PROPOSED PIAZZA, SACRED HEART CATHEDRAL, BENDIGO

GEOTECHNICAL & PRELIMINARY ENVIRONMENTAL INVESTIGATION

FOR
LATERAL PROJECTS & DEVELOPMENTS

GTS Report Number 15C 0697
Sept 2015

Sandhurst Geotech Pty Ltd, Trading as **Geotechnical Testing Services – Southern.** ABN: 18 169 924 109 ACN: 169 924 109

Email: info@geotestsouthern.com.au; Ph: 03 5441 4881; Fax: 03 5441 5089; Mail Address: PO Box 13, STRATHDALE, Vic, 3550
Offices: • La Trobe University Applied Science 2 Building 7 Sharon Street, Flora Hill, VIC 3550; • Shed 3, 140 Ogilvie Avenue, Echuca , VIC 3654,

DISCLAIMER

This investigation has been carried out in goodwill and under the instructions of Lateral Projects and Developments. The investigation has been undertaken with the care and skill of competent personnel as defined within Geotechnical Testing Services quality system. It is not a comprehensive investigation but a guide to the conditions throughout the designated area.

The results from this investigation relate to the specified sites labelled throughout this document, and hence the information obtained may need to be extrapolated to the rest of the designated area. While care has been taken throughout this investigation, soil conditions can vary between each individual test site and at depths greater than that drilled during this investigation. Hence, if variations from this report are found during excavations/construction then Geotechnical Testing Services should be notified so it can be assessed and appropriate advice provided.

This document has been prepared for Lateral Projects and Developments, and hence no responsibility or liability is being accepted to any third party, where any part of the report is used in either isolation or without consideration of the whole document. This document is not appropriate where there has been a significant change in the project or either for the specific needs of the reader.

Please, don't hesitate to contact the undersigned, if you require any further information or assistance.

Shane Hampton (BE (Hons))
Senior Geotechnical Engineer

Telephone: (03) 5441 4881
Mobile: 0437 496 215
Email: shaneh@geotestsouthern.com.au

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APPENDIX

1 INTRODUCTION

Lateral Projects and Developments commissioned Geotechnical Testing Services (GTS) to undertake a geotechnical and preliminary environmental investigation for the proposed Piazza at the Sacred Heart Cathedral in Bendigo.

A review of the AS James report conducted in 2009 (reference 110879) was also conducted.

The purpose of the investigation was to assess general subsurface conditions at the site with a view to providing comments, design parameters and a preliminary indication of the contamination status of the material at the site for the proposed construction.

2 SITE AND GEOLOGY

2.1 SITE LOCATION AND GENERAL CONDITIONS

The site is located on the south side of the Sacred Heart Cathedral on High Street, Bendigo.

The site has a fall to the southeast varying from steep to slight with the proposed development area currently vacant. A building was removed from the development area during 2014. There are also buildings in the east of the site (along Short Street) that are to remain. At the time of the investigation, the surface of the site was moist with a good grass covering over the majority of the site and gravel surfacing in the southeast. There are two medium sized trees in the southwest, and several medium to large trees in the adjacent road reserves. In addition, there have also been several medium to large trees removed in the vicinity of the demolished building. There were no visual signs of surface cracking.

2.2 GEOLOGY

The Department of Primary Industries online “Geovic” map shows the site to be underlain by Quaternary aged sedimentary deposits of the Shepparton formation along High Street and bordering onto Ordovician aged Siltstone/Sandstone rock with this generally confirmed by the field data.

3 FIELDWORK

The geotechnical investigation was conducted on the 27th August 2015 and involved the drilling of 6 boreholes by a Gemco drilling rig to depths of between 2.7 and 6.0 metres. In addition a footing exposure was excavated against the existing Cathedral. Samples of the material at the site were obtained at regular intervals for contamination assessment.

The field investigation was conducted by a technician under the direction of a Geotechnical Engineer, who logged the subsurface profile and determined the testing and sampling program. The engineering logs are included in the Appendix with their locations shown on the enclosed site plan.

The field investigation indicated that the soil profile variable across the site due to the change in geology, but may be summarized as follows:

Boreholes 1 to 3 (top of slope)

FILL: Sandy SILT, dark brown, fine sand

to depths of between 0.2 and 0.3 metres

Overlying

FILL: Silty Gravelly CLAY/Clayey GRAVEL, low plasticity, pale brown, brown, grey, fine to coarse gravel and cobbles, stiff

to depths of between 2.0 and 2.4 metres

Overlying

SILTSTONE, extremely to distinctly weathered, pale brown, low to moderate strength

to termination depths

Boreholes 4 to 6 (lower part of slope)

FILL: Sandy SILT & Sandy Silty CLAY, dark brown, brown,

to depths of between 0.2 and 0.6 metres

Overlying

ALLUVIAL: (Sandy) Silty CLAY, low to medium plasticity, pale brown, brown, grey, stiff to very stiff, to depths of between 3.3 and 4.8 metres

Overlying

SILTSTONE, extremely to distinctly weathered, pale brown, orange, pale green, low to moderate strength, to termination depths

Therefore, generally the steep slope and flat area on the south side of the cathedral has been filled with Siltstone rock and clay materials to form the current surface levels. The southern part of the site fronting High Street where there is less slope is generally alluvial materials that may have undergone some alluvial mining in the past (100+years ago).

The footing exposure on the Cathedral indicated that the external footing was located in the moderately weathered Siltstone rock. It was observed that the top of the concrete strip footing was at a depth of 1.3 metres below the surface whilst the weathered Siltstone rock commenced at a depth of 1.05 metres. Due to the hardness of the rock, it was not possible to excavate to find the base of the footing, however, due to the hardness of the rock, this is not necessary. Photographs of the footing exposure are included in the Appendix. Based on the strength of the rock at this location, there is an allowable bearing pressure of 1MPa. However, with the variation in weathering of the Siltstone rock, throughout the site, the strength of the founding rock may also vary with recommendations discussed in Section 4.

Reference should be made to the appended borehole logs for a full description of subsurface conditions at each location.

Groundwater in the form of a perched water table on the Siltstone rock was encountered in boreholes 5 and 6 at depths of 4.0 and 5.0 metres respectively.

4 ENGINEERING RECOMMENDATIONS

It is understood that the proposed development consists of a tiered terraced piazza on the lower level of the site with access up the hill to the cathedral by either steps or a flat path with elevator.

Therefore, based on the results of this investigation, particular conditions at the site dictate that the founding medium and minimum depth below existing surface levels is outlined below.

- **SILTSTONE ROCK**, extremely to distinctly weathered, pale brown, orange,
  At depths varying from below 2.0 to 4.8 metres

An allowable bearing pressure of 400kPa is available for edge and internal beams of a raft slab, strip and pad (spread) footings founded as above.

Due to the required founding depth, bored piers may be considered. For bored piers socketed a minimum depth of 1 metre or 1 diameter (whichever is greater) there is an allowable bearing pressure of 700kPa available with an allowable skin friction of 70kPa.

In addition, on the lower section, footings may be founded in the alluvial (Sandy) Silty Clay material at depths below 0.6 metres and proportioned for an allowable bearing pressure of 100kPa. However, there may be differential settlement between structures founded in the weathered Siltstone and those in the alluvial material. The expected settlements may be determined when footing size and loadings are known.

Based on past experience with our drill rig, it is capable of augering through low strength, extremely weathered Siltstone rock and will refuse on moderate to good strength rock. It is noted that refusal was encountered in BH2 at 2.7 metres and BH5 at 5.5m. In addition, the 5 tonne excavator encountered refusal with the rock bucket (ripper not used) at depths of 1.3 metres in the footing exposure. As such, there will be areas of excavation that will prove difficult and require the use of a ripper and possibly pneumatic hammer. For any bored piers, provisions for drilling into the hard rock will also be required.

It is noted that the boreholes remained open during the investigation, however, these are of small diameter (100mm) and were for a short time. The presence of water table in BHs 5 and 6 and alluvial materials (possible sand lenses/layers) in conjunction with a larger diameter hole may cause instability in the excavation. As such, provisions for shoring or alternate excavation techniques may be required to keep the excavation stable. It is also recommended that all heavy machinery maintain a minimum distance of 1.5m from the excavation to minimise the risk of instability occurring.

5 PRELIMINARY ENVIRONMENTAL SOIL ANALYSIS

5.1 FIELDWORK

In accordance with the client's request, GTS conducted preliminary soil sampling & analysis to assist in determining the contamination status of the soil type at the site for residential use and suitable removal/disposal or re-use purposes, where and if required.

Subsequently, a total of eighteen samples were taken in line with the geotechnical works undertaken at the site for indicative purpose only. Consecutively, samples were taken near surface (100mm) and at regular depths down to the weathered rock.

The chemical testing regime consisted of three EPA 621 Clean Fill (broad) screens due to the prior usage of the site being somewhat unknown. This was to ascertain the potential for varied contaminants to exist at the site, including (but not limited to) MAH, PAH, TPH/BTEX, PCB's, Chromium, Cyanide, OCC/OPP. The remaining 15 samples were tested for heavy metal screens which targets Bendigo's mining history.

The soil samples were handled with gloves and the equipment cleaned prior with Decon-90 in accordance with standard procedures, namely Australian Standard (AS 4482.1) – Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and Semi-volatile compounds. All sample jars were suitably labelled and stored in an appropriate sealed container (esky). After completion of the field work, each sample was sent to a NATA accredited laboratory (ALS Environmental) for the aforementioned analysis. Accordingly, all chain of custody protocols were also completed.

5.2 CHEMICAL ANALYSIS

GTS compared the analytical results with both the health & waste standards, namely:

- Health: Schedule B (1) of the National Environmental Protection Measure (NEPM) – Guideline on the investigation levels for soil and groundwater, 2013. Schedule B (1) provides a range of investigation levels for the protection of human health, which are referred to as Health Based Investigation Levels (HILs).
  ***HIL - 'C'** is categorised as public open space such as parks where potential for exposure is lower.
- EPA Industrial Waste Resource Guidelines - 'Soil Hazard Categorisation and Management' – Publication IWRG621, June 2009.

The full 'Certificate of Analysis' and Chain of Custody is appended to this report. A discussion of the analytical results in regards to the aforementioned guidelines is outlined below:

Waste Classification

When reviewing the chemical findings, all of the samples submitted for testing were found to exhibit concentrations exceeding acceptable EPA Clean Fill Limits, including:

Sample	Analyte	Determined Concentration (mg/kg)	Allowable EPA Clean Fill Limit (mg/kg)	Allowable EPA Category C Limit (mg/kg)	EPA Hazard Category
BH1 – 0.1m	Arsenic Benzo(a)pyrene	34 1.4	≤20 ≤1	≤500 ≤5	Category 'C'
BH2 – 0.1m	Arsenic	44	≤20	≤500	Category 'C'
BH2 – 0.5m	Arsenic	34	≤20	≤500	Category 'C'
BH3 – 0.1m	Arsenic	49	≤20	≤500	Category 'C
BH3 – 0.5m	Arsenic	280	≤20	≤500	Category 'C
BH4 – 0.1m	Arsenic	200	≤20	≤500	Category 'C
BH5 – 0.1m	Arsenic	50	≤20	≤500	Category 'C
BH5 – 2.5m	Arsenic	38	≤20	≤500	Category 'C
BH6 – 0.1m	Arsenic	680	≤20	≤500 (2000 – B)	Category 'B
BH6 – 4.5m	Arsenic	52	≤20	≤500	Category 'C

For the elevated arsenic concentrations, leachable tests were not conducted at this stage but would be required to fully categorise the material.

NEPM – Health Investigation Levels:

All chemical concentrations determined to exist across the site were found to be within acceptable health investigation levels/limits for public open spaces (HIL – C), NEPM 2013 apart from the following.

Sample	Analyte	Determined Concentration (mg/kg)	HIL Limit - Recreational C (mg/kg)
BH6 – 0.1m	Arsenic	680	≤300

5.3 DISCUSSION

It should be noted that the contamination assessment conducted is not a full environmental audit and was conducted to give an indication only of the contamination status of the material at this site.

Waste Classification

Based on the results of the chemical testing, the material is generally classified as Category C – Low level contaminated material. The exception is in BH6 at 0.1m where the material is classified as Category B – contaminated material. This borehole is located in the region of the old car park between the demolished and existing building. As such, it is likely to be imported material for the car park and not indicative of the entire site.

As this investigation indicates that there is contaminated material at the site, for material to be removed and disposed of offsite it shall be stockpiled and tested in accordance with EPA guidelines (including leachable fractions) to accurately determine the category for disposal. It is recommended that material from the upper profile of the car park (region of BH6) should be stockpiled and tested separately prior to disposal. In addition, it may be prudent to separately stockpile the fill material, alluvial material and weathered Siltstone and test separately.

NEPM – Health Investigation Levels

Based on the results of this investigation, the contamination status of the material indicates that it is generally suitable for ongoing use as a public open space (HIL-C). The only exception is the near surface material in BH6 which is the old car park as discussed above. This area may be remediated with shallow excavation to remove the contaminated material. Following validation tests in the base of

the excavation and disposal of the material off site, the site appears suitable for ongoing use as a public open space.

6 IMPORTANT NOTES ABOUT THIS REPORT

Material types and quality in areas away from the test locations are inferred only and may vary from those encountered during the investigation. It is recommended that the base of all foundation excavations are inspected by a Geotechnical Engineer to ensure the founding medium and strength requirements referenced herein are met. If further variations in descriptions in soil types, colour or depths are discovered during construction, this office should be notified immediately so that potential influence on the footings may be assessed.

The soil colours provided in the borelogs attached may vary with soil moisture content and individual interpretation, therefore colour alone should not be used to identify these soils.

Strength characteristics of soils often exhibit a large variation between wet and dry conditions. Soil characteristics of a soil profile are given on the soil conditions at the time of the investigation.

Shane Hampton (BE (Hons))
Senior Geotechnical Engineer

APPENDIX

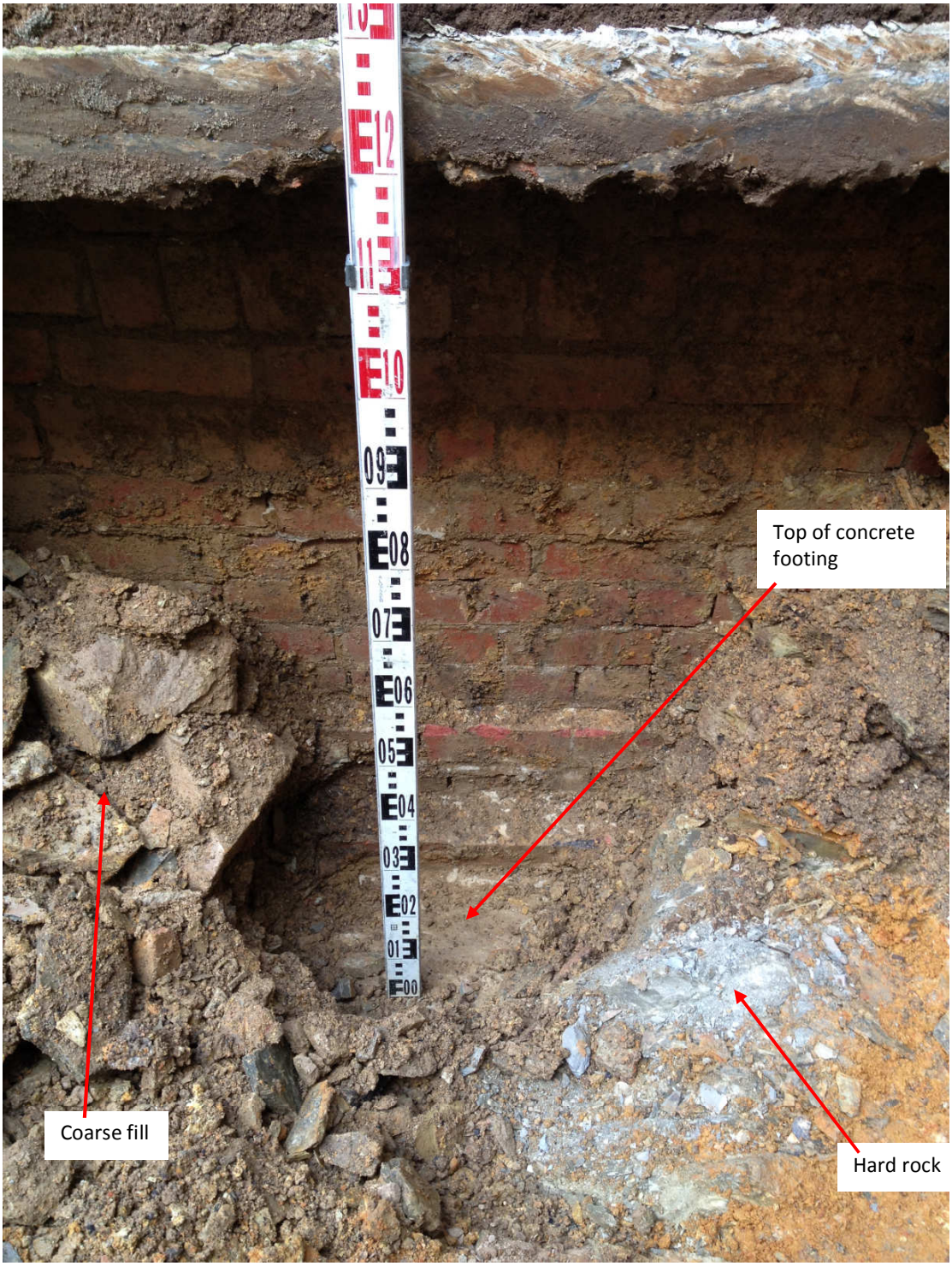

Fig 1: Footing Exposure

Fig 2: Top of concrete footing (closer view)

Fig 3: Location of footing exposure

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GEOTECHNICAL
TESTING SERVICES
SOUTHERN

PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 1
Sheet no. 1 of 1
Job no. 15C 0697

Client :	Lateral Projects and Developments			Date:	27/08/2015
Project :	Cathedral Investigation			Logged by:	RC+TP
Location :	Bendigo Cathedral				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), dark brown				M	MD	FILL			
Gravelly Silty CLAY (CL), low plasticity, brown, pale brown, fine to coarse gravel				M	St	FILL			
	1.00								
	2.00								
Silty CLAY (CI), medium plasticity, brown				M	VSt				
	3.00								
3100mm									
SILSTONE, extremely weathered, pale brown				M	M/H	ROCK			
	4.00								
4500mm									
Borehole terminated @ 4.5m									
	5.00								
	6.00								
	7.00								
	8.00								

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PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 2
Sheet no. 1 of 1
Job no. 15C 0697

Client :	Lateral Projects and Developments			Date:	27/08/2015
Project :	Cathedral Investigation			Logged by:	RC+TP
Location :	Bendigo Cathedral				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*t measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), dark brown				M	MD	FILL			
Gravelly Silty CLAY (CL), low plasticity, brown, pale brown, fine to coarse gravel				M	St	FILL			
	1.00								
	2.00								
SILTSTONE, , extremely weathered, pale brown 2700mm				D	H	ROCK			
Refusal @ 2.7m	3.00								
	4.00								
	5.00								
	6.00								
	7.00								
	8.00								

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SOUTHERN

PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 3
Sheet no. 1 of 1
Job no. 15C 0697

Client :	Lateral Projects and Developments			Date:	27/08/2015
Project :	Cathedral Investigation			Logged by:	RC+TP
Location :	Bendigo Cathedral				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), dark brown				M	MD	FILL			
Gravelly Silty CLAY (CL), low plasticity, brown, pale brown, fine to coarse gravel				M	St	FILL			
	1.00								
	2.00								
2300mm									
SILTSTONE, extremely weathered, pale brown				D	M/H	ROCK			
	3.00								
Borehole terminated @ 3m									
	4.00								
	5.00								
	6.00								
	7.00								
	8.00								

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TESTING SERVICES
SOUTHERN

PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 4
Sheet no. 1 of 1
Job no. 15C 0697

Client :	Lateral Projects and Developments			Date:	27/08/2015
Project :	Cathedral Investigation			Logged by:	RC+TP
Location :	Bendigo Cathedral				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*t measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy SILT (ML), dark brown				M	MD	FILL			
300mm									
Silty CLAY (CL), low plasticity, pale brown, trace fine sand				D-M	St	ALLUVIALS			
	1.00								
1100mm									
Sandy Silty CLAY (CL-CI), low to medium, pale brown, fine sand				D-M	St	ALLUVIALS			
	2.00								
2500mm									
Silty CLAY (CI), medium plasticity, grey, brown, pale brown, trace of fine sand				M	VSt				
	3.00								
3300mm									
SILTSTONE, extremely weathered, grey				D	M/H	ROCK			
	4.00								
4500mm									
Borehole terminated @ 4.5m									
	5.00								
	6.00								
	7.00								
	8.00								

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TESTING SERVICES
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PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 5
Sheet no. 1 of 1
Job no. 15C 0697

Client :	Lateral Projects and Developments			Date:	27/08/2015
Project :	Cathedral Investigation			Logged by:	RC+TP
Location :	Bendigo Cathedral				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy Silty CLAY (CI), medium plasticity, brown, fine to coarse sand 300mm				M	St	FILL			
Silty CLAY (CI), medium plasticity, brown, pale brown	1.00			M	St				
1100mm									
Silty CLAY (CI), medium plasticity, brown, pale brown, some fine to coarse sand	2.00			M	VSt				
	3.00								
Gravelly Silty CLAY (CI), medium plasticity, brown, some fine to coarse sand, fine to coarse gravel	4.00			M/W	St	ALLUVIALS SWL @ 4m			
SILTSTONE, extremely weathered, pale orange	5.00			D	H	ROCK			
5500mm									
Refusal @ 5.5m	6.00								
	7.00								
	8.00								

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GEOTECHNICAL
TESTING SERVICES
SOUTHERN

PO Box 13, Strathdale 3550
Ph (03) 54414881 Fax (03) 5441 5089

ENGINEERING BOREHOLE LOG

Borehole no. 6
Sheet no. 1 of 1
Job no. 15C 0697

Client :	Lateral Projects and Developments			Date:	27/08/2015
Project :	Cathedral Investigation			Logged by:	RC+TP
Location :	Bendigo Cathedral				
Drill model :	Gemco HS7	Slope	90 deg	RL surface:	*Not measured*
Hole diameter :	100mm	Bearing	- deg	Datum :	-

Material Description	Depth (m)	Graphic log	Water	Moisture condition	Consistency density, index	Structure, additional observations	Notes Samples Tests	Method	Support
Sandy Gravelly CLAY (CL), low plasticity. brown, pale brown, dark brown				M	St	FILL			
Sandy CLAY (CL), low plasticity, brown, fine to medium sand	1.00			M	St	ALLUVIALS			
1100mm									
Silty CLAY (CI), medium plasticity, brown, some fine to coarse sand	2.00			M	St	ALLUVIALS			
	3.00								
Gravelly Silty CLAY (CL), low plasticity, brown	4.00			W	St	ALLUVIALS			
SILTSTONE, extremely weathered, pale green	5.00			M	S	ROCK SWL @ 5m			
	6.00								
Borehole terminated @ 6m	7.00								
	8.00								

CHAIN OF CUSTODY

ALS Water Resources Group

ABN 94 105 060 320 www.alsglobal.com

CLIENT: GTS Southern
CONTACT:
ADDRESS: PO BOX 13, Strathdale
PHONE: (03) 5441 4881
FAX
EMAIL bradb@geotestsouthern.com.au
QUOTE No.

Head Office
Caribbean Business Park
22 Dalmore Dve
Scoresby, Vic 3179
Phone: 61 3 8756 8000
Fax: 61 3 9763 1862
Email: melbournewrg@alsglobal.com

Bendigo Office
LaTrobe University
Gate 6, Sharon Street
Bendigo, Vic 3550
Phone: 61 3 5441 0700
Fax: 61 3 5444 5208
Email: bendigowrg@alsglobal.com

Job Reference: 15C/697 Bendigo Cathedral

ALS WATER RESOURCES GROUP SAMPLE SUBMISSION SHEET (Please return with the samples)

Page 1 of 2

Sample ID	Sample Description	No of Containers	On Site Information: Date Sampled	On Site Information: Time Sampled	TESTS REQUIRED: EPA 621 Clean Fill Screen	TESTS REQUIRED: Heavy Metal Screen	Lab use only: Project # 15-40012 Matrix S=Soil, W=Water	Parent #	Child #
BH1 - 0.1m	SOIL	1	27/08/2015		X		S	4463769	4463790
BH1 - 1.5m	SOIL	1	27/08/2015			X	S	4463770	4463797
BH1 - 2.5m	SOIL	1	27/08/2015			X	S	4463771	4463798
BH2 - 0.1m	SOIL	1	27/08/2015			X	S	4463772	4463801
BH2 - 0.5m	SOIL	1	27/08/2015		X		S	4463774	4463802
BH2 - 2.5m	SOIL	1	27/08/2015			X	S	4463775	4463807
BH3 - 0.1m	SOIL	1	27/08/2015			X	S	4463776	4463810
BH3 - 0.5m	SOIL	1	27/08/2015			X	S	4463777	4463811
BH3 - 1.5m	SOIL	1	27/08/2015			X	S	4463778	4463817
BH4 - 0.1m	SOIL	1	27/08/2015			X	S	4463779	4463813
BH4 - 1.5m	SOIL	1	27/08/2015			X	S	4463780	4463814
BH4 - 3.5m	SOIL	1	27/08/2015			X	S	4463781	4463815

Relinquished by		Time & Date	Received by (ALS)	Time & Date
Brad Bishop	GTS	9.30 7/9/15		7/9 9:30

This form is for recording of sample data after prior consultation with an analyst regarding sampling procedures and does not over-ride pricing agreements, OHS requirements and our terms and conditions.

As an Occupational Health and Safety consideration, it is a requirement of WSL Consultants Pty. Ltd. that all samples received be undamaged and prior advice given in writing of any potential health risks.

LAB USE ONLY

Sample conditions:

Samples received undamaged [Yes/No]
Samples adequately preserved [Yes/No]
Samples within recommended holding times [Yes/No]
Samples transported at appropriate temperature [Yes/No]

PO - 15C/697

CHAIN OF CUSTODY

ALS Water Resources Group

ABN 94 105 060 320 www.alsglobal.com

CLIENT: GTS Southern
CONTACT:
ADDRESS: PO BOX 13, Strathdale
PHONE: (03) 5441 4881
FAX
EMAIL bradb@geotestsouthern.com.au
QUOTE No.

Head Office
Caribbean Business Park
22 Dalmore Dve
Scoresby, Vic 3179
Phone: 61 3 8756 8000
Fax: 61 3 9763 1862
Email: melbournewrg@alsglobal.com

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Phone: 61 3 5441 0700
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Job Reference: 15C/697 Bendigo Cathedral

ALS WATER RESOURCES GROUP SAMPLE SUBMISSION SHEET (Please return with the samples)

Page 2 of 2

		On Site Information			TESTS REQUIRED								Lab use only: Project # 15-40012.		
Sample ID	Sample Description	No of Containers	Date Sampled	Time Sampled	EPA 621 Clean Fill Screen	Heavy Metal Screen							Matrix S=Soil, W=Water	Parent #	Child #
BH5 - 0.1m	SOIL	1	27/08/2015		X								S	4463783	4463817
BH5 - 0.5m	SOIL	1	27/08/2015			X							S	4463784	4463818
BH5 - 2.5m	SOIL	1	27/08/2015			X							S	4463785	4463819
BH6 - 0.1m	SOIL	1	27/08/2015			X							S	4463786	4463820
BH6 - 1.5m	SOIL	1	27/08/2015			X							S	4463787	4463821
BH6 - 4.5m	SOIL	1	27/08/2015			X							S	4463788	4463822

Relinquished by	Time & Date	Received by (ALS)	Time & Date
Brad Bishop GTS	9:30 7/9/15		7/9 9:30

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LAB USE ONLY

Sample conditions:

Samples received undamaged [Yes/No]
Samples adequately preserved [Yes/No]
Samples within recommended holding times [Yes/No]
Samples transported at appropriate temperature [Yes/No]

ALS Group

Environmental Division (Water Resources Group)

NATA Accredited Laboratory No. 992

Accredited for compliance with ISO/IEC 17025

Food & Environmental Pharmaceutical

ALS Life Sciences

CERTIFICATE OF ANALYSIS

Batch No:	**15-40012**	*Page*	Page 1 of 16
Final Report	516017	*Laboratory*	Bendigo Laboratory
		Address	Gate 6 Sharon Street, La Trobe University, Bendigo, VIC 3550
Client:	**Sandhurst Geotech Pty Ltd**	*Phone*	03 5441 0700
Contact:	**Brad Bishop**	*Fax*	03 5444 5208
Address:	t/a Geotechnical Testing Services - Southern PO Box 13 STRATHDALE VIC 3550	Contact:	Robert Filcock Bendigo Laboratory Manager Robert.Filcock@alsglobal.com
Client Program Ref:	**15C/697 Bendigo Cathedral**	Date Sampled:	27-Aug-2015
ALS Program Ref:	**SANDHURSTGEO**	Date Samples Received:	07-Sep-2015
PO No:	**SG 0221**	*Date Issued:*	**14-Sep-2015**

The sample(s) referred to in this report were analysed by the following method(s) under NATA Accreditation No. 992. The hash (#) below indicates methods not covered by NATA accreditation in the performance of this service.

Analysis	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*
BTEXN	VIC-CM047	Scoresby	**CHC**	VIC-CM045	Scoresby	**Cyanide**	EK026SF	Scoresby
Total Fluoride	EK040TSC	Scoresby	**HVOL**	VIC-CM047	Scoresby	**MAH**	VIC-CM051 & CM047	Scoresby
Moisture	VIC-CM041	Scoresby	**MS Total Metals**	VIC-CM050 C	Scoresby	**OCP**	CM048	Scoresby
PAH	VIC-CM043	Scoresby	**PCB**	CM048	Scoresby	**pH**	EA002	Scoresby
Phenols(Halo)	VIC-CM056	Scoresby	**Phenols(NonHalo)**	VIC-CM056	Scoresby	**Total Cr 6+ DA**	EG048G	Scoresby
TRH & TPH (>C10)	VIC-CM030	Scoresby	**TRH & TPH (>C10)**	VIC-CM030	Scoresby	**TRH & TPH (C6-C10)**	VIC-CM047	Scoresby

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Analysis conducted outside holding time due to late arrival or delayed extraction/analysis. Based on APHA, VICEPA, AS & NEPM

Late Sample Arrival - Cyanide[4463769,4463774,4463783] pH[4463769,4463774,4463783] TRH & TPH (>C10)[4463769,4463774,4463783] TRH & TPH (>C10)[4463769,4463774,4463783] TRH & TPH (C6-C10)[4463769,4463774,4463783]

Signatories
These results have been electronically signed by the authorised signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11

Name	*Title*	*Name*	*Title*
Chatura Perera	Team Leader Nutrients	Hoa Nguyen	Analyst
Hao Zhang	Team Leader Organics	John Earl	Team Leader Metals
Kosta Christopoulos	Deputy Team Leader Organics		

Batch No: 15-40012
Report Number: 516017
Client: Sandhurst Geotech Pty Ltd
Client Program Ref: 15C/697 Bendigo Cathedral

Soil Analysis

Sample	Sampled Date	Your Ref	Analysis:	Moisture	pH	Total Fluoride	Cyanide	Total Cr 6+ DA
			Component:	Moisture	pH	Total Fluoride	CN	Total Cr6+ DA
			Units:	% w/wet w	Units	mg/kg	mg/kg	mg/kg
			Sample Type					
4463769	27-08-15	BH1 - 0.1m	SOIL	12	8.0	250	<5	<1
4463774	27-08-15	BH2 - 0.5m	SOIL	10	8.0	140	<5	<1
4463783	27-08-15	BH5 - 0.1m	SOIL	14	7.2	320	<5	<1

Soil Metals

Sample	Sampled Date	Your Ref	Analysis:	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
			Component:	Al	Sb	As	Ba	Be	B	Cd	Cr	Co
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
4463769	27-08-15	BH1 - 0.1m	SOIL			34				<0.2		
4463770	27-08-15	BH1 - 1.5m	SOIL	7800	<5	13	37	<5	<10	0.3	14	10
4463771	27-08-15	BH1 - 2.5m	SOIL	25000	<5	8	67	<5	<10	<0.2	33	11
4463772	27-08-15	BH2 - 0.1m	SOIL	6200	<5	44	52	<5	<10	<0.2	14	<5
4463774	27-08-15	BH2 - 0.5m	SOIL			34				<0.2		
4463775	27-08-15	BH2 - 2.5m	SOIL	17000	<5	10	56	<5	<10	<0.2	26	13
4463776	27-08-15	BH3 - 0.1m	SOIL	5500	<5	49	39	<5	<10	<0.2	10	<5
4463777	27-08-15	BH3 - 0.5m	SOIL	8600	<5	280	41	<5	<10	0.2	16	9
4463778	27-08-15	BH3 - 1.5m	SOIL	17000	<5	9	44	<5	<10	<0.2	25	23
4463779	27-08-15	BH4 - 0.1m	SOIL	5300	<5	200	57	<5	<10	<0.2	14	7
4463780	27-08-15	BH4 - 1.5m	SOIL	15000	<5	5	99	<5	<10	<0.2	21	11
4463781	27-08-15	BH4 - 3.5m	SOIL	17000	<5	8	48	<5	<10	<0.2	25	19
4463783	27-08-15	BH5 - 0.1m	SOIL			50				<0.2		
4463784	27-08-15	BH5 - 0.5m	SOIL	11000	<5	5	77	<5	<10	<0.2	19	<5
4463785	27-08-15	BH5 - 2.5m	SOIL	8700	<5	38	68	<5	<10	<0.2	23	9
4463786	27-08-15	BH6 - 0.1m	SOIL	9800	<5	680	160	<5	<10	<0.2	15	7
4463787	27-08-15	BH6 - 1.5m	SOIL	12000	<5	14	54	<5	<10	<0.2	19	10
4463788	27-08-15	BH6 - 4.5m	SOIL	11000	<5	52	88	<5	<10	<0.2	23	23

Samples not collected by ALS and are tested as received.

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Batch No: 15-40012
Report Number: 516017
Client: Sandhurst Geotech Pty Ltd
Client Program Ref: 15C/697 Bendigo Cathedral

Soil Metals

Sample	Sampled Date	Your Ref	Analysis: / Component: / Units: / Sample Type	MS Total Metals Cu mg/kg	MS Total Metals Fe mg/kg	MS Total Metals Pb mg/kg	MS Total Metals Mn mg/kg	MS Total Metals Hg mg/kg	MS Total Metals Mo mg/kg	MS Total Metals Ni mg/kg	MS Total Metals Se mg/kg	MS Total Metals Ag mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	23		79		0.14	<5	8	<3	<5
4463770	27-08-15	BH1 - 1.5m	SOIL	13	20000	28	590	0.07	<5	26	<3	<5
4463771	27-08-15	BH1 - 2.5m	SOIL	29	37000	34	21	<0.05	<5	21	<3	<5
4463772	27-08-15	BH2 - 0.1m	SOIL	13	11000	19	190	<0.05	<5	8	<3	<5
4463774	27-08-15	BH2 - 0.5m	SOIL	17		31		0.08	<5	13	<3	<5
4463775	27-08-15	BH2 - 2.5m	SOIL	20	27000	24	130	0.09	<5	23	<3	<5
4463776	27-08-15	BH3 - 0.1m	SOIL	10	9600	33	170	0.08	<5	7	<3	<5
4463777	27-08-15	BH3 - 0.5m	SOIL	22	21000	27	240	0.55	<5	22	<3	<5
4463778	27-08-15	BH3 - 1.5m	SOIL	19	25000	22	78	<0.05	<5	24	<3	<5
4463779	27-08-15	BH4 - 0.1m	SOIL	25	25000	170	200	0.65	<5	20	<3	<5
4463780	27-08-15	BH4 - 1.5m	SOIL	14	25000	17	91	<0.05	<5	16	<3	<5
4463781	27-08-15	BH4 - 3.5m	SOIL	30	35000	28	320	<0.05	<5	26	<3	<5
4463783	27-08-15	BH5 - 0.1m	SOIL	14		39		0.12	<5	14	<3	<5
4463784	27-08-15	BH5 - 0.5m	SOIL	11	21000	15	93	<0.05	<5	12	<3	<5
4463785	27-08-15	BH5 - 2.5m	SOIL	16	51000	25	72	<0.05	<5	19	<3	<5
4463786	27-08-15	BH6 - 0.1m	SOIL	24	23000	62	170	0.59	<5	13	<3	<5
4463787	27-08-15	BH6 - 1.5m	SOIL	18	23000	16	72	<0.05	<5	16	<3	<5
4463788	27-08-15	BH6 - 4.5m	SOIL	21	74000	28	300	<0.05	<5	26	<3	<5

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Soil Metals

Sample	Sampled Date	Your Ref	Sample Type	Sr mg/kg	Tl mg/kg	Th mg/kg	Sn mg/kg	Ti mg/kg	U mg/kg	V mg/kg	Zn mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL				<5				65
4463770	27-08-15	BH1 - 1.5m	SOIL	53	<5	8	<5	31	<5	23	49
4463771	27-08-15	BH1 - 2.5m	SOIL	6	<5	26	<5	7	8	26	50
4463772	27-08-15	BH2 - 0.1m	SOIL	10	<5	5	<5	73	<5	15	42
4463774	27-08-15	BH2 - 0.5m	SOIL				<5				77
4463775	27-08-15	BH2 - 2.5m	SOIL	6	<5	21	<5	9	<5	16	51
4463776	27-08-15	BH3 - 0.1m	SOIL	9	<5	6	<5	47	<5	9	38
4463777	27-08-15	BH3 - 0.5m	SOIL	35	<5	9	<5	59	<5	9	71
4463778	27-08-15	BH3 - 1.5m	SOIL	7	<5	25	<5	9	<5	17	45
4463779	27-08-15	BH4 - 0.1m	SOIL	17	<5	<5	8	51	<5	11	120
4463780	27-08-15	BH4 - 1.5m	SOIL	10	<5	12	<5	30	<5	23	48
4463781	27-08-15	BH4 - 3.5m	SOIL	14	<5	15	<5	12	<5	13	110
4463783	27-08-15	BH5 - 0.1m	SOIL				<5				50
4463784	27-08-15	BH5 - 0.5m	SOIL	12	<5	9	<5	26	<5	20	39
4463785	27-08-15	BH5 - 2.5m	SOIL	7	<5	9	<5	16	<5	22	41
4463786	27-08-15	BH6 - 0.1m	SOIL	20	<5	9	<5	25	<5	15	110
4463787	27-08-15	BH6 - 1.5m	SOIL	7	<5	12	<5	37	<5	24	29
4463788	27-08-15	BH6 - 4.5m	SOIL	11	<5	9	<5	12	<5	32	57

Soil MAH

Sample	Sampled Date	Your Ref	Sample Type	Styrene mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5

Soil BTEXN

Sample	Sampled Date	Your Ref	Sample Type	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylene - m&p mg/kg	Xylene - O mg/kg	Naphthalene mg/kg	Total Xylenes mg/kg	BTEX (Sum) mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1

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Soil TRH/TPH (Volatile)

Sample	Sampled Date	Your Ref	Sample Type	TRH & TPH (C6-C10) TPHC6-C9 mg/kg	TRH & TPH (C6-C10) TRHC6-C10 mg/kg	TRH & TPH (C6-C10) TRHC6-C10 minus BTEX mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	<20	<20	<20
4463774	27-08-15	BH2 - 0.5m	SOIL	<20	<20	<20
4463783	27-08-15	BH5 - 0.1m	SOIL	<20	<20	<20

Soil TRH/TPH

Sample	Sampled Date	Your Ref	Sample Type	TRH & TPH (>C10) TRHC10-C16 minus NAP mg/kg	TRH & TPH (>C10) TPH C10-C14 mg/kg	TRH & TPH (>C10) TPH C15-C28 mg/kg	TRH & TPH (>C10) TPH C29-C36 mg/kg	TRH & TPH (>C10) TRH>C10-C16 mg/kg	TRH & TPH (>C10) TRH>C16-C34 mg/kg	TRH & TPH (>C10) TRH>C34-C40 mg/kg	TRH & TPH (>C10) Sum of TRH>C10-C40 mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	<20	<20	<50	<50	<20	80	<50	80
4463774	27-08-15	BH2 - 0.5m	SOIL	<20	<20	58	<50	<20	81	<50	81
4463783	27-08-15	BH5 - 0.1m	SOIL	<20	<20	<50	<50	<20	<50	<50	<50

Soil PAH

Sample	Sampled Date	Your Ref	Sample Type	PAH Acenaphthene mg/kg	PAH Acenaphthylene mg/kg	PAH Anthracene mg/kg	PAH Benz(a)anthracene mg/kg	PAH Benzo(a)pyrene mg/kg	PAH Benz(b)fluranthen mg/kg	PAH Benzo(ghi)perylene mg/kg	PAH Benz(k)fluranthen mg/kg	PAH Chrysene mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.1	0.3	0.5	1.8	1.4	0.9	0.7	1.1	1.4
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.1	<0.1	<0.1	0.4	0.4	0.3	0.2	0.3	0.4
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil PAH

Sample	Sampled Date	Your Ref	Sample Type	PAH Dibenz(ah)anthrcn mg/kg	PAH Fluoranthene mg/kg	PAH Fluorene mg/kg	PAH Indeno(123)pyrene mg/kg	PAH Naphthalene mg/kg	PAH Phenanthrene mg/kg	PAH Pyrene mg/kg	PAH Total PAHs mg/kg	PAH BaP TEQ (zero) mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	0.2	4.3	0.2	0.8	<0.1	2.6	4.3	20	2.1
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.1	0.9	<0.1	0.2	<0.1	0.5	0.9	4.5	0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil PAH

Sample	Sampled Date	Your Ref	Sample Type	PAH BaP TEQ (half LOR) mg/kg	PAH BaP TEQ (LOR) mg/kg
4463769	27-08-15	BH1 - 0.1m	SOIL	2.1	2.1
4463774	27-08-15	BH2 - 0.5m	SOIL	0.6	0.6
4463783	27-08-15	BH5 - 0.1m	SOIL	0.1	0.2

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Soil O.C. Pesticides

Sample	Sampled Date	Your Ref	Sample Type	Component: BHC (alpha) mg/kg	a-Endosulphan mg/kg	Aldrin mg/kg	BHC (beta) mg/kg	b-Endosulphan mg/kg	Chlordane mg/kg	cis-Chlordane mg/kg	trans-Chlordane mg/kg	BHC (delta) mg/kg
			Analysis:	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil O.C. Pesticides

Sample	Sampled Date	Your Ref	Sample Type	Component: DDD mg/kg	DDE mg/kg	DDT mg/kg	Dieldrin mg/kg	Endosulphan mg/kg	Endosulfan Sulfate mg/kg	Endrin mg/kg	Endrin Aldehyde mg/kg	Endrin Ketone mg/kg
			Analysis:	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil O.C. Pesticides

Sample	Sampled Date	Your Ref	Sample Type	Component: HexaChlorBenzene mg/kg	Heptchlor Epoxide mg/kg	Heptachlor mg/kg	Lindane mg/kg	Methoxychlor mg/kg	Oxychlordane mg/kg	DDD+DDE+DDT mg/kg	Aldrin and Dieldrin mg/kg
			Analysis:	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil PCBs

Sample	Sampled Date	Your Ref	Sample Type	Component: Aroclor 1016 mg/kg	Aroclor 1221 mg/kg	Aroclor 1232 mg/kg	Aroclor 1242 mg/kg	Aroclor 1248 mg/kg	Aroclor 1254 mg/kg	Aroclor 1260 mg/kg	Total PCBs mg/kg
			Analysis:	PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil CHCs

Sample	Sampled Date	Your Ref	Sample Type	Component: 1234TetraChlBenz mg/kg	1235TetraChlBenz mg/kg	123TriChloroBenz mg/kg	1245TetraChlBenz mg/kg	124TriChloroBenz mg/kg	12DiChloroBenz mg/kg	135TriChloroBenz mg/kg	13DiChloroBenz mg/kg	14DiChloroBenz mg/kg
			Analysis:	CHC	CHC	CHC	CHC	CHC	CHC	CHC	CHC	CHC
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Soil CHCs

Sample	Sampled Date	Your Ref	Analysis:	CHC	CHC	CHC	CHC	CHC	CHC	CHC	CHC
			Component:	2ChloroNaphthlene	Benzal Chloride	BenzoTriChloride	Benzylcl	HexaChloroEthane	HexaChlButadiene	HexaClCyclPenten	PentaChlBenzene
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type								
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Phenols (Halogenated)

Sample	Sampled Date	Your Ref	Analysis:	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)
			Component:	4Chlor3MethylPhnl	2-ChloroPhenol	24DiChloroPhenol	2,6DiChloroPhenol	PentaChlorPhenol	2345TetraChloPhnl	2346TetraChloPhnl	2356TetraChloPhnl	245TriChlorPhenol
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Phenols (Halogenated)

Sample	Sampled Date	Your Ref	Analysis:	Phenols(Halo)	Phenols(Halo)
			Component:	246TriChlorPhenol	Total Phenols (Halo)
			Units:	mg/kg	mg/kg
			Sample Type		
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<0.5

Phenols (Non Halogenated)

Sample	Sampled Date	Your Ref	Analysis:	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)
			Component:	Phenol	Total Cresols	2,4DiMethylPhenol	2,4-Dinitrophenol	2Mthyl46DiNitrPhnl	2-NitroPhenol	4-NitroPhenol	2CyHxl46DiNitPhnl	Dinoseb
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<1	<0.5	<30	<10	<0.5	<0.5	<30	<10
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<1	<0.5	<30	<10	<0.5	<0.5	<30	<10
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<1	<0.5	<30	<10	<0.5	<0.5	<30	<10

Phenols (Non Halogenated)

Sample	Sampled Date	Your Ref	Analysis:	Phenols(NonHalo)
			Component:	Total Phenols(NonH)
			Units:	mg/kg
			Sample Type	
4463769	27-08-15	BH1 - 0.1m	SOIL	<30
4463774	27-08-15	BH2 - 0.5m	SOIL	<30
4463783	27-08-15	BH5 - 0.1m	SOIL	<30

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Soil Halo. Volatiles

Sample	Sampled Date	Your Ref	Analysis:	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			Component:	1112TetraClEthane	1122TetraClEthane	1,1DiChloroEthane	1,1DiChloroEthene	11DiChlorPropene	123TriChlPropane	12DiBr3ChlPrpane	12DiChlorEthene[c]	12DiChlorEthene[t]
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil Halo. Volatiles

Sample	Sampled Date	Your Ref	Analysis:	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			Component:	12DiChloroEthane	12 DiChloPropane	13DiChlorPropane	13DiChlPropene[c]	13DiChlPropene[t]	22DiChlorPropane	2-ChloroToluene	4-ChloroToluene	BromChloMethane
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil Halo. Volatiles

Sample	Sampled Date	Your Ref	Analysis:	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			Component:	BroDiChloMethane	BromoBenzene	Bromoform	CarbonTetChloride	Chloroform	ChloroBenzene	DiBroChloMethane	DiBromoMethane	12DiBromoEthane
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type									
4463769	27-08-15	BH1 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil Halo. Volatiles

Sample	Sampled Date	Your Ref	Analysis:	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			Component:	DiChloroMethane	TriChloFluMethane	TetraChloroEthene	Vinyl Chloride	111TriChlorEthane	112TriChlorEthane	TriChloroEthene
			Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Sample Type							
4463769	27-08-15	BH1 - 0.1m	SOIL	<1	<2	<0.5	<1	<0.5	<0.5	<0.5
4463774	27-08-15	BH2 - 0.5m	SOIL	<1	<2	<0.5	<1	<0.5	<0.5	<0.5
4463783	27-08-15	BH5 - 0.1m	SOIL	<1	<2	<0.5	<1	<0.5	<0.5	<0.5

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Quality Control

Soil BTEXN

	BTEXN	BTEXN	BTEXN	BTEXN	BTEXN	BTEXN	BTEXN	BTEXN
	Benzene	Toluene	Ethyl Benzene	Xylene - m&p	Xylene - O	Naphthalene	Total Xylenes	BTEX (Sum)
4463774 DUPLICATE Sample Value	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1
4463774 DUPLICATE Duplicate Value	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1
4463774 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4466446 BLANK Value	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1	<1

Soil CHCs

	CHC	CHC	CHC	CHC	CHC	CHC	CHC	CHC	CHC
	1234TetraChlBenz	1235TetraChlBenz	123TriChloroBenz	1245TetraChlBenz	124TriChloroBenz	12DiChloroBenz	135TriChloroBenz	13DiChloroBenz	14DiChloroBenz
4463783 DUPLICATE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE Sample Value	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 SPIKE Expected Value	1.5		1.5	2.9	1.5	1.5	1.5	1.5	1.5
4463783 SPIKE % Recovery	**79.2**		**78.4**	**79.1**	**74.0**	**79.2**	**78.4**	**75.2**	**77.8**
4466340 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil CHCs

	CHC	CHC	CHC	CHC	CHC	CHC	CHC	CHC
	2ChloroNaphthlene	Benzal Chloride	BenzoTriChloride	Benzylcl	HexaChloroEthane	HexaChlButadiene	HexaClCyclPenten	PentaChlBenzene
4463783 DUPLICATE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE Sample Value	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1
4463783 SPIKE Expected Value	1.5	1.5	1.5	1.5		1.5		1.5
4463783 SPIKE % Recovery	**82.8**	**82.0**	**81.2**	**87.8**		**78.2**		**79.0**
4466340 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil Halo. Volatiles

	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
	1112TetraClEthane	1122TetraClEthane	1,1DiChloroEthane	1,1DiChloroEthene	11DiChlorPropene	123TriChlPropane	12DiBr3ChlPrpane	12DiChlorEthene[c]	12DiChlorEthene[t]
4463774 DUPLICATE Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774 DUPLICATE Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4466578 BLANK Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

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Soil Halo. Volatiles

			HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			12DiChloroEthane	12 DiChloPropane	13DiChlorPropane	13DiChlPropene[c]	13DiChlPropene[t]	22DiChlorPropane	2-ChloroToluene	4-ChloroToluene	BromChloMethane
4463774	DUPLICATE	Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	DUPLICATE	Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	**DUPLICATE**	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4466578	BLANK	Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil Halo. Volatiles

			HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			BroDiChloMethane	BromoBenzene	Bromoform	CarbonTetChloride	Chloroform	ChloroBenzene	DiBroChloMethane	DiBromoMethane	12DiBromoEthane
4463774	DUPLICATE	Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	DUPLICATE	Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463774	**DUPLICATE**	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4466578	BLANK	Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Soil Halo. Volatiles

			HVOL	HVOL	HVOL	HVOL	HVOL	HVOL	HVOL
			DiChloroMethane	TriChloFluMethane	TetraChloroEthene	Vinyl Chloride	111TriChlorEthane	112TriChlorEthane	TriChloroEthene
4463774	DUPLICATE	Sample Value	<1	<2	<0.5	<1	<0.5	<0.5	<0.5
4463774	DUPLICATE	Duplicate Value	<1	<2	<0.5	<1	<0.5	<0.5	<0.5
4463774	**DUPLICATE**	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4466578	BLANK	Value	<1	<2	<0.5	<1	<0.5	<0.5	<0.5

Soil MAH

			MAH
			Styrene
4463774	DUPLICATE	Sample Value	<0.5
4463774	DUPLICATE	Duplicate Value	<0.5
4463774	**DUPLICATE**	**% RPD**	**0**
4466580	BLANK	Value	<0.5

Soil O.C. Pesticides

			OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
			BHC (alpha)	a-Endosulphan	Aldrin	BHC (beta)	b-Endosulphan	Chlordane	cis-Chlordane	trans-Chlordane	BHC (delta)
4463783	DUPLICATE	Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783	DUPLICATE	Duplicate Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783	**DUPLICATE**	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783	SPIKE	Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783	SPIKE	Expected Value	2.9	1.5	1.5	2.5	1.5	2.9	1.5	1.5	2.9
4463783	**SPIKE**	**% Recovery**	**98.9**	**88.6**	**112**	**93.5**	**84.2**	**96.0**	**95.4**	**96.6**	**123**
4466365	BLANK	Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

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Soil O.C. Pesticides

	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
	DDD	DDE	DDT	Dieldrin	Endosulphan	Endosulfan Sulfate	Endrin	Endrin Aldehyde	Endrin Ketone
4463783 DUPLICATE Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783 DUPLICATE Duplicate Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE Sample Value	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05
4463783 SPIKE Expected Value	1.5	1.5	1.5	1.5		1.5		1.5	1.5
4463783 SPIKE % Recovery	**96.0**	**102**	**83.2**	**79.8**		**92.8**		**95.8**	**102**
4466365 BLANK Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil O.C. Pesticides

	OCP	OCP	OCP	OCP	OCP	OCP	OCP	OCP
	HexaChlorBenzene	Heptchlor Epoxide	Heptachlor	Lindane	Methoxychlor	Oxychlordane	DDD+DDE+DDT	Aldrin and Dieldrin
4463783 DUPLICATE Sample Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783 DUPLICATE Duplicate Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4463783 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE Sample Value	<0.05	<0.05	<0.05	<0.05				
4463783 SPIKE Expected Value	2.6	1.5	1.5	2.9				
4463783 SPIKE % Recovery	**101**	**95.8**	**94.4**	**99.2**				
4466365 BLANK Value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Soil PAH

	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benz(b)fluranthen	Benzo(ghi)perylene	Benz(k)fluranthen	Chrysene
4463783 DUPLICATE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 SPIKE Expected Value	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
4463783 SPIKE % Recovery	**90.0**	**92.8**	**102**	**111**	**93.6**	**86.8**	**91.8**	**97.8**	**100**
4466357 BLANK Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil PAH

	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
	Dibenz(ah)anthrcn	Fluoranthene	Fluorene	Indeno(123)pyrene	Naphthalene	Phenanthrene	Pyrene	Total PAHs	BaP TEQ (zero)
4463783 DUPLICATE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE % RPD	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
4463783 SPIKE Expected Value	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
4463783 SPIKE % Recovery	**89.0**	**117**	**96.4**	**93.6**	**100**	**99.6**	**117**		

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		PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH
		Dibenz(ah)anthrcn	Fluoranthene	Fluorene	Indeno(123)pyrene	Naphthalene	Phenanthrene	Pyrene	Total PAHs	BaP TEQ (zero)
4466357 BLANK	Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Soil PAH

		PAH	PAH
		BaP TEQ (half LOR)	BaP TEQ (LOR)
4463783 DUPLICATE	Sample Value	0.1	0.2
4463783 DUPLICATE	Duplicate Value	0.1	0.2
4463783 DUPLICATE	**% RPD**	**0.0**	**0.0**
4466357 BLANK	Value	0.1	0.2

Soil PCBs

		PCB	PCB	PCB	PCB	PCB	PCB	PCB	PCB
		Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
4463783 DUPLICATE	Sample Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE	Duplicate Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4463783 DUPLICATE	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE	Sample Value	<0.1						<0.1	
4463783 SPIKE	Expected Value	2.8						2.5	
4463783 SPIKE	**% Recovery**	**103**						**83.5**	
4466368 BLANK	Value	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Phenols (Halogenated)

		Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)	Phenols(Halo)
		4Chlor3MethylPhnl	2-ChloroPhenol	24DiChloroPhenol	2,6DiChloroPhenol	PentaChlorPhenol	2345TetraChloPhnl	2346TetraChloPhnl	2356TetraChloPhnl	245TriChlorPhenol
4463783 DUPLICATE	Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463783 DUPLICATE	Duplicate Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4463783 DUPLICATE	**% RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783 SPIKE	Sample Value	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5
4463783 SPIKE	Expected Value	1.5	1.5	1.5	1.5	1.5		2.9	1.5	1.5
4463783 SPIKE	**% Recovery**	**93.8**	**77.4**	**74.6**	**84.2**	**80.0**		**97.7**	**104**	**74.0**
4466374 BLANK	Value	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Phenols (Halogenated)

		Phenols(Halo)	Phenols(Halo)
		246TriChlorPhenol	Total Phenols (Halo)
4463783 DUPLICATE	Sample Value	<0.5	<0.5
4463783 DUPLICATE	Duplicate Value	<0.5	<0.5
4463783 DUPLICATE	**% RPD**	**0**	**0**
4463783 SPIKE	Sample Value	<0.5	
4463783 SPIKE	Expected Value	1.5	

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		Phenols(Halo)	Phenols(Halo)
		246TriChlorPhenol	Total Phenols (Halo)
4463783	**SPIKE % Recovery**	**98.4**	
4466374	BLANK Value	<0.5	<0.5

Phenols (Non Halogenated)

		Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)	Phenols(NonHalo)
		Phenol	Total Cresols	2,4DiMethylPhenol	2,4-Dinitrophenol	2Mthyl46DiNitrPhnl	2-NitroPhenol	4-NitroPhenol	2CyHxl46DiNitPhnl	Dinoseb
4463783	DUPLICATE Sample Value	<0.5	<1	<0.5	<30	<10	<0.5	<0.5	<30	<10
4463783	DUPLICATE Duplicate Value	<0.5	<1	<0.5	<30	<10	<0.5	<0.5	<30	<10
4463783	**DUPLICATE % RPD**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4463783	SPIKE Sample Value	<0.5	<1	<0.5			<0.5	<0.5		
4463783	SPIKE Expected Value	1.5	4.4	1.5			1.5	1.5		
4463783	**SPIKE % Recovery**	**82.6**	**74.7**	**99.0**			**94.0**	**94.6**		
4466371	BLANK Value	<0.5	<1	<0.5	<30	<10	<0.5	<0.5	<30	<10

Phenols (Non Halogenated)

		Phenols(NonHalo)
		Total Phenols(NonH)
4463783	DUPLICATE Sample Value	<30
4463783	DUPLICATE Duplicate Value	<30
4463783	**DUPLICATE % RPD**	**0**
4466371	BLANK Value	<30

Soil Analysis

		Moisture	pH	Total Fluoride	Cyanide	Total Cr 6+ DA
		Moisture	pH	Total Fluoride	CN	Total Cr6+ DA
4463754	SPIKE Sample Value					<1
4463754	SPIKE Expected Value					0.20
4463754	**SPIKE % Recovery**					**110**
4463828	DUPLICATE Sample Value					<1
4463828	DUPLICATE Duplicate Value					<1
4463828	**DUPLICATE % RPD**					**0**
4466935	BLANK Value					<1
4467172	BLANK Value			<100		
4463834	SPIKE Sample Value			290		
4463834	SPIKE Expected Value			410		
4463834	**SPIKE % Recovery**			**105**		
4463790	DUPLICATE Sample Value			250		
4463790	DUPLICATE Duplicate Value			240		
4463790	**DUPLICATE % RPD**			**4.4**		

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			Moisture	pH	Total Fluoride	Cyanide	Total Cr 6+ DA
			Moisture	pH	Total Fluoride	CN	Total Cr6+ DA
4463248	SPIKE	Sample Value				<5	
4463248	SPIKE	Expected Value				20	
4463248	**SPIKE**	**% Recovery**				**75.1**	
4463248	DUPLICATE	Sample Value				<5	
4463248	DUPLICATE	Duplicate Value				<5	
4463248	**DUPLICATE**	**% RPD**				**0**	
4465567	DUPLICATE	Sample Value	4				
4465567	DUPLICATE	Duplicate Value	4				
4465567	**DUPLICATE**	**% RPD**	**3.4**				
4469068	BLANK	Value	100				
4437537	DUPLICATE	Sample Value		8.5			
4437537	DUPLICATE	Duplicate Value		8.5			
4437537	**DUPLICATE**	**% RPD**		**0.1**			

Soil Metals

			MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
			Al	Sb	As	Ba	Be	B	Cd	Cr	Co
4467697	BLANK	Value	<5	<5	<5	<5	<5	<10	<0.2	<5	<5
4465271	DUPLICATE	Sample Value	11000	<5	<5	56	<5	<10	<0.2	20	11
4465271	DUPLICATE	Duplicate Value	11000	<5	<5	56	<5	<10	<0.2	20	10
4465271	**DUPLICATE**	**% RPD**	**0.5**	**0**	**0**	**0.5**	**0**	**0**	**0**	**0.4**	**0.5**
4465271	SPIKE	Sample Value	11000	<5	<5	56	<5		<0.2	20	11
4465271	SPIKE	Expected Value	10000	100	100	150	100		100	120	110
4465271	**SPIKE**	**% Recovery**	**81.3**	**106**	**84.7**	**99.0**	**89.5**		**106**	**93.8**	**87.7**

Soil Metals

			MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
			Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag
4467697	BLANK	Value	<5	<10	<5	<5	<0.05	<5	<5	<3	<5
4465271	DUPLICATE	Sample Value	7	18000	12	76		<5	12	<3	<5
4465271	DUPLICATE	Duplicate Value	7	18000	11	75		<5	12	<3	<5
4465271	**DUPLICATE**	**% RPD**	**1.0**	**1.4**	**4.2**	**0.9**		**0**	**0.9**	**0**	**0**
4465271	SPIKE	Sample Value	7		12	76	<0.05	<5	12	<3	<5
4465271	SPIKE	Expected Value	110		110	160	1.0	100	110	100	1.0
4465271	**SPIKE**	**% Recovery**	**89.8**		**108**	**99.5**	**107**	**94.2**	**85.8**	**80.2**	**97.8**

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Soil Metals

		MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals	MS Total Metals
		Sr	Tl	Th	Sn	Ti	U	V	Zn
4467697 BLANK	Value	<5	<5	<5	<5	<5	<5	<5	<5
4465271 DUPLICATE	Sample Value	8	<5	9	<5	15	<5	25	10
4465271 DUPLICATE	Duplicate Value	8	<5	9	<5	15	<5	25	10
4465271 DUPLICATE	**% RPD**	**0.7**	**0**	**3.7**	**0**	**0.9**	**0**	**0.7**	**0.1**
4465271 SPIKE	Sample Value	8	<5		<5		<5	25	10
4465271 SPIKE	Expected Value	110	100		100		100	120	110
4465271 SPIKE	**% Recovery**	**83.9**	**94.1**		**103**		**98.1**	**90.0**	**89.0**

Soil TRH/TPH (Volatile)

		TRH & TPH (C6-C10)	TRH & TPH (C6-C10)	TRH & TPH (C6-C10)
		TPHC6-C9	TRHC6-C10	TRHC6-C10 minus BTE
4464467 DUPLICATE	Sample Value	59	63	49
4464467 DUPLICATE	Duplicate Value	47	59	45
4464467 DUPLICATE	**% RPD**	**23.7**	**7.4**	**7.8**
4459372 SPIKE	Sample Value	<20	<20	
4459372 SPIKE	Expected Value	120	120	
4459372 SPIKE	**% Recovery**	**95.3**	**93.0**	
4466451 BLANK	Value	<20	<20	<20

Soil TRH/TPH

		TRH & TPH (>C10)	TRH & TPH (>C10)	TRH & TPH (>C10)	TRH & TPH (>C10)	TRH & TPH (>C10)	TRH & TPH (>C10)	TRH & TPH (>C10)
		TPH C10-C14	TPH C15-C28	TPH C29-C36	TRH>C10-C16	TRH>C16-C34	TRH>C34-C40	Sum of TRH>C10-C40
4466524 DUPLICATE	Sample Value	150	<50	<50	99	<50	<50	99
4466524 DUPLICATE	Duplicate Value	160	<50	<50	110	<50	<50	110
4466524 DUPLICATE	**% RPD**	**3.2**	**0**	**0**	**7.4**	**0**	**0**	**10.5**
4465434 SPIKE	Sample Value		<50			93		
4465434 SPIKE	Expected Value		860			960		
4465434 SPIKE	**% Recovery**		**91.1**			**94.8**		
4468235 BLANK	Value	<20	<50	<50	<20	<50	<50	<50

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DESCRIPTIVE TERMS BOREHOLE/EXCAVATION LOG

Classification Symbol & Soil Name

Classification of material and its description is based on the Unified Classification System as referenced in AS1726 – 1993 Geotechnical Site Investigations, Appendix A. A summary of the more common terms is included within.

Particle Size Descriptive Terms

Name	Subdivision	Size
Boulders		>200mm
Cobbles		63 – 200mm
Gravel	Coarse	20 – 63mm
	Medium	6 – 20mm
	Fine	2.36 – 6mm
Sand	Coarse	0.6 – 2.36mm
	Medium	200 – 600 micron
	Fine	75 – 200 micron
Silt		2 – 75 micron
Clay		< 2 micron

Consistency of Cohesive Soils

Term	Undrained shear strength, s_u (kPa)	Field Guide
Very Soft (VS)	<12	A finger can be pushed well into the soil with little effort
Soft (S)	12 – 25	A finger can be pushed into the soil to about 25mm depth
Firm (F)	25 – 50	The soil can be indented about 5mm with the thumb
Stiff (St)	50 – 100	The surface of the soil can be indented with the thumb
Very Stiff (VSt)	100 – 200	The surface of the soil can be indented by thumb nail
Hard (H)	>200	The surface of the soil can be marked only with the thumbnail
Friable (F)	-	Crumbles or powders when scraped by thumbnail

Density of Granular Soils

Term	Density Index (%)
Very Loose (VL)	< 15
Loose (L)	15 – 35
Medium Dense (MD)	35 – 65
Dense (D)	65 – 85
Very Dense (VD)	> 85

Minor Components

Term	Field Guide	Proportion of Minor Component In:
Trace of	Presence just detectable by feel or eye	Coarse grained soils: <5% Fine grained soils: <15%
Some	Presence easily detectable by feel or eye	Coarse grained soils: 5-12% Fine grained soils: 15-30%

Moisture Condition

Dry (D) Looks & feels dry. Cohesive soils are usually hard, powdery or friable. Granular soils run freely through the hand.

Moist (M) Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere. Free water does not form.

Wet (W) As for moist, but with free water forming on hands when remoulded.

Method

S Auger Screwing
D Auger Drilling
R Roller/tricone
W Washboring
N Natural Exposure
E Existing Excavation
B Blade/bucket
C Coring
H Hammer Drill

Support

***** Nil
C Casing
M Mud/polymer

Water

* Not observed
Observed water level (date shown)
Observed water inflow
Observed water outflow
R Refer to report for details

Notes, Samples, Tests

U63 Undisturbed sample, 63mm diameter
D Disturbed sample
N* Standard Penetration Test, (*) Sample Figure = results

Structures, Additional Observations

PP Pocket Penetrometer test (kPa)
DCP Dynamic Cone Penetrometer test (blows/100mm)

Surface

_____ Known boundary
- - - - - - - - - - Probably boundary
-?-?-?-?-?-?- Possible boundary