore discontinued at 3.7m - refusal on river gravel							

RIG: DT 100 **DRILLER:** SS **LOGGED:** JE **CASING:** Uncased
TYPE OF BORING: Auger to termination
WATER OBSERVATIONS: No free groundwater observed
REMARKS: *SPT aborted, concern over services; ** Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 27.0*
EASTING: 283155
NORTHING: 6262667
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 84503
DATE: 26/9/2014
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	FILLING - brown, sandy silt (topsoil) with bark and rootlets		E	0.1		PID<1		
	0.4	FILLING - light orange-brown, silty sand with trace clay and sticks (<5cm length) (possibly reworked natural)		E	0.15 0.2		PID<1		
	0.7	SILTY SAND - light orange-brown, silty sand with trace of clay and ironstone gravel		E	0.25 0.5		PID<1		
	1	Bore discontinued at 0.7m - refusal on tree root			0.6				
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								

RIG: Hand tools **DRILLER:** JAL **LOGGED:** JAL **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.8**
EASTING: 283083
NORTHING: 6262650
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 84503
DATE: 26/9/2014
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, sandy silt (topsoil)		E	0.1		PID<1		
	0.4	FILLING - brown, silty clayey sand filling with some sandstone gravel			0.2				
		SILTY CLAYEY SAND - orange-brown, silty, fine to medium clayey sand		E*	0.5		PID<1		
	0.9	- medium to coarse sand at 0.7m		E	0.6		PID<1		
		Bore discontinued at 0.9m - target depth reached			0.7		PID<1		
					0.8				

RIG: Hand tools **DRILLER:** JAL **LOGGED:** JAL **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: *BD1/260914; ** Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.4*
EASTING: 283052
NORTHING: 6262656
DIP/AZIMUTH: 90°/--

BORE No: BH5A
PROJECT No: 84503
DATE: 26/9/2014
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	FILLING - dark brown, sandy silt filling with rootlets							
	0.7	FILLING - orange-brown, clayey silty sand filling with some sandstone and shale gravel, quartz and brick fragments		E E	0.3 0.4 0.5		PID<1 PID<1		
	0.9 1 1.0	FILLING - mottled grey-red-brown, sandy clay filling with trace sandstone gravel and wire fragments							
		FILLING - brown, gravelly sand filling with trace clay and shale gravel							
		Bore discontinued at 1.0m - refusal on hard filling							
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								

RIG: Hand tools **DRILLER:** JAL **LOGGED:** JAL **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: * Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.3*
EASTING: 283048
NORTHING: 6262658
DIP/AZIMUTH: 90°/--

BORE No: BH5B
PROJECT No: 84503
DATE: 26/9/2014
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	FILLING - dark brown, sandy silt filling with rootlets							
	0.4	FILLING - orange-brown, clayey silty sand filling with some sandstone and shale gravel, quartz and brick fragments		E	0.5 0.6		PID<1		
	0.7	FILLING - mottled grey-red-brown, sandy clay filling with some shale gravel and trace brick fragments		E	0.7 0.8		PID<1		
	1.0	CLAYEY SAND - brown, clayey sand with some ironstone and shale gravel							
		Bore discontinued at 1.0m - target depth reached							

RIG: Hand tools **DRILLER:** JAL **LOGGED:** JAL **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.6**
EASTING: 283075
NORTHING: 6262580
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 84503
DATE: 26/9/2014
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	FILLING - brown, sandy silt (topsoil) with traces of rootlets		E	0.0		PID<1		
		SAND - light brown, sand with medium to coarse river gravel (quartz, etc)			0.15				
				E*	0.3		PID<1		
					0.4				
	0.8				0.8				
	0.9	SANDY CLAY - brown, sandy clay, moist		E	0.9		PID<1		
	1	Bore discontinued at 0.9m - target depth reached							
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								

RIG: Hand tools **DRILLER:** JAL **LOGGED:** JAL **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: *BD2/260914; ** Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 25.9*
EASTING: 283107
NORTHING: 6252681
DIP/AZIMUTH: 90°/--

BORE No: BH7
PROJECT No: 84503
DATE: 26/9/2014
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	TOPSOIL - dark brown, silty clay topsoil (MC<PL) (rootlets to 50mm)		E/D	0.2		PID<1		
		SILTY CLAY - light brown-grey, silty clay with some fine to medium sand (MC<<PL)		E/D	0.5				
	1			E/D	1.0				1
	1.2	Bore discontinued at 1.2m - at target depth							
	2								2
	3								3
	4								4
	5								5
	6								6
	7								7
	8								8
	9								9

RIG: DT 100 **DRILLER:** SS **LOGGED:** JE **CASING:** Uncased

TYPE OF BORING: Auger to termination

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Uniting Care Ageing
PROJECT: Proposed Aged Care Facility
LOCATION: Emerald Street, Emu Plains

SURFACE LEVEL: 26.5*
EASTING: 282988
NORTHING: 6262665
DIP/AZIMUTH: 90°/--

BORE No: BH8
PROJECT No: 84503
DATE: 26/9/2014
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	TOPSOIL - dark brown, silty clay topsoil with some fine to medium sand (MC<PL) (rootlets to 50mm)		E/D	0.2		PID<1		
		FILLING - brown, sandy silty clay filling with trace shale and brick fragments		E/D	0.5		PID<1		
	0.7	SILTY CLAY - stiff, red-brown, silty clay with some fine to medium sand (MC<PL)		E/D	1.0		PID<1		
	1.2	Bore discontinued at 1.2m - at target depth							

RIG: DT 100 **DRILLER:** SS **LOGGED:** JE **CASING:** Uncased

TYPE OF BORING: Auger to termination

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Surface levels interpolated from Vince Morgan Surveyors Drawing No. 16582T2 dated 20 June 2014

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Appendix D

Results of Laboratory Testing

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
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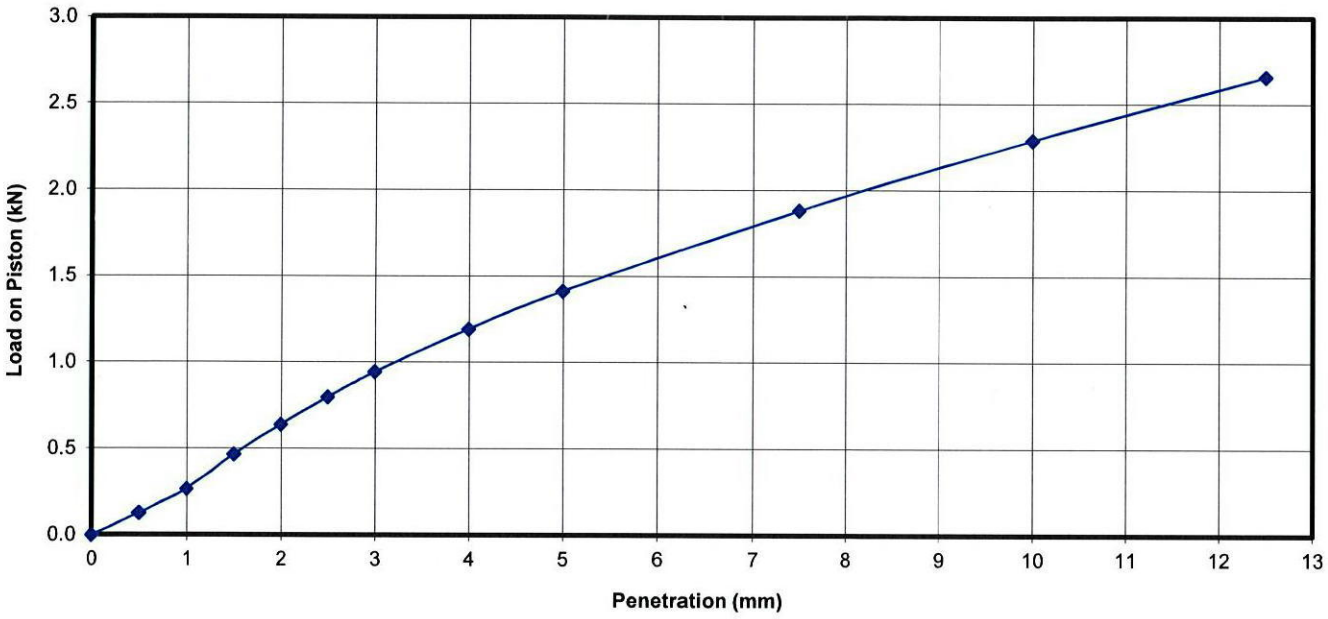
96 Hermitage Road
West Ryde
NSW 2114Phone (02) 9809 0666
Fax (02) 9809 4095

Results of California Bearing Ratio Test

Client :	Uniting Care Ageing	**Project No. :**	84503.00
		Report No. :	2
Project :	Proposed Aged Care Facility	**Report Date :**	10/10/2014
		Date Sampled :	26/09/2014
Location :	1-11 Emerald Street, Emu Plains	**Date of Test:**	7/10/2014
Test Location :	BH1		
Depth / Layer :	0.5 - 1.0m	**Page:**	1 of 1



Description: Red Silty Clay

Test Method(s): AS1289 6.1.1, AS1289 5.1.1, AS1289 2.1.1

Sampling Method(s): Sampled by Engineering Department

Percentage > 19mm: 0%

LEVEL OF COMPACTION: 100% of STD MDD
MOISTURE RATIO: 101% of STD OMC
SURCHARGE: 4.5 kg
SOAKING PERIOD: 4 days
SWELL: 0.5%

CONDITION		MOISTURE CONTENT %	DRY DENSITY t/m^3
At compaction		13.9	1.86
After soaking		16.1	1.86
After test	Top 30mm of sample	16.0	-
	Remainder of sample	15.1	-
Field values		10.4	-
Standard Compaction		13.7	1.87

RESULTS		
TYPE	**PENETRATION**	**CBR (%)**
TOP	**5.0 mm**	**7**

NATA Accredited Laboratory No 828
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Accredited for compliance with ISO/IEC 17025

Mark Matthews
Laboratory Manager

Douglas Partners
Geotechnics I Environment I Groundwater

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West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
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Fax (02) 9809 4095

Results of Moisture Content, Plasticity and Linear Shrinkage Tests

Client:	**Uniting Care Ageing**	**Project No:**	84503
		Report No:	1
Project:	Proposed Aged Care Facility	**Report Date:**	10/10/2014
		Date Sampled:	26/09/2014
Location:	1-11 Emerald Street, Emu Plains	**Date of Test:**	08/10/2014
		Page:	1 of 1

Test Location	Depth (m)	Description	Code	W_F %	W_L %	W_P %	PI %	*LS %
BH1	0.5	Red silty clay	2,5	-	24	14	10	-
BH7	1.0	Light brown silty clay	2,5	-	24	16	8	-

Legend:

W_F	Field Moisture Content
W_L	Liquid limit
W_P	Plastic limit
PI	Plasticity index
LS	Linear shrinkage from liquid limit condition (Mould length125mm)

Test Methods:

Moisture Content:	AS 1289 2.1.1
Liquid Limit:	AS 1289 3.1.2
Plastic Limit:	AS 1289 3.2.1
Plasticity Index:	AS 1289 3.3.1
Linear Shrinkage:	AS 1289 3.4.1

Code:

Sample history for plasticity tests

1. Air dried
2. Low temperature (<50°C) oven dried
3. Oven (105°C) dried
4. Unknown

Method of preparation for plasticity tests

5. Dry sieved
6. Wet sieved
7. Natural

*Specify if sample crumbled CR or curled CU

Sampling Methods: Sampled by Engineering Department

Remarks:

NATA Accredited Laboratory Number: 828

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025

Tested: LW
Checked: MM

Mark Matthews
Laboratory Manager

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
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www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 116867

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Jessica Little

Sample log in details:

Your Reference:	**84503.00, Emu Plains Aged Care**
No. of samples:	13 Soils
Date samples received / completed instructions received	29/09/2014 / 29/09/2014

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	7/10/14 / 7/10/14
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ---------- 	116867-2 BH2 0.5 26/09/2014 Soil	116867-5 BH5A 0.3 26/09/2014 Soil
Date extracted	-	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014
Dichlorodifluoromethane	mg/kg	<1	<1
Chloromethane	mg/kg	<1	<1
Vinyl Chloride	mg/kg	<1	<1
Bromomethane	mg/kg	<1	<1
Chloroethane	mg/kg	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1
1,1-Dichloroethene	mg/kg	<1	<1
trans-1,2-dichloroethene	mg/kg	<1	<1
1,1-dichloroethane	mg/kg	<1	<1
cis-1,2-dichloroethene	mg/kg	<1	<1
bromochloromethane	mg/kg	<1	<1
chloroform	mg/kg	<1	<1
2,2-dichloropropane	mg/kg	<1	<1
1,2-dichloroethane	mg/kg	<1	<1
1,1,1-trichloroethane	mg/kg	<1	<1
1,1-dichloropropene	mg/kg	<1	<1
Cyclohexane	mg/kg	<1	<1
carbon tetrachloride	mg/kg	<1	<1
Benzene	mg/kg	<0.2	<0.2
dibromomethane	mg/kg	<1	<1
1,2-dichloropropane	mg/kg	<1	<1
trichloroethene	mg/kg	<1	<1
bromodichloromethane	mg/kg	<1	<1
trans-1,3-dichloropropene	mg/kg	<1	<1
cis-1,3-dichloropropene	mg/kg	<1	<1
1,1,2-trichloroethane	mg/kg	<1	<1
Toluene	mg/kg	<0.5	<0.5
1,3-dichloropropane	mg/kg	<1	<1
dibromochloromethane	mg/kg	<1	<1
1,2-dibromoethane	mg/kg	<1	<1
tetrachloroethene	mg/kg	<1	<1
1,1,1,2-tetrachloroethane	mg/kg	<1	<1
chlorobenzene	mg/kg	<1	<1
Ethylbenzene	mg/kg	<1	<1
bromoform	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
styrene	mg/kg	<1	<1
1,1,2,2-tetrachloroethane	mg/kg	<1	<1
o-Xylene	mg/kg	<1	<1

VOCs in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	116867-2 BH2 0.5 26/09/2014 Soil	116867-5 BH5A 0.3 26/09/2014 Soil
1,2,3-trichloropropane	mg/kg	<1	<1
isopropylbenzene	mg/kg	<1	<1
bromobenzene	mg/kg	<1	<1
n-propyl benzene	mg/kg	<1	<1
2-chlorotoluene	mg/kg	<1	<1
4-chlorotoluene	mg/kg	<1	<1
1,3,5-trimethyl benzene	mg/kg	<1	<1
tert-butyl benzene	mg/kg	<1	<1
1,2,4-trimethyl benzene	mg/kg	<1	<1
1,3-dichlorobenzene	mg/kg	<1	<1
sec-butyl benzene	mg/kg	<1	<1
1,4-dichlorobenzene	mg/kg	<1	<1
4-isopropyl toluene	mg/kg	<1	<1
1,2-dichlorobenzene	mg/kg	<1	<1
n-butyl benzene	mg/kg	<1	<1
1,2-dibromo-3-chloropropane	mg/kg	<1	<1
1,2,4-trichlorobenzene	mg/kg	<1	<1
hexachlorobutadiene	mg/kg	<1	<1
1,2,3-trichlorobenzene	mg/kg	<1	<1
Surrogate Dibromofluorometha	%	119	119
Surrogate aaa-Trifluorotoluene	%	116	117
Surrogate Toluene-d8	%	100	101
Surrogate 4-Bromofluorobenzene	%	79	78

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	116	111	114	117

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9	116867-10
Your Reference	----------	BH5B	BH6	BH7	BH8	TS
Depth	----------	0.5	0.3	0.2	0.5	-
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
TRHC6 - C9	mg/kg	<25	<25	<25	<25	[NA]
TRHC6 - C10	mg/kg	<25	<25	<25	<25	[NA]
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	118%
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	118%
Ethylbenzene	mg/kg	<1	<1	<1	<1	118%
m+p-xylene	mg/kg	<2	<2	<2	<2	118%
o-Xylene	mg/kg	<1	<1	<1	<1	118%
naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	114	111	117	108	116

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	116867-11
Your Reference	----------	TB
Depth	----------	-
Date Sampled		26/09/2014
Type of sample		Soil
Date extracted	-	30/09/2014
Date analysed	-	30/09/2014
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	119

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	350	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	290	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	140	<100	<100
Surrogate o-Terphenyl	%	79	82	85	83	88

svTRH (C10-C40) in Soil					
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9
Your Reference	----------	BH5B	BH6	BH7	BH8
Depth	----------	0.5	0.3	0.2	0.5
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100
Surrogate o-Terphenyl	%	86	84	87	81

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	116867-1 BH1 0.2 26/09/2014 Soil	116867-2 BH2 0.5 26/09/2014 Soil	116867-3 BH3 0.2 26/09/2014 Soil	116867-4 BH4 0.1 26/09/2014 Soil	116867-5 BH5A 0.3 26/09/2014 Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Naphthalene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL(+)VE	0.18	NIL(+)VE	NIL(+)VE	NIL(+)VE
Surrogate p-Terphenyl-d14	%	98	97	102	106	101

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	116867-6 BH5B 0.5 26/09/2014 Soil	116867-7 BH6 0.3 26/09/2014 Soil	116867-8 BH7 0.2 26/09/2014 Soil	116867-9 BH8 0.5 26/09/2014 Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	102	100	99	101

Organochlorine Pesticides in soil						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	102	99	108	100

Organochlorine Pesticides in soil					
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9
Your Reference	----------	BH5B	BH6	BH7	BH8
Depth	----------	0.5	0.3	0.2	0.5
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	109	104	97

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	116867-1 BH1 0.2 26/09/2014 Soil	116867-2 BH2 0.5 26/09/2014 Soil	116867-3 BH3 0.2 26/09/2014 Soil	116867-4 BH4 0.1 26/09/2014 Soil	116867-5 BH5A 0.3 26/09/2014 Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	100	102	99	108	100

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	116867-6 BH5B 0.5 26/09/2014 Soil	116867-7 BH6 0.3 26/09/2014 Soil	116867-8 BH7 0.2 26/09/2014 Soil	116867-9 BH8 0.5 26/09/2014 Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	108	109	104	97

Total Phenolics in Soil						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	07/10/2014	07/10/2014	07/10/2014	07/10/2014	07/10/2014
Date analysed	-	07/10/2014	07/10/2014	07/10/2014	07/10/2014	07/10/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil					
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9
Your Reference	----------	BH5B	BH6	BH7	BH8
Depth	----------	0.5	0.3	0.2	0.5
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	07/10/2014	07/10/2014	07/10/2014	07/10/2014
Date analysed	-	07/10/2014	07/10/2014	07/10/2014	07/10/2014
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5

Acid Extractable metals in soil						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Arsenic	mg/kg	<4	4	<4	9	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	24	14	8	17	11
Copper	mg/kg	12	29	8	19	36
Lead	mg/kg	13	9	22	20	13
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	21	21	5	5	6
Zinc	mg/kg	32	56	43	29	31

Acid Extractable metals in soil					
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9
Your Reference	----------	BH5B	BH6	BH7	BH8
Depth	----------	0.5	0.3	0.2	0.5
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil
Date digested	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Arsenic	mg/kg	4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	11	10	13
Copper	mg/kg	33	7	8	9
Lead	mg/kg	15	9	26	21
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	14	6	5	6
Zinc	mg/kg	66	30	29	23

CEC Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	116867-1 BH1 0.2 26/09/2014 Soil	116867-2 BH2 0.5 26/09/2014 Soil	116867-6 BH5B 0.5 26/09/2014 Soil
Date extracted	-	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014
Exchangeable Ca	meq/100g	7.2	7.7	6.7
Exchangeable K	meq/100g	0.2	0.6	0.5
Exchangeable Mg	meq/100g	1.2	5.8	6.9
Exchangeable Na	meq/100g	0.99	2.0	0.53
Cation Exchange Capacity	meq/100g	9.5	16	15

Miscellaneous Inorg - soil						
Our Reference:	UNITS	116867-1	116867-2	116867-6	116867-12	116867-13
Your Reference	----------	BH1	BH2	BH5B	BH2	BH1
Depth	----------	0.2	0.5	0.5	1.0	2.5
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
pH 1:5 soil:water	pH Units	9.6	9.5	7.6	6.9	6.9
Electrical Conductivity 1:5 soil:water	µS/cm	[NA]	[NA]	[NA]	76	28
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	<10	10
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	80	10

Moisture						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	01/10/2014	01/10/2014	01/10/2014	01/10/2014	01/10/2014
Moisture	%	4.5	6.3	14	8.1	5.6

Moisture						
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9	116867-11
Your Reference	----------	BH5B	BH6	BH7	BH8	TB
Depth	----------	0.5	0.3	0.2	0.5	-
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/09/2014	30/09/2014	30/09/2014	30/09/2014	30/09/2014
Date analysed	-	01/10/2014	01/10/2014	01/10/2014	01/10/2014	01/10/2014
Moisture	%	12	5.5	7.6	8.7	0.2

Asbestos ID - soils						
Our Reference:	UNITS	116867-1	116867-2	116867-3	116867-4	116867-5
Your Reference	----------	BH1	BH2	BH3	BH4	BH5A
Depth	----------	0.2	0.5	0.2	0.1	0.3
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	7/10/2014	7/10/2014	7/10/2014	7/10/2014	7/10/2014
Sample mass tested	g	Approx 40g	Approx 40g	Approx 40g	Approx 40g	Approx 40g
Sample Description	-	Brown coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Brown coarse-grained sandy soil	Brown coarse-grained soil & rocks	Orange coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils					
Our Reference:	UNITS	116867-6	116867-7	116867-8	116867-9
Your Reference	----------	BH5B	BH6	BH7	BH8
Depth	----------	0.5	0.3	0.2	0.5
Date Sampled		26/09/2014	26/09/2014	26/09/2014	26/09/2014
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	7/10/2014	7/10/2014	7/10/2014	7/10/2014
Sample mass tested	g	Approx 40g	Approx 40g	Approx 40g	Approx 40g
Sample Description	-	Brown clayey soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soil based on Rayment and Lyons 2011.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL VOCs in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Dichlorodifluoromethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Chloromethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Vinyl Chloride	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Bromomethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Chloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Trichlorofluoromethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,1-Dichloroethene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
trans-1,2-dichloroethene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,1-dichloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	111%
cis-1,2-dichloroethene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
bromochloromethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
chloroform	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	132%
2,2-dichloropropane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2-dichloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	118%
1,1,1-trichloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	122%
1,1-dichloropropene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Cyclohexane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
carbon tetrachloride	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Benzene	mg/kg	0.2	Org-014	<0.2	116867-2	<0.2 || <0.2	[NR]	[NR]
dibromomethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2-dichloropropane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
trichloroethene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	109%
bromodichloromethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	133%
trans-1,3-dichloropropene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
cis-1,3-dichloropropene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,1,2-trichloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Toluene	mg/kg	0.5	Org-014	<0.5	116867-2	<0.5 || 0.6	[NR]	[NR]
1,3-dichloropropane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
dibromochloromethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	129%
1,2-dibromoethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
tetrachloroethene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	LCS-2	129%
1,1,1,2-tetrachloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
chlorobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Ethylbenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
bromoform	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
m+p-xylene	mg/kg	2	Org-014	<2	116867-2	<2 || <2	[NR]	[NR]
styrene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,1,2,2-tetrachloroethane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
o-Xylene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2,3-trichloropropane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]

QUALITY CONTROL VOCs in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
isopropylbenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
bromobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
n-propyl benzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
2-chlorotoluene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
4-chlorotoluene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,3,5-trimethyl benzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
tert-butyl benzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2,4-trimethyl benzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,3-dichlorobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
sec-butyl benzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,4-dichlorobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
4-isopropyl toluene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2-dichlorobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
n-butyl benzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2-dibromo-3-chloropropane	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2,4-trichlorobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
hexachlorobutadiene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
1,2,3-trichlorobenzene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Surrogate Dibromofluorometha	%		Org-014	116	116867-2	119 || 113 || RPD: 5	LCS-2	107%
Surrogate aaa-Trifluorotoluene	%		Org-014	105	116867-2	116 || 113 || RPD: 3	LCS-2	105%
Surrogate Toluene-d8	%		Org-014	100	116867-2	100 || 97 || RPD: 3	LCS-2	97%
Surrogate 4-Bromofluorobenzene	%		Org-014	72	116867-2	79 || 76 || RPD: 4	LCS-2	92%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
$TRHC_6$ - C_9	mg/kg	25	Org-016	<25	116867-2	<25 || <25	LCS-2	124%
$TRHC_6$ - C_{10}	mg/kg	25	Org-016	<25	116867-2	<25 || <25	LCS-2	124%
Benzene	mg/kg	0.2	Org-016	<0.2	116867-2	<0.2 || <0.2	LCS-2	116%
Toluene	mg/kg	0.5	Org-016	<0.5	116867-2	<0.5 || 0.6	LCS-2	122%
Ethylbenzene	mg/kg	1	Org-016	<1	116867-2	<1 || <1	LCS-2	123%
m+p-xylene	mg/kg	2	Org-016	<2	116867-2	<2 || <2	LCS-2	130%
o-Xylene	mg/kg	1	Org-016	<1	116867-2	<1 || <1	LCS-2	125%
naphthalene	mg/kg	1	Org-014	<1	116867-2	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	105	116867-2	116 || 113 || RPD: 3	LCS-2	105%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
$TRHC_{10}$ - C_{14}	mg/kg	50	Org-003	<50	116867-2	<50 || <50	LCS-2	102%
$TRHC_{15}$ - C_{28}	mg/kg	100	Org-003	<100	116867-2	<100 || <100	LCS-2	97%
$TRHC_{29}$ - C_{36}	mg/kg	100	Org-003	<100	116867-2	<100 || <100	LCS-2	100%
$TRH>C_{10}$-C_{16}	mg/kg	50	Org-003	<50	116867-2	<50 || <50	LCS-2	102%
$TRH>C_{16}$-C_{34}	mg/kg	100	Org-003	<100	116867-2	<100 || <100	LCS-2	97%
$TRH>C_{34}$-C_{40}	mg/kg	100	Org-003	<100	116867-2	<100 || <100	LCS-2	100%
Surrogate o-Terphenyl	%		Org-003	83	116867-2	82 || 81 || RPD: 1	LCS-2	95%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	0.2 || 0.2 || RPD: 0	LCS-2	92%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	LCS-2	96%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	LCS-2	102%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	LCS-2	99%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	LCS-2	100%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	LCS-2	89%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	116867-2	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	116867-2	<0.05 || <0.05	LCS-2	109%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	95	116867-2	97 || 97 || RPD: 0	LCS-2	104%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
HCB	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	91%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	92%
Heptachlor	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	95%
delta-BHC	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	100%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	101%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	88%
Dieldrin	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	99%
Endrin	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	95%
pp-DDD	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	96%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	LCS-2	94%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	105	116867-2	102 || 99 || RPD: 3	LCS-2	98%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-2	30/09/2014
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	LCS-2	117%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	116867-2	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	105	116867-2	102 || 99 || RPD: 3	LCS-2	100%
QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			07/10/2014	116867-1	07/10/2014 || 07/10/2014	LCS-1	07/10/2014
Date analysed	-			07/10/2014	116867-1	07/10/2014 || 07/10/2014	LCS-1	07/10/2014
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	116867-1	<5 || <5	LCS-1	97%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-6	30/09/2014
Date analysed	-			30/09/2014	116867-2	30/09/2014 || 30/09/2014	LCS-6	30/09/2014
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	116867-2	4 || 4 || RPD: 0	LCS-6	103%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	116867-2	<0.4 || <0.4	LCS-6	106%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	116867-2	14 || 15 || RPD: 7	LCS-6	107%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	116867-2	29 || 32 || RPD: 10	LCS-6	105%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	116867-2	9 || 12 || RPD: 29	LCS-6	104%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	116867-2	<0.1 || <0.1	LCS-6	88%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	116867-2	21 || 24 || RPD: 13	LCS-6	106%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	116867-2	56 || 66 || RPD: 16	LCS-6	105%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/09/2014	[NT]	[NT]	LCS-1	30/09/2014
Date analysed	-			30/09/2014	[NT]	[NT]	LCS-1	30/09/2014
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	104%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	103%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	101%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	100%
Cation Exchange Capacity	meq/100g	1	Metals-009	<1.0	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			[NT]	116867-12	30/09/2014 || 30/09/2014	LCS-1	30/09/2014
Date analysed	-			[NT]	116867-12	30/09/2014 || 30/09/2014	LCS-1	30/09/2014
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	116867-12	6.9 || 6.7 || RPD: 3	LCS-1	102%
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	116867-12	76 || 80 || RPD: 5	LCS-1	108%
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	116867-12	<10 || <10	LCS-1	81%
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	116867-12	80 || 84 || RPD: 5	LCS-1	87%

QUALITY CONTROL VOCs in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
Dichlorodifluoromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Chloromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	mg/kg	[NT]	[NT]	[NR]	[NR]
Bromomethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Chloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	mg/kg	[NT]	[NT]	[NR]	[NR]
trans-1,2-dichloroethene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	mg/kg	[NT]	[NT]	116867-5	119%
cis-1,2-dichloroethene	mg/kg	[NT]	[NT]	[NR]	[NR]
bromochloromethane	mg/kg	[NT]	[NT]	[NR]	[NR]
chloroform	mg/kg	[NT]	[NT]	116867-5	140%
2,2-dichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	mg/kg	[NT]	[NT]	116867-5	129%
1,1,1-trichloroethane	mg/kg	[NT]	[NT]	116867-5	132%
1,1-dichloropropene	mg/kg	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Cyclohexane	mg/kg	[NT]	[NT]	[NR]	[NR]
carbon tetrachloride	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
dibromomethane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
trichloroethene	mg/kg	[NT]	[NT]	116867-5	118%
bromodichloromethane	mg/kg	[NT]	[NT]	116867-5	140%
trans-1,3-dichloropropene	mg/kg	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
Toluene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
dibromochloromethane	mg/kg	[NT]	[NT]	116867-5	140%
1,2-dibromoethane	mg/kg	[NT]	[NT]	[NR]	[NR]
tetrachloroethene	mg/kg	[NT]	[NT]	116867-5	140%
1,1,1,2-tetrachloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
chlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
bromoform	mg/kg	[NT]	[NT]	[NR]	[NR]
m+p-xylene	mg/kg	[NT]	[NT]	[NR]	[NR]
styrene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	mg/kg	[NT]	[NT]	[NR]	[NR]
o-Xylene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,3-trichloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
isopropylbenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
bromobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	mg/kg	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
tert-butyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
sec-butyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	mg/kg	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
hexachlorobutadiene	mg/kg	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichlorobenzene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluorometha	%	[NT]	[NT]	116867-5	110%
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	116867-5	115%
Surrogate Toluene-d8	%	[NT]	[NT]	116867-5	96%
Surrogate 4-Bromofluorobenzene	%	[NT]	[NT]	116867-5	72%
QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
TRHC6 - C9	mg/kg	[NT]	[NT]	116867-5	135%
TRHC6 - C10	mg/kg	[NT]	[NT]	116867-5	135%
Benzene	mg/kg	[NT]	[NT]	116867-5	124%
Toluene	mg/kg	[NT]	[NT]	116867-5	133%
Ethylbenzene	mg/kg	[NT]	[NT]	116867-5	136%
m+p-xylene	mg/kg	[NT]	[NT]	116867-5	140%
o-Xylene	mg/kg	[NT]	[NT]	116867-5	136%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	116867-5	115%
QUALITY CONTROL svTRH(C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
TRHC10 - C14	mg/kg	[NT]	[NT]	116867-5	115%
TRHC15 - C28	mg/kg	[NT]	[NT]	116867-5	116%
TRHC29 - C36	mg/kg	[NT]	[NT]	116867-5	107%
TRH>C10-C16	mg/kg	[NT]	[NT]	116867-5	115%
TRH>C16-C34	mg/kg	[NT]	[NT]	116867-5	116%
TRH>C34-C40	mg/kg	[NT]	[NT]	116867-5	107%
Surrogate o-Terphenyl	%	[NT]	[NT]	116867-5	95%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
Naphthalene	mg/kg	[NT]	[NT]	116867-5	94%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	116867-5	97%
Phenanthrene	mg/kg	[NT]	[NT]	116867-5	100%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	116867-5	99%
Pyrene	mg/kg	[NT]	[NT]	116867-5	100%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	116867-5	90%
Benzo(b,j+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	116867-5	109%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	[NT]	[NT]	116867-5	105%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	116867-5	90%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	116867-5	89%
Heptachlor	mg/kg	[NT]	[NT]	116867-5	90%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	116867-5	98%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	116867-5	98%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	116867-5	86%
Dieldrin	mg/kg	[NT]	[NT]	116867-5	97%
Endrin	mg/kg	[NT]	[NT]	116867-5	91%
pp-DDD	mg/kg	[NT]	[NT]	116867-5	95%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	116867-5	92%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	116867-5	97%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
Arochlor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	[NT]	[NT]	116867-5	117%
Arochlor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	116867-5	93%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	116867-2	07/10/2014
Date analysed	-	[NT]	[NT]	116867-2	07/10/2014
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	116867-2	97%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	116867-5	30/09/2014
Date analysed	-	[NT]	[NT]	116867-5	30/09/2014
Arsenic	mg/kg	[NT]	[NT]	116867-5	100%
Cadmium	mg/kg	[NT]	[NT]	116867-5	96%
Chromium	mg/kg	[NT]	[NT]	116867-5	100%
Copper	mg/kg	[NT]	[NT]	116867-5	110%
Lead	mg/kg	[NT]	[NT]	116867-5	94%
Mercury	mg/kg	[NT]	[NT]	116867-5	87%
Nickel	mg/kg	[NT]	[NT]	116867-5	95%
Zinc	mg/kg	[NT]	[NT]	116867-5	92%

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	116867-13	30/09/2014
Date analysed	-	[NT]	[NT]	116867-13	30/09/2014
pH 1:5 soil:water	pH Units	[NT]	[NT]	[NR]	[NR]
Electrical Conductivity 1:5 soil:water	µS/cm	[NT]	[NT]	[NR]	[NR]
Chloride, Cl 1:5 soil:water	mg/kg	[NT]	[NT]	116867-13	90%
Sulphate, SO4 1:5 soil:water	mg/kg	[NT]	[NT]	116867-13	100%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

Asbestos ID was analysed by Approved Identifier: Paul Ching
Asbestos ID was authorised by Approved Signatory: Paul Ching

INS: Insufficient sample for this test
NA: Test not required
<: Less than

PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than

NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.