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Report on
Detailed Site Investigation

Residential Aged Care Facility
Lang Road, Marsh Parade and Hume Highway,
Casula

Prepared for
Catholic Healthcare Limited

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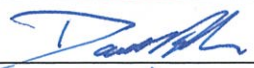
Author		28 February 2017
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Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

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1. Introduction

This report prepared by Douglas Partners Pty Ltd (DP) presents the results of a detailed site investigation (DSI) undertaken for the residential aged care facility at Lang Road, Marsh Parade and Hume Highway, Casula (the site). The site location is shown on Drawing 1, Appendix A. The investigation was commissioned by Catholic Healthcare Limited and was undertaken in accordance with DP's proposal (SYD160682) dated 1 June 2016.

The objective of the current DSI is to evaluate whether the site is suitable from a site contamination perspective for the proposed development. The investigation included the review of previous reports, drilling of nineteen test bores, laboratory testing of selected samples and development of a conceptual site model (CSM).

The following previous investigations on the site undertaken by DP and others were reviewed as part of the assessment:

- Environmental Investigation Services Pty Ltd, *'Preliminary Stage 1 Environmental Site Assessment for Proposed Aged Care Development, 11 Lang Road, 76, 78, 80, Marsh Parade, and 536, 538, 540 & 542 Hume Highway, Casula NSW*', ref: E29358Krpt, April 2016 (EIS, 2016); and
- Douglas Partners Pty Ltd, *'Pre-demolition Hazardous Building Materials Report, Proposed Aged Care and Seniors Living Facility, Lang Road, Marsh Parade and Hume Highway, Casula'*, ref: 85600.P001, September 2016 (DP, 2016).

The DSI has been conducted in general accordance with the National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure* 1999 (amended 2013, NEPC 2013) and the NSW Office of Environment and Heritage *Contaminated Sites: Guidelines for Reporting on Contaminated Sites* 2011 (reprint).

It is noted that this assessment was undertaken concurrently with DP's geotechnical assessment which has been reported separately.

2. Scope of Works

The scope of works for the DSI is as follows:

- Review of the EIS (2016) and DP (2016) reports;
- Undertake a Dial-Before-You-Dig search and review service plans provided by the Client;

- Undertake a site walkover to set out test bores and scan proposed locations using an electromagnetic scanner;
- Auger 19 test bores to 0.5 m into natural or prior refusal (whichever was the lesser) using a bobcat with solid flight augur attachment and hand tools;
- Logging of each test bore by a DP engineer/scientist;
- Collection of soil samples from each test bore at regular intervals and where signs of contamination were observed;
- Analysis of 25 selected soil samples and one material sample (plus QA/QC analysis) at a NATA accredited laboratory for various combinations of the following contaminants of potential concern and parameters:
    - Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
    - Total recoverable hydrocarbons (TRH) (a screening test for total petroleum hydrocarbons – TPH);
    - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene – BTEX);
    - Polycyclic aromatic hydrocarbons (PAH);
    - Organochlorine pesticides (OCP);
    - Organophosphate pesticides (OPP);
    - Polychlorinated biphenyls (PCB);
    - Phenols;
    - Asbestos (40 g sample for initial screening purposes);
    - pH;
    - Electrical conductivity;
    - Cation exchange capacity (CEC); and
    - TCLP (for waste classification).
- This DSI report detailing the methodology and results of the assessment. The report also includes a preliminary waste classification (and VENM assessment) for the soils to assist with project planning.

3. Site Identification and Description

3.1 Site Identification

The street address for the site covers 11, 13 and 15 Lang Road, 76, 78 and 80 Marsh Parade and 536, 538, 540 and 542 Hume Highway, Casula. The site is irregularly shaped and covers a surveyed area of 8,564 m^2. The site is located within the local government authority of the Liverpool City Council.

A site plan depicting the site boundary and locality map is included as Drawing 1, Appendix A.

3.2 Site Description

A site walkover of the 10 properties that form the site was undertaken by a DP environmental scientist on 23 January 2017 as part of this DSI. The observations from this walkover are noted below with photographs provided in Appendix B. Some of the properties were still occupied at the time of the walkover.

The site was occupied by numerous low density residential buildings with sheds/garages present in all properties. 542 Hume Highway located on the corner of the site has a swimming pool in the backyard, whilst the area at the rear of 536 Hume Highway was grassed area partially overgrown with vegetation, in particular in the eastern section of this property. The site was relatively level with no significant filling apparent.

Bonded fibrous fragments (assumed to contain asbestos) were observed around the perimeters and below some buildings. Potential asbestos-containing materials were not observed on the ground surfaces away from the buildings during the site walkover. However, it is noted that thick grass coverage was present across significant portions of the site which may have precluded/restricted the observations of such materials at the surface in these areas. General rubbish and fragments of anthropogenic material (plastic, metal, tile and cloth) were observed on the surface. Other features and items observed included, but not limited to, garden beds and associated gardening equipment, chairs, empty metal drum, pool pump, roof tiles, rubbish bins, beer kegs, plastic buckets.

The site is bounded by Marsh parade in the north, Hume Highway to the west, Lang Road to the south and residential properties to the east. The site is located in a primarily residential area with some commercial and light industrial land use present approximately 65 m away to the east. Several vacant lots are present to the south and south-east.

3.3 Proposed Development

The proposed residential aged care facility development comprises the construction of two to three storey buildings with partial basement parking on the northern half of the site. Buildings will be surrounded by a mixture of hard landscaping (paving, driveways etc) and soft landscaping (turf, garden beds etc).

Architectural plans for the development are provided in Appendix A.

4. Regional Geology, Hydrology and Topography

Reference to the Penrith 1:100 000 Series Geological Sheet (9030) indicates the site is underlain by Bringelly Shale. Bringelly Shale typically comprises shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff.

Reference to the Penrith 1:100,000 Soils Landscape Map of Sydney indicates that the majority of the site is situated on the Residual Blacktown Landscape and the south eastern corner is situated on the Erosional Luddenham Landscape. The Residual Blacktown Landscape is typified by gentle undulating

rises on Wianamatta Group and Hawkesbury Shales with broad rounded crests and ridges with gently inclined slopes, whilst the Erosional Luddenham Landscape is characterised by undulating to rolling low hills on Wianamatta Group shales, often associated with Minchinbury Sandstone.

According to NSW Acid Sulphate Soil Risk mapping (1994-1998) the site is not located within or close to an area with a risk for acid sulphate soils.

The nearest water course to the site is the Georges River, located approximately 500 m to the east. The Georges River flows in an approximately north to south direction towards Botany Bay. It is anticipated that groundwater would flow toward the Georges River.

The site has a gradual fall towards the north.

5. Review of Previous Reports

5.1 EIS 2016

EIS (2016) comprised a review of desktop information and site walkover. It is noted that 13 and 15 Lang Road were not part of the assessment.

In summary EIS concluded that:

- A review of site history indicated:
  - The aerial photographs indicate that the site has comprised residential structures since prior to 1955 to the present;
  - The historical land title records indicate that the site was owned by numerous companies including Liverpool Golf Club;
  - The historical land title records indicate that the site was owned by a farmer and a mechanic; and
  - NSW EPA records did not indicate any notices for the site.
- The Preliminary Site Conceptual Model (PSCM) identified the following areas of concern (AEC):
  - Fill material - The site may have been historically filled to achieve existing levels. The fill may have been imported from various sources and can contain elevated concentrations of contaminants;
  - Use of pesticides - The site has potentially been used for agricultural purposes between 1926 and 1958. The use of pesticides during this period could have resulted in potential contamination; and
  - Hazardous building materials - The buildings on the site have been constructed prior to the 1990's. Hazardous building materials were used for construction purposes during this period. The hazardous building materials can pose a potential contamination source during demolition/development.

EIS assessed the risk of contamination at the site to be moderate based on the AEC identified in the PSCM and consequently recommended that the site could be made suitable for the proposed residential age care facility provided that the following additional works take place:

- Undertake a Stage 2 Environmental Site Assessment to meet the sampling density outlined in the NSW EPA *Contaminated Site Sampling Design Guidelines* (1995);
- Undertake a waste classification assessment for the off-site disposal of material excavated for the proposed development; and
- Undertake a Hazardous Materials Assessment (Hazmat) for the existing buildings prior to the commencement of demolition work.

It is noted that this report and DP (2016) have been undertaken to address the above recommendations.

5.2 DP (2016) - HAZMAT

DP (2016) comprised a hazardous building materials survey of the existing structures. The report identified the presence of hazardous materials on all properties within the site. These included:

- Asbestos;
- Lead dust;
- Lead paint;
- PCB; and
- Synthetic mineral fibres (SMF).

Appropriate management and removal of these hazardous building materials is required during the demolition process for site structures.

6. Conceptual Site Model

A CSM is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

The CSM is presented below is an updated version of the Preliminary CSM presented in EIS (2016).

6.1 Potential Sources

Based on the current investigation, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified.

S1 – Imported filling: Importation of filling from unknown sources to achieve existing site levels. It is noted that based on site walkover on site previous levelling/filling at the site is not expected to be significant.

COPC include: metals, TRH, BTEX, PAH, PCB, OCP, OPP, phenols, and asbestos.

S2 – Use of pesticides: The site has potentially been used for agricultural purposes between 1926 and 1958. The use of pesticides during this period could have resulted in potential contamination.

COPC include: metals, OCP and OPP.

S3 – Hazardous building materials: The buildings have been identified to include hazardous materials (DP, 2016). These materials pose a potential contamination risk during demolition/redevelopment.

COPC include: asbestos, lead, SMF and PCB.

6.2 Potential Receptors

Human Health Receptors:

R1 – Construction and maintenance workers;

R2 – Site users (current and end users - residential and aged care); and

R3 – Adjacent users (residential).

Environmental Receptors:

R4 – Surface water (Georges River);

R5 – Groundwater (freshwater); and

R6 – Terrestrial ecology.

6.3 Potential Pathways

P1 – Ingestion and dermal contact;

P2 – Inhalation of dust and/or vapours;

P3 – Leaching of contaminants and vertical migration into groundwater;

P4 – Lateral migration of groundwater providing base flow to water bodies; and

P5 – Contact with terrestrial ecology.

Given the distance to the nearest water body (Georges River) and the developed nature of the surrounding area, surface water run-off to a receiving water body from the site was not considered to be of concern.

6.4 Summary of CSM

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to the identified receptors from contamination sources on or in the vicinity of the site, via exposure pathways (complete pathways). The possible pathways between the above sources (S1 to S3) and receptors (R1 to R6) are provided in Table 2 below.

Table 2: Potential Complete Pathways

Source	Transport Pathway	Receptor	Risk Management Action Recommended
S1: Imported Filling Metals, TRH, BTEX, PAH, PCB, OPP, OCP, phenols and asbestos **S2: Use of pesticides,** Metals, OPP and OCP	P1: Ingestion and dermal contact	R1: Construction and maintenance workers R2: Site users (residential and commercial)	An intrusive investigation undertaken to investigate potential contamination on-site (this DSI). Based on the site history and preliminary conceptual site model which indicated generally low level for chemical contamination, investigation of groundwater was not considered warranted unless chemical contamination is identified in the soils as part of the intrusive investigation.
	P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Site users (residential and aged care) R3: Adjacent users (residential)	
	P3 – Leaching of contaminants and vertical migration into groundwater	R5: Groundwater (freshwater)	
	P4: Lateral migration of groundwater providing base flow to water bodies	R4: Surface water (Georges River)	
	P5: Contact with terrestrial ecology	R6 – Terrestrial ecology	
S4: Existing buildings COPC: Asbestos, lead, SMF and PCB	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Site users (residential and commercial)	HAZMAT assessment undertaken as outlined in DP (2016). Appropriate management and disposal of hazardous material during demolition works. Inspection of site post demolition works.

7. Data Quality Objectives

7.1 The Data Quality Objectives and Project Quality Procedures

The DSI has been devised broadly in accordance with the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

Referenced sections for the respective DQOs listed above are presented in Table Q1, Appendix C.

7.2 Data Quality Indicators

The performance of the assessment in achieving the DQO was assessed through the application of Data Quality Indicators (DQI), defined as follows:

Precision:	A quantitative measure of the variability (or reproducibility) of data;
Accuracy:	A quantitative measure of the closeness of reported data to the "true" value;
Representativeness:	The confidence (expressed qualitatively) that data are representative of each media present on the site;
Completeness:	A measure of the amount of useable data from a data collection activity; and
Comparability:	The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

Further comments on the DQIs are presented in Appendix C.

7.3 Fieldwork Methods

Eleven of the test bores, which were also undertaken for DP's geotechnical assessment, were drilled using a bobcat drill rig with augur attachment. The remaining eight bores were augured using hand tools.

The depths of each bore and drilling methods are shown on the test bore logs provided in Appendix D. The work was undertaken on 23 and 34 January 2017.

7.4 Field Quality Assurance and Quality Control

The field QC procedures for sampling were as prescribed in Douglas Partners' *Field Procedures Manual*, and are outlined later in this section.

Field replicates were recovered and analysed for a limited suite of contaminants by means of intra-laboratory analysis.

7.5 Laboratory QA/QC

The analytical laboratories, accredited by NATA, are required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory certificates in Appendix E.

The results of the DP assessment of laboratory QA/QC are shown in Appendix C with the full laboratory certificates of analysis included in Appendix E.

7.6 Sample Location and Rationale

The recommended minimum sampling density as stipulated in the NSW EPA's *Contaminated Sites: Sampling Design Guideline, 199*5 for a 8,564 m^2 ha site is between 19 and 20 sampling points. One test bore location had to be abandoned due to access limitations, therefore 19 test bores were drilled. Based on the generally low potential for contamination associated with the former and current site uses it is considered that the general site coverage achieved is suitable for this DSI.

The test bore locations are shown on Drawing 1, Appendix A.

7.7 Soil Sampling Procedure

All sample locations were cleared for services and underground pipes by a services locator and by review of dial-before-you-dig (DBYD) plans.

All sampling data was recorded on DP's test bore logs with essential information included in the chain-of-custody sheets. The general sampling procedure adopted for the collection of environmental samples is summarised below:

- Collection of soil samples directly from the SPT tube and auger using disposable sampling equipment;
- Collection of 10% replicate samples for QA/QC purposes;
- Transfer of samples into laboratory-prepared glass jars, filled to the top to minimise the headspace within the sample jar and capping immediately to minimise loss of volatiles. Replicate samples were placed into snap lock plastic bags for asbestos analysis;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;

- Placement of the glass jars, with Teflon lined lid, into an ice cooled, insulated and sealed container for transport to the laboratory; and
- Chain of custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

7.8 Analytical Rationale

The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of contaminants that may be attributable to past and present activities and features within the site, as discussed in Section 6.

Envirolab Services Pty Ltd (Envirolab) was used for the primary analysis of soil samples. Envirolab is required to carry out routine in-house QC procedures. Laboratory analytical methods are provided in the laboratory certificates of analysis in Appendix E and are summarised in the QA/QC section in Appendix C.

8. Site Assessment Criteria

The proposed development for the site is a residential aged care facility which it is considered would result in limited exposure to soils for site users. Nevertheless, taking into account the presence of soft landscaping areas and adopting a conservative approach, a low density residential land use setting has been adopted in determining the SAC.

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination on the site (Section 6). Soil analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). NEPC (2013) is endorsed by the NSW EPA under the CLM Act 1997. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g. Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

8.1 Health Investigation and Screening Levels

The Health Investigation Levels (HIL) and Health Screening Levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HILs are applicable to assessing health risk arising via all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HILs apply for other land uses.

HSLs are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSLs have been developed for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. As discussed above, given the proposed development conservative criteria have been adopted (i.e. low density residential land use). The adopted HIL and HSL are:

- **HIL-A** – Residential with opportunities for soil access;
- **HSL-A & B** – Low –high density residential (for vapour intrusion); and
- **HSL-A** – Residential (low-density) (for direct contact).

It is noted that health screening levels for intrusive maintenance workers are listed in CRC CARE (2011), however, these have not be used as SAC for the current investigation as the screening levels are higher than HSL-A and therefore are considered unlikely to be risk drivers for further assessment.

The HSL adopted are predicated on the inputs summarised in Table 3.

Table 3: **Inputs to the Derivation of HSLs**

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation) / Direct contact *	Both potential exposure pathways identified in the CSM. It is noted that direct contact HSLs are generally not the risk drivers for further site assessment for the same contamination source as the HSLs for vapour intrusion (NEPC, 2013).
Soil Type	Silt	Clay/silt filling or silty clay filling types were recorded at the site. Silt was adopted as the more conservative of the two.
Depth to contamination	0 m to <1 m	Filling comprising clay and silt was present within the top 1 m at the site.

* Developed by CRC CARE (2011)

The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 4.

Table 4: Health Investigation and Screening Levels (HIL and HSL) in mg/kg

Contaminants		HIL- A & HSL- A Direct Contact	HSL-A & HSL-B Vapour Intrusion
Metals	Arsenic	100	-
	Cadmium	20	-
	Chromium (VI)	100	-
	Copper	6000	-
	Lead	300	-
	Mercury (inorganic)	40	-
	Nickel	400	-
	Zinc	7400	-
PAH	Benzo(a)pyrene TEQ[1]	3	-
	Naphthalene	1400 (HSL)	4
	Total PAH	300	-
TRH	C6 – C10 (less BTEX) [F1]	4400 (HSL)	40
	>C10-C16 (less Naphthalene) [F2]	3300 (HSL)	230
	>C16-C34 [F3]	4500 (HSL)	-
	>C34-C40 [F4]	6300 (HSL)	-
BTEX	Benzene	100 (HSL)	0.6
	Toluene	14 000 (HSL)	390
	Ethylbenzene	4500 (HSL)	NL
	Xylenes	12 000 (HSL)	95
Phenol	Pentachlorophenol (used as an initial screen)	100	-
OCP	Aldrin + Dieldrin	6	-
	Chlordane	50	-
	DDT+DDE+DDD	240	-
	Endosulfan	270	-
	Endrin	10	-
	Heptachlor	6	-
	HCB	10	-
	Methoxychlor	300	-
PCB [2]		1	-

Notes: 1 – sum of carcinogenic PAH
2 – non dioxin-like PCBs only

8.2 Ecological Investigation Levels

Given that it currently unclear if the development footprint, namely any basement car parking will cover the whole site envelope, Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, derived from the *Interactive (Excel) Calculation Spreadsheet* are shown in the following Table 5.

The following assumptions have been used to determine the EILs:

- A protection level of 80% for urban residential areas and public open space has been adopted;
- The EILs will apply to the top 2 m of the soil profile which corresponds to the root zone and habitation zone of many species;
- Given the likely predominant source of soil contaminants (i.e. historical site uses / fill) the contamination is considered as “aged” (>2 years);
- ABCs have been derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters of NSW for the State in which the site is located, and low for traffic volumes; and
- Location specific pH and CEC values have been used as input parameters from four locations (BH1, BH7, BH11 and BH17). The average values obtained from these locations were pH 5.7 and CEC 12.5 $cmol_c/kg$, respectively.

Table 5: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL	Comments
Metals	Arsenic	100	*Adopted pH of 5.7 and CEC of 12.5 $cmol_c/kg$; **A conservative assumed clay content of 10% was adopted.
	Copper*	170	
	Nickel*	200	
	Chromium III**	410	
	Lead	1,100	
	Zinc*	390	
PAH	Naphthalene	170	
OCP	DDT	180	

8.3 Ecological Screening Levels – Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and benzo(a)pyrene. Site specific data and assumptions as summarised in Table 6 have been used to determine the ESL. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table 7.

Table 6: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Residential	Proposed development is for a residential aged care facility.
Soil Texture	Fine	Site soils include silt and clay in filling, therefore a fine soil texture has been adopted.

Table 7: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	1300	
	>C34-C40 [F4]	5600	
BTEX	Benzene	65	
	Toluene	105	
	Ethylbenzene	125	
	Xylenes	45	
PAH	Benzo(a)pyrene	0.7	

8.4 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B(7), Schedule B1 of NEPC (2013) are shown in the following Table 8. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;
- The Management Limits for residential land uses apply; and
- Site soils include silts and clays in natural soils and filling. A “fine” soil texture has been adopted and is the most conservative texture for soil Management Limits.

Table 8: Management Limits in mg/kg

Analyte		Management Limit
TRH	$C_6 – C_{10}$ (F1) #	800
	$>C_{10}-C_{16}$ (F2) #	1000
	$>C_{16}-C_{34}$ (F3)	3500
	$>C_{34}-C_{40}$ (F4)	10,000

Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

8.5 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and/or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment on the buildings was undertaken as part of DP (2016). Noting that clearance of the site will be required post demolition works, for the purposes of this DSI the presence or absence of asbestos in soil, at a limit of reporting of 0.1 g/kg, has been adopted as an initial screen.

8.6 Waste Classification Criteria

To assess the waste classification of the material for off-site disposal purposes a preliminary waste classification assessment was undertaken in accordance with the six step process outlined in the NSW EPA *Waste Classification Guidelines 2014*. The soil results are assessed against the general solid waste (GSW) criteria outlined in Tables 1 and 2 of the guidelines.

With respect to the natural materials at the site, these are also assessed for their potential classification as Virgin Excavated Natural Material (VENM). In this regard the NSW EPA defines VENM as:

- *"natural material (such as clay, gravel, sand, soil or rock fines):*
- *that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or process residues, as a result of industrial, commercial, mining or agricultural activities; and*
- *that does not contain any sulfidic ores or soils or any other waste; and*
- *includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice."*

For the purpose of providing screening criteria to compare laboratory results against for assessing VENM, DP have compared the results of the natural soils to published background concentrations in ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Environmental Soil Quality Guidelines* Background A [ANZECC A]. In the case of organics where no reference values are provided the laboratory PQL has been adopted as the screening level.

9. Results

9.1 Field

The test bore logs are included in Appendix D and should be read in conjunction with the accompanying standard notes defining classification methods and descriptive terms.

The subsurface conditions are broadly summarised as follows:

- TOPSOIL – Typically present in the top 0.2 m comprising brown and grey silt and silty clay with traces of rootlets, siltstone gravel and fine sand. A bonded ACM fragment was found in BH9;
- FILLING – Brown and grey silty clay and silt with traces of ironstone gravel. Brick fragments were encountered in BH9, BH11, BH13 and BH14 whilst tile fragments were observed in BH10. Filling was observed to depths of between 0.1 m and 0.8 m bgl (BH8);
- NATURAL SOILS – Red, brown and grey clay with varying silt composition and inclusions of ironstone gravel. The natural soils were encountered at depths of between 0.1 m and 0.8 m bgl; and
- BEDROCK - Brown and grey siltstone was encountered in BH1 to BH8 at depths of between 2.7 m and 5.8 m bgl.

No signs of gross chemical contamination, such as odours or staining, were observed during the investigation, although an ACM fragment was observed in the filling (topsoil) at BH9.

No free groundwater was observed during the investigation.

9.2 Laboratory Results

The results of the soil laboratory analysis undertaken are summarised in Table E1: Summary of Soil Laboratory Results, in Appendix E.

The full laboratory certificates together with the chain of custody and sample receipt information are also presented in Appendix E.

10. Discussion and Conclusion

All chemical laboratory results for the site were within the adopted SAC and indicated low potential for contamination. The fragment of ACM from the near surface at BH9 confirmed the presence of chrysotile and amosite asbestos. Screening for asbestos in soil did not record asbestos concentrations above the laboratory reporting limit of 0.1 g/kg. It is considered likely that the ACM fragment found in BH9 is due to current and past structures on the site which are known to contain asbestos. In this regard, it should be noted that there is the potential for asbestos fragments to be present sporadically across the site, in particular around existing structures and within the near surface materials and hence appropriate management measures should be adopted to manage this during construction (e.g. appropriate demolition and clearance of structures, unexpected finds protocol, etc). The low chemical concentrations and the presence of bonded asbestos are considered to be consistent with the historical use of the site and the findings in DP's HAZMAT survey (DP, 2016).

With respect to the preliminary waste classification, the lead concentrations in four filling samples were at or above the CT1 criteria for general solid waste without TCLP analysis. Analysis for these samples for TCLP recorded low leaching characteristics and were within the general solid waste criteria with TCLP analysis.

All results from the natural soils were within the adopted background ranges.

Given this, the preliminary waste classification for the soils on the site is summarised as follows:

- Brown and grey silty clay and silt filling/topsoil with ironstone gravel and inclusions of rootlets, brick, tile is preliminarily classified as General Solid Waste (non-putrescible);
- The brown silt clay filling/topsoil with some gravel, and inclusions of rootlets and asbestos around BH9 and the existing structures is preliminarily classified as Special Waste (asbestos) General Solid Waste (non-putrescible); and
- The red brown and grey clay and silty clay natural soils with inclusions of ironstone, and the grey and brown siltstone and bedrock are preliminarily classified as Virgin Excavated Natural Material (VENM).

Based on the field and analytical results presented in this report it is considered the site can be made suitable for the proposed residential aged care facility development, subject to the implementation of the following:

- An unexpected finds protocol;
- Surface inspection, and if necessary sampling, following demolition of the existing structures and stripping of the grass coverage to assess the presence of asbestos in the filling material which is to be retained on the site; and
- Confirmation of the preliminary waste classifications, including delineation for the presence of asbestos around BH9.

11. Limitations

Douglas Partners (DP) has prepared this report for the project at Lang Road, Marsh Parade and Hume Highway, Casula in accordance with DP's proposal dated 1 June 2016 and acceptance received from Catholic Healthcare Ltd. The work was carried out under agreed contract between DP and Catholic Healthcare Ltd. This report is provided for the exclusive use of Catholic Healthcare Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

This report must be read in conjunction with all of the attached 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.

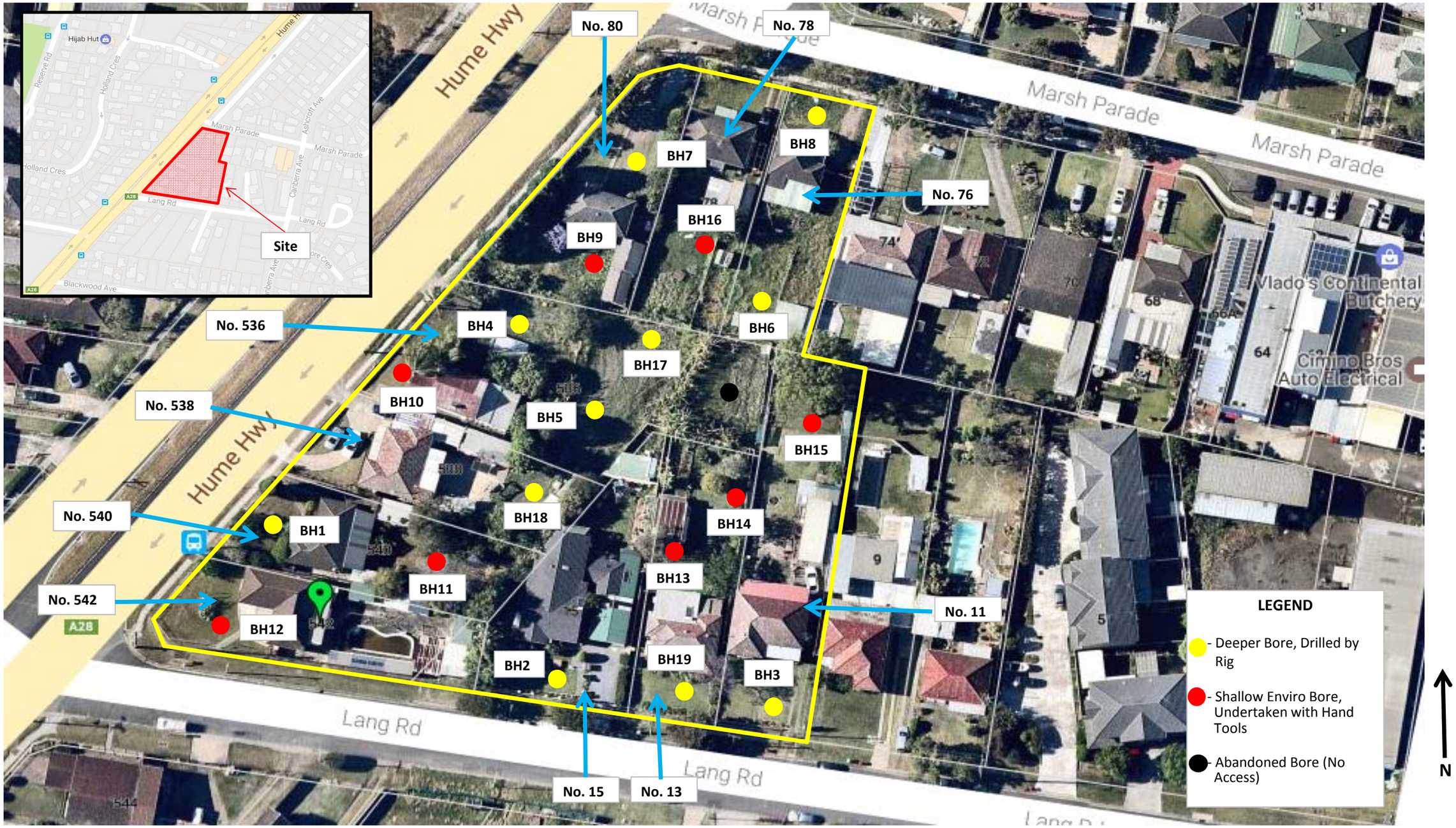
The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design 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 environmental 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

Drawings

About This Report



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Catholic Healthcare Ltd		TITLE:	**Bore Locations**	PROJECT No: 85600
	OFFICE: Sydney	DRAWN BY: CB		**Residential Aged Care Facility**	DRAWING No: 1
	SCALE: As shown	DATE: 25 Feb 2017		**Lang Road, Marsh Parade and Hume Highway, Casula**	REVISION: B

Amendments

Issue	Description	Date
1	PRE-DA MEETING	25/11/16
2	ISSUED FOR INFORMATION	01.12.16
3	ISSUED FOR INFORMATION	08.12.16
4	ISSUED FOR INFORMATION	12.01.17
5	ISSUED FOR INFORMATION	19.01.17
6	ISSUED FOR INFORMATION	25.01.17
7	ISSUED FOR INFORMATION	02.02.17
8	ISSUED FOR INFORMATION	15.02.17

North Point

IDA SUBMISSIONDN

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

GROUND FLOOR PLAN RL 38.5

Scale	1 : 200
Drawing Created (date)	12/01/17
Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

Project No	Drawing No	Issue
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5	ISSUED FOR INFORMATION	19.01.17
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7	ISSUED FOR INFORMATION	02.02.17
8	ISSUED FOR INFORMATION	15.02.17

North Point

DA SUBMISSION

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.gentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

LEVEL 1 PLAN RL 42.5

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Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

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4	ISSUED FOR INFORMATION	12.01.17
5	ISSUED FOR INFORMATION	19.01.17
6	ISSUED FOR INFORMATION	25.01.17
7	ISSUED FOR INFORMATION	02.02.17
8	ISSUED FOR INFORMATION	15.02.17

DA SUBMISSION

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

catholic healthcare

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

GROUPGSA

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

LEVEL 2 PLAN RL 45.8

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Verified	Checker
Approved	Approver

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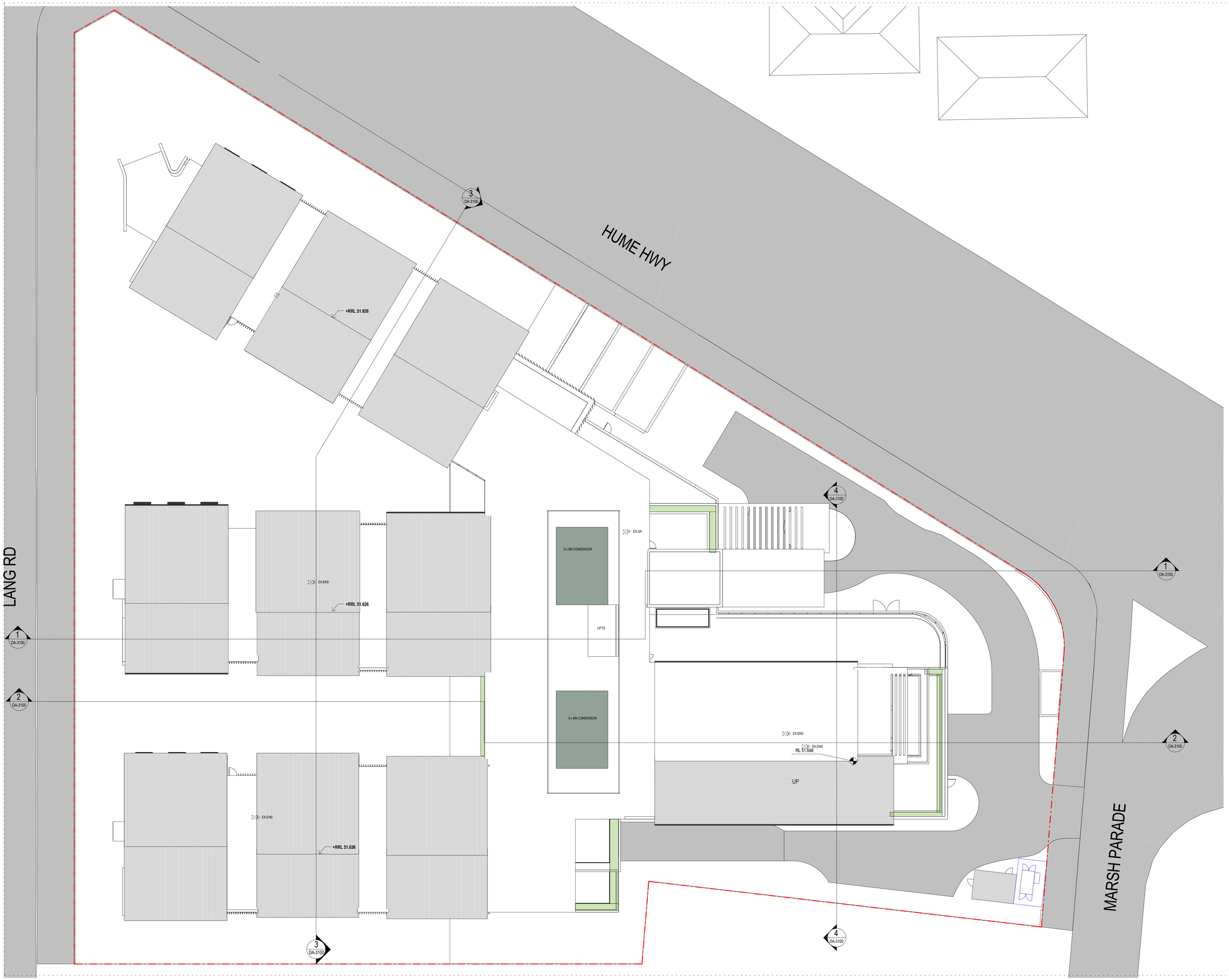

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Issue	Description	Date
1	PRE-DA MEETING	25/11/16
2	ISSUED FOR INFORMATION	12.01.17
3	ISSUED FOR INFORMATION	02.02.17

FOR TENDER

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

ROOF PLAN

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Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

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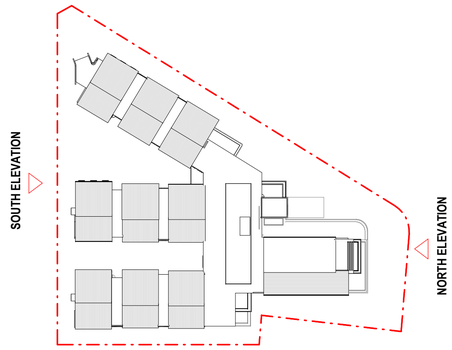

Amendments

Issue	Description	Date
1	ISSUED FOR INFORMATION	15.02.17

DA SUBMISSION

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

NORTH / SOUTH ELEVATIONS

Scale	As indicated
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Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

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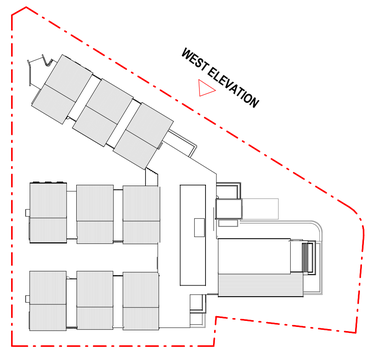

Amendments

Issue	Description	Date
1	ISSUED FOR INFORMATION	15.02.17

DA SUBMISSION

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

EAST / WEST ELEVATIONS

Scale	As indicated
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Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

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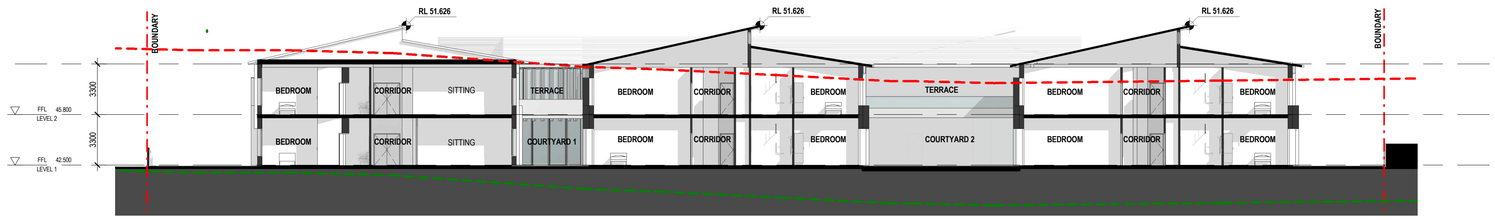

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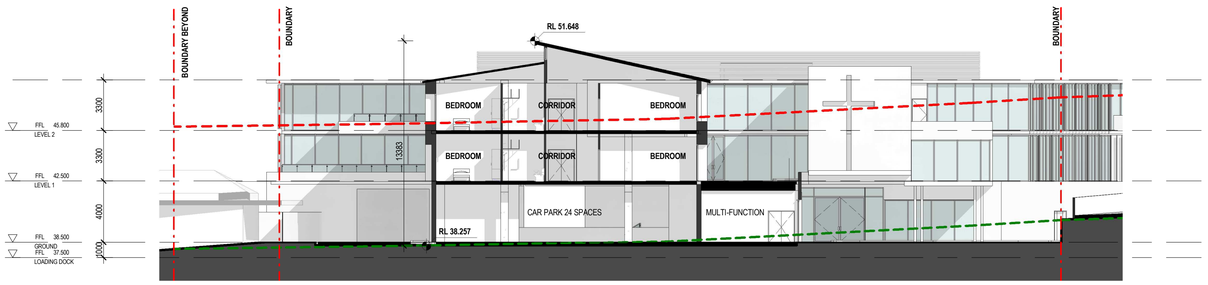

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LEGEND

EXISTING GROUND LEVEL

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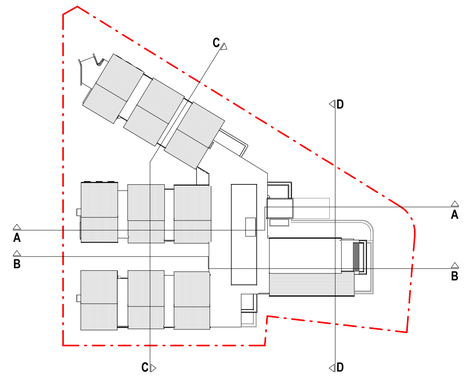

Amendments

Issue	Description	Date
1	PRE-DA MEETING	25/11/16

DA SUBMISSION

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
Phone +61 2 94115660
Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

Client

Catholic Healthcare Limited
Suite 1, Level 5, 15 Talavera Road, Macquiare Park,NSW 2113.
Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

SECTIONS

Scale	As indicated
Drawing Created (date)	11/08/16
Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

Project No	Drawing No	Issue
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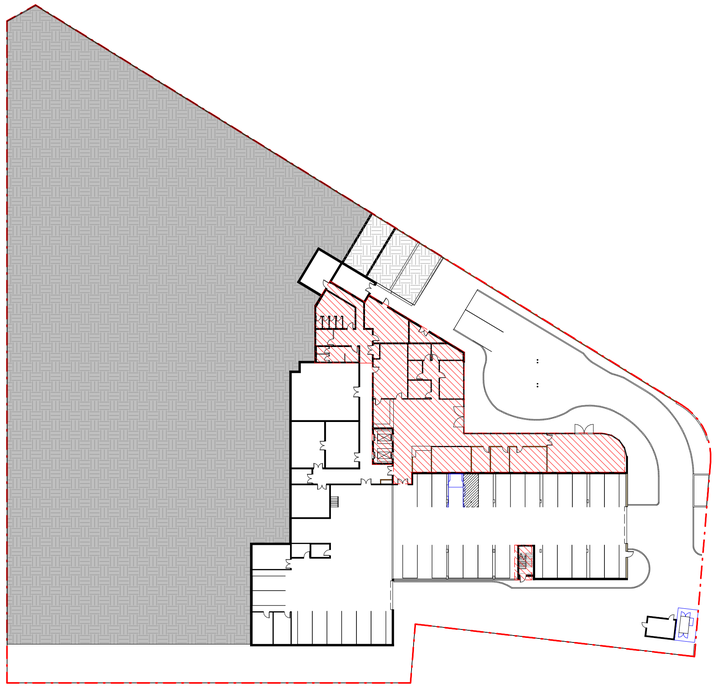

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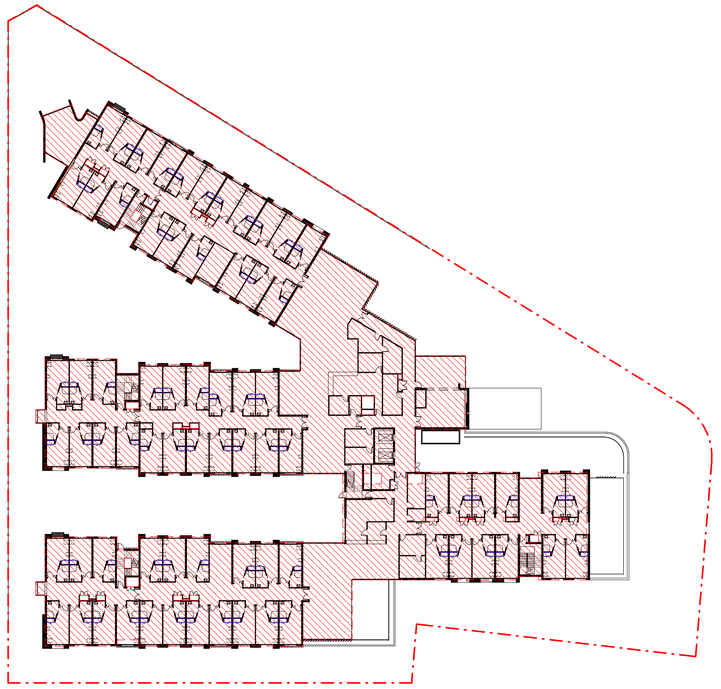

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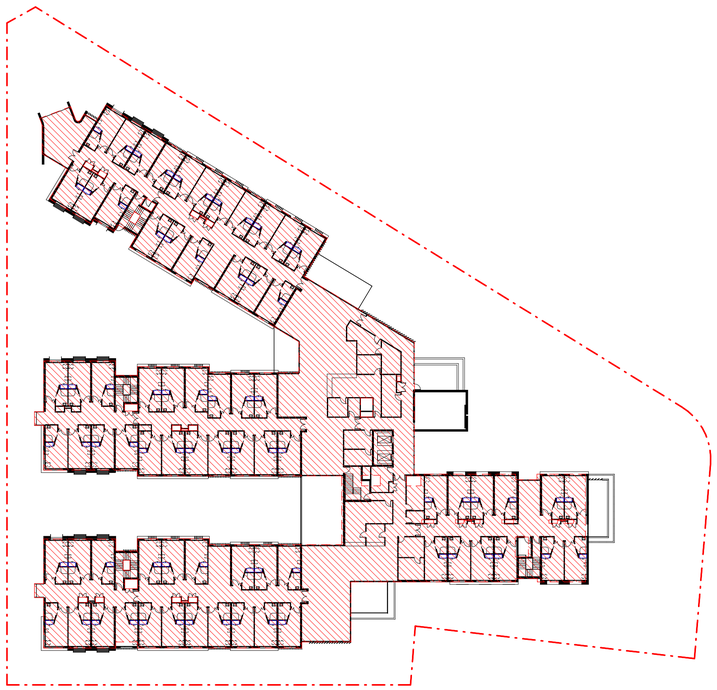

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GFA CALCULATIONS	
SITE AREA	8564 M2
GROUND FLOOR (EXCLUDING LAUNDRY, KITCHEN, STORE AND LOADING DOCK.)	635.8 M2
LEVEL 1	3685.5 M2
LEVEL 2	3528.6 M2
TOTAL GFA	7850 M2
FSR	0.91:1

Amendments

Issue	Description	Date
1	ISSUED FOR INFORMATION	15.02.17

North Point

DA SUBMISSION

Civil Engineer / Structural Engineer

BONACCI GROUP
Phone +61 2 82478400
Address Level 6, 37 York Street, Sydney NSW 2000

Electrical Engineer / Hydraulic Engineer / Mechanical Engineer

DSC CONSULTING ENGINEERS
Phone +61 2 94161177
57-59 Hill Street, Roseville, NSW 2069
fred.pentecost@dsc.com.au

Planning

HIGGINS PLANNING PTY. LTD.
Phone +61 2 99294044
305, Level 3, 26 Ridge street, North Sydney
marian@higginsplanning.com.au

Traffic Engineer

TTPA
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Address 502, Level 5, 282 Victoria Ave, Chatswood NSW 2067
ross@ttpa.com.au

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Catholic Healthcare Limited
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Phone +61 2 88762100

Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

T +612 9361 4144 F +612 9332 3458

architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

CASULA AGED CARE

11 Lang Road,76,78 and 80 March Parade,536,538,540 and 540 Hume Hwy, Casula NSW 2170

Drawing Title

GFA CALCULATIONS

Scale	1 : 500
Drawing Created (date)	11/25/16
Drawing Created (by)	Author
Plotted and checked by	Designer
Verified	Checker
Approved	Approver

Project No	Drawing No	Issue
160474	DA-4000	1

15/02/2017 7:25:00 PM

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

Appendix B

Site Photographs

Photograph 1 - Typical Fibro Dwelling on the Site

Photograph 2- Typical Brick Dwelling on the Site

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Lang Road, Marsh Parade &** **Hume Highway, Casula**	PROJECT: 85600 PLATE No: B1 REV: A
	CLIENT: Catholic Healthcare Ltd	DATE: 7-Feb-17

Photograph 3 - Looking East Across Open Grassed Area in Central Area of Site

Photograph 4 - Typical Backyard on the Site (e.g. Garden Bed)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Lang Road, Marsh Parade &** **Hume Highway, Casula**	PROJECT: 85600 PLATE No: B2 REV: A
	CLIENT: Catholic Healthcare Ltd	DATE: 7-Feb-17

Photograph 5 - Typical Backyard on the Site (Open Grassed Area)

Photograph 6 - Typical Backyard on the Site (Open Grassed Area)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Lang Road, Marsh Parade &** **Hume Highway, Casula**	PROJECT: 85600 PLATE No: B3 REV: A
	CLIENT: Catholic Healthcare Ltd	DATE: 7-Feb-17

Photograph 7 - Typical Backyard on the Site (Open Grassed Area)

Photograph 8 - General Rubbish on the Site (e.g chair, roof tiles, plastic)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Lang Road, Marsh Parade &** **Hume Highway, Casula**	PROJECT: 85600 PLATE No: B4 REV: A
	CLIENT: Catholic Healthcare Ltd	DATE: 7-Feb-17

Photograph 9 - General Rubbish/Anthropogenic on the Surface (e.g metal, plastic, tile)

Photograph 10- Bonded Asbestos Fragments on Surface Near/Under Structures

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Lang Road, Marsh Parade &** **Hume Highway, Casula**	PROJECT: 85600 PLATE No: B5 REV: A
	CLIENT: Catholic Healthcare Ltd	DATE: 7-Feb-17

Appendix C

Data Quality Assessment

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The Detailed Site Investigation (DSI) was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table Q1.

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S1 Introduction (objective) S10 Discussion and Conclusion
Identify Inputs to the Decision	S1 Introduction S3 Site Identification and Description S4 Regional Geology, Hydrogeology and Topography S5 Review of Pervious Reports S8 Site Assessment Criteria S9 Results
Define the Boundary of the Assessment	S3 Site Identification and Description Drawing 1 - Appendix A
Develop a Decision Rule	S8 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S7 Data Quality Objectives S8 Site Assessment Criteria QA/QC Procedures and Results – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S7.6 Sample Location and Rationale QA/QC Procedures and Results – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork and analysis procedures in Section 7 and the laboratory results certificates in Appendix E for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	10% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]

NOTES: 1 qualitative assessment of RPD results overall; refer Section Q2.1

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagent Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes

Notes: 1 ELS: <5xPQL – any RPD; >5xPQL – 0-50%RPD

In summary, the QC data is considered to be of sufficient quality to be acceptable for the purpose and objective of this assessment.

Q2.1 Intra-Laboratory Replicates

Intra-laboratory replicates were analysed as an internal check of the reproducibility within the primary laboratory Envirolab Services Pty Ltd (ELS) and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate samples are summarised in Table Q4.

Note that, where both samples are below LOR/PQL the difference and RPD has been given as zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

Table Q4: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals								PAH			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	total	BaP TEQ	BaP	Naphthalene
ELS	BH4/1.5	23/01/2017	Natural	mg/kg	6	<0.4	10	22	17	<0.1	4	26	0	<0.5	<0.05	<0.1
ELS	BD5/230117	23/01/2017	Natural	mg/kg	5	<0.4	9	20	16	<0.1	4	24	0	<0.5	<0.05	<0.1
Difference				mg/kg	1	0	1	2	1	0	0	2	0	0	0	0
RPD				%	18	0	11	10	6	0	0	9	0	0	0	0
ELS	BH10/0.02-0.1	23/01/2017	Filling	mg/kg	11	<0.4	24	21	180	<0.1	8	160	0	<0.5	<0.05	<0.1
ELS	BD2/231017	23/01/2017	Filling	mg/kg	9	<0.4	20	16	100	<0.1	6	100	0	<0.5	<0.05	<0.1
Difference				mg/kg	2	0	4	5	80	0	2	60	0	0	0	0
RPD				%	20	0	18	27	**57**	0	29	**46**	0	0	0	0
ELS	BH18/0.9-1	23/01/2017	Natural	mg/kg	32	<0.4	10	19	18	<0.1	3	21	0	<0.5	<0.05	<0.1
ELS	BD4/230117	23/01/2017	Natural	mg/kg	26	<0.4	9	16	17	<0.1	3	19	0	<0.5	<0.05	<0.1
Difference				mg/kg	6	0	1	3	1	0	0	2	0	0	0	0
RPD				%	21	0	11	17	6	0	0	10	0	0	0	0

Notes: - not applicable, not tested

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and ± 50% for organics with the with the exception of those in bold and highlighted. However, this is not considered to be significant because:

- The replicate sample which exceeded the acceptable range was from fill soils which were heterogeneous in nature;
- Soil replicates, rather than homogenised soil duplicates, were used to minimise the risk of possible volatile loss, hence greater variability can be expected;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQIs.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Q3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on-site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the 'true' value.

The DQIs were assessed as outlined in the following Table Q5.

Table Q5: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned systematic and selected target locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

Appendix D

Test Bore Log Results

Descriptive Notes

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

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Description and Classification Methods

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

Soil Types

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

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

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

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

The proportions of secondary constituents of soils are described as:

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

Definitions of grading terms used are:

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

Cohesive Soils

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

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

Cohesionless Soils

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

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

Soil Descriptions

Soil Origin

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

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

Transported soils may be further subdivided into:

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

Rock Strength

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Degree of Fracturing

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

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

Rock Descriptions

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

Symbols & Abbreviations

Douglas Partners

Introduction

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

Drilling or Excavation Methods

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

Water

▷	Water seep
▽	Water level

Sampling and Testing

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

Description of Defects in Rock

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

Defect Type

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

Orientation

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

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

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

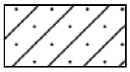
Soils


Topsoil

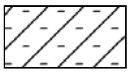

Peat


Clay

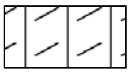

Silty clay

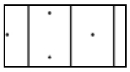

Sandy clay

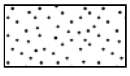

Gravelly clay

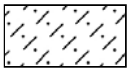

Shaly clay

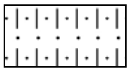

Silt


Clayey silt


Sandy silt

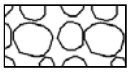

Sand

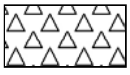

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

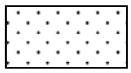

Talus

Sedimentary Rocks

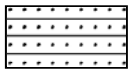

Boulder conglomerate

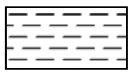

Conglomerate


Conglomeratic sandstone

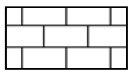

Sandstone


Siltstone


Laminite

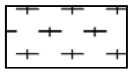

Mudstone, claystone, shale

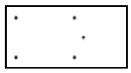

Coal


Limestone

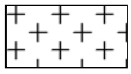
Metamorphic Rocks

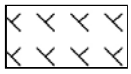

Slate, phyllite, schist

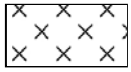

Gneiss

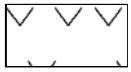

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 43.0 AHD
EASTING: 306699
NORTHING: 6241736
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 85600.00
DATE: 24/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
43	0.0	FILLING (TOPSOIL) - loosely compacted, brown to dark grey silt filling, traces of rootlets, siltstone gravel and fine sand		A/E	0.0 - 0.1				
	0.18	CLAY - very stiff, red-brown to brown clay, trace of silt, humid		A/E	0.45 - 0.5				
42	1			A/E*	1.0 - 1.05				1
	1.5	CLAY - very stiff, red-brown and light grey mottled clay, traces of silt and some ironstone gravel, humid		A	2.0 - 2.05				
41	2								2
40	3								3
	3.1	CLAY - very stiff to hard, light brown clay with traces of silt and some ironstone gravel, humid		A	3.2 - 3.3				
	3.4	SILTSTONE - extremely low strength, extremely weathered, light grey-light brown siltstone with some clay bands		A	3.45 - 3.5				
	3.5	Bore discontinued at 3.5m - target depth reached (auger refusal)							
39	4								4

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 3.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD6/240117 taken at 1.0m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 41.1 AHD
EASTING: 306747
NORTHING: 6241709
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 85600.00
DATE: 24/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
41	0	FILLING - loosely compacted, dark grey-brown silt filling with traces of sand, rootlets and gravel		A/E	0.1 0.15				
				A/E	0.45 0.5				
	0.55	CLAY - very stiff, red-brown and grey mottled clay with traces of silt, humid							
40	1			A/E	1.0 1.05				1
	1.2	CLAY - very stiff, light grey, red-brown mottled clay with traces of silt, humid							
39	2			A	2.0 2.05				2
	2.8	CLAY - hard, red-brown and grey mottled clay with some ironstone bands and traces of silt, humid		A	2.8 2.85				
	3								3
38	3.0	SILTSTONE - extremely low strength, extremely to highly weathered, light brown siltstone		A	3.0 3.05				
	3.1	Bore discontinued at 3.1m - target depth reached (auger refusal)							
	4								4
37									

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 3.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 40.8 AHD
EASTING: 306786
NORTHING: 6241707
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 85600.00
DATE: 24/1/2017
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
40.8	0.25	FILLING - loosely compacted, dark grey-brown silt filling with traces of sand, rootlets and gravel		A/E	0.1 0.15				
		CLAY - very stiff, red-brown clay with traces of silt, humid		A/E	0.5 0.55				
40	1			A/E	1.0 1.05				1
	1.3	CLAY - very stiff, red-brown-grey mottled clay with some silt, moist		A	1.5 1.55				
39	1.8	CLAY - very stiff, red-brown, grey mottled clay with some silt and ironstone fragments, moist		A	2.0 2.05				2
38	2.9	CLAY - very stiff, light grey, red mottled clay with some silt, humid		A	3.2 3.25				3
37	4			A	4.0 4.05				4
	4.3	CLAY - very stiff to hard, light grey and light brown clay with traces of silt and some ironstone bands							
36									

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 6.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 40.8 AHD
EASTING: 306786
NORTHING: 6241707
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 85600.00
DATE: 24/1/2017
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
35	5.8	CLAY - very stiff to hard, light grey and light brown clay with traces of silt and some ironstone bands *(continued)*							
	6	SILTSTONE - extremely low strength, extremely to highly weathered, light grey, light brown siltstone		A	6.0 6.05				6
	6.2	Bore discontinued at 6.2m - target depth reached (auger refusal)							
34	7								7
33	8								8
32	9								9
31									

Dynamic Penetrometer Test (blows per 150mm) scale: 5, 10, 15, 20

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 6.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 40.1 AHD
EASTING: 306741
NORTHING: 6241771
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 85600.00
DATE: 23/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
40	0.2	FILLING - loosely compacted, dark grey silt filling with some gravel and rootlets and some fine sand		A/E	0.1 0.15				
		CLAY - very stiff, light grey mottled clay, traces of silt, humid		A/E	0.5 0.55				
	0.8	CLAY - very stiff, red-brown and light grey mottled clay, traces of silt, humid		A/E	1.0 1.05				
39	1			A/E*	1.5 1.55				
				A	2.0 2.05				
38	2								
	2.5	CLAY - very stiff to hard, grey-red-brown clay, traces of silt and ironstone bands, humid		A	2.5 2.55				
	2.8	CLAY - very stiff to hard, light grey and brown clay, traces of silt and ironstone bands, humid							
37	3			A	3.1 3.15				
	3.3	SILTSTONE - extremely low strength, extremely weathered, light grey siltstone							
	3.5	Bore discontinued at 3.5m - target depth reached (auger refusal)		A	3.45 3.5				
36	4								

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 3.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD5/230117 taken at 1.5m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.6 AHD
EASTING: 306754
NORTHING: 6241753
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 85600.00
DATE: 24/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
39	0.2	FILLING - loosely compacted, dark brown-grey silt filling, traces of fine sand and some rootlets		A/E	0.1 0.15				
		CLAY - very stiff, red-brown clay, traces of silt, humid		A/E	0.5 0.55				
	0.8	CLAY - very stiff, brown to light brown-grey mottled clay, traces of silt, humid		A/E	1.0 1.05				
38	1.8	CLAY - very stiff to hard, light brown and light grey clay with some ironstone bands		A	2.0 2.05				
37	2.7	SILTSTONE - extremely low strength, highly weathered, light grey siltstone		A	2.75 2.8				
	2.8	Bore discontinued at 2.8m - target depth reached (auger refusal)							
36									
35									

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 2.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 38.4 AHD
EASTING: 306778
NORTHING: 6241777
DIP/AZIMUTH: 90°/--

BORE No: 6A
PROJECT No: 85600.00
DATE: 23/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
38	0.16	FILLING (TOPSOIL) - loosely compacted, dark brown-grey silt filling with traces of fine sand and rootlets		A/E	0.1 0.15				
		FILLING - apparently moderately compacted, dark brown silt filling with traces of red-brown clay and ironstone gravel		A/E	0.5 0.55				
	0.6	CLAY - very stiff, brown and red-brown mottled clay, traces of silt, humid			0.7		0.7-2.0m: Bulk sample		
	1			A/E	1.0 1.05				1
	1.2	CLAY - very stiff, red-brown clay, trace of silt, humid							
37				A/E*	1.5 1.55				
	2			A	1.9 2.0				2
36				A	2.5 2.55				
	2.8	CLAY - very stiff to hard, red-brown clay, trace of silt, humid							
	3				3.0				3
	3.0	SILTSTONE - extremely low strength, extremely weathered, light grey siltstone		S			5,10 refusal		
35	3.3	Bore discontinued at 3.3m - target depth reached (auger refusal)			3.3				
	4								4
34									

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 3.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD3/2310116 taken at 1.5m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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
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BOREHOLE LOG

CLIENT: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.1 AHD
EASTING: 306760
NORTHING: 6241804
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 85600.00
DATE: 23/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
39	0.15	FILLING (TOPSOIL) - loosely compacted, dark brown-grey silt filling with traces of ceramic, fine sand and rootlets		A/E	0.1 0.15				
		FILLING - apparently moderately compacted, dark brown silt filling with traces of red-brown clay							
	0.55	CLAY - very stiff, brown and red-brown clay, traces of silt, humid		A/E	0.5 0.55 0.6		0.6-1.6m: Bulk sample		
38	1.1	CLAY - very stiff, red-brown clay, trace of silt, humid		A/E	1.0 1.05				
				A/E	1.5 1.55				
37				A	2.0 2.05				
	2.4	CLAY - very stiff to hard, red-brown clay, trace of silt, humid		A	2.5 2.55				
36	3.1	SILTSTONE - extremely low strength, extremely weathered, light grey siltstone		A	3.0 3.05				
	3.3	Bore discontinued at 3.3m - target depth reached (auger refusal)							
35									

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 3.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 38.1 AHD
EASTING: 306789
NORTHING: 6241809
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 85600.00
DATE: 23/1/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
38	0.2	FILLING (TOPSOIL) - apparently loosely compacted, dark brown-grey silt filling with traces of fine sand and rootlets		A/E	0.1 0.15				
		FILLING - moderately compacted, dark brown silt filling with traces of red-brown clay and ironstone gravel		A/E	0.5 0.55				
	0.8	CLAY - very stiff, brown and red mottled clay, trace of silt, humid		A/E	1.0 1.05		1.0-2.5m: Bulk sample		
37	1								1
	1.5	CLAY - very stiff, red-brown clay, trace of silt, humid		A	1.45 1.5				
				S	1.95		7,17,17 N = 34		
	2			A	2.3 2.35				2
36	2.5	CLAY - very stiff to hard, red-brown and grey clay, humid			2.5				
				S	2.95		25,14,17 N = 31		
	3								3
35	3.3	SILTSTONE - extremely low strength, extremely weathered, light grey siltstone			3.5				
				S			16,25/120mm refusal		
	3.82	Bore discontinued at 3.82m - target depth reached (auger refusal)			3.82				
34	4								4

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 3.82m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.4 AHD
EASTING: 306753.9
NORTHING: 6241784.4
DIP/AZIMUTH: 90°/--

BORE No: 9
PROJECT No: 85600.00
DATE: 23/1/2017
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
39	0.02	FILLING (TOPSOIL) - brown silty clay filling with some fine igneous gravel with rootlets, ACM fragment found		A	0.02		PID<5		
		FILLING - brown silty clay filling with some fine igneous gravel			0.1				
				A*	0.3				
	0.4	- apparently in a stiff condition			0.4				
	0.41	SILTY CLAY - stiff, red-grey mottled silty clay							
		Bore discontinued at 0.41m							
		- hand auger refusal on stiff clay							
38	1								1
37	2								2
36	3								3
35	4								4

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD1/230117 taken at 0.3m to 0.4m

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 42.4 AHD
EASTING: 306719.4
NORTHING: 6241765.5
DIP/AZIMUTH: 90°/--

BORE No: 10
PROJECT No: 85600.00
DATE: 23/1/2017
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
42	0.02	FILLING (TOPSOIL) - brown silty clay filling with some fine igneous gravel and rootlets		A	0.01 0.1		PID<5		
	0.16	FILLING - brown silty clay filling with some fine igneous and ironstone gravel and tile fragments							
		Bore discontinued at 0.16m - hand auger refusal on clay filling							
	1								
41									
	2								
40									
	3								
39									
	4								
38									

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: *BD2/230117 taken at 0.02m to 0.1m

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 41.5 AHD
EASTING: 306727.1
NORTHING: 6241730.3
DIP/AZIMUTH: 90°/--

BORE No: 11
PROJECT No: 85600.00
DATE: 23/1/2017
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
41	0.02	FILLING (TOPSOIL) - brown silty clay filling with some fine igneous gravel and rootlets		A	0.02 0.1		PID<5		
	0.2	FILLING - brown silty clay filling with some fine igneous gravel and brick fragments (4-5cm)		A	0.2 0.3		PID<5		
	0.35	SILTY CLAY - stiff, brown red mottled silty clay Bore discontinued at 0.35m - hand auger refusal on stiff clay							
40	1								1
39	2								2
38	3								3
37	4								4

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 43.8 AHD
EASTING: 306691.9
NORTHING: 6241718.7
DIP/AZIMUTH: 90°/--

BORE No: 12
PROJECT No: 85600.00
DATE: 23/1/2017
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
43	0.01	FILLING (TOPSOIL) - brown silty clay filling with some fine sand and some fine igneous gravel and rootlets		A	0.01		PID<5		
				A	0.1		PID<5		
	0.21	FILLING - brown silty clay filling with some fine igneous and ironstone gravel - stiff, grey and yellow mottled clay clumps from 0.16m			0.2				
	1	Bore discontinued at 0.21m - hand auger refusal on clay filling							
42	2								
41	3								
40	4								
39									

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.7 AHD
EASTING: 306767.3
NORTHING: 6241733.3
DIP/AZIMUTH: 90°/--

BORE No: 13
PROJECT No: 85600.00
DATE: 23/1/2017
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
39	0.01	FILLING (TOPSOIL) - brown silty clay filling with some fine sand and some fine igneous gravel and rootlets		A	0.01		PID<5		
				A	0.1		PID<5		
	0.26	FILLING - brown silty clay filling with some fine igneous and ironstone gravel and fine brick fragments - apparently stiff			0.2				
		Bore discontinued at 0.26m - hand auger refusal on clay filling							
38	1								1
37	2								2
36	3								3
35	4								4

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.6 AHD
EASTING: 306774.6
NORTHING: 6241740.7
DIP/AZIMUTH: 90°/--

BORE No: 14
PROJECT No: 85600.00
DATE: 23/1/2017
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
39.6	0.02	FILLING (TOPSOIL) - brown silty clay filling with some fine sand and some igneous gravel and some rootlets		A	0.02		PID<5		
				A	0.1		PID<5		
	0.25	FILLING - brown silty clay filling with fine igneous and ironstone gravel and brick fragments			0.2				
		Bore discontinued at 0.25m - hand auger refusal on clay filling							
39	1								1
38	2								2
37	3								3
36	4								4
35									

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.1 AHD
EASTING: 306788.2
NORTHING: 6241756.1
DIP/AZIMUTH: 90°/--

BORE No: 15
PROJECT No: 85600.00
DATE: 23/1/2017
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
39	0.01	FILLING (TOPSOIL) - brown silty clay filling with some fine igneous gravel and rootlets		A	0.01		PID<5		
	0.1	FILLING - brown silty clay filling with some fine igneous gravel		A	0.1		PID<5		
	0.3	SILTY CLAY - stiff, red-brown mottled silty clay			0.2				
		Bore discontinued at 0.3m - refusal on stiff clay			0.3				
38	1								
37	2								
36	3								
35	4								

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 38.4 AHD
EASTING: 306768.9
NORTHING: 6241788.3
DIP/AZIMUTH: 90°/--

BORE No: 16
PROJECT No: 85600.00
DATE: 23/1/2017
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
	0.02	FILLING (TOPSOIL) - brown silty clay filling with some fine igneous gravel and rootlets		A	0.02		PID<5		
				A	0.1		PID<5		
	0.21	FILLING - brown silty clay filling with some fine igneous gravel			0.2				
38		Bore discontinued at 0.21m - hand auger refusal on clay filling							
	1								1
37									
	2								2
36									
	3								3
35									
	4								4
34									

RIG: Hand tools **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 39.0 AHD
EASTING: 306767.1
NORTHING: 6241771.2
DIP/AZIMUTH: 90°/--

BORE No: 17
PROJECT No: 85600.00
DATE: 23/1/2017
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
39	0.01	FILLING (TOPSOIL) - brown silty clay filling with fine igneous gravel, rootlets		A	0.01		PID<5		
		FILLING - brown silty clay filling with some fine igneous gravel			0.1				
				A	0.4		PID<5		
	0.5	SILTY CLAY - brown-red mottled silty clay			0.5				
38	1 1.0			A	0.9		PID<5		1
		Bore discontinued at 1.0m - target depth reached			1.0				
37	2								2
36	3								3
35	4								4

RIG: Bobcat **DRILLER:** CB/TG **LOGGED:** CB **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to to 1.01m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 41.8 AHD
EASTING: 306741.2
NORTHING: 6241742.5
DIP/AZIMUTH: 90°/--

BORE No: 18
PROJECT No: 85600.00
DATE: 23/1/2017
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
41	0.02	FILLING (TOPSOIL) - brown silty clay filling with fine igneous gravel and rootlets		A	0.02 - 0.1		PID<5		
		FILLING - brown silty clay filling with some fine igneous gravel							
		- mottled red-brown from 0.4m		A	0.4 - 0.5		PID<5		
	0.6	CLAY - red-grey mottled silty clay							
	1			A	0.9 - 1.0		PID<5		1
	1.1	Bore discontinued at 1.1m - target depth reached							
40	2								2
39	3								3
38	4								4
37									

RIG: Bobcat **DRILLER:** GM **LOGGED:** CB **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to to 1.1m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD4/230117 taken at 0.9m to 1.0m

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: Catholic Healthcare
PROJECT: Proposed Residential Aged Care Facility
LOCATION: Marsh Parade, Lang Road, Hume Highway, Casula

SURFACE LEVEL: 40.9 AHD
EASTING: 306767
NORTHING: 6241708
DIP/AZIMUTH: 90°/--

BORE No: 19
PROJECT No: 85600.00
DATE: 24/1/2017
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
40	0.2	FILLING (TOPSOIL) - loosely compacted, dark grey-brown silt filling with traces of sand, rootlets and gravel		A/E	0.1 0.15				
		FILLING - loosely compacted, dark grey-brown silt filling with some sand and gravel and traces of rootlets		A/E	0.5 0.55				
	0.6	CLAY - very stiff, brown-red mottled clay with traces of silt							
	1 1.0	CLAY - very stiff, red-brown clay with traces of silt		A/E	1.0 1.05				1
	1.5			A/E*	1.45 1.5				
		Bore discontinued at 1.5m - target depth reached							
39	2								2
38	3								3
37	4								4
36									

RIG: Bobcat **DRILLER:** GM **LOGGED:** AT **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger (TC-bit) to 1.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD7/240117 taken at 1.5m

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 E

Summary of Results Table

Laboratory Certificates

Table E1: Summary of Soil Laboratory Results

Field_ID	Material	Sample Depth (m bgl)	Sampled Date	pH	Cation Exchange Capacity (CEC)	Metals: Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Lead (TCLP)	Mercury	Nickel	Zinc
				pH units	meq/100g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg
EQL				0.1	1	4	0.4	1	1	1	0.03	0.1	1	1
NEPM 2013 HILs Res A and HSL A (direct contact)				-	-	100	20	100	6000	300	-	40	400	7400
NEPM 2013, Res A/B Soil HSL for Vapour Intrusion, Silty Soil, 0-2 m				-	-	-	-	-	-	-	-	-	-	-
NEPM 2013- EIL and ESL, 0-2 m, for Urban Res, SIlty Soil				-	-	100	-	410	170	1100	-	-	200	390
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Silty Soil				-	-	-	-	-	-	-	-	-	-	-
NSW 2014 General Solid Waste (CT1)				-	-	100	20	100	-	100	-	4	40	-
NSW 2014 General Solid Waste (SCC1 and TCLP1)				-	-	-	-	-	-	1500	5	-	-	-
ANZECC (1992) - For Natural Material				-	-	0.2-30	0.04-2	0.5-110	1-190	<2-200	-	0.001-0.1	2-400	2-180
BH1	Filling	0.1	24/01/2017	-	-	8	<0.4	20	25	100	<0.03	0.1	8	96
BH1	Natural	0.5	24/01/2017	5.3	13	6	<0.4	22	16	22	-	<0.1	7	28
BH2	Filling	0.5	24/01/2017	-	-	9	<0.4	24	21	24	-	<0.1	7	26
BH3	Filling	0.1	24/01/2017	-	-	<4	<0.4	9	8	29	-	<0.1	3	28
BH4	Filling	0.1	23/01/2017	-	-	5	<0.4	9	18	130	0.04	<0.1	7	92
BH4	Natural	1.5	23/01/2017	-	-	6	<0.4	10	22	17	-	<0.1	4	26
BD5/230117	Natural	1.5	23/01/2017	-	-	5	<0.4	9	20	16	-	<0.1	4	24
BH5	Filling	0.1	24/01/2017	-	-	17	0.7	17	37	200	<0.03	0.1	10	290
BH6A	Filling	0.5	23/01/2017	-	-	7	<0.4	26	20	24	-	<0.1	11	26
BH7	Filling	0.5	23/01/2017	5.5	11	7	<0.4	25	16	16	-	<0.1	6	110
BH7	Natural	1.5	23/01/2017	-	-	9	<0.4	6	14	12	-	<0.1	2	13
BH8	Filling	0.5	23/01/2017	-	-	7	<0.4	22	14	23		<0.1	9	68
BH8	Natural	1	23/01/2017	-	-	9	<0.4	27	13	20	-	<0.1	3	16
BH9	Material	0.01-0.02	23/01/2017	-	-	-	-	-	-	-	-	-	-	-
BH9	Filling	0.02-0.1	23/01/2017	-	-	9	<0.4	20	43	59	-	0.2	7	98
BH10	Filling	0.02-0.1	23/01/2017	-	-	11	<0.4	24	21	180	0.04	<0.1	8	160
BD2/230117	Filling	0.02-0.1	23/01/2017	-	-	9	<0.4	20	16	100	-	<0.1	6	100
BH11	Filling	0.02-0.1	23/01/2017	6.5	12	6	<0.4	19	14	34	-	<0.1	7	79
BH12	Filling	0.1-0.2	23/01/2017	-	-	9	<0.4	24	11	39	-	<0.1	6	36
BH13	Filling	0.1-0.2	23/01/2017	-	-	20	0.6	18	27	77	-	<0.1	7	160
BH14	Filling	0.02-0.1	23/01/2017	-	-	12	<0.4	26	65	42	-	<0.1	6	63
BH15	Filling	0.01-0.1	23/01/2017	-	-	19	0.6	20	26	79	-	<0.1	6	190
BH16	Filling	0.1-0.2	23/01/2017	-	-	11	1	24	27	87	-	<0.1	8	110
BH17	Filling	0.4-0.5	23/01/2017	-	-	10	<0.4	22	16	45	-	<0.1	6	58
BH17	Natural	0.9-1	23/01/2017	5.5	14	14	<0.4	16	13	17	-	<0.1	3	14
BH18	Filling	0.02-0.1	23/01/2017	-	-	7	<0.4	22	18	52	-	<0.1	7	110
BH18	Natural	0.9-1	23/01/2017	-	-	32	<0.4	10	19	18	-	<0.1	3	21
BD4/230117	Natural	0.9-1	23/01/2017	-	-	26	<0.4	9	16	17	-	<0.1	3	19
BH19	Filling	0.5	24/01/2017	-	-	7	<0.4	36	10	23	-	<0.1	5	15

Field_ID	Material	Sample Depth (m bgl)	Sampled Date	TRH: C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	C6-C10 less BTEX (F1)	C6-C10	BTEX: Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	Halogenated Benzenes
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				50	100	100	50	25	50	100	100		50	25	25	0.2	1	0.5	2	1	1	0.1
NEPM 2013 HILs Res A and HSL A (direct contact)				-	4500	6300	3300	-	-	-	-	-	-	4400	-	100	4500	14,000	-	-	12,000	10
NEPM 2013, Res A/B Soil HSL for Vapour Intrusion, Silty Soil, 0-2 m				-	-	-	230	-	-	-	-	-	-	40	-	0.6	NL	390	-	-	95	-
NEPM 2013- EIL and ESL, 0-2 m, for Urban Res, SIlty Soil				-	1300	5600	120	-	-	-	-	-	-	180	-	65	125	105	-	-	45	-
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Silty Soil				1000	3500	10000	-	-	-	-	-	-	-	-	800	-	-	-	-	-	-	-
NSW 2014 General Solid Waste (CT1)				-	-	-	-	650	-	-	-	10,000	-	-	-	10	600	288	-	-	1000	-
NSW 2014 General Solid Waste (SCC1 and TCLP1)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (1992) - For Natural Material				-	-	-	-	-	-	-	-	-	-	-	-	0.05-1	-	0.1-1	-	-	-	-
BH1	Filling	0.1	24/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH1	Natural	0.5	24/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH2	Filling	0.5	24/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH3	Filling	0.1	24/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH4	Filling	0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH4	Natural	1.5	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BD5/230117	Natural	1.5	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	Filling	0.1	24/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH6A	Filling	0.5	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH7	Filling	0.5	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH7	Natural	1.5	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH8	Filling	0.5	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH8	Natural	1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH9	Material	0.01-0.02	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	Filling	0.02-0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH10	Filling	0.02-0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BD2/230117	Filling	0.02-0.1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	Filling	0.02-0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH12	Filling	0.1-0.2	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH13	Filling	0.1-0.2	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH14	Filling	0.02-0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	<0.1
BH15	Filling	0.01-0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH16	Filling	0.1-0.2	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH17	Filling	0.4-0.5	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH17	Natural	0.9-1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH18	Filling	0.02-0.1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BH18	Natural	0.9-1	23/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-
BD4/230117	Natural	0.9-1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	Filling	0.5	24/01/2017	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<3	-

Field_ID	Material	Sample Depth (m bgl)	Sampled Date	PAH: Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Benzo(b,j+k)fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Phenolics Total	Total +ve PAHs	Pyrene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1	0.1	0.1	0.1	0.05	0.5	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	5	0.05	0.1
NEPM 2013 HILs Res A and HSL A (direct contact)				-	-	-	-	-	3	-	-	-	-	-	-	-	1400	-	100	300	-
NEPM 2013, Res A/B Soil HSL for Vapour Intrusion, Silty Soil, 0-2 m				-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
NEPM 2013- EIL and ESL, 0-2 m, for Urban Res, SIlty Soil				-	-	-	-	0.7	-	-	-	-	-	-	-	-	170	-	-	-	-
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Silty Soil				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NSW 2014 General Solid Waste (CT1)				-	-	-	-	-	0.8	-	-	-	-	-	-	-	4	-	-	-	-
NSW 2014 General Solid Waste (SCC1 and TCLP1)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (1992) - For Natural Material				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	Filling	0.1	24/01/2017	<0.1	<0.1	<0.1	<0.1	0.06	<0.5	<0.1	<0.1	<0.1	0.2	<0.2	<0.1	<0.1	<0.1	0.1	<5	0.46	0.1
BH1	Natural	0.5	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH2	Filling	0.5	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH3	Filling	0.1	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH4	Filling	0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	0.2	-	0.2	<0.1
BH4	Natural	1.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BD5/230117	Natural	1.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH5	Filling	0.1	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	0.2	-	0.2	<0.1
BH6A	Filling	0.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH7	Filling	0.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH7	Natural	1.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH8	Filling	0.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH8	Natural	1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH9	Material	0.01-0.02	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH10	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BD2/230117	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH11	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH12	Filling	0.1-0.2	23/01/2017	<0.1	<0.1	<0.1	<0.1	0.07	<0.5	<0.1	<0.1	<0.1	0.2	<0.2	<0.1	<0.1	<0.1	0.1	-	0.57	0.2
BH13	Filling	0.1-0.2	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH14	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<5	0	<0.1
BH15	Filling	0.01-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH16	Filling	0.1-0.2	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH17	Filling	0.4-0.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH17	Natural	0.9-1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH18	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH18	Natural	0.9-1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BD4/230117	Natural	0.9-1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1
BH19	Filling	0.5	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	-	0	<0.1

* ND - Non Detect

Table E1: Summary of Soil Laboratory Results

	Polychlorinated Biphenyls								Organochlorine Pesticides																												Organophosphorous Pesticides																
	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Parathion	Asbestos
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g/kg
EQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NEPM 2013 HILs Res A and HSL A (direct contact)	-	-	-	-	-	-	-	1	-	-	-	6	-	50		-	-	240	-	270			-	10	-	-	6	-	300	-	-		-	-	-	-	-	-	-	-	-	No Detect
NEPM 2013, Res A/B Soil HSL for Vapour Intrusion, Silty Soil, 0-2 m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013- EIL and ESL, 0-2 m, for Urban Res, Silty Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Silty Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NSW 2014 General Solid Waste (CT1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	10,000	-	-	-	-	-	No Detect
NSW 2014 General Solid Waste (SCC1 and TCLP1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (1992) - For Natural Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.95-5	-	0.03-0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field_ID	**Material**	**Sample Depth (m bgl)**	**Sampled Date**																																									
BH1	Filling	0.1	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	Natural	0.5	24/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	Filling	0.5	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH3	Filling	0.1	24/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH4	Filling	0.1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH4	Natural	1.5	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD5/230117	Natural	1.5	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	Filling	0.1	24/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH6A	Filling	0.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH7	Filling	0.5	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH7	Natural	1.5	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	Filling	0.5	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH8	Natural	1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH9	Material	0.01-0.02	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	chrysotile and amosite asbestos detected
BH9	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH10	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BD2/230117	Filling	0.02-0.1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH12	Filling	0.1-0.2	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH13	Filling	0.1-0.2	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH14	Filling	0.02-0.1	23/01/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH15	Filling	0.01-0.1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH16	Filling	0.1-0.2	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH17	Filling	0.4-0.5	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH17	Natural	0.9-1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18	Filling	0.02-0.1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH18	Natural	0.9-1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD4/230117	Natural	0.9-1	23/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	Filling	0.5	24/01/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1

* ND - Non Detect

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 160839

Client:

Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: David Holden

Sample log in details:

Your Reference:	**85600.00, Casula**
No. of samples:	28 soils 1 material
Date samples received / completed instructions received	25/01/17 / 25/01/17

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:	2/02/17 / 2/02/17
Date of Preliminary Report:	Not Issued

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

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	160839-1	160839-2	160839-3	160839-4	160839-5
Your Reference	---------- -	BH1	BH1	BH2	BH3	BH4
Depth	----------	0.1	0.5	0.5	0.1	0.1
Date Sampled		24/01/2017	24/01/2017	24/01/2017	24/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ 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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	115	113	119	119	119

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	160839-6	160839-7	160839-8	160839-9	160839-10
Your Reference	---------- -	BH4	BH5	BH6A	BH7	BH7
Depth	----------	1.5	0.1	0.5	0.5	1.5
Date Sampled		23/01/2017	24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ 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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	115	115	115	119	119

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	160839-11	160839-12	160839-13	160839-14	160839-15
Your Reference	---------- -	BH8	BH8	BH9	BH10	BH11
Depth	----------	0.5	1	0.02-0.1	0.02-0.1	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ 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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	117	126	126	104	105

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	160839-16	160839-17	160839-18	160839-19	160839-20
Your Reference	---------- -	BH12	BH13	BH14	BH15	BH16
Depth	----------	0.1-0.2	0.1-0.2	0.02-0.1	0.01-0.1	0.1-0.2
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ 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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	109	106	104	107

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	160839-21	160839-22	160839-23	160839-24	160839-25
Your Reference	----------	BH17	BH17	BH18	BH18	BH19
Depth	- ----------	0.4-0.5	0.9-1.0	0.02-0.1	0.9-1.0	0.5
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ 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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	87	83	85	84	85

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	160839-1	160839-2	160839-3	160839-4	160839-5
Your Reference	---------- -	BH1	BH1	BH2	BH3	BH4
Depth	----------	0.1	0.5	0.5	0.1	0.1
Date Sampled		24/01/2017	24/01/2017	24/01/2017	24/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	30/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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	<100	<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	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	101	101	105	102	102

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	160839-6	160839-7	160839-8	160839-9	160839-10
Your Reference	---------- -	BH4	BH5	BH6A	BH7	BH7
Depth	----------	1.5	0.1	0.5	0.5	1.5
Date Sampled		23/01/2017	24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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	<100	<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	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	106	115	106	106	105

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	160839-11	160839-12	160839-13	160839-14	160839-15
Your Reference	---------- -	BH8	BH8	BH9	BH10	BH11
Depth	----------	0.5	1	0.02-0.1	0.02-0.1	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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	<100	<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	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	107	107	109	106	112

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	160839-16	160839-17	160839-18	160839-19	160839-20
Your Reference	---------- -	BH12	BH13	BH14	BH15	BH16
Depth	----------	0.1-0.2	0.1-0.2	0.02-0.1	0.01-0.1	0.1-0.2
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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	<100	<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	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	106	106	106	112	111

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	160839-21	160839-22	160839-23	160839-24	160839-25
Your Reference	----------	BH17	BH17	BH18	BH18	BH19
Depth	----------	0.4-0.5	0.9-1.0	0.02-0.1	0.9-1.0	0.5
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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	<100	<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	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	109	110	111	109	111

PAHs in Soil Our Reference: Your Reference	UNITS ----------	160839-1 BH1	160839-2 BH1	160839-3 BH2	160839-4 BH3	160839-5 BH4
Depth	----------	0.1	0.5	0.5	0.1	0.1
Date Sampled		24/01/2017	24/01/2017	24/01/2017	24/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Naphthalene	mg/kg	<0.1	<0.1	<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	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<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	0.06	<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 calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.5	<0.05	<0.05	<0.05	0.2
Surrogate p-Terphenyl-d14	%	98	97	91	97	96

PAHs in Soil Our Reference: Your Reference	UNITS ----------	160839-6 BH4	160839-7 BH5	160839-8 BH6A	160839-9 BH7	160839-10 BH7
Depth	----------	1.5	0.1	0.5	0.5	1.5
Date Sampled		23/01/2017	24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Naphthalene	mg/kg	<0.1	<0.1	<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	0.2	<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 calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	0.2	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	93	96	94	103	106

PAHs in Soil Our Reference: Your Reference	UNITS ----------	160839-11 BH8	160839-12 BH8	160839-13 BH9	160839-14 BH10	160839-15 BH11
Depth	----------	0.5	1	0.02-0.1	0.02-0.1	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Naphthalene	mg/kg	<0.1	<0.1	<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 calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	119	96	102	107	87

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	160839-16 BH12 0.1-0.2 23/01/2017 Soil	160839-17 BH13 0.1-0.2 23/01/2017 Soil	160839-18 BH14 0.02-0.1 23/01/2017 Soil	160839-19 BH15 0.01-0.1 23/01/2017 Soil	160839-20 BH16 0.1-0.2 23/01/2017 Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Naphthalene	mg/kg	<0.1	<0.1	<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	0.2	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.2	<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	0.07	<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 calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.61	<0.05	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	113	115	95	95	105

PAHs in Soil Our Reference: Your Reference	UNITS ----------	160839-21 BH17	160839-22 BH17	160839-23 BH18	160839-24 BH18	160839-25 BH19
Depth	----------	0.4-0.5	0.9-1.0	0.02-0.1	0.9-1.0	0.5
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Naphthalene	mg/kg	<0.1	<0.1	<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 calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	96	103	99	98	94

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	160839-26 BD2/230117 - 23/01/2017 Soil	160839-27 BD4/230117 - 23/01/2017 Soil	160839-28 BD5/230117 - 23/01/2017 Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	108	102	95

Organochlorine Pesticides in soil						
Our Reference:	UNITS	160839-1	160839-3	160839-4	160839-8	160839-11
Your Reference	----------	BH1	BH2	BH3	BH6A	BH8
	-					
Depth	----------	0.1	0.5	0.1	0.5	0.5
Date Sampled		24/01/2017	24/01/2017	24/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	107	104	100	105	108

Organochlorine Pesticides in soil						
Our Reference:	UNITS	160839-13	160839-14	160839-15	160839-17	160839-18
Your Reference	----------	BH9	BH10	BH11	BH13	BH14
	-					
Depth	----------	0.02-0.1	0.02-0.1	0.02-0.1	0.1-0.2	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
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
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	110	107	124	107

Organophosphorus Pesticides						
Our Reference:	UNITS	160839-1	160839-3	160839-4	160839-8	160839-11
Your Reference	---------- -	BH1	BH2	BH3	BH6A	BH8
Depth	----------	0.1	0.5	0.1	0.5	0.5
Date Sampled		24/01/2017	24/01/2017	24/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	107	104	100	105	108

Organophosphorus Pesticides						
Our Reference:	UNITS	160839-13	160839-14	160839-15	160839-17	160839-18
Your Reference	---------- -	BH9	BH10	BH11	BH13	BH14
Depth	----------	0.02-0.1	0.02-0.1	0.02-0.1	0.1-0.2	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	108	110	107	124	107

PCBs in Soil						
Our Reference:	UNITS	160839-1	160839-3	160839-4	160839-8	160839-11
Your Reference	----------	BH1	BH2	BH3	BH6A	BH8
Depth	- ----------	0.1	0.5	0.1	0.5	0.5
Date Sampled		24/01/2017	24/01/2017	24/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	107	104	100	105	108

PCBs in Soil						
Our Reference:	UNITS	160839-13	160839-14	160839-15	160839-17	160839-18
Your Reference	----------	BH9	BH10	BH11	BH13	BH14
Depth	- ----------	0.02-0.1	0.02-0.1	0.02-0.1	0.1-0.2	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	108	110	107	124	107

Acid Extractable metals in soil						
Our Reference:	UNITS	160839-1	160839-2	160839-3	160839-4	160839-5
Your Reference	----------	BH1	BH1	BH2	BH3	BH4
Depth	- ----------	0.1	0.5	0.5	0.1	0.1
Date Sampled		24/01/2017	24/01/2017	24/01/2017	24/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Arsenic	mg/kg	8	6	9	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	22	24	9	9
Copper	mg/kg	25	16	21	8	18
Lead	mg/kg	100	22	24	29	130
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	7	7	3	7
Zinc	mg/kg	96	28	26	28	92

Acid Extractable metals in soil						
Our Reference:	UNITS	160839-6	160839-7	160839-8	160839-9	160839-10
Your Reference	----------	BH4	BH5	BH6A	BH7	BH7
Depth	- ----------	1.5	0.1	0.5	0.5	1.5
Date Sampled		23/01/2017	24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Arsenic	mg/kg	6	17	7	7	9
Cadmium	mg/kg	<0.4	0.7	<0.4	<0.4	<0.4
Chromium	mg/kg	10	17	26	25	6
Copper	mg/kg	22	37	20	16	14
Lead	mg/kg	17	200	24	16	12
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	10	11	6	2
Zinc	mg/kg	26	290	26	110	13

Acid Extractable metals in soil						
Our Reference:	UNITS	160839-11	160839-12	160839-13	160839-14	160839-15
Your Reference	---------- -	BH8	BH8	BH9	BH10	BH11
Depth	----------	0.5	1	0.02-0.1	0.02-0.1	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Arsenic	mg/kg	7	9	9	11	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	27	20	24	19
Copper	mg/kg	14	13	43	21	14
Lead	mg/kg	23	20	59	180	34
Mercury	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	9	3	7	8	7
Zinc	mg/kg	68	16	98	160	79

Acid Extractable metals in soil						
Our Reference:	UNITS	160839-16	160839-17	160839-18	160839-19	160839-20
Your Reference	---------- -	BH12	BH13	BH14	BH15	BH16
Depth	----------	0.1-0.2	0.1-0.2	0.02-0.1	0.01-0.1	0.1-0.2
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Arsenic	mg/kg	9	20	12	19	11
Cadmium	mg/kg	<0.4	0.6	<0.4	0.6	1
Chromium	mg/kg	24	18	26	20	24
Copper	mg/kg	11	27	65	26	27
Lead	mg/kg	39	77	42	79	87
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	7	6	6	8
Zinc	mg/kg	36	160	63	190	110

Acid Extractable metals in soil						
Our Reference:	UNITS	160839-21	160839-22	160839-23	160839-24	160839-25
Your Reference	----------	BH17	BH17	BH18	BH18	BH19
	-					
Depth	----------	0.4-0.5	0.9-1.0	0.02-0.1	0.9-1.0	0.5
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Arsenic	mg/kg	10	14	7	32	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	16	22	10	36
Copper	mg/kg	16	13	18	19	10
Lead	mg/kg	45	17	52	18	23
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	3	7	3	5
Zinc	mg/kg	58	14	110	21	15

Acid Extractable metals in soil				
Our Reference:	UNITS	160839-26	160839-27	160839-28
Your Reference	----------	BD2/230117	BD4/230117	BD5/230117
	-			
Depth	----------	-	-	-
Date Sampled		23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017
Arsenic	mg/kg	9	26	5
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	20	9	9
Copper	mg/kg	16	16	20
Lead	mg/kg	100	17	16
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	6	3	4
Zinc	mg/kg	100	19	24

Misc Soil - Inorg						
Our Reference:	UNITS	160839-1	160839-3	160839-4	160839-8	160839-11
Your Reference	----------	BH1	BH2	BH3	BH6A	BH8
	-					
Depth	----------	0.1	0.5	0.1	0.5	0.5
Date Sampled		24/01/2017	24/01/2017	24/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference:	UNITS	160839-13	160839-14	160839-15	160839-17	160839-18
Your Reference	----------	BH9	BH10	BH11	BH13	BH14
	-					
Depth	----------	0.02-0.1	0.02-0.1	0.02-0.1	0.1-0.2	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Moisture						
Our Reference:	UNITS	160839-1	160839-2	160839-3	160839-4	160839-5
Your Reference	----------	BH1	BH1	BH2	BH3	BH4
	-					
Depth	----------	0.1	0.5	0.5	0.1	0.1
Date Sampled		24/01/2017	24/01/2017	24/01/2017	24/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Moisture	%	5.9	13	8.2	5.4	6.0

Moisture						
Our Reference:	UNITS	160839-6	160839-7	160839-8	160839-9	160839-10
Your Reference	----------	BH4	BH5	BH6A	BH7	BH7
	-					
Depth	----------	1.5	0.1	0.5	0.5	1.5
Date Sampled		23/01/2017	24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Moisture	%	11	9.3	14	17	15

Moisture						
Our Reference:	UNITS	160839-11	160839-12	160839-13	160839-14	160839-15
Your Reference	----------	BH8	BH8	BH9	BH10	BH11
	-					
Depth	----------	0.5	1	0.02-0.1	0.02-0.1	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Moisture	%	9.5	18	11	8.3	9.3

Moisture						
Our Reference:	UNITS	160839-16	160839-17	160839-18	160839-19	160839-20
Your Reference	----------	BH12	BH13	BH14	BH15	BH16
	-					
Depth	----------	0.1-0.2	0.1-0.2	0.02-0.1	0.01-0.1	0.1-0.2
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Moisture	%	6.6	10	12	18	9.9

Moisture Our Reference: Your Reference	UNITS ----------	160839-21 BH17	160839-22 BH17	160839-23 BH18	160839-24 BH18	160839-25 BH19
Depth	- ----------	0.4-0.5	0.9-1.0	0.02-0.1	0.9-1.0	0.5
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Moisture	%	9.5	15	12	12	8.9

Moisture Our Reference: Your Reference	UNITS ----------	160839-26 BD2/230117	160839-27 BD4/230117	160839-28 BD5/230117
Depth	- ----------	-	-	-
Date Sampled		23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	30/01/2017	30/01/2017	30/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017
Moisture	%	7.4	10	12

Asbestos ID - soils						
Our Reference:	UNITS	160839-1	160839-3	160839-4	160839-5	160839-7
Your Reference	---------- -	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.1	0.5	0.1	0.1	0.1
Date Sampled		24/01/2017	24/01/2017	24/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
Sample mass tested	g	Approx. 20g	Approx. 25g	Approx. 25g	Approx. 35g	Approx. 25g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	160839-8	160839-9	160839-11	160839-13	160839-14
Your Reference	---------- -	BH6A	BH7	BH8	BH9	BH10
Depth	----------	0.5	0.5	0.5	0.02-0.1	0.02-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
Sample mass tested	g	Approx. 25g	Approx. 35g	Approx. 30g	Approx. 25g	Approx. 20g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	160839-15	160839-16	160839-17	160839-18	160839-19
Your Reference	---------- -	BH11	BH12	BH13	BH14	BH15
Depth	----------	0.02-0.1	0.1-0.2	0.1-0.2	0.02-0.1	0.01-0.1
Date Sampled		23/01/2017	23/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017
Sample mass tested	g	Approx. 30g	Approx. 20g	Approx. 40g	Approx. 25g	Approx. 25g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils					
Our Reference:	UNITS	160839-20	160839-21	160839-23	160839-25
Your Reference	---------- -	BH16	BH17	BH18	BH19
Depth	----------	0.1-0.2	0.4-0.5	0.02-0.1	0.5
Date Sampled		23/01/2017	23/01/2017	23/01/2017	24/01/2017
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017
Sample mass tested	g	Approx. 20g	Approx. 55g	Approx. 25g	Approx. 20g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil					
Our Reference:	UNITS	160839-2	160839-9	160839-15	160839-22
Your Reference	----------	BH1	BH7	BH11	BH17
	-				
Depth	----------	0.5	0.5	0.02-0.1	0.9-1.0
Date Sampled		24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Date analysed	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017
pH 1:5 soil:water	pH Units	5.3	5.5	6.5	5.5

CEC Our Reference: Your Reference	UNITS ---------- -	160839-2 BH1	160839-9 BH7	160839-15 BH11	160839-22 BH17
Depth	----------	0.5	0.5	0.02-0.1	0.9-1.0
Date Sampled		24/01/2017	23/01/2017	23/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	31/01/2017	31/01/2017	31/01/2017	31/01/2017
Date analysed	-	01/02/2017	01/02/2017	01/02/2017	01/02/2017
Exchangeable Ca	meq/100g	2.7	4.1	8.0	5.3
Exchangeable K	meq/100g	0.2	0.1	0.3	0.2
Exchangeable Mg	meq/100g	9.0	6.5	3.6	7.4
Exchangeable Na	meq/100g	0.79	0.55	0.19	0.92
Cation Exchange Capacity	meq/100g	13	11	12	14

Asbestos ID - materials		
Our Reference:	UNITS	160839-29
Your Reference	---------- -	BH9/A1
Depth	----------	0.01-0.02
Date Sampled		23/01/2017
Type of sample		material
Date analysed	-	31/01/2017
Mass / Dimension of Sample	-	37x21x5mm
Sample Description	-	Grey compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected

Method ID	Methodology Summary
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-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. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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-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. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	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. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-008	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.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 °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.
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.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			01/02/2017	160839-1	01/02/2017 || 01/02/2017	LCS-3	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	160839-1	<25 || <25	LCS-3	109%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	160839-1	<25 || <25	LCS-3	109%
Benzene	mg/kg	0.2	Org-016	<0.2	160839-1	<0.2 || <0.2	LCS-3	122%
Toluene	mg/kg	0.5	Org-016	<0.5	160839-1	<0.5 || <0.5	LCS-3	122%
Ethylbenzene	mg/kg	1	Org-016	<1	160839-1	<1 || <1	LCS-3	102%
m+p-xylene	mg/kg	2	Org-016	<2	160839-1	<2 || <2	LCS-3	100%
o-Xylene	mg/kg	1	Org-016	<1	160839-1	<1 || <1	LCS-3	100%
naphthalene	mg/kg	1	Org-014	<1	160839-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	119	160839-1	115 || 123 || RPD: 7	LCS-3	120%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			31/01/2017	160839-1	30/01/2017 || 31/01/2017	LCS-3	30/01/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	160839-1	<50 || <50	LCS-3	108%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	160839-1	<100 || <100	LCS-3	103%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	160839-1	<100 || <100	LCS-3	107%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	160839-1	<50 || <50	LCS-3	108%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	160839-1	<100 || <100	LCS-3	103%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	160839-1	<100 || <100	LCS-3	107%
Surrogate o-Terphenyl	%		Org-003	109	160839-1	101 || 104 || RPD: 3	LCS-3	109%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			31/01/2017	160839-1	31/01/2017 || 31/01/2017	LCS-3	31/01/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	LCS-3	88%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	LCS-3	102%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	160839-1	0.1 || <0.1	LCS-3	99%
Anthracene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	160839-1	0.2 || <0.1	LCS-3	107%
Pyrene	mg/kg	0.1	Org-012	<0.1	160839-1	0.1 || <0.1	LCS-3	112%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	LCS-3	95%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	160839-1	<0.2 || <0.2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	160839-1	0.06 || <0.05	LCS-3	88%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	104	160839-1	98 || 96 || RPD: 2	LCS-3	136%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			31/01/2017	160839-1	31/01/2017 || 31/01/2017	LCS-3	31/01/2017
HCB	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	84%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	90%
Heptachlor	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	88%
delta-BHC	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	83%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	87%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	88%
Dieldrin	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	93%
Endrin	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	111%
pp-DDD	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	81%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	LCS-3	87%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	107	160839-1	107 || 108 || RPD: 1	LCS-3	118%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			31/01/2017	160839-1	31/01/2017 || 31/01/2017	LCS-3	31/01/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	93%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	88%
Dimethoate	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	78%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	98%
Malathion	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	102%
Parathion	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	103%
Ronnel	mg/kg	0.1	Org-008	<0.1	160839-1	<0.1 || <0.1	LCS-3	110%
Surrogate TCMX	%		Org-008	107	160839-1	107 || 108 || RPD: 1	LCS-3	102%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			31/01/2017	160839-1	31/01/2017 || 31/01/2017	LCS-3	31/01/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	LCS-3	96%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	160839-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	107	160839-1	107 || 108 || RPD: 1	LCS-3	102%

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 prepared	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-3	30/01/2017
Date analysed	-			31/01/2017	160839-1	31/01/2017 || 31/01/2017	LCS-3	31/01/2017
Arsenic	mg/kg	4	Metals-020	<4	160839-1	8 || 8 || RPD: 0	LCS-3	119%
Cadmium	mg/kg	0.4	Metals-020	<0.4	160839-1	<0.4 || <0.4	LCS-3	104%
Chromium	mg/kg	1	Metals-020	<1	160839-1	20 || 21 || RPD: 5	LCS-3	111%
Copper	mg/kg	1	Metals-020	<1	160839-1	25 || 22 || RPD: 13	LCS-3	107%
Lead	mg/kg	1	Metals-020	<1	160839-1	100 || 95 || RPD: 5	LCS-3	107%
Mercury	mg/kg	0.1	Metals-021	<0.1	160839-1	0.1 || 0.1 || RPD: 0	LCS-3	98%
Nickel	mg/kg	1	Metals-020	<1	160839-1	8 || 7 || RPD: 13	LCS-3	102%
Zinc	mg/kg	1	Metals-020	<1	160839-1	96 || 100 || RPD: 4	LCS-3	106%
QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-1	30/01/2017
Date analysed	-			30/01/2017	160839-1	30/01/2017 || 30/01/2017	LCS-1	30/01/2017
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	160839-1	<5 || <5	LCS-1	102%
QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			31/01/2017	[NT]	[NT]	LCS-3	31/01/2017
Date analysed	-			31/01/2017	[NT]	[NT]	LCS-3	31/01/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-3	101
QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			31/01/2017	[NT]	[NT]	LCS-1	31/01/2017
Date analysed	-			01/02/2017	[NT]	[NT]	LCS-1	01/02/2017
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	110%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	115%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	112%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-1	110%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	160839-11	30/01/2017 || 30/01/2017	LCS-4	30/01/2017
Date analysed	-	160839-11	01/02/2017 || 01/02/2017	LCS-4	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	160839-11	<25 || <25	LCS-4	104%
TRHC$_6$ - C$_{10}$	mg/kg	160839-11	<25 || <25	LCS-4	104%
Benzene	mg/kg	160839-11	<0.2 || <0.2	LCS-4	96%
Toluene	mg/kg	160839-11	<0.5 || <0.5	LCS-4	96%
Ethylbenzene	mg/kg	160839-11	<1 || <1	LCS-4	107%
m+p-xylene	mg/kg	160839-11	<2 || <2	LCS-4	110%
o-Xylene	mg/kg	160839-11	<1 || <1	LCS-4	111%
naphthalene	mg/kg	160839-11	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	160839-11	117 || 126 || RPD: 7	LCS-4	90%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	160839-11	30/01/2017 || 30/01/2017	LCS-4	30/01/2017
Date analysed	-	160839-11	31/01/2017 || 31/01/2017	LCS-4	31/01/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	160839-11	<50 || <50	LCS-4	105%
TRHC$_{15}$ - C$_{28}$	mg/kg	160839-11	<100 || <100	LCS-4	98%
TRHC$_{29}$ - C$_{36}$	mg/kg	160839-11	<100 || <100	LCS-4	100%
TRH>C$_{10}$-C$_{16}$	mg/kg	160839-11	<50 || <50	LCS-4	105%
TRH>C$_{16}$-C$_{34}$	mg/kg	160839-11	<100 || <100	LCS-4	98%
TRH>C$_{34}$-C$_{40}$	mg/kg	160839-11	<100 || <100	LCS-4	100%
Surrogate o-Terphenyl	%	160839-11	107 || 106 || RPD: 1	LCS-4	111%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	160839-11	30/01/2017 || 30/01/2017	LCS-4	30/01/2017
Date analysed	-	160839-11	31/01/2017 || 31/01/2017	LCS-4	31/01/2017
Naphthalene	mg/kg	160839-11	<0.1 || <0.1	LCS-4	92%
Acenaphthylene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	160839-11	<0.1 || <0.1	LCS-4	101%
Phenanthrene	mg/kg	160839-11	<0.1 || <0.1	LCS-4	100%
Anthracene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	160839-11	<0.1 || <0.1	LCS-4	104%
Pyrene	mg/kg	160839-11	<0.1 || <0.1	LCS-4	107%
Benzo(a)anthracene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	160839-11	<0.1 || <0.1	LCS-4	99%
Benzo(b,j+k)fluoranthene	mg/kg	160839-11	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	160839-11	<0.05 || <0.05	LCS-4	90%
Indeno(1,2,3-c,d)pyrene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	160839-11	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	160839-11	119 || 105 || RPD: 12	LCS-4	127%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	160839-11	30/01/2017 || 30/01/2017
Date analysed	-	160839-11	31/01/2017 || 31/01/2017
HCB	mg/kg	160839-11	<0.1 || <0.1
alpha-BHC	mg/kg	160839-11	<0.1 || <0.1
gamma-BHC	mg/kg	160839-11	<0.1 || <0.1
beta-BHC	mg/kg	160839-11	<0.1 || <0.1
Heptachlor	mg/kg	160839-11	<0.1 || <0.1
delta-BHC	mg/kg	160839-11	<0.1 || <0.1
Aldrin	mg/kg	160839-11	<0.1 || <0.1
Heptachlor Epoxide	mg/kg	160839-11	<0.1 || <0.1
gamma-Chlordane	mg/kg	160839-11	<0.1 || <0.1
alpha-chlordane	mg/kg	160839-11	<0.1 || <0.1
Endosulfan I	mg/kg	160839-11	<0.1 || <0.1
pp-DDE	mg/kg	160839-11	<0.1 || <0.1
Dieldrin	mg/kg	160839-11	<0.1 || <0.1
Endrin	mg/kg	160839-11	<0.1 || <0.1
pp-DDD	mg/kg	160839-11	<0.1 || <0.1
Endosulfan II	mg/kg	160839-11	<0.1 || <0.1
pp-DDT	mg/kg	160839-11	<0.1 || <0.1
Endrin Aldehyde	mg/kg	160839-11	<0.1 || <0.1
Endosulfan Sulphate	mg/kg	160839-11	<0.1 || <0.1
Methoxychlor	mg/kg	160839-11	<0.1 || <0.1
Surrogate TCMX	%	160839-11	108 || 110 || RPD: 2

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	160839-11	30/01/2017 || 30/01/2017
Date analysed	-	160839-11	31/01/2017 || 31/01/2017
Azinphos-methyl (Guthion)	mg/kg	160839-11	<0.1 || <0.1
Bromophos-ethyl	mg/kg	160839-11	<0.1 || <0.1
Chlorpyriphos	mg/kg	160839-11	<0.1 || <0.1
Chlorpyriphos-methyl	mg/kg	160839-11	<0.1 || <0.1
Diazinon	mg/kg	160839-11	<0.1 || <0.1
Dichlorvos	mg/kg	160839-11	<0.1 || <0.1
Dimethoate	mg/kg	160839-11	<0.1 || <0.1
Ethion	mg/kg	160839-11	<0.1 || <0.1
Fenitrothion	mg/kg	160839-11	<0.1 || <0.1
Malathion	mg/kg	160839-11	<0.1 || <0.1
Parathion	mg/kg	160839-11	<0.1 || <0.1
Ronnel	mg/kg	160839-11	<0.1 || <0.1
Surrogate TCMX	%	160839-11	108 || 110 || RPD: 2

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	160839-11	30/01/2017 || 30/01/2017
Date analysed	-	160839-11	31/01/2017 || 31/01/2017
Aroclor 1016	mg/kg	160839-11	<0.1 || <0.1
Aroclor 1221	mg/kg	160839-11	<0.1 || <0.1
Aroclor 1232	mg/kg	160839-11	<0.1 || <0.1
Aroclor 1242	mg/kg	160839-11	<0.1 || <0.1
Aroclor 1248	mg/kg	160839-11	<0.1 || <0.1
Aroclor 1254	mg/kg	160839-11	<0.1 || <0.1
Aroclor 1260	mg/kg	160839-11	<0.1 || <0.1
Surrogate TCLMX	%	160839-11	108 || 110 || RPD: 2

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	160839-11	30/01/2017 || 30/01/2017	LCS-4	30/01/2017
Date analysed	-	160839-11	31/01/2017 || 31/01/2017	LCS-4	31/01/2017
Arsenic	mg/kg	160839-11	7 || 7 || RPD: 0	LCS-4	115%
Cadmium	mg/kg	160839-11	<0.4 || <0.4	LCS-4	103%
Chromium	mg/kg	160839-11	22 || 21 || RPD: 5	LCS-4	108%
Copper	mg/kg	160839-11	14 || 14 || RPD: 0	LCS-4	103%
Lead	mg/kg	160839-11	23 || 24 || RPD: 4	LCS-4	102%
Mercury	mg/kg	160839-11	<0.1 || <0.1	LCS-4	80%
Nickel	mg/kg	160839-11	9 || 7 || RPD: 25	LCS-4	101%
Zinc	mg/kg	160839-11	68 || 77 || RPD: 12	LCS-4	103%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	160839-21	30/01/2017 || 30/01/2017	160839-3	30/01/2017
Date analysed	-	160839-21	01/02/2017 || 01/02/2017	160839-3	01/02/2017
TRHC$_6$ - C$_9$	mg/kg	160839-21	<25 || <25	160839-3	109%
TRHC$_6$ - C$_{10}$	mg/kg	160839-21	<25 || <25	160839-3	109%
Benzene	mg/kg	160839-21	<0.2 || <0.2	160839-3	122%
Toluene	mg/kg	160839-21	<0.5 || <0.5	160839-3	122%
Ethylbenzene	mg/kg	160839-21	<1 || <1	160839-3	101%
m+p-xylene	mg/kg	160839-21	<2 || <2	160839-3	100%
o-Xylene	mg/kg	160839-21	<1 || <1	160839-3	99%
naphthalene	mg/kg	160839-21	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	160839-21	87 || 84 || RPD: 4	160839-3	116%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	160839-21	30/01/2017 || 30/01/2017	160839-3	30/01/2017
Date analysed	-	160839-21	31/01/2017 || 31/01/2017	160839-3	31/01/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	160839-21	<50 || <50	160839-3	99%
TRHC$_{15}$ - C$_{28}$	mg/kg	160839-21	<100 || <100	160839-3	95%
TRHC$_{29}$ - C$_{36}$	mg/kg	160839-21	<100 || <100	160839-3	102%
TRH>C$_{10}$-C$_{16}$	mg/kg	160839-21	<50 || <50	160839-3	99%
TRH>C$_{16}$-C$_{34}$	mg/kg	160839-21	<100 || <100	160839-3	95%
TRH>C$_{34}$-C$_{40}$	mg/kg	160839-21	<100 || <100	160839-3	102%
Surrogate o-Terphenyl	%	160839-21	109 || 109 || RPD: 0	160839-3	105%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	160839-21	30/01/2017 || 30/01/2017	160839-3	30/01/2017
Date analysed	-	160839-21	31/01/2017 || 31/01/2017	160839-3	31/01/2017
Naphthalene	mg/kg	160839-21	<0.1 || <0.1	160839-3	86%
Acenaphthylene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	160839-21	<0.1 || <0.1	160839-3	90%
Phenanthrene	mg/kg	160839-21	<0.1 || <0.1	160839-3	86%
Anthracene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	160839-21	<0.1 || <0.1	160839-3	82%
Pyrene	mg/kg	160839-21	<0.1 || <0.1	160839-3	86%
Benzo(a)anthracene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	160839-21	<0.1 || <0.1	160839-3	85%
Benzo(b,j+k)fluoranthene	mg/kg	160839-21	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	160839-21	<0.05 || <0.05	160839-3	66%
Indeno(1,2,3-c,d)pyrene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	160839-21	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	160839-21	96 || 97 || RPD: 1	160839-3	108%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	160839-3	30/01/2017
Date analysed	-	[NT]	[NT]	160839-3	31/01/2017
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	160839-3	79%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	160839-3	80%
Heptachlor	mg/kg	[NT]	[NT]	160839-3	82%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	160839-3	79%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	160839-3	81%
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]	160839-3	84%
Dieldrin	mg/kg	[NT]	[NT]	160839-3	88%
Endrin	mg/kg	[NT]	[NT]	160839-3	104%
pp-DDD	mg/kg	[NT]	[NT]	160839-3	78%
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]	160839-3	86%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	160839-3	114%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	160839-3	30/01/2017
Date analysed	-	[NT]	[NT]	160839-3	31/01/2017
Azinphos-methyl (Guthion)	mg/kg	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	160839-3	93%
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	[NT]	[NT]	160839-3	106%
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	160839-3	91%
Fenitrothion	mg/kg	[NT]	[NT]	160839-3	83%
Malathion	mg/kg	[NT]	[NT]	160839-3	68%
Parathion	mg/kg	[NT]	[NT]	160839-3	106%
Ronnel	mg/kg	[NT]	[NT]	160839-3	114%
Surrogate TCMX	%	[NT]	[NT]	160839-3	106%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	160839-3	30/01/2017
Date analysed	-	[NT]	[NT]	160839-3	31/01/2017
Aroclor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	[NT]	[NT]	160839-3	102%
Aroclor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	160839-3	106%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	160839-21	30/01/2017 || 30/01/2017	160839-3	30/01/2017
Date analysed	-	160839-21	31/01/2017 || 31/01/2017	160839-3	31/01/2017
Arsenic	mg/kg	160839-21	10 || 11 || RPD: 10	160839-3	82%
Cadmium	mg/kg	160839-21	<0.4 || <0.4	160839-3	85%
Chromium	mg/kg	160839-21	22 || 20 || RPD: 10	160839-3	85%
Copper	mg/kg	160839-21	16 || 18 || RPD: 12	160839-3	98%
Lead	mg/kg	160839-21	45 || 51 || RPD: 12	160839-3	71%
Mercury	mg/kg	160839-21	<0.1 || <0.1	160839-3	102%
Nickel	mg/kg	160839-21	6 || 7 || RPD: 15	160839-3	81%
Zinc	mg/kg	160839-21	58 || 72 || RPD: 22	160839-3	73%

QUALITY CONTROL Misc Soil - Inorg	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	160839-3	30/01/2017
Date analysed	-	[NT]	[NT]	160839-3	30/01/2017
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	160839-3	98%
QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	160839-22	30/01/2017
Date analysed	-	[NT]	[NT]	160839-22	01/02/2017
TRH C_6 - C_9	mg/kg	[NT]	[NT]	160839-22	101%
TRH C_6 - C_{10}	mg/kg	[NT]	[NT]	160839-22	101%
Benzene	mg/kg	[NT]	[NT]	160839-22	92%
Toluene	mg/kg	[NT]	[NT]	160839-22	93%
Ethylbenzene	mg/kg	[NT]	[NT]	160839-22	104%
m+p-xylene	mg/kg	[NT]	[NT]	160839-22	107%
o-Xylene	mg/kg	[NT]	[NT]	160839-22	108%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	160839-22	84%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	160839-22	30/01/2017
Date analysed	-	[NT]	[NT]	160839-22	31/01/2017
TRH C_{10} - C_{14}	mg/kg	[NT]	[NT]	160839-22	115%
TRH C_{15} - C_{28}	mg/kg	[NT]	[NT]	160839-22	107%
TRH C_{29} - C_{36}	mg/kg	[NT]	[NT]	160839-22	103%
TRH >C_{10}-C_{16}	mg/kg	[NT]	[NT]	160839-22	115%
TRH >C_{16}-C_{34}	mg/kg	[NT]	[NT]	160839-22	107%
TRH >C_{34}-C_{40}	mg/kg	[NT]	[NT]	160839-22	103%
Surrogate o-Terphenyl	%	[NT]	[NT]	160839-22	110%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	160839-22	30/01/2017
Date analysed	-	[NT]	[NT]	160839-22	31/01/2017
Naphthalene	mg/kg	[NT]	[NT]	160839-22	88%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	160839-22	98%
Phenanthrene	mg/kg	[NT]	[NT]	160839-22	87%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	160839-22	90%
Pyrene	mg/kg	[NT]	[NT]	160839-22	96%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Chrysene	mg/kg	[NT]	[NT]	160839-22	87%
Benzo(b,j+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	160839-22	76%
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]	160839-22	121%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	160839-22	30/01/2017
Date analysed	-	[NT]	[NT]	160839-22	31/01/2017
Arsenic	mg/kg	[NT]	[NT]	160839-22	91%
Cadmium	mg/kg	[NT]	[NT]	160839-22	94%
Chromium	mg/kg	[NT]	[NT]	160839-22	89%
Copper	mg/kg	[NT]	[NT]	160839-22	105%
Lead	mg/kg	[NT]	[NT]	160839-22	84%
Mercury	mg/kg	[NT]	[NT]	160839-22	96%
Nickel	mg/kg	[NT]	[NT]	160839-22	87%
Zinc	mg/kg	[NT]	[NT]	160839-22	84%

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.
Note: Samples for asbestos testing were sub-sampled from jars provided by the client.

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

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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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.

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Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics 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.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85600.00	**Suburb:**	Casula	**To:**	Envirolab Services
Project Name:	Casula	**Order Number**			
Project Manager:	David Holden	**Sampler:**	CB	**Attn:**	Aileen Hie
Emails:	david.holden@douglaspartners.com.au	chris.bagia@douglaspartners.com.au		**Phone:**	
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☒			**Email:**	Ahie@envirolab.com.au
Prior Storage:	☐ Esky ☒ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☒ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Sample Depth	Lab ID	Date Sampled	Sample Type (S - soil W - water)	Container Type (G/P)	Analytes: Combo 8a	Combo 3a	Combo 3	CEC	pH	Heavy Metals	PAH	BTEX		Notes/preservation
BH1	0.1	1	24/01/17	S	G	x									
BH1	0.5	2	24/01/17	S	G			x	x	x					
BH2	0.5	3	24/01/17	S	G	x									
BH3	0.1	4	24/01/17	S	G	x									
BH4	0.1	5	23/01/17	S	G		x								
BH4	1.5	6	23/01/17	S	G			x							
BH5	0.1	7	24/01/17	S	G		x								
BH6A	0.5	8	23/01/17	S	G	x									
BH7	0.5	9	23/01/17	S	G		x		x	x					
BH7	1.5	10	23/01/17	S	G			x							
BH8	0.5	11	23/01/17	S	G	x									
BH8	1	12	23/01/17	S	G			x							
BH9	0.02 - 0.1	13	23/01/17	S	G	x									
BH10	0.02 - 0.1	14	23/01/17	S	G	x									
BH11	0.02 - 0.1	15	23/01/17	S	G	x			x	x					
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐		

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 160459
Date Received: 25.1
Time Received: 19:15
Received by: JAG
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address** **Phone:** **Fax:**

Signed: **Received by:** James-ELS **Date & Time:** 25/1/17 19:15

~~extra BH9 (A1) 0.01-0.02 29~~ 2hl

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85600.00	**Suburb:** Casula	**To:** Envirolab Services
Project Name:	Casula	**Order Number**	
Project Manager:	David Holden	**Sampler:**	**Attn:** Aileen Hie
Emails:	david.holden@douglaspartners.com.au	chris.bagia@douglaspartners.com.au	**Phone:**
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☐		**Email:** Ahie@envirolab.com.au
Prior Storage: ☐ Esky ☐ Fridge ☐ Shelved		Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type	Container Type	Analytes									Notes/preservation
160439				S - soil W - water	G/P	Combo 8a	Combo 3a	Combo 3	CEC	pH	Heavy Metals	PAH	BTEX	Asbestos ID	
BH12	0.1 - 0.2	16	23/01/17	S	G		x								
BH13	0.1 - 0.2	17	23/01/17	S	G	x									
BH14	0.02 - 0.1	18	23/01/17	S	G	x									
BH15	0.01 - 0.1	19	23/01/17	S	G		x								
BH16	0.1 - 0.2	20	23/01/17	S	G		x								
BH17 21	0.4 - 0.5	~~NR~~	23/01/17	S	G		x								
BH17 22	0.9 - 1.0	21	23/01/17	S	G			x	x	x					
BH18 23	0.02 - 0.1	22	23/01/17	S	G		x								
BH18 24	0.9 - 1.0	23	23/01/17	S	G			x							
BH19 25	0.5	24	24/01/17	S	G		x								
BD2/230117	-	26	23/01/17	S	G						x	x			
BD4/230117	- 27	26	23/01/17	S	G						x	x			
BD5/230117	- 28	24	23/01/17	S	G						x	x			
~~Trip Spike~~	-		-										[redacted]		
~~Trip Blank~~	-		-										[redacted]		
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container:	**Relinquished by:**	**Transported to laboratory by:**	
Send Results to: Douglas Partners Pty Ltd	**Address**	**Phone:**	**Fax:**
Signed:	**Received by:** James ELS	**Date & Time:** 25/1 17:15	

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85600.00	**Suburb:** Casula	**To:** Envirolab Services
Project Name:	Casula	**Order Number**	
Project Manager:	David Holden	**Sampler:**	**Attn:** Aileen Hie
Emails:	david.holden@douglaspartners.com.au	chris.bagia@douglaspartners.com.au	**Phone:**
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☐		**Email:** Ahie@envirolab.com.au
Prior Storage: ☐ Esky ☐ Fridge ☐ Shelved		Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W - water	Container Type: G/P	Analytes: Combo 8a	Combo 3a	Combo 3	CEC	pH	Heavy Metals	PAH	BTEX	Asbestos ID	Notes/preservation
160859															
BH9/A1 29	0.01 - 0.02	24	23/01/17	ACM	P									x	
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐	

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address** **Phone:** **Fax:**

Signed: **Received by:** James Ellis **Date & Time:** 25/1 13:15

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 160839-A

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

Attention: David Holden

Sample log in details:

Your Reference:	**85600.00, Casula**
No. of samples:	Additional Testing on 4 Soils
Date samples received / completed instructions received	25/01/17 / 03/02/17

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:	10/02/17 / 8/02/17
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

Metals in TCLP USEPA1311					
Our Reference:	UNITS	160839-A-1	160839-A-5	160839-A-7	160839-A-14
Your Reference	----------	BH1	BH4	BH5	BH10
Depth	----------	0.1	0.1	0.1	0.02-0.1
Date Sampled		24/01/2017	23/01/2017	24/01/2017	23/01/2017
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	07/02/2017	07/02/2017	07/02/2017	07/02/2017
Date analysed	-	07/02/2017	07/02/2017	07/02/2017	07/02/2017
pH of soil for fluid# determ.	pH units	5.6	5.7	6.1	6.1
pH of soil TCLP (after HCl)	pH units	1.5	1.6	1.6	1.6
Extraction fluid used	-	1	1	1	1
pH of final Leachate	pH units	4.9	4.9	4.9	4.9
Lead in TCLP	mg/L	<0.03	0.04	<0.03	0.04

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP) using Zero Headspace Extraction (zHE) using AS4439 and USEPA 1311.
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.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			07/02/2017	[NT]	[NT]	LCS-W1	07/02/2017
Date analysed	-			07/02/2017	[NT]	[NT]	LCS-W1	07/02/2017
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-W1	99%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
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Aileen Hie

From: David Holden <David.Holden@douglaspartners.com.au>
Sent: Friday, 3 February 2017 7:44 AM
To: Aileen Hie
Subject: 160839 85600.00, Casula- TCLP Analysis

Hi Aileen,

Could I please get the following additional TCLP analysis for Casula (85600), ELS- 160839

Sample 168039-1 (BH1/0.1)- TCLP lead
Sample 160839-5 (BH4/0.1)- TCLP lead
Sample 160839-7 (BH5/0.1)- TCLP lead
Sample 160839-14 (BH10/0.02-0.1)- TCLP lead

Envirolab Ref: 160839A
Due: 10/2/17
Std 7 1A.

Thanks

Dave

David Holden | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0652 | F: 02 9809 4095 | M: 0414 768 997 | E: David.Holden@douglaspartners.com.au

From: Ken Nguyen [mailto:KNguyen@envirolab.com.au]
Sent: Thursday, 2 February 2017 6:30 PM
To: David Holden; Christopher Bagia
Subject: Results for Registration 160839 85600.00, Casula

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC
an excel file containing the results

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
customerservice@envirolab.com.au

Regards

Envirolab Services
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
www.envirolabservices.com.au