

Report on Phase 1 Contamination Assessment with Limited Sampling

> Fernhill Estate Eastern Precinct Mulgoa Road, Mulgoa

Prepared for Cubelic Holdings Pty Ltd

> Project 71706.01 June 2013



-Douglas Geotechnics I Environment I Groundwater Partners

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Executive Summary

Douglas Partners Pty Ltd (DP) was commissioned in 2010 to undertake a Phase 1 Contamination Assessment at Lot 100 in DP717549, Lot 1 in DP570484 and Lot 6 in DP173159 (the Eastern Precinct of the Fernhill Estate, hereafter referred to as "the site") Mulgoa. It is understood that the assessment is required for rural residential rezoning and concurrent development application purposes.

The Phase 1 Contamination Assessment was conducted to assess the potential for broad scale contamination of the site based on past and present site usage, and, if contamination exists, the likely nature of this contamination. The scope of works for the current assessment included a limited site history search and limited intrusive soil sampling with a view to obtaining data pertaining to the broad scale contamination status of the site.

From a review of historical aerial photographs, the site appears to have been previously used for market gardening and subsequently for rural purposes.

Based on the available historical information and site features, the potential for contamination was considered to be low, and include:

- The limited placement of fill to develop the site with material from unknown sources (i.e. dams) and potential localised filling not observed during the assessment;
- The possible general spraying of pesticides and application of fertilisers during past land use; and
- Asbestos containing material, which may be present around previous and existing structures and as a result of fly tipping (not observed during the current assessment) or within filling material.

The analytical results for the limited number of soil samples analysed show that the levels of contaminants within the analysed samples were all within the adopted Site Assessment Criteria (SAC).

The analytical results for the surface water samples from the dams showed that the levels of OCP and OPP were all below the laboratory PQL. The Heavy Metals concentrations were reported at less than the adopted Surface Water Investigation Levels (SWIL).

Based on the results of this preliminary contamination assessment, it is considered that the site, in general, has a low risk of contamination and is not likely to present an unacceptable risk of contamination with respect to rural residential land use. However, given the limited and generally broad nature of the assessment, it is recommended that further investigative studies be undertaken to address the following:

- Former market gardening sampling to NSW EPA (formerly DECCW) guidelines
- Potential for consumption of home grown produce;
- Dam water quality prior to dewatering;
- Dam wall and sediment materials;
- Filling or hazardous materials around past and present structures;
- Unexpected finds protocol;
- · Waste classification prior to disposal; and
- Imported fill protocol

Further details are provided in Section 13 of the report.



Glossary of Terms

As	arsenic
Bgl	below ground level
B(a)P	benzo(a)pyrene (a polycyclic aromatic hydrocarbon compound)
BTEX	benzene, toluene, ethyl benzene, total xylenes (monocyclic aromatic hydrocarbons)
Cd	cadmium
Cr	chromium (total)
Cr(III)	chromium with oxidation state III (stable in normal environments)
Cr(VI)	chromium with oxidation state VI (typically not stable in normal en∨ironments)
Cu	copper
$C_6 - C_9$	light hydrocarbon chain groups
$C_{10} - C_{14}$	medium hydrocarbon chain groups
C ₁₅ -C ₂₈	heavy hydrocarbon chain groups
C ₂₉ -C ₃₆	heavy hydrocarbon chain groups
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DIPNR	Department of Infrastructure, Planning and Natural Resources
DNR	Department of Natural Resources
DWE	Department of Water and Energy
DP	Douglas Partners Pty Ltd
EPA	Environment Protection Authority
GW	groundwater
ha	hectares
HIL	NSW EPA Contaminated Sites: Guidelines for the NSW Site Auditors Scheme, 2 nd Edition
	2006. Health-based investigation levels (Columns 1 to 4)
Hg	mercury
m	metres
mg/kg	milligrams per kilogram (or parts per million)
NATA	National Association of Testing Authorities
Ni	nickel
NSW	New South Wales
OCP	organochlorine pesticides
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyls
PID	photo ionisation detector
TPH	total petroleum hydrocarbons
VOC	Volatile Chlorinated Hydrocarbons
Zn	zinc



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Report on Phase 1 Contamination Assessment with Limited Sampling Fernhill Estate, Eastern Precinct Mulgoa Road, Mulgoa

1. Introduction

This report details the methodology and results of a Phase 1 Contamination Assessment (with limited sampling) undertaken by Douglas Partners Pty Ltd (DP) at Lot 100 in DP 717549, Lot 1 in DP 570484 and Lot 6 in DP 173159 (The Eastern Precinct of the Fernhill Estate, hereafter referred to as "the site"). The 2010 assessment was requested by Urbis Pty Ltd (Urbis – head consultant) on behalf of Owston Nominees No. 2. Pty Ltd (Owston – developer). This report comprises an update to the 2010 report, as commissioned by Cubelic Holdings Pty Ltd, on behalf of the the new property developer.

It is understood that the proposed development will ultimately include the subdivision of the site into approximately 54 residential allotments with a typical allotment size of approximately 1000 m². The new lots will be serviced by several new roads that will provide access to the site from two entry points located on Mulgoa Road near to the northern and southern ends of the site. Presently, the development is at a concurrent rezoning and development application stage, with the current proposed development layout shown on Drawing 1, in Appendix A.

To assist the rezoning and development application and to comply with Penrith City Council's (Council) Stage 2 Local Environmental Plan requirements, DP has investigated and assessed the site to determine its suitability for urban development, with specific consideration given to geotechnical surface and subsurface conditions, slope instability and soil erosion risks, soil salinity and the potential for soil contamination. The results of the land capability assessment undertaken for this site are reported separately. Please refer to DP's *Report on Land Capability Assessment* (Project 71706.01, dated June 2013).

The current Phase 1 Contamination Assessment was conducted to:

- (a) provide a preliminary assessment of the potential for contamination of the site based on past and present site usage and the likely nature of this potential contamination.
- (b) make a preliminary evaluation on the likely suitability of the site from a contamination perspective for rezoning purposes.

This report documents the findings.

2. Background

This Phase 1 contamination assessment with limited sampling was originally undertaken by DP for a previous developer of the site, Owston Nominees No. 2 Pty Ltd. The results of the assessment were presented in DP's original environmental Report on Phase 1 Contamination Assessment with Limited Sampling (refer DP Project No. 71706, dated 16 August 2010). DP understands that the appropriate



permissions have been granted by the original developer and their appointed Receivers and Managers (Korda menthe) to access all prior reports to assist the new development proposal.

The current report comprises an update to DP's 2010 report, with amendments made to reflect the newly proposed development layout only. No new assessment works have been undertaken. Although all references to the previous development proposal have been updated, all data previously presented in the 2010 report appendices remains unchanged. The findings of the report also remain unchanged.

3. Scope of Work

The scope of work for the contamination assessment, as outlined in DP's proposal dated 5 February 2010 and accepted by Owston Nominees No. 2 Pty Ltd generally comprised:

3.1 Desktop

- A search through the NSW EPA Land Information records to confirm the status of statutory Notices under the Contaminated Land Management Act 1997 in relation to any parts of the release area;
- Review of historical aerial photography for the area through the records available from the Department of Environment, Climate Change and Water (now NSW EPA). This information was used to assess the extent of historical, potentially contaminating land use;
- Review of local history records/photographs at Penrith City Library, obtaining background information on local planning/land use issues from discussion with Council's planner and a review of Council's zoning plans for the area was recommended as part of the scope of works, however was not undertaken as part of the current assessment.
- Drive-over/walk-over field mapping to draw together the desktop studies and link it with field mapping;
- Identify areas of potential areas of environmental concern (AEC);
- Search on NSW Office of Water's registered groundwater bore database;
- A review of Council's Section 149 Certificates, land title and WorkCover licence records for the storage of Dangerous Goods were also recommended, however these were not conducted at this stage.

3.2 Fieldwork

 Test pit locations were cleared for services and pipes based on dial-before-you-dig information and an electro-magnetic sweep;

- Laboratory analysis was conducted on 12 selected soil samples (including two samples from the wall of Dam 1's Spillway), at a NATA accredited laboratory for a combination of the following potential contaminants:
 - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
 - Polycyclic Aromatic Hydrocarbons (PAH);
 - Total Petroleum Hydrocarbons (TPH);

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- Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene BTEX);
- Organochlorine and Organophosphorus Pesticides (OCP and OPPs); and
- Asbestos.

Analysis was conducted on the following additional samples for QA/QC purposes:

- 1 Trip Spike (BTEX); and
- 1 Trip Blank (BTEX)
- A total of 6 surface water samples were collected from three dams within the site.
- Laboratory analysis was conducted on 6 surface water samples (two from each sampling location) at a NATA accredited laboratory for a combination of the following potential contaminants:
 - Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
 - Organochlorine Pesticides (OCP); and
 - Organophosphorus Pesticides (OPPs)

3.3 Reporting

 A Phase 1 contamination assessment report was prepared detailing the methodology and results of the assessment to provide a preliminary evaluation of the likely suitability of the site to support urban development from a contamination perspective as well as providing recommendations regarding the need for any additional investigations.

4. Site Identification and History

4.1 Site Identification

The site in whole occupies an area of about 27.5 hectares (ha) and comprises three registered allotments as shown on Drawing 1, Appendix A, namely:

- Lot 100 in DP717549;
- Lot 1 in DP570484; and



Lot 6 in DP173159.

The proposed subdivision development is planned for the eastern parts of Lot 1 Lot 6. The total proposed development area is approximately 8 ha (refer Drawing 1).

The subject site is within the southern region of the Penrith City Council local government area, in the Parish of Mulgoa and the County of Cumberland. For the purposed of the rezoning and development application process, the subject site is referred to as "The Eastern Precinct". The site has an irregular shape and comprises of rural land with a residential premises located within the site off Mulgoa Road. A site plan and locality map is presented in Drawing 1, Appendix A.

4.2 Site History

A limited site historical information review was conducted, comprising a review of historical aerial photographs, Contaminated Land Register for Notices issued under the *Contaminated Land Management Act 1997*, as well as a groundwater bore search of the NSW Office of Water database. These reviews can provide a broad scale indication of potentially contaminating activities or features that may have been carried out at the subject site. The site history search information referenced in the following sub-sections is presented in Appendix B.

4.2.1 Aerial Photograpy

The aerial photographs from 1947, 1961, 1970, 1978, 1986, 1994 and 1998 were provided by Urbis, obtained from the NSW Department of Lands Office. The recent image was obtained from the NSW Department of Lands website (<u>www.lands.nsw.gov.au</u>) on 8 July 2010. The aerial photographs are presented in Appendix B. These aerial photos were reviewed and interpreted to assess the possible past uses and features of the site. The findings are summarised below.

- 1947 The site appears to be within an area of rural land use. Due to the poor quality of the 1947 image, it is unclear whether there are any structures present within the subject site, however there may be a couple of dwellings in the south-eastern corner, near what appear to be agricultural/market gardens. There is a body of water observed within the site area in the vicinity of where Dam 2 is currently located. The remainder of the site is observed to be covered by sparse bushland. A creek runs along to northern boundary of the site. Mulgoa Road does not appear to yet extend along the eastern boundary of the site.
- 1961 The site appears further developed since the 1947 image, with the presence of the two
 dams resembling current site conditions. The bushland in the north-western and central areas of
 the site have been cleared to make way for cultivated agricultural fields. The presence of a few
 small buildings is noted within the central east area amongst the fields, as well as a few small
 buildings located in the south-eastern corners. The surround land use appears similar to the
 1947 image, with the addition of Mulgoa Road along the site's eastern boundary.
- 1970 The 1970 image appears similar to that taken in 1961. As the quality of the 1970 image is slightly better than the 1961 photo, the features of the site and surrounding lands are easier to observe. There does not appear to have been significant change within the subject site, apart from the clearing of some trees. The appearance of the surrounding area appears to be similar to observations made on the 1961 image, with the bushland appearing more sparse and the presence of dwellings at the south-eastern boundary of the site in the 1970 image.

- 1978 Although observations are restricted by the quality of the image, it appears that there may be a building structure present at the north-eastern corner of the site, as well as the addition of a circular mark in the south-eastern portion of the site (possibly related to horse trotting or training). In general, the site and it's surroundings appear generally unchanged from the observations made on the 1970 image.
- 1986 The majority of the buildings that were located in the south-eastern corner of the site appear to have been removed, as well as one of the buildings in the central area of the site near the eastern boundary. There has been the addition of a rectangular structure near the centre of the site, between the circular marking and the dams. The bushland in the western half of the site appears more sparse. A few additional dwellings are observed to the south and east of the site, with what appears to be residential land use at the southern end of the image.
- 1994 The site appears generally similar to the 1986 image, however it appears that all but one of the buildings in the south-eastern corner, including the added structure that was first observed in the 1986 image, have been removed. The circular mark is also missing, and a few trees have been planted within the south-eastern area. The rectangular building that was present in the 1986 image near the dirt road within the central east part of the site appears to have been removed, with the addition of a new grey-roofed building, which appears to be a house on the other side of the dirt road. The surrounding land appears similar to observations made in the 1986 image, with the addition of a few buildings to the south of the site.
- 1998 Although restricted by image quality, the subject site and the surrounding lands do not appear significantly different to observations made in the 1998 image. Due to the crop of the image provided, it is not possible to view the surrounding land to the south of the site.
- 2009 (most current) The subject site and the surrounding lands do not appear significantly
 different to observations made in the 1998 image, although there appears to be a few more
 structures near the residential dwelling. The one remaining structure in the south-eastern corner
 of the site appears to have been removed. Further development is observed to the south of the
 site, with the addition of more rural residential buildings as well as a sports court to the south-east
 of the site. Generally the area has not been changed significantly.

4.2.2 Regulatory Notices Search

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The NSW EPA (formerly DECCW) publishes records of contaminated sites under Section 58 of the *Contaminated Land Management* (CLM) Act 1997 on a public database accessed via the Internet. The Notices relate to investigation and/or remediation of contaminated sites considered to pose a significant risk of harm under the definition in the CLM Act. A search of the public database revealed that the subject site is not listed. However, although prior to the implementation of the CLM Act, the search did list one site within 3 km of the subject site. Penrith Waste Services Pty Ltd, located at 842 Mulgoa Road, was issued with a Notice under Section 35 of the *Environmentally Hazardous Chemicals* Act, 1985, on 14 October 1992 by the EPA which, at the time, had reason to believe that the premises being used for or in connection with a prescribed activity, was contaminated by chemical wastes, namely aluminium processing waste plus various undifferentiated industrial wastes. The Notice was later revoked on 17 May 1993. The search results are included in Appendix B.

The NSW EPA (formerly DECCW) also issues environmental protection licences to the owners or operators of various industrial premises under the *Protection of the Environment Operations* Act 1997 (POEO Act). Licence conditions relate to pollution prevention and monitoring, and cleaner production



through recycling and reuse and the implementation of best practice. A search of the public register did not locate any listing for the subject site.

A search for licences, applications and notices of the surrounding area, however, did locate records for Penrith Waste Services Pty Ltd, the Nepean District Christian School (adjacent to Penrith Waste Services), Winbourne and Joe David Gauci. A licence summary and associated licence variations were listed for Penrith Waste Services for waste disposal (application to land), with the licence review completed on 18 January 2006. The Nepean District Christian School was issued with a Surrender Licence Notice under Section 80 on 15 September 1999. The Notice listed the premises as under the industry of 'package treatment plants'. Winbourne, a property listed under the irrigation industry, which was located within approximately 1 km south of the subject site on Mulgoa Road, and was also issued with a Surrender Licence Notice under Section 80 on 9 December 1999. Joe David Gauci, located at 254 Park River Close (approximately 5 km south-west of the subject site), was issued with a Notice of Clean Up Action by the EPA on 30 September 2002. The Notice followed an inspection carried out by the EPA at the property which provided reason to believe that industrial waste may have been placed on the land and that clean-up action was to be undertaken in relation to any stockpiles or areas on the property which had received fill materials over a particular time-frame. No further notices for sites in the area were listed on the database. It is noted that the sites discussed above are not located up-gradient from the subject site, or within very close proximately of the site, therefore are not considered to have posed a threat with regards to contamination migrating onto the subject site.

4.2.3 Groundwater Bore Search

A groundwater bore search of the Department of Water and Energy (Note: water related issues now the responsibility of the NSW Office of Water) website database was conducted. Nine groundwater bores within a 2 km radius were located north, south, east and west of the site. Four of the bores (GW105854, GW108642, GW108515, GW106183) were used for domestic stock purposes and were all located to the west of the site. Bore GW020309, located to the north-west of the site, had an authorised purpose for domestic use, with the intended purpose of oil exploration. Bore GW075160, located south of the subject site, is used for the town water supply. The other three bores were intended for irrigation use, with GW053969 authorised for domestic irrigation stock, and GW047458 authorised for stock purposes. These bores are located north-east and north of the site respectively.

Groundwater zones were not listed on any of the reports, with standing water levels only recorded for three of the registered bores being at 100 m, 120 m and 143.50 m all within sandstone. Water bearing zones were recorded for seven of the bores, with the shallowest zone recorded at 17 m – 18.30 m in GW047458 (town water supply bore) from within a clay profile. The groundwater bore search map and Groundwater Works Summary for the registered bores are attached in Appendix B.

5. Geology, Hydrogeology and Topography

Reference to the Penrith 1:100,000 Geological Sheet indicates that the subject site is underlain by Bringelly Shale from the Wianamatta Group from the Middle Triassic Period, as well as s section of Minchinbury Sandstone also from the Wianamatta Group from the Middle Triassic Period, which generally runs thru the middle of the site. The lithology description of Bringelly Shale is that of shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and



tuff. The lithology description of Minchinbury Sandstone is that of fine to medium-grained quartz-lithic sandstone.

Reference to the Penrith 1:100,000 Soils Landscape Sheet indicates that the site is situated within the Erosional Luddenham soil landscape, which is typified by undulating to rolling low hills on Wianamatta Group shales often associated with Minchinbury Sandstone, with narrow ridges, hillcrests and valleys. Moderately deep Yellow Podzoic Soils and Prairie Soils on lower sloped and drainage lines are expected, with shallow, dark Podzolic Soils or Massive Earth Clays on crests and moderately deep, red Podzolic Soils on upper slopes. Limitations of the soil type include a high soil erosion hazard, moderately reactive and localised impermeable highly plastic subsoil.

The nearest waterways to the site, apart from the dams located within the subject site, are the Nepean and Warragamba Rivers. The Nepean River is located broadly west of the site, with Warragamba River connecting to the south. Nepean River is located within approximately 3.7 km to the north-west, and 2.7 km to the south. The Nepean River is expected to flow in a northerly direction eventually connecting to the Hawkesbury River which is located approximately 26 km north of the subject site.

Topographical relief across the majority of the site is slight to moderate, with the overall landform being undulating and varying in elevation from reduced levels of RL 72 m relative to Australian height datum (AHD) in the south east portion of the site to RL 60 m at the waters edge of both dams in the centre of the site. A broad ridge line runs north to south through the central eastern part of the site between the dams and Mulgoa Road. A second broad ridge line runs in a north-east to south-west direction midway between the dams and the western property boundary. The crest of each ridge line is slightly undulating with ground surface slopes to either side of both ridges generally falling to the east and west, although irregular spurs extend from the main ridge line in varying directions thus ground slopes face many different directions. Ground slopes typically fall at angles of between 3 and 12 degrees within the proposed development area. Local ground slopes fall at up to 30 degrees near the northern boundary of the site and on the downstream side of the large dam embankment (Dam 1 – refer Drawing 1).

The site is located in an area outside of the Department of Land & Water Acid Sulphate Soil Risk Map Series 1:25 000, Edition II.

6. Site Description

The site is currently a rural property that has an existing residence and accompanying outbuildings in the central eastern part of Lot 1. Surrounding the residence are fenced paddocks that contain a few horses but are otherwise unused. An asphalt sealed driveway provides access to the existing residence from Mulgoa Road. There is evidence of a previous dwelling in the central eastern part of Lot 6, although this dwelling appears to have been demolished, leaving behind remnant sheet metal and other building refuse within a small compound that is surrounded by a high chain wire fence.

Surrounding the developed areas of the site is vacant rural land that is covered with grass and scattered with dense natural tree growth. Although the site is mostly undeveloped and appears to follow the inferred natural land form, the proposed development areas have been cleared of almost all substantial vegetation leaving a thick grass cover. Previous land uses are not directly evident from



site inspection, although it is likely that the site has been used for grazing or other rural land uses, which is supported by the presence of two existing rural dams, one of which is quite large.

The observations made during the various inspections of the site undertaken during and following the field investigation programme (April and May 2010) are summarised below:

- Rock outcrops were not identified within the site. Outcrops of sandstone and shale are evident to
 the east and west of the site in road cuttings. Although not observed, it is likely that in-situ rock
 would be present at the base of the dam excavations at this site.
- The soil profile across the site is residual and comprises silty clay overlying shale and sandstone bedrock. The residual soil is sometimes mottled and contains some ironstone gravel in places.
- The landform is predominantly gently to moderately sloping undulating terrain of shallow relief. Crests and gullies are broad but defined, hence there are no areas of significant soil erosion at site due to concentrated overland water flow.
- Vegetation was relatively healthy across the site with no significant die-back noted, although grasses were dry.
- Areas adjacent to Dam 1 contained potentially intermittently water-logged ground that supported reedy grasses.
- Three dams were observed within the site. Water levels within the existing dams were below the high water level line, indicating possible recent dry weather conditions, which is further supported by the dry grasses evident across the site, mostly on crests and mid to upper slopes.

The locations and aerial views of the features described above may be obtained with reference to Drawing 1, Appendix A.

6.1 Adjacent Site Use

The proposed development area is bordered by:

- North Side Lot 100 and the Fernhill Estate (Lot 10 in DP615085);
- South Side Several existing rural and residential lots that border the northern side of Fairlight Road;
- East Side Mulgoa Road; and
- West Side An existing large rural allotment that is situated on the northern side of Fairlight Road.

Due to the nature of the activities and based on the local topography and geology, it is considered that the potential for contamination and migration of contamination onto the subject site would be low.

7. Potential for Contamination

Based on the available information and DP's site observations, the greatest potential for contamination is considered to be the past use of large expanses of the site for market gardening. The potential for



contamination resulting from this land use is primarily surficial and related to the application of pesticides and fertilisers (i.e. Heavy Metals, OCP and OPP). There is also the potential for localised contamination around pesticides storage areas / sheds. DP's experience in assessing large market garden areas suggests that the potential for OCP and OPP contamination is low.

Other potential areas/issues of environmental concern considered to be of a lower risk may arise from general anthropogenic sources from past and present site activities including the possible limited placement of fill during site development, and building materials from the demolition of old buildings (particularly within the south-eastern portion of the site).

The table below lists the possible contaminants that are associated with the potential areas of environmental concern.

Potential AEC Description of Potential Contaminating Activity		Chemicals of Concern
Possible Imported Fill	Fill material may have been placed at site during past development, including dam and building construction. Some localised filling of depressions may have also taken place in the past. The source of fill material (if present) is likely to be unknown.	Hea∨y metals, TPH, BTEX, PAH, OCP, phenols and asbestos.
Use of Pesticides	Use of Pesticides From observations made in the aerial photos, the site appears to have been used for agricultural purposes including market gardens, therefore it is possible that pesticides and fertilisers may have been sprayed across the site in these areas.	
Hazardous building materials During the demolition of old building the site, there is the potential of contamination from materials such asbestos in fibro and lead paint, su within the location of the pile of building the site.		Asbestos, Lead

Table 1: Areas of Environmental Concern (AEC's)

As stated earlier, three dams were noted within the site. Rural dams are typically positioned in low lying areas, such as depressions, to maximise the catchment collecting surface water runoff. As such, dams can be collectors of contaminants transported by surface waters. Given the rural nature of the site and the past market gardening, the most likely contaminants in the dam water would be Heavy Metals, OCP and OPP.



8. Fieldwork

8.1 Data Quality Objectives and Data Quality Indicators

The data quality objectives (DQO) of the Phase 1 Contamination Assessment have been developed to define the type and quality of the data to achieve the project objectives and were based broadly in accordance with the seven step data quality objective process, as defined in Australian Standard (AS) "Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds (AS 4482.1 – 2005). The DQO process is outlined in the AS and defined by:

- 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 DQO's have been addressed within the report as follows in Table 2.

Data Quality Objective	Report Section Where Addressed		
State the Problem	S1 Introduction		
Identify the Decision	S11 Discussions, Recommendations and Conclusions		
Identify Inputs to the Decision	 S3 Site Identification and History S6 Potential For Contamination S8 Sampling Rationale S9 Site Assessment Criteria S10 Results of Investigation 		
Define the Boundary of the Assessment	S3.1 Site Identification Site Drawing - Appendix A		
Develop a Decision Rule	S9 Site Assessment Criteria		
Specify Acceptable Limits on Decision Errors	S7 Fieldwork QA/QC Procedures and Results - Appendix F		
Optimise the Design for Obtaining Data	S8 Sampling Rationale QA/QC Procedures and Results - Appendix F		

Table 2: Data Quality Objectives

Data quality Indicators (DQI) were established as follows in Table 3.



Table 3: Data Quality Indicators

Objective	Evaluation Procedure		
Documentation completeness	Completion of field and laboratory documentation including chain-of-custody, test pit reports etc.		
Data completeness	Sampling from limited sampling points as a broad scale coverage of the site to provide a preliminary assessment, analysis of appropriate contaminants, soil horizons, QA samples etc		
Data comparability	Use of NATA accredited analytical methods, use of a consistent sampling technique, commitment to equipment decontamination, field sample storage techniques, inter- laboratory replicates etc.		
Data representativeness	Sampling from targeted areas and to give general site coverage in order to obtain samples generally representative of broad site conditions.		
Precision and accuracy for sampling and analysis	Use of NATA accredited analytical methods and achievement of laboratory QC criteria (refer Appendix F).		

8.2 Quality Assurance and Quality Control

Environmental sampling was performed according to standard operating procedures outlined in the DP *Field Procedures Manual* and summarised below. Sample handling and transport procedures were conducted as follows:

- Soil samples were collected directly from excavator returns using disposable gloves;
- Transfer of samples into laboratory-prepared glass jars, and capping immediately with teflon lined lids;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the sample jars into a 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 the transfer of samples.

Envirolab Services Pty Ltd, a NATA accredited laboratory (accreditation number 2901), was employed as the primary laboratory to conduct analysis on all samples. Labmark Environmental Laboratories (Labmark), also NATA accredited, was employed as the secondary laboratory to conduct analysis of inter-laboratory replicate samples. The laboratories are required to carry out routine in-house QC procedures.



9. Sampling Rationale

The NSW EPA's publication Sampling Design Guidelines (1995) recommends a minimum of 55 sampling points to characterise a site of 5 hectares. The developable area of the Mulgoa Precinct site has an approximate area of 27.5 hectares which, under the guidelines, would require in the order of 300 sampling points. Due to the preliminary nature of the assessment, a limited sampling regime was conducted, with an attempt to provide general coverage of the locations as illustrated in Figure 3 of Hughes Trueman's Consultancy Brief, dated 22 January 2010.

Sample locations were selected to provide general site coverage and an indication of the broad scale contamination status of the site. In this respect, the sampling pattern was systematic, tying in with the requirements of the geotechnical and salinity assessments. No targeted soil sampling was undertaken.

Soil samples were collected from test pits at broadly regular intervals. Out of a total of 32 test pits excavated across the site, samples were selected for analysis from five. The five locations were selected in an unbiased manner spread generally across the site. The samples considered most likely to be contaminated from each of the five test pits were selected for laboratory analysis i.e. the surface/near surface soil profile.

As stated earlier, water samples were recovered from each of the dams identified within the site.

10. Site Assessment Criteria

For the purpose of contamination assessments, the NSW EPA (formerly DECCW) has established assessment criteria for a number of standard, health risk based settings for various land uses, which are defined in the *Guidelines for the NSW Site Auditor Scheme*, 2nd edition, 2006, Appendix II. The following land use scenarios are included:

- Residential with accessible soil and use of home grown produce. Includes child-care centres, primary schools, pre-schools, town houses and villas;
- Residential with minimal access to soil such as high rise apartments and flats;
- Parks, recreational open space or playing fields and including secondary schools;
- Commercial or industrial use.

In addition, the NSW EPA (formerly DECCW) also sets provisional phytotoxicity-based investigation levels (PPIL) for the protection of plants in the appropriate sensitive land use setting (residential with gardens, or unpaved areas outside of the building footprint of apartments and flats and open space). The PPILs are not applicable to commercial/industrial sites.

With regard to the subject site and its proposed rezoning for residential land use, it is considered that the site would fall within a health risk setting of residential land use with accessible soil.

In the case of petroleum hydrocarbons, where other comprehensive assessment criteria are not available, the threshold concentrations for sensitive land use are used as specified in the NSW EPA publication *Guidelines for Assessing Service Station Sites* (1994).



With respect to asbestos, the recent WA Department of Health (2009) approach has been generally adopted, which is as follows:

- No visible asbestos pieces in the top 100 mm of the soil profile;
- 0.001% asbestos fibres by weight;
- 0.01% asbestos cement materials by weight.

It should be noted that this approach has not yet been endorsed by the NSW EPA (formerly DECCW), however it is understood that the same approach will be incorporated within the upcoming National Environmental Protection Measure (NEPM) revision. This approach has been adopted given the lack of available guidance in NSW.

The adopted SACs with respect to the identified contaminants in soils are presented in Table 4.

Contaminant	Adopted Criteria (SAC)		Guidelines
$\begin{array}{c} \textbf{TPH} \\ C_6 - C_9 \\ C_{10} - C_{36} \end{array}$	65 mg/kg 1000 mg/kg		NSW EPA Contaminated Sites Guidelines Assessing Service Station Sites (1994)
BTEX 1 mg/kg Benzene 1.4 mg/kg Toluene 3.1 mg/kg Ethylbenzene 14 mg/kg		g/kg g/kg g/kg g/kg	threshold concentrations for sensitive land use- soils. Currently there are no other comprehensive EPA endorsed investigation levels for petroleum hydrocarbons
Metals Arsenic (total) Cadmium Chromium Copper Lead Mercury Nickel Zinc	HIL 100 mg/kg 20 mg/kg 120000 mg/kg 1,000 mg/kg 300 mg/kg 15 mg/kg 600 mg/kg 7,000 mg/kg	PPIL 20 mg/kg 3 mg/kg 1 mg/kg 100 mg/kg 600 mg/kg 1 mg/kg 60 mg/kg 200 mg/kg	NSW EPA Contaminated Sites Guidelines for the NSW Site Auditor Scheme (2 nd Edition)
OCP aldrin + dieldrin chlordane DDT (including DDD, DDE, DDT) Heptachlor	10 m 50 m 200 m 10 m	g/kg g/kg ng/kg g/kg	 (2006) Appendix II, Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath- based investigation levels residential with gardens and accessible soils (HIL Column 1).

Table 4: Site Assessment Criteria for Soil/ Filling



Contaminant	Adopted Criteria (SAC)	Guidelines
Asbestos	No visible asbestos present in soil at the surface 0.001% asbestos fibres by weight 0.01% asbestos cement by weight	WA Department of Health Guidelines for the Assessment, Remediation, and Management of Asbestos Contaminated Sites in Western Australia, May 2009

The guidelines used in the assessment of contamination in surface waters are as follows:

 The Australian and New Zealand Guidelines for Fresh and Marine Waters, (2000), published by the Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

The site is situated within reasonably close proximity to the Nepean River. As such, it is possible that surface water runoff from within the site could impact on the quality of the Nepean River waters and subsequently the ecosystem within.

In order to determine whether the surface water may impact on aquatic life within the fresh water aquatic ecosystems associated with the River, the surface water test results were assessed against the available Trigger Values for a slightly / moderately disturbed freshwater system, at a general protection level of protection of 95% of species, which are extracted from the abovementioned guidelines.

For ease of reference, the adopted criteria have been referred to as the Surface Water Investigation Levels (SWIL). The adopted SWIL are shown in the following Table 5.

Contaminant	Adopted Criteria (SWIL)	Source						
Metals Arsenic (III) Cadmium Chromium Copper Lead Mercury Nickel Zinc	13 μg/L 0.2 μg/L 3.3 μg/L 1.4 μg/L 3.4 μg/L 0.6 μg/L 11 μg/L 8 μg/L	ANZECC Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) trigger values for toxicants in freshwater waters for the protection of 95% of species.						
OCP Aldrin Chlordane	0.001 µg/L 0.08 µg/L 0.03 µg/L	5						

Table 5: Surface Water Investigation Levels



Contaminant	Adopted Criteria (SWIL)	Source
DDE	0.01 µg/L	
DDT	0.01 µg/L	
Dieldrin	0.2 µg/L	
Endosulfan	0.02 µg/L	
Endrin	0.09 µg/L	
Heptachlor	0.005 µg/L	
Methoxychlor	1094	
OPP		
Chlorpyrifos	0.01 µg/L	
Diazinon	0.01 µg/L	
Dimethoate	0.15 µg/L	
Fenitrothion	0.2 μg/L	

11. Results of Investigation

11.1 Field Observations

Detailed descriptions of the materials encountered at each test pit are given on the Test Pit Logs presented in Appendix D, together with notes defining classification methods and descriptive terms.

In general, the test pits indicate that the site is underlain by variable depths of silty clay topsoil overlying natural clays, weathered shale and weathered sandstone. The typical sub-surface conditions encountered in the test pits are summarised as follows:

Topsoil: Consisting of firm to stiff dark brown silty clay with some rootlets. Topsoils were present at all test pit locations and extended to depths of between 0.18 m and 0.41 m, typically 0.25 m to 0.3 m thick with the upper 0.1 m containing organics. Topsoils were generally damp. Residual Soil: Comprising stiff to very stiff and hard, orange brown, mottled red brown and grey silty clay. Residual clays were present in all thirty-two test pits and extended to depths of between 0.4 m and 2.5 m. Residual clays were generally humid to moist and of estimated medium to high plasticity. Weathered Rock: Comprising Shale and Sandstone encountered from depths of between 0.4 m and 2.5 m, generally at shallower levels on the eastern side of the Initially of extremely low to low strength, bucket penetration in site. sandstone was typically less than 0.9 m whereas penetration in shale reached 2.4 m in depth.

No signs of gross contamination were observed at any of the sample locations. The water in the dams was observed to be generally brackish. There was no odour or staining / sheen on the water surface to suggest a potential for contamination.



11.2 Analytical Results

11.2.1 Soil

With respect to the topsoil/filling and the underlying natural strata, results recorded relatively low contamination levels in all analysed samples.

All recorded concentrations for TPH, BTEX, OCP and OPP were below laboratory practical quantitation limits (PQL) and well below the respective SAC. All samples analysed for asbestos recorded results below reporting limits.

All samples analysed for asbestos recorded results below laboratory reporting limits. No asbestos fragments were found at the test pit locations.

Heavy metal concentrations were generally low and all were well within their respective HILs and within respective PPILs.

The laboratory results are summarised in Table 6, with NATA Laboratory Reports provided in Appendix E.

11.2.2 Surface Water

With respect to the surface waters of the dams located within the subject site, results generally recorded relatively low contamination levels in all analysed samples.

All recorded concentrations for OCP and OPP were below laboratory PQL. It is noted, however, that some of the laboratory PQLs exceed the respective SAC. The general lack of detection of OCP and OPP in both soil and surface water samples, however, suggest that OCP and OPP contamination is not likely to be an issue.

Concentrations of dissolved arsenic, cadmium, copper, lead, mercury and nickel were also all below laboratory PQL. Chromium was detected in sample W1-U, however the concentration was below the trigger value. Zinc was detected in all three locations, W1-U, W1-D and W2, however concentrations were well below the trigger value.

The laboratory results are summarised in Table 7, with NATA Laboratory Reports provided in Appendix E.



Table 6: Results of Soil Analysis (All results in mg/kg unless otherwise stated)

		81 			Hea	avy Metai	ls				8	трн			Toluene	ane	ne²			8
Sample ID (Pit No. / depth(m))	Sampling Date	As	Cd	Cr ¹	Cu	Pb	Hg	Ni	Zn	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	Benzene		Ethylbenze	Total Xyle	OCP	орр	Asbesto
						6 - 13 M - 6				Fill Sample	s		h inter	20 20200						eren (* 1997) 19 - Charles (* 1997)
Dam1 spilway 0-0.1	22/04/2010	8	<0.5	19	24	32	<0.1	16	56	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
Dam1 spillway 0.2-0.3	22/04/2010	7	<0.5	17	22	22	<0.1	13	42	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	SE -0.503969690905	80	3024 H 010145		on - 915-556	< 351154 K	0 - 27.0 - 0	o - 90-90 - 9	То	psoil Sam	ples	200-00000-0	o envise	85 - WILDO	e - 2546 2545	8 1028	100	20	W	e sse g
TP104/0.2-0.3	21/04/2010	10	<0.5	60	4	26	<0.1	3	5	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
TP110/0.2-0.3	22/04/2010	9	<0.5	24	18	19	<0.1	8	30	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
TP123/0.2-0.3	22/04/2010	8	<0.5	15	16	18	<0.1	5	15	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
en 15 Maria Andrea de la composición de	SE 10.50796569930	8800	3024 H 010145	0.000	00-10-00	x 92-315 - 3	9	os	Natu	ral Clay Sa	mples	201-00120-0	o envor	251 - AMILLA	o - 1996 (1995	8 10288		20	W	e 565 j
TP104/0.4-0.5	21/04/2010	9	<0.5	50	10	21	<0.1	4	9	- E	. S	1.1	154	50		-		<2	<0.8	
TP110/0.4-0.5	22/04/2010	8	<0.5	10	13	14	<0.1	4	12		÷	8-3 * 2-3	(ite);	8 18 3		5-00028		<2	<0.8	
TP123/0.4-0.5	22/04/2010	<4	<0.5	6	19	14	<0.1	3	11		÷	1.0	1			200		<2	<0.8	
TP124/0.2-0.3	22/04/2010	11	<0.5	12	28	20	<0.1	21	55	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
TP124/0.4-0.5	22/04/2010	7	<0.5	12	34	22	<0.1	26	70		- R		1			200		<2	<0.8	
TP132/0.2-0.3	4/23/2010	11	<0.5	43	9	28	<0.1	14	25	<25	<50	<100	<100	<0.5	<0.5	<1	<3	<2	<0.8	ND
TP132/0.4-0.5	4/23/2010	3	<0.5	37	16	27	<0.1	12	24		. G	J (a) .	154	J 🗟 J	. ¥	201		<2	<0.8	
- 15% Of MOREO CONTROL 0	1 2010/20000	01.772	227 11 11 21 21 23	2566	00-00-00	x - 12.005 - 1	0	0 55-05 5	Q/	A/QC Samp	oles	200 0	0	22 0	2 S	S 53			M-25005-0	0
Trip Spike		8		20	1.0						÷	8 64 8	1	88%	91%	92%	93%	Q 24		
Trip Blank		-			- 192 I	19		19	- £3	1		1.6	1	<0.5	<0.5	<1	3			¥3
POL		4	0.5	1	1	1	0.1	1	1	25	50	100	100	0.5	0.5	1	3	2	0.8	0.1 o/ka
									Site Asse	ssment Cr	iteria (SAC)									
HIL ³	2	100	20	12%	1,000	300	15	600	7,000	65 ⁶		1000 ^a		15	1.4 6	3.1 5	14 ⁶	10/50/200/10 5	8,500	0.01% / 0.001%7
PPIL		20	3	400	100	600	1	60	200	52		-			57	0.50		82/	10	51

Notes:

2

1 All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment

where analytical results below laboratory practical quantitation limit (PQL) for all compounds, results quoted as <PQL of most compounds

3 Health based investigation levels for residential with gardens and accessible soil

4 Provisional phytotoxicity based investigation levels

5 OCP thresholds given in order Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor

6 NSW EPA Service Station Guidelines

7 0.01% asbestos cement / 0.001% for asbestos fibres (WA Department of Health); no asbestos in upper 100mm

ND Not detected at reporting limit of 0.1g/kg

not analysed / not applicable

PQL Laboratory practical quantation limit

BOLD exceeds HIL



Table 7: Results of Surface Water Analysis (All results in µg/L)

1000 100000 00 5466 500000 00			Heavy Metals							OCP									OPP			
Sample ID	Sampling Date	As	Cd	Cr ¹	Cu	Pb	Hg	Ni	Zn	Aldrin	Chlordane	DDE	DDT	Dieldrin	Endosulfan	Endrin	Heptachlor	Methoxychlor	Chlorpyrifos	Diazinon	Dimethoate	Fenitrothion
W1-U	23/04/2010	<1	<0.1	2	<1	<1	<0.5	<1	2	-		38	1		2	-	-	, 99 4 0		-	14	
W1-U1	23/06/2010	242	144	- 2	1.323		- 12 - 12	343	848	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
W1-D	23/04/2010	<1	<0.1	<1	<1	<1	<0.5	<1	1	2	2		100				12	. <u>86</u> 8.	25		1990	
W1-D1	23/06/2010			-		÷ - a				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
W2	23/04/2010	<1	<0.1	<1	<1	<1	<0.5	<1	2	-	5	1255			2	10.00		1.51	55	5		
W2-1	23/06/2010	19	2.55		1050	-				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
P	PQL	1	0.1	1	1	1	0.5	1	1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
				8	80 · · ·	40 7.4 20 1.4	1	8	1.5	98 18	Surface water	Investig	ation Lev	el (SWIL)		90 04 An na		16		87 50		
SI	WIL ³	13	0.2	3.3 ⁴	1.4	3.4	0.6	11	8 5	0.001 4	0.08	0.03 4	0.01	0.01 4	0.2	0.02	0.09 6	0.005 4	0.01 5	0.01 6	0.15	0.2 6

Notes:

1 All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment

2 where analytical results below laboratory practical quantitation limit (PQL) for all compounds, results quoted as <PQL of most compounds

3 ANZECC Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) trigger values for toxicants in fresh waters for the protection of 95% of species.

4 freshwater low reliability trigger value. Refer to Section 8.3.7 of guideline

5 freshwater high reliability trigger value. Refer to Section 8.3.7 of guideline

6 freshwater moderate reliability guideline figure. Refer to Section 8.3.7 of guideline

- not analysed / not applicable

PQL Laboratory practical quantative limit

Bold exceeds guideline



12. Interpretation and Discussion of Results

The analytical results for the soil samples show that the levels of contaminants within the analysed samples were all within the relevant health investigation levels for residential land use as well as within the provisional phytotoxicity based investigation levels. The concentrations of TPH, BTEX, OCP, OPP and asbestos were all below the laboratory PQL and therefore less than the SAC. These results are considered to support, in combination with the general site history and current site features, the earlier statement that the site presents a low potential for contamination.

The analytical results for the surface water samples from the dams showed that the levels of OCP and OPP were all below the laboratory PQL. Furthermore, the heavy metals recorded concentrations below the relevant trigger values.

13. Conclusion and Recommendations

Based on the results of this preliminary contamination assessment, it is considered that the site, in general, has a low risk of contamination and is not likely to present an unacceptable risk of contamination with respect to rural residential land use. However, given the limited and generally broad nature of the assessment, and the past agricultural use of the site, it is recommended that further investigative studies be undertaken as follows:

- Given the extensive market gardening history, further sampling should be undertaken over the developable portion of the site in accordance with the *Contaminated Sites: Sampling Design Guidelines*, NSW EPA, September 1995 and/or the *Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens*, NSW DEC, June 2005. This can be undertaken at DA stage;
- The health based guidelines adopted for the assessment of the test results on soils were taken from the NSW EPA (formerly DECCW) *Guidelines for the NSW Site Auditor Scheme*, 2nd edition, 2006, Appendix II, and are applicable for residential properties where home grown produce contributes less than 10% of the fruit and vegetable uptake, with no poultry. Should any of the proposed properties not comply with this restriction, further assessment of health risks needs to be undertaken;
- Further assessment of the water quality in the dams should be undertaken prior to dewatering activities to assess the quality of the water at the time of dewatering and subsequently assess appropriate disposal methods;
- Assessment of materials in the existing dam walls and dam sediment prior to re-use within the site or disposal off-site;
- Assessment of soil in the vicinity of and beneath former structures and existing structures yet to be removed to assess the potential for filling and/or the presence of hazardous materials;
- An unexpected finds protocol should be implemented during the civil works to provide guidance and methodology for addressing unexpected occurrences of contamination such as localised filling, fly tipping or asbestos fragment. Such a protocol should be prepared by a suitability qualified environmental consultant;



- The disposal of any excess spoil from the site must be carried out in accordance with the relevant legislation. Prior to disposal, materials must initially be classified in accordance with the NSW EPA (formerly DECCW) waste classification guidelines; and
- A fill importation protocol must be implemented to ensure that any imported materials during the subdivision works meet the legislative requirements regarding suitability. Such a protocol should be prepared by a suitability qualified environmental consultant.

14. Limitations

Douglas Partners (DP) has prepared this updated report for this project at Fernhill Estate, Eastern Precinct, Mulgoa Road, Mulgoa, in accordance with instructions received from Mr Paul Cubelic of Cubelic Holdings Pty Ltd The work was carried out under DP's Conditions of Engagement. This updated report is provided for the exclusive use of Cubelic Holdings Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

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

About this Report

Site Drawing



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

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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 History Documentation



Project Suburb/Location:	Mulgoa	August 2010	CON NU BARAN
Project Address:	Owston Estate - Eastern Precinct	71706	Plate 1: 1947 Image
Project Title:	Phase 1 Contamination Assessment	Project	





Project Address:	Owston Estate - Eastern Precinct	71706	Plate 2: 1961 Image
Project Suburb/Location:	Mulgoa	August 2010	
		db	Douglas Partners





	0.607		
Project Suburb/Location:	Mulgoa	August 2010	CLARE IN C. BRACH
Project Address:	Owston Estate - Eastern Precinct	71706	Plate 3: 1970 Image
Project Title:	Phase 1 Contamination Assessment	Project	





Project Title: Project Address: Project Suburb/Location:	Owston Estate - Eastern Precinct Mulgoa	71706 August 2010	Plate 4: 1978 Image
1 8 - A		60	Douglas Partnors




Project Title:	Phase 1 Contamination Assessment	Project	
Project Address: Project Suburb/Location:	Owston Estate - Eastern Precinct Mulgoa	71706 August 2010	Plate 5: 1986 Image
.ar			





Project Title:	Phase 1 Contamination Assessment	Project	
Project Address:	Owston Estate - Eastern Precinct	71706	Plate 6: 1994 Image
Project Suburb/Location:	Mulgoa	August 2010	CODE NOT BEAM





Project Suburb/Location: Mulgoa August 2010	Project Address: Owston Estate - Eastern Precinct Project Suburb/Location: Mulgoa	71706 August 2010	Plate 7: 1998 Image
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Project Address: Owston Estate - Eastern Precinct 71706 Plate 8: 2009 Current August 2010	Project Address: Project Suburb/Location:	Owston Estate - Eastern Precinct Mulgoa	71706 August 2010	Plate 8: 2009 Current Ima
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You are here: <u>Home</u> > Environment protection licences > POEO Public Register > Search for licences, applications and notices

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Your search for: Suburb - mulgoa

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plus 11 notices (whe 1 licence (with a

(with applications or notices matching your s es (where no licence is available online. See f	earch) ag_)	
	Search again	Return to previous page
Name	Address	Status/Notice type
PENRITH WASTE SERVICES PTY. LIMITED li <u>cence summary</u>	842 MULGOA ROAD MULGOA 2745	Issued
"WINBOURNE" notice_summary	MULGOA ROAD MULGOA 2750	S 80 Surrender Licence
GAUCI; JOE DAVID notice summary	254 PARKRIVER CLOSE MULGOA 2745	S 91 Ciean-Up Notice
NEPEAN DISTRICT CHRISTIAN SCHOOL notice_summary	836 MULGOA ROAD MULGOA 2745	S 80 Surrender Licence
PENRITH WASTE SERVICES PTY LTD notice summary	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD notice summary	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD notice summary	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD notice summary	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation
PENRITH WASTE SERVICES PTY LTD	842 MULGOA RD., MULGOA 2745	S 58 Licence Variation

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008468 008331

008617

010995

Page 1 of 1

010262 008621 008043

008363 1020935 008944 3438 Document number

Name

NSW Government | tobs.nsw

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4 August 2010



For information on the meaning of fields please see <u>Glossary</u> Document Generated on Thursday, July 8, 2010

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW108642

Works Details (top)

GROUNDWATER NUMBER	GW108642
LIC-NUM	10BL165850
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Rotary - Percussion (Down Hole Hammer)
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2005-11-25
FINAL-DEPTH (metres)	162.00
DRILLED-DEPTH (metres)	162.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	WILLIAMS
GWMA	•
GW-ZONE	•
STANDING-WATER-LEVEL	100.00
SALINITY	
YIELD	0.50
Site Details (top)	
REGION 10 -	SYDNEY SOUTH COAST
AREA-DISTRICT	

http://is2.dnr.nsw.gov.au/proxy/dipnr/gwworks?GWWID=GW108642

8/07/2010

SCALE

ELEVATION

CMA-MAP GRID-ZONE

EASTING

6253630.00 280486.00

NORTHING

ELEVATION-SOURCE

LATITUDE

33 50' 5" 150 37' 40"

GS-MAP

REMARK	COORD-SOURCE G	AMG-ZONE 56
	IS - Geographic Information System	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	4//235175

Licensed (top)

PORTION-LOT-DP	ARISH	COUNTY
4 235175	MULGOA	CUMBERLAND

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

FROM- DEPTH (metres	Water	<u>ح</u>	<u>→</u>	د.	NO NO
÷	Beari	<u>ح</u>			NO E-
ro-DEPTH THIC metres) (met	ing Zones <u>(to</u>	Casing	Hole	Hole	COMPONENT- CODE
KNESS res)	<u>(</u>	PVC Class	Hole	Hole	COMPON TYPE
ROCH CAT- DESC		s 9			ENT-
Υ ⁻ Υ-		-0.40	150.00	0.00	DEPTH- FROM (metres)
L D D		150.00	162.00	150.00	DEPTH- TO (metres)
D DEF		160	150	200	(mm) GD
ST-HOL STH STH stres)		151.6			(mm)
E- DURATI					INTERVAL
ON SALINITY		Riveted and Glued; Driven into Hole; Seated on Bottom; Open End	Rotary - Percussion (Down Hole Hammer)	Rotary - Percussion (Down Hole Hammer)	DETAIL

0.00

0.30

0.30 17.70

topsoil

FROM TO

THICKNESS DESC

GEO-MATERIAL COMMENT

18.00 0.30

23.00

18.00

23.00

41.00

18.00 5.00

shales sandstone shale, brown Drillers Log (top)

154.00

154.00

0.00

0.20

0.50

2.00

Page 3 of 3

41.00 162.00 121.00 sandstone

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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested --- GW108515

Works Details (top)

	CM/108515
LIC-NUM	10BL600780
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2006-11-16
FINAL-DEPTH (metres)	162.00
DRILLED-DEPTH (metres)	162.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	WILLIAMS
GWMA	I
GW-ZONE	•
STANDING-WATER-LEVEL	120.00
SALINITY	1320.00
YIELD	0.80

Site Details (top)

REGION RIVER-BASIN AREA-DISTRICT CMA-MAP GRID-ZONE SCALE ELEVATION	10 - SYDNEY SOUTH COAST
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6253487.00
EASTING	280464.00
LATITUDE	33 50' 10"
LONGITUDE	150 37' 39"
GS-MAP	

8/07/2010		8515	D=GW10	ks?GWWJ	pm/gwwor	.au/proxy/di	r.nsw.gov	http://is2.dn
RIAL COMMENT	MATE	GEO-				NESS DESC Clay	ТНІСК 2.50	FROM TO 0.00 2.50
							g (top)	Drillers Lo
1650.00 1650.00 1320.00			0.30 0.20 0.30	120.00		4.00 3.00 0.20	143.00 151.00 157.20	139.00 148.00 157.00
DURATION SALINITY	ы Т	TEST- HOLE DEPTI (metre	P- YIELD	S-W-L	S ROCK- CAT- DESC	THICKNES (metres)	TO- DEPTH (metres)	FROM- DEPTH (metres)
						es (<u>top)</u>	ring Zon	Water Bear
		159	5.60	-0,10	crete	Con	Annulus	ح
Driven into Hole; Open End	145.4	155	5.60	-0.40	<u>v</u>	Stee	Casing	د ۲
Down Hole Hammer		155	162.00	120.00		Hole	Hole	-
Down Hole Hammer		159	120.00	5.50	ζμ.	Hole	Hole	-
Down Hole Hammer		204	5.50	0.00		Hole	Hole	۲
INTERVAL DETAIL	(mm)	OD (mm)	DEPTH- TO (metres)	DEPTH- FROM (metres)	APONENT-	NENT- CON	- COMPO	HOLE- PIPE
			ameter; }-Quantity	0D-Outside Di S-Grain Size;0	H-Hole;P-Pipe;(h;A-Aperture;G;	e Ground Level; d;SL-Slot Lengt	ndicate Abov rr;C-Cemente	Negative depths i ID-Inside Diamete
							on (top)	Constructio
						MBERLAND LGOA 35175	CU MU 0 T-DP 4 2:	COUNTY PARISH PORTION-LC
							(do	Licensed (t
						MBERLAND LGOA 35175	CUI MU 1 T-DP 4//2	COUNTY PARISH PORTION-LC
							Ę	Form-A (top

AMG-ZONE COORD-SOURCE REMARK

GIS - Geographic Information System

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Page 3 of 3

157.20 162	157.00 157	151.00 157	148.00 151	145.00 148	143.00 145	139.00 143	135.00 139	119.00 135	118.00 119	77.00 118	72.00 77.0	71.00 72.0	56.00 71.0	4.00 56.(2.50 4.00
2.00 4.80	.20 0.20	,00 6,00	.00 3.00	00 3.00	00 2.00	.00 4.00	.00 4.00	00 16.00	00 1.00	.00 41.00	5.00	00 1.00	00 15.00	00 52.00	0 1.50
Sandstone, grey	Siltstone, & Quartz	Sandstone, grey	Sandstone-Quartz	Sandstone, grey	Sandstone, fine Quartz	Sandstone-Quartz	Sandstone, fine Quartz	Sandstone, grey	Sandstone-Quartz	Sandstone, grey with small brown bands	Sandstone, with Shale bedding	Sandstone, brown	Sandstone, grey with brown bands	Sandstone, light bronw	Sandstone, soft

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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested --- GW106183

Works Details (top)

GROUNDWATER NUMBER	GW106183
LIC-NUM	10BL163499
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2004-07-23
FINAL-DEPTH (metres)	156.00
DRILLED-DEPTH (metres)	156.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	MARCHANT
GWMA	
GW-ZONE	•
STANDING-WATER-LEVEL	143.50
SALINITY	1800.00
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9030-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6253286.00
EASTING	279991.00
LATITUDE	33 50' 16"
LONGITUDE	150 37' 21"
GS-MAP	

PORTION-LC	0T-DP 2//23	35175							
Licensed (<u>t</u>	(do								
COUNTY PARISH PORTION-LC	CUN MUL DT-DP 2 23	11BERLAND .GOA 5175							
Constructi	on (<u>top)</u>								
Negative depths i ID-Inside Diamet	indicate Above er;C-Cemented	Ground Level;H-Ho l;SL-Slot Length;A-A	le;P-Pipe;Ol \perture;GS-	D-Outside E -Grain Size;)iameter; Q-Quantity				
HOLE- PIPE NO NO	COMPON	JENT- COMPO	NENT- D	EPTH- ROM netres)	DEPTH- TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
<u>ب</u>	Hole	Hole	0	.00	11.60	206			Down Hole Hammer
	Hole	Hole	<u>ح</u>	1.60	146.20	159			Down Hole Hammer
<u>ــ</u>	Hole	Hole	<u>ب</u>	46.20	156.00	157.5			Down Hole Hammer
د د	Casing	Steel	L.	0.40	11.60	168	158.4		Welded; Driven into Hole; Open End
<u> </u>	Casing	PVC Cla	- 6 sst	0.40	89.60	140			Screwed and Glued; Suspended in Clamps
<u>د</u>	Annulus	Concrete	е О	.50	11.60	206	159		
Water Bea	ring Zone	(<u>top)</u>							
FROM- DEPTH (metres)	TO- DEPTH (metres)	THICKNESS (metres)	ROCK- CAT- DESC	S-W-L	r D' Aler	D HOL DEP	tres)	DURATIO	N SALINITY
145.00	147.00	2.00		143.50				2.00	1800.00
Drillers Lo	g (top)								
FROM TO 0.00 1.50	THICKN 1.50	ESS DESC clay, brow	3			_	GEO-N	IATERIAL C	OMMENT

AMG-ZONE COORD-SOURCE REMARK GIS - Geographic Information System 56

Form-A (top)

PARISH COUNTY MULGOA CUMBERLAND

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Page 2 of 3

		:	
unknown) 13.00	156.00	143.00
sandstone, light grey & quartz	0.30	143.00	142.70
sandstone, light grey	3.70	142.70	139.00
sandstone, light grey & quartz	0.50	139.00	138.50
sandstone, light grey) 7.50	138.50	131.00
sandstone, light brown	0.50	131.00	130.50
sandstone, light brown grey) 17.90	130.50	112.60
sandstone, light brown	0.10	112.60	112.50
sandstone, light brown	0.50	112.50	112.00
sandstone, dark brown	0.40	112.00	111.60
sandstone, light brown	3.90	111.60	107.70
sandstone, brown	0.10	107.70	107.60
sandstone, light grey	1.40	107.60	106.20
sandstone, brown	0.10	106.20	106.10
sandstone, light brown	3.70	106.10	102,40
sandstone, brown	0.90	102.40	101.50
sandstone, light grey, light brown	11.90	101.50	89.60
sandstone, light grey, dark brown weathered	71.60	89.60	18.00
shale dark grey	6.50	18.00	11.50
shale, grey light brown	5.70	11.50	5.80
shale, grey weather	1.30	5.80	4.50
clay, light brown	1.00	4.50	3.50
ironstone	0.50	3.50	3.00
shale, light brown	1.50	3.00	1.50

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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested --- GW105157

Works Details (top)

Site Details (top) YIELD STANDING-WATER-LEVEL PROPERTY DRILLER-NAME CONTRACTOR-NAME DRILLED-DEPTH (metres) FINAL-DEPTH (metres) COMPLETION-DATE COMMENCE-DATE OWNER-TYPE CONSTRUCTION-METHOD WORK-STATUS WORK-TYPE INTENDED-PURPOSES **AUTHORISED-PURPOSES** LIC-NUM GROUNDWATER NUMBER GW105157 SALINITY **GW-ZONE** GWMA 120.00 Bore IRRIGATION 0.95 τ IRRIGATION SMITH 1981-01-01 10BL157153

EGION 10 - SYDNEY SOUTH COAST VER-BASIN 212 - HAWKESBURY RIVER REA-DISTRICT 9030-3N RID-ZONE 56/1	RID-ZONE 56/1	CALE 1:25,000	LEVATION	LEVATION-SOURCE (Unknown)	ORTHING 6255870.00	ASTING 281042.00	ATITUDE 33 48' 53"	DNGITUDE	S-MAP
r South Coast Esbury River									

AMG-ZONE 56 COORD-SOURCE REMARK

Form-A (top)

PORTION-LOT-DP	PARISH	COUNTY
LT 5 DP 260373	MULGOA	CUMBERLAND

Licensed (top)

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PORTION-LOT-DP	PARISH	COUNTY	
5 260373	MULGOA	CUMBERLAND	

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

-	-	HOLE.
<u>د</u>		NO E-
Casing	Hole	COMPONENT- CODE
P.V.C.	Hole	COMPONENT- TYPE
0.00	0.00	DEPTH- FROM (metres)
0.00	120.00	DEPTH- TO (metres)
150		OD (mm)
		(mm)
		INTERVAL
		DETAIL

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW047458

Works Details (top)

2 2 0 0 E 0 5 7 0 0

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9030-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6256379.00
EASTING	282149.00
LATITUDE	33 48' 37"
LONGITUDE	150 38' 47"
GS-MAP	0056C4

AMG-ZONE	56
COORD-SOURCE	GD.,ACC.MAP
REMARK	

Form-A (top)

PORTION-LOT-DP	PARISH	COUNTY
L4 DP239393 (18)	MULGOA	CUMBERLAND

Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	4 239393

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

NOLE-	1 NO NO NO PIPE-	COMPONENT- CODE Casing	COMPONENT- TYPE P.V.C.	DEPTH- FROM (metres) -0.40	DEPTH- TO (metres) 20.00	OD (mm) 162	(mm)	INTERVAL
ح	<u> </u>	Casing	P.V.C.	-0.40	20.00	162		
<u>ب</u>		Opening	Slots - Horizontal	12.00	20.00	162		

FROM- DEPTH	Water B
TO- DEPTH	earing Zo
THICKNESS	nes (top)
ROCK-CAT-	
Šγ	
D- D- VIELD NEPTH	
DURATION SALINITY	

17.0

FROM- DEPTH (metres)	DEPTH (metres)	THICKNESS (metres)	ROCK-CAT- DESC	₹∾	- YIELD	HOLE- DEPTH (metres)	DURATION SALINITY
17.00	18.30	1.30	Unconsolidated	5.50	0.62		Salty
) = -							

Driller	ŝ T ŝ.	(<u>top)</u>	
FROM	ТО	THICKNESS	DESC GEO-MATERIAL COMMEN
0.00	0.20	0.20	Topsoil Dark
0.20	11.30	11.10	Clay Shale
11.30	17.00	5.70	Clay Grey Shale

17.00 17.00

18.30 1.30 18.30 1.30

18.30

20.00 1.70

Clay Grey Shale

Gravel Fine Rounded Water Supply

Clay Grey

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Page 3 of 3

(DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

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Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

## Work Requested -- GW053969

### Works Details (top)

<b>GROUNDWATER NUMBER</b>	GW053969
LIC-NUM	10BL112638
<b>AUTHORISED-PURPOSES</b>	DOMESTIC IRRIGATION STOCK
INTENDED-PURPOSES	IRRIGATION
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1981-07-01
FINAL-DEPTH (metres)	0.00
DRILLED-DEPTH (metres)	138.70
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	•
GW-ZONE	•
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

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#### Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
<b>RIVER-BASIN</b>	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9030-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6255224.00
EASTING	284233.00
LATITUDE	33 49' 16"
LONGITUDE	150 40' 7"
GS-MAP	0056C4

8/07/2010

#### Form-A (top)

PORTION-LOT-DP	PARISH	COUNTY
L20 DP243554 (25)	MULGOA	CUMBERLAND

#### Licensed (top)

PORTION-LOT-DP	PARISH	COUNTY
LT20 DP243554	MULGOA	CUMBERLAND

## Water Bearing Zones (top)

FROM- DEPTH (metres)	TO- DEPTH (metres)	THICKNESS (metres)	ROCK-CAT- DESC	L S-M-		TEST- HOLE- DEPTH	DURATION SALINITY
106.70	107.00	0.30	Consolidated	36.60	0.15		Good
Drillers	Log (top)						
FROM T	O THIC!	<b>KNESS DESC</b>		GEO	-MATERIAL	COMME	T
0.00 0	.30 0.30	Topsoil					
0.30 4	.60 4.30	Clay Re	ä				

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6.10

33.50

106.70

Shale

Shale Clay Bands Shale Decomposed

106.70 138.70

32.00 73.20 27.40

Sandstone Water Supply

4.60

6.10 33.50

> 1.50 4.30

Page 2 of 2

For information on the meaning of fields please see <u>Glossary</u> Document Generated on Thursday, July 8, 2010

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

## Work Requested -- GW020309

### Works Details (top)

GWMA COMMENCE-DATE **OWNER-TYPE** CONSTRUCTION-METHOD WORK-STATUS WORK-TYPE **AUTHORISED-PURPOSES** LIC-NUM GROUNDWATER NUMBER GW020309 YIELD **GW-ZONE** DRILLED-DEPTH (metres) COMPLETION-DATE INTENDED-PURPOSES SALINITY STANDING-WATER-LEVEL PROPERTY DRILLER-NAME CONTRACTOR-NAME FINAL-DEPTH (metres) Rotary 0.00 Private DOMESTIC (Unknown) Bore 603 - SYDNEY BASIN OIL XPLORATION 1716.00 1960-06-01 10BL010564 ARIDA

#### Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
<b>RIVER-BASIN</b>	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9030-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
<b>ELEVATION-SOURCE</b>	R.L. at Surface
NORTHING	6256363.00
EASTING	281480.00
LATITUDE	33 48' 37"
LONGITUDE	150 38' 21"
GS-MAP	0056C4

AMG-ZONE 56 COORD-SOURCE GD.,ACC.MAP REMARK

#### Form-A (top)

PORTION-LOT-DP	PARISH	COUNTY
18	MULGOA	CUMBERLAND

#### Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	10 260373

#### Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-	PIPE-	COMPONENT-	COMPONENT-	DEPTH-	DEPTH-	8	0	INTERVAL	DETAIL
NO	NO	CODE	ТҮРЕ	(metres)	(metres)	(mm)	(mm)		
ح	د	Casing	Concrete	0.00	0.00	0		-	(Unknown)
<u>د</u>		Casing	Steel	0.00	19.80	457			Cemented
د	<u>د</u>	Casing	Drilled	0.00	19.80	495			(Unknown)
	د	Casing	(Unknown)	0.00	91.90	0		_	(Unknown)
-		Casing	Drilled	19.80	343.80	419		_	(Unknown)
<b>د</b>	<del>د</del>	Casing	Concrete	48.50	48.50	0			(Unknown)
	<u> </u>	Casing	Concrete	72.80	72.80	0		_	(Unknown)
<del>د</del>	<u>د</u>	Casing	Concrete	91.70	91.70	0			(Unknown)
<u>د</u>		Casing	Drilled	91.80	633.70	149			(Unknown)
<u>د</u>	-	Casing	Concrete	109.70	109.70	0			(Unknown)
<u>د</u>	د	Casing	Threaded Steel	205.70	324.00	340			Cemented
<u>ح</u>	<u>د</u>	Casing	Concrete	243.80	243.80	0			(Unknown)
د	<u>~</u>	Casing	Drilled	324.00	842.20	318			(Unknown)
<u>د</u>	<u>د</u>	Casing	Concrete	326.10	326.10	0			(Unknown)
<u>د</u>	د	Casing	Concrete	393.10	393.10	0			(Unknown)
د.	<u>~~</u>	Casing	Concrete	395.90	395.90	0			(Unknown)
	<u> </u>	Casing	Concrete	399.80	399.80	0			(Unknown)
-	-	Casing	Concrete	475.20	475.20	0			(Unknown)
<b>د</b>	~	Casing	Concrete	485.80	485.80	0			(Unknown)
-	<u>د</u>	Casing	Concrete	499.80	499.80	0			(Unknown)
-	-	Casing	Concrete	566.90	566.90	0			(Unknown)
-	-	Casing	Concrete	621.70	621.70	0			(Unknown)
<b>د.</b>	د.	Casing	Concrete	630.90	630.90	0			(Unknown)
-		Casing	Concrete	658.10	658.10	0			(Unknown)

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(Unknown)	0	981.40	981.40	Concrete	Casing	<u> </u>	
(Unknown)	0	947.90	947.90	Concrete	Casing	<u>د</u>	<b>_</b>
(Unknown)	0	859.50	859.50	Concrete	Casing	<u>د</u>	<u>د</u>
(Unknown)	222	1091.80	842.20	Drilled	Casing		<u> </u>
(Unknown)	0	792.40	792.40	Concrete	Casing	-	<b>→</b>
(Unknown)	0	783.30	783.30	Concrete	Casing	د	>

## Water Bearing Zones (top)

FROM- DEPTH (metres)	TO- DEPTH (metres)	THICKNESS (metres)	ROCK-CAT- DESC	S-W-L D-	TEST- YIELD HOLE- DEPTH (metres)	DURATION SALINITY
146.30	146.30	0.00	Consolidated			0-500 ppm
173.40	173.40	0.00	Consolidated	126.40	3.79	0-500 ppm
323.00	323.00	0.00	(Unknown)			501-1000 ppm
333.70	336.70	3.00	Consolidated		0.00	0-500 ppm
342.20	342.20	0.00	(Unknown)			(Unknown)
377.90	377.90	0.00	(Unknown)			(Unknown)
400.80	400.80	0.00	(Unknown)			(Unknown)
413.90	413.90	0.00	(Unknown)			(Unknown)
426.70	426.70	0.00	(Unknown)			(Unknown)
430.30	430,30	0.00	(Unknown)	91.40		(Unknown)
441.90	441.90	0.00	(Unknown)			(Unknown)
460.20	463.20	3.00	(Unknown)			(Unknown)
510.50	510.50	0.00	(Unknown)		0.13	(Unknown)
541.00	541.00	0.00	(Unknown)			(Unknown)
560.50	560.50	0.00	Consolidated	181.30		(Unknown)
780.80	780.80	0.00	(Unknown)		1.26	10001- 14000 ppm
871.40	871.40	0.00	(Unknown)			(Unknown)
1399.00	1399.00	0.00	(Unknown)		0.00	10001- 14000 ppm
1477.00	1477.00	0.00	(Unknown)			10001- 14000 ppm
1659.60	1659.60	0.00	(Unknown)		0.13	10001- 14000 ppm
Drillers	Log ( <u>top)</u>					

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

no details

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Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

## Work Requested -- GW105854

Works Details (top)

YIELD DRILLER-NAME DRILLED-DEPTH (metres) FINAL-DEPTH (metres) COMPLETION-DATE COMMENCE-DATE **OWNER-TYPE** CONSTRUCTION-METHOD WORK-STATUS WORK-TYPE INTENDED-PURPOSES **AUTHORISED-PURPOSES** GROUNDWATER NUMBER GW105854 SALINITY STANDING-WATER-LEVEL **GW-ZONE** PROPERTY CONTRACTOR-NAME LIC-NUM GWMA DOMESTIC STOCK ı Bore BROWN 2005-05-04 10BL163242

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
<b>RIVER-BASIN</b>	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9030-3N
GRID-ZONE	56/1
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6253881.00
EASTING	280958.00
LATITUDE	33 49' 57"
LONGITUDE	150 37' 59"
GS-MAP	

#### Form-A (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	65 247308

#### Licensed (top)

COUNTY	CUMBERLAND
PARISH	MULGOA
PORTION-LOT-DP	65 247308

## Water Bearing Zones (top)

no details

#### Drillers Log (top)

no details

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For information on the meaning of fields please see <u>Glossary</u> Document Generated on Thursday, July 8, 2010

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

## Work Requested -- GW075160

### Works Details (top)

GROUNDWATER NUMBER	GW075160
LIC-NUM	10WM000003
AUTHORISED-PURPOSES	TOWN WATER SUPPLY
INTENDED-PURPOSES	TEST BORE TOWN WATER SUPPLY
WORK-TYPE	Bore
WORK-STATUS	Supply Obtained
CONSTRUCTION-METHOD	Down Hole Hammer
OWNER-TYPE	Other Govt
COMMENCE-DATE	
COMPLETION-DATE	2007-08-15
FINAL-DEPTH (metres)	348.00
DRILLED-DEPTH (metres)	348.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	SYDNEY CATCHMENT
GWMA	•
GW-ZONE	•
STANDING-WATER-LEVEL	
SALINITY	
YIELD	16.50
Site Details ( <u>top)</u>	
REGION 10 -	SYDNEY SOUTH COAST
RIVER-BASIN 212	- HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP 903	0-3N

REGION	10 - SYDNEY SOUTH COAST
<b>RIVER-BASIN</b>	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	9030-3N
<b>GRID-ZONE</b>	56/1
SCALE	1:25,000
ELEVATION	
<b>ELEVATION-SOURCE</b>	
NORTHING	6251791.00
EASTING	282174.00
LATITUDE	33 51' 6"
LONGITUDE	150 38' 44"
GS-MAP	

-

AMG-ZONE	56
COORD-SOURCE	GPS - Global Positioning System
REMARK	

#### Form-A (top)

COUNTY C	UMBERLAND 1ULGOA
COUNTY	UMBERLAND
PARISH N	<b>1</b> ULGOA
PORTION-LOT-DP 2	//340271

#### Licensed (top)

no details

#### Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

Water	<u>ح</u>	ح	<b>د</b>	<b>ب</b>	د.	<u>ح</u>		<u>د</u>	HOLE-
Beari	<b>د</b>	<u>~</u>	<u>ح</u>	<u>حـ</u>					PIPE- NO
ing Zones <u>(to</u> p	Opening	Casing	Casing	Casing	Hole	Hole	Hole	Hole	COMPONENT- CODE
0)	Slots - Horizontal	Steel	Pressure Cemented Casing	Steel	Hole	Hole	Hole	Hole	COMPONENT- TYPE
	102.00	0.00	0.00	0.00	120.00	84.00	4.00	0.00	DEPTH- FROM (metres)
	120.00	120.00	84.00	4.00	348.00	120.00	84.00	4.00	DEPTH- TO (metres)
	219	219	273	323	165	254	300	400	OD (mm)
		209.4	260.2	310.2					(mm) CID
									INTERVAL
	Steel; Casing - Plasma-cut Slot; SL: 18mm; A: 3mm; Welded	Welded; Driven into Hole; Open End	Welded; Driven into Hole; Open End	Welded; Driven into Hole; Open End	Down Hole Hammer	Down Hole Hammer	Down Hole Hammer	Down Hole Hammer	DETAIL

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FROM-DEPTH (metres)

> TO-DEPTH THICKNESS (metres) (metres)

ROCK-CAT-DESC

г¢ф

YIELD DEPTH (metres)

DURATION SALINITY

2				
0.97	1.20	1.00	205.00	204.00
1.21	0.80	1.00	187.00	186.00
3.42	0.80	1.00	121.00	120.00
	2.00	1.00	63.00	62.00

FROM	TO	THICKNESS	) DESC	GEO-MATERIAL COMMENT
0.00	2.00	2.00	Clay	
2.00	5.00	3.00	Clay, white	
5.00	60.00	55.00	Shale	
60.00	72.00	12.00	Shale, Sandstone bands	
72.00	130.00	58.00	Sandstone, fine	
130.00	136.00	6.00	Shale	
136.00	324.00	188.00	Sandstone, coarse, white-grey	
324.00	330.00	6.00	Siltstone, hard, grey	
330.00	333.00	3.00	Claystone, red	
333.00	336.00	3.00	Siltstone, grey	
336.00	348.00	12.00	Sandstone, white	

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#### Appendix C

Site Photographs



Photo 1 - View looking north across eastern part of Lot 1 between existing dwelling and Mulgoa Road



Photo 2 - View looking east across central eastern part of Lot 1 between Dam 1 and existing dwelling

<b>Douglas Partners</b> Geotechnics   Environment   Groundwater	General Site Photographs	PROJECT:	71706.01
	Proposed Development	PLATE No:	1
	Eastern Precinct, Fernhill Estate, Mulgoa Rd, Mulgoa	REV.	В
	CLIENT: Cubelic Holdings Pty Ltd	DATE:	3-Aug-10





#### Appendix D

Test Pit Logs



#### 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 thinwalled 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 insitu 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
### Sampling Methods

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

### Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

### Soil Descriptions

### **Description and Classification Methods**

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

### Soil Types

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

Туре	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:

Туре	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	Ĵ Î	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 Descriptions

### **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 I	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2-6
Medium	М	0.3 - 1.0	6 - 20
High	Н	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EĤ	>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:

RQD % = <u>cumulative length of 'sound' core sections ≥ 100 mm long</u> 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

### 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

$\triangleright$	Water seep
$\nabla$	Water level

### Sampling and Testing

- Auger sample A
- в Bulk sample
- D Disturbed sample
- Е Environmental sample
- U₅₀ Undisturbed tube sample (50mm)
- W Water sample
- pocket penetrometer (kPa) pp
- 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**

В	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
- vertical ٧
- sub-horizontal sh
- sub-vertical SV

### **Coating or Infilling Term**

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

### **Coating Descriptor**

calcite
carbonaceous
clay
iron oxide
manganese
silty

### Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

### Roughness

ро	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

$\times\!\!\!\times\!\!\!\times$	

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



Limestone

### **Metamorphic Rocks**

Slate, phyllite, schist

Quartzite

Gneiss

### **Igneous Rocks**

Granite

Dolerite, basalt, andesite

Dacite, epidote

Tuff, breccia

Porphyry



CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 71.5 AHD **EASTING:** 282648 **NORTHING:** 6253569

PIT No: 101 PROJECT No: 71706 DATE: 23/4/2010

			Ę	YAZIN		: 90°/-		ഗ	HEET 1 OF	
RL (m)	of Strata	Graphic Log	Туре	Depth		Results & Comments		Water	Dynamic Penetro (blows per ) 5 10	ymeter Omm) 15
	TOPSOIL - firm, dark brown, silty clay with some rootlets. damp	Z							······	
71 	SILTY CLAY - stiff, brown grey and orange brown, sility clay									
0.95	SANDSTONE - very low strength, highly weathered, grey, fine grained sandstone with a trace of orange brown sity clay		<u> </u>	+					·	
	Pit discontinued at 0.95m - refusal on medium strength sandstone				<del></del>			• ·····	<u>د</u>	
				. <u> </u>				<del>, , , , ,</del>		
· · · · · · · · · · · · · · · · · · ·								, ,	N 	••••••
69										•••••
· · · · · · · · · · ·	· · · · ·							, , , , , , ,	ω	
68								<del>,,,,,</del>		
	·							• • • •		
67										
· · · · ·										
RIG: Case	58 Backhoe		5	GED:	₽					
WATER OI REMARKS	BSERVATIONS: No free groundwater observed :: Survey levels taken from survey plans provided by	Urbis I	Pty Lto						and Penetrometer	r AS12 r AS12
A Auger sar D Disturbed B Bulk samp U, Tube sam W Water san	SAMPLING & IN SITU TESTING LEGEND       pp     pp Pocket penetrometer (kPa)       sample     piD Photo ionisation detector       pipe (x mm dia.)     PL Point iona strength Is(50) MPa       pipe (x mm dia.)     V		CHEO				õ	<u>l</u>	las Par	Ť.
W Water san	ple (x mm dia.) PL Point toad strength Is(50) MPa	<u></u>	t ∕~	8 0			Č	G	Ids Fai	

CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 69.5 AHD **EASTING:** 282569 **NORTHING:** 6253594

PIT No: 102 PROJECT No: 71706 DATE: 23/4/2010

<b>iglas Partners</b> nics · Environment · Groundwater		8. D	CHEC Initials: A Date: 3	SAMPLING & IN SITU TESTING LEGEND ple pp Pockel penetrometer (kPa) provide pp Pockel penetrometer (kPa) plo Photo ionisation detector standard penetration test plo Photo ionisation detector standard penetration test plo Photo ionisation detector plo Photo ionisation dete	A Auger sam D Disturbed : B Buik samp U, Tube samy W Water sam C Core drillin
<ul> <li>Sand Penetrometer AS1289.6.3.3</li> <li>Cone Penetrometer AS1289.6.3.2</li> </ul>	U	IGED: AF	LOC rbis Pty Ltc	58 Backhoe •SERVATIONS: No free groundwater observed Survey levels taken from survey plans provided by L	RIG: Case WATER OE REMARKS:
				- refusal on medium strength sandstone	
		1.0		SANDSTONE - low strength, grey, fine grained sandstone with some ironstone banding	· · ·
		0.5 <u>5</u> 		TOPSOIL - stiff, brown, silty clay with some rootlets SILTY CLAY - very stiff, brown grey, silty clay with a trace of rootlets, medium to high plasticity SILTY CLAY - very stiff, orange brown, silty clay, medium to high plasticity	
Water Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20	& In Situ Testing Results & Comments	Depth Sampling	Type	Description of Strata	RL (m)
SHEET 1 OF 1	TH: 90°/	/AZIMU			

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 68.5 AHD **EASTING:** 282691 **NORTHING:** 6253639 **DIP/AZIMUTH:** 90°/--

PIT No: 103 PROJECT No: 71706 DATE: 21/4/2010

			DIP//	ZIML	JTH: 90°/	6	SHEET 1 OF 1
L Depth	Description	g	s S	ampling	& In Situ Testing	er	Dvnamic Penetrometer Test
RI (E)	Of Grap		Depth	Sample	Results & Comments	Wate	blows per 0mm) 5 10 15 20
	TOPSOIL - firm, dark brown, silty clay with some rootlets, damp	777					
68 0	SILTY CLAY - very stiff, orange brown and red brown, silty clay with a trace of ironstone gravel, medium plasticity	<u>_</u>		<u> </u>			
				••••••••••••••••••••••••••••••••••••••		······································	·····
	SHALE - extremely low to low strength, extremely to						
N							<u>, к</u>
	2.1m: low to medium strength	<u>      </u>					
	Pit discontinued at 2.3m - practical refusal on low to medium strength shale						
		<u>-</u>				······································	۵ 
65							
			<u></u>			··	<u>ن</u>
64						······	
						······	
RIG: Case	58 Backhoe	F	-0GG	ED: Af	U		
WATER OF	3SERVATIONS: No free groundwater observed Survey levels taken from survey plans provided by Urt	is Pty	Ltd				Sand Penetrometer AS1289.6.3 Cone Penetrometer AS1289.6.3

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) S Bandard penetration test mm dia.) P Point load strength 1s(50) MPa V Shaart Yane (kPa) V Shaart Yane (kPa) V Shaart Yane (kPa)

Date: 3.8.10

CHECKED

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CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 70.0 AHD EASTING: 282615 NORTHING: 6253657

PIT No: 104 PROJECT No: 71706 DATE: 21/4/2010

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND P Pookel penetrometer (Pa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(S0) MPa V Stear Vane (Pa) V Water seep * Water level

Initials: RCB

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CHECKED

Date: 3,8,10

CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 69.0 AHD EASTING: 282563 NORTHING: 6253671 DID/AZIMITH: 00°/-

PIT No: 105 PROJECT No: 71706 DATE: 21/4/2010 SUFET 1 OF 1

				DIP	IAZIN	НГОИ	-/,06	(1)	SHEET 1 OF 1	
	7 #	Description	nic		Sampli	ng & In	) Situ Testing	er		4
RL	(m)	of Strata	Grapi Log	Туре	Depth	sample	Results & Comments	Wate	Uynamic Penetron (blows per Ot	nm) 20
		TOPSOIL - firm, dark brown, silty clay with some rootlets, damp	Ð							
	92.0	SILTY CLAY - stiff, mottled red brown and grey, silty day with a trace of ironstone gravel, medium to high plasticity	<u> </u>							
, , ,					0.8 5		pp = 420kPa			
68	<u> </u>				2		2011 H		·····	
		SANDSTONE - extremely low strength, extremely weathered, grey, fine grained sandstone							· · · · · · · · · · · · · · · · · · ·	
<del></del>		1.3m: low to medium strength							•••••	
	 بر هز	Pit discontinued at 1.4m - practical refusal on low to medium strength sandstone								
65 66 67	۵٬۰۰۰ ۵٬۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰									
[				-	-	-		-		
문	3: Case	58 Backhoe		LOG	GED:	AP				
문 옷	MARKS	BSERVATIONS: No free groundwater observed Survey levels taken from survey plans provided by	Urbis	Pty Ltd					Sand Penetrometer Cone Penetrometer	AS1289.6.3.3 AS1289.6.3.2
o≦⊂∞□>	Auger san Disturbed Bulk samp Tube sam	SAMPLING & IN SITU TESTING LEGEND       sample     pp       sample     PID       ple     Standard penetromater (kPa)       ple     PL       point load sterringth is(5D) MPa       rple     V	2 3				Do	<u>9</u>	las Part	iners
6	Core drillin	ng D> Water seep ` ≇ Water level		ate:	10 10		Context Geoter	shnics	s - Environment - G	roundwater

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 65.5 AHD EASTING: 282728 NORTHING: 6253727 DIP/AZIMUTH: 90°/--

PIT No: 106 PROJECT No: 71706 DATE: 22/4/2010

		;		Same	הם & הה	Situ Tasting		
(m)	of Strata	Graphi Log	Туре	Depth	Sample	Results & Comments	Water	Dynamic Pene (blows pei
TOPSOII rootlets, c	stiff, dark brown, silty clay with some damp	<u>F</u> C	0	.25	;			
0.32 SILTY CL a trace of	AY - very stiff to hard, red brown, silty clay with f ironstone gravel	<u> </u>	0	5				······
0.6 SHALE - grey shale	extremely low strength, extremely weathered, e with some orange brown sitty clay seams							
			U	1.0				
1.3 SANDSTI weathered	ONE - extremely low strength, extremely d, grey, fine grained sandstone			1.5			· · · · · · ·	
1.8 SHALE to highly v	extremely low to very low strength, extremely weathered, grey shale		0	2.0			·	
2.3 2.2m: low	to medium strength						 ,	 
- practice	al refusal on low to medium strength shale		· · · · · · · · · · · · · · · · · · ·				······································	-

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Auger sample Disturbed sample Bulk sample (x mm dia,) Water sampte Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetromater (APa) PID Photo ionisation deactor S Standard penetration test PL Point load stength Is(50) MPa V Shear Vrane (APa) D Water seep T Water level

Initials: 208 Date: 3.8.10

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CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 67.5 AHD EASTING: 282586 NORTHING: 6253728 DIP/AZIMUTH: 90°/--

PIT No: 107 PROJECT No: 71706 DATE: 21/4/2010 SHEET 1 OF 1

			!					
L Depth	Description	ohic g		San	8 Buildt	In Situ Testing	er	Dvnamic Penetron
R (1) (1)	of Strata	Grap Lo	Туре	Depth	Sample	Results & Comments	Wat	(blows per Or 5 10 15
· · · · ·	TOPSOIL - firm to stiff, brown, silty clay with some rootlets and a trace of gravel, damp	ZZ						
<u>67</u> ,	3 SILTY CLAY - stiff to very stiff, silty clay with a trace of ironstone gravel, medium to high plasticity	<u>[]]</u>	σ	0.5	-		- <del></del>	
<u> </u>		┤╌╎╌╎╌╎╌╎╌╎╴ ┤╶╎╶╎╶╎╶╎╴╎╴	0	1.0				
, , , , , , , , , , , , , , , , , , ,	SHALE - extremely low to very low strength, extremely to highly weathered, grey shale							
								~
2	SANDSTONE - low strength, highly weathered, grey, fine grained sandstone	· · · · ·					, <u>, .</u> ,.,.	
<u>65</u>	2.5m: low to medium strength							
ω ω	Pit discontinued at 2.6m - practical refusal on low to medium strength sandstone							
<u>- 1 1 1 - 1 1 - 1 1 1 1 1 1 1 1 1 1 1 1</u>								
4		·····		10-14 1			· · · ·	
• • • •								
<u> </u>								·····
							····	
lG: Cas	e 58 Backhoe		5	GGEI	D: AP			
IATER C	DBSERVATIONS: No free groundwater observed S: Survev levels taken from survev plans provided by	l Irbis F	Pt Lt	2			ີ 🗆 . ລຸດ	and Penetrometer
EMARK	S: Survey levels taken from survey plans provided by	Urbis F	Pty Lt	Δ.				one Penetrometer

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND P Pocket penetrometer (kPa) P Photo issuina detector S Standard penetration test P Point load strength Is(50) MPa P Shear Vane (kPa) V Shear Vane (kPa) P Water seep ¥ Water ley

Water level

Date: 3.8.10

Initials: RCB CHECKED

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CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 68.5 AHD EASTING: 282543 NORTHING: 6253765 DID/AZIMITH: 60°/-

PIT NO: 108 PROJECT NO: 71706 DATE: 21/4/2010 SUFET 1 OF 1

				ALL ALL			-	
L Depth	Description	phic g	-	Samp	ling & In	Situ Testing	l ter	Dyna
R (11)	of Strata	Grap Lo	Туре	Depth	3ample	Results & Comments	Wai	5
	TOPSOIL - stiff, dark brown, silty clay with some rootlets, damp	<u>7</u>						
	SILTY CLAY - stiff to very stiff, mottled red brown and orange brown, silty clay with some grey shale gravel, medium to high plasticity	<u>777777</u>		0.5				
······································	SANDSTONE - extremely low to low strength, extremely to highly weathered, grey, fine grained sandstone		۳ 	.0				, , ,
67		· · · · · · · · · · · · · · · · · · ·						· · · · · · · · · · · · · · · · · · ·
· · · · · · · · · · · · · · · · · · ·	1.7m; medium strength							•••••
	Pit discontinued at 1.8m - practical refusal on medium strength sandstone							N .
<u>66</u>			·····					
·····································				<u></u> _				ω
65								
▶								
								·····
64								· · · · · · · · · · · · · · · · · · ·
								· · · ·
RIG: Case	58 Backhoe		L0G	GED	AP -			
WATER O	BSERVATIONS: No free groundwater observed S: Survey levels taken from survey plans provided by	l Irhic D	* <b> </b> <del>1</del>				30	Sand Pe
REMARKS	Survey levels taken from survey plans provided by	Urbis P	ty Ltd				$\boxtimes$	Cone Pe

SAMPLING & IN SITU TESTING LEGEND pp Pockel penetometer (kPa) Ie Picto konsation detector Standard penetration test pL Point load strength Is(50) MPa V Stater seep ¥ Water lev Water level Initials: RCB 9

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 66.5 AHD EASTING: 282737 NORTHING: 6253796 DIP/AZIMUTH: 90°/--

PIT No: 109 PROJECT No: 71706 DATE: 22/4/2010 SHFFT 1 OF 1

Description       Sample         of       Strata         Strata       Strata         PSOIL - firm, dark brown, silty clay with some       GraLog         Itets and gravel, damp       GraLog         race of ironstone gravel       U         ALE - extremely low strength, extremely weathered, y shale with orange brown silty clay seams       U         0.8       U         0.8       U         0.8       U         0.9       U         0.8       U         0.8       U         0.9       U	Description       Sampling & In         of       Strata         PSOIL - firm, dark brown, silty clay with some       Grapping & In         Itets and gravel, damp       Itel brown, silty clay with some         race of ironstone gravel       U         ALE - extremely low strength, extremely weathered, y shale with orange brown silty clay seams       U         0.8       U         0.8       U         0.8       U         0.8       U         0.8       U         0.8       U         0.9       0.9         0.10       0.10         0.11       U         0.12       0.12         0.13       U         0.14       U         0.15       U         0.16       U         0.17       U         0.18       U         0.16       U         0.17       U         0.18       U         0.19       U         0.11       U         0.11       U         0.12       U         0.13       U         0.14       U         0.15       U <tr< th=""><th>Description     cite     Sampling &amp; In Situ Testing       of     Strata     Strata       PSOIL - firm, dark brown, sitly clay with some     G     Type       Itels and gravel, damp     results &amp;     Comments       TY CLAY - slift to very stiff, red brown, silty clay with     0.6     pp&gt;400kPa       ALE - extremely low strength, extremely weathered,    </th><th></th><th>RL (m)</th><th>07 50</th><th></th><th>·····</th><th>gree</th><th><u>65</u></th><th></th><th>······································</th><th></th><th></th><th></th><th></th><th></th><th></th></tr<>	Description     cite     Sampling & In Situ Testing       of     Strata     Strata       PSOIL - firm, dark brown, sitly clay with some     G     Type       Itels and gravel, damp     results &     Comments       TY CLAY - slift to very stiff, red brown, silty clay with     0.6     pp>400kPa       ALE - extremely low strength, extremely weathered,		RL (m)	07 50		·····	gree	<u>65</u>		······································						
Graphic Log C Type Omego Son Depth Son C Depth	Image: Constraint of the second se	d, Graphic Log Graphic Log Graphic Log C Depth Sample Results & Comments Sample Sample Pp>400kPa	Description	of Strata	PSOIL - firm, dark brown, silty clay with some tlets and gravel, damp	TY CLAY - stiff to very stiff, red brown, silty clay w ace of ironstone gravel		ALE - extremely low strength, extremely weathered y shale with orange brown silty clay seams		n: ironstone band		n: low strength	n: low strength n: medium strength	n: low strength n: medium strength discontinued at 3.2m ractical refusal on medium strength shale	n: low strength n: medium strength discontinued at 3.2m ractical refusal on medium strength shale	n: medium strength n: medium strength actical refusal on medium strength shale	n: low strength n: medium strength discontinued at 3.2m ractical refusal on medium strength shale
C Type C Depth Marg	C Type C Depth Sample Sample	C     Type       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0     0.6       0	ic	Graph Log	Ľ	₩  - - - - - - - - - - - - - - - - - - -											
Depth of Depth	Sample	0.6 Depth Sample Sample 0.6 Sample Comments & Comments	;	Туре	<u> </u>					· · · · · · · · · · · · · · · · · · ·							
	Sample 5 S	Sample ing & In Situ Testing Pp>4000kPa	Sampl	Depth		0.0	0.8		,			-					
pp>400kPa Water	Water			Dynamic Penetro (blows per ( 5 10 1						N			ω	ω	ω 4	ω 4	ω 4
Situ Testing     tr Results &     Dynamic Penetro Wat       pp>400kPa     -1       -1     -2	-2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -	Dynamic Penetro (blows per ( 10		meter Test Jmm) 15 20													

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Auger sample Diskurbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

JG & IN SITU TESTING LEGEND pp Packel penetrometer (kPa) piD Packel penetrometer (kPa) S Standard penetration test pL Point/bad strength Is(50) MPa ∨ Sheat Vane (kPa) V Alter seep 
¥ Water level

CHECKED

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**Douglas Partners** Geolechnics - Environment - Groundwater

Date: 3.8.10

SAMPLING

CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 65.5 AHD **EASTING:** 282635 **NORTHING:** 6253787

PIT No: 110 PROJECT No: 71706 DATE: 22/4/2010

ω 20 <u>10 10 10 10 10 10 10 10 10 10 10 10 10 1</u>	 .2	<u>, s</u>	64	RL (m) (TPpt	-
	<ul> <li>Pit discontinued at 2.5m</li> <li>practical refusal on low to medium strength shale</li> </ul>	2.300 io mealum strength, dark grey brown	TOPSOIL - stiff, dark brown, silty clay with some rootlets and gravel, damp SILTY CLAY - stiff to very sliff, mottled red brown and grey, silty clay with a trace of rootlets, medium to high plasticity SHALE - extremely low strength, extremely weathered, grey shale with red brown silty clay seams	of Strata	Description
				Graphi Log	c
				Туре	
			-1. 0.0.0. 0.5.4.3.2	Depth	Sam
			s	lample	pling &
				Results & Comments	In Situ Testing
_				Water	_
				Dynamic Penetrome (blows per 150n	
				ter Test ווחו)	ļ

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Auger sample Disturbed sample Bulk sample (X mm dia.) Vater sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetromater (KPa) PID Photo ionisation detector S Standard penetration test PL Point load strength (KPa) V Shear Vane (KPa) b Water seep ¥ Water level

Initials: RCB Date: 3 .8. 60

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CHECKED

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

 SURFACE LEVEL:
 63.5 AHD

 EASTING:
 282475

 NORTHING:
 6253800

 DIP/AZIMUTH:
 90°/-

PIT No: 111 PROJECT No: 71706 DATE: 21/4/2010

0.2     TOPSOLL - firm to stiff, brown, silty clay with some rootiets, humid to damp     G     F     b       0.2     SILTY CLAY - very stiff, red brown, silty clay, medium to high plasticity     D     0.25       1     SANDSTONE - extremely low strength, extremely     D     0.25       SSALDSTONE - low to medium strength, moderately     D     0.5       1.3     SHALE - low to medium strength, moderately     D     1.0       1.8     Pit discontinued at 1.8m     D     1.5       - practical refusal on low to medium strength shale     D     1.5	Strata <u>G</u> <u>Strata</u>	Strata     Strata       0.2     TOPSOLI- finn to stifl, brown, silv day with some rodes, four, very stifl, red brown, silv day, medium to high plasticity     p     p     p     p       1     SILTY CLAY - very stifl, red brown, silv day, medium to high plasticity     p     p     p     p       1     SILTY CLAY - very stifl, red brown, silv day, medium to weathered, grey, fine grained sandstone     p     p     p     p       1     SILTY CLAY - very stiff, red brown, silv day, medium strength, extremely weathered, dark grey brown shale     p     p     p       1     PH discontinued at 1.8m - practical refusal on low to medium strength shale     p     p     p       2     - station - practical refusal on low to medium strength shale     p     p     p       2     - station - practical refusal on low to medium strength shale     p     p       2     - station - practical refusal on low to medium strength shale     p     p	RL Depth	Description of	raphic Log		samp Samp		n Situ Testi	
0.22     SILTY CLAY - very stiff, red brown, silly clay, medium to the high plasticity     D     0.25       0.13     SHALE - low to medium strength, moderately weathered, grey, fine grained sandstone     D     1.0       1.3     SHALE - low to medium strength, moderately weathered, dark grey brown shale     D     1.0       1.4     Pit discontinued at 1.8m     D     1.5	0.2     SILTY CLAY: very stiff, red brown, silty clay, medium to billy clay, medium strength, extremely class clas cla	0.2     SILTY CLAY - very stiff, red trown, sity day, medium to high plasticity     0     0.3       0.3     SANOSTIONE: extremely low strength, extremely weathered, grey, fine grained sandstone     0     0       1.3     SHALE - low to medium strength, moderately weathered, dark grey trown shale     0     1.0       1.9     Pt discontinued at 1.3m - practical refusal on low to medium strength shale     0     1.5       1.9     Pt discontinued at 1.3m - practical refusal on low to medium strength shale     0     1.5       1.9     Pt discontinued at 1.3m - practical refusal on low to medium strength shale     0     1.6       1.9     Dt discontinued at 1.3m - practical refusal on low to medium strength shale     0     1.6	(m)	of Strata	Grap	Туре	Depth	Sample		Results & Comments
0.9     SANDSTONE - extremely low strength, extremely     0     0.5       1.3     SHALE - low to medium strength, moderately     0     1.0       1.8     Pit discontinued at 1.8m     0     1.5       - practical refusal on low to medium strength shale     0     1.8	high plasticity     b       0.0     SANDSTONE - extremely low strength, extremely     0     0.5       1.3     SHALE - low to medium strength, moderately	0.0     SANUSTONE - extremely low strength, extremely     0     0.5       1.3     SHALE - low to medium strength, moderately     0     1.0       1.3     SHALE - low to medium strength, moderately     0     1.0       1.4     Pit discontinued at 1.8m     0     1.5       1.5     0     1.5     0       1.6     Prediscontinued at 1.8m     0     1.5       1.7	0.22	rootlets, numid to damp SILTY CLAY - very stiff, red brown, silty clay, medium to	ŽŽ	0	0.25			
0.9       SANDSTONE - extremely low strength, extremely       D       1.0         1.3       SHALE - low to medium strength, moderately	0.9       SANDSTONE - extremely low strength, extremely       p       1.0         1.3       SHALE - low to medium strength, moderately	0.0     SANDSTONE - extremely low strength, extremely     b     1.0       1.3     SHALE - low to medium strength, moderately				D	0.5			
1.3       SHALE - low to medium strength, moderately	1.3 SHALE - low to medium strength, moderately weathered, dark grey brown shale - practical refusal on low to medium strength shale	1.3 SHALE - low to medium strength, moderately weathered, dark grey brown shale Pit discontinued at 1.3m - practical refusal on low to medium strength shale 		SANDSTONE - extremely low strength, extremely weathered, grey, fine grained sandstone		σ	۲. 0			
2 Pit discontinued at 1.8m - practical refusal on low to medium strength shale	4 3 1.8m - practical refusal on low to medium strength shale	Case 58 Backhoe	ىت. نې	SHALE - low to medium strength, moderately weathered, dark grey brown shale		0				
	4	Case 58 Backhoe	ω Ν	- practical refusal on low to medium strength shate						

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core dniling

SAMPLING & IN SITU TESTING LEGEND pp Prodet penetrometer (kPa) ale PID Photo ionsation detector S Standard penetration test mm dia.) PL Point load strength 1s(50) MPa V Shear Vane (kPa) V Shear Vane (kPa) V Shear Vane (kPa) V Shear Vane (kPa)

Initials: RCB

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**Douglas Partners** Geotechnics · Environment · Groundwater CHECKED

Date: 3.8.10

CLIENT: PROJECT; LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 61.5 AHD EASTING: 282505 NORTHING: 6253839

PIT No: 112 PROJECT No: 71706 DATE: 21/4/2010

	RIG: C WATER REMAR	57 58 ω	59 			<u>61</u>		RL (T) P	
SAMPLING & IN SITU TESTING LEGEND pp Pocksi peneirometer hurbed sample PID Photoionisation dete S Standard genetration pp Pock penetration	2ase 58 Backhoe R OBSERVATIONS: No free groundwater obser RKS: Survey levels taken from survey plans		Pit discontinued at 2.0m refusal on medium strength shale	1.7m: medium strength, dark grey brown	1.1 SHALE - extremely low to very low strength, to highly weathered, grey shale	0.41 SILTY CLAY - stiff to very stiff, red brown th brown and grey, slity clay with a trace of iror gravel	TOPSOIL - firm to stiff, dark brown, silty clar rootlets, damp	Description p) of Strata	
(KPa) Stor Stor Stor Stor Stor CHECKED	LOGGED: A ved provided by Urbis Pty Ltd				extremely	nstone D 0.5	v with some	Graphic Log Type Depth	
	Ū							Results & Comments	UH: 90'/
uglas Partners	□ Sand Penetrometer AS1289.6.3.3 ⊠ Cone Penetrometer AS1289.6.3.2	Δ. Δ				<b></b>		Water Dynamic Penetrometer Test (blows per 150mm)	

\$ **Douglas Partners** Geotechnics - Environment - Groundwater



CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

 SURFACE LEVEL:
 61.0 AHD

 EASTING:
 282577

 NORTHING:
 6253828

 DIP/AZIMUTH:
 90°/-

PIT No: 113 PROJECT No: 71706 DATE: 22/4/2010 SHEET 1 OF 1

57 <b>1 1 1 1 1 1 1 1 1 1</b>	-γ <u>- 58</u> ω ν	· · · · · · · · · · · · · · · · · · ·	59 N			61 F (T)	L. Depth
	2.6m: medium strength, dark grey brown Pit discontinued at 2.7m - refusat on medium strength shale	SHALE - low strength, highly weathered, grey and dark grey shale	SHALE - extremely low strength, extremely weathered, grey shale with some orange brown silty clay		a trace of gravel SILTY CLAY - stiff, mottled orange brown and grey, silty clay with a trace of ironstone gravel, medium plasticity	TOPSOIL - firm, brown, silty clay with some rootlets and	Description
	      				<u> </u>	Grap	ohic g
					·····	Туре	
						Depth	Samp
						Sample	a ling &
						Results & Comments	n Situ Testing
	·····	, , , , , , , , , , , , , , , , , , ,		· · · · · · · · · · · · · · · · · · ·		Wat	er
	۵۵ مـ 		N	-		5 10 15	Dynamic Penefron
••••						חח) 20	lefer Test

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (RPa) Pib Prodo ionisation delector Sandard penetration telector Situatard penetration telector PL Point load stength Is(50) MPa V Shear Vane (RPa) V Water seep ¥ Water level

Initials: RCB

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**Douglas Partners** Geotechnics · Environment · Groundwater CHECKED

Date: 3.8.10

CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 67.5 AHD **EASTING:** 282672 **NORTHING:** 6253848

PIT No: 114 PROJECT No: 71706 DATE: 22/4/2010

			DIP/	AZIN	TUN	ו: 90°∕		~	SHEET 1 OF 1	
Deoth	Description			Sampl	ing & li	n Situ Testing		31		Poto Fort
(m)	Strata	Lòg	Type	Depth	Sample	Results & Comment	<u>م</u>	Wate	blows per 15	ineren rest
	TOPSOIL - stiff, brown, silty clay with some rootlets, damp	<u>7</u> 7		25						
	SILTY CLAY - stiff to hard, red brown, silty clay with a trace of fine grained sand, medium to high plasticity			ັດ 	. "					
	SANDSTONE - extremely low strength, extremely weathered, grey, fine grained sandstone	······							· · · <u> </u>	[
<u>66</u>	1.3m: very low to low strength	<u></u>		ັກ 						
N N N	SHALE - extremely low to very low strength gray shale	<u>  </u>		ö				· · · · · · · · · · · · · · · · · · ·		
	2.7m: low strength			ິດາ 						
·····································	Pit discontinued at 2.9m - practical refusal on low to medium strength shale								ώ.	
								· · · · · · · ·		
		<u></u>								
63										
RIG: Case WATER OI	- 58 Backhoe BSERVATIONS: No free groundwater observed	_	1066	jedi	AP				Sand Penetrometer	AS1289.6.3.3
REMARKS	<ol> <li>Survey levels taken from survey plans provided by Urt</li> </ol>	ois Pty	y Ltd						Cone Penetrometer	AS1289.6.3.2
A Auger san D Disturbed B Bulk sam U, Tube sam C Core drill	SAMPLING & IN SITU TESTING LEGEND mple pp Pocket penetronteer (kPa) ple (xmm dia) PID Photo ionisation detector S Standard penetration test S Standard penetration test ple (xmm dia) PL Point load strength Is(50) MPa mple V Star Vane (Pa) ng D Water seep Vater level	Initial Date:		0 0				la <b>L</b> Q	Las Part	<b>iners</b> roundwater

Douglas Partners Geotechnics · Environment · Groundwater



CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 67.5 AHD EASTING: 282759 NORTHING: 6253842 DIP/AZIMUTH: 90°/--

PIT NO: 115 PROJECT NO: 71706 DATE: 22/4/2010 SHEFT 1 OF 1

		,					
L Depth	Description		Sai	npling	& In Situ Testing	er	Dvnamic Penetrome
R (M)	Strata	Туре	Depth	Sample	Results & Comments	Wa	(blows per Omr
	TOPSOIL - firm to stiff, dark brown, silty clay with some						
0.22	SILTY CLAY - very stiff to hard, red brown silty clay,	<u> </u>					
67							
, , , , , , , , , , , , , , , , , , ,	SHALE - extremely low to very low strength, extremely to highly weathered, grey shale with some orange brown silty clay seams	o D	1.0			,,,,	_
N 66	1.8m: very low to low strength					••••	N
	3.3m: low to medium strength						ω · · · · · · · · · · · · · · · · · · ·
1	Pit discontinued at 3.5m - practical refusal on medium strength shale						
63					,		
						· · · ·	
RIG: Case WATER OE	58 Backhoe BSERVATIONS: No free groundwater observed	5	OGGE	D: AP	J	□ ^	
WATER OF	<b>BSERVATIONS:</b> No free groundwater observed	1	-			ດ ເ	and Penetrometer At

n≤<u>~</u>∞o>

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (RPa) pD Photo borisation cleator S Standard penetration test Point load strength Is(50) MPa V Shear Vane (RPa) V Shear Vane (RPa) Water seep

CHECKED

Date: 3.8. (O

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CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 69.5 AHD EASTING: 282791 NORTHING: 6253876 DIP/AZIMUTH: 90°/--

PIT No: 116 PROJECT No: 71706 DATE: 22/4/2010 SHEET 1 OF 1

		ĺ	5		-	a0   1	ć	
」 Depth	Description	hic g T		Samplin	g & In S	itu Testing	er	Dynamic Penetrometer T
<u>r</u> (m;	of Strata	Grap Lo	Type	Sample		Results & Comments	Wat	(blows per 150mm)
-	TOPSOIL - stiff, dark brown, silty clay with some rootlets, damp	Ż		<u> </u>			_	<b></b>
0.21	SILTY CLAY - very stiff to hard, brown and red brown, silty clay with a trace of ironstone gravel, medium to high plasticity	<u> </u>		<u></u>	<del></del>		·	
		[-[-[-]-]-						
- <u>-</u> - - - -	SANDSTONE - very low to low strength, highly weathered, grey, fine grained sandstone				<del>.</del> .		····, · · · · ·	·····
····			<u>.</u>					
1.7	Pit discontinued at 1.7m							
ν ν	- practical refusal on medium strength sandstone	19 <b>10</b> 14 1						بې 
• • • • •							· · · · · · · · · · · · · · · · · · ·	
							 	۵ 
4							· · · · · · · · · · · · · · · · · · ·	
• • • •								
, <u>, '</u> ''''''''				<b></b> ,				
G: Case	58 Backhoe	-	1060	iED: A	- <del>ت</del>		-	
ATER OE	SSERVATIONS: No free groundwater observed Survey levels taken from survey plans provided by I	Irbis Pt	V Ltd				30	and Penetrometer AS12

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (Pa) PD Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (R-a) V Vater seep

> CHECKED Initials: ACS

Date: 3.8, 10

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CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

 SURFACE LEVEL:
 70.0 AHD

 EASTING:
 282751

 NORTHING:
 6253894

 DIP/AZIMUTH:
 90°/-

PIT No: 117 PROJECT No: 71706 DATE: 22/4/2010

							-
RL Depth	Description	Log	be	Sampli	20 910 70 910	Situ Testing	Vater
70	Strata		Ty	De		Comments	<u> </u>
	rootlets, damp	$\mathcal{D}$					<del>, , , , , , , , , , , , , , , , , , , </del>
0.26	SILTY CLAY - very stiff, mottled red brown and grey, silty clay with a trace of ironstone gravel	<u>77</u>					
	- increasing ironstone from 0.6m	<u>7</u> 72					<u> </u>
• • •		-[-[-[					
69							
······································		<u> </u>					·····
 		Ð		<u> </u>	<u> </u>		<del>,</del>
	SANDSTONE - extremely low to very low strength, extremely to highly weathered, grey, fine grained sandstone		<b>-</b>				
68 N							
· · · · ·	2.2m: low to medium strength	·····					. ,
2.4	- nractical refusal on modium strength sandstone		-+				
			<b></b>				
							 , , , ,
				·. ·			
RIG: Case	58 Backhoe			GED:	A -		
WATER OF	BSERVATIONS: No free groundwater observed	F ;; 0	:				0 0
REMARKS	Survey levels taken from survey plans provided by t	Irbis P	ty Ltd				 0

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (Pa) ED Photo consettor delector S Standard penetration test PL Point load strength 1s(50) MPa V Shear Vane (Pa) D Water seep Water level

Initials: <u>PCB</u> Date: 3.8.10

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**Douglas Partners** Geotechnics - Environment - Groundwater CHECKED

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 69.5 AHD **EASTING:** 282694 **NORTHING:** 6253879 **DIP/AZIMUTH:** 90°/--

PIT NO: 118 PROJECT NO: 71706 DATE: 22/4/2010 SHEFT 1 OF 1

<ul> <li>TOPSOIL - firm, brown, silly damp</li> <li>SILTY CLAY - very sill, clay with some root brown and grey, silly clay with some ironstone g medium to high plasticity</li> <li>SANDSTONE - extremely low strength, extreme weathered, fine grained sandstone with some resulty clay seams</li> <li>Pit discontinued at 2.3m</li> <li>- practical refusal on medium strength sandston</li> </ul>	TOPSOIL     firm, brown, silly clay with some root       0.2     SILTY CLAY - very stiff, orange brown motiled in brown and grey, silly clay with some ironstone grey medium to high plasticity       1.2     SANDSTONE - extremely low strength, extreme weathered, fine grained sandstone with some re silly clay seams       2.1 m: low to medium strength       2.1 m: low to medium strength       2.1 m: low to medium strength       pil discontinued at 2.3m       - practical refusal on medium strength sandston       save 58 Backhoe	RL Depth (m)	Description of Strata		Graphic Log	Graphic Log Type Depth	Graphic Log Type Depth Sample Sample
<ul> <li>SILTY CLAY - very stiff, orange brown mottled red brown and grey, slify clay with some ironstone gravel, medium to high plasticity</li> <li>SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow slify clay seams</li> <li>Pit discontinued at 2.3m - practical refusal on medium strength sandstone</li> </ul>	12     SILTY CLAY - very slift, orange brown motiled red brown and gray, slity clay with some ironstone gravel, medium to high plasticity       12     SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow slity clay seams       Pit discontinued at 2.3m - practical refusal on medium strength sandstone       23       Pit discontinued at 2.3m - practical refusal on medium strength sandstone       24	}	TOPSOIL - firm, brown, slity clay with some rootlets ar a trace of gravel, damp		Å	a Q	đ
12 SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow silly clay seams Pit discontinued at 2.3m - practical refusal on medium strength sandstone	12       SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow silly clay seams         2.1 m: low to medium strength         2.2 Pit discontinued at 2.3 m         - practical refusal on medium strength sandstone         - practical refusal on medium strength sandstone         - see 58 Backhoe	0 <u>2</u>	SILTY CLAY - very stiff, orange brown mottled red brown and grey, silty clay with some ironstone gravel, medium to high plasticity		<u>77</u>		0.4
1.2 SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brown slily clay seams 2.1m: low to medium strength 2.1m: low to medium strength - practical refusal on medium strength sandstone - practical refusal on medium strength sandstone	1.2       SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow silly clay seams         2.1 m: low to medium strength         2.1 m: low to medium strength         - practical refusal on medium strength sandstone         - practical refusal on medium strength sandstone         - practical refusal on medium strength sandstone         - S8 Backhoe	·····					и и и и и и и и и и и и и и и и и и
<ul> <li>SANDSTONE - extremely low strength weathered, fine grained sandstone with some red brown silly clay seams</li> <li>2.1 m: low to medium strength - practical refusal on medium strength sandstone</li> </ul>	<ul> <li>SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow slily clay seams</li> <li>2. fm: low to medium strength</li> <li>Pit discontinued at 2.3m</li> <li>- practical refusal on medium strength sandstone</li> <li>- practical refusal on medium strength sandstone</li> </ul>			<u> </u>			
2.1 m: low to medium strength Pit discontinued at 2.3m - practical refusal on medium strength sandstone	2.1m: low to medium strength - practical refusal on medium strength sandstone - practical refusal on medium strength sandstone 		SANDSTONE - extremely low strength, extremely weathered, fine grained sandstone with some red brow silty clay seams			······	
- practical refusal on medium strength sandstone	- practical refusal on medium strength sandstone - sandstone - sandstone 	<u>22</u>	2.1111: Iow to meaning strength				
· · · · · · · · · · · · · · · · · · ·	Asse 58 Backhoe	ن بن ارجــــــــــــــــــــــــــــــــــــ	Pit discontinued at 2.3m - practical refusal on medium strength sandstone		• •		•
	2ase 58 Backhoe						
	Asse 58 Backhoe				<u>.</u>		
	Ase 58 Backhoe						
	Ase 58 Backhoe						
	ase 58 Backhoe						

Douglas Partners Geotechnics · Environment · Groundwater



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Auger sample Disturbet sample Bulk sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Proceed penetrometer ((Pa) PD Photo foursation deactor S Standard penetration test Pu Point load strength Is(50) MPa V Shear Vane (Ra) V Shear Vane (Ra) V Water seep F Water level

CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 67.0 AHD EASTING: 282620 NORTHING: 6253877 DIP/AZIMUTH: 90°/--

PIT No: 119 PROJECT No: 71706 DATE: 22/4/2010 SHEET 1 OF 1

		HECKED		Survey levels taken from survey plans provided by t SAMPLING & IN SITU TESTING LEGEND protection of the survey plans provided by t sample Picket, penetrometer (cPa) plant protection detector plant plant protection test plant plant plant penetration test plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plant plan	Auger sam Disturbed s Bulk sampl Tube samp Water samp
	D: AP	OGGEI		58 Backhoe 3SERVATIONS: No free groundwater observed	G: Case : ATER OB
				1.4m: medium strength Pit discontinued at 1.5m - refusal on medium strength sandstone	ά κ κ κ κ κ κ κ κ κ κ κ κ κ
				SANDSTONE - extremely low to very low strength, extremely to highly weathered, grey, fine grained sandstone	
		······································		ironstone cobbles, damp SILTY CLAY - very stiff, red brown, silty clay with some ironstone gravel and cobbles, medium to high plasticity	
comments	Sample	Depth	Gran	TOPSOIL - firm, brown, silty clay with some rootlets and	(m)
Testing	npling & In Situ i	San	ohic g	Description	J Depth

ENT: Owston Nominees No. 2 Pty Ltd DJECT: Land Capability Assessment CATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 65.5 AHD EASTING: 282649 NORTHING: 6253908 DIP/AZIMUTH: 90°/--

PIT No: 120 PROJECT No: 71706 DATE: 22/4/2010 SHEET 1 05 1

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Auger sample Disturbed sample Buik sample (x mm dia.) Yuder sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (IPa) pD photo ionisation detector Standard penetration tast PL Point load strength is(50) MPa V Stear Vans (IPa) b Water seep Vater level

> CHECKED Initials: LCL

Date: 3.8.10

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**Douglas Partners** Geotechnics · Environment · Groundwater CLIENT: PROJECT: LOCATION:

CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 70.0 AHD EASTING: 282729 NORTHING: 6253916

PIT No: 121 PROJECT No: 71706 DATE: 22/4/2010

			ויזוט		11H: 90-1			
RL (m)	Description of	raphic Log	pe	pui Sampling	& In Situ Testing Results &	Nater	Dynamic Penetrom (blows per 150	eter Test mm)
70	TOPSOL - stiff, brown, sity clay with some rootlets and a trace of ironstone gravel	Z (	т   	Se				
0.33	SILTY CLAY - hard, mottled red brown and grey, silty clay and ironstone gravel, medium to high plasticity	<u> </u>		Öi			· · · · · · · · · · · · · · · · · · ·	<u> </u>
		- <u> -</u>  -   - <u> -</u>  -						
-8-1 0.95	SANDSTONE - medium strength, slightly weathered, grey, fine grained sandstone		1.	ò			·····	
• •	Pit discontinued at 1.1m - practical refusal on medium strength sandstone							
68 88				<b>.</b>			· · · N	
· · · · · · · · · ·								
67 							· · · ·	
66 4				**************************************			4	
• • • • • • • • • • • • • • • • • • •								
RIG: Case WATER OI	58 Backhoe BSERVATIONS: No free groundwater observed		LOGO	SED: A	יי	ב		
REMARKS	<ol> <li>Survey levels taken from survey plans provided by</li> </ol>	/ Urbis P	ty Ltd				Sand Penetrometer / Cone Penetrometer /	AS1289.6.3.3 AS1289.6.3.2
A Auger sai D Disturbed B Bulk sam U, Tube san W Water san C Core drill	mple SAMPLING & IN SITU TESTING LEGEND mple pp Pocket penetrometer (KPa) 1 semple 5 Bin Proctor ionisation detector ple Standard strength 1s(50) MPa mple (xmm dia.) V Shear Vane (KPa) mple (xmm dia.) V Shear Vane (KPa) mple (xmm dia.) V Water seep ∓ Water level			ō 🖓 🖁		0 <b>U</b> 9	las Part	oundwater

CLIENT: PROJECT; LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 69.5 AHD EASTING: 282719 NORTHING: 6253942 DIP/AZIMUTH: 90°/--

PIT No: 122 PROJECT No: 71706 DATE: 22/4/2010 SHEET 1 OF 1

Cepth Children Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction
Description         of         Strata         TOPSOLL - firm to stiff, brown, silly clay with some ironstone gravel, medium and silly clay with some ironstone gravel, medium the gray with some ironstone gravel, medium the gravel, medium the grave at 1.2m         1.1m: medium strength         Pit discontinued at 1.2m         - practical refusal on medium strength sandsto
put m)     Description of Strata       TOPSOIL - firm to stiff, brown, silly clay with sor roottets, humid to damp       0.32       SULTY CLAY - very stiff, mottled red brown and silly day with some ironstone gravel, medium to plasticity       OSANDSTONE - very low strength, highly weathe gray, fine grained sandstone       1.1m: medium strength       Pit discontinued at 1.2m       - practical refusal on medium strength sandstor       - practical refusal on medium strength sandstor
Depth (m)     Description of Strata       0.32     TOPSOIL - firm to stiff, brown, silly clay with so rootlets, humid to damp       0.32     SILTY CLAY - very stiff, mottled red brown and silly day with some ironstone gravel, medium to plasticity       1.1     Tim: medium strength       1.1     Pit discontinued at 1.2m       - practical refusal on medium strength sandstor
Depth     Description       of     of       TOPSOIL - firm to stiff, brown, silty clay with some rootlets, humid to damp       0.3     SILTY CLAY - very stiff, mottled red brown and silty day with some ironstone gravel, medium to plasticity       12     SANDSTONE - very low strength, highly weathe grey, fine grained sandstone       12     Pit discontinued at 1.2m       - practical refusal on medium strength sandstor       2     3
Description of of Strata TOPSOIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.9 SANDSTONE - very low strength, highly weather grey, fine grained sandstone 1.2 Pit discontinued at 1.2m - practical refusal on medium strength sandston
Description of of Strata TOPSOIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.3 SILTY CLAY - very stiff, mottled red brown and silty clay with some ironstone gravel, medium to plasticity SANDSTONE - very low strength, highly weathe grey, fine grained sandstone 1.1m: medium strength - practical refusal on medium strength sandston
Description of of TOPSOIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.3 SILTY CLAY - very stiff, mottled red brown and silty clay with some ironstone gravel, medium to plasticity SANDSTONE - very low strength, highly weathe 1.2 Pit discontinued at 1.2m - practical refusal on medium strength sandston
Description of of TOPSCIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.32 SILTY CLAY - very stiff, mottled red brown and silty clay with some ironstone gravel, medium to plasticity save with some ironstone gravel, medium to plasticity 1.1m: medium strength 1.2 Pff discontinued at 1.2m
Description of of Strata TOPSCIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.32 SILTY CLAY - very stiff, mottled red brown and silty clay with some ironstone gravel, medium to plasticity save ironstone gravel, medium to gray, fine grained sandstone
Depth Description of of TOPSOIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.32 SILTY CLAY - very stiff, mottled red brown and , silty clay with some ironstone gravel, medium to plasticity
Description of (m) TOPSOIL - firm to stiff, brown, silty clay with sor rootlets, humid to damp 0.32 SILTY CLAY - very stiff, mottled red brown and
Depth Description (m) of TOPSOIL - firm to stiff, brown, silly clay with sor
Depth Description (m) of Strata

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CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 64.5 AHD **EASTING:** 282674 **NORTHING:** 6253970 **DIP/AZIMUTH:** 90°/--

PIT No: 123 PROJECT No: 71706 DATE: 22/4/2010 SHEFT 1 OF 1

Rig	, , , , , , , , , , , , , , , , , , ,	60		61		62	· · · · ·	63		·····	64	· · · ·	RL	
: Case			*		یں	•	1,8	0			0.35	<del>م</del>	(m)	
58 Backhoe					·		- refusal on medium strength shale	1.6m: medium strength		with orange brown silty clay seams	SILTY CLAY - very stiff, red brown silty clay, medium to high plasticity SHALE - very low strength, highly weathered, grey shale	TOPSOIL - stiff, brown, silty clay with some rootlets and gravel, humid	of Strata	Description
							-					D)	Grap	
5												т	Туре	
ĠĠĔ											0.4 0.5	0.2	Depth	San
D: Af													Sample	ipling a
U													Results & Comments	& In Situ Testing
											·		Wate	er
	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		<u></u>		- <u>-</u>	· · · ·	· · · <u>·</u> ·		· · · · · · · · · · · · · · · · · · ·		(blows per 150mm) 5 10 15 2	

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo konsation detector Standard penetration test PL Point foad strength 1s(50) MPa V Shear Vane (kPa) D Water seep ¥ Water level

cHECKED Initials: <u>RCB</u> Date: **3, 8, 10** 

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CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

 SURFACE LEVEL:
 63.0 AHD

 EASTING:
 282532

 NORTHING:
 6253965

PIT NO: 124 PROJECT NO: 71706 DATE: 22/4/2010

			DIP/	AZIMU	ITH: 90°/	ş	HEET 1 OF 1
	Description	hic		Sampling	& In Situ Testing	er	Deposite Dopotes motor Tort
3 RI	) ) Strata	Grap Log	Туре	Depth Sample	Results & Comments	Wate	blows per 150mm)
e	TOPSOIL - firm to stiff, brown, silty clay with some rootlets and gravel	$\mathbb{Z}$					1
· · · · · ·	of rootlets, high plasticity	7777	m m	ذَا فَ £ 1			
		┥┥┥┥┥┥┥┥┥ ╵╴┤╴┤╶┤╶┤╴┤╴┤╴┤╴┤╴		<u>່ວ ທ</u>			
· · · · · · · · · · · · · · · · · · ·	<ul> <li>Pit discontinued at 1.2m</li> <li>practical refusal on low strength shale</li> </ul>						
61 						· · · · · · · · · · · · · · · · · · ·	
60 60 60							-
59 						 	
RIG: C WATEF	ase 58 Backhoe ? OBSERVATIONS: No free groundwater observed		LOG	3ED: AI	U	្ព	and Penetrometer AS1289.6.3.2
REMAR	KS: E = Environmental sample. Survey levels taken fro	J m sur	rey plar	ns provio	ted by Urbis Pty Ltd		one Penetrometer AS1289.6.3.
C Core	SAMPLING & IN SITU TESTING LEGEND pp Packet penetrometer (KPa) pD Photo instantion tector sample sample (x mm dia.) r sample (x mm dia.) pu Pl Doint load strangth 1s(50) MPa pr sample (x mm dia.) p Shart van (KPa) p Vater seep \$ Water level			0 0 0		len sinte	as Partners

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 64.0 AHD EASTING: 282457 NORTHING: 6253982 DIP/AZIMUTH: 90°/--

PIT No: 125 PROJECT No: 71706 DATE: 22/4/2010

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		 			 				 						1	1.5								0.2		Ĵ.	epth	
													ġ	Pit discontinued at 1.7m - practical refusal on high strength shale	grey shale	SHALE - medium to high strength, slightly weathered							medium to high plasticity	SII TY CI AY - very stiff to hard red brown sitty day	TOPSOIL - firm to stiff, brown, silty clay with some	of Strata	Description	
			 							 							-[-  -[-	7			<u> - -</u>	- -  -	- - -  -	X	X	Grap Lo	phic g	
									 													<b>w</b>				Туре	-	
		 	 				 														<u>_</u> _	0.6	0.4			Depth	Sampl	1A2II
							 				<u> </u>															Sample	ing & In	
																										Results & Comments	Situ Testing	: 90°/
		 	 	, ,			 	,	 ,	 	, (					<del>- ,</del>				. ,				,	,	Wat	ler	- u
		 	 4		 		 		 	 			•••••						ين 	••••••						(blows per 0mm) 5 10 15 20	Dvnamic Penetrometer Te	HEET 1 OF 1

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pockat penetrometer ((Pa) PID Photo ionisation detector S Standard penetration test PL Point load strength is(50) MPa V Shear Vane (kPa) V Water seep ¥ Water level

CHECKED Initials: RCS Date: 3.8.10

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CLIENT: PROJECT: LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 63.0 AHD EASTING: 282438 NORTHING: 6253914 DIP/AZIMUTH: 90°/-

PIT No: 126 PROJECT No: 71706 DATE: 22/4/2010 SHEET 1 OF 1

iglas Partners	Dou Geotecha		PCC	Date:	SAMPLING & IN SITU TESTING LEGEND PD Pocket penetrometer (KPa) PID Photo ionisation detector Standard penetration detector (X mm dia.) PL Point load strength Is(SD) MPa V Stear Vane (KPa) D Walar seep T Watar level	Auger samp Disturbed sa Bulk sample Tube samp Vater samp Core drilling	∩≲cœo>
□ Sand Penetrometer AS1289.6.3.3 ☑ Cone Penetrometer AS1289.6.3.3			Ltd	rbis Pty	SERVATIONS: No free groundwater observed Survey levels taken from survey plans provided by U	ATER OB	ᇛ
		D: AP	OGGEI	F	8 Backhoe	IG: Case 5	R
							59
			· · · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·
· · · · ن ن · · · · · · · · · · · · · ·							60
2						N N	
					1.4m: medium strength Pit discontinued at 1.5m - practical refusal on medium strength shale		
					SHALE - extremely low to very low strength, extremely to highly weathered, grey shale		
·····					SILTY CLAY - stiff, red brown silty clay, medium plasticity	0.27	
5 10 15 20	Commering	Sa	D	Ϋ́,	Strata TOPSOIL - firm, brown, silty clay with some rootlets and a trace of gravel		
Water Dynamic Penetrometer Test (blows per 150mm)	Results &	Imple & In &	epth 👷		Description .	Depth (m)	RL
	90 /						٦

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CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 63.5 AHD EASTING: 282367 NORTHING: 6253871 DIP/AZIMUTH: 90°/--

PIT NO: 127 PROJECT NO: 71706 DATE: 23/4/2010

Description     Description       cl     (m)     Strata     Strata     Strata       cl     (m)     Open of the way stiff, data brown server, stiff, data b						IH: 90°/	U H	
Image: State     State     State       10     100     State     State     State       100     100     State     State     State       100     State     State     State     State       11     State     State     State     State       12     State     State     State     State       12     State     State     State     State       12     State     State     State     State       13     State     State     State     State       14     State     State     State     State       15     State     State     State     State       14     State     State     State     State       15     Sta	L Depth	Description	g 	Sa	mpling	& In Situ Testing	er	Dvnamic Penetromete
0.0     COSEQLI - Sint Joseff data kinoma, silv day with some of the original data in the origent data in the original data in the original data in the	RL ()	of Strata Grap	 Type	Depth	Sample	Results & Comments	Wate	(blows per 150mm) 5 10 15
a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a       a     a     a     a     a		TOPSOIL - firm to stiff, dark brown, silly clay with some rootlets and a trace of gravel, damp	27					
Constraints of the sense shale gravel     Constraints of the sense	0,19	SILTY CLAY - stiff to very stiff, dark brown grey, silty full clay with a trace of rootlets, medium to high plasticity	<u>777</u>	0.25				
Bellin CDAY stiff, red brown sity day,     Shift E - externally low strength, ortemaly weathered     Performation of a 2 minute gravel     Performation of a 2 minute gravele     Performation of a 2 minute gravele	- <u>63</u>		<u>777</u>	0.5				
8     1       1     1       2     StALE       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       1     2       2     1       2     1       2     1       2     1		SILTY CLAY - stiff to very stiff, red brown silty clay, medium plasticity						
-12     -2       -2     -2       -2     -2       -12     -1       -12     -1       -13     -1       -14     -1       -15     -1       -16     -1       -17     -1       -18     -1       -19     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -10     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11     -1       -11 <t< td=""><td></td><td>4444</td><td></td><td>1.0</td><td></td><td></td><td>•</td><td></td></t<>		4444		1.0			•	
Bit discontinued at 2.5m Fit discontinued at 2.5m Pit discontinued a		1.2m: with some shale gravel	-7-7-7					
State     12       Image: State     State       Image: State     Fieldscontinued at 2.5m       Image: State     Image: State       Image: State     Image:	62		-777 0	1.5				
B     12       SHALE - extremely low strength, extremely weathered, grey shale								
Solution of the strength, extremely weathered, the strength, extremely weathered, the strength, extremely weathered, the strength, dark grey brown the strength, dark grey brown the strength at 2.5m reactical refusal on low to medium strength shale the strength shale the strength shale the strength strength strength strength at 2.5m strength st			<u></u>	2.0				
	2.2	SHALE - extremely low strength, extremely weathered, grey shale						
	 	- low to medium strength, dark grey brown	;! <u></u>					•••••
	60 60 60 60 60 60 60 60 60 60 60 60 60 6	Pit discontinued at 2.5m - practical refusal on low to medium strength shale						
	WATER O	BSERVATIONS: No free groundwater observed	l				Sa	nd Penetrometer AS1
WATER OBSERVATIONS: No free groundwater observed	REMARKS	S: Survey levels taken from survey plans provided by Urb	is Pty	Ltd			8 8	ne Penetrometer AS

CHECKED Initials: RCS Date: S. 8.10

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Auger sample Disturbed sample Bulk sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND Prodect penetrometer (kPa) PiD Proto konsation testector Standard penetration test piD Proto konsation testector standard penetration test Point load strength 1s(50) MPa V Shaar Vrane (kPa) P Water seep ¥ Water lovel



### TEST PIT **FOG**

CLIENT: PROJECT: LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct) Owston Nominees No. 2 Pty Ltd Land Capability Assessment

 
 SURFACE LEVEL:
 64.0 AHD

 EASTING:
 282378

 NORTHING:
 6253968
 DIP/AZIMUTH: 6253968 90°/--

PIT No: 128 PROJECT No: DATE: 23/4/2010 SHEET 1 OF 1 71706



REMARKS:

Survey levels taken from survey plans provided by Urbis Pty Ltd

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Auger sample Disturbed sample Buik sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetromater (Pa) PID Photo ionisation deactor Standard penetration test point load strength Is(50) MPa PU Shear Vane (kPa) D Water seep T Water lev

Water level

Date:

3.8.10

Initials: RCB

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**Douglas Partners** Geotechnics · Environment · Groundwater

Cone Penetrometer AS1289.6.3.2

CHECKED

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 67.0 AHD EASTING: 282338 NORTHING: 6253927 DIP/AZIMUTH: 90°/--

PIT NO: 129 PROJECT NO: 71706 DATE: 23/4/2010 SHEET 1 OF 1

El     Dight (b)     Strate Strate     Convert       0.27     tropsol     Finn, brown, sily clay with some notatas, high plasticity, vory stif, red brown and gray, sily div with some provide and coobles     Top ob all     Top ob all		Description	с 		Samp	ling & Ir	) Situ Testing		
027     SILT CLAY: self, motified promises involves and gray, medium to high plasticity way self, red brown ally clay, medium to day with some gravel and coubles     0     10       1.8     SILT CLAY: self, motified promises involves and gray, self day with some gravel and coubles     0     10       2.1     SILT CLAY: self, motified promises involves and gray, self day with some gravel, inv graned sandstone     0     10       2.1     SILT CLAY: self, motified promises through the graned sandstone     0     10       2.1     Fill dasoning the graned sandstone     0     10       2.1     Fill dasoning through all 2.5m     10     10       2.2     Fill dasoning through all 2.5m     10     10       1.4	7 RL Depth	of Strata	Graphi Log	Туре	Depth	Sample	Results & Comments	Water	Dynamic F (blov
927     SILTY CLAY- very stiff, ned brown silly clay, medium to high plasticity     0.4       10     SULTY CLAY- very stiff, ned brown and grey, silly day with some lonstone grave and cabbles     0.4       10     SHALE - extremely low to very los strength, grey shale with some grave, fine grained sandstone	, 67	TOPSOIL - firm, brown, silty clay with some rootlets, damp	X						
B     1     0.0     SLTYCLAY: stiff, mutited orange brown and coopies       B     1.1     clary with some instance gravel and coopies       B     1.1     clary with some gravel and coopies	0.27	SILTY CLAY - very stiff, red brown silty clay, medium to high plasticity			0.5			· · · ·	
1.1 SHALE - extremely low to very low strength, grey shale with some prey, fine grained sandstore 1.2 2.7 m: medium strength, dark grey brown - refusel on medium strength shale - refusel on medium strength shale 	8.00 	SILTY CLAY - stiff, mottled orange brown and grey, silty clay with some ironstone gravel and cobbles		0	1.0			·····	<del>به</del>
5-2     SHALE - extransity low to very fine grained sandstone       2-2     with some grey, fine grained sandstone       2-1     2.7m: medium strength, dark grey brown	• • • • • • • • • • • • • • • • • • •							· · · · · · · · · · · · · · · · · · ·	
2.7m: medium strength, dark grey brown       Fit discontinued at 2.8m       - refusal on medium strength shale       - a   -a	65 N	SHALE - extremely low to very low strength, grey shale with some grey, fine grained sandstone							N
63 64 64 64 64 64 64 64 64 64 64 64 64 64	2.8	2.7m: medium strength, dark grey brown							
	63 64 64 64 64 64 64 64 64 64 64 64 64 64	Pit discontinued at 2.8m - refusal on medium strength shale							۵ ع ۱
	WATER OB REMARKS:	SERVATIONS: No free groundwater observed	/ Urbis P	ř Ltd	_				Sand Pene
NATER OBSERVATIONS: No free groundwater observed	REMARKS:	: Survey levels taken from survey plans provided by	Urbis P	'ty Ltd					Sone Pene

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia,) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation detactor S Standard penetration test PL Point load stength 1s(50) MPa V Shear Vane (kPa) PM dial V Shear Vane (kPa) V Shear Vane (kPa) Water seep ¥ Water level

CHECKED

Date:

3.8.10

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**Douglas Partners** Geotechnics - Environment - Groundwater .
# **TEST PIT LOG**

CLIENT: Owston Nominees No. 2 Pty Ltd PROJECT: Land Capability Assessment LOCATION: Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 68.0 AHD EASTING: 282304 NORTHING: 6253899 DIP/AZIMUTH: 90°/--

PIT NO: 130 PROJECT NO: 71706 DATE: 23/4/2010 SHEFT 1 OF 1

	65 ω		66 N	67 			68 R	
		24 2.	ي 19 ي		З Q	0.23 da		
	t discontinued at 2.4m practical refusal on iow to medium strength shale	3m: low to medium strength, dark grey brown	HALE - extremely low strength, extremely weathered, ey shale with orange brown silty clay seams		ILTY CLAY - very stiff to hard, red brown silty clay, edium plasticity	amp	of Strata	Description
						R	Grap Lo	hic J
				e			Type	
				4	თ 	<u></u>	Sample	sampling
					pp>400kPa		Results & Comments	& In Situ Testing
		······		······································			Wat	er
•							(blows per 1	
							0/mm) 15 20	motor Tast

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core dnilling

SAMPLING & IN SITU TESTING LEGEND pp Porteel penationneter (kPa) DP Protocie loenationneter (kPa) Si Panto cinitation detector Si Standard penetration test P Standard penetration test P Standard penetration test V Shear Yane (kPa) V Shear Yane (kPa) Valer seep \$ Water level

cHECKED Initials: <u>20B</u> Date: 3.8.10

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**Douglas Partners** Geotechnics · Environment · Groundwater

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CLIENT: PROJECT; LOCATION: Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

**SURFACE LEVEL:** 65.0 AHD **EASTING:** 282247 **NORTHING:** 6253927

PIT No: 131 PROJECT No: 71706 DATE: 23/4/2010

RIG		63	·····	64	····	es R	L
i: Case	ώ 4 () ()	ذ <u>ن</u> ت	<u>د</u> ن د	÷	0.33	(m)	Depth
58 Backhoe	- practical refusal on low to medium strength sandstone	SANDSTONE - low to medium strength, slightly weathered, yellow brown, fine grained sandstone	SHALE - low to medium strength, extremely weathered, grey shale with some orange brown silty clay seams	0.8m: mottled red brown and grey	damp SILTY CLAY - very stiff to hard, orange brown silty clay, medium to high plasticity	of Strata TOPSOIL - firm brown silly clay with some mothets	Description
				╶╎╌╎╌╎╌╎╌╎╴		Grap	ohic g
5		U	U		0 0	Туре	
GGEL	· · · · · · · · · · · · · · · · · · ·	2.0		0.83 1.0	0.25 0.5	Depth	Sam
): AP						Sample	pling &
					pp≻400kPa	Results & Comments	In Situ Testing
		- <u>.</u> .				Wat	ter
		N 		-		(blows per 0mm) 5 10 15 20 	Dynamic Penetrometer Test

REMARKS:

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia,) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND Procession provide preventioneter (Pa) PiD Photo ionisation detector Standard penetration tast PL Point load strength Is(50) MPa V Shaar Vane (Ra) P Water seep * Water lovel

Date: 3.8-10 Initials: Rus CHECKED

\$

**Douglas Partners** Geotechnics · Environment · Groundwater

□ Cone Penetrometer AS1289.6.3.2

Survey levels taken from survey plans provided by Urbis Pty Ltd

### TEST PIT LOG

Owston Nominees No. 2 Pty Ltd Land Capability Assessment Mulgoa Road, Mulgoa (Eastern Precinct)

SURFACE LEVEL: 68.5 AHD EASTING: 282238 NORTHING: 6253882 DIP/AZIMUTH: 90°/--

PIT No: 132 PROJECT No: 71706 DATE: 23/4/2010

ពីឆ្ល			· · · · · · · · · · · · · · · · · · ·	67	· · · ···	· · · · · · · · · · · · · · · · · · ·	68		R	
Case			č	<u>,</u> 	<u> </u>			5	Ē	Depth
58 Backhoe			Pit discontinued at 1.8m - practical refusal on medium strength sandstone	1.7m: medium strength	SANDSTONE - extremely low strength, extremely weathered, grey, fine grained sandstone with a trace of grey shale		SILTY CLAY - stiff to very stiff, red brown, sity clay with a trace of ironstone gravel	TOPSOIL - stiff, brown, silty clay with some rootlets and a trace of gravel, humid to damp	of Strata	Description
	· · ·			· · · · · · · · · · · · · · · · · · ·	Ż			X	Grap Lo	ohic g
					-				Type Depth	
ED: AP		· · · · · · · · · · · · · · · · · · ·							Sample	ampling 8
									Results & Comments	In Situ Testing
-		·	· · · · · · · · · · · · · · · · · · ·			<u>, , , , , , , , , , , , , , , , , , , </u>	······································		Wate	er
	غ	ο.	<u>ن</u>			<u>.</u> 			blows per 150mn	Dvnamic Penetromete

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Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

SAMPLING & IN SITU TESTING LEGEND pp Pockel penetrometer (I/Pa) PID Proto kinisation detector S Standard penetration test PL Point load strength Is(30) MPa V Streat vane (KPa) V Streat vane (KPa) V Streat vane (KPa) V Streat vane (KPa)

Initials: RCB

\$

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CHECKED

Date: 3.8.10

Water level

CLIENT: PROJECT: LOCATION:

### Appendix E

Laboratory Report and Chain-of-Custody Documentation



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 enquiries@envirolabservices.com.au www.envirolabservices.com.au

# CERTIFICATE OF ANALYSIS 40738

Client: MSM West Ryde 96 Hermitage Rd **Douglas Partners** 2114

Attention: Adam Podnar

Date completed instructions received: No. of samples: Date samples received: Your Reference: Sample log in details:

07/05/10 07/05/10 28 Soils, 13 Waters 71706, Mulgoa

## Analysis Details:

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

### עוט Details

Nepul Detaile.	
Date results requested by:	14/05/10
Date of Preliminary Report:	Not issued
Issue Date:	9/06/10
NATA accreditation number 2901. This document s	nall not be reproduced except in full.
This document is issued in accordance with NATA'	accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Tests not covered by NATA are denoted with *.

## Results Approved By:

Labophtory Manager Jacinta/Hurst

Envirolab Reference: Revision No: R 00 40738

Technical Manager te g

Giovanni Agosti



Juin Morgen

Rhian Morgan Metals Supervisor



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																						ET						-								_		
Surrogate aaa-Trifluorotoluene	o-Xylene	m+p-xylene	Ethylbenzene	Toluene	Benzene	vTPH Ce - Ce	Date analysed	Date extracted	Type of sample		Your Reference	VIPH & BIEX in Soil Our Reference:	Surrogate aaa-Trifluorotoluene	o-Xylene	m+p-xylene	Ethylbenzene	Toluene	Benzene	VTPH C6 - C9	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	vTPH & BTEX in Soil	Surrogate aaa-Trifluorotoluene	o-Xylene	m+p-xylene	Ethylbenzene	Toluene	Benzene	vTPH C6 - C9	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	VTPH & BTEX in Soil
%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	I	-				UNITS	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	•	1			UNITS		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ı	•			UNITS	
105	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil		TP124 0.2-0.3	40738-21	89	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP21 0.2-0.3	40738-11		91	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP5 0.0-0.1	40738-1	
105	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil		TP132 0.2-0.3	40738-23	105	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP25 0.2-0.3	40738-13	.   .	91	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP5 0.4-0.5	40738-2	
85	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	0.0-0.1	Dam 1	40738-36	86	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP104 0.2-0.3	40738-15		93	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP10 0.0-0.1	40738-5	
9R	<u>4</u> .0	<2.0	<u>^1.0</u>	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	Spillway 0.2-0.3	Dam 1	40738-37	96	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP110 0.2-0.3	40738-17		96	<1.0	<2.0	<1.0	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP130.2-03	40738-7	
107	92%	93%	92%	91%	88%	[NA]	11/5/10	11/5/10	Soil		Trip Spike	40738-38	75	<1.0	<2.0	<u> </u>	<0.5	<0.5	<25	11/5/10	11/5/10	Soil	TP123 0.2-0.3	40738-10		88	<1.0	<2.0	<u></u>	^0,5	<0.5	<25	11/5/10	11/5/10	Soil	TP160.2-03	10730 0	

**Client Reference:** 

71706, Mulgoa

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40738 R 00

Envirolab Reference:

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Reference:	
71706,	
Mulgoa	

Surrogate aaa-Trifluorotoluene	o-Xylene	m+p-xylene	Ethylbenzene	Toluene	Benzene	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	vTPH & BTEX in Soil
%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	•	•	*******		UNITS	
66	<1.0	<2.0	<1.0	<0.5	<0.5	11/5/10	11/5/10	Soil	Trip Blank	40738-39	



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Envirolab Reference: 40738 Revision No: R 00

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Reference:	
71706, N	
hulgoa	

	Your Reference	Our Reference:	sTPH in Soil (C10-C36)		Surrogate o-Terphenyl	TPH C29 - C36	TPH C15 - C28	TPH C10 - C14	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	sTPH in Soil (C10-C36)	Surrogate o-Terphenyl	TPH C29 - C36	TPH C15 - C28	TPH C10 - C14	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	sTPH in Soil (C10-C36)	CI
		UNITS			%	mg/kg	mg/kg	mg/kg	•				UNITS		%	mg/kg	mg/kg	mg/kg	ı	1			UNITS		ent Reference
2	TP124 0.2-0.3	40738-21			131	<100	<100	<50	11/5/10	11/5/10	Soil	TP21 0.2-0.3	40738-11		135	<100	<100	<50	11/5/10	11/5/10	Soil	TP5 0.0-0.1	40738-1		»: 71706, N
2	TP1320.2-0.3	40738-23			129	<100	<100	<50	11/5/10	11/5/10	Soil	TP250.2-0.3	40738-13		134	<100	<100	<50	11/5/10	11/5/10	Soil	TP5 0.4-0.5	40738-2		fulgoa
Spillway	Dam 1	40738-36			133	<100	<100	<50	11/5/10	11/5/10	Soil	TP104 0.2-0.3	40738-15		136	<100	<100	<50	11/5/10	11/5/10	Soil	TP100.0-0.1	40738-5		
Spillway 0.2-0.3	Dam 1	40738-37			129	<100	<100	<50	11/5/10	11/5/10	Soil	TP1100.2-0.3	40738-17		134	<100	<100	<50	11/5/10	11/5/10	Soil	TP130.2-0.3	40738-7		
				L	129	<100	<100	<50	11/5/10	11/5/10	Soil	TP1230.2-0.3	40738-19		134	<100	<100	<50	11/5/10	11/5/10	Soil	TP16 0.2-0.3	40738-9		



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<b>Client Reference:</b>	
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Mulgoa	

Methoxychlor	Endosulfan Sulphate	Endrin Aldehyde	pp-DDT	Endosulfan II	CCC-dd	Endrin	Dieldrin	pp-DDE	Endosulfan I	alpha-chlordane	gamma-Chlordane	Heptachlor Epoxide	Aldrin	delta-BHC	Heptachlor	beta-BHC	gamma-BHC	alpha-BHC	HCB	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	Organochlorine Pesticides in soil
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	I	1			UNITS	
<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	<b>6</b> .1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP5 0.0-0.1	40738-1	
-0.1	<0,1	<b>-0</b> .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	10/5/10	10/5/10	Soil	TP5 0.4-0.5	40738-2	
<0.1	<0.1	<0.1	<u>6</u> .1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	< <u>0</u> .1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	€.1	10/5/10	10/5/10	Soil	TP110.2-0.3	40738-3	
<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	10/5/10	10/5/10	Soil	TP110.4-0.5	40738-4	
<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	<u>&lt;0</u> _1	<0.1	<0.1	<u>6.</u> 1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP100.0-0.1	40738-5	

Surrogate TCLMX

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Client
Reference:
71706,
Mulgoa

Surrogate TCLMX	Methoxychlor	<b>Endosulfan Sulphate</b>	Endrin Aldehyde	pp-DDT	Endosulfan II	pp-DDD	Endrin	Dieldrin	pp-DDE	Endosulfan I	alpha-chlordane	gamma-Chlordane	Heptachlor Epoxide	Aldrin	delta-BHC	Heptachlor	beta-BHC	gamma-BHC	alpha-BHC	HCB	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	Organochlorine Pesticides in soil
%	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	ı	•	2		UNITS	
120	<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	10/5/10	. 10/5/10	Soil	TP10 0.4-0.5	40738-6	
117	<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	10/5/10	10/5/10	Soil	TP130.2-0.3	40738-7	
126	<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	10/5/10	10/5/10	Soil	TP130.4-0.5	40738-8	
113	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6.1	<0.1	<0.1	<0.1	<0.1	<0.1	-0.1	<0.1	10/5/10	10/5/10	Soil	TP160.2-0.3	40738-9	
119	<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 <u>.</u> 1	-0.1	<u>^0.</u> 1	< <u>0</u> .1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP16 0.4-0.5	40738-10	

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Client Reference:	
71706,	
Mulgoa	

ਤੂ ਰ ਰ ਰ ਤੋਂ ਜੋ ਤੋ	gam Hej del
	mg/kg
UNITS 	
UNITS 40738-11 TP210.2-0.3 Soil Soil 	
UNITS         40738-11         40738-12            TIP21 0.2-0.3         TIP21 0.4-0.5            10/5/10         10/5/10           -         10/5/10         10/5/10           -         10/5/10         10/5/10           -         10/5/10         10/5/10           mg/kg         <0.1	< <u>0</u> .1
UNITS         40738-11         40738-12         40738-13            TP21 0.2-0.3         TP21 0.4-0.5         TP25 0.2-0.3	<0.1
UNITS         40738-11         40738-12         40738-13         40738-14	
leptachlor Jelta-BHC Aldrin	
leptachlor leptachlor Aldrin Aldrin achlor Epoxide	Heptachlor Epoxide         mg/kg         <0.1         <0.1         <0.1         <0.1           namma-Chlordane         mg/kg         <0.1
reptachlor Jelta-BHC Aldrin Achlor Epoxide ma-Chlordane	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
ieptachlor Jelta-BHC Aldrin Aldrin achlor Epoxide ma-Chlordane na-chlordane na-chlordan	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
reptachlor Ieptachlor Aldrin Achlor Epoxide na-Chlordane na-chlordane pp-DDE	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
lepta-bric Jelta-BHC Aldrin achlor Epoxide ma-Chlordane na-chlordane ndosulfan 1 pp-DDE Dieldrin	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
leptachlor Jelta-BHC Aldrin achlor Epoxide ma-Chlordane na-chlordane ndosulfan 1 pp-DDE Dieldrin Endnin	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
leptachlor leptachlor Aldrin achlor Epoxide ma-Chlordane na-chlordane pp-DDE Dieldrin Endnin Endnin	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
repta-bric Jelta-BHC Aldrin achlor Epoxide ma-Chlordane na-chlordane ndosulfan 1 pp-DDE Dieldrin Endrin pp-DDD pp-DDD	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
leptachlor Jelta-BHC Aldrin achlor Epoxide na-Chlordane ndosulfan 1 pp-DDE Dieldrin Endrin Endrin pp-DDD	Heptachlor Epoxide         mg/kg         <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         <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         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1         <0.1 </td
feptachlor feptachlor Aldrin achlor Epoxide na-Chlordane na-Chlordane na-Chlordane na-Chlordane Dieldrin 1 pp-DDE Dieldrin Endrin Endrin pp-DDD Moosulfan II pp-DDT	HeptachlorEpoxide         mg/kg         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1
leptachlor Jelta-BHC Aldrin achlor Epoxide ma-Chlordane na-chlordane Dieldrin Dieldrin Endrin Endrin pp-DDD Endrin pp-DDD Indosulfan II pp-DDT Indosulfan II pp-DDT	Heptachlor Epoxide         mg/kg         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1 </td
feptachlor feptachlor Aldrin achlor Epoxide na-Chlordane na-Chlordane pp-DDE Dieldrin Endnin Endnin Endnin pp-DDD fin Aldehyde sulfan Sulphate	Heptachlor Epoxide         mg/kg         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1         40.1 </td



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ACCREDITED FOR TECHNICAL COMPETENCE NATA

Reference	
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71706, Mulgo	

 Client Reference:
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Surrogate TCLMX	Methoxychlor	Endosulfan Sulphate	Endrin Aldehyde	pp-DDT	Endosulfan II		Endrin	Dieldrin	pp-DDE	Endosulfan I	alpha-chlordane	gamma-Chlordane	Heptachlor Epoxide	Aldrin	delta-BHC	Heptachlor	beta-BHC	gamma-BHC	alpha-BHC	HCB	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	Organochlorine Pesticides in soil
%	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	ŀ	B			UNITS	
120	<0.1	<0.1	<0.1	<0.1	<u>6</u> .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	10/5/10	10/5/10	Soil	TP104 0.4-0.5	40738-16	
122	-0,1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<u>0</u> .1	<0.1	<0.1	<0,1	<0.1	<0_1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP1100.2-0.3	40738-17	
115	<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	10/5/10	10/5/10	Soil	TP1100.4-0.5	40738-18	
107	<0.1	<0.1	<0,1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<b>~0</b> .1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP123 0.2-0.3	40738-19	
120	<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	10/5/10	10/5/10	Soil	TP1230.4-0.5	40738-20	

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Reference:	
71706, Mulgo	

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Cli	ent Reference	9: 71706, N	lulgoa			
Organochlorine Pesticides in soil						
Our Reference:	UNITS	40738-21	40738-22	40738-23	40738-24	40738-36
Your Reference		TP124 0.2-0.3	TP124 0.4-0.5	TP1320.2-0.3	TP132 0.4-0.5	Dam 1
						Spillway 0.0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	E	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Date analysed	1	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
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	<b>6</b> .1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<del>-0</del> .1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0 <u>.</u> 1
Heptachlor	mg/kg	<0.1	<0.1	<0,1	<0.1	<b>6</b> .1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	ô.1	<u>6</u> 1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<b>6</b> .1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<b>-0</b> .1
gamma-Chlordane	mg/kg	<0.1	<0.1	<u>6</u> .1	-0.1	<u>-0</u> _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	<b>-0</b> .1
Dieldrin	mg/kg	<0,1	<0.1	<0,1	<0.1	< <u>0</u> 1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<b>6</b> .1
DDD-ddd	mg/kg	<0.1	<0.1	<0,1	<0.1	<u>6.</u> 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	<b>-0</b> .1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0,1	<del>.</del> 0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	122	115	124	124	118

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Cli	ent Reference	: 71706, M	glu
Organochlorine Pesticides in soil			
Our Reference:	UNITS	40738-37	
Your Reference		Dam 1	
		0.2-0.3	
Type of sample		Soil	
Date extracted		10/5/10	
Date analysed	1	10/5/10	
HCB	mg/kg	<0,1	
alpha-BHC	mg/kg	<0.1	
gamma-BHC	mg/kg	<0.1	
beta-BHC	mg/kg	<0.1	
Heptachlor	mg/kg	<0.1	
delta-BHC	mg/kg	<del>^</del> 0.1	
Aldrin	mg/kg	<0.1	
Heptachlor Epoxide	mg/kg	<0.1	
gamma-Chlordane	mg/kg	<0.1	
alpha-chlordane	mg/kg	<0.1	
Endosulfan I,~	mg/kg	<0.1	
PP-DDE	mg/kg	<0.1	
Dieldrin	mg/kg	<0.1	
Endrin	mg/kg	<0.1	
DDD-qq	mg/kg	<0.1	•
Endosulfan II 🕤	mg/kg	<0.1	
pp-DDT	mg/kg	<0.1	
Endrin Aldehyde	mg/kg	<0.1	
Endosulfan Sulphate	mg/kg	<0.1	
Methoxychlor	mg/kg	<0.1	
Surrogate TCLMX	%	116	

Surrogate TCLMX

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Surrogate TCLMX	Ethion	Bromophos-ethyl	Fenitrothion	Chlorpyriphos	Ronnel	Chlorpyriphos-methyl	Dimethoate	Diazinon	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	Orasponhornic Desticides	Surrogate TCLMX	Ethion	Bromophos-ethyl	Fenitrothion	Chlorpyriphos	Ronnel	Chlorpyriphos-methyl	Dimethoate	Diazinon	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	Organophosphorus Pesticides	Surrogate TCLMX	Ethion	Bromophos-ethyl	
%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ŧ	•			UNITS		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ſ				UNITS		 %	mg/kg	mg/kg	
115	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0,1	10/5/10	10/5/10	Soil	TP21 0.2-0.3	40738-11		120	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP100.4-0.5	40738-6		124	< <u>0</u> .1	<0.1	
116	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP21 0.4-0.5	40738-12		117	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP130.2-0.3	40738-7		131	<0.1	-0.1	
119	<0.1	<0,1	<0.1	<0.1	<0 <u>.</u> 1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP250.2-0.3	40738-13		126	<0.1	<0.1	<0.1	<0.1	<0.1	<0,1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP13 0.4-0.5	40738-8		117	<0.1	<0.1	
120	<0.1	<0.1	<0.1	< <u>0</u> .1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Sol	TP25 0.4-0.5	40738-14		113	<0.1	<0.1	<0.1	<0.1	<u>~0.1</u>	<0.1	<0.1	<0,1	10/5/10	10/5/10	Soil	TP16 0.2-0.3	40738-9		121	<0.1	<0.1	
120	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0,1	<0.1	10/5/10	10/5/10	Soil	TP104 0.2-0.3	40738-15		119	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0,1	10/5/10	10/5/10	Soil	TP160.4-0.5	40738-10		122	<0.1	<u>&lt;0.</u> 1	

## **Client Reference:** 71706, Mulgoa

Surrogate TCLMX	Ethion	Bromophos-ethyl	Fenitrothion	Chlorpyriphos	Ronnel	Chlorpyriphos-methyl	Dimethoate	Diazinon	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	Organophosphorus Pesticides
%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	I	1			UNITS	
124	<0.1	<0.1	<0.1	<0.1	<u>6</u> .1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP5 0.0-0.1	40738-1	
131	<0.1	<0.1	<b>6</b> .1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP5 0.4-0.5	40738-2	-
117	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP11 0.2-0.3	40738-3	
121	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP11 0.4-0.5	40738-4	
122	<0.1	<0.1	<0.1	<0.1	<0.1	<0,1	<0.1	<0.1	10/5/10	10/5/10	Soil	TP100.0-0.1	40738-5	

Organophosphorus Pesticides	I NITO	10720 10	10728.17	10738-18	10738-10	10738-201
Your Reference		TP104 0.4-0.5	TP110 0.2-0.3	TP1100.4-0.5	TP123 0.2-0.3	TP123 0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Date analysed	ŧ	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0,1	<0.1	<0.1	<0.1	<b>-0</b> .1
Chlorpyriphos-methyl	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
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<u>^0.1</u>	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	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
Surrogate TCLMX	%	120	122	115	107	120
Organophosphorus Pesticides						
Our Reference:	UNITS	40738-21	40738-22	40738-23	40738-24	40738-36
Your Reference		TP124 0.2-0.3	TP124 0.4-0.5	TP1320.2-0.3	TP1320.4-0.5	Dam 1 Spillway
						0.0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	1	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Date analysed	1	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Diazinon	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
Chlorpyriphos-methyl	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
Chlorpyriphos	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
Bromophos-ethyl	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
Surrogate TCLMX	%	122	115	124	124	118

**Client Reference:** 

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	Client Reference:	71706, <b>M</b> ul
Organophosphorus Pesticides		
Our Reference:	UNITS	40738-37
Your Reference		Dam 1
		Spillway
Type of sample		Soil
Date extracted		10/5/10
Date analysed	1	10/5/10
Diazinon	mg/kg	<u>6</u> .1
Dimethoate	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Fenitrothion	mg/kg	-0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Surrogate TCLMX	%	116

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Cadmium         rmg/kg         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7         40.7																														-							
mg/kg         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.5         40.7         31         32         30         31         32         30         31         32         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30         30		Zinc	Nickel	Mercury	Lead	Copper	Chromium	Cadmium	Arsenic	Date analysed	Date digested	Type of sample	Your Reference	Acid Extractable metals in soil Our Reference:		Zinc	Nickel	Mercury	Lead	Copper	Chromium	Cadmium	Arsenic	Date analysed	Date digested	Type of sample	Your Reference	Our Reference:	Acid Extractable metals in soil		Zinc	Nickel	Mercury	Lead	Copper	Chromium	Cadmium
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ı	1			UNITS		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ļ	•			UNITS			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		N	N	<0.1	13	4	25	<0.5	9	11/05/10	11/05/10	Soil	TP21 0.2-0.3	40738-11	-	G	თ	<0.1	27	თ	36	<0.5	თ	11/05/10	11/05/10	Soil	TP100.4-0.5	40738-6			15	9	<0.1	3	13	31	<0.5
<0.5         <0.5         <0.5         <0.5           31         36         9         12           24         29         30         30           40738-8         40738-9         TP160.2-0.3         TP160.4-0.5           Soil         11/05/10         11/05/10         11/05/10         11/05/10           11/05/10         11/05/10         11/05/10         11/05/10         1005/10           11/05/10         11/05/10         11/05/10         11/05/10         1005/10           5         5         8         6         6         6           40738-13         40738-14         1005/10         11/05/10         1005/10           11/05/10         11/05/10         11/05/10         1005/10         1000/10           11/05/10         11/05/10         11/05/10         11/05/10         100/10           11/05/10         11/05/10         11/05/10         11/05/10         10           40738-14         40738-14         40738-15         10           5         30         41         40738-15         10           405         40738-14         40738-15         100         10           5         30         41         4	-	<u>ـ</u>	4	<0.1	თ	7	თ	<0.5	4	11/05/10	11/05/10	Soil	TP21 0.4-0.5	40738-12		з	4	<0.1	19	2	30	<0.5	თ	11/05/10	11/05/10	Soil	TP130.2-0.3	40738-7			S	ω	<0.1	28	17	21	<0.5
<0.5		N	N	<0.1	18	7	30	<0.5	4	11/05/10	11/05/10	Soil	TP250.2-0.3	40738-13		ω	თ	<0.1	19		41	<0.5	<i>σ</i> ι	11/05/10	11/05/10	Soil	TP130.4-0.5	40738-8			თ	თ	<0,1	24	8	31	<0.5
<0.5 30 12 30 <0.1 7 7 8 8 8 8 8 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 11/05/10 35 2 2 5 60 40 26 5 5		ω	Сл	<u>6</u> .1	17	-	41	<0.5	C1	11/05/10	11/05/10	Soil	TP250.4-0.5	40738-14		ω	ω	<0.1	18	4	23	<0.5	(JT	11/05/10	11/05/10	Soil	TP160.2-0.3	40738-9			σı	сл	<0.1	29	9	36	<0.5
		ហ	ω	<0.1	26	4	60	<0.5	10	11/05/10	11/05/10	Soil	TP104 0.2-0.3	40738-15		ω	4	<0.1	19	N	35	<0.5	თ 	11/05/10	11/05/10	Soil	TP160.4-0.5	40738-10			œ	7	<0.1	30	12	30	<0,5

40738-1 TP5 0.0-0.1 40738-2 TP5 0.4-0.5 **Client Reference:** 

71706, Mulgoa

Acid Extractable metals in soil Our Reference: Your Reference

UNITS

Type of sample

Date analysed Date digested

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11/05/10 11/05/10

11/05/10 11/05/10

11/05/10 11/05/10

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11/05/10 11/05/10

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Soil

Soil

Soil

Soil

Soil

40738-3 TP11 0.2-0.3

40738-4 TP11 0.4-0.5

40738-5 TP10 0.0-0.1

mg/kg mg/kg

Arsenic

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	Type of sample		Your Reference	Our Reference:	Acid Extractable metals in soil		. Zinc	Nickel	Mercury	Lead	Copper	Chromium	Cadmium	Arsenic	Date analysed	Date digested	Type of sample		Your Reference	Our Reference:	Acid Extractable metals in soil		Zinc	Nickel	Mercury	Lead	Copper	Chromium	Cadmium	Arsenic	Date analysed	Date digested	Type of sample	Your Reference	Our Reference:	Acid Extractable metals in soil	Clie
				UNITS			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	1	•				UNITS			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	•				UNITS		ent Reference
	Soil	Spillway 0.2-0.3	Dam 1	40738-37			55	21	<0.1	20	28	12	<0.5	11	11/05/10	11/05/10	Soil		TP124 0.2-0.3	40738-21			9	4	<0.1	21	10	50	<0.5	9	11/05/10	11/05/10	Soil	TP104 0.4-0.5	40738-16		9: 71706, M
_1	<u>i</u>						70	26	<0.1	22	34	12	<0.5	7	11/05/10	11/05/10	Soil		TP124 0.4-0.5	40738-22			30	œ	<0.1	19	18	24	<0.5	9	11/05/10	11/05/10	Soil	TP1100.2-0.3	40738-17		llulgoa
							25	14	<0.1	28	G	43	<0,5	11	11/05/10	11/05/10	Soil		TP132 0.2-0.3	40738-23			12	4	<0.1	14	13	10	<0.5	8	11/05/10	11/05/10	Soil	TP1100.4-0.5	40738-18		
							24	12	<0.1	27	16	37	<0.5	13	11/05/10	11/05/10	Soil		TP132 0.4-0.5	40738-24			15	თ	<0.1	18	16	15	<0.5	œ	11/05/10	11/05/10	Soil	TP123 0.2-0.3	40738-19		
							56	16	<0.1	32	24	19	<0.5	со Со	11/05/10	11/05/10	Soil	0.0-0.1	Dam 1	40738-36			11	ω	<del>-0</del> .1	14	19	o	<0.5	4	11/05/10	11/05/10	Soil	TP123 0.4-0.5	40738-20		

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Chromium Copper Cadmium Mercury Arsenic Nickel Lead Zinc mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg

Date analysed Date digested . . 11/05/10 11/05/10 <0.5</li>
 22
 22
 22
 22
 417
 417 7

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	Moisture	Date analysed	Date prepared	Type of sample		Your Reference	Our Reference:	Moisture	Moisture	Date analysed	Date prepared	Type of sample	Your Reference	Our Reference:	Moisture	Moisture	Date analysed	Date prepared	Type of sample	Your Reference	Our Reference:	Moisture	Moisture	Date analysed	Date prepared	Type of sample	Your Reference	Our Reference:	Moisture	Moisture	Date analysed	Date prepared	Type of sample	Your Reference	Our Reference:	Moisture
:	%	ŧ	•				UNITS		%					UNITS		%	•				UNITS		%	ı	•			UNITS		%	ı	1			UNITS	
	1	10/5/10	10/5/10	Soil		TP124 0.2-0.3	40738-21		21	10/5/10	10/5/10	Soil	TP104 0.4-0.5	40738-16		8.6	10/5/10	10/5/10	Soil	TP21 0.2-0.3	40738-11		16	10/5/10	10/5/10	Soil	TP10 0.4-0.5	40738-6		19	10/5/10	10/5/10	Soil	TP5 0.0-0.1	40738-1	
	13	10/5/10	10/5/10	Soil		TP124 0.4-0.5	40738-22		13	10/5/10	10/5/10	Soil	TP1100.2-0.3	40738-17		7.0	10/5/10	10/5/10	Soil	TP21 0.4-0.5	40738-12		17	10/5/10	10/5/10	Soil	TP13 0.2-0.3	40738-7		21	10/5/10	10/5/10	Soil	TP5 0.4-0.5	40738-2	
	6.5	10/5/10	10/5/10	Soil		TP132 0.2-0.3	40738-23		16	10/5/10	10/5/10	Soil	TP1100.4-0.5	40738-18		11	10/5/10	10/5/10	Soil	TP250.2-0.3	40738-13		19	10/5/10	10/5/10	Soil	TP130.4-0.5	40738-8		16	10/5/10	10/5/10	Soil	TP11 0.2-0.3	40738-3	
	17	10/5/10	10/5/10	Soil		TP132 0.4-0.5	40738-24		 6.6	10/5/10	10/5/10	Soil	TP123 0.2-0.3	40738-19		22	10/5/10	10/5/10	Sol	TP25 0.4-0.5	40738-14		11	10/5/10	10/5/10	Sail	TP160.2-0.3	40738-9		24	10/5/10	10/5/10	Soil	TP11 0.4-0.5	40738-4	
	12	10/5/10	10/5/10	Soil	o.o-o.1	Dam 1	40738-36		15	10/5/10	10/5/10	Soil	TP123 0.4-0.5	40738-20		8.4	10/5/10	10/5/10	Soil	TP104 0.2-0.3	40738-15		12	10/5/10	10/5/10	Soil	TP160.4-0.5	40738-10		19	10/5/10	10/5/10	Soil	TP100.0-0.1	40738-5	

**Client Reference:** 

71706, Mulgoa

<b>Client Reference:</b>
71706, Mulgoa

	-		<u>.</u>				
Moisture	Date analysed	Date prepared	Type of sample		Your Reference	Our Reference:	Moisture
%	·	t				UNITS	
9.3	10/5/10	10/5/10	Soil	Spillway 0.2-0.3	Dam 1	40738-37	
0.10	10/5/10	10/5/10	Soil		Trip Blank	40738-39	



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**Client Reference:** 71706, Mulgoa

Asbestos ID - soils Our Reference: Your Reference	Trace Analysis	Asbestos ID in soil	Date analysed Sample Description	Your Reference Type of sample	Asbestos ID - soils Our Reference:
UNITS	,	ı	1 1		UNITS
40738-11 TP21 0.2-0.3	Respirable fibres not detected	No asbestos found at reporting limit of 0.1g/kg	12/5/10 Approx 35g Clay Soil	TP5 0.4-0.5 Sail	40738-2
40738-13 TP25 0.2-0.3	Respirable fibres not detected	No asbestos found at reporting limit of 0.1g/kg	12/5/10 Approx 35g Clay Soil	TP11 0.4-0.5 Soil	40738-4
40738-15 TP104 0.2-0.3	Respirable fibres not detected	No asbestos found at reporting limit of 0.1g/kg	12/5/10 Approx 30g Soil	TP100.4-0.5 Soil	40738-6
40738-17 TP110 0.2-0.3	Respirable fibres not detected	No asbestos found at reporting limit of 0.1g/kg	12/5/10 Approx 35g Soil	TP13 0.2-0.3 Soil	40738-7
40738-19 TP123 0.2-0.3	Respirable fibres not detected	No asbestos found at reporting limit of 0.1g/kg	12/5/10 Approx 30g Soil	TP16 0.2-0.3 Soil	40738-9

Date analysed Sample Description Asbestos ID in soil Trace Analysis	Asbestos ID - soils Our Reference: Your Reference Type of sample	Date analysed Sample Description Asbestos ID in soil Trace Analysis	Asbestos ID - soits Our Reference: Your Reference Type of sample
	UNITS	1 1 1 1	UNITS
12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0. 1g/kg Respirable fibres not detected	40738-21 TP124 0.2-0.3 Soil	12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0. 1g/kg Respirable fibres not detected	40738-11 TP21 0.2-0.3 Soil
12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0. 1g/kg Respirable fibres not detected	40738-23 TP132 0.2-0.3 Soil	12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0.1g/kg Respirable fibres not detected	40738-13 TP25 0.2-0.3 Soil
12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0.1g/kg Respirable fibres not detected	40738-36 Dam 1 Spillway 0.0-0.1 Soil	12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0.1g/kg Respirable fibres not detected	40738-15 TP104 0.2-0.3 Soil
12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0.1g/kg Respirable fibres not detected	40738-37 Dam 1 Spillway 0.2-0.3 Soil	12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0.1g/kg Respirable fibres not detected	40738-17 TP110 0.2-0.3 Soil
<u> </u>		12/5/10 Approx 35g Soil No asbestos found at reporting limit of 0.1g/kg Respirable fibres not detected	40738-19 TP123 0.2-0.3 Soil

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<b>Client Reference:</b>	
71706,	
Mulgoa	

Surrogate toluene-d8	Surrogate Dibromofluoromethane	o-xylene	m+p-xylene	Ethylbenzene	Toluene	Benzene	Date analysed	Date extracted	Type of sample	Your Reference	Our Reference:	BTEX in Water
%	%	ЪĴ	μg/L	J/6rl	J/Brl	µg/L					UNITS	
81	84	120%	117%	119%	103%	81%	14/05/2010	14/05/2010	Water	Trip Spike	40738-40	
83	82	<1.0	<2.0	<1.0	<1.0	<1.0	14/05/2010	14/05/2010	Water	Trip Blank	40738-41	
	Surrogate toluene-d8 % 81 83	Surrogate Dibromofluoromethane     %     84     82       Surrogate toluene-d8     %     81     83	o-xylene µg/L 120% <1.0 Surrogate Dibromofluoromethane % 84 82 Surrogate toluene-d8 % 81 83	m+p-xylene         µg/L         117%         <2.0           o-xylene         µg/L         120%         <1.0	Ethylbenzene         µg/L         119%         <1.0           m+p-xylene         µg/L         117%         <2.0	Toluene         µg/L         103%         <1.0           Ethylbenzene         µg/L         119%         <1.0	Benzene         µg/L         81%         <1.0           Toluene         µg/L         103%         <1.0	Date analysed         -         14/05/2010         14/05/2010           Benzene         µg/L         81%         <1.0	Date extracted         -         14/05/2010         14/05/2010           Date analysed         -         14/05/2010         14/05/2010           Benzene         µg/L         81%         <1.0	Type of sample          Water         Water         Water           Date extracted         -         14/05/2010         14/05/2010           Date analysed         -         14/05/2010         14/05/2010           Benzene         µg/L         81%         <1.0	Your Reference          Trip Spike         Trip Slank           Type of sample          Water         Water         Water           Date extracted         -         14/05/2010         14/05/2010         14/05/2010           Date analysed         -         14/05/2010         14/05/2010         14/05/2010           Date analysed         -         14/05/2010         14/05/2010         14/05/2010           Benzene         µg/L         81%         <1.0	Our Reference:         UNITS         40738-40         40738-41           Your Reference          Trip Spike         Trip Spike         Trip Spike           Type of sample          Water         Water         Water           Date extracted         -         14/05/2010         14/05/2010         14/05/2010           Date analysed         -         14/05/2010         14/05/2010         14/05/2010           Benzene         µg/L         103%         <1.0

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CI	ent Referenc	e: 71706, I	Mulgoa			
HM in water - dissolved						
Your Reference	C IND	40/ 30-25	40738-26 M/1_D	40738-27	40738-28	40738-29
Type of sample		Water	Water	Water	Water	wo Water
Date prepared		10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Date analysed	,	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Arsenic-Dissolved	Hg/L	4	2	4	2	<u>م</u>
Cadmium-Dissolved	hĝ/L	<u>0</u> 1	<u>6</u> .1	<u>6</u> .1	< <u>0.1</u>	<u>6</u>
<b>Chromium-Dissolved</b>	J/bd	N	2	2	4	<u></u>
Copper-Dissolved	hg/L	4	2	<u> </u>	<u> </u>	소 .
Lead-Dissolved	hg/L	<u>^</u>	7	4	4	Δ.
Mercury-Dissolved	hg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel-Dissolved	1/g/L	4	7	7	2	<u> </u>
Zinc-Dissolved	hð/r	2		2	22	41
HM in water - dissolved						
Our Reference:	UNITS	40738-30	40738-31	40738-32	40738_33	10238-37
Your Reference		M3-N	W9-D	W10	W11	W12-U
Type of sample		Water	Water	Water	Water	Water
Date prepared		10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Date analysed	1	10/5/10	10/5/10	10/5/10	10/5/10	10/5/10
Arsenic-Dissolved	µg/L	7	4	4	Δ	4
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	7	4	4	4	4
Copper-Dissolved	µg/L	4	4	4	4	4
Lead-Dissolved	hð/L	-	7	4	ω	15
Mercury-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Nickei-Dissolved	J/bri	7	4	7	4	7
Zinc-Dissolved	µg/L	9	σ	15	20	4
HM in water - dissolved						
Our Reference:	UNITS	40738-35				
Your Reference		W12-D				
Type of sample		Water				
Date prepared	1	10/5/10				
Date analysed	ı	10/5/10				
Arsenic-Dissolved	۲/br	2				
Cadmium-Dissolved	hâ/r	<0.1				
Chromium-Dissolved	J/Bri	2				
Copper-Dissolved	1/Bri	7				
Lead-Dissolved	µg/L	2				
Mercury-Dissolved	hâ/L	<0.5				
Nickel-Dissolved	hâyr	2				
Zinc-Dissolved	hâ/L	З				



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Client
Reference:
71706,
Mulgoa

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Type of sample	Your Reference	Our Reference:	Miscellaneous Inorganics		Magnesium - Dissolved	Calcium - Dissolved		Hardness	Date analysed	Date prepared	Type of sample	Your Reference	Our Reference:	Miscellaneous Inorganics
		UNITS			mg/L	mg/L	/۲	mgCaCO3	ı				UNITS	
Water	M3-N	40738-30			12	7.2		67	10/05/10	10/05/10	Water	U-1W	40738-25	
Water	M9-D	40738-31			12	7.4		70	10/05/10	10/05/10	Water	W1-D	40738-26	
Water	W10	40738-32			15	8.2		81	10/05/10	10/05/10	Water	W2	40738-27	
Water	W11	40738-33			1.6	1.1		9	10/05/10	10/05/10	Water	W7	40738-28	
Water	W12-U	40738-34			2.1	1.5		12	10/05/10	10/05/10	Water	W8	40738-29	
				I	L						L			

					-						
Magnesium - Dissolved	Calcium - Dissolved	Hardness	Date analysed	Date prepared	Type of sample	Your Reference	Our Reference:	Miscellaneous Inorganics		Magnesium - Dissolved	Calcium - Dissolved
mg/L	mg/L	mgCaCO3 /L	•	F			UNITS			mg/L	mg/L
7.0	2.0	34	10/05/10	10/05/10	Water	W12-D	40738-35			1.4	1.0
L					1				•		

Date analysed Date prepared

Hardness

mgCaCO3 /L

0.9 1.3

2.3 5.7

Ξ 0.9

8.3 2.7 i.

10/05/10 10/05/10

10/05/10 10/05/10

10/05/10 10/05/10

10/05/10 10/05/10

10/05/10 10/05/10

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Metals.22 Determin	ASB.1 Asbestos Microsco	LAB.8 Moisture	Metals.21 Determin CV-AAS	Metals.20 Determin	GC.8 Soil sam	GC-5 Soil samp GC with d	GC.3 Soil samp	GC.16 Soil samt Water sa	Method ID Methodol
ation of various metals by ICP-MS.	ID - Qualitative identification of asbestos type fibres in bulk samples using Polarised Light by and Dispersion Staining Techniques.	content determined by heating at 105 deg C for a minimum of 4 hours.	ation of Mercury by Cold Vapour AAS.	ation of various metals by ICP-AES.	les are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by ual ECD's.	ites are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by ual ECD's.	les are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed ).	les are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. nples are analysed directly by purge and trap GC-MS.	xgy Summary



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**Client Reference:** 71706, Mulgoa

23 of 30	Page		AT A	Z		40738 R 00	erence:	Envirolab Ref Revision No:
[NR]	[NR]	<0.1    <0.1	40738-9	-0. -1	GC-5	0.1	mg/kg	pp-DDT
[NR]	[NR]	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	Endosulfan II
135%	LCS-1	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	DDD-dd
94%	LCS-1	<0.1    <0.1	40738-9	-0.1	GC-5	0.1	mg/kg	Endrin
111%	LCS-1	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	Dieldrin
114%	LCS-1	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	pp-DDE
[NR]	[NR]	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	Endosulfan (
[NR]	[NR]	<0.1    <0.1	40738-9	<u>6</u> .1	GC-5	0.1	mg/kg	alpha-chlordane
[NR]	[NR]	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	gamma-Chlordane
104%	LCS-1	<0.1    <0.1	40738-9	<0.1	905 9	0.1	mg/kg	Heptachlor Epoxide
104%	LCS-1	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	Aldrin
[NR]	[NR]	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	delta-BHC
97%	LCS-1	<0.1    <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	Heptachlor
132%	LCS-1	<0.1    <0.1	40738-9	<u>6</u> .1	GC-5	0.1	mg/kg	beta-BHC
[NR]	[NR]	<0.1    <0.1	40738-9	<u>^0.1</u>	GC-5	0.1	mg/kg	gamma-BHC
107%	LCS-1	<0.1    <0.1	40738-9	<u>^0.1</u>	GC-5	0.1	mg/kg	alpha-BHC
[NR]	[NR]	<0.1   <0.1	40738-9	<0.1	GC-5	0.1	mg/kg	НСВ
10/5/10	LCS-1	10/5/10    10/5/10	40738-9	10/5/10			۱	Date analysed
10/5/10	LCS-1	10/5/10    10/5/10	40738-9	10/5/10			ı	Date extracted
		Base II Duplicate II %RPD						Organochlorine Pesticides in soil
Spike % Recovery	Spike Sm#	Duplicate results	Duplicate Sm#	Blank	METHOD	PQL	UNITS	QUALITY CONTROL
129%	LCS-1	134    130    RPD: 3	40738-9	135	GC.3		%	S <i>urrogate</i> o-Terphenyl
82%	LCS-1	<100    <100	40738-9	<100	GC.3	100	mg/kg	TPH C29 - C36
86%	LCS-1	<100 jl <100	40738-9	<100	GC.3	100	mg/kg	TPH C15 - C28
75%	LCS-1	<50    <50	40738-9	<50	GC.3	50	mg/kg	TPH C10 - C14
11/5/10	LCS-1	11/5/10    11/5/10	40738-9	11/5/10			1	Date analysed
11/5/10	LCS-1	11/5/10  ] 11/5/10	40738-9	11/5/10				Date extracted
		Base II Duplicate II %RPD						sTPH in Soil (C10-C36)
Spike % Recovery	Spike Sm#	Duplicate results	Duplicate Sm#	Blank	METHOD	PQL	UNITS	QUALITY CONTROL
80%	LCS-1	105    107    RPD: 2	40738-21	102	GC.16		%	Surrogate aaa-Trifluorotoluene
86%	LCS-1	<1.0    <1.0	40738-21	<1.0	GC.16		mg/kg	a-Xylene
88%	LCS-1	<2.0    <2.0	40738-21	<2.0	GC.16	N	mg/kg	m+p-xylene
83%	LCS-1	<1.0 <b> </b>   <1.0	40738-21	<1.0	GC.16	-	mg/kg	Ethylbenzene
102%	LCS-1	<0.5    <0.5	40738-21	<0.5	GC.16	0.5	mg/kg	Toluene
118%	LCS-1	<0.5    <0.5	40738-21	<0.5	GC. 16	0.5	mg/kg	Benzene
96%	LCS-1	<25    <25	40738-21	<25	GC.16	25	mg/kg	vTPH C6 - C9
11/5/10	LCS-1	11/5/10    11/5/10	40738-21	11/5/10			F	Date analysed
11/5/10	LCS-1	1 1/5/10    11/5/10	40738-21	11/5/10			,	Date extracted
		Base II Duplicate II %RPD						vTPH & BTEX in Soil
Spike % Recoverv	Spike Sm#	Duplicate results	Duplicate Sm#	Blank	METHOD	PQL	UNITS	QUALITY CONTROL

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		Clie	nt Referen	ce: 71	706, Mulgoa			
QUALITY CONTROL	UNITS	POL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recoverv
Organochlorine Pesticides in soil						Base II Duplicate II %RPD		
Endrin Aldehyde	mg/kg	0.1	GC-5	<0.1	40738-9	<0.1  ] <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	GC-5	<0,1	40738-9	<0.1    <0.1	LCS-1	93%
Methoxychlor	mg/kg	0.1	GC-5	<0.1	40738-9	<0.1    <0.1	[NR]	[NR]
Surrogate TCLMX	%		GC-5	120	40738-9	113    121    RPD: 7	LCS-1	115%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike %
Organophosphorus Pesticides						Base II Duplicate II %RPD		
Date extracted	•			10/5/10	40738-9	10/5/10    10/5/10	LCS-1	10/5/10
Date analysed	•			10/5/10	40738-9	10/5/10    10/5/10	LCS-1	10/5/10
Diazinon	mg/kg	0.1	GC.8	<0.1	40738-9	<0.1    <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	GC.8	<0.1	40738-9	<0.1    <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	GC.8	<0.1	40738-9	<0.1    <0.1	[NR]	[NR]
Chlornyrinhos	mg/kg	o c 	GC 8	<ol> <li>40.1</li> </ol>	40738-9	<0.1    <0.1	LCS-1	129%
Fenitrothion	mg/kg	0.1	GC,8	<0.1	40738-9	<0.1    <0.1	LCS-1	125%
Bromophos-ethyl	mg/kg	0.1	GC.8	<0.1	40738-9	<0.1    <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	GC.8	<0.1	40738-9	<0.1    <0.1	LCS-1	108%
Surrogate TCLMX	%		GC.8	120	40738-9	113    121    RPD: 7	LCS-1	123%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike %
Acid Extractable metals in soil						Base II Duplicate II %RPD		
Date digested	,			11/05/1 0	40738-9	11/05/10    11/05/10	LCS-2	11/05/10
Date analysed	1			11/05/1 0	40738-9	11/05/10    11/05/10	LCS-2	11/05/10
Arsenic	mg/kg	4	Metals.20 ICP-AES	4	40738-9	5    7    RPD: 33	LCS-2	110%
Cadmium	:mg/kg	0.5	Metals.20 ICP-AES	<0.5	40738-9	<0.5    <0.5	LCS-2	111%
Chromium	mg/kg		Metals.20 ICP-AES	7	40738-9	23    33    RPD: 36	LCS-2	111%
Copper	mg/kg	د	Metals.20 ICP-AES	4	40738-9	4    4    RPD: 0	LCS-2	114%
Lead	mg/kg		Metals.20 ICP-AES	4	40738-9	18    22    RPD: 20	LCS-2	111%
Mercury	mg/kg	0.1	Metals.21 CV-AAS	<0.1	40738-9	<0.1    <0.1	LCS-2	101%
Nicke!	mg/kg	ــ	Metals.20 ICP-AES	2	40738-9	3    4    RPD: 29	LCS-2	113%
Zinc	mg/kg		Metals.20 ICP-AES	4	40738-9	3    4    RPD: 29	LCS-2	111%
		_						

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QUALITY CONTROL	Moisture	Date analysed	Date prepared	Moisture	QUALITY CONTROL
UNITS	%		-		UNITS
PQL	0.1				PQL
METHOD	LAB.8			-	METHOD
Blank	<0.10	10/5/10	10/5/10		Blank

Asbestos ID - soils

Nate analysed				ITN				
					F			
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
3TEX in Water						Base II Duplicate II %RPD		
Date extracted	•			14/05/2 010	[NT]	[LN]	LCS-W1	14/05/2010
Date analysed	•			14/05/2 010	[NT]	[TN]	LCS-W1	14/05/2010
Benzene	hâ/r		GC.16	<1.0	[TN]	[TN]	LCS-W1	93%
Toluene	µg/L	-	GC.16	<1.0	[N]	[NT]	LCS-W1	93%
Ethylbenzene	hâ/L	• •	GC.16	<1.0	[NT]	[NT]	LCS-W1	111%
m+p-xylene	μg/L	2	GC. 16	<2.0	[TN]	[NT]	LCS-W1	90%
o-xylene	hã/r		GC. 16	^1.0	[TN]	[NT]	LCS-W1	111%
S <i>urrogate</i> Dibromofluoromethane	%		GC.16	111	[N]	[TN]	LCS-W1	106%
Surrogate toluene-d8	%		GC.16	126	[IN]	[N]	LCS-W1	89%
Surrogate 4-BFB	%		GC.16	98	[FN]	[NT]	LCS-W1	96%
QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
HM in water - dissolved						Base II Duplicate II %RPD		
Date prepared	ı			10/5/10	40738-25	10/5/10    10/5/10	LCS-W1	10/5/10
Date analysed				10/5/10	40738-25	10/5/10    10/5/10	LCS-W1	10/5/10

	2		00.10	ç	[]	[]		
UALITY CONTROL	UNITS	PQ	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike %
M in water - dissolved						Base II Duplicate II %RPD		
Date prepared	1			10/5/10	40738-25	10/5/10    10/5/10	LCS-W1	10/5/10
Date analysed	ı			10/5/10	40738-25	10/5/10    10/5/10	LCS-W1	10/5/10
Arsenic-Dissolved	µg/L	<u>د</u>	Metals.22 ICP-MS	4	40738-25	<1] <1	LCS-W1	97%
Cadmium-Dissolved	μg/L	0.1	Metals.22 ICP-MS	<b>~0</b> .1	40738-25	<0.1    <0.1	LCS-W1	%86
Chromium-Dissolved	μĝ/L		Metals.22 ICP-MS	Δ	40738-25	2  <1	LCS-W1	93%
Copper-Dissolved	µg/L	-	Metals.22 ICP-MS	4	40738-25	4	LCS-W1	%06
Lead-Dissolved	μg/L		Metals.22 ICP-MS	4	40738-25	<1    <1	LCS-W1	103%
Mercury-Dissolved	hg/L	0.5	Metals.21 CV-AAS	<0.5	40738-25	<0.5    <0.5	LCS-W1	100%
Nickel-Dissolved	Ъ/р	<u>د</u>	Metals.22 ICP-MS	4	40738-25	4    <1	LCS-W1	%06
Zinc-Dissolved	hð/r	<u> </u>	Metals.22 ICP-MS	2	40738-25	2    1    RPD: 67	LCS-W1	91%



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QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics		-				Base II Duplicate II %RPD		
Date prepared	r			10/05/1 0	40738-25	10/05/10    10/05/10	LCS-W6	10/05/10
Date analysed	•			10/05/1 0	40738-25	10/05/10    10/05/10	LCS-W6	10/05/10
Hardness	mgCaCO ₃/L	-	Metals.20 ICP-AES	7	40738-25	67    67    RPD: 0	[NR]	[NR]
Calcium - Dissolved	mg/L	0.03	Metals.20 ICP-AES	<0.03	40738-25	7.2    7.2    RPD: 0	LCS-W6	88%
Magnesium - Dissolved	mg/L	0.03	Metals.20 ICP-AES	<0.03	40738-25	12    12    RPD: 0	LCS-W6	84%
QUALITY CONTROL	UNITS		0up. Sm#	B200 +	Duplicate	Spike Sm#	Spike % Recovery	
Date extracted	1		0738-21	11/5	210 11 11/5/10	10.5-2	11/5/10	
Dete analysed			0738-01	14/6		10.8-2	11/5/10	
TPH C10 - C14	mg/kg		0738-21		-50    <50	LCS-2	78%	
TPH C15 - C28	mg/kg		0738-21	٨	100    <100	LCS-2	89%	
TPH C29 - C36	mg/kg		0738-21	^	100    <100	LCS-2	84%	
Surrogate o-Terphenyl	%		0738-21	132	[ 131    RPD: 1	LCS-2	132%	<u> </u>
Organochlorine Pesticides in soil			Jup. Sm#	Base + [	Duplicate + %RPD		Spike % Recovery	<u></u>
Date extracted	,		10738-21	10/	5/10    10/5/10	LCS-2	10/5/10	
Date analysed	1		10738-21	10/8	5/10    10/5/10	LCS-2	10/5/10	
HCB	mg/kg		10738-21		<0.1    <0.1	[NR]	[NR]	
alpha-BHC	mg/kg		10738-21		≪0.1    <0.1	LCS-2	101%	
gamma-BHC	mg/kg		10738-21		<0.1    <0.1	[NR]	[NR]	
beta-BHC	mg/kg		10738-21		<0.1    <0.1	LCS-2	129%	
Heptachlor	mg/kg		10738-21		≪0.1    <0.1	LCS-2	77%	
delta-BHC	mg/kg		10738-21		<0.1    <0.1	[NR]	[NR]	
Aldrin	mg/kg		10738-21		<0.1    <0.1	LCS-2	85%	
Heptachlor Epoxide	mg/kg		10738-21		<0.1    <0.1	LCS-2	94%	
gamma-Chlordane	mg/kg		10738-21		<0.1    <0.1	[NR]	[NR]	
alpha-chlordane	mg/kg		10738-21		<0.1    <0.1	[NR]	[NR]	
Endosulfan I	mg/kg		40738-21		<0.1    <0.1	[NR]	[NR]	
pp-DDE	mg/kg		40738-21		<0.1    <0.1	LCS-2	119%	
Dieldrin	mg/kg		40738-21		<0.1    <0.1	LCS-2	95%	
Endrin	mg/kg		40738-21		<0.1    <0.1	LCS-2	84%	
pp-DDD	mg/kg		40738-21		<0.1    <0.1	LCS-2	105%	
Endosulfan II	mg/kg		40738-21		<0.1    <0.1	[NR]	[NR]	
pp-DDT	mg/kg		40738-21		<0.1    <0.1	[NR]	[NR]	
Endrin Aldehyde	mg/kg		40738-21		<0.1    <0.1	[NR]	[NR]	

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									Acid	٥	6		_				ç					0	Q	60		<u>م</u>	Orga	Q	}
Mercury	Lead	-	Copper	Chromium	Cadmium	Arsenic	Date analysed	Date digested	Extractable metals in soil	UALITY CONTROL	Surrogate TCLMX	Ethion	3romophos-ethyl	Fenitrothion	Chlorpyriphos	Ronnel	lorpyriphos-methyl	Dimethoate	Diazinon	Date analysed	Date extracted	rganophosphorus Pesticides	UALITY CONTROL	surrogate TCLMX	Methoxychlor	dosulfan Sulphate	nochlorine Pesticides in soil	UALITY CONTROL	
fiv/6111		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ı	ı		UNITS	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	,	1		UNITS	%	mg/kg	mg/kg		UNITS	
	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21		Dup. Sm#	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21	40738-21		Dup. Sm#	40738-21	40738-21	40738-21		Dup. Sm#	<b>Client Referenc</b>
	<0.1    <0.1	20    24    RPD: 18	28    28    RPD: 0	12    12    RPD: 0	<0.5    <0.5	11    12    RPD: 9	11/05/10    11/05/10	11/05/10    11/05/10	Base + Duplicate + %RPD	Duplicate	122    119    RPD: 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	10/5/10    10/5/10	10/5/10    10/5/10	Base + Duplicate + %RPD	Duplicate	122    119    RPD: 2	<0.1    <0.1	<0.1    <0.1	Base + Duplicate + %RPD	Duplicate	e: 71706, Mulgoa
- >>>	LCS-3	LCS-3	LCS-3	LCS-3	LCS-3	LCS-3	LCS-3	LCS-3		Spike Sm#	LCS-2	LCS-2	[NR]	LCS-2	LCS-2	[NR]	[NR]	[NR]	[NR]	LCS-2	LCS-2		Spike Sm#	LCS-2	[NR]	LCS-2		Spike Sm#	
110%	100%	107%	110%	107%	107%	106%	11/05/10	11/05/10		Spike % Recovery	111%	%66	[NR]	82%	95%	[NR]	[NR]	[NR]	[NR]	10/5/10	10/5/10		Spike % Recovery	116%	[NR]	79%		Spike % Recovery	

Envirolab Reference: Revision No: 40738 R 00

ACCREDITED FOR TECHNICAL COMPETENCE

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Envirolab Reference: 40738 Revision No: R 00

		Client Reference	:e: 71706, Mulgoa	-	
QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	,	[NT]	[NT]	40738-26	10/5/10
Date analysed	•	[NT]	[TN]	40738-26	10/8/10
Arsenic-Dissolved	μg/L	[NT]	[TN]	40738-26	82%
Cadmium-Dissolved	J/Bri	[NT]	[TN]	40738-26	%96
Chromium-Dissolved	hâ\r	[ITN]	[NT]	40738-26	110%
Copper-Dissolved	hâ/r	[NT]	[TN]	40738-26	101%
Lead-Dissolved	η/ĝr	[NT]	[TN]	40738-26	110%
Mercury-Dissolved	hâ/r	[NT]	[NT]	40738-26	114%
Nickel-Dissolved	μg/L	[NT]	[NT]	40738-26	101%
Zinc-Dissolved	hã/r	[NT]	[TIN]	40738-26	112%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
Miscellaneous Inorganics			Base + Duplicate + %RPD		
Date prepared	1	40738-35	10/05/10    10/05/10	40738-34	10/05/10
Date analysed	E	40738-35	10/05/10    10/05/10	40738-34	10/05/10
Hardness	mgCaCO 3/L	40738-35	34    34    RPD: 0	[NR]	[NR]
Calcium - Dissolved	mg/L	40738-35	2.0    2.0    RPD: 0	40738-34	95%
Magnesium - Dissolved	mg/L	40738-35	7.0    7.1    RPD: 1	40738-34	93%
QUALITY CONTROL sTPH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	E	[NT]	ĮNŢ	40738-23	11/5/10
Date analysed	ı	[TN]	[TN]	40738-23	11/5/10
TPH Cit - Cit	mg/kg	[NT]	[NT]	40738-23	77%
TPH C15 - C28	mg/kg	[NT]	[N]	40738-23	92%
TPH C29 - C35	mg/kg	[N]	[NT]	40738-23	89%
Surrogate o-Terphenyl	%	[TN]	[N]	40738-23	124%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	r	[IN]	[N]	40738-23	10/5/10
Date analysed	•	[IN]	[TN]	40738-23	10/5/10
HCB	mg/kg	[IN]	[IN]	[NR]	[NR]
alpha-BHC	mg/kg	[LN]	[TN]	40738-23	113%
gamma-BHC	mg/kg	[IN]	[IN]	[NR]	ĮNRI
beta-BHC	mg/kg	[IN]	[TN]	40738-23	113%
Heptachlor	mg/kg	[TN]	[TN]	40738-23	105%
delta-BHC	mg/kg	[TN]	[TN]	[NR]	[NR]
Aldrin	mg/kg	[IN]	[IN]	40738-23	113%
Heptachlor Epoxide	mg/kg	[N]	[IN]	40738-23	117%
gamma-Chlordane	mg/kg	[TN]	[LN]	[NR]	[NR]
alpha-chlordane	mg/kg	[LN]	[TN]	[NR]	[NR]

		<b>Client Reference</b>	ce: 71706, Mulgoa		
QUALITY CONTROL Organochlorine Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Endoeulfan	maika				
op-DDE	ma/ka	INTI	INTI	40738-23	130%
Dieldrin	mg/kg	[TN]	[TN]	40738-23	127%
Endrin	mg/kg	[TN]	[TN]	40738-23	110%
pp-DDD	mg/kg	[TN]	[TN]	40738-23	120%
Endosulfan II	mg/kg	[NT]	[TN]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[TN]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[TN]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	40738-23	112%
Methoxychlor	mg/kg	[TN]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	40738-23	115%
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Spike % Recovery
Acid Extractable metals in soil			Base + Duplicate + %RPD		
Date digested	1	[NT]	[N]	40738-23	11/05/10
Date analysed	•	[TIN]	[TN]	40738-23	11/05/10
Arsenic	mg/kg	[TN]	[NT]	40738-23	95%
Cadmium	mg/kg	[NT]	[NT]	40738-23	85%
Chromium	mg/kg	[NT]	[NT]	40738-23	85%
Соррег	mg/kg	[NT]	[TN]	40738-23	104%
Lead	mg/kg	[NT]	[NT]	40738-23	86%
Mercury	mg/kg	[TN]	[NT]	40738-23	98%
Nickel	mg/kg	[NT]	[NT]	40738-23	88%
Zinc	mg/kg	[NT]	[NT]	40738-23	84%

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## Report Comments:

organics and filtered and acidified for metals. Water received in Plastic bottle - on receipt was transferred to glass for

Envirolab recommends supplying 30-40g of sample in it's own container. procedures. We cannot guarantee that this sub-sample is indicative of the entire sample Asbestos was analysed by Approved Identifier: Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to Envirolab Matt Mansfield Matt Mansfield

RPD: Relative Percent Difference INS: Insufficient sample for this test Asbestos was authorised by Approved Signatory: NT: Not tested NA: Test not required PQL: Practical Quantitation Limit LCS: Laboratory Control Sample <: Less than NR: Not requested Science: Science:

selected should be one where the analyte concentration is easily measurable. Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples. Quality Control Definitions Blank: This is the component of the analytical signal which is not derived from the sample but from reagents,

spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist. sand or water) fortified with analytes representative of the analyte class. It is simply a check sample. LCS (Laboratory Control Sample): This comprises either a standard reference material or a control matrix (such as a blank Matrix Spike: A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix

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

# Laboratory Acceptance Criteria:

spike recoveries for the sample batch were within laboratory acceptance criteria. to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for

SVOC and speciated phenols is acceptable Surrogates: 60-140% is acceptable for general organics and 10-140% for



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Revision No: Envirolab Reference: 40738 R 8

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Project	No:		717	٥6	Sam	pler:		AP		• • • • • • • • • • •	••••••		•••••	••••	10.	12 A	shlev	oerv / Stre	vices Set C	hatswo	od NSW 2068	(INVITOIAL) CHAISWOOD	12 Ashley d NSW 2
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				Sampl e Type								-		Ana	ytes							Security: Initalitation	lene
Sample ID	Sample Depth	Lab ID	Sampling Date	S - soil W - water	Container	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	втех/ ТРН	OCPs/ OPPs	PCBs	РАН	Phenols	VOCS	Other School	N	otes	
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TP16	0.2-0.3	9																		+			
TP16	0.4-0.5	_10				F									1								
TP21	0.2-0.3	11				<u> </u>														<u> </u>			
Τρ21	0.4-0.5	12		V		<b> </b> ~																	
ab Report	No																		F	hone:	(02) 9809 0666		
end Resul	ts to: Do	uglas	Partr	ners /	Addres	ss: 9	96 He	rmita	ige R	oad, V	West	Ryde	211	4		1	1		F	ax:	(02) 9809 4095		
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				Sampl e Type			1		r					Ana	lytes						
Sample ID	Sample Depth	Lab ID	Sampling Date	S - soil W - water	Container	As	Cd.	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/ TPH	OCPs/ OPPs	PCBs	PAH	Phenois	vocs	Other Scherger	Notes
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Project Name:	Mulgsa	
Project No:		AP
Project Mgr:		666 775
Email:	adam.podnar@d	louglaspartners.com.au
Date Required:	Std turnaround	Lab Quote No

- To: Envirolab Services 12 Ashley Street, Chatswood NSW 2068 Attn: Tania Notaras Phone: 02 9910 6200 Fax: 02 9910 6201
  - Email: tnotaras@envirolabservices.com.au

				Sampl e Type										Anal	lytes						
Sample ID	Sample Depth	Lab ID	Sampling Date	S - soit W water	Container	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	втех/ трн	OCPs/ OPPs	PCBs	РАН	Phenols	VOCs	Hardness Other	Notes
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Project Name:

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Project Mgr:

**Douglas Partners** Geolechnics · Environment · Growndwater

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	u by:	···	51	gned:					Date	ok inn 	ne:			F	keceived	ву:	/			Da	ate & Time:

To: Envirolab Services

Attn: Tania Notaras

12 Ashley Street, Chatswood NSW 2068

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......Mob. Phone: 0438 666 775.....

### CHAIN OF CUSTODY

This document is issued in accordance wi LabMark Environmental Laborat * SYDNEY: Unit 1, 8 Leighton Place Asquith NSW 2077 * Telephone: (02) 9476 6533 * Fax: (02) 9476 8219 Form Qs0144, Rev. 1: Dat	Geoff Weir Quality Control (Report signatory) geoff.weir@labmark.com.au geoff.weir@labmark.com	gian gia	Data Quality Objective     s:     matrix spike recovery     p:     pending       Data Quality Indicator     d:     laboratory duplicate     lcs:     laborator       Estimated Quantitation Limit     t:     laboratory triplicate     crm:     certified       not applicable     r:     RPD relative % difference     mb;     method b	Sensitivity: EQL: Typically 2-5 x Method Detection Limit (MDL) RESULT ANNOTATION	Metals 6 months general elements Mercury 28 days Confirmation: target organic analysis: GC/MS, or confirmatory column	RPD values exceed acceptance criteria Holding Times: soils, waters: table VOC's 14 days water / soil VAC's 7 days water or 14 days acidified VAC's 7 days water, 14 days soil SVOC's 7 days water, 14 days soil Pesticides 7 days water, 14 days soil	Accuracy:       Intrust 5-20, used 1 every 20 samples         ics, crm, method:       1 per analytical batch         surrogate spike:       addition per target organic method         Precision:       laboratory duplicate:       1 in first 5-10, then 1 every 10 samples         laboratory triplicate:       re-extracted & reported when duplicate	QUALITY ASSURANCE CRITERIA	This Final Certificate of Analysis consists of sample results, DQI's, method descripti accreditation and endorsement. The DQO compliance relates specifically to QA/QC indication of sample result quality. Transfer of report ownership from Labmark to the verified. All report copies may be retracted where full payment has not occured with	Chent Neiterence: Adam Podnar Contact Name: Adam Podnar Chain of Custody No: na Sample Matrix: SOIL	Laboratory Report No: E048274 Client Name: Douglas Partners	FINAL CERTIFICATE OF ANALYSIS -	ENVIRONMENTAL LABORATORIES	
with NATA's accreditation requirements. © copyright 2000 atories ABN 30 008 127 802 * MELECURNE: 1868 Dandenong Road, Clayton VIC 3168 * Telephone: (03) 9538 2277 * Fax: (03) 9538 2278 Date Issued M672/X8	Jeremy Truong NATA signatory) Authorising Chemist (NATA signatory) jeremy.truong@labmark.com.au	Dr. I. Jun	g bcs: batch specific les ory control sample bmb: batch specific mb d reference material l blank	Uncertainty: spike, lcs: measurement calculated from historical analyte specific control charts	ANALYTE SPECIFIC ACCEPTANCE CRITERIA (ASAC) Accuracy: spike, lcs, crm analyte specific recovery data surrogate: <3xsd of historical mean	<ul> <li>T-2 - S% (&gt;3 mequ)</li> <li>Precision: method blank: not detected &gt;95% of the reported EQL duplicate lab</li> <li>0-30% (&gt;10xEQL), 0-75% (5-10xEQL)</li> <li>RPD (metals): 0-100% (<sxeql)< li=""> <li>duplicate lab</li> <li>0-50% (&gt;10xEQL), 0-75% (5-10xEQL)</li> <li>RPD: 0-100% (<sxeql)< li=""> </sxeql)<></li></sxeql)<></li></ul>	Accuracy: spike, les, erm general analytes 70% - 130% recovery surrogate: phenol analytes 50% - 130% recovery organophosphorous pesticide analytes 60% - 130% recovery phenoxy acid herbicides, organotin 50% - 130% recovery anion/cation bal: +/- 10% (0-3 meq/l),	QUALITY CONTROL GLOBAL ACCEPTANCE CRITERIA (GAC)	tions, laboratory definitions, and internationally recognised NATA C results as performed as part of the sample analysis, and may provide an the client shall only occur once full & final payment has been settled and thin the agreed settlement period.	Date Received: 20/05/2010 Date Reported: 27/05/2010	Cover Page 1 of 4 plus Sample Results	- ENVIRONMENTAL DIVISION	Acreatized for compliance with ISO/IEC 17023. The results of test, cellbardiour and/or measurements included in this document are impacting a signalogy to Australian/hailonal standards. NATA is a signalogy to the APLAC mutual recognition of the equivalence of testing cellbartion and impection reports.	AQIS NATA AUSTRALIAN QUARANTINE

ENVIRONMENTAL LABORATORIES

CUSTOMER CENTRIC - ANALYTICAL CHEMISTS

### Environmental Environmental Industry Group Feamdation Member

## Laboratory Report: E048274

Cover Page 2 of 4

## NEPC GUIDELINE COMPLIANCE - DQO

### 1. GENERAL

- Α Results relate specifically to samples as received. Sample results are not corrected for matrix spike, surrogate recovery data. , lcs, 9
- EQL's are matrix dependant and may be increased due to sample dilution or matrix interference

Ъ.

- C. Laboratory QA/QC samples are specific to this project.
- Ģ www.nata.asn.au. Inter-laboratory proficiency results are available upon request. NATA accreditation details available at
- Щ extraction. VOC spikes & surrogates added to samples during extraction, SVOC spikes & surrogates added prior to
- Ч Recovery data outside GAC limits shall be investigated and compared to ASAC (historical mean +/- 3sd). recovery data <20%, then the relevant results for that compound are considered not reliable. ff
- ဂ Anomolous QC data is examined in conjunction with other QC samples and a final decision whether to accept or reject results is provided by the professional judgement of the senior analyst. The USEPA-CLP National Functional Guidelines are referred to for specific recommendations. Recovery data (ms, surrogate, crm, los) outside ASAC limits shall initiate an investigative action
- Η not requiring sample preparation (eg. VOCs in water, etc) may report a common extraction and analysis date. Extraction (preparation) date refers to the date that sample preparation was initiated. Note that certain methods
- Γ. LabMark shall maintain an official copy of this Certificate of Analysis for all tracable reference purposes.

# CHAIN OF CUSTODY (COC) & SAMPLE RECEIPT NOTICE (SRN) REQUIREMENTS

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- A. SRN issued to client upon sample receipt & login verification.
- μ Preservation & sampling date details specified on COC and SRN, unless noted
- Ω Sample Integrity & Validated Time of Sample Receipt (VTSR) Holding Times verified (preservation may extend holding time, refer to preservation chart).

## 3. NATA ACCREDITED METHODS

- Α to subcontracted test reports for NATA accreditation status) NATA accreditation held for each in-house method and sample matrix type reported, unless noted below (Refer
- в NATA accredited in-house laboratory methods are referenced from NEPC, ASTM, modified USEPA / APHA
- Ω Subcontracted analyses: Refer to Sample Receipt Notice and additional DQO comments. documents. Corporate Accreditation No. 13542.

This document is issued in accordance with NATA's accreditation requirements.

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 * SYDNEY: Unit 1, 8 Leighton Place Asquith NSW 2077
 * MELBOURNE: 1868 Dandenong Road, Clayton VIC 3168

 * Telephone: (02) 9476 6533
 * Fax: (02) 9476 8219

Form QS0144, Rev. 1 : Date Issued 06/02/08



## CUSTOMER CENTRIC - ANALYTICAL CHEMISTS



## Laboratory Report: E048274

Cover Page 3 of 4

4

## QA/QC FREQUENCY COMPLIANCE TABLE SPECIFIC TO THIS REPORT

Matrix:	SOIL						
Page:	Method:	Totals:	#d	%d-ratio	#t	#s	%s-ratio
1	BTEX by P&T	1	0	0%	0	0	0%
1	Volatile TPH by P&T (vTPH)	1	0	0%	0	0	0%
2	Petroleum Hydrocarbons (TPH)	1	0	0%	0	0	0%
ω	<b>Organochlorine Pesticides (OC)</b>	2	0	0%	0	0	0%
4	Organophosphorus Pesticides (OP)	2	0	0%	0	0	0%
ა	Acid extractable metals (M7)	2	0	0%	0	0	0%
6	Acid extractable metals - mercury	2	0	0%	0	0	0%
7	Moisture	2	ł	ł	1	1	ł

### GLOSSARY:

- #d %d-ratio #t #s %s-ratio number of discrete duplicate extractions/analyses performed. NEPC guideline for laboratory duplicates is 1 in 10 samples (min 10%). number of triplicate extractions/analyses performed. number of spiked samples analysed. USEPA guideline for laboratory matrix spikes is 1 in 20 samples (min 5%).

## Ś ADDITIONAL COMMENTS SPECIFIC TO THIS REPORT

below. A. All tests were conducted by LabMark Environmental Sydney, NATA accreditation No. 13542, unless indicated

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* SYDNEY: Unit 1, 8 Leighton Place Asquith NSW 2077
 * Telephone: (02) 9476 6533
 * Fax: (02) 9476 8219
 * Metabolic ABN 39 008 127 802
 * MELBOURNE: L868 Dandenong Road, Clayton VIC 3168
 * Telephone: (03) 9538 2277
 * Fax: (03) 9538 2278
 Form QS0144, Rev. 1: Date Jourd 0x0208

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Cover Page 4 of 4 Laboratory Report: E048274

Environmental Laboratory Industry Group Foundation Member

Laboratory QA/QC data shall relate specifically to this report, and may provide an indication of site specific sample result quality. LabMark <u>DOES</u> <u>NOT</u> report <u>NON-RELEVANT BATCH QA/QC</u> data. Acceptance of this self assessment certificate does not preclude any requirement for a QA/QC review by a accredited contaminated site EPA auditor, when and wherever necessary. Laboratory QA/QC self assessment references available upon request.



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ENVIRONMENTAL LABORATORIES

	Labora	atory Repor	t No: E	048274		Page	e: 1 of 7		Final	
	Client	Name:	Γ	ouglas Partr	ners	plus	cover page		Cer	tificate
ENVIRONMENTAL LABORATORIES	Contac	t Name:	А	dam Podnar		Date	e: 27/05/10		of An	alysis
	Client	Reference:	Ν	fulgoa 7170	6	This r	eport supercedes	reports issued or	n: N/A	
Laboratory Identification		262867	lcs	mb						
Sample Identification		40738-1	QC	QC						
Depth (m)										
Sampling Date recorded on COC		7/5/10	*		·	 				
Laboratory Extraction (Preparation) Date		24/5/10	24/5/10	24/5/10						
Laboratory Analysis Date		24/5/10	24/5/10	24/5/10		 -				
Method : E029.2/E016.2										
BTEX by P&T	EQL		0.50/							
Benzene	0.2	<0.2	97%	<0.2		:				
Toluene	0.5	<0.5	94%	<0.5						
Ethylbenzene	0.5	<0.5	90%	<0.5						
meta- and para-Xylene			9370	< 0.5						
ortno-Aylene	0.5	<b>\0.5</b>	9370	-0.5						
CDEP (Sum (a) $4 ma/ka$ )		01%	107%	107%						
CDFB (Surr @ 4 mg/kg)		2170		10770						
Method : E029.2/E016.2 Volatile TPH by P&T (vTPH) C6 - C9 Fraction	EQL 10	<10	104%	<10		-				

Comments:

E029.2/E016.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/FID/MSD. E029.2/E016.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/MSD.

	Labora	atory Repor	t No: E	2048274		Page	e: 2 of 7		Final	
	Client	Name:	Ι	Douglas Partr	ners	plus	cover page		Cer	tificate
ENVIRONMENTAL LABORATORIES	Contac	et Name:	A	Adam Podnar		Date	e: 27/05/10		of An	alysis
	Client	Reference:	Ν	/Iulgoa 7170	6	 This r	eport supercedes	reports issued or	n: N/A	
Laboratory Identification		262867	lcs	mb						
Sample Identification		40738-1	QC	QC						
Depth (m) Sampling Date recorded on COC		 7/5/10								
Laboratory Extraction (Preparation) Date Laboratory Analysis Date		24/5/10 25/5/10	24/5/10 25/5/10	24/5/10 25/5/10		 				
Method : E006.2 Petroleum Hydrocarbons (TPH) C10 - C14 Fraction C15 - C28 Fraction C29 - C36 Fraction Sum of TPH C10 - C36	EQL 50 100 100 	<50 <100 <100 	 84%  	<50 <100 <100 						

Comments:

E006.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/FID.

	Labora	atory Repor	t No: I	E048274		Page	e: 3 of 7		Final	
A REGRESSARCHE. HZ	Client	Name:	I	Douglas Partr	iers	plus	cover page		Cert	tificate
ENVIRONMENTAL LABORATORIES	Contac	of Name	,	Adam Podnar		Date	e: 27/05/10		of Ana	lysis
	CUlta		1	Aulgon 7170	6	This r	enort supercedes	reports issued or	1: N/A	
	Client	Reference:	1	viuigoa 7170	0 1	 				
Laboratory Identification		262867	262868	les	mb	 · · ·				
Sample Identification		40738-1	40738-3	QC	QC					
Depth (m)										
Sampling Date recorded on COC		7/5/10	7/5/10							
Laboratory Extraction (Preparation) Date		24/5/10	24/5/10	24/5/10	24/5/10					
Laboratory Analysis Date		25/5/10	25/5/10	24/5/10	.24/5/10					
Organochlorine Pesticides (OC) a-BHC Hexachlorobenzene b-BHC g-BHC (Lindane) d-BHC Heptachlor Aldrin Heptachlor epoxide trans-chlordane Endosulfan I	EQL 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.0	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05	94% 99% 96% 96%  99% 95% 95% 101% 94%	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05					
cis-chlordane Dieldrin 4,4-DDE Endrin Endosulfan II 4,4-DDD Endosulfan sulphate 4,4-DDT Methoxychlor DBC (Surr @ 0.2mg/kg)	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.2 <0.2 <i>82%</i>	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.2 <0.2 78%	107% 79% 105% 96% 88% 92% 103% 90% 95% <i>81%</i>	<0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.2 <0.2 105%					

Comments:

E013.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/dual ECD.

LabMark Pty Ltd ABN 27 079 798 397 SYDNEY: Unit 1, 8 Leighton Place Asquith NSW 2077 Telephone: (02) 9476 6533 Fax: (02) 9476 8219 MELBOURNE: 116 Moray Street, South Melbourne VIC 3205 Telephone: (03) 9686 8344 Fax: (03) 9686 7344

	Labora	atory Repor	t No: E	048274		Page	e: 4 of 7		Final
	Client	Name:	Γ	ouglas Partr	ners	plus	cover page		Certificate
ENVIRONMENTAL LABORATORIES	Contor	t Nama:	Δ	dam Podnar		Date	: 27/05/10		of Analysis
	Contac		1		r	This n	anort supercedes	reports issued or	· N/A
	Chent	Reference:	N	Auigoa /1700	o r	 *****			
Laboratory Identification		262867	262868	lcs	mb	 			
Sample Identification		40738-1	40738-3	QC	QC				
Depth (m)									
Sampling Date recorded on COC		7/5/10	7/5/10						
Laboratory Extraction (Preparation) Date		24/5/10	24/5/10	24/5/10	24/5/10				
Laboratory Analysis Date		27/5/10	27/5/10	27/5/10	27/5/10				
Method · E014.2									
Organophosphorus Pesticides (OP)	EOL								
Dichlorvos	0.5	<0.5	<0.5	116%	<0.5				
Mevinphos (Phosdrin)	0.5	<0.5	<0.5	122%	<0.5				
Demeton (total)	1	<1	<1	120%	<1				
Ethoprop	0.5	<0.5	<0.5	118%	<0.5				
Monocrotophos	0.5	<0.5	<0.5	129%	<0.5				
Phorate	0.5	<0.5	<0.5	122%	<0.5				
Dimethoate	0.5	<0.5	<0.5	113%	<0.5				
Diazinon	0.5	<0.5	<0.5	112%	<0.5				
Disulfoton	0.5	<0.5	<0.5	115%	<0.5				
Methyl parathion	0.5	<0.5	<0.5	114%	<0.5				
Ronnel	0.5	<0.5	<0.5	108%	<0.5				
Fenitrothion	0.5	<0.5	<0.5	112%	<0.5				
Malathion	0.5	<0.5	<0.5	106%	<0.5				
Chlorpyrifos	0.5	<0.5	<0.5	110%	<0.5				
Fenthion	0.5	<0.5	<0.5	114%	<0.5				
Parathion	0.5	<0.5	<0.5	103%	<0.5		•		
Stirofos	0.5	<0.5	<0.5	115%	<0.5				
Prothiofos	0.5	<0.5	<0.5	110%	<0.5				
Azinophos methyl	0.5	<0.5	<0.5	122%	<0.5				
Coumaphos	0.5	<0.5	<0.5	115%	<0.5				
TPP (Surr @ 2mg/kg)		91%	98%	92%	120%				

Comments:

E014.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/MSD.

.

	Labora	atory Repor	t No: E	E048274			Pag	e: 5 of 7		Final	
	Client	Name:	Ι	Douglas Partr	ners		plus	cover page		Cer	tificate
ENVIRONMENTAL LABORATORIES	Contac	et Name:	I	Adam Podnar			Date	e: 27/05/10		of Ana	alysis
	Client	<b>Reference:</b>	N	/ulgoa 7170	6		This r	eport supercede	s reports issued or	n: N/A	
Laboratory Identification		262867	262868	crm	lcs	mb					
Sample Identification		40738-1	40738-3	QC	QC	QC					
Depth (m)											
Sampling Date recorded on COC		7/5/10	7/5/10								
Laboratory Extraction (Preparation) Date		24/5/10	24/5/10	24/5/10	24/5/10	24/5/10			ľ		l i
Laboratory Analysis Date	-	25/5/10	25/5/10	24/5/10	24/5/10	24/5/10					
Method : E022.2 Acid extractable metals (M7) Arsenic Cadmium Chromium Copper	EQL 1 0.1 1 2	5 <0.1 19 11	4 <0.1 25 6 2	96% 109% 101% 106% 73%	100% 117% 107% 108%	<1 <0.1 <1 <2					
[Nickel		5 24	15	01%	103%						
Zinc	5	11	<5	109%	117%	<5					

Comments:

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

	Labora	atory Repor	t No: ]	E048274			Pag	e: 6 of 7		Final	
	Client	Name:	]	Douglas Partr	ners		plus	cover page		Cer	tificate
ENVIRONMENTAL LABORATORIES	Contac	et Name:	1	Adam Podnar			Dat	e: 27/05/10		of Ana	alysis
	Client	Reference:	]	Mulgoa 7170	6		This 1	eport supercede:	s reports issued or	n: N/A	
Laboratory Identification		262867	262868	crm	lcs	mb					
Sample Identification		4 <b>0738-</b> 1	40738-3	QC	QC	QC					
Depth (m)											
Sampling Date recorded on COC		7/5/10	7/5/10								
Laboratory Extraction (Preparation) Date		24/5/10	24/5/10	24/5/10	24/5/10	24/5/10					
Laboratory Analysis Date		25/5/01	25/5/01	24/5/10	24/5/10	24/5/10	-				
Method : E026.2 Acid extractable metals - mercury Mercury	<b>EQL</b> 0.05	0.21	0.18	88%	102%	<0.05					

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

	Labora	ntory Repor	t No:	E048274	Page	e: 7 of 7		Final	· ~ .
	Client	Name:		Douglas Partners	_ plus	cover page		Cert	tificate
ENVIRONMENTAL LABORATORIES	Contac	t Name:		Adam Podnar	Date	e: 27/05/10		of Ana	lysis
	Client	Reference:		Mulgoa 71706	This r	eport supercedes	reports issued or	n: N/A	
Laboratory Identification		262867	262868						
Sample Identification		40738-1	40738-3						
Depth (m)									
Sampling Date recorded on COC		7/5/10	7/5/10						
Laboratory Extraction (Preparation) Date		24/5/10	24/5/10						
Laboratory Analysis Date		25/5/10	25/5/10						
Method : E005.2 Moisture Moisture	EQL 	17	16						

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

			Report Date : 20/05/20 Renort Time : 6:29:14	IPM
ENVIRÓNMENTAL LABORATO	RIES	Samp	ile 🦛	
		Rece	ipt L	
Quality, Service, Suppo	<del>-</del>	Notic	e (SRN) for E048:	274
Clie	nt Details	Laboratory I	<b>Reference Information</b>	
Client Name: Douglas Client Phone: 02 9809	Partners 0666	Please have when c	e this information ready ontacting Labmark.	                         
Client Fax: 02 9809 Contact Name: Adam P	4095 odnar	Laboratory Report:	E048274	
Contact Email: adam.p	odnar@douglaspartners.com.au	<b>Quotation Number:</b>	- Not provided, standard pric	es apply
Client Address: 96 Hern West Ry	itage Road de NSW 2114	Laboratory Address:	Unit 1, 8 Leighton Pl. Asquith NSW 2077	
Project Name: Mulgoa		Phone:	61 2 9476 6533	
CoC Serial Number: - Not pr	ovided -			
Surchase Order: - Not pr	ovided -	Email:	Ros.Schacht@labmark.com.	au
due dat		Reporting Contact: Email:	Leanne Boag leanne.boag@labmark.com	au
Date Sampled (earliest date	): 07/05/2010	NATA Accreditation:	13542	
Date Samples Received:	20/05/2010	<b>TGA GMP License:</b>	185-336 (Sydney)	
Date Sample Receipt Notic	issued: 20/05/2010	APVMA License:	6105 (Sydney)	
Client TAT Request Date:	28/05/2010	AQIS Entry Permit:	200521534 (Sydney)	
<b>Reporting Requirements:</b>	Electronic Data Download required: No		voice Number: 10EA9595	
Sample Condition:	COC received with samples. Report r Samples received in good order . Samples received with cooling media: Samples received chilled.	umber and lab ID's defined Ice bricks .	d on COC.	
	Security seals not used . Sample container & chemical preserva	ation suitable .		
Comments:	Sampling dates not provided - THT ca	Iculated from 7/5/09 unless	s otherwise instructed.	
Holding Times:	Date received allows for sufficient time	e to meet Technical Holding	g Times.	
Preservation:	Chemical preservation of samples sat	isfactory for requested ana	alytes.	

# LabMark shall responsibly dispose of spent customer soll and water samples which includes the disintegration of the sample label. A sample disposal fee of \$1.00 is applicable on all samples received by the laboratory regardless of whether they have undergone analytical testing. Sample disposal of environmental samples received by the laboratory regardless of whether they have undergone after laboratory receipt, unless otherwise requested in writing by the client. Samples requested to be held in non-refrigerated storage shall incur \$5.00/ sample/ 3 months. Additional refrigerated storage shall incur \$30/ sample/ 3 months. Combination prices apply only if requested. Transfer of report ownership from LabMark to the client shall occur once full and final payment has been settled and verified. All report copies may be retracted where full payment does not occur within the agreed settlement period.

Important Notes:

Analysis comments:

Subcontracted Analyses:

Additional information on www.labmark.com.au Form QS0012, Rev 13: Date Issued 14/12/08.

Thank you for choosing Labmark to analyse your project samples.

ENVIRONMENTAL LABORATORIES. (C) Leals IVA car Sc

> Report Time : 6:29:14PM Report Date : 20/05/2010

Receipt Sample



Quality, Service, Support

The table below represents LabMark's understanding and interpretation of the customer supplied sample COC request (refer to SRN comments section on first page for external subcontracting method details). Please confirm that your COC request has been entered correctly. Due to THT and TAT requirements, testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing.

	262868 07/05	262867 07/05	No. Date Depth	
Totals:	40738-3	40738-1	Client Sample ID	
		٠	BTEX by P&T	
2	٠	٠	Acid extractable metals - mercury	-
2	٠	•	Acid extractable metals (M7)	
2	٠	•	Moisture	
2	٠	•	Organochlorine Pesticides (OC)	
2	٠	•	Organophosphorus Pesticides (OP)	-
2	•	•		
-		•		
		٠		Req
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'PREP Not Reported' refers to an internal laboratory instruction - client confirmation of this parameter is not required.

Thank you for choosing Labmark to analyse your project samples. Additional information on www.labmark.com.au Form QS0012, Rev 13: Date Issued 14/12/08.

ENVIRONMENTAL LABORATORIES O Lab Mark

Quality, Service, Support

Report Date : 20/05/2010 Report Time : 6:29:14PM

Sample Notice (SRN) for E048274 Receipt



Totals:

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Form QS0012, Rev 13: Date Issued 14/12/08.

Thank you for choosing Labmark to analyse your project samples. Additional information on www.labmark.com.au

Project Project Project Email: Date Re	Name: No: Mgr: equired:	 . <b>(</b> St		<u>М</u> . М	ob. F ada	Sam Yhone m.po	pler: : 04: dnar	38 66 @do . L	AP 6 77 ugla: ab C	5 spart Quote	ners. No,	com.	 au.	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	To: Attn:	Envir 12 A Tahia Phon Emai	rolab shley a Not ne: 02 il: tno	Serv Stre aras 9910 taras	ices et, C 0 620 s@er	hatswoo 0 Fax: 0 wirolabs	od NSW 2068 2 9910 6201 ervices.com.au	Lob No: 240 Date racelved: 7/5 Time received: 1/- Received by: 1/- Temp: Coolormbient
				Si e	ampl Type							<b>.</b>			Anal	ytes				· · · · ·			Recurity: Inlaculting
Sample ID	Sample Depth	Lab ID	Sampling	S - soil	W water	Container tyne	As	Cđ	Cr	Cu	Pb	Hg	Ni	Zn	BTEX/ TPH	OCPs/ OPPs	PCBs	РАН	Phenols	VOCs	Other Schoold Strate	N	lotes
TPS	9-0.1		1286		S						14.30	N. 204		2245						Ī			
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TP (I	0,2-0-3	3	26286											5 7.0550.405 1 (16:00-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0								· · · · · · · · · · · · · · · · · · ·	
TPII	0.4-0.5	4													 -	+					1		
TP 10	0-0.1	5				1	<u> </u>									{							
TPIO	0-4-0-5	6					<b>}</b>						· · ·	+		<del> </del> l					<b>├</b> ───┤		
тріз	0.2-0.3	7					Ì														<b>\</b>	•	
TP13	0.4-9.5	8					<i> -</i>	<u> </u>								11	 						
TP15	0. <u>0</u> -0-3	9						<u> </u>									. 				H	*	•
TP16	0.4-0.5	10					<u> </u>	<u> </u>						┼──┤		1	<u> </u>						
TP21	0.2 - 0.3	11			,		<u> </u>	<u> </u>					 								<u>  </u>		
TP21	0.4-0.5	12			V				<u> </u>					+			V						
ab Report end Resu	t No Its to: Do	ouglas	s Part	ner	<u>S /</u>	Addre	ss:	96 He	ermit	age F	Road,	West	Ryd	le 211	4	Pocolugy	d Byr		16		Phone: Fax:	(02) 9809 0666 (02) 9809 4095	

- 8

### Appendix F

Quality Assurance/Quality Control Procedures and Results



### QA/QC PROCEDURES AND RESULTS

### FIELD QUALITY ASSURANCE AND QUALITY CONTROL

### **Trip Spike**

According to the NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (1997), laboratory prepared trip spikes are to be taken into the field, subjected to the same preservation methods as the field samples, then analysed, for the purposes of determining the losses in volatile organics incurred prior to reaching the laboratory.

The practicalities of trip spikes are currently being debated and a standardised procedure is yet to be defined. The laboratory prepared one soil trip spike before the soil sampling rounds, which was then preserved in the standard manner and taken into the field unopened. At this stage, the laboratory has no standard acceptance limits in recovery rates. Results are presented below and indicate the percentage recovery for BTEX during the trip.

### Table F1: Trip Spike Results (% recovery)

Sample ID	Benzene	Toluene	Ethyl Benzene	m+p-Xylene	o-xylene
Soil Trip Spike	88%	91%	92%	93%	92%

### Trip Blank

The laboratory prepared a trip blank that was taken out to the field unopened, subjected to the same preservation methods as the field samples. The sample was then analysed for the purposes of determining the transfer of contaminants into the blank sample incurred prior to reaching the laboratory. The results of the laboratory analysis for the trip blank are shown below.

### Table F2: Trip Blank Results

Sample ID	Benzene	Ethyl-benzene	Toluene	Xylene
Soil Trip Blank	<0.5	<0.5	<1	<3

Levels of analytes were found to be below detection limits, indicating that cross contamination of BTEX (as an indication of volatile analytes), had not occurred during the course of the round trip from laboratory to site, during the sampling where the trip blank was taken, and therefore demonstrated that appropriate sample handling was undertaken.

### LABORATORY QA/QC PROCEDURES

The following QA/QC procedures were conducted by the laboratory.

### Reagent Blank

This sample is prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. The laboratory results for reagent blanks for soil analyses indicated concentrations



of all analytes to be below laboratory detection limits. These results are included in the laboratory report in Appendix E.

### Spike Recovery

This is a sample replicate prepared by adding a known amount of analyte prior to analysis, and then treated exactly the same as all other samples. The recovery result indicates the proportion of the known concentration of the analyte that is detected during analysis. These results are included in the laboratory reports in Appendix E. The spike recovery rates are compared with limits as specified in Envirolab Services Quality Control System, and any exceedances are highlighted in the report. The spike recovery results are acceptable range. On this basis, it is considered that the spike recovery results are acceptable.

### Surrogate Recovery

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis to each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis. The surrogate recovery rates are compared with limits as specified in Envirolab Services and any exceedances are highlighted in the report. As no exceedances and no comments were noted on the report, it is considered that the results indicate that the analytical results are not significantly affected by matrix interference.

### Duplicates

These are additional portions of a sample which are analysed in exactly the same manner as all other samples. The duplicate sample results are included in the laboratory results in Appendix E.

In overall terms, therefore, the data quality objectives have been attained and the quality of the investigation data is considered acceptable.