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HYDROGEOLOGICAL, SALINITY, ACID SULPHATE SOIL AND GEOTECHNICAL ASSESSMENT

CRAIGIEBURN WEST PSP

DOCUMENT CONTROL DATA

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Reference: 1801684

Client: Victorian Planning Authority (VPA)

Revision Table

Rev	Description	Date	Authorised
DRAFT	Hydrogeological, Salinity, Acid Sulphate Soil and Geotechnical Assessment Craigieburn West PSP	13/11/18	AH
1	Hydrogeological, Salinity, Acid Sulphate Soil and Geotechnical Assessment Craigieburn West PSP	19/02/2020	AH
1.1	Hydrogeological, Salinity, Acid Sulphate Soil and Geotechnical Assessment Craigieburn West PSP	23/09/2020	AH

Distribution Table

Date	Revision	Distribution
19/02/2020	1.1	Victorian Planning Authority (VPA)
19/02/2020	1.1	Beveridge Williams

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LIST OF ABBREVIATIONS AND UNITS

ANZECC	Australia and New Zealand Environment and Conservation Council	**PSH**	Phase Separated Hydrocarbons
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand	**QA/QC**	Quality Assurance/Quality Control
AST	Above-ground Storage Tank	**RL**	Reduced Level
BaP	Benzo(a)pyrene	**RPD**	Relative Percentage Difference
BTEX	Benzene, Toluene, Ethyl benzene & Xylene	**SEPP**	State Environment Protection Policy
CHC	Chlorinated hydrocarbons	**SVOC**	Semi Volatile Organic Compounds
COC	Chain of Custody	**SWL**	Standing Water Level
CUTEP	Clean Up to the Extent Practicable	**TDS**	Total Dissolved Solids
DNAPL	Dense Non-Aqueous Phase Liquid	**TEQ**	Toxicity Equivalent Quotient
DO	Dissolved Oxygen	**TPH**	Total Petroleum Hydrocarbons
EC	Electrical Conductivity	**TRH**	Total Recoverable Hydrocarbons
EIL	Environmental Investigation Level	**UST**	Underground Storage Tank
EPA	Victorian Environmental Protection Authority	**VOC**	Volatile Organic Compounds
GWDB	Groundwater Data Base	**VVG**	Visualising Victoria's Groundwater
HIL	Health Investigation Level	**-**	On tables is no data
HM	Heavy Metal		
HVO	Halogenated Volatile Organics		
LNAPL	Light Non-Aqueous Phase Liquid	**Units**	
LOR	Limit of Reporting	**µg/kg**	micrograms per kilogram (ppb)
MAH	Monocyclic Aromatic Hydrocarbons	**µg/L**	micrograms per litre
NATA	National Association of Testing Authorities	**µs/cm**	microseimens per centimetre
ND	Non Detect	**mg/kg**	milligrams per kilogram (ppm)
NEPM	National Environmental Protection Measure (Amended 2013)	**mg/L**	milligrams per litre
NHMRC	National Health and Medical Research Council	**m BGL**	Metres below ground level
NAPL	Non-Aqueous Phase Liquid	**m TOC**	Metres below top of casing
OCP	Organochlorine Pesticides	**m AHD**	Metres Australian Height Datum
OPP	Organophosphate Pesticides	**ppb**	parts per billion
PAH	Polycyclic Aromatic Hydrocarbons	**ppm**	parts per million
PCB	Polychlorinated biphenyl	**Ha**	Hectare
PID	Photo-ionisation detector		

1 INTRODUCTION

At the request of the Victorian Planning Authority (VPA), Beveridge Williams & Co P/L (Beveridge Williams) has conducted a Hydrogeological, Salinity, Acid Sulphate Soil and Geotechnical Assessment within the farming zone Craigieburn West PSP (PSP 1068). The work was authorised by Ben Weiner from the Victorian Planning Authority in an email dated 22 October 2018.

The purpose of the Hydrogeological, Salinity, Acid Sulphate Soil and Geotechnical Assessment was to assess groundwater conditions within the PSP area (PSP 1068) to provide high-level advice with regards to potential development constraints (if any) and recommendations for additional physical investigations to confirm the findings of the desktop investigation detailed in this report.

This report presents information from desktop resources, an evaluation of collated desktop information with respect to beneficial uses of the PSP area and recommendations for further assessment prior to development.

2 SCOPE OF WORK

The preliminary hydrogeological, salinity, acid sulphate soil and geotechnical assessment includes the following:

- A high level review of available historical data to assess the risk of salinity including maps, reports, borehole data and historic aerial photographs
- A preliminary site inspection from the site boundaries to identify general landforms and areas of potential salinity or acid sulphate soils
- A preliminary geotechnical and soil salinity sampling and analysis program across the study area through different geology and potential salinity areas identified during the desktop assessment and site inspection.

3 SITE DETAILS

Site details are presented in Table 3-1.

Table 3-1: Summary of Site Details

Item		Site Details	Refer to
Site Address		Craigieburn West PSP (PSP 1068)	Figure 1
Approx. Site Area (ha)		561	Appendix A
Zoning & Municipality		Farming Zone – Schedule 3, City of Hume	Appendix A
Current Use		Farming (grazing)	Appendix B
Historic Site Use		Farming (grazing)	-
Surrounding land uses	North	Residential and grazing	Figure 1
	East	Residential	
	South	Residential and grazing	
	West	Farming and grazing	

4 DESKTOP REVIEW

The following sources of historical information were reviewed:

- Aerial photographs
- Geology plans
- Topography plans
- Climate data
- Hydrogeology plans
- Melbourne Water Drainage Schemes including surface water and drainage plans
- Review of available catchment data from Yarra Valley Water and Port Phillip & Westernport Catchment Management Authorities

4.1 Aerial Photograph Review

Historical aerial photographs from 1951, 1962, 1974, 1982 and 1991 from the Department of Environment, Land, Water and Planning were reviewed for hydrological indicators. Aerial photographs from 2010, 2014 and 2018 from Nearmap were also reviewed. A summary is provided in Table 4-1.

Table 4-1: Aerial Photograph Review Summary

Year / Source	Summary
1951	The PSP area appears to be predominantly used for agricultural uses (grazing/cropping). The area is largely grass covered with some sparse tree cover. However, some properties across the site exhibit denser tree growth. Aitken Creek is observed running through the northern portion of the PSP area, from the northwest to the southeast. A floodplain area is observed in the northern portion of the PSP area, east of Buddhist Temple Daham Niketanaya. A large dam is observed in the southern portion of the PSP area, approximately 750 m south of the Craigieburn Road. Numerous minor dams (approximate radii of <20 m) are observed within the PSP area. Furthermore, Yuroke Creek is observed in the southern portion of the site, originating from approximately 480 m from the southern boundary and heading offsite to the south. The area adjacent to the east of Yuroke Creek (now Greenvale Reservoir) appears to have significant soil disturbance. A drainage alignment is observed east of the southern portion of the PSP area (approximately 500 m south of Craigieburn Road). The tributary stream moves offsite to the east and feeds Aitken Creek. Offsite approximately 2 km to the east, Malcolm Creek is observed heading south/southeast. Offsite approximately 2.5 km to the northwest, Deep Creek is observed running southwest through a hilly region. The hills appear to be of higher elevation than the site.
1962	An unnamed drainage alignment is observed within the northern portion of the site, originating from adjacent to a homestead, and heading southwest offsite. No other significant surface hydrology changes are observed within the PSP area.
1974	Greendale Reservoir has been constructed approximately 650 m offsite to the south and is separated from Yurokes Creek. The reservoir contains a rolled earth fill and rockfill embankment. No other significant surface hydrology changes are observed within the PSP area.
1982 - 1991	No other significant surface hydrology changes are observed within the PSP area.

Year / Source	Summary
2010	Aitken Hill Conference Centre has been constructed within the southeast corner of the PSP area, which includes a golf course. An area of grass discoloration is observed offsite to the north of Aitken Hill Conference Centre. No other significant surface hydrology changes are observed within the PSP area.
2014	Areas of land abutting the PSP area along the eastern boundary have been developed for residential use. The drainage alignment east of the southern PSP area feeding Aitken Creek has been engineered into a wetland. The unnamed drainage alignment in the northern portion of the site has been cut off from the site and redirected in to a drainage reserve due to residential development to the east. No other significant surface hydrology changes are observed within the PSP area.
2018	No significant surface hydrology changes are observed within the PSP area.

The historic aerial photograph review shows areas of surface water runoff and water logging present running through the north portion to the south east consistent with the current site conditions across the PSP area. Based on this Beveridge Williams considers that observations and proposed physical investigation locations based on the current site conditions remains suitable for the recommendations made in this assessment.

4.2 EPA Priority Sites Register and Issued Statements and Certificates of Environmental Audit

The PSP area is not listed on the EPA Priority Sites Register and there are no EPA Priority Sites within 1 km of the PSP area.

A search of the list of issued Certificates and Statements of Environmental Audit revealed that there are 2 sites within 1 km of the PSP area that have been audited. Environmental Audit reports for these sites were reviewed as part of this assessment. A summary of these reports is presented Table 4-2[1].

Table 4-2: Summary of issued Certificates and Statements of Environmental Audit

Location	CARMS No	Date of Audit Completion	Certificate / Statement	Approx. Distance from Site (m)	Direction from Site
Audit Area C, 30-98 Lysterfield Dr, Greenvale	56205-4	17.05.2008	Certificate	800	Southeast
Audit Area D, 30-98 Lysterfield Dr, Greenvale	56205-5	13.04.2017	Certificate	800	Southeast

[1] Environmental audit reports can be accessed: https://www.epa.vic.gov.au/our-work/environmental-auditing/environmental-audit-reports-online

4.2.1 Summary of Nearby Environmental Audits

Nearby environmental audits to the southeast of the PSP area have included soil and hydrogeological investigations assessed by LanePiper in 2008 (CARMS no. 56205-4) and Cardno in 2017 (CARMS no. 56205-5). Fourteen groundwater monitoring wells had been installed over the environmental audit areas. Groundwater in the area ranged from 13.5 m to 19.5 m below ground surface and found to be moving to the south and southeast.

4.3 Geology Plans

Review of the DEDJTR GeoVic version 3[2] website indicates that the majority of the PSP area is underlain by Miocene to Holocene aged Newer Volcanic Group (Neo) basalt flows with intercalated gravel, sand, clay. The southern portion of the PSP area (south of Craigieburn Road) contains predominantly Silurian aged Melbourne Formation (Sxm) comprising hornfels, and Late Devonian aged Bulla Granodiorite (G276) comprising biotite-cordierite and granite (coarse grained with minor garnet).

Regional geology is presented on Figure 2.

4.4 Topography Plans

The topographical high point within the PSP area is in the northwest corner, with an elevation of approximately 270 mAHD. The topographical low point is in the southeast corner of the PSP area at Yuroke Creek with an elevation of approximately 190 mAHD. There are two hills in the vicinity of the PSP area; one located 700 m west of the PSP area centre (approximate elevation of 300 mAHD) and the other in the southeast corner of the PSP area (approximate elevation of 260 mAHD). The PSP area generally slopes to the southeast, although topography slopes gradually to the east along Craigieburn Road, and outward from the hill in the southeast corner of the PSP area.

Regional topography is sloping to the south, with an approximate topographical high point of 1,000 mAHD located approximately 34 km northwest of the PSP area near at Mount Macedon.

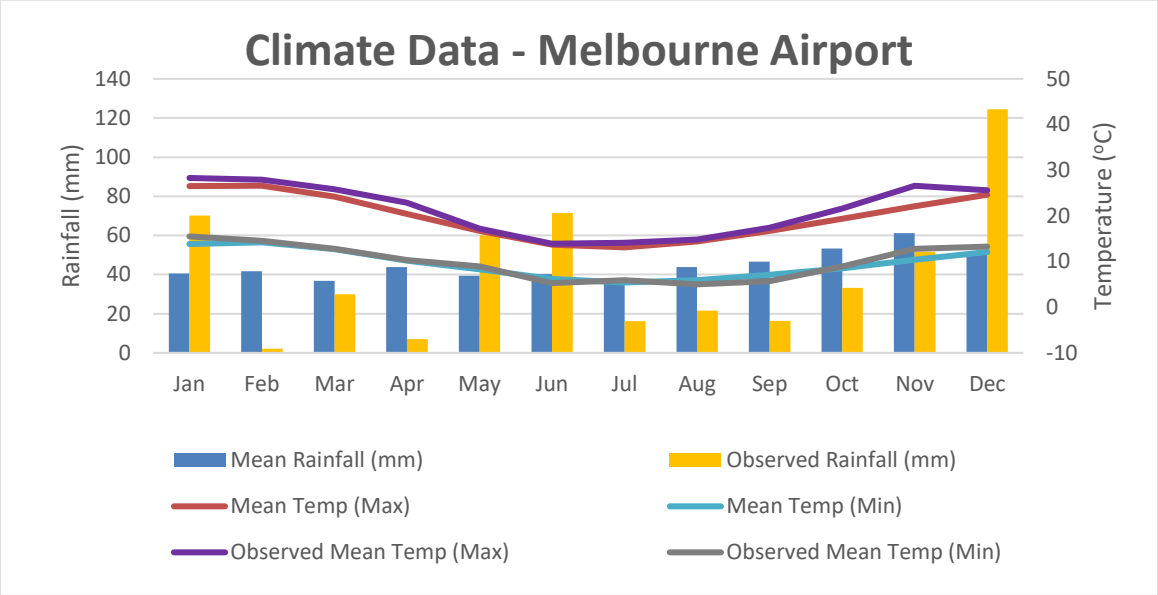
Port Phillip Bay is the main regional low point and is located approximately 25 km south of the PSP area.

4.5 Climate

The local climate information presented on Figure 3-1 was extracted from a meteorological station located at Melbourne Airport approximately 7.2 km southwest of the PSP area. The mean maximum annual temperature is approximately 19.9°C and the mean minimum annual temperature is 9.6°C. Mean annual precipitation at Melbourne Airport is about 534.6 mm/yr with approximately 86.7 rain days (precipitation greater than or equal to 1 mm per year).

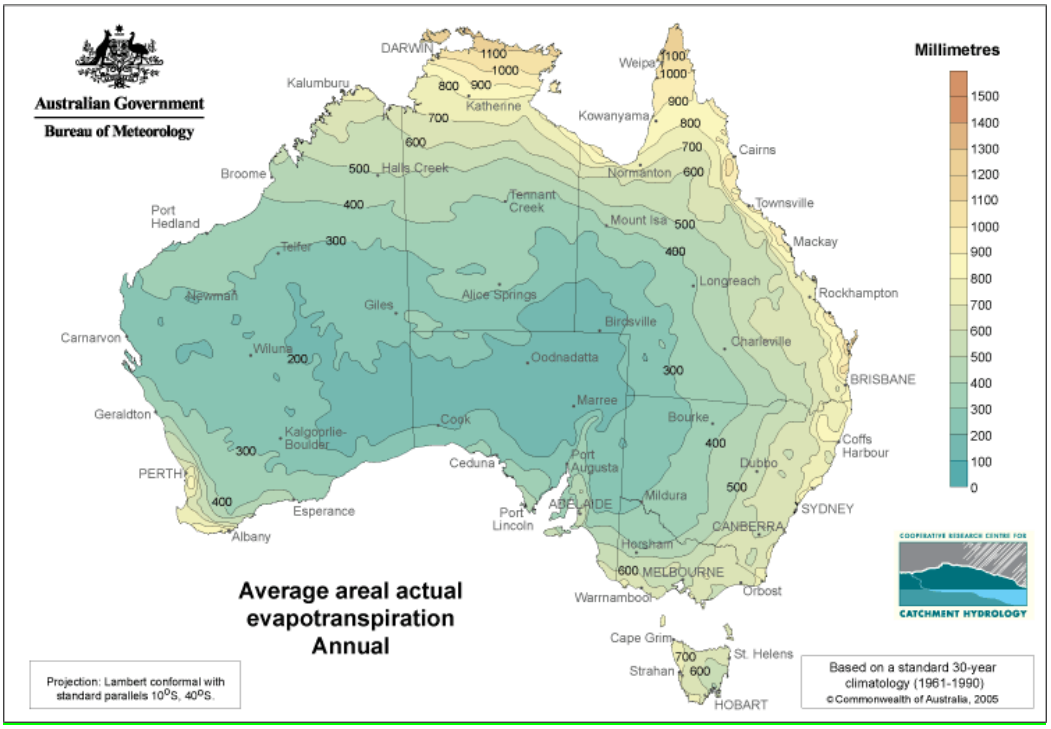
[2] http://er-info.dpi.vic.gov.au/sd_weave/anonymous.html - (online) accessed October 2018

Figure 3-1: Mean (since 1970) and Observed (year 2017-2018) Weather Data for Melbourne Airport[3]



The PSP area is located in a region which has a mean actual evapotranspiration of between 500 and 600 mm/year (presented in Figure 3-2). The PSP area is expected to receive an average of between 0 and 100 mm/year of infiltrated precipitation.

Figure 3-2: Average Annual Areal Actual Evapotranspiration data[4]



[3] http://www.bom.gov.au/climate/averages/tables/cw_086282_All.shtml - (online) accessed October 2018 - Bureau of Meteorology, Melbourne Airport, Victoria, 144.83°E, 37.67°S, 113 mAHD

[4] http://www.bom.gov.au/jsp/ncc/climate_averages/evapotranspiration/index.jsp - (online) accessed October 2018 - Bureau of Meteorology, 2018, Average areal actual evapotranspiration (Annual)

4.6 Hydrogeology Plans

4.6.1 Protected Beneficial Uses

A search of the Visualising Victoria's Groundwater[5] database showed the PSP area to be underlain by groundwaters with varying total dissolved solids (TDS) concentrations, with TDS concentrations generally ranging from 3,500 to 7,000 mg/L. This classifies the groundwater as Segment C, as per the State Environment Protection Policy (SEPP) for Water (2018). However, groundwater in the northwest corner and in the PSP area centre have indicative TDS ranges between 1,000 to 3,500 mg/L and 7,000 to 13,000 mg/L respectively.

The protected beneficial uses of Segment C are listed in Table 4-3.

Table 4-3: Beneficial Uses for Groundwater

Beneficial Uses		Segments (mg/L TDS)						
		A1	A2	B	C	D	E	F
		(0 - 600)	(601-1,200)	(1,201 - 3,100)	(3,101 – 5,400)	(5,401 – 7,100)	(7,101 – 10,000)	(>10,000)
Water dependent ecosystems and species		√	√	√	√	√	√	√
Potable water supply	desirable	√						
	acceptable		√					
Potable mineral water supply		√	√	√	√			
Agriculture and irrigation	irrigation	√	√	√				
	stock watering	√	√	√	√	√	√	
Industrial and commercial		√	√	√	√	√		
Water-based recreation (primary contact recreation)		√	√	√	√	√	√	√
Traditional Owner cultural values		√	√	√	√	√	√	√
Cultural and spiritual values		√	√	√	√	√	√	√
Buildings and structures		√	√	√	√	√	√	√
Geothermal properties		√	√	√	√	√	√	√

Note: Table 4-3 is a reproduction of 'Table 2 – Beneficial Uses for Groundwater' from the State Environment Protection Policy (Waters, October 2018). The shading denotes the beneficial uses to be protected for the site based on the reported TDS values.

4.6.2 Groundwater Depth

Information on groundwater depths collected from the Visualising Victoria's Groundwater[2] database showed groundwater depth to be varied across the PSP area. In the northern and central portion of

[5] http://www.vvg.org.au/ - (online) accessed October 2018

the PSP area, groundwater ranges between <5 m to 20 m below the ground surface. Groundwater in the southern portion however was indicated as generally ranging between 10 m to 50 m below the ground surface.

Previous environmental audits conducted approximately 800 m southeast of the PSP area revealed that the depth to groundwater in July 2016 (Atma, 2016) in the area ranged from 13.5 m to 19.5 m below ground surface.

4.7 Groundwater Flow Direction and Recharge

Groundwater flow is anticipated to be in line with the regional topography, with the general groundwater flow direction to the southeast, towards Aitken Creek and Greenvale Reservoir, which groundwater is then expected to discharge into. Previous environmental audits conducted approximately 800 m southeast of the PSP area revealed that groundwater was moving south (EPA CARMS no. 56205-5) and southeast (EPA CARMS no. 56205-4).

Ultimately it is considered that groundwater will discharge into Port Phillip Bay to the south of the PSP area. Regional groundwater recharge is most likely to occur in open grassland predominantly from rainfall. It is considered within the PSP area dams could potentially be acting as local recharge features if hydraulically connected to the unconfined aquifer.

4.8 Groundwater Users and Management Authority

The PSP area is located within a region administered by Southern Rural Water. A search was completed for registered groundwater bores within an approximate 5.0 km circular radius from the centre of the PSP area.

4.8.1 Registered Users

Ninety-six groundwater bores were registered within an approximate 5.0 km radius from the centre of the PSP area. The Water Measurement Information System (WMIS)[6] search data is presented in Appendix C. The locations of the registered groundwater bores are present on Figure 3. A summary of the data is presented in Table 4-3.

Table 4-3: Groundwater Database Assets - Registered Uses

Number of Bores	Registered Uses	Total depth (m)
4	Domestic	58 – 120
53	Domestic & Stock	9 – 121
1	Domestic & Irrigation	31
3	Groundwater Investigation	35 – 67
1	Industrial	150
2	Irrigation	33 – 55
1	Miscellaneous	91

[6] WMIS managed by Department of Environment, Land, Water and Planning: http://data.water.vic.gov.au/monitoring.htm (accessed 25 October 2018).

Number of Bores	Registered Uses	Total depth (m)
13	Non-groundwater	10 – 59
8	Not Known	21 – 97
2	Observation & Dryland Salinity Bore Network	25 – 27
3	Observation	10 – 28
4	Stock	24 – 58
1	Stock, Dairy & Domestic	166

Twelve (12) groundwater bores are present within the PSP area (for stock, domestic, non-groundwater, observation, dairy and irrigation purposes). Two bores are listed as observation bores, which have a total depth of 10 mBGL, considered to be targeting the Quaternary Basalt aquifer unit.

4.8.2 Groundwater Data

4.8.2.1 Groundwater Levels and Yields

Groundwater levels were reported within two registered groundwater bores within 5.0 km of the PSP area. Standing water levels were recorded in November 2004 in both wells. The standing water levels were 225 mAHD in WRK957993 (4 km northeast of the PSP area centre) and 201 mAHD in WRK957997 (southeast of the PSP area centre (1.7 km southeast of the PSP area centre). This is in line with the anticipated south-easterly groundwater flow direction.

The drilled depths of the registered bores indicate multiple aquifers are present within the surrounding area, with screened depths ranging between 15 and 166 mBTOC. The recorded yields from the registered bores within the area ranged from 0.05 to 10.07 litres/second.

4.8.2.2 Groundwater Chemistry

Groundwater chemistry data was available from three groundwater observation wells within the PSP area. Field pH area ranged from 6.5 to 8.3.

Regional TDS concentrations were variable, ranging between 3,437 and 7,889 mg/L. Only one monitoring well within 5 km of the PSP area centre reported TDS data for groundwater within 30 m of the ground surface, reported as 3,437 mg/L. Regional field pH was also variable, ranging from 6.5 to 9.0.

4.9 Surface Water and Drainage

Three large dams (greater than 5,000 m^2) are present within the PSP area, all located south of Craigieburn Road. Numerous (approx. 40) minor stock watering/irrigation dams are present within the PSP area.

Four major surface drains are present traversing the PSP area:

- Unnamed drainage alignment within the northern portion of the site heading offsite to the southeast.
- Aitken Creek within the northern portion of the site, heading offsite to the southeast.

- Yuroke Creek in the southern portion of the site, heading offsite to the south.
- Broadies Creek in the south portion of the site heading offsite to the southeast.

Surface water runoff is expected to occur in varying directions across the PSP area:

- Surface water runoff in the northern portion of the PSP area is expected to occur to the southeast in line with the unnamed drainage alignment and Aitken Creek.
- Surface water runoff in the center of the PSP area is anticipated to occur to the east in line with Craigieburn Road.
- Surface water runoff in the southern portion of the PSP area is expected to occur predominantly to the south, in line with the topographical gradient caused by Aitken Hill towards Yuroke Creek adjacent to the Greenvale Reservoir. Runoff to the north is expected to occur on the northern side of Aitken Hill.

4.9.1 Hydrology and wetlands

A review of the available information from Melbourne Water, Yarra Valley Water and Port Phillip & Westernport Catchment Management Authorities[7] show that one semi-ephemeral creek, Aitken Creek is located in the north portion of the PSP area. Aitken Creek was observed to drain to the south east with occasional small ponds and constructed wetlands/retention basins located along the creek before draining into Merri Creek (a major tributary of the Yarra River Basin) approximately 5.6 km to the south east.

The creeks are fed from catchments in the north and north west, flowing to the south where the Merri Creek eventually joins the Yarra River. No water level data for Merri Creek was available from Melbourne Water.

No nationally important wetlands, wetland sites of National Environmental Significance or sites of state significance were identified within or immediately adjacent to the PSP area.

Melbourne Water Drainage Scheme design plans have been provided in Appendix A.

4.9.2 Dams

There are a number of small dams across the Study Area. Apart from dams in the north-east of the Study Area, most dams are on flat land and appear to have limited run-off catchment. Some dams were seen to have channels connecting to the Whiteside Street drain, which may allow filling from or overflow to this channel. Some dams may have been excavated to intersect groundwater in the south portion of the site. At the time of the site visit, the majority of the dams held water. It is noted that a number of factors may influence water levels in dams, so the water level in dams is not necessarily an indication of the depth to groundwater.

No visual indications of salinity were noted at within the observe dams in the study area.

[7] http://www.ppwrcs.vic.gov.au/interactive-map/ (Accessed 1 November 2018)

4.9.3 Soil Salinity and Acid Sulphate Soils

4.9.3.1 Acid Sulphate Soils

A review of the Victorian Resources online[8] plans indicate that the PSP area is not identified as a potential acid sulphate soils area with the closest known area of acid sulphate soils located approximately 12 km south in Oak Park.

4.9.3.2 Salinity

In order to assess the risk of salinity issues within the PSP area, Beveridge Williams has compared the inferred groundwater depths, total salinity/total dissolved solids and site observations (including broad vegetation type).

In accordance with Rhoades et al.(1992) waters are typically divided into the following classifications:

Table 4: Classification of Saline Waters (Rhoades et. al., 1992)

Water Class	Type of Water	EC (µS/cm)
Non-saline	Drinking water and irrigation	<700
Slightly Saline	Irrigation	700 – 2,000
Moderately Saline	Primary drainage water and groundwater	2,000 – 10,000
Highly Saline	Secondary drainage water and groundwater	>10,000

Based on the inferred groundwater TDS concentrations and measured salinity within the existing groundwater bores located through the PSP and surrounding regions, groundwaters have been identified with TDS ranging between 3,437 and 7,889 mg/L and electrical conductivity of 182 to 15,500 µS/cm (averaging 7,700 µS/cm). Based on this groundwaters are considered to typically range between moderately saline to highly saline waters.

A review of the groundwater dependent ecosystems (GDE) high level maps prepared by the Bureau of Meteorology (BOM)[9] was undertaken. This high level remote sensing data shows the PSP located within the Central Victorian Uplands and Victorian Volcanic plain bio regions with surface water flows through the PSP area comprising:

- Aitken Creek (north portion of the PSP area)
- Yuroke Creek (central portion of the PSP area)
- Broadies Creek (south portion of the PAP area)

Based on inferred groundwater depths (ranging between <5 m to 20-50 m, refer to Figure 4) through these regions it is anticipated that the waters are likely to receive groundwater inflows through the central portion the PSP (Yuroke Creek) with Aitken and Broadies Creeks heavily influenced by rainfall events.

[8] http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/soil_acid_sulfate_soils_pdfs/$FILE/melbourne-t7822.pdf (Accessed 1 November 2018)
[9] http://www.bom.gov.au/water/groundwater/gde/map.shtml (accessed 1 November 2018)

4.10 Site Inspection

Site inspections were carried out across the Craigieburn West PSP (PSP 1068) by a Beveridge Williams Environmental Scientist on 1 November and 12-14 December 2018. A map of photograph locations (Figure 6) and site photographs taken during the site inspection are shown in Appendix G.

A summary of the observations is presented in Table 4-3.

Table 4-3: Site Inspection Notes

Address	Site No	Notes	Photos
550-570 Mt Ridley Road, /1780 Mickleham Road Mickleham	5	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	IMG_01, IMG_02, IMG_019, IMG_031
685 Mt Ridley Road/1880 Mickleham Road Mickleham	3	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised education (primary school).	-
1800 Mickleham Road Mickleham	4	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	IMG_03
1760 Mickleham Road Mickleham	6	Topography grading to south with a slight rise to the north east portion, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	IMG_04, IMG_018, IMG_032, IMG_033, IMG034
1690 Mickleham Road Mickleham	10	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing). Drainage was observed extending towards the south east from the north west corner of 1690 through 1720 Mickleham Road.	IMG_05, IMG_017
1720 Mickleham Road Mickleham	7		IMG_06, IMG_035
220 Olivers Road Mickleham	14		IMG_020, IMG_036
290 Olivers Road Mickleham	8		-
1660 Mickleham Road Mickleham	11	Topography grading to west before grading back towards the south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	-
1630 Mickleham Road Mickleham	12		IMG_07
1600 Mickleham Road Mickleham	17		-
1570 Mickleham Road Mickleham	18	Topography grading to south, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	IMG_08

Address	Site No	Notes	Photos
1550 Mickleham Road Mickleham	19	Topography grading to south east, no signs of shallow groundwater, healthy vegetation with extensive grass growth. Property use comprised agricultural (grazing).	-
1540 Mickleham Road Mickleham	20		IMG_09
1520 Mickleham Road Mickleham	21/22		-
1530 Mickleham Road Mickleham	21/22		-
680-690 Craigieburn Road Mickleham	24	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	IMG_024
700 Craigieburn Road Mickleham	23		
125 Whites Lane Mickleham	16	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	-
225 Olivers Road Mickleham	15	Topography grading to south east, no signs of shallow groundwater, healthy vegetation. Property use comprised agricultural (grazing).	-
75 Whites Lane Mickleham	25	Topography grading to south east, a single dam located along east boundary. Basalt boulders observed in excavation spoil/dam embankment, some reed grass vegetation observed through the paddock area to the south. Property use comprised agricultural (grazing).	IMG_022
640 Craigieburn Road Mickleham	26	Topography grading to south east. Basalt boulders observed in excavation spoil/dam embankment, some reed grass vegetation observed throughout the paddock. Property use comprised agricultural (grazing).	IMG_023, IMG_040
665 Craigieburn Road Craigieburn	28	Topography grading to south east. Lager tree vegetation observed across the north portion of the property, some reed grass vegetation observed throughout the paddock. Site use comprised agricultural (grazing).	IMG_025
1480 Mickleham Road Craigieburn	27	Topography grading to south east. Lager tree vegetation observed across the east portion of the property, some reed grass vegetation observed throughout the paddock. Site use comprised agricultural (grazing).	-
1430 Mickleham Road Craigieburn	29	Topography grading to south east, a single dam with high embankment located along east boundary in line with a drainage alignment present through the residential development to the east. Some reed grasses and willow trees observed surrounding the dam area. Property use comprised agricultural (grazing).	IMG_028
1390 Mickleham Road Craigieburn	30	Topography slightly grading to south east with a drainage channel observed from the north west corner of the property feeding into a large dam in the south west corner. Lager tree vegetation observed across the west boundary portion of the property. Property use comprised agricultural (grazing).	IMG_010, IMG_029
1370 Mickleham Road Craigieburn	32	Topography slightly grading to south west and vegetated with low lying grasses. Property use comprised agricultural (grazing).	IMG_011
1360 Mickleham Road Craigieburn	33	Topography slightly grading to south west and vegetated with low lying grasses. Property use comprised agricultural (grazing).	IMG_030

Address	Site No	Notes	Photos
1340 Mickleham Road Craigieburn	31	Topography slightly grading to south west from the east and vegetated with low lying grasses. Property use comprised agricultural (grazing). A portion of clearing was visible in the central portion of the property and a dam was located in the south west corner.	IMG_012, IMG_027
1320 Mickleham Road Craigieburn	34	Topography slightly grading to south west and vegetated with low lying grasses. Property use comprised agricultural (grazing).	-
1300 Mickleham Road Craigieburn	35		IMG_014
1290 Mickleham Road Greenvale	36	Topography grading to south west and vegetated with low lying grasses. Property use comprised agricultural (grazing).	IMG_037
1240 Mickleham Road Greenvale	18	Topography grading to south west and vegetated with low lying grasses. Property use comprised agricultural (grazing).	IMG_013, IMG_016
1880 Mickleham Road Mickleham	3		-
20 Dunhelen Lane, Craigieburn	39	Topography slightly grading to south west and vegetated with low lying grasses. Site use comprised commercial (conference center)	IMG_016, IMG038, IMG_039

Selected photographs taken during the site inspections on 22 May 2018 are presented in Appendix B, locations of site observations are provided on Figure 7.

5 GEOTECHNICAL AND SOIL SALINTY ASSESSMENT

A field inspection with a limited soil sampling and geotechnical investigation was undertaken focusing on the identified areas of:

- Potential shallow groundwater
- Different geological profiles; and
- Potential areas of salinity

Sample locations are shown in Figure 7.

5.1 Geotechnical Investigation

A Geotechnical Investigation and General Soil Classification for Development report was completed by Strata Geoscience and Environmental.

The general findings of this investigation were:

- Geotechnical soils to a maximum depth of 3.0 meters below the existing ground surface (mbg) and found a variable veneer of Clayey Silts (ML) and Silty CLAYS (CH) overlying inferred Quaternary-aged Basalts. Stoney rises and rocky outcroppings of basalt were observed over significant areas of the precinct. Bore BH18 was associated with inferred Devonian aged Granites whilst BH07 is thought to be associated with Silurian Siltstones.
- No groundwater was encountered throughout geotechnical reconnaissance over the site. It is noteworthy that shallow ephemeral water tables may exist throughout wetter periods. Accordingly construction activities are not recommended preceding during or immediately post periods of high rainfall.
- Shallow hard rock deposits were encountered over significant areas of the precinct. This will impact excavation activities including excavation of service trenches, road cutting, pile inserts and foundation construction.
- Aerialisation of dust likely when bulk earthworks conducted in drier periods. Dust management measures to prevent aerialisation should be implemented.
- Numerous farm dams. Groundwater not encountered – perched water tables over endemic clays (where present) likely throughout wetter months, drainage required where foundations/utilities/roading are founded in this zone. Existing dams MUST not be used as subdivisional development areas without further site specific intensive geotechnical assessment and are better suited as incorporation in WSUD or as landscape amenities.
- Geotechnical drilling of the precinct revealed Clayey SILTS (ML)/Silty CLAYS (CL/CH). Based on experience with similar subgrades, it is recommended that:
    - A CBR range value of 3-6 % be adopted for subgrade materials. This range is close to a lower bound value for these materials and are based on the assumption that the topsoil will be stripped (where required) prior to pavement construction. It is also contingent upon adequate site preparation by proof rolling (to detect any unsuitable soft or loose material) and subgrade compaction.

- Geotechnical test pitting immediately prior to bulk excavations over the proposed excavation areas is recommended given the potential for shallow rock over some areas as encountered in some bores and observed over the landscape. This may affect the ability to cost effectively the establishment of underground services in some areas.
- Emmerson Class testing revealed that subsoils are generally prone to severe soil dispersion, it is recommended that bulk storages have excavated surfaces treated with gypsum and are lined to prevent potential soil dispersion/erosion and the resultant risks associated with structural infrastructure failure and water quality decline

It is recommended that further geotechnical investigation, incorporating geotechnical test pitting, be conducted when specific development/infrastructure design plans are finalised and the siting of all earthworks and construction locations are known.

The detailed geotechnical report and findings are provided in Appendix E.

5.2 Soil Salinity

Soils were sampled using a solid augur from the surface to a maximum depth of 2 m below the surface. No deeper salinity samples were undertaken as part of this investigation based on the preliminary nature and shallow rock formations prevalent within the region.

Soil electrical conductivity (EC) was measured using a 1:5 extract method by mixing 1 part soil to 5 parts deionised water by volume (approximately 20g:100mL). Solution was shaken for 1 minute and allowed to settle prior to testing for EX and pH using a water quality meter.

5.2.1 Adopted Investigation levels

As salinity levels which may affect vegetation EC ranges have been derived from plant tolerance levels for different soil types provided by Victoria Resources Online[10] (previously managed by the Department of Environment and Primary Industries).

Water Class	EC 1:5 (µS/cm)		
	Sandy Loams	Clay loams to light clays	Medium to heavy clays
Non-saline (S0)	<200	<200	<300
Slightly Saline (S1)	200 – 300	200 – 400	300 – 600
Moderately Saline (S2)	400 – 700	500 – 900	700 – 1,300
Highly Saline (S3)	800 – 1,500	1,000 – 1,800	1,400 – 2,700
Extremely Saline (S4)	>1,500	>1,800	>2,700

[10] http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/water_spotting_soil_salting#sc (accessed 30/11/2018)

5.2.2 Results

Site ID	Sample Location	Soil Type	Sample Depth	pH 1:5	EC 1:5 (µS/cm)	Water Class
5	BH01	Clay loams to light clays	0.0-0.1 1.2-1.3	6.09 7.65	140 450	S0 S1
5	BH02	Clay loams to light clays	0.0-0.1 1.9-2.0	7.43 7.24	240 880	S1 S2
6	BH03	Clay loams to light clays	0.0-0.1 1.9-2.0	6.02 7.03	180 250	S0 S1
6	BH04	Clay loams to light clays	0.0-0.1 1.9-2.0	5.92 6.90	240 90	S1 S0
9	BH05	Clay loams to light clays	0.0-0.1	5.82	60	S0
7	BH06	Clay loams to light clays	0.0-0.1	5.79	160	S0
12	BH07	Sandy Loams Clay loams to light clays	0.0-0.1 1.7-1.8	6.61 7.86	50 150	S0 S0
13	BH08	Sandy Loams	0.0-0.1	7.35	70	S0
14	BH09	Clay loams to light clays	0.0-0.1	6.40	60	S0
16	BH10	Clay loams to light clays	0.0-0.1 0.7-0.8	7.09 7.08	30 30	S0
26	BH11	Clay loams to light clays	0.0-0.1 1.9-2.0	6.76 7.07	20` 50	S0
27	BH12	Clay loams to light clays	0.0-0.1	6.55	40	S0
28	BH13	Clay loams to light clays	0.0-0.1 1.9-2.0	6.52 6.67	60 90	S0
30	BH14	Clay loams to light clays	0.0-0.1 1.4-1.5	7.10 7.73	50 150	S0
33	BH15	Sandy Loams Clay loams to light clays	0.0-0.1 1.3-1.4	6.25 6.74	110 180	S0
34	BH16	Clay loams to light clays	0.0-0.1 0.9-1.0	6.16 7.84	50 210	S0 S1
34	BH17	Clay loams to light clays	0.0-0.1	7.14	10	S0
36	BH18	Sandy Loams	0.0-0.1 1.9-2.0	6.60 7.44	70 100	S0
39	BH19	Clay loams to light clays	0.0-0.1	7.18	50	S0

Based on the field testing the majority of the soils across the study area were recorded within the non-saline to slightly saline soil ranges with underlying soils at a single location BH02) located in the north portion (Site 5) along an observed low point anticipated to act as a preferential flow path for surface water runoff towards the south east.

Borehole logs and field testing results are provided in Appendix D.

5.3 Acid Sulphate Soil and Background Concentrations

Based on the Victorian Resources online plans the risk of acid sulphate soils being present within the PSP area is considered to be low. Additional sampling works were undertaken to confirm the low risk with soil samples collected from between 0.5 m depth and 2.0 with select samples tested for pH field ($pH_{(f)}$) and pH oxidised ($pH_{(fox)}$), sulphate, nitrate and heavy metals. Additional chemical testing for background concentrations for nitrate, organochlorine pesticides (OCP) and organophosphorus pesticides was also undertaken.

The chemical testing program for individual samples is detailed in Table 4-5.

Table 4-5: Soil Sample Chemical Testing Program

Sample Numbers	Testing Program
BH01/0.0-0.1, BH02/0.0-0.1, BH04/0.0-0.1, BH05/0.0-0.1, BH06/0.0-0.1, BH07/0.0-0.1, BH08/0.0-0.1, BH09/0.0-0.1, BH10/0.0-0.1, BH11/0.0-0.1,BH12/0.0-0.1, BH13/0.0-0.1, BH14/0.0-0.1, BH15/0.3-0.4, BH16/0.0-0.1, BH17/0.0-0.1, BH18/0.0-0.1, BH19/0.0-0.1	Heavy metals[11], Organochlorine Pesticides (OCP) and Organophosphate Pesticides (OPP)
BH01/0.0-0.1, BH01/1.2-1.3, BH02/0.0-0.1, BH02/1.9-2.0, BH04/0.0-0.1, BH04/1.9-2.0, BH05/0.0-0.1, BH06/0.0-0.1, BH07/0.0-0.1, BH07/1.7-1.8, BH08/0.0-0.1, BH09/0.0-0.1, BH10/0.0-0.1, BH11/0.0-0.1, BH11/1.9-2.0, BH12/0.0-0.1, BH13/0.0-0.1, BH13/1.9-2.0, BH14/0.0-0.1, BH15/0.3-0.4, BH15/1.3-1.4, BH16/0.0-0.1, BH16/0.9-1.0, BH17/0.0-0.1, BH18/0.0-0.1, BH18/1.9-2.0, BH19/0.0-0.1	Sulphate, $ph_{(f)}$ and $pH_{(fox)}$

5.3.1 Chemical Testing Results

The reported chemical testing results were compared against adopted criteria (DSE, Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soils and NEPM Amendment 2013 ecological screening level (ESL) criteria).

5.3.1.1 Heavy metals, OCP and OPP

With the exception of a single nickel concentration (31mg/kg, BH17/0.0-0.1), marginally above the adopted criteria (30mg/kg) all analytes were reported below the NEPM Amendment 2013 Ecological Investigation Levels and generally lower nutrient (nitrate) concentrations the risk of surface water runoff to adversely impacted receiving waters to be low providing adequate sediment controls are maintained during any site works.

5.3.1.2 $pH_{(f)}$ and $pH_{(fox)}$

With the exception of locations (BH05, BH16 and BH17) $pH_{(f)}$ and $pH_{(fox)}$ testing results reported a slight reactivity in the majority of the soils across the study area indicating a low risk to underground structures and concrete slabs.

[11] Heavy metals: Al, Sb, As, Ba, Be, B, Cd, Cr (III+VI), Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Sn, V, Zn

Soils at BH05, BH16 and BH17 all reported a moderate reactivity and were situated within a grey silty CLAY/clayey silt, indicative if the underlying weathered basaltic soils.

5.3.1.3 Sulphate

Reported concentrations of sulphate ranged between 230 m/kg and 3700 mg/kg. These concentration ranges are anticipated to be representative of back ground concentrations an in conjunction with the reported pH(f) ranges (>5) the sulphate concentrations are not likely to pose an acidification risk with the majority of the sulphate bound within mineralisation (R.Wrigley, R. van de Graaff, S. Lang, 2006[121]) such as Barium Sulphate and inert.

5.3.2 Summary

The majority of the site soils are considered to be of low risk fir site structures and potential runoff impacts providing adequate sediment controls are maintained. However, based on the moderate reactivity reported within BH05, BH16 and BH17, consideration should be made where structures are proposed to be in contact with the grey silty CLAY/clayey SILT in which structures should:

- Be constructed with materials suitable for use within moderately reactive soils.
- Where possible adequate buffer constructed from a low reactivity medium (such as crushed rock packing) should be used between concrete structures and the grey silty CLAY/clayey SILT

The Laboratory Certificates of Analysis for soil samples are provided in Appendix F.

[12] Roger Wrigley, Robert van de Graaff and Simone Lang (2006), “Residential Development On The New Volcanics: A Case Study Of Suspected Barium Contamination And Soil Amendment”, Australian Geomechanics Vol 41 No 3

6 DISCUSSION

6.1 Summary of Findings

6.1.1 Hydrogeological, Salinity and Acid Sulphate Soil (Beveridge Williams)

Based historical photographs, pre-existing native vegetation was already cleared for grazing around by the 1950s (i.e. approximately 70 years ago), therefore, salinity due to water table rise would be expected to have become evident by this time. Seasonal variations and longer-term climatic variation are likely to vary the level of the water table, but significant changes due to lag effects of vegetation clearing are not expected.

The typically thin soil cover over the basalt would limit capillary rise of groundwater, if the water table is located within the basalt material (i.e. below the soil horizon) indicating local effects around surface water bodies. Existing dams and open drainage channels are expected to be removed or incorporated into landscaped areas, drainage and/or wetland reserve as part of the development through the Study area.

Although the detailed planned stormwater management approach for the future residential developments within the Study area is not known, improved drainage, along with the introduction of impermeable surfaces of roads and roofing, may have the effect of lowering the groundwater table across the majority of the study area. This would further reduce the risk of salinity expression at the surface.

Although the depth to groundwater in the Study Area has not been confirmed, available groundwater chemistry information suggests the groundwater in the uppermost (basalt) aquifer to be of low to moderate salinity across the majority of the study area.

Based on the information reviewed and site observations the following was noted:

- Salting risk within this land system has been assigned a “very low” rating based on slope type commonly comprising steep slopes or elevated plateaus and depth to water table (typically deeper than 10m)
- Areas of shallow groundwater (<5m, see Figure 4) are more vulnerable to dryland salinity such as discharge points around drains, dams and springs (as shown on Figure 7)
- No piezometers have been installed to verify groundwater quality and depths, however surface observations were made and some preliminary sampling of soils was undertaken of the more vulnerable areas with the landscape.
- The preliminary field observations and surface sampling confirmed some localised moderately saline soils onsite, with no evidence of broad salinity with the Study Area
- The majority of the PSP area is underlain by basaltic based geology with Melbourne Formation and Bulla Granodiorite with refusal on the underlying rock formations typically within 3m below ground level across the majority the Study area
- Field and Laboratory testing results (Section 4.9.3.2 and Appendix F respectively) indicate the majority of the study area is underlain by slightly reactive soils with sulphate concentrations representative of typical background concentrations in soils of basaltic origin. Based on this and the common form of sulphate in volcanic soils commonly bound in the form of barium

sulphate it is considered the risk to future development activities in the PSP area is likely to be low provided verification of soil conditions along areas of proposed concrete structures is undertaken including any specific foundations and/or infrastructure alignments

- The area has a high density of groundwater wells used for domestic and stock watering uses (19 registered wells within the Study Area), consistent with the available groundwater quality data which indicates that groundwater is of sufficiently low salinity to be potentially suitable for stock watering, or irrigation without harm to vegetation
- Potential for shallow groundwater and/or discharge is present through the central portion of the PSP area along Yuroke Creek
- Potential for higher (perched) water tables is present in proximity to dams (shown on Figure 7)
- Groundwaters are considered to predominantly comprise low to moderately saline waters with a portion of potentially high salinity waters through the central portion of the site (Figure 5). However, based on the anticipated depths (between 10 to 50 m) across the majority of the PSP area, groundwater may not be encountered or pose a constraint to the development of the PSP area.
- No obvious signs of salinity were observed across the PSP area.

6.1.2 Geotechnical (Strata Geoscience and Environmental)

Physical investigations across the precinct area encountered soils to a maximum depth of 3.0 meters below the existing ground surface (mbg) and found a variable veneer of Clayey Silts (ML) and Silty CLAYS (CH) overlying inferred Quaternary-aged Basalts with stoney rises and rocky outcroppings of basalt were observed over significant areas of the precinct. Further observations included:

- No groundwater was encountered throughout the geotechnical reconnaissance over the site
- Based on the surface soils across the majority of the precinct comprising Clayey Silts (ML) and Silty CLAYS shallow ephemeral water tables may exist throughout wetter periods

The detailed discussions and testing results are provided in Strata Geocience and Environmental's report provided in Appendix E.

7 CONCLUSIONS

7.1 Hydrogeological, salinity and Acid Sulphate Soil Assessment

Based the investigations undertaken as part of the Hydrogeological, salinity and acid sulphate soil assessment, Beveridge Williams Considers:

- The risk to future development activities as a result of underlying hydrogeology, soil salinity, acid sulphate soils and geotechnical conditions across the majority of the PSP area is likely to be low
- The preliminary soils sampling confirmed soils confirmed the majority of the soils across the PSP area ranged between non-saline to slightly saline soils (Section 5.2.2) and the risk of dryland salinity is considered low across the PSP area
- Isolated areas of potential salinity may be present with areas of shallow groundwater through the central portion of the PSP area (inferred shallow groundwater of moderate to high salinity, shown on Figures 4 and 5) and in proximity to dams and other surface water bodies (Figure 7).

7.2 Geotechnical Assessment

Based on the Risk assessment undertaken by Strata Geocience and Environmental (Appendix E) the following was concluded:

- Shallow hard rock deposits likely over significant areas of the precincts will impact excavation activities including excavation of service trenches, road cutting, pile inserts and foundation construction.
- Aerialisation of dust likely when bulk earthworks conducted in drier periods.
- Slope stability across the precinct is typically considered to be of low risk
- Bearing capacity for soils is considered to be of low risk with capacities up to 100 kPa in natural clays providing adequate drainage is allowed for
- Soil reactivity (expansion and contraction) is considered to be a high risk with predicted values in the order of 75mm
- Due to the small particulate size of clayey silts and silty clays there is a moderate risk of erosion
- Perched water tables over endemic clays (where present) are likely throughout wetter months

8 RECOMMENDATIONS

Based on the above Beveridge Williams and Strata Geoscience and Environmental have made the following recommendations:

- Further precinct designs should be carried out on the basis of soils within the precinct area ranging between non-saline to moderately saline soils (Section 5.2.2) including appropriate construction materials proposed to be in direct contact with underlying natural soils or groundwater used in any precinct development works are sufficiently rated for use in the observed site conditions and proposed use

- Prior to detailed design (drainage, subdivision or underground infrastructure alignments) a precinct wide OR development specific physical groundwater investigation through the areas identified with shallow (<5 m) and potential saline waters (TDS concentrations indicated between 7,000 - 13,000 mg/L), as shown on Figures 4 and 5 respectively, including a gauging/sampling round to confirm the groundwater flow direction and hydrogeological conditions to confirm risk of groundwater intrusion during excavation or bulk earthworks within the precinct area and the management measures required for any water intrusion which may be encountered.
- Where shallow groundwater is encountered (from further physical hydrogeological investigations detailed above) and potential for upwards intrusion into future drainage and /or retention basins is confirmed, a clay (or similar) capping barrier should be designed to minimise upward intrusion of potentially saline waters into proposed stormwater systems and retaining basins.
- Based on the moderate to high reactivity (expansion and contraction with changing moisture content) reported within BH05, BH16 and BH17 (shown on Figure 8), consideration should be made where structures are proposed to be in contact with the identified grey silty CLAY/clayey SILT in which infrastructure and structures should:
    - Be constructed with materials suitable for use within moderately reactive soils in-line with the recommendations detailed in Strata Geosciences report (presented in Appendix E including:
        - Pad, slab and strip footings are acceptable foundation solutions only when founding in underlying natural Silty CLAYS
        - All piers/piles MUST,
            - Penetrate through any uncontrolled fill, upper Clayey SILTS (ML) and into firm to stiff underlying Silty CLAYS (CL/CH),
            - Be founded at a minimum of 1.5 m below the existing ground surface (or refusal). This recommendation may be revised subject to review of specific development plans when available.
            - Have a maximum end bearing of 100 Kpa and a maximum skin friction of 15Kpa below the first meter of natural soils; and
            - A maximum pile spacing of 2.0 m is recommended for Natural CLAYS
        - A CBR range value of 3-6 % be adopted for subgrade materials used in road and utility infrastructure
        - Any battering carried out as art of the future precinct development will need be between 30 degrees (fill, sands and soft-firm clays) to 45 degrees (stiff clays, dense sandy clays and clayey gravels), however, Given that soils will unlikely be at dry to slightly moist moisture contents, an engineered design solution for any shoring and retaining of pit walls will be required

- Retaining wall design and specifications must comply with recommendations detailed in Section 3.4 of Strata Geoscience and Environmnetal's geotechnical assessment report (Appendix E)
- Due to the sub-soils being prone to dispersion it is recommended that:
    - Bulk storages have excavated surfaces treated with gypsum and are lined to prevent potential soil dispersion/erosion and the resultant risks associated with structural infrastructure failure and water quality decline; AND
    - That an specific Erosion Risk Assessment and Soil and Water Management Plan be commissioned and implemented prior to commencing site development works.

- Where possible, adequate buffer fill constructed from a low reactivity medium (such as crushed rock packing) should be used between concrete structures and the moderate to high reactivity grey silty CLAY/clayey SILT.
- Due to the likelihood of perched water tables over endemic clays in wetter months, drainage is required where foundations/utilities/roads are founded. Existing dams should not be used as subdivisional development areas without further site specific intensive geotechnical assessment.

- Dust mitigation measures are to be put in place for areas of sparsely vegetated or cleared areas during future development works within the precinct area due to the high likelihood of aerialisation during the dryer months of the year
- Where backfilling of existing dams are required as part of landscaping for future development where these can-not be incorporated into stormwater design elements or retained as landscaping/recreation amenities the following must be undertaken:
    - Dam waters are tested in line with Melbourne Water requirements to ensure release waters are not considered to pose risk to the environment (either due to chemical or salinity parameters)
    - Dam sediments are not used as a substrate for future precinct development without appropriate geotechnical and chemical testing
    - Suitably geotechnically stable fill material is to be utilised as backfill.

9 LIMITATIONS

Soil and rock formations are variable. The geology maps indicate the approximate subsurface conditions inferred from on topographic profiles and broad geological surveys. Boundaries between geological and hydrogeological zones are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends largely on the frequency and method of sampling, and the uniformity of subsurface conditions and environmental conditions.

Conditions described in this report refer only to those conditions indicated by analysis of information at the points and under the circumstances noted in the report. These conditions may differ due to the variability of concentrations in imported fill material or in natural soil as a consequence of activities on the site or adjacent sites. Conditions may vary due to changes in the environment also. Where conditions encountered at the site, proposed development or surrounding area differ from those anticipated in this report, it is a condition of this report that Beveridge Williams & Co Pty Ltd be notified of the changes and provided with an opportunity to review the recommendations of this report.

BEVERIDGE WILLIAMS & CO PTY LTD

Prepared by:

Justin Tillig

Environmental Engineer

Approved for issue by:

Adam Hayes

Senior Environmental Scientist

FIGURES

Approximate Site Location

Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: Site Location Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 22.10.2018
Approved A.HAYES
Date 05.11.2018
Image Source NEARMAP

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Scale 1:20,000 @ A3
Project Ref. 1801684 Figure No. 01 Rev. 0
Drawing Ref. K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

N

Approximate Site Location

Watercourse and Lakes

200 Elevation Contours (mAHD)

Neo Newer Volcanic Group - basalt flows

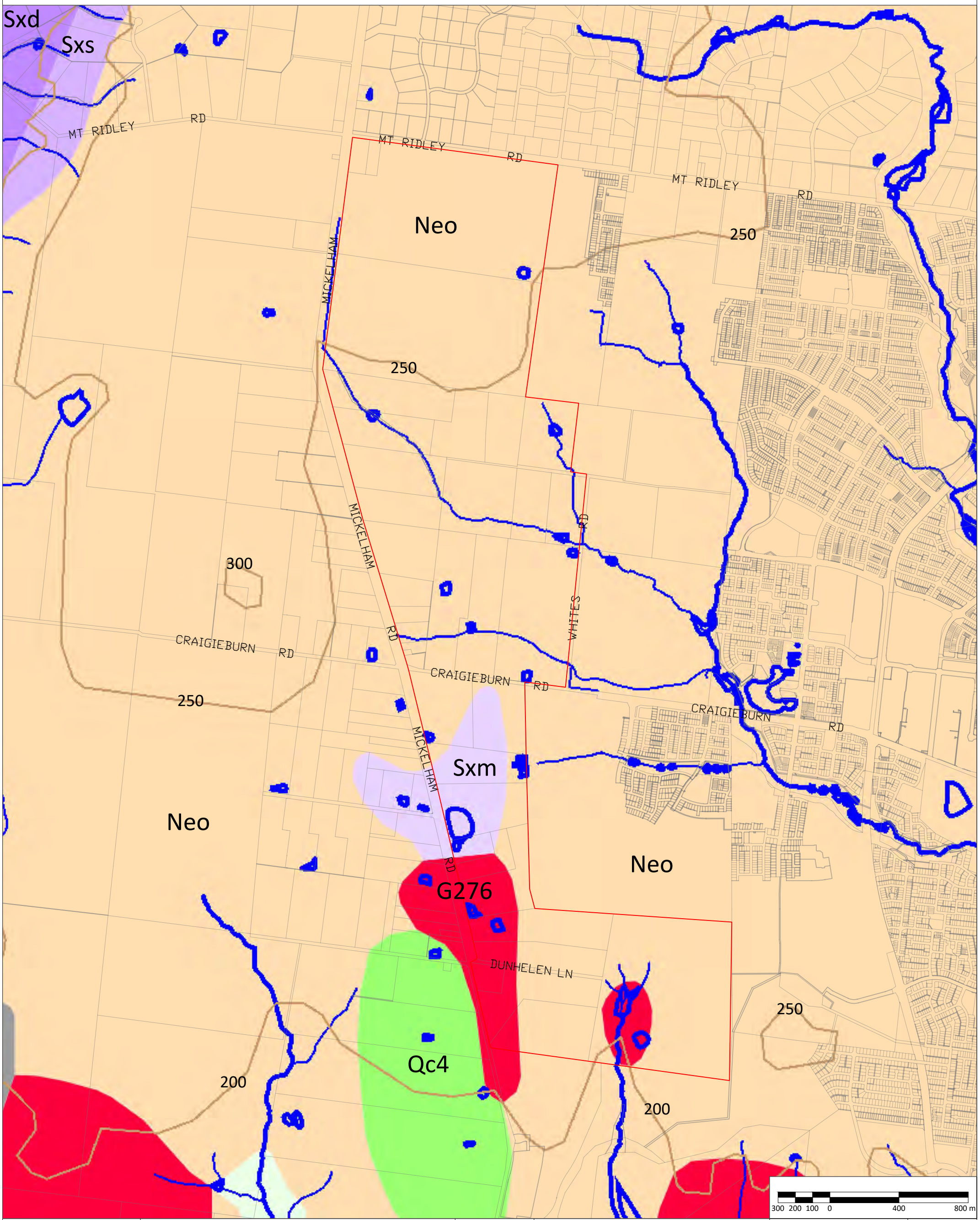
Sxm Melbourne Formation - hornfels

G276 Bulla Granodiorite - granite

Qc4 Granite-derived colluvium (quartz and feldspar sand)

Sxs Springfield Sandstone - sandstone, siltstone and conglomerate

Sxd Deep Creek Siltstone - siltstone and sandstone



Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: Regional Geology, Topography and Watercourse Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 22.10.2018
Approved A.HAYES
Date 05.11.2018
Image Source NEARMAP

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Project Ref. 1801684 Figure No. 02 Rev. 0

Drawing Ref. K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

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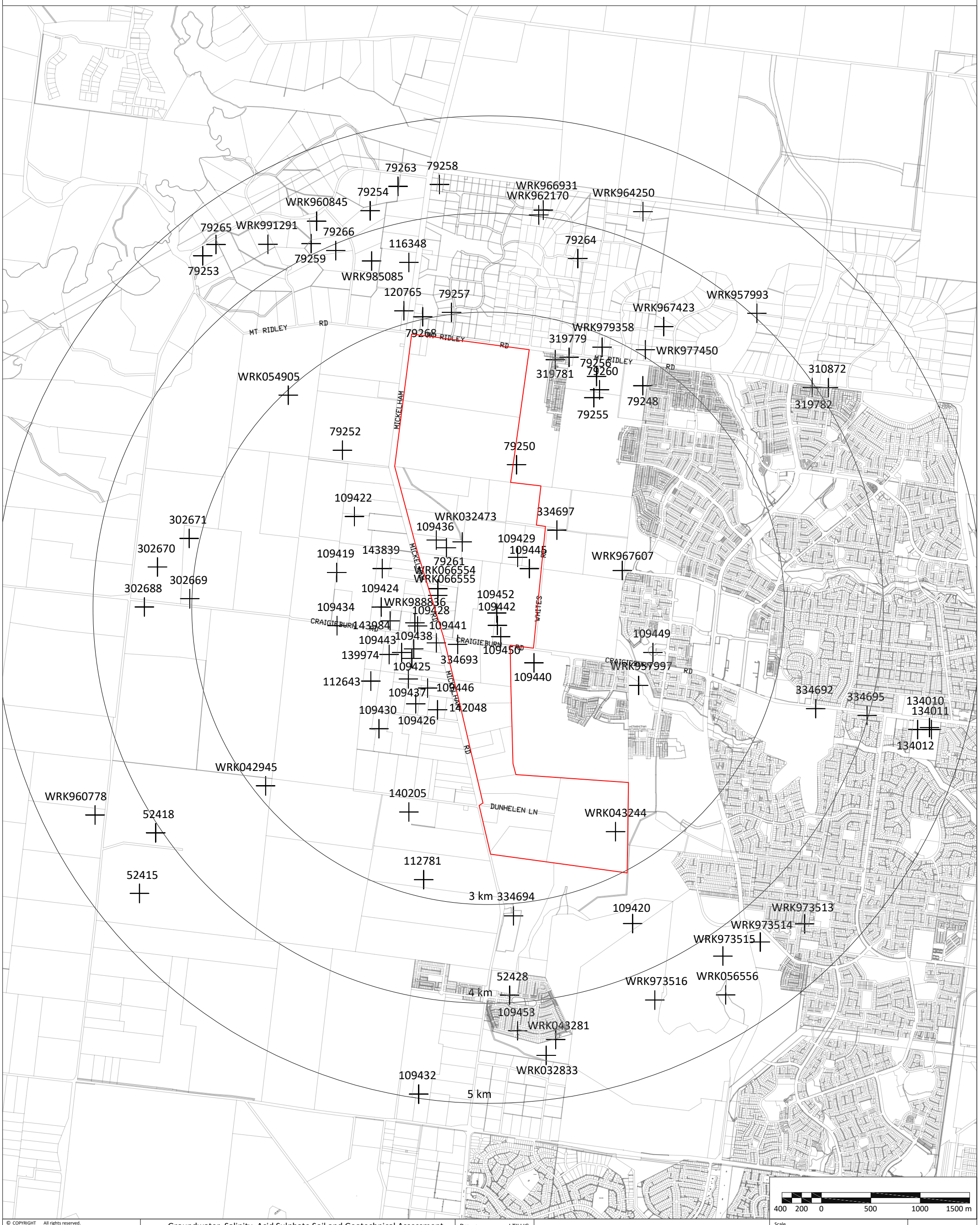
Approximate Site Location

WRK985085

Approximate Location of Registered Groundwater Bore



Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: WMIS Database Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 25.10.2018

Approved A.HAYES
Date 05.11.2018

Image Source WMIS/VICMAP

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Project Ref. 1801684
Figure No. 03
Rev. 0

Drawing Ref. K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

N

Approximate Site Location

Approximate Depth to Groundwater

- <5 mBGL
- 5-10 mBGL
- 10-20 mBGL
- 20-50 mBGL
- >50 mBGL

MT RIDLEY RD

MICKELHAM RD

WHITES RD

CRAIGIEBURN RD

DUNHELEN LN

Note: groundwater depth information adapted from Visualising Victoria's Groundwater data

300 200 100 0 400 800 m

Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: Approximate Groundwater Depth Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 01.11.2018
Approved A.HAYES
Date 05.11.2018
Image Source VVG

Beveridge Williams
development & environment consultants
1 Glenferrie Road
Malvern VIC 3144
Ph : 03 9524 8888
Fax: 03 9524 8899
www.beveridgewilliams.com.au

Scale 1:20,000 @ A3

Project Ref. 1801684 Figure No. 04 Rev. 0

Drawing Ref. K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

N

Approximate Site Location

Approximate Groundwater Segments

- 1,000 - 3,500 mg/L
- 3,500 - 7,000 mg/L
- 7,000 - 13,000 mg/L

MT RIDLEY RD

MICKELHAM RD

WHITES RD

CRAIGIEBURN RD

DUNHELEN LN

Note: groundwater segments information adapted from Visualising Victoria's Groundwater data

300 200 100 0 400 800 m

Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: Approximate Groundwater Segments Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 1.11.2018
Approved A.HAYES
Date 05.11.2018
Image Source VVG

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Scale 1:20,000 @ A3

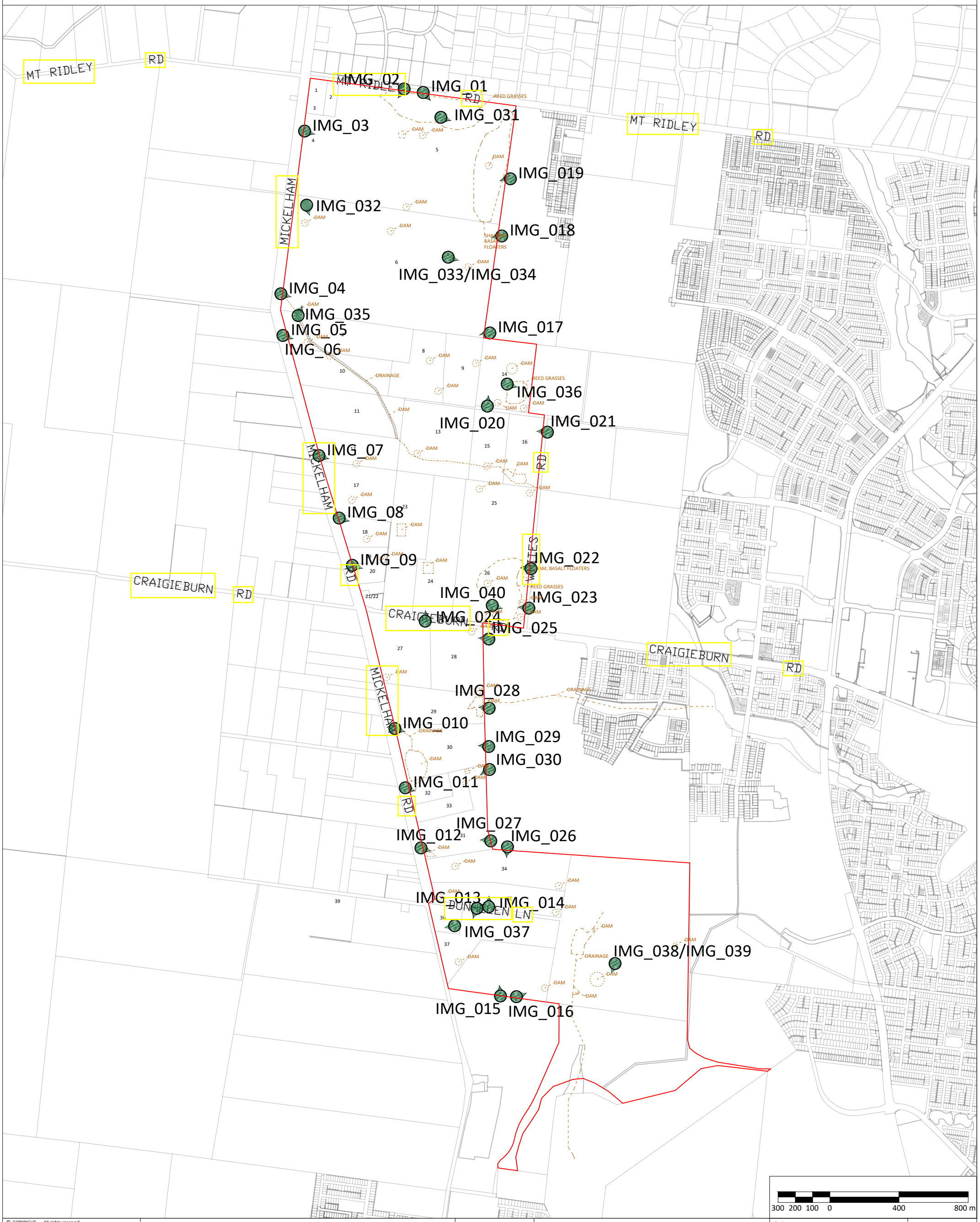
Project Ref. 1801684 Figure No. 05 Rev. 0

Drawing Ref.
K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

N

Approximate Site Location

Photograph Location and Perspective



Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment Craigieburn West Precint Structure Plan

Drawing Title: Site Photograph Location Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 7.11.2018
Approved A.HAYES
Date 12.11.2018
Image Source VICMAP

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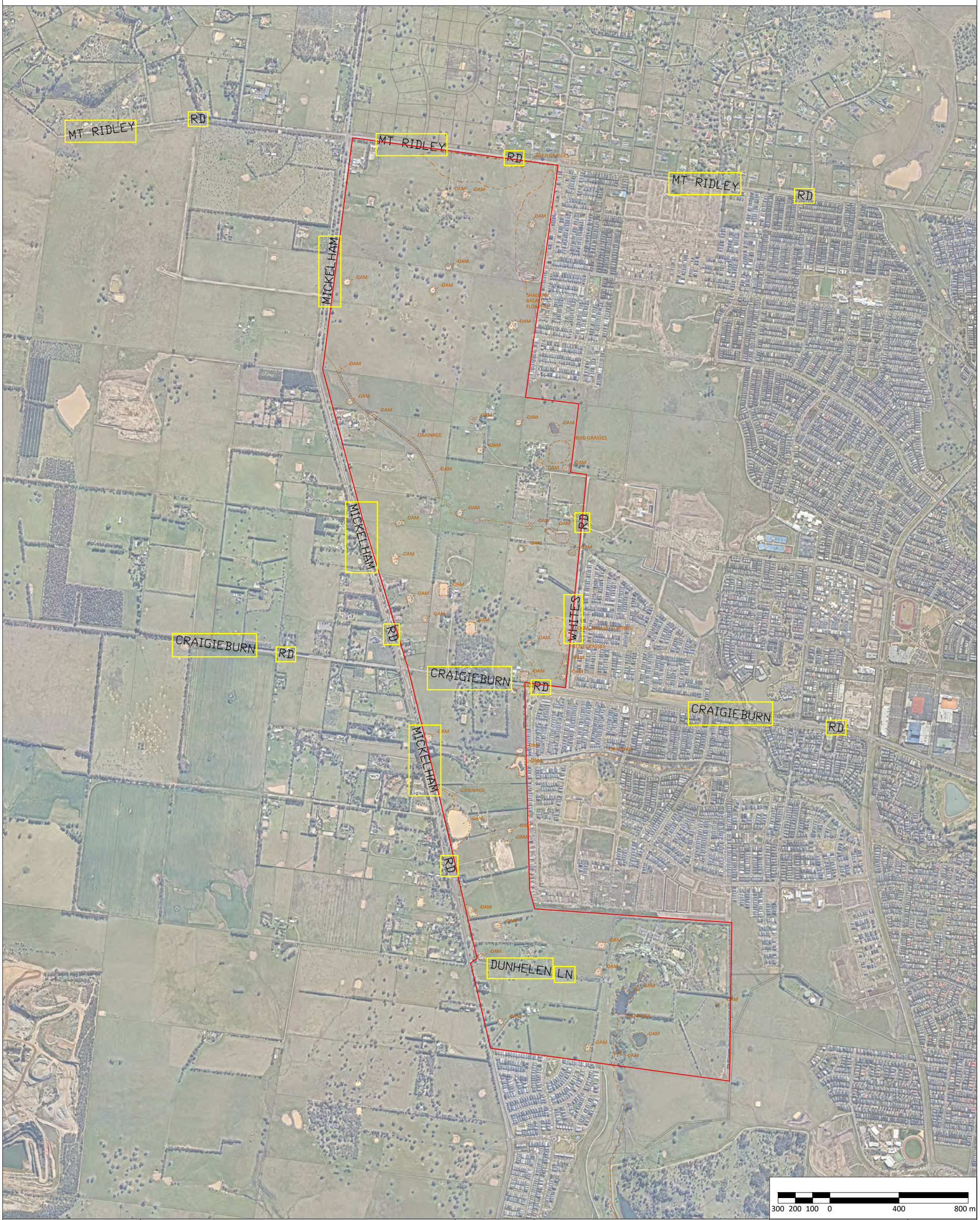
Scale 1:20,000 @ A3
Project Ref. 1801684
Figure No. 06
Rev. 0
Drawing Ref. K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

Approximate Site Location

Photograph Location and Perspective



Rev	Description	Date	By	App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: Site Observation Plan

Client: Victorian Planning Authority

Drawn: J.TILLIG
Date: 7.11.2018

Approved: A.HAYES
Date: 12.11.2018

Image Source: VICMAP

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Scale: 1:20,000 @ A3

Project Ref.: 1801684
Figure No.: 07
Rev.: 0

Drawing Ref.
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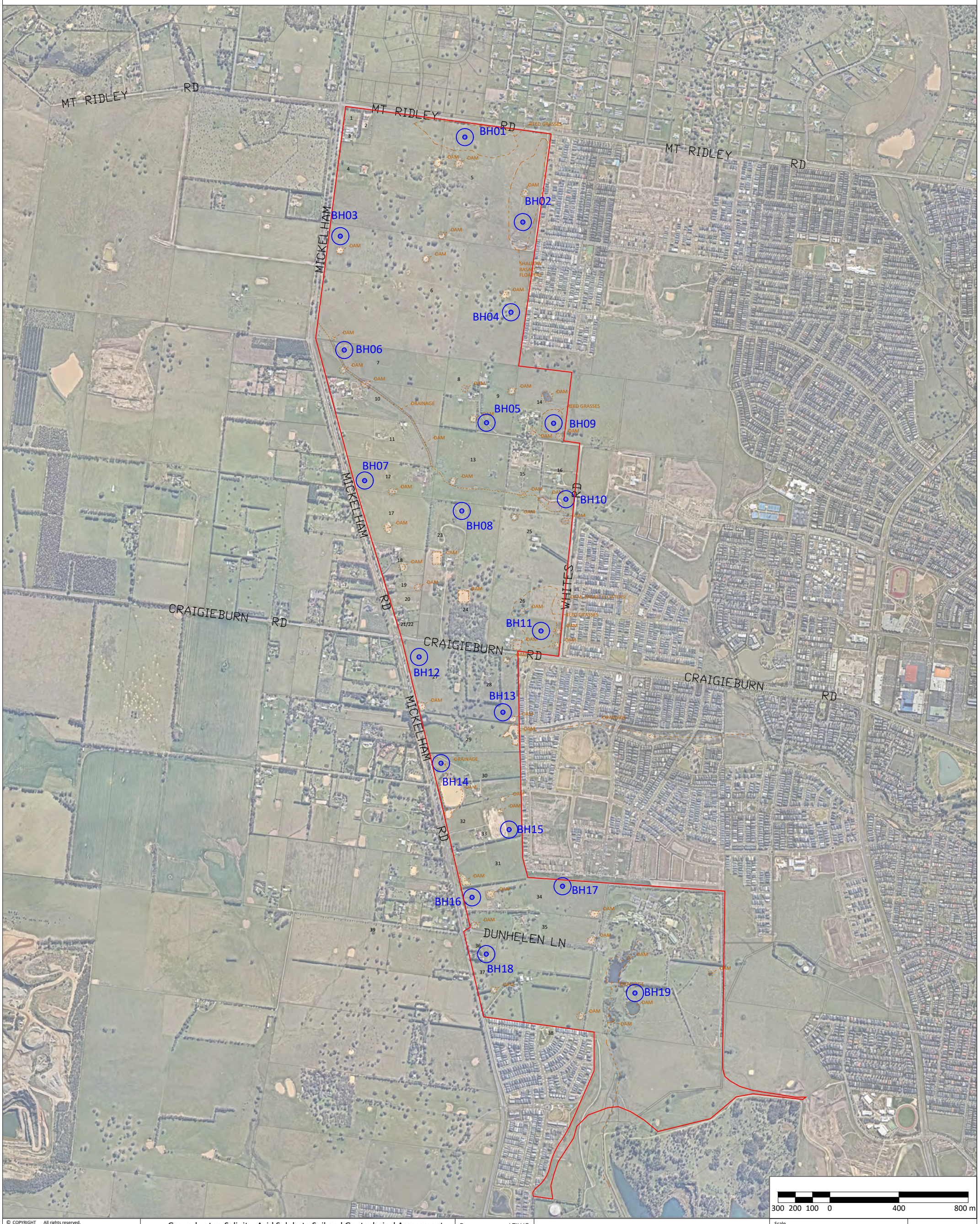
Approximate Site Location

Geotechnical Borehole and Salinty Sample Location



Rev Description Date By App.

Project Name: Groundwater, Salinity, Acid Sulphate Soil and Geotechnical Assessment
Craigieburn West Precint Structure Plan

Drawing Title: Sample Location Plan

Client: Victorian Planning Authority

Drawn J.TILLIG
Date 7.12.2018

Approved A.HAYES
Date 14.12.2018

Image Source NEARMAP

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Project Ref. 1801684
Figure No. 08
Rev. 0

Drawing Ref. K:\JOBS DATA\1801684 - CRAIGIEBURN WEST PSP_ENV\00\PLANS\1801684 - PLAN.DWG

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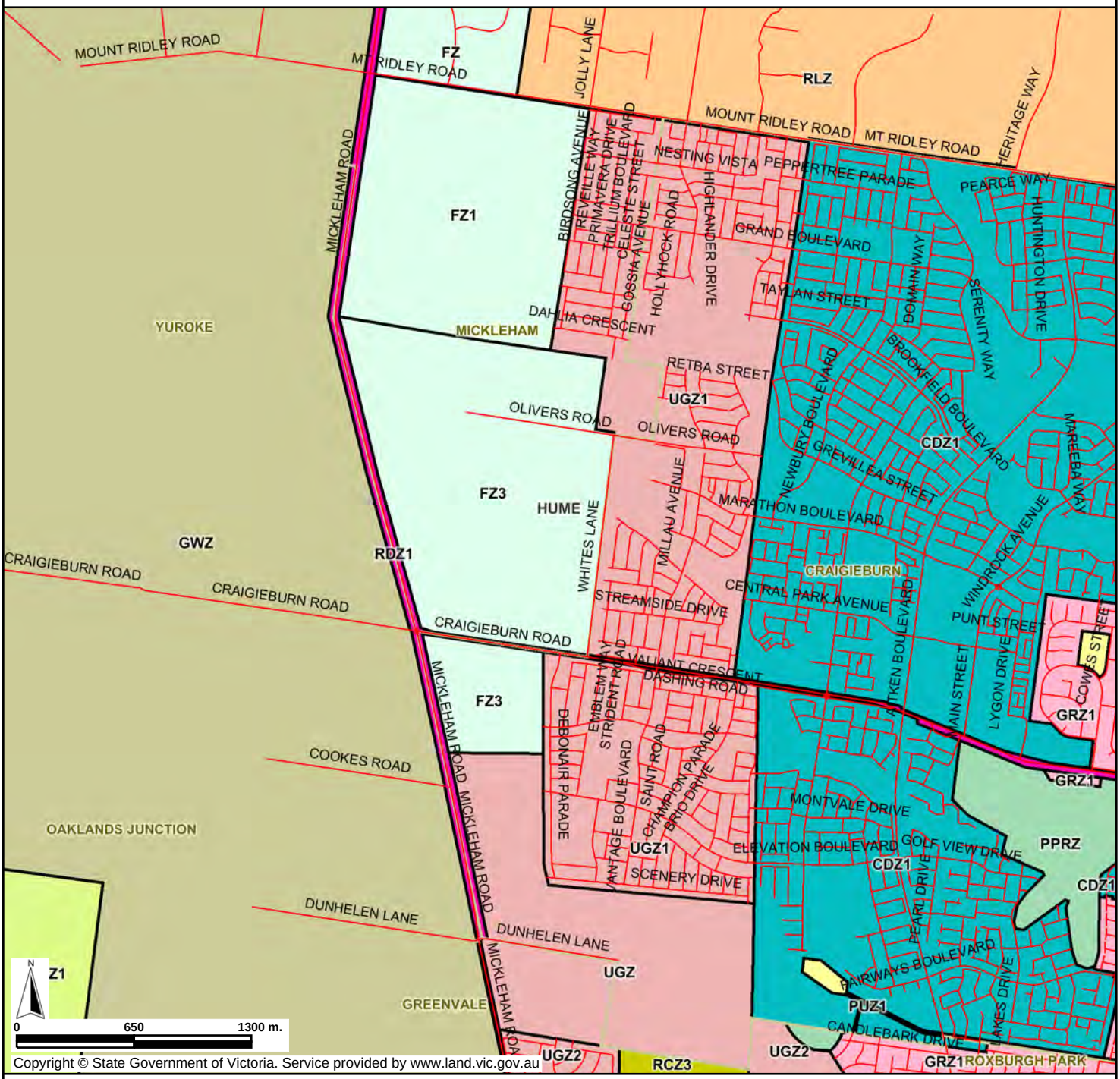
APPENDIX A PLANNING AND MELBOURNE WATER DRAINAGE SCHEME MAPS

Planning Map

Department of Environment, Land Water and Planning



Legend

WARRNAMBOOL Major Town
Major Road, Road
BOURKE STREET Road name
Railway, Tramway
Property/Parcel, Selected
25 2 1C Address, Lot, Crown allotment
River, Stream, Coastline
Waterbody
Locality
SEDDON Locality Name
Local Government Area
BRIMBANK Local Government Name
Urban Growth Boundary (UGB)
Area outside the UGB
Investigation Area
Land added to UGB since 2005
Boundary of Searched Suburb

ZONES

- ACZ - Activity Centre
- B1Z - Commercial 1
- B2Z - Commercial 1
- B3Z - Commercial 2
- B4Z - Commercial 2
- B5Z - Commercial 1
- C1Z - Commercial 1
- C2Z - Commercial 2
- CA - Commonwealth Land
- CCZ - Capital City
- CDZ - Comprehensive Development
- DZ - Dockland
- ERZ - Environmental Rural
- FZ - Farming
- GRZ - General Residential
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- IN1Z - Industrial 1
- IN2Z - Industrial 2
- IN3Z - Industrial 3
- LDRZ - Low Density Residential
- MUZ - Mixed Use
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PDZ - Priority Development
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service & Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ4 - Public Use - Transport
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public Use
- PZ - Port
- R1Z - General Residential
- R2Z - General Residential
- R3Z - General Residential
- RAZ - Rural Activity
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- RDZ2 - Road - Category 2
- RGZ - Residential Growth
- RLZ - Rural Living
- RUZ - Rural
- SUZ - Special Use
- TZ - Township
- UFZ - Urban Floodway
- UGZ - Urban Growth

OVERLAYS

- AEO - Airport Environs
- BMO - Bushfire Management
- CLPO - City Link Project
- DCPO - Development Contributions Plan
- DDO - Design & Development
- DDOPT - Design & Development Part
- DPO - Development Plan
- EAO - Environmental Audit
- EMO - Erosion Management
- ESO - Environmental Significance
- FO - Floodway
- HO - Heritage
- ICPO - Infrastructure Contributions Plan
- IPO - Incorporated Plan
- LSIO - Land Subject to Inundation
- MAEO1 - Melbourne Airport Environs 1
- MAEO2 - Melbourne Airport Environs 2
- NCO - Neighbourhood Character
- PO - Parking
- PAO - Public Acquisition
- RO - Restructure
- RCO - Road Closure
- SBO - Special Building
- SLO - Significant Landscape
- SMO - Salinity Management
- SRO - State Resource
- VPO - Vegetation Protection

Map Centre - Melways **386 A6**
Map Scale 1:31,795
November 7, 2018 1:41:27 PM

VICTORIA State Government | Environment, Land, Water and Planning

Melbourne Water

N

Melway Ref: 386 B5

Author: Rebekah Campbell

Scale @ A1 1:9000

DSCM Legend

- DSS Boundary
- DS Strategy Boundary
- DSCM Property
- Stage (Allocated)
- Stage (Works in Progress)
- Stage (Finalised)
- Nodes
- Bio-Retention Swale
- Channel
- Cleanout works
- Culvert
- Grassed Swale
- Low flow pipe with Channel
- Overland flow path
- Pipeline
- Soft Engineering
- Bio-Retention Basin
- Buffer Strip
- Inlet/Outlet Structure
- Junction Pit
- Litter trap
- Retarding Basin
- Sediment trap
- Wetland

As Constructed Legend

- Channel
- Natural Waterway
- Sewer Main
- Underground Drain
- Water Main
- Flood Extents
- Lake
- Retarding Basin
- Sediment Trap
- Wetland

Plan Date: April 2017

Melbourne Water is providing our indicative assets information and is not to be used as the basis of future design and expects that the appointed engineering consultant will perform their own calculations as part of requirements for their development.

Please note that as schemes develop and Melbourne Water receives additional information, the conceptual/indicative advice you have been provided as part of the feasibility request may become out-dated. Under the QA process it is the responsibility of the consultant to ensure that Melbourne Water's feasibility advice is current and to certify that all information ultimately provided to Melbourne Water for acceptance is correct having completed their own detailed catchment analysis.

4480 - Aitken Creek DSS Infrastructure 1/1

4480

Melbourne Water

4381 - Upper Brodies Creek DSS Infrastructure 1/1

N

Melway Ref: 385 K12

Author: Rebekah Campbell

Scale @ A1 1:4000

DSCM Legend

- DSS Boundary
- DS Strategy Boundary
- DSCM Property
- Stage (Allocated)
- Stage (Works in Progress)
- Stage (Finalised)
- Nodes
- Bio-Retention Swale
- Channel
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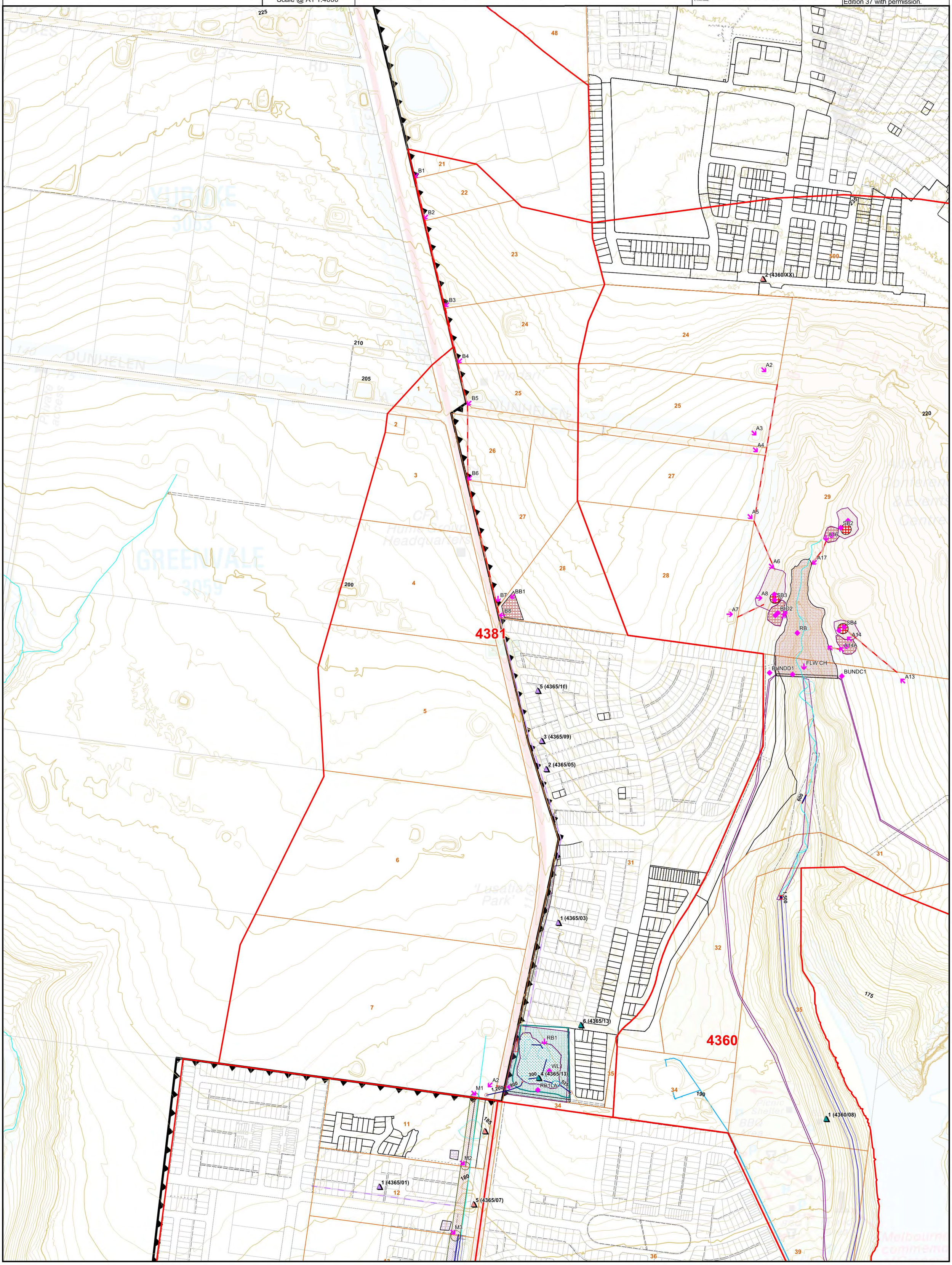


APPENDIX B SITE PHOTOGRAPHS

IMG 01. North east portion of PSP 1068 from Mt Ridley Road

IMG 02. North west portion of PSP 1068 from Mt Ridley Road

IMG 03. North west portion from Mickleham Road

IMG 04. South west portion of 1760 Mickleham Road, greener vegetation and some reed grasses were observed

IMG 05. West portion, unnamed drainage channel was observed extending to the south east

IMG 06. West portion, unnamed drainage channel was observed extending to the south east

IMG 07. Central portion from Mickleham Road, slight topographic rise to the east

IMG 08. Central portion from Mickleham Road, slight grading to the south

IMG 09. Central portion from Mickleham Road, slight topographic grading to the south

IMG 010. South portion from Mickleham Road, slight rise to centre of 1390 Mickleham Road

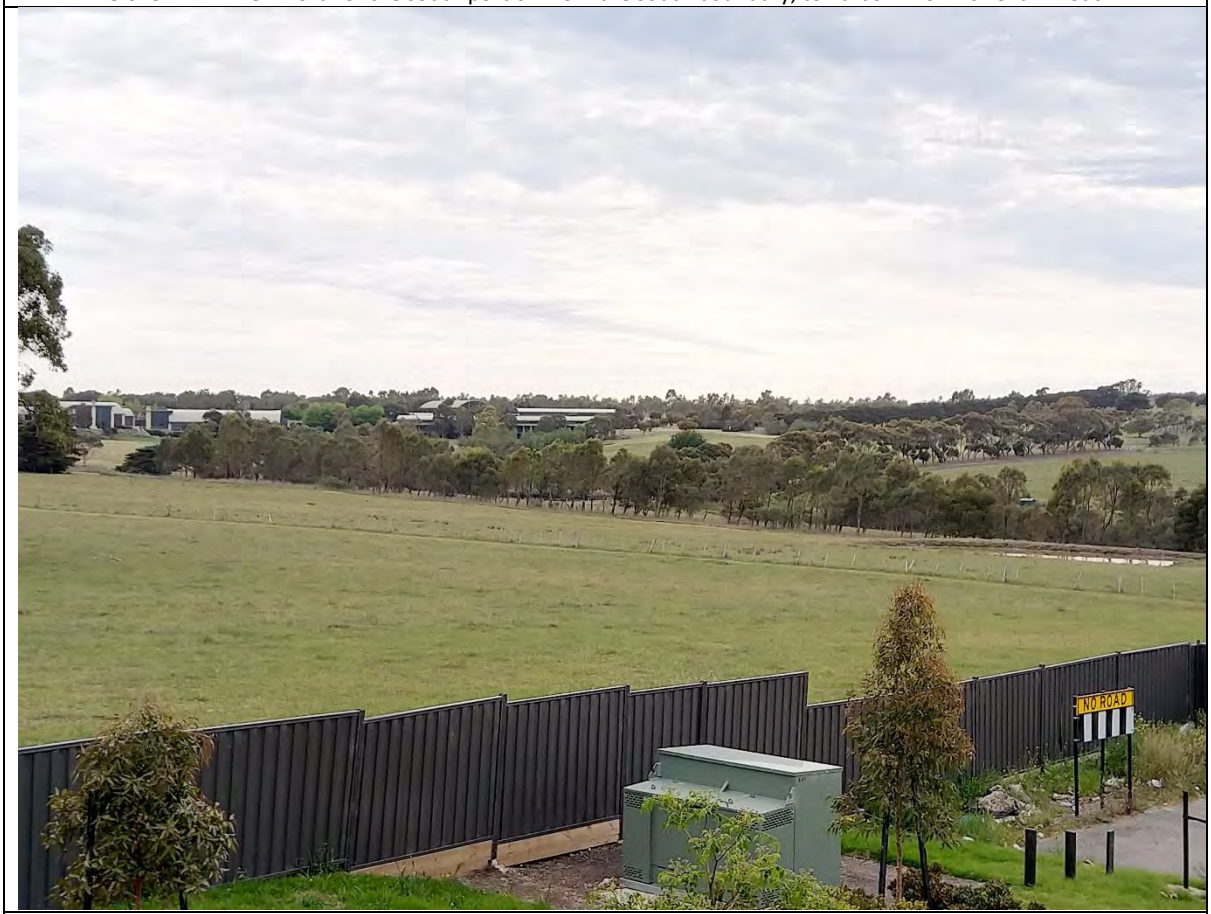
IMG 011. South portion from Mickleham Road, slight rise to east portion of 1370 Mickleham Road

IMG 012. South portion from Mickleham Road, low point along west boundary of 1340 Mickleham Road occupied by a dam

IMG 013. South portion south of Dunhelen Lane, towards 1880 and 1240 Mickleham Road

IMG 014. South portion north of Dunhelen Lane, towards 1300 and 1320 Mickleham Road

IMG 015. View north of the south portion from the south boundary, towards 1240 Mickleham Road



IMG 016. View east of the south portion from the south boundary, towards 20 Dunhelen Lane

IMG 017. View west of the central portion from the east boundary, topography graded towards the south east

IMG 018. View west of the north portion from the east boundary, some areas of surficial fill were observed along the east boundary

IMG 019. View west of the north portion from the east boundary, some areas of surficial clearing and shallow basalt floaters were observed

IMG 020. View to the north of Olivers Road in the north portion, reed gasses were observed indicating a drainage or potential shallow groundwater area

IMG 021. View to the west of Olivers Road in the north portion, property was generally flat with a slight gradient towards the south

IMG 022. View to the west of Olivers Road a dam was located along the east boundary, large basalt floaters were observed in the embankments and reed grasses through the paddock further west

IMG 023. View to the north west from near the corner of Olivers and Craigieburn Roads reed grasses throughout the paddock to the north and west

IMG 024. View to the north from Craigieburn Road. Topography typically sloped towards the south/south east

IMG 025. View to the west from Debonair Parade. Property was well vegetated with young and established gum trees

IMG 026. View south of the east portion of 1320 Mickleham Road. Property was grassed and graded towards the south east from the centre of the property.

IMG 027. View west of the east portion of 1340 Mickleham Road. Property was grassed and graded towards the south east from the centre of the property.

IMG 028. East portion of 1340 Mickleham Road, a large dam was observed. Drainage continued through a drainage reserve to the east through the neighbouring residential development

IMG 029. East portion of 1390 Mickleham Road, the property as grassed generally flat with a slight gradient towards the south east.

IMG 030. East portion of 1360 Mickleham Road, the property as grassed generally flat with a slight gradient towards the south and south west. An area of grass clearing/grading was observed in the central portion the property

IMG 031. 1780 Mickleham Rd, Mickleham near BH01, the property as grassed generally flat with a slight gradient towards the south east and reed grasses present across the north and east portion.

IMG 032. 1760 Mickleham Rd, Mickleham near BH03, the property as grassed. Onsite dams were observed to be cutdown and basalt floaters were observed with in the subsurface soils.

IMG 033. 1760 Mickleham Rd, Mickleham, basalt floaters were observed through surface soils across the site

IMG 034. East portion of 1760 Mickleham Rd, Mickleham, the property vegetated with occasional trees and low lying grasses. The east portion of the site was located at the top of a topographic rise before sloping towards the south east and west.

IMG 035. View north from the east portion of 1720 Mickleham Rd, Mickleham near BH07, the property as grassed sand located within a surface water drainage alignment sloping to the south east. Dam walls in the property to the north shows the shallow nature of the underlying basalt rock.

IMG 036. South east portion of 220 Olivers Rd, Mickleham, the property as grassed generally slpoped to the south east with dams located along low points to intercept surface water runoff. An area of reed grass was observed through the surfaces water drainage alignment.

IMG 037. West portion of 1290 Mickleham Rd, Greenvale, the property as grassed generally flat with a slight gradient towards the west and south east.

IMG 038. South portion of portion of 20 Dunhelen Lane, Yuroke, the property as grassed generally flat with a slight gradient towards the south and south west.

IMG 039. South portion of 20 Dunhelen Lane, Yuroke, the property contained a series of ponds as part of the waste water management system of the property before discharging into Yurok Creek.

IMG 040. East portion of 640 Craigieburn Rd, the property as grassed generally flat with a slight gradient towards the south and south west. Extensive reed grasses were observed across the east portion of the site.

APPENDIX C WMIS DATABASE SEARCH

Table 1
Visualising Victoria's Groundwater Search
Site Details

Bore ID	Direction	Bore Onsite	Type	Status	Latitude (GDA94)	Longitude (GDA94)	Location method	Easting (MGA)	Northing (MGA)	Map zone	Distance from Centre of Site (m)	Date commenced	Date completed	Use
109452	ESE	Yes	DRILLED BORE	Used	-37.587735	144.8860217	TRANSLATION	313353.2	5837824.2	55	381	5/06/1989	3/07/1989	STOCK,DOMESTIC
109442	SSE	Yes	DRILLED BORE	Used	-37.588862	144.8860577	TRANSLATION	313359.2	5837699.2	55	309	28/04/1981	29/04/1981	STOCK,DOMESTIC
109450	SSE	Yes	DRILLED BORE	Used	-37.589905	144.8864128	TRANSLATION	313393.2	5837584.2	55	307	19/04/1989	22/04/1989	DOMESTIC
334693	SW	Yes	DRILLED BORE	Used	-37.590519	144.8814578	TRANSLATION	312957.2	5837506.2	55	137	12/04/1970	12/04/1970	NON GROUNDWATER
WRK066555	WNW	Yes	DRILLED BORE	Used	-37.586012	144.8792961	NOT KNOWN	312755	5838002	55	561	1/12/2011	1/12/2011	OBSERVATION
WRK066554	WNW	Yes	DRILLED BORE	Used	-37.5854	144.8793361	NOT KNOWN	312757	5838070	55	617	1/12/2011	1/12/2011	OBSERVATION
109445	NE	Yes	DRILLED BORE	Used	-37.583758	144.8898706	TRANSLATION	313683.2	5838273.2	55	937	25/02/1983	1/03/1983	STOCK,DOMESTIC
109429	NNE	Yes	DRILLED BORE	Used	-37.582698	144.8885536	TRANSLATION	313564.2	5838388.2	55	965	30/10/1971	30/10/1971	STOCK,DOMESTIC
109441	WSW	No	DRILLED BORE	Used	-37.59034	144.8790169	TRANSLATION	312741.2	5837521.2	55	347	6/10/1980	10/10/1980	STOCK,DOMESTIC
109440	SE	No	DRILLED BORE	Used	-37.592351	144.8901487	TRANSLATION	313729.2	5837320.2	55	680	1/08/1980	4/08/1980	DOMESTIC
WRK032473	NNW	Yes	DRILLED BORE	Used	-37.581179	144.8822437	TRANSLATION	313003.2	5838544.2	55	1000	27/01/1995	31/01/1995	STOCK,DAIRY,DOMESTIC
109428	W	No	DRILLED BORE	Used	-37.588752	144.8769099	TRANSLATION	312551.2	5837693.2	55	554	4/11/1971	4/11/1971	STOCK,DOMESTIC
79261	NNW	Yes	DRILLED BORE	Used	-37.581687	144.8804177	TRANSLATION	312843.2	5838484.2	55	967	5/08/1982	5/08/1982	STOCK,DOMESTIC
WRK988836	W	No	DRILLED BORE	Used	-37.588469	144.8766103	NOT KNOWN	312524	5837724	55	589	26/01/2009	26/01/2009	DOMESTIC AND STOCK
109438	WSW	No	DRILLED BORE	Not Used	-37.590843	144.8764089	TRANSLATION	312512.2	5837460.2	55	581	1/11/1978	1/11/1978	DOMESTIC AND STOCK
109436	NW	Yes	DRILLED BORE	Used	-37.580954	144.8792717	TRANSLATION	312740.2	5838563.2	55	1073	7/02/1977	7/02/1977	STOCK
109425	WSW	No	DRILLED BORE	Used	-37.591703	144.8761689	TRANSLATION	312493.2	5837364.2	55	622	31/12/1962	31/12/1962	NOT KNOWN
109443	WSW	No	DRILLED BORE	Used	-37.591142	144.8750189	TRANSLATION	312390.2	5837424.2	55	707	9/04/1981	9/04/1981	STOCK,DOMESTIC
143984	W	No	DRILLED BORE	Used	-37.588236	144.8737769	TRANSLATION	312273.2	5837744.2	55	836	11/12/1999	11/12/1999	STOCK,DOMESTIC
109446	SW	No	DRILLED BORE	Used	-37.594438	144.877904	TRANSLATION	312653.2	5837064.2	55	652	31/05/1985	31/05/1985	STOCK,DOMESTIC
334697	NE	No	DRILLED BORE	Used	-37.580301	144.8931165	TRANSLATION	313961.2	5838663.2	55	1416	13/09/1971	13/09/1971	NON GROUNDWATER
109437	SW	No	DRILLED BORE	Used	-37.59357	144.87572	TRANSLATION	312458.2	5837156.2	55	742	15/06/1978	26/06/1978	STOCK,DOMESTIC
109424	W	No	DRILLED BORE	Used	-37.586956	144.8727939	TRANSLATION	312183.2	5837884.2	55	963	31/12/1962	31/12/1962	NOT KNOWN
139974	WSW	No	DRILLED BORE	Used	-37.591296	144.873576	TRANSLATION	312263.2	5837404.2	55	836	20/02/1999	20/02/1999	STOCK,DOMESTIC
143839	WNW	No	DRILLED BORE	Used	-37.583446	144.8730068	TRANSLATION	312193.2	5838274.2	55	1151	9/09/1999	9/09/1999	STOCK,DOMESTIC
142048	SSW	No	DRILLED BORE	Used	-37.59644	144.878979	TRANSLATION	312753.2	5836844.2	55	782	1/11/1999	1/11/1999	DOMESTIC
109426	SW	No	DRILLED BORE	Used	-37.595855	144.876504	TRANSLATION	312533.2	5836904.2	55	852	31/12/1962	31/12/1962	NOT KNOWN
112643	WSW	No	DRILLED BORE	Not Used	-37.59369	144.871413	TRANSLATION	312078.2	5837134.2	55	1090	19/01/1992	19/01/1992	STOCK,DOMESTIC
WRK967607	ENE	No	DRILLED BORE	Decom.	-37.584119	144.9005054	TRANSLATION	314623.2	5838254.2	55	1688	21/11/2005	22/11/2005	DOMESTIC AND STOCK
79250	N	No	DRILLED BORE	Used	-37.574246	144.8886674	TRANSLATION	313553.2	5839326.2	55	1840	31/12/1970	31/12/1970	NOT KNOWN
109434	W	No	DRILLED BORE	Used	-37.588558	144.867686	TRANSLATION	311736.2	5837696.2	55	1357	31/05/1976	31/05/1976	STOCK,DOMESTIC
109419	W	No	DRILLED BORE	Used	-37.583712	144.8677899	TRANSLATION	311733.2	5838234.2	55	1516	21/05/1962	21/05/1962	NOT KNOWN
109422	WNW	No	DRILLED BORE	Used	-37.578641	144.8699618	TRANSLATION	311912.2	5838801.2	55	1718	31/12/1970	31/12/1970	STOCK,DOMESTIC
109430	SW	No	DRILLED BORE	Used	-37.598049	144.8722171	TRANSLATION	312160.2	5836652.2	55	1291	30/07/1973	30/07/1973	STOCK,DOMESTIC
WRK957997	SSE	No	DRILLED BORE	Used	-37.594629	144.9020882	NOT KNOWN	314789	5837091	55	1760	14/11/2004	15/11/2004	OBS., DRYLAND SAL. BORE NTWRK
109449	ESE	No	DRILLED BORE	Used	-37.591657	144.9038045	TRANSLATION	314933.2	5837424.2	55	1847	10/02/1988	10/02/1988	STOCK,DOMESTIC
79252	NW	No	DRILLED BORE	Used	-37.572573	144.8687537	TRANSLATION	311790.2	5839472.2	55	2322	9/02/1974	9/02/1974	STOCK
140205	SSW	No	DRILLED BORE	Used	-37.605704	144.8754312	TRANSLATION	312463.2	5835809.2	55	1854	24/01/2000	24/01/2000	STOCK,DOMESTIC
79255	NNE	No	DRILLED BORE	Used	-37.568298	144.8976892	TRANSLATION	314335.2	5840004.2	55	2758	16/01/1980	1/02/1980	STOCK,DOMESTIC
79260	NNE	No	DRILLED BORE	Used	-37.567589	144.8983662	TRANSLATION	314393.2	5840084.2	55	2856	1/06/1982	1/06/1982	STOCK,DOMESTIC
79256	NNE	No	DRILLED BORE	Not Used	-37.566367	144.8980602	TRANSLATION	314363.2	5840219.2	55	2964	20/01/1980	2/07/1982	NOT KNOWN
WRK043244	ESE	Yes	DRILLED BORE	Used	-37.607792	144.8990753	CALCULATED N	314555	5835610	55	2425	10/05/2003	11/05/2003	IRRIGATION
319781	NNE	No	DRILLED BORE	Used	-37.564751	144.8933732	TRANSLATION	313945.2	5840389.2	55	2973	23/04/1970	23/04/1970	NON GROUNDWATER
319779	NNE	No	DRILLED BORE	Used	-37.564563	144.8949642	TRANSLATION	314085.2	5840413.2	55	3039	31/12/1965	31/12/1965	NON GROUNDWATER
79248	NNE	No	DRILLED BORE	Used	-37.567308	144.9033331	TRANSLATION	314831.2	5840125.2	55	3114	30/05/1962	30/05/1962	NOT KNOWN
112781	S	No	DRILLED BORE	Not Used	-37.611904	144.8769543	TRANSLATION	312613.2	5835124.2	55	2478	27/03/1992	29/03/1992	STOCK,DOMESTIC
WRK042945	SW	No	DRILLED BORE	Used	-37.60302	144.8590834	TRANSLATION	311013.2	5836074.2	55	2546	16/12/1994	19/12/1994	INDUSTRIAL
WRK979358	NNE	No	DRILLED BORE	Used	-37.563704	144.8987673	NOT KNOWN	314419	5840516	55	3257	16/02/2007	17/02/2007	DOMESTIC AND STOCK
WRK054905	NW	No	DRILLED BORE	Used	-37.567436	144.8626934	GLOBAL POSIT	311242	5840030	55	3095	15/02/2010	16/02/2010	DOMESTIC AND STOCK
79257	N	No	DRILLED BORE	Used	-37.560223	144.8816033	TRANSLATION	312894.2	5840868.2	55	3333	1/09/1980	14/09/1980	STOCK,DOMESTIC
302669	W	No	DRILLED BORE	Used	-37.585793	144.8508802	TRANSLATION	310245.2	5837969.2	55	2869	31/12/2027	31/12/1927	NON GROUNDWATER
79268	N	No	DRILLED BORE	Used	-37.560561	144.8782994	TRANSLATION	312603.2	5840824.2	55	3319	5/04/1990	5/04/1990	STOCK,DOMESTIC

Table 1
Visualising Victoria's Groundwater Search
Site Details

Bore ID	Direction	Bore Onsite	Type	Status	Latitude (GDA94)	Longitude (GDA94)	Location method	Easting (MGA)	Northing (MGA)	Map zone	Distance from Centre of Site (m)	Date commenced	Date completed	Use
WRK977450	NNE	No	DRILLED BORE	Used	-37.564027	144.9037169	NOT KNOWN	314857	5840490	55	3437	15/02/2007	16/02/2007	DOMESTIC AND STOCK
302671	W	No	DRILLED BORE	Used	-37.580297	144.8509701	TRANSLATION	310239.2	5838579.2	55	3026	31/12/2027	31/12/1927	NON GROUNDWATER
334694	E	No	DRILLED BORE	Used	-37.615395	144.8871532	TRANSLATION	313522.2	5834757.2	55	2834	26/03/1970	26/03/1970	NON GROUNDWATER
120765	NNW	No	DRILLED BORE	Used	-37.559981	144.8761654	TRANSLATION	312413.2	5840884.2	55	3411	18/12/1993	19/12/1993	STOCK,DOMESTIC
WRK967423	NNE	No	DRILLED BORE	Used	-37.561955	144.905883	TRANSLATION	315043.2	5840724.2	55	3734	1/06/2005	1/06/2005	DOMESTIC AND STOCK
302670	W	No	DRILLED BORE	Used	-37.582834	144.8472622	TRANSLATION	309918.2	5838290.2	55	3251	31/12/2027	31/12/1927	NON GROUNDWATER
334692	SSE	No	DRILLED BORE	Used	-37.597113	144.9223174	TRANSLATION	316581.2	5836855.2	55	3558	31/12/1965	31/12/1965	NON GROUNDWATER
302688	W	No	DRILLED BORE	Used	-37.586455	144.8456633	TRANSLATION	309786.2	5837885.2	55	3314	11/03/1970	11/03/1970	NON GROUNDWATER
109420	SSE	No	DRILLED BORE	Used	-37.616341	144.900789	TRANSLATION	314728.2	5834679.2	55	3313	30/09/1962	30/09/1962	NOT KNOWN
116348	N	No	DRILLED BORE	Used	-37.555578	144.8768563	TRANSLATION	312463.2	5841374.2	55	3885	31/08/1993	31/08/1993	DOMESTIC
79264	NNE	No	DRILLED BORE	Used	-37.555564	144.896213	TRANSLATION	314173.2	5841414.2	55	4023	4/03/1987	4/03/1987	STOCK
WRK985085	NNW	No	DRILLED BORE	Decom.	-37.555368	144.8725922	NOT KNOWN	312086	5841389	55	3978	20/02/2008	21/02/2008	DOMESTIC AND STOCK
52428	E	No	DRILLED BORE	Used	-37.62262	144.8865063	TRANSLATION	313483.2	5833954.2	55	3628	18/10/1989	18/10/1989	STOCK,DOMESTIC
79266	NNW	No	DRILLED BORE	Used	-37.554346	144.8685144	TRANSLATION	311723.2	5841494.2	55	4183	7/12/1988	8/12/1988	STOCK,DOMESTIC
319782	ENE	No	DRILLED BORE	Used	-37.567812	144.9227238	TRANSLATION	316545.2	5840107.2	55	4300	14/05/1970	14/05/1970	NON GROUNDWATER
334695	SSE	No	DRILLED BORE	Used	-37.597838	144.9281863	TRANSLATION	317101.2	5836786.2	55	4081	4/05/1970	4/05/1970	NON GROUNDWATER
WRK962170	N	No	NOT KNOWN	Used	-37.551512	144.891845	TRANSLATION	313777.2	5841855.2	55	4372	12/08/2003	14/08/2003	DOMESTIC AND STOCK
WRK957993	NE	No	DRILLED BORE	Used	-37.560929	144.9165848	NOT KNOWN	315986	5840859	55	4403	10/11/2004	11/11/2004	OBS., DRYLAND SAL. BORE NTWRK
52418	WSW	No	DRILLED BORE	Used	-37.607079	144.8463596	TRANSLATION	309900.2	5835598.2	55	3736	13/09/1974	13/09/1974	MISCELLANEOUS
WRK966931	N	No	DRILLED BORE	Used	-37.55108	144.892378	TRANSLATION	313823.2	5841904.2	55	4427	15/09/2004	20/09/2004	DOMESTIC AND STOCK
79259	NNW	No	DRILLED BORE	Used	-37.553664	144.8657034	TRANSLATION	311473.2	5841564.2	55	4336	24/02/1983	24/02/1983	STOCK,DOMESTIC
310872	ENE	No	DRILLED BORE	Used	-37.567854	144.9245908	TRANSLATION	316710.2	5840106.2	55	4433	31/12/1965	31/12/1965	NON GROUNDWATER
79254	NNW	No	DRILLED BORE	Used	-37.550787	144.8725553	TRANSLATION	312071.2	5841897.2	55	4476	1/12/1975	1/12/1975	STOCK,DOMESTIC
WRK973515	ESE	No	DRILLED BORE	Used	-37.61949	144.9110537	NOT KNOWN	315642	5834350	55	4100	27/04/2006	27/04/2006	DOMESTIC AND STOCK
109453	S	No	DRILLED BORE	Used	-37.625879	144.8873204	TRANSLATION	313563.2	5833594.2	55	3996	17/01/1989	17/01/1989	STOCK,DOMESTIC
WRK960845	NNW	No	DRILLED BORE	Used	-37.551631	144.8663954	TRANSLATION	311529.2	5841791.2	55	4529	25/04/2003	25/04/2003	DOMESTIC AND STOCK
WRK991291	NNW	No	DRILLED BORE	Used	-37.553631	144.8607561	GLOBAL POSIT	311036	5841558	55	4511	4/06/2009	4/06/2009	DOMESTIC AND STOCK
WRK973516	ESE	No	DRILLED BORE	Used	-37.62336	144.9031388	NOT KNOWN	314953	5833905	55	4103	27/04/2006	28/04/2006	DOMESTIC AND STOCK
WRK964250	NNE	No	DRILLED BORE	Used	-37.551428	144.9037888	TRANSLATION	314832.2	5841888.2	55	4686	10/02/2004	10/02/2004	DOMESTIC AND STOCK
79258	N	No	DRILLED BORE	Used	-37.548525	144.8805651	TRANSLATION	312773.2	5842164.2	55	4638	21/10/1982	23/10/1982	STOCK
WRK973514	SE	No	DRILLED BORE	Used	-37.618278	144.9153701	NOT KNOWN	316020	5834493	55	4240	26/04/2006	26/04/2006	DOMESTIC AND STOCK
79263	N	No	DRILLED BORE	Used	-37.54862	144.8758082	TRANSLATION	312353.2	5842144.2	55	4665	6/08/1982	6/08/1982	STOCK,DOMESTIC
WRK043281	E	No	DRILLED BORE	Used	-37.626758	144.8916693	TRANSLATION	313949.2	5833505.2	55	4147	1/11/2004	1/11/2004	IRRIGATION
WRK960778	WSW	No	DRILLED BORE	Used	-37.605321	144.8394547	TRANSLATION	309286.2	5835779.2	55	4191	18/01/2003	19/01/2003	DOMESTIC AND STOCK
134012	SSE	No	DRILLED BORE	Used	-37.599219	144.9339472	TRANSLATION	317613.2	5836644.2	55	4610	11/03/1998	11/03/1998	GROUNDWATER INVESTIGATION
WRK973513	SE	No	DRILLED BORE	Used	-37.616719	144.9205005	NOT KNOWN	316469	5834676	55	4440	26/04/2006	26/04/2006	DOMESTIC AND STOCK
52415	SW	No	DRILLED BORE	Used	-37.612575	144.8443428	TRANSLATION	309736.2	5834984.2	55	4221	7/08/1971	7/08/1971	STOCK,DOMESTIC
WRK032833	E	No	DRILLED BORE	Used	-37.628189	144.8905414	TRANSLATION	313853.2	5833344.2	55	4287	10/03/1999	10/03/1999	DOMESTIC,IRRIGATION
WRK056556	ESE	No	DRILLED BORE	Used	-37.623036	144.9112717	NOT KNOWN	315670	5833957	55	4431	10/06/2010	10/06/2010	OBSERVATION
79253	NW	No	DRILLED BORE	Not Used	-37.554538	144.8532616	TRANSLATION	310376.2	5841442.2	55	4751	8/10/1974	8/10/1974	STOCK,DOMESTIC
79265	NNW	No	DRILLED BORE	Used	-37.553548	144.8548066	TRANSLATION	310510.2	5841555.2	55	4771	10/05/1976	10/05/1976	STOCK,DOMESTIC
134010	SSE	No	DRILLED BORE	Used	-37.599061	144.9353112	TRANSLATION	317733.2	5836664.2	55	4724	10/03/1998	10/03/1998	GROUNDWATER INVESTIGATION
134011	SSE	No	DRILLED BORE	Used	-37.599245	144.9355322	TRANSLATION	317753.2	5836644.2	55	4747	11/03/1998	11/03/1998	GROUNDWATER INVESTIGATION
109432	S	No	DRILLED BORE	Used	-37.631457	144.8758196	TRANSLATION	312562.2	5832952.2	55	4641	3/04/1975	3/04/1975	STOCK,DOMESTIC

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Bore ID	Direction	Bore Onsite	Total depth (m)	Max diameter (mm)	Elevation top of casing (mAHD)	Elevation ground level (mAHD)	Date surveyed	Survey desc	Surveyor name	Screen top (m)	Screen bottom (m)	Artesian y/n	Screened Lithology
109452	ESE	Yes	121	-	226.53	226.53	9/11/2011	DSELI	DSE-C/O SKM TATURA	78	121	N	78.000-121.000 m: MUDSTONE
109442	SSE	Yes	39.6	-	227.02	227.02	9/11/2011	DSELI	DSE-C/O SKM TATURA	30	39	N	30.000-39.600 m: BASALT
109450	SSE	Yes	120	-	226.93	226.93	9/11/2011	DSELI	DSE-C/O SKM TATURA	96	120	N	90.000-120.000 m: SILTSTONE
334693	SW	Yes	40.99	-	231.08	231.08	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK066555	WNW	Yes	10	-	-	-	-	-	-	-	-	N	-
WRK066554	WNW	Yes	10	-	-	-	-	-	-	-	-	N	-
109445	NE	Yes	115	-	225.58	225.58	9/11/2011	DSELI	DSE-C/O SKM TATURA	103	115	N	70.000-115.000 m: MUDSTONE
109429	NNE	Yes	62.5	-	225.76	225.76	9/11/2011	DSELI	DSE-C/O SKM TATURA	30.48	62.48	N	22.860-48.770 m: CLAY
109441	WSW	No	94.5	-	235.73	235.73	9/11/2011	DSELI	DSE-C/O SKM TATURA	80	93	N	79.000-94.000 m: SHALE
109440	SE	No	82	-	222.35	222.35	9/11/2011	DSELI	DSE-C/O SKM TATURA	31	55	N	55.000-72.000 m: CLAY
WRK032473	NNW	Yes	166	-	234.05	234.05	9/11/2011	DSELI	DSE-C/O SKM TATURA	41	71	N	-
109428	W	No	41.8	-	242.21	242.21	9/11/2011	DSELI	DSE-C/O SKM TATURA	40.8	41.8	N	40.800-41.800 m: BASALT
79261	NNW	Yes	60	-	239.36	239.36	9/11/2011	DSELI	DSE-C/O SKM TATURA	24	60	N	24.380-60.000 m: BASALT
WRK988836	W	No	47	172	243.44	243.44	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109438	WSW	No	45	-	242.49	242.49	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109436	NW	Yes	32.91	-	241.63	241.63	9/11/2011	DSELI	DSE-C/O SKM TATURA	18	32.91	N	21.940-27.430 m: BASALT
109425	WSW	No	-	-	242.87	242.87	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109443	WSW	No	48	-	245.91	245.91	9/11/2011	DSELI	DSE-C/O SKM TATURA	42	48	N	42.000-45.000 m: BASALT
143984	W	No	93	-	254.65	254.65	9/11/2011	DSELI	DSE-C/O SKM TATURA	78	93	N	-
109446	SW	No	150	-	238.95	238.95	9/11/2011	DSELI	DSE-C/O SKM TATURA	135	150	N	40.000-150.000 m: BASALT
334697	NE	No	24.99	-	233.15	233.15	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109437	SW	No	66	-	244.45	244.45	9/11/2011	DSELI	DSE-C/O SKM TATURA	62	66	N	62.000-66.000 m: BASALT
109424	W	No	-	-	267.55	267.55	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
139974	WSW	No	85	-	248.78	248.78	9/11/2011	DSELI	DSE-C/O SKM TATURA	73	85	N	-
143839	WNW	No	63	-	265.63	265.63	9/11/2011	DSELI	DSE-C/O SKM TATURA	40	63	N	-
142048	SSW	No	58	-	226.09	226.09	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109426	SW	No	-	-	230.08	230.08	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
112643	WSW	No	27.43	-	240.25	240.25	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK967607	ENE	No	30	200	220.07	220.07	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
79250	N	No	-	-	248.36	248.36	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109434	W	No	54.25	-	265.75	265.75	9/11/2011	DSELI	DSE-C/O SKM TATURA	44.19	54.25	N	45.720-54.250 m: GRAVEL
109419	W	No	64.01	-	293.33	293.33	9/11/2011	DSELI	DSE-C/O SKM TATURA	43.59	44.5	N	43.590-44.500 m: BASALT
109422	WNW	No	-	-	256.57	256.57	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109430	SW	No	99.06	-	225.6	225.6	9/11/2011	DSELI	DSE-C/O SKM TATURA	76.2	99.06	N	76.200-99.060 m: HORNFELS
WRK957997	SSE	No	26.92	50	211.43	211.43	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109449	ESE	No	77	-	213.68	213.68	9/11/2011	DSELI	DSE-C/O SKM TATURA	70	77	N	24.000-77.000 m: MUDSTONE
79252	NW	No	32.61	-	260.78	260.78	9/11/2011	DSELI	DSE-C/O SKM TATURA	27.43	32.61	N	27.430-32.610 m: BASALT
140205	SSW	No	33.6	-	203.01	203.01	9/11/2011	DSELI	DSE-C/O SKM TATURA	22	33.6	N	-
79255	NNE	No	45	-	248.75	248.75	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	23.000-32.000 m: BASALT
79260	NNE	No	38	-	250.05	250.05	9/11/2011	DSELI	DSE-C/O SKM TATURA	15	38	N	15.200-38.000 m: BASALT
79256	NNE	No	97	-	251.57	251.57	9/11/2011	DSELI	DSE-C/O SKM TATURA	61	97	N	27.000-60.800 m: CLAY
WRK043244	ESE	Yes	55	230	227.05	227.05	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
319781	NNE	No	48.76	-	255.48	255.48	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
319779	NNE	No	48.31	-	254.91	254.91	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
79248	NNE	No	-	-	250.25	250.25	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
112781	S	No	58	-	197.39	197.39	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK042945	SW	No	150	-	230.61	230.61	9/11/2011	DSELI	DSE-C/O SKM TATURA	36	42	N	-
WRK979358	NNE	No	68	188	253.57	253.57	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK054905	NW	No	100	180	261.5	261.5	9/11/2011	DSELI	DSE-C/O SKM TATURA	88	94	N	-
79257	N	No	84	-	266.87	266.87	9/11/2011	DSELI	DSE-C/O SKM TATURA	78	84	N	51.000-81.000 m: BASALT
302669	W	No	59.43	-	240.32	240.32	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
79268	N	No	96	-	271.05	271.05	9/11/2011	DSELI	DSE-C/O SKM TATURA	87	93	N	80.000-96.000 m: SILTSTONE

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Bore ID	Direction	Bore Onsite	Total depth (m)	Max diameter (mm)	Elevation top of casing (mAHD)	Elevation ground level (mAHD)	Date surveyed	Survey desc	Surveyor name	Screen top (m)	Screen bottom (m)	Artesian y/n	Screened Lithology
WRK977450	NNE	No	80	188	251.99	251.99	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
302671	W	No	46.93	-	237.62	237.62	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
334694	E	No	9.44	-	196.98	196.98	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
120765	NNW	No	118	-	274.21	274.21	9/11/2011	DSELI	DSE-C/O SKM TATURA	82	94	N	-
WRK967423	NNE	No	93	165	249.39	249.39	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	75.000-82.000 m: BASALT
302670	W	No	47.24	-	235.35	235.35	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
334692	SSE	No	9.75	-	206.58	206.58	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
302688	W	No	35.35	-	234.77	234.77	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
109420	SSE	No	21.34	-	187.78	187.78	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
116348	N	No	106	-	269.62	269.62	9/11/2011	DSELI	DSE-C/O SKM TATURA	100	106	N	90.000-106.000 m: SANDSTONE
79264	NNE	No	24	-	256.07	256.07	9/11/2011	DSELI	DSE-C/O SKM TATURA	18	24	N	18.000-24.000 m: BASALT
WRK985085	NNW	No	90	200	274.39	274.39	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	70.000-90.000 m: BASALT
52428	E	No	36	-	184.53	184.53	9/11/2011	DSELI	DSE-C/O SKM TATURA	30	36	N	30.000-36.000 m: BASALT
79266	NNW	No	93	-	275.87	275.87	9/11/2011	DSELI	DSE-C/O SKM TATURA	66	93	N	66.000-93.000 m: SANDSTONE
319782	ENE	No	44.8	-	248.85	248.85	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
334695	SSE	No	47.24	-	205.16	205.16	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK962170	N	No	81	205	259.67	259.67	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK957993	NE	No	24.5	50	239.88	239.88	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
52418	WSW	No	91.44	-	196.32	196.32	9/11/2011	DSELI	DSE-C/O SKM TATURA	35.36	42.36	N	35.350-42.360 m: GRANITE
WRK966931	N	No	90.5	188	258.49	258.49	9/11/2011	DSELI	DSE-C/O SKM TATURA	70	90.5	N	-
79259	NNW	No	119	-	273.26	273.26	9/11/2011	DSELI	DSE-C/O SKM TATURA	114	119	N	71.000-119.000 m: MUDSTONE
310872	ENE	No	25.29	-	254.51	254.51	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
79254	NNW	No	57	-	267.69	267.69	9/11/2011	DSELI	DSE-C/O SKM TATURA	47	55	N	48.000-52.000 m: SAND
WRK973515	ESE	No	9	130	197.41	197.41	9/11/2011	DSELI	DSE-C/O SKM TATURA	4	9	N	-
109453	S	No	54	-	170.27	170.27	9/11/2011	DSELI	DSE-C/O SKM TATURA	50	54	N	50.000-54.000 m: BASALT
WRK960845	NNW	No	87	165	263.36	263.36	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK991291	NNW	No	76	188	230.75	230.75	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK973516	ESE	No	27	130	166.24	166.24	9/11/2011	DSELI	DSE-C/O SKM TATURA	24	27	N	-
WRK964250	NNE	No	80	188	249.34	249.34	9/11/2011	DSELI	DSE-C/O SKM TATURA	66	80	N	-
79258	N	No	58	-	268.34	268.34	9/11/2011	DSELI	DSE-C/O SKM TATURA	56	58	N	48.000-58.000 m: SANDSTONE
WRK973514	SE	No	17	130	198.41	198.41	9/11/2011	DSELI	DSE-C/O SKM TATURA	11	17	N	-
79263	N	No	74.67	-	266.62	266.62	9/11/2011	DSELI	DSE-C/O SKM TATURA	27	74.67	N	27.000-74.670 m: BASALT
WRK043281	E	No	33	215	164.8	164.8	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
WRK960778	WSW	No	63	165	173.61	173.61	9/11/2011	DSELI	DSE-C/O SKM TATURA	57	63	N	-
134012	SSE	No	67	-	199.96	199.96	9/11/2011	DSELI	DSE-C/O SKM TATURA	31.6	37.6	N	-
WRK973513	SE	No	18	130	196.98	196.98	9/11/2011	DSELI	DSE-C/O SKM TATURA	12	18	N	-
52415	SW	No	91.4	-	188.16	188.16	9/11/2011	DSELI	DSE-C/O SKM TATURA	48.76	51.81	N	48.760-51.810 m: COAL
WRK032833	E	No	31	-	156.91	156.91	9/11/2011	DSELI	DSE-C/O SKM TATURA	23	31	N	-
WRK056556	ESE	No	28	150	169	169	9/11/2011	DSELI	DSE-C/O SKM TATURA	22	28	N	-
79253	NW	No	38.1	-	182.08	182.08	9/11/2011	DSELI	DSE-C/O SKM TATURA	-	-	N	-
79265	NNW	No	42.67	-	192.42	192.42	9/11/2011	DSELI	DSE-C/O SKM TATURA	32	42.67	N	33.520-42.670 m: CLAY
134010	SSE	No	36.3	-	199.92	199.92	9/11/2011	DSELI	DSE-C/O SKM TATURA	30.3	36.3	N	-
134011	SSE	No	34.8	-	199.43	199.43	9/11/2011	DSELI	DSE-C/O SKM TATURA	28.8	34.8	N	-
109432	S	No	39.5	-	178.52	178.52	9/11/2011	DSELI	DSE-C/O SKM TATURA	20	39.5	N	-

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Bore ID	Start date	Component	Material	Interval from (m)	Interval to (m)	Construction method	Out.Diam. (mm)	Ins.Diam. (mm)
109452	3/07/1989	Hole	-	0	121	D.H. HAMMER	-	-
109452	3/07/1989	Casing	MILD STEEL	0	78	-	-	127
109452	3/07/1989	Screen	MILD STEEL	78	121	-	-	-
109442	29/04/1981	Hole	-	0	39.6	D.H. HAMMER	177	-
109442	29/04/1981	Casing	PVC	0	30	-	-	152
109442	29/04/1981	Screen	PVC	30	39	-	152	-
109442	29/04/1981	Casing	PVC	39	39.6	-	-	152
109450	22/04/1989	Hole	-	0	120	D.H. HAMMER	-	-
109450	22/04/1989	Casing	PVC	0	96	-	-	100
109450	22/04/1989	Screen	PVC	96	120	-	-	-
109445	1/03/1983	Hole	-	0	115	D.H. HAMMER	165	-
109445	1/03/1983	Casing	STEEL	0	70	-	-	125
109445	1/03/1983	Casing	PVC	70	103	-	-	100
109445	1/03/1983	Screen	PVC	103	115	-	-	100
109429	30/10/1971	Hole	-	0	62.5	CABLE TOOL	-	-
109429	30/10/1971	Casing	NOT KNOWN	0	48.77	-	-	-
109429	30/10/1971	Screen	NOT KNOWN	30.48	62.48	-	-	-
109441	10/10/1980	Hole	-	0	68	D.H. HAMMER	203	-
109441	10/10/1980	Hole	-	68	94.5	D.H. HAMMER	152	-
109441	10/10/1980	Casing	PVC	0	42	-	-	165
109441	10/10/1980	Casing	PVC	42	94.5	-	-	140
109441	10/10/1980	Screen	PVC	80	93	-	140	-
109440	4/08/1980	Hole	-	0	82	ROTARY	160	-
109440	4/08/1980	Casing	PVC	0	31	-	-	125
109440	4/08/1980	Screen	PVC	31	55	-	125	-
109440	4/08/1980	Casing	PVC	55	66	-	-	125
109440	4/08/1980	Screen	PVC	66	82	-	125	-
WRK03247	31/01/1995	Hole	-	0	41	DIAMOND CORE	200	-
WRK03247	31/01/1995	Hole	-	41	78	D.H. HAMMER	175	-
WRK03247	31/01/1995	Hole	-	78	166	D.H. HAMMER	150	-
WRK03247	31/01/1995	Casing	STEEL	-0.3	71	-	-	150
WRK03247	31/01/1995	Screen	STEEL	41	71	-	165	150
WRK03247	31/01/1995	Screen	SLOTTED STEEL	71	166	-	-	-
109428	4/11/1971	Hole	-	0	41.8	CABLE TOOL	-	-
109428	4/11/1971	Casing	NOT KNOWN	0	3.05	-	-	-
109428	4/11/1971	Screen	NOT KNOWN	40.8	41.8	-	-	-
79261	5/08/1982	Hole	-	0	60	D.H. HAMMER	178	-
79261	5/08/1982	Casing	MILD STEEL	0	24	-	-	152
79261	5/08/1982	Screen	MILD STEEL	24	60	-	-	152
WRK98883	26/01/2009	Hole	-	0	47	ROTARY	172	-
WRK98883	26/01/2009	Outer Lining	CEMENT	0	1	-	-	-
WRK98883	26/01/2009	Outer Lining	SEAL	35	36	-	-	-
WRK98883	26/01/2009	Casing	PVC	0	36	-	135	125
WRK98883	26/01/2009	Slotted Casing	PVC	36	47	-	135	125
109438	1/11/1978	Hole	-	0	45	D.H. HAMMER	165	-
109436	7/02/1977	Hole	-	0	32.91	D.H. HAMMER	-	-
109436	7/02/1977	Casing	NOT KNOWN	0	32.91	-	-	127
109436	7/02/1977	Screen	NOT KNOWN	18	32.91	-	-	-
109425	31/12/1962	Hole	-	0	9999.99	CABLE TOOL	-	-
109443	9/04/1981	Hole	-	0	48	D.H. HAMMER	-	-
109443	9/04/1981	Casing	PVC	0	42	-	-	125
109443	9/04/1981	Screen	PVC	42	48	-	-	-
143984	11/12/1999	Hole	-	0	93	ROTARY AIR	165	-
143984	11/12/1999	Casing	PVC	-0.3	78	-	-	125
143984	11/12/1999	Screen	PVC	78	93	-	-	125
109446	31/05/1985	Hole	-	0	135	D.H. HAMMER	152	-
109446	31/05/1985	Hole	-	135	150	D.H. HAMMER	114	-
109446	31/05/1985	Casing	PVC	0	135	-	-	127
109446	31/05/1985	Screen	PVC	135	150	-	-	-
109437	26/06/1978	Hole	-	0	66	D.H. HAMMER	152	-
109437	26/06/1978	Casing	PVC	0	62	-	-	100
109437	26/06/1978	Casing	STEEL	0	57	-	-	127
109437	26/06/1978	Screen	STEEL	62	66	-	100	-
109424	31/12/1962	Hole	-	0	9999.99	CABLE TOOL	-	-
139974	20/02/1999	Hole	-	0	85	D.H. HAMMER	165	-
139974	20/02/1999	Outer Lining	CEMENT	0	0.7	-	-	-
139974	20/02/1999	Casing	PVC	0	85	-	-	125
139974	20/02/1999	Screen	PVC	73	85	-	-	-
143839	9/09/1999	Hole	-	0	63	ROTARY AIR	165	-
143839	9/09/1999	Casing	PVC	-0.3	40	-	-	125
143839	9/09/1999	Screen	PVC	40	63	-	-	125
142048	1/11/1999	Hole	-	0	5	ROTARY MUD	200	-
142048	1/11/1999	Hole	-	5	58	D.H. HAMMER	171	-
109426	31/12/1962	Hole	-	0	9999.99	CABLE TOOL	-	-
112643	19/01/1992	Hole	-	0	27.4	D.H. HAMMER	162	-
WRK96760	22/11/2005	Hole	-	0	0.7	MECH. AUGER	200	-
WRK96760	22/11/2005	Hole	-	0.7	30	D.H. HAMMER	200	-

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Bore ID	Start date	Component	Material	Interval from (m)	Interval to (m)	Construction method	Out.Diam. (mm)	Ins.Diam. (mm)
79250	31/12/1970	Hole	-	0	0	NOT KNOWN	-	-
109434	31/05/1976	Hole	-	0	54.25	CABLE TOOL	-	-
109434	31/05/1976	Casing	PVC	0	54.25	-	-	140
109434	31/05/1976	Screen	PVC	44.19	54.25	-	-	-
109419	21/05/1962	Hole	-	0	64.01	CABLE TOOL	-	-
109419	21/05/1962	Casing	NOT KNOWN	0	43.59	-	-	-
109419	21/05/1962	Screen	NOT KNOWN	43.59	44.5	-	-	-
109422	31/12/1970	Hole	-	0	9999.99	NOT KNOWN	-	-
109430	30/07/1973	Hole	-	0	99.06	D.H. HAMMER	-	-
109430	30/07/1973	Casing	GALVANISED IRO	0	76.2	-	-	152
109430	30/07/1973	Screen	GALVANISED IRO	76.2	99.06	-	-	-
109449	10/02/1988	Hole	-	0	77	D.H. HAMMER	-	-
109449	10/02/1988	Casing	PVC	0	70	-	-	125
109449	10/02/1988	Screen	PVC	70	77	-	-	-
79252	9/02/1974	Hole	-	0	32.61	CABLE TOOL	-	-
79252	9/02/1974	Casing	NOT KNOWN	0	27.43	-	-	152
79252	9/02/1974	Screen	NOT KNOWN	27.43	32.61	-	-	-
140205	24/01/2000	Hole	-	0	33.6	D.H. HAMMER	200	-
140205	24/01/2000	Outer Lining	CEMENT	0	0.8	-	-	-
140205	24/01/2000	Outer Lining	GRAVEL	0.8	33.6	-	-	-
140205	24/01/2000	Casing	NOT KNOWN	0	33.6	-	-	125
140205	24/01/2000	Screen	NOT KNOWN	22	33.6	-	-	-
79255	1/02/1980	Hole	-	0	45	CABLE TOOL	177	-
79260	1/06/1982	Hole	-	0	24	D.H. HAMMER	178	-
79260	1/06/1982	Hole	-	24	38	D.H. HAMMER	165	-
79260	1/06/1982	Casing	MILD STEEL	0	15	-	-	127
79260	1/06/1982	Screen	MILD STEEL	15	38	-	-	-
79256	2/07/1982	Hole	-	0	97	D.H. HAMMER	152	-
79256	2/07/1982	Casing	STEEL	0	61	-	-	152
79256	2/07/1982	Screen	STEEL	61	97	-	-	-
WRK04324	11/05/2003	Hole	-	0	55	ROTARY AIR	230	-
WRK04324	11/05/2003	Outer Lining	CEMENT	-0.15	18	-	-	-
WRK04324	11/05/2003	Outer Lining	BENTONITE	18	19	-	-	-
WRK04324	11/05/2003	Outer Lining	GRAVEL	19	55	-	-	-
WRK04324	11/05/2003	Casing	PVC	-3	35	-	-	150
WRK04324	11/05/2003	Slotted Casing	PVC	35	52	-	-	150
79248	30/05/1962	Hole	-	0	0	NOT KNOWN	-	-
112781	29/03/1992	Hole	-	0	58	ROTARY	160	-
WRK04294	19/12/1994	Hole	-	0	70	D.H. HAMMER	200	-
WRK04294	19/12/1994	Hole	-	70	150	D.H. HAMMER	139	-
WRK04294	19/12/1994	Outer Lining	CEMENT	0	2	-	-	-
WRK04294	19/12/1994	Outer Lining	GRAVEL	2	0	-	-	-
WRK04294	19/12/1994	Outer Lining	GRAVEL	35	75	-	-	-
WRK04294	19/12/1994	Outer Lining	SEAL	75	0	-	139	-
WRK04294	19/12/1994	Casing	PVC CLASS 9	0	75	-	-	100
WRK04294	19/12/1994	Casing	PVC CLASS 9	0	54	-	-	150
WRK04294	19/12/1994	Screen	PVC CLASS 9	36	42	-	-	-
WRK04294	19/12/1994	Screen	SCREENED PVC	53	59	-	-	-
WRK04294	19/12/1994	Screen	SCREENED PVC	71.5	75	-	-	-
WRK04294	19/12/1994	Screen	SCREENED PVC	75	150	-	-	-
WRK97935	17/02/2007	Hole	-	0	1	NOT KNOWN	188	-
WRK97935	17/02/2007	Hole	-	1	68	D.H. HAMMER	165	-
WRK97935	17/02/2007	Outer Lining	CEMENT	0	0.5	-	-	-
WRK97935	17/02/2007	Casing	-	0.5	57	-	-	-
WRK97935	17/02/2007	Slotted Casing	-	57	68	-	-	-
WRK05490	16/02/2010	Hole	-	0	100	D.H. HAMMER	180	-
WRK05490	16/02/2010	Outer Lining	CEMENT	0	9	-	-	-
WRK05490	16/02/2010	Outer Lining	BENTONITE	9	10	-	-	-
WRK05490	16/02/2010	Outer Lining	GRAVEL	10	100	-	-	-
WRK05490	16/02/2010	Casing	PVC	0.5	88	-	129	125
WRK05490	16/02/2010	Screen	PVC	88	94	-	129	-
WRK05490	16/02/2010	Casing	PVC	94	100	-	129	125
79257	14/09/1980	Hole	-	0	84	D.H. HAMMER	165	-
79257	14/09/1980	Casing	PVC CLASS 9	0	78	-	-	129
79257	14/09/1980	Screen	PVC CLASS 9	78	84	-	127	-
79268	5/04/1990	Hole	-	0	96	D.H. HAMMER	-	-
79268	5/04/1990	Casing	PVC	0	87	-	-	100
79268	5/04/1990	Screen	PVC	87	93	-	-	-
WRK97745	16/02/2007	Hole	-	0	2.3	ROTARY AIR	188	-
WRK97745	16/02/2007	Hole	-	2.3	80	D.H. HAMMER	165	-
WRK97745	16/02/2007	Outer Lining	CEMENT	0	0.5	-	-	-
WRK97745	16/02/2007	Casing	PVC	0.5	66	-	140	125
WRK97745	16/02/2007	Slotted Casing	PVC	66	80	-	140	125

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Bore ID	Start date	Component	Material	Interval from (m)	Interval to (m)	Construction method	Out.Diam. (mm)	Ins.Diam. (mm)
120765	19/12/1993	Hole	-	0	118	D.H. HAMMER	165	-
120765	19/12/1993	Outer Lining	CEMENT	0	0.5	-	-	-
120765	19/12/1993	Outer Lining	GRAVEL	50	112	-	-	-
120765	19/12/1993	Casing	NOT KNOWN	0	118	-	-	-
120765	19/12/1993	Casing	PVC CLASS 9	0	82	-	-	100
120765	19/12/1993	Screen	PVC CLASS 9	82	94	-	100	-
WRK96742	1/06/2005	Hole	-	0	93	ROTARY AIR	165	-
WRK96742	1/06/2005	Casing	PVC	1.3	70	-	-	125
WRK96742	1/06/2005	Slotted Casing	PVC	70	93	-	-	125
109420	30/09/1962	Hole	-	0	21.34	CABLE TOOL	-	-
116348	31/08/1993	Hole	-	0	106	D.H. HAMMER	165	-
116348	31/08/1993	Outer Lining	CEMENT	0	0.5	-	-	-
116348	31/08/1993	Outer Lining	GRAVEL	80	106	-	-	-
116348	31/08/1993	Casing	PVC CLASS 9	-0.2	100	-	-	100
116348	31/08/1993	Screen	PVC CLASS 9	100	106	-	-	100
79264	4/03/1987	Hole	-	0	24	D.H. HAMMER	-	-
79264	4/03/1987	Casing	PVC	0	18	-	-	125
79264	4/03/1987	Screen	PVC	18	24	-	125	-
WRK98508	21/02/2008	Hole	-	0	10	D.H. HAMMER	200	-
52428	18/10/1989	Hole	-	0	36	D.H. HAMMER	-	-
52428	18/10/1989	Outer Lining	SEAL	28	0	-	165	-
52428	18/10/1989	Casing	PVC	0	30	-	-	100
52428	18/10/1989	Screen	PVC	30	36	-	-	-
79266	8/12/1988	Hole	-	0	93	D.H. HAMMER	-	-
79266	8/12/1988	Casing	PVC	0	66	-	-	100
79266	8/12/1988	Screen	PVC	66	93	-	-	-
WRK96217	14/08/2003	Hole	-	0	63	D.H. HAMMER	205	-
WRK96217	14/08/2003	Hole	-	63	81	D.H. HAMMER	137	-
WRK96217	14/08/2003	Outer Lining	CEMENT	0	0.5	-	-	-
WRK96217	14/08/2003	Casing	PVC	0	63	-	-	145
WRK96217	14/08/2003	Openhole	-	63	81	-	-	-
52418	13/09/1974	Hole	-	0	35.36	ROTARY AIR	-	-
52418	13/09/1974	Hole	-	35.36	91.44	D.H. HAMMER	-	-
52418	13/09/1974	Casing	STEEL	0	35.36	-	-	203
52418	13/09/1974	Screen	STEEL	35.36	42.36	-	-	-
WRK96693	20/09/2004	Hole	-	0	7.3	ROTARY AIR	188	-
WRK96693	20/09/2004	Hole	-	7.3	90.5	D.H. HAMMER	165	-
WRK96693	20/09/2004	Outer Lining	CEMENT	0	0.5	-	-	-
WRK96693	20/09/2004	Casing	PVC	-0.5	70	-	140	125
WRK96693	20/09/2004	Screen	PVC	70	90.5	-	140	125
79259	24/02/1983	Hole	-	0	119	D.H. HAMMER	165	-
79259	24/02/1983	Casing	PVC	0	114	-	-	125
79259	24/02/1983	Screen	PVC	114	119	-	-	-
79254	1/12/1975	Hole	-	0	57	CABLE TOOL	-	-
79254	1/12/1975	Casing	GALVANISED IRO	0	47	-	-	127
79254	1/12/1975	Screen	GALVANISED IRO	47	55	-	114	-
79254	1/12/1975	Casing	GALVANISED IRO	55	57	-	-	127
WRK97351	27/04/2006	Hole	-	0	4.3	MECH. AUGER	130	-
WRK97351	27/04/2006	Hole	-	4.3	9	ROTARY AIR	120	-
WRK97351	27/04/2006	Outer Lining	CEMENT	0	4	-	-	-
WRK97351	27/04/2006	Outer Lining	BENTONITE	4	5	-	-	-
WRK97351	27/04/2006	Outer Lining	GRAVEL	5	9	-	-	-
WRK97351	27/04/2006	Casing	PVC	0	4	-	60	50
WRK97351	27/04/2006	Screen	PVC	4	9	-	60	-
109453	17/01/1989	Hole	-	0	54	D.H. HAMMER	-	-
109453	17/01/1989	Casing	PVC	0	50	-	-	125
109453	17/01/1989	Screen	PVC	50	54	-	125	-
WRK96084	25/04/2003	Hole	-	0	87	D.H. HAMMER	165	-
WRK96084	25/04/2003	Outer Lining	CEMENT	0	0.5	-	-	-
WRK96084	25/04/2003	Casing	PVC	0	69	-	-	125
WRK96084	25/04/2003	Slotted Casing	PVC	69	87	-	-	-
WRK99129	4/06/2009	Hole	-	0	3	ROTARY AIR	188	-
WRK99129	4/06/2009	Hole	-	3	76	D.H. HAMMER	165	-
WRK99129	4/06/2009	Outer Lining	CEMENT	0	1	-	-	-
WRK99129	4/06/2009	Casing	PVC	0.5	63	-	140	125
WRK99129	4/06/2009	Slotted Casing	PVC	63	76	-	140	125
WRK97351	28/04/2006	Hole	-	0	2	MECH. AUGER	130	-
WRK97351	28/04/2006	Hole	-	2	27	D.H. HAMMER	120	-
WRK97351	28/04/2006	Outer Lining	CEMENT	0	22	-	-	-
WRK97351	28/04/2006	Outer Lining	BENTONITE	22	23	-	-	-
WRK97351	28/04/2006	Outer Lining	GRAVEL	23	27	-	-	-
WRK97351	28/04/2006	Casing	PVC	0	24	-	60	50
WRK97351	28/04/2006	Screen	NOT KNOWN	24	27	-	60	-
WRK96425	10/02/2004	Hole	-	0	3	ROTARY AIR	188	-
WRK96425	10/02/2004	Hole	-	3	80	D.H. HAMMER	165	-
WRK96425	10/02/2004	Outer Lining	CEMENT	0	0.5	-	-	-
WRK96425	10/02/2004	Casing	PVC	0.5	66	-	140	125
WRK96425	10/02/2004	Screen	PVC	66	80	-	140	125

Table 2
Visualising Victoria's Groundwater Search
Bore Construction

Bore ID	Start date	Component	Material	Interval from (m)	Interval to (m)	Construction method	Out.Diam. (mm)	Ins.Diam. (mm)
79258	23/10/1982	Hole	-	0	58	D.H. HAMMER	203	-
79258	23/10/1982	Casing	STEEL	0	56	-	-	152
79258	23/10/1982	Screen	STEEL	56	58	-	-	-
WRK97351	26/04/2006	Hole	-	0	2.1	MECH. AUGER	130	-
WRK97351	26/04/2006	Hole	-	2.1	17	D.H. HAMMER	120	-
WRK97351	26/04/2006	Outer Lining	CEMENT	0	9	-	-	-
WRK97351	26/04/2006	Outer Lining	BENTONITE	9	10	-	-	-
WRK97351	26/04/2006	Outer Lining	GRAVEL	10	17	-	-	-
WRK97351	26/04/2006	Casing	PVC	0	11	-	60	50
WRK97351	26/04/2006	Screen	PVC	11	17	-	60	-
79263	6/08/1982	Hole	-	0	58	D.H. HAMMER	178	-
79263	6/08/1982	Hole	-	58	74.67	D.H. HAMMER	140	-
79263	6/08/1982	Casing	MILD STEEL	0	27	-	-	127
79263	6/08/1982	Screen	MILD STEEL	27	74.67	-	-	-
WRK04328	1/11/2004	Hole	-	0	18	ROTARY AIR	215	-
WRK04328	1/11/2004	Hole	-	18	33	ROTARY AIR	165	-
WRK04328	1/11/2004	Outer Lining	CEMENT	0.1	18	-	-	-
WRK04328	1/11/2004	Outer Lining	BENTONITE	18	19	-	-	-
WRK04328	1/11/2004	Casing	PVC	0.3	21	-	-	125
WRK04328	1/11/2004	Slotted Casing	PVC	21	32	-	-	125
WRK04328	1/11/2004	Casing	PVC	32	33	-	-	125
WRK96077	19/01/2003	Hole	-	0	8	ROTARY AIR	165	-
WRK96077	19/01/2003	Hole	-	8	63	D.H. HAMMER	165	-
WRK96077	19/01/2003	Outer Lining	CEMENT	0	0.5	-	-	-
WRK96077	19/01/2003	Casing	PVC	-0.5	57	-	140	125
WRK96077	19/01/2003	Screen	PVC	57	63	-	140	125
134012	11/03/1998	Hole	-	0	67	D.H. HAMMER	137	-
134012	11/03/1998	Outer Lining	CEMENT	0	0.6	-	-	-
134012	11/03/1998	Outer Lining	GRAVEL	30	37.6	-	-	-
134012	11/03/1998	Casing	STEEL	-0.05	0.5	-	-	150
134012	11/03/1998	Casing	PVC CLASS 18	0	37.6	-	-	50
134012	11/03/1998	Screen	PVC CLASS 18	31.6	37.6	-	-	-
WRK97351	26/04/2006	Hole	-	0	2	MECH. AUGER	130	-
WRK97351	26/04/2006	Hole	-	2	18	ROTARY AIR	120	-
WRK97351	26/04/2006	Outer Lining	CEMENT	0	10.5	-	-	-
WRK97351	26/04/2006	Outer Lining	BENTONITE	10.5	11.5	-	-	-
WRK97351	26/04/2006	Outer Lining	GRAVEL	11.5	18	-	-	-
WRK97351	26/04/2006	Casing	PVC	0	12	-	60	50
WRK97351	26/04/2006	Screen	PVC	12	18	-	60	-
52415	7/08/1971	Hole	-	0	52.42	CABLE TOOL	-	-
52415	7/08/1971	Casing	NOT KNOWN	0	48.76	-	-	-
52415	7/08/1971	Screen	NOT KNOWN	48.76	51.81	-	-	-
WRK03283	10/03/1999	Hole	-	0	31	ROTARY AIR	125	-
WRK03283	10/03/1999	Casing	PVC	-0.3	23	-	-	125
WRK03283	10/03/1999	Screen	PVC	23	31	-	-	125
WRK05655	10/06/2010	Hole	-	0	28	D.H. HAMMER	150	-
WRK05655	10/06/2010	Outer Lining	CEMENT	0	18.5	-	-	-
WRK05655	10/06/2010	Outer Lining	BENTONITE	18.5	21.5	-	-	-
WRK05655	10/06/2010	Outer Lining	GRAVEL	21.5	28	-	-	-
WRK05655	10/06/2010	Casing	PVC	0	22	-	60	50
WRK05655	10/06/2010	Screen	PVC	22	28	-	60	-
79253	8/10/1974	Hole	-	0	38.1	CABLE TOOL	-	-
79265	10/05/1976	Hole	-	0	42.67	CABLE TOOL	-	-
79265	10/05/1976	Casing	PVC	0	42.67	-	-	140
79265	10/05/1976	Screen	PVC	32	42.67	-	-	-
134010	10/03/1998	Hole	-	0	36.3	D.H. HAMMER	137	-
134010	10/03/1998	Outer Lining	CEMENT	0	0.5	-	-	-
134010	10/03/1998	Outer Lining	BENTONITE	27.5	28.5	-	-	-
134010	10/03/1998	Outer Lining	GRAVEL	28.5	36.3	-	-	-
134010	10/03/1998	Casing	PVC CLASS 18	0	36.3	-	-	50
134010	10/03/1998	Screen	PVC CLASS 18	30.3	36.3	-	-	-
134011	11/03/1998	Hole	-	0	34.8	D.H. HAMMER	137	-
134011	11/03/1998	Outer Lining	CEMENT	0	0.6	-	-	-
134011	11/03/1998	Outer Lining	GRAVEL	26.3	34.8	-	-	-
134011	11/03/1998	Casing	STEEL	-0.5	0.5	-	-	150
134011	11/03/1998	Casing	PVC CLASS 18	0	34.8	-	-	50
134011	11/03/1998	Screen	PVC CLASS 18	28.8	34.8	-	-	-
109432	3/04/1975	Hole	-	0	39.5	ROTARY	-	-
109432	3/04/1975	Casing	PVC	0	39.5	-	-	101
109432	3/04/1975	Screen	PVC	20	39.5	-	-	-

Table 3
Visualising Victoria's Groundwater Search
Lithology

Bore ID	Interpretation	Date	Interval from (m)	Interval to (m)	Rock Type
109452	Interpretation from Screen	3/07/1989	78	121	NOT KNOWN
109442	Interpretation from Screen	29/04/1981	30	39	NOT KNOWN
109450	Interpretation from Screen	22/04/1989	96	120	CLAY
109445	Interpretation from Screen	1/03/1983	103	115	NOT KNOWN
109429	Interpretation from Screen	30/10/1971	30.48	62.48	NOT KNOWN
109441	Interpretation from Screen	10/10/1980	80	93	NOT KNOWN
109440	Interpretation from Screen	4/08/1980	31	55	NOT KNOWN
109440	Interpretation from Screen	4/08/1980	66	82	SANDSTONE
109428	Interpretation from Screen	4/11/1971	40.8	41.8	CLAY
79261	Interpretation from Screen	5/08/1982	24	60	SANDSTONE
109436	Interpretation from Screen	7/02/1977	18	32.91	MUDSTONE
109443	Interpretation from Screen	9/04/1981	42	48	SHALE
109446	Interpretation from Screen	31/05/1985	135	150	BASALT
109437	Interpretation from Screen	26/06/1978	62	66	BASALT
109434	Interpretation from Screen	31/05/1976	44.19	54.25	SANDSTONE
109419	Interpretation from Screen	21/05/1962	43.59	44.5	BASALT
109430	Interpretation from Screen	30/07/1973	76.2	99.06	BASALT
109449	Interpretation from Screen	10/02/1988	70	77	MUDSTONE
79252	Interpretation from Screen	9/02/1974	27.43	32.61	SILTSTONE
79260	Interpretation from Screen	1/06/1982	15	38	MUDSTONE
79256	Interpretation from Screen	2/07/1982	61	97	BASALT
WRK043244	Interpretation from Casing	11/05/2003	-3	35	SILTSTONE
WRK043244	Interpretation from Slot. Scrn.	11/05/2003	35	52	MUDSTONE
WRK042945	Interpretation from Screen	19/12/1994	36	42	SILTSTONE
WRK042945	Interpretation from Screen	19/12/1994	53	59	NOT KNOWN
WRK042945	Interpretation from Screen	19/12/1994	71.5	75	NOT KNOWN
WRK054905	Interpretation from Casing	16/02/2010	0.5	88	BASALT
WRK054905	Interpretation from Casing	16/02/2010	94	100	NOT KNOWN
WRK054905	Interpretation from Screen	16/02/2010	88	94	BASALT
79257	Interpretation from Screen	14/09/1980	78	84	SANDSTONE
79268	Interpretation from Screen	5/04/1990	87	93	SANDSTONE
WRK967423	Interpretation from Slot. Scrn.	1/06/2005	70	93	SANDSTONE
79264	Interpretation from Screen	4/03/1987	18	24	NOT KNOWN
52428	Interpretation from Screen	18/10/1989	30	36	SAND
79266	Interpretation from Screen	8/12/1988	66	93	SLATE
52418	Interpretation from Screen	13/09/1974	35.36	42.36	BASALT
79259	Interpretation from Screen	24/02/1983	114	119	SANDSTONE
79254	Interpretation from Screen	1/12/1975	47	55	MUDSTONE
109453	Interpretation from Screen	17/01/1989	50	54	BASALT
79258	Interpretation from Screen	23/10/1982	56	58	BASALT
79263	Interpretation from Screen	6/08/1982	27	74.67	BASALT
134012	Interpretation from Screen	11/03/1998	31.6	37.6	BASALT
52415	Interpretation from Screen	7/08/1971	48.76	51.81	NOT KNOWN
WRK056556	Interpretation from Casing	10/06/2010	0	22	SANDSTONE
WRK056556	Interpretation from Screen	10/06/2010	22	28	SILTSTONE
79265	Interpretation from Screen	10/05/1976	32	42.67	NOT KNOWN
134010	Interpretation from Screen	10/03/1998	30.3	36.3	NOT KNOWN
134011	Interpretation from Screen	11/03/1998	28.8	34.8	NOT KNOWN
109432	Interpretation from Screen	3/04/1975	20	39.5	SCORIA

Table 4
Visualising Victoria's Groundwater Search
Driller Log

Bore ID	Date	Interval from	Interval to	Description
109452	3/07/1989	0	1	TOPSOIL
109452	3/07/1989	1	24.3	CLAY
109452	3/07/1989	24.3	45	MUDSTONE
109452	3/07/1989	45	57	HONEY COMB ROCK
109452	3/07/1989	57	78	BASALT
109452	3/07/1989	78	94	MUDSTONE
109452	3/07/1989	94	121	BASALY
109442	29/04/1981	0	0.1	TOP SOIL
109442	29/04/1981	0.1	3.6	FIRM RED CLAY
109442	29/04/1981	3.6	4.2	CLAYEY DECOMPOSED BASALT
109442	29/04/1981	4.2	15	MEDIUM HARD HONEYCOMB BASALT
109442	29/04/1981	15	30.5	MEDIUM HARD BLUE BASALT
109442	29/04/1981	30.5	35	MEDIUM HARD BASALT AND SCORIA
109442	29/04/1981	35	37.5	FIRM BAKED RED CLAY
109442	29/04/1981	37.5	39.6	HARD BASALT
109450	22/04/1989	0	0.5	SOIL
109450	22/04/1989	0.5	6	BASALT
109450	22/04/1989	6	13	BASALTIC CLAY
109450	22/04/1989	13	16	BASALT
109450	22/04/1989	16	22	MOTTLED CLAY
109450	22/04/1989	22	36	YELLOW MUDSTONE
109450	22/04/1989	36	120	GREY SILTSTONE
109445	1/03/1983	0	29	BASALT
109445	1/03/1983	29	48	MUDSTONE
109445	1/03/1983	48	107	GREY MUDSTONE
109445	1/03/1983	107	115	GREY SANDSTONE
109429	30/10/1971	0	21.34	MEDIUM HARD BASALT
109429	30/10/1971	21.34	30.48	HARD BASALT
109429	30/10/1971	30.48	33.83	CLAYEY DECOMPOSED BASALT
109429	30/10/1971	33.83	49.07	CLAYEY DECOMPOSED MUDSTONE
109429	30/10/1971	49.07	62.48	SOFT GREY MUDSTONE
109441	10/10/1980	0	0.1	TOP SOIL
109441	10/10/1980	0.1	1.2	FINE CLAYEY BOULDES
109441	10/10/1980	1.2	4.5	MEDIUM HARD BASALT (CLAY LAYERS)
109441	10/10/1980	4.5	19.7	HARD BASALT
109441	10/10/1980	19.7	26.5	RED BASALT AND SCORIA
109441	10/10/1980	26.5	29	HARD BASALT
109441	10/10/1980	29	33.5	MEDIUM HARD BASALT WITH TRACES OF CLAY
109441	10/10/1980	33.5	37.5	STIFF RED CLAY
109441	10/10/1980	37.5	51	FIRM RED BAKED CLAY
109441	10/10/1980	51	78	MEDIUM HARD GREY MUDSTONE
109441	10/10/1980	78	94.5	MEDIUM HARD BLUE SHALE
109440	4/08/1980	0	7	CLAY
109440	4/08/1980	7	18	WEATHERED BASALT
109440	4/08/1980	18	42	SOFT SANDSTONE
109440	4/08/1980	42	82	GREY MUDSTONE
WRK032473	31/01/1995	0	5	ROCK
WRK032473	31/01/1995	5	15	SCORIA
WRK032473	31/01/1995	15	18	WHITE CLAY
WRK032473	31/01/1995	18	166	BASALT
109428	4/11/1971	0	0.3	TOP SOIL
109428	4/11/1971	0.3	0.91	BROWN CLAY
109428	4/11/1971	0.91	3.05	BASALT BOULDERS
109428	4/11/1971	3.05	41.7	BASALT ROCK LAYERS
79261	5/08/1982	0	2	TOP SOIL
79261	5/08/1982	2	60	BASALT
WRK988836	26/01/2009	0	5	topsoil clay
WRK988836	26/01/2009	5	30	basalt
WRK988836	26/01/2009	30	47	fractured basalt
109438	1/11/1978	0	25	BASALT
109438	1/11/1978	25	40	DECOMPOSED BASALT
109438	1/11/1978	40	45	CLAY
109436	7/02/1977	0	2	TOP BASALTIC CLAY
109436	7/02/1977	2	3	HARD BASALT
109436	7/02/1977	3	6	WEATHERED BASALT
109436	7/02/1977	6	12	HARD BASALT
109436	7/02/1977	12	14	CLAY
109436	7/02/1977	14	15	WEATHERED BASALT
109436	7/02/1977	15	19	CLAY
109436	7/02/1977	19	32.91	WEATHERED BASALT
109443	9/04/1981	0	1	CLAY
109443	9/04/1981	1	33	WEATHERED BASALT
109443	9/04/1981	33	46	HARD BASALT
109443	9/04/1981	46	48	CLAY

Table 4
Visualising Victoria's Groundwater Search
Driller Log

Bore ID	Date	Interval from	Interval to	Description
143984	11/12/1999	0	1	VOLCANIC TOP SOIL AND CLAY
143984	11/12/1999	1	2	CLAY AND BASALT
143984	11/12/1999	2	13	BOULDERS
143984	11/12/1999	13	21	RED CLAY
143984	11/12/1999	21	48	MUSDSTONE
143984	11/12/1999	48	53	SANDSTONE
143984	11/12/1999	53	93	GREY SANDSTONE
109446	31/05/1985	0	150	BASALT
109437	26/06/1978	0	3	CLAY
109437	26/06/1978	3	37	WEATHERED BASALT
109437	26/06/1978	37	41	HARD BASALT
109437	26/06/1978	41	55	CLAY
109437	26/06/1978	55	66	MUDSTONE
139974	20/02/1999	0	1	SOIL & CLAY
139974	20/02/1999	1	40	BASALT
139974	20/02/1999	40	50	RED CLAY
139974	20/02/1999	50	65	BROWN/GREY CLAY
139974	20/02/1999	65	75	SILURIAN MUDSTONE
139974	20/02/1999	75	85	BROWN SANDSTONE
143839	9/09/1999	0	1	TOP SOIL AND CLAY
143839	9/09/1999	1	3	CLAY
143839	9/09/1999	3	18	SUBSOIL AND CLAY
143839	9/09/1999	18	34	BLUESTONE
143839	9/09/1999	34	63	HARD BLUESTONE
112643	19/01/1992	0	3	BROWN TOP SOIL
112643	19/01/1992	3	27.43	BROKEN BASALT
WRK967607	22/11/2005	0	0.7	SILTY CLAY
109434	31/05/1976	0	1.52	TOP SOIL
109434	31/05/1976	1.52	21.34	BASALT
109434	31/05/1976	21.34	47.24	DECOMPOSED BASALT
109434	31/05/1976	47.24	54.25	HARD BASALT
109430	30/07/1973	0	99.06	CLAY AND BASALT
109449	10/02/1988	0	3	CLAY
109449	10/02/1988	3	7	BASALT
109449	10/02/1988	7	15	BASALTIC CLAYS
109449	10/02/1988	15	40	YELLOW MUDSTONE
109449	10/02/1988	40	69	GREY SILTSTONE
109449	10/02/1988	69	77	GREY SANDSTONE
79252	9/02/1974	0	0.3	TOP SOIL
79252	9/02/1974	0.3	32.61	BASALT ROCK
140205	24/01/2000	0	0.5	SOIL & FILL
140205	24/01/2000	0.5	2	BROWN CLAY
140205	24/01/2000	2	8	BASALT
140205	24/01/2000	8	33.6	WEATHERED BASALT
79255	1/02/1980	0	1	SOIL AND CLAY
79255	1/02/1980	1	10	BASALT
79255	1/02/1980	10	13	VOLCANIC CLAY
79255	1/02/1980	13	17	HONEYCOMB BASALT
79255	1/02/1980	17	32	BASALT VERY HARD
79255	1/02/1980	32	45	SILURIAN CLAYS
79260	1/06/1982	0	0.1	TO SOIL
79260	1/06/1982	0.1	15.2	MOTTLED CLAY
79260	1/06/1982	15.2	22.8	BASALT
79260	1/06/1982	22.8	25.8	SCORIA
79260	1/06/1982	25.8	26.8	RED CLAY
79260	1/06/1982	26.8	38	BASALT
79256	2/07/1982	0	1	TOP SOIL AND CLAY
79256	2/07/1982	1	8.7	BASALT
79256	2/07/1982	8.7	10	RED VOLCANIC CLAY
79256	2/07/1982	10	13	HONEYCOMB BASALT
79256	2/07/1982	13	20.7	BASALT
79256	2/07/1982	20.7	48	SILURIAN CLAYS
79256	2/07/1982	48	60.8	GREY CLAYEY SHALE
79256	2/07/1982	60.8	97	SLATE
WRK043244	11/05/2003	0	2.3	GREY TOPSOIL & SUBSOIL
WRK043244	11/05/2003	2.3	9	FHARD BLUESTONE
WRK043244	11/05/2003	9	16	BLUESTONE
WRK043244	11/05/2003	16	27	RED BROWN SCORIA
WRK043244	11/05/2003	27	36	BROWN SCORIA
WRK043244	11/05/2003	36	52	RED SCORIA
WRK043244	11/05/2003	52	52.1	YELLOW CLAY
WRK043244	11/05/2003	52.1	52.8	YELLOW CLAY & GRANITE
WRK043244	11/05/2003	52.8	55	SAND PIPE CLAY
112781	29/03/1992	0	9.5	OVERBURDEN
112781	29/03/1992	9.5	24	BASALT
112781	29/03/1992	24	28.5	CLAY
112781	29/03/1992	28.5	32	SAND
112781	29/03/1992	32	58	HARD GRANITIC ROCK (BLUE)

Table 4
Visualising Victoria's Groundwater Search
Driller Log

Bore ID	Date	Interval from	Interval to	Description
WRK042945	19/12/1994	0	2.7	SOIL AND CLAY
WRK042945	19/12/1994	2.7	22	BASALT
WRK042945	19/12/1994	22	24	WEATHERED BASALT
WRK042945	19/12/1994	24	26	RED AND YELLOW MOTTLED CLAY
WRK042945	19/12/1994	26	45	RED SILTY CLAY
WRK042945	19/12/1994	45	70	YELLOW TO BROWN SILTSTONE
WRK042945	19/12/1994	70	150	GREY SILTSTONE AND SANDSTONE
WRK054905	16/02/2010	0	15	basalt
WRK054905	16/02/2010	15	30	mudstone
WRK054905	16/02/2010	30	40	sandstone
WRK054905	16/02/2010	40	100	fine sandstone
79257	14/09/1980	0	18	WEATHERED BASALT
79257	14/09/1980	18	18.2	CLAY
79257	14/09/1980	18.2	43	WEATHERED BASALT
79257	14/09/1980	43	51	HARD BASALT
79257	14/09/1980	51	67	RED CLAYEE DECOMPOSED BASALT
79257	14/09/1980	67	69	BASALT
79257	14/09/1980	69	73	BLACK CLAY
79257	14/09/1980	73	84	WEATHERED BASALT
79268	5/04/1990	0	0.6	SOIL
79268	5/04/1990	0.6	50	BASALT
79268	5/04/1990	50	55	RED BASALTIC CLAY
79268	5/04/1990	55	60	GREY CLAY
79268	5/04/1990	60	70	MOTTLED CLAY
79268	5/04/1990	70	80	MUDSTONE
79268	5/04/1990	80	96	GREY SILTSTONE
120765	19/12/1993	0	0.3	SOIL
120765	19/12/1993	0.3	54	BASALT
120765	19/12/1993	54	57	RED CLAY
120765	19/12/1993	57	63	YELLOW CLAY
120765	19/12/1993	63	80	MUDSTONE
120765	19/12/1993	80	112	GREY SILTSTONE
120765	19/12/1993	112	118	BACKFILLED
WRK967423	1/06/2005	0	3	TOP SOIL & SUB SOIL
WRK967423	1/06/2005	3	21	BLUESTONE
WRK967423	1/06/2005	21	49	MUDSTONE
WRK967423	1/06/2005	49	93	BEDROCK
116348	31/08/1993	0	1.5	SOIL & CLAY
116348	31/08/1993	1.5	15	BASALT
116348	31/08/1993	15	20	SOFT RED VESICULAR BASALT
116348	31/08/1993	20	30	BASALT
116348	31/08/1993	30	35	REDDISH, ORANGE CLAY HARD, DRY
116348	31/08/1993	35	106	SILLRIAN MUDSTONE, SANDSTONE
WRK985085	21/02/2008	0	1	TOP SOIL
WRK985085	21/02/2008	1	5	BASALT
WRK985085	21/02/2008	5	15	SCORIA
WRK985085	21/02/2008	15	25	BASALT
WRK985085	21/02/2008	25	40	SCORIA
WRK985085	21/02/2008	40	48	CLAY
WRK985085	21/02/2008	48	90	BASALT
52428	18/10/1989	0	0.1	SOIL
52428	18/10/1989	0.1	2	CLAY
52428	18/10/1989	2	25	BASALT
52428	18/10/1989	25	27	RED BASALTIC CLAY
52428	18/10/1989	27	35	BASALT
52428	18/10/1989	35	36	GRANITIC CLAY
79266	8/12/1988	0	1	SOIL AND CLAY
79266	8/12/1988	1	10.5	BASALT
79266	8/12/1988	10.5	12	CAVITY IN BASALT
79266	8/12/1988	12	27	BASALT
79266	8/12/1988	27	33	MOTTLED CLAY
79266	8/12/1988	33	93	SANDSTONE
WRK962170	14/08/2003	0	0.5	SOIL & CLAY
WRK962170	14/08/2003	0.5	30	BASALT
WRK962170	14/08/2003	30	40	BASLATIC CLAY
WRK962170	14/08/2003	40	53	SILURIAN CLAY
WRK962170	14/08/2003	53	81	SILTSTONE & SANDSTONE
52418	13/09/1974	0	0.3	TOP SOIL
52418	13/09/1974	0.3	7.92	CLAY AND GRAVEL
52418	13/09/1974	7.92	16.46	RED CLAY
52418	13/09/1974	16.46	34.44	SHALE AND CLAY STONE
52418	13/09/1974	34.44	35.36	WEATHERED HORNFELS
52418	13/09/1974	35.36	42.37	HORNFELS (FISSURED)
52418	13/09/1974	42.37	79.55	HORNFELS WITH QUARTZ BANDS
52418	13/09/1974	79.55	91.44	HORNFELS

Table 4
Visualising Victoria's Groundwater Search
Driller Log

Bore ID	Date	Interval from	Interval to	Description
WRK966931	20/09/2004	0	2	BROWN CLAY
WRK966931	20/09/2004	2	7.3	WEATHERED BASALT
WRK966931	20/09/2004	7.3	28.5	BASALT
WRK966931	20/09/2004	28.5	33	WEATHERED BASALT
WRK966931	20/09/2004	33	45	BROWN CLAY
WRK966931	20/09/2004	45	52	GREY CLAY
WRK966931	20/09/2004	52	60.5	SOFT BROWN MUDSTONE
WRK966931	20/09/2004	60.5	67.5	BROWN MUDSTONE
WRK966931	20/09/2004	67.5	70	BLUE MUDSTONE
WRK966931	20/09/2004	70	81	FRACTURED BLUE MUDSTONE
WRK966931	20/09/2004	81	90.5	BASALT
79259	24/02/1983	0	12	BASALT
79259	24/02/1983	12	81	MUDSTONE
79259	24/02/1983	81	119	GREY MUDSTONE
79254	1/12/1975	0	0.03	TOP SOIL
79254	1/12/1975	0.03	0.91	SUB SOIL
79254	1/12/1975	0.91	10.3	ROCK
79254	1/12/1975	10.3	11	SAND STONE (SOFT)
79254	1/12/1975	11	20.9	CLAY
79254	1/12/1975	20.9	33.4	SAND STONE (SOFT)
79254	1/12/1975	33.4	48.6	SAND STONE WITH S/CLAY
79254	1/12/1975	48.6	55	SOFT SAND STONE
79254	1/12/1975	55	57	CLAY
109453	17/01/1989	0	0.6	BROWN TOPSOIL
109453	17/01/1989	0.6	2	RED CLAY
109453	17/01/1989	2	50	BASALT
109453	17/01/1989	50	54	BROKEN BASALT TO RED GRANITIC CLAY @ 54M
WRK960845	25/04/2003	0	2.5	SOIL & CLAY
WRK960845	25/04/2003	2.5	65	BROWN MUDSTONE & SANDSTONE
WRK960845	25/04/2003	65	80	FRACTURED SANDSTONE
WRK960845	25/04/2003	80	87	DARK GREY SILTSTONE
WRK991291	4/06/2009	0	3	brown clay
WRK991291	4/06/2009	3	38	mudstone
WRK991291	4/06/2009	38	60	sandstone
WRK991291	4/06/2009	60	76	shale
WRK964250	10/02/2004	0	1	OVERBURDEN
WRK964250	10/02/2004	1	3	GREY CLAY
WRK964250	10/02/2004	3	9	BASALT
WRK964250	10/02/2004	9	10.5	RED CLAY
WRK964250	10/02/2004	10.5	36	BROWN MUDSTONE
WRK964250	10/02/2004	36	51	BLUE MUDSTONE
WRK964250	10/02/2004	51	66	BASALT
WRK964250	10/02/2004	66	75	FRACTURED BASALT
WRK964250	10/02/2004	75	80	BASALT
79258	23/10/1982	0	2	CLAY
79258	23/10/1982	2	6	BASALT
79258	23/10/1982	6	17	HONEYCOMB BASALT
79258	23/10/1982	17	24	BASALT
79258	23/10/1982	24	27	WEATHERED BASALT
79258	23/10/1982	27	31	RED CLAY
79258	23/10/1982	31	58	SANDSTONE
79263	6/08/1982	0	0.2	TOP SOIL
79263	6/08/1982	0.2	6	MOTTLED CLAY
79263	6/08/1982	6	74.67	BASALT
WRK043281	1/11/2004	0	1	TOP SOIL
WRK043281	1/11/2004	1	3	CLAY & ROCK
WRK043281	1/11/2004	3	23	BLUESTONE
WRK043281	1/11/2004	23	32	BASALT
WRK043281	1/11/2004	32	33	BLUESTONE
WRK960778	19/01/2003	0	2	DARK BLACK CLAY
WRK960778	19/01/2003	2	8	WEATHERED BASALT
WRK960778	19/01/2003	8	33	BASALT
WRK960778	19/01/2003	33	48	RED CLAY
WRK960778	19/01/2003	48	53	BROWN MUDSTONE
WRK960778	19/01/2003	53	58.5	BASALT
WRK960778	19/01/2003	58.5	61.5	FRACTURED BASALT
WRK960778	19/01/2003	61.5	63	BROWN CLAY

Table 4
Visualising Victoria's Groundwater Search
Driller Log

Bore ID	Date	Interval from	Interval to	Description
134012	11/03/1998	0	0.8	FILL & BROWN CLAY
134012	11/03/1998	0.8	33	SILVURIAN MUDSTONE
134012	11/03/1998	33	67	GREY SILTSTONE
52415	7/08/1971	0	0.61	TOP SOIL
52415	7/08/1971	0.61	21.34	GREY AND CREAM WEATHERED BASALT
52415	7/08/1971	21.34	30.48	HARD BASALT
52415	7/08/1971	30.48	45.72	WEATHERED BASALT
52415	7/08/1971	45.72	48.77	VERY FINE FLOWING SAND
52415	7/08/1971	48.77	91.4	FINE TO COARSE SAND, MEDIUM GRAVEL WITH COAL
WRK032833	10/03/1999	0	1	GREY TOPSOIL AND CLAY
WRK032833	10/03/1999	1	7	CLAY
WRK032833	10/03/1999	7	18	BASALT
WRK032833	10/03/1999	31	31	GREY GRANITE
WRK056556	10/06/2010	0	2	top soil
WRK056556	10/06/2010	2	21.5	basalt
WRK056556	10/06/2010	21.5	23	basalt with clay bands
WRK056556	10/06/2010	23	26.5	weathered basalt
WRK056556	10/06/2010	26.5	28	red clay
79253	8/10/1974	0	0.3	TOPSOIL
79253	8/10/1974	0.3	1.83	CLAY
79253	8/10/1974	1.83	29.87	BASALT
79253	8/10/1974	29.87	38.1	SILURIAN CLAY
79265	10/05/1976	0	0.61	TOP SOIL
79265	10/05/1976	0.61	2.13	BROWN CLAY
79265	10/05/1976	2.13	33.53	BASALT
79265	10/05/1976	33.53	42.67	SILURIAN CLAYS
134010	10/03/1998	0	0.5	FILL
134010	10/03/1998	0.5	1	BLACK SILTY CLAY
134010	10/03/1998	1	30	MUDSTONE/SILVRIAN
134010	10/03/1998	30	36.3	GREY SILTSTONE
134011	11/03/1998	0	0.1	FILL & CLAY
134011	11/03/1998	0.1	34.8	SILVRIAN MUDSTONE
109432	3/04/1975	0	36	WEATHERED BASALT
109432	3/04/1975	36	39.5	CLAYEE DECOMPOSED BASALT

Table 5
Visualising Victoria's Groundwater Search
Lab Chemistry

Bore ID	Reading date	Reading time	Interval from (m)	Interval to (m)	Parameter name	Parameter value	Unit of measure
109442	29/04/1981	0:00:00	30	39	Conductivity (µS/cm)	12000	µS/cm @ 25°C
109442	29/04/1981	0:00:00	30	39	Calcium, as Ca	47	mg/L
109442	29/04/1981	0:00:00	30	39	Chloride, as Cl	4000	mg/L
109442	29/04/1981	0:00:00	30	39	Carbonate, as CO3	71	mg/L
109442	29/04/1981	0:00:00	30	39	Hardness, as CaCO3 (calc.)	2896	mg/L
109442	29/04/1981	0:00:00	30	39	Bicarbonate, as HCO3	837	mg/L
109442	29/04/1981	0:00:00	30	39	Potassium, as K	18	mg/L
109442	29/04/1981	0:00:00	30	39	Sodium, as Na	1919	mg/L
109442	29/04/1981	0:00:00	30	39	Nitrate, as N	1.354	mg/L
109442	29/04/1981	0:00:00	30	39	Sulphate, as SO4	587	mg/L
109442	29/04/1981	0:00:00	30	39	DME Silicate, as SIO3	43	mg/L
109442	29/04/1981	0:00:00	30	39	Iron, total as Fe	3	mg/L
109442	29/04/1981	0:00:00	30	39	Magnesium, as Mg	675	mg/L
109442	29/04/1981	0:00:00	30	39	Total Soluble Salts (Summation	8203	mg/L
109450	22/04/1989	0:00:00	96	120	Conductivity (µS/cm)	14000	µS/cm @ 25°C
109450	22/04/1989	0:00:00	96	120	Total Alkalinity, as CaCO3	290	mg/L
109450	22/04/1989	0:00:00	96	120	Calcium, as Ca	190	mg/L
109450	22/04/1989	0:00:00	96	120	Chloride, as Cl	4800	mg/L
109450	22/04/1989	0:00:00	96	120	Hardness, as CaCO3	3428.03	mg/L
109450	22/04/1989	0:00:00	96	120	Bicarbonate, as HCO3	353.659	mg/L
109450	22/04/1989	0:00:00	96	120	Potassium, as K	35	mg/L
109450	22/04/1989	0:00:00	96	120	Sodium, as Na	1800	mg/L
109450	22/04/1989	0:00:00	96	120	Nitrate & Nitrite, as N(0.15de	1.5	mg/L
109450	22/04/1989	0:00:00	96	120	Silica, total as SiO2	15	mg/L
109450	22/04/1989	0:00:00	96	120	Sulphate, as SO4	390	mg/L
109450	22/04/1989	0:00:00	96	120	Iron (Undigested), as Fe	0.54	mg/L
109450	22/04/1989	0:00:00	96	120	Magnesium, as Mg	710	mg/L
109450	22/04/1989	0:00:00	96	120	Total Dissolved Solids, 105C	7888.8	mg/L
109429	1/11/1971	0:00:00	30.48	62.48	Conductivity (µS/cm)	182	µS/cm @ 25°C
109429	1/11/1971	0:00:00	30.48	62.48	Calcium, as Ca	3	mg/L
109429	1/11/1971	0:00:00	30.48	62.48	Chloride, as Cl	21	mg/L
109429	1/11/1971	0:00:00	30.48	62.48	Hardness, as CaCO3 (calc.)	23	mg/L
109429	1/11/1971	0:00:00	30.48	62.48	Bicarbonate, as HCO3	38	mg/L
109429	1/11/1971	0:00:00	30.48	62.48	Magnesium, as Mg	4	mg/L
109429	1/11/1971	0:00:00	30.48	62.48	Total Soluble Salts (Conductiv	136	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Conductivity (µS/cm)	7710	µS/cm @ 25°C
109429	29/08/1972	0:00:00	30.48	62.48	Calcium, as Ca	65	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Chloride, as Cl	2283	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Carbonate, as CO3	56	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Hardness, as CaCO3 (calc.)	1881	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Bicarbonate, as HCO3	805	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Sulphate, as SO4	190	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Iron, total as Fe	195	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Magnesium, as Mg	418	mg/L
109429	29/08/1972	0:00:00	30.48	62.48	Total Soluble Salts (Conductiv	4651	mg/L
109440	26/09/1980	0:00:00	31	82	Conductivity (µS/cm)	15500	µS/cm @ 25°C
109440	26/09/1980	0:00:00	31	82	Calcium, as Ca	194	mg/L
109440	26/09/1980	0:00:00	31	82	Chloride, as Cl	5570	mg/L
109440	26/09/1980	0:00:00	31	82	Hardness, as CaCO3 (calc.)	4436	mg/L
109440	26/09/1980	0:00:00	31	82	Bicarbonate, as HCO3	361	mg/L
109440	26/09/1980	0:00:00	31	82	Potassium, as K	23	mg/L
109440	26/09/1980	0:00:00	31	82	Sodium, as Na	2041	mg/L
109440	26/09/1980	0:00:00	31	82	Nitrate, as N	0.451	mg/L
109440	26/09/1980	0:00:00	31	82	Sulphate, as SO4	1199	mg/L
109440	26/09/1980	0:00:00	31	82	DME Silicate, as SIO3	10	mg/L
109440	26/09/1980	0:00:00	31	82	Magnesium, as Mg	960	mg/L
109440	26/09/1980	0:00:00	31	82	Total Soluble Salts (Summation	10360	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Conductivity (µS/cm)	5688	µS/cm @ 25°C
109428	13/12/1971	0:00:00	40.8	41.8	Calcium, as Ca	16	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Chloride, as Cl	1562	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Carbonate, as CO3	35	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Hardness, as CaCO3 (calc.)	1011	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Bicarbonate, as HCO3	716	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Magnesium, as Mg	236	mg/L
109428	13/12/1971	0:00:00	40.8	41.8	Total Soluble Salts (Conductiv	3373	mg/L
109443	9/04/1981	0:00:00	42	48	Conductivity (µS/cm)	6450	µS/cm @ 25°C
109443	9/04/1981	0:00:00	42	48	Calcium, as Ca	16	mg/L
109443	9/04/1981	0:00:00	42	48	Chloride, as Cl	1715	mg/L
109443	9/04/1981	0:00:00	42	48	Carbonate, as CO3	50	mg/L
109443	9/04/1981	0:00:00	42	48	Hardness, as CaCO3 (calc.)	752	mg/L
109443	9/04/1981	0:00:00	42	48	Bicarbonate, as HCO3	989	mg/L
109443	9/04/1981	0:00:00	42	48	Potassium, as K	17	mg/L
109443	9/04/1981	0:00:00	42	48	Sodium, as Na	1282	mg/L
109443	9/04/1981	0:00:00	42	48	Nitrate, as N	2.483	mg/L
109443	9/04/1981	0:00:00	42	48	Sulphate, as SO4	176	mg/L
109443	9/04/1981	0:00:00	42	48	DME Silicate, as SIO3	54	mg/L
109443	9/04/1981	0:00:00	42	48	Iron, total as Fe	5	mg/L

Table 5
Visualising Victoria's Groundwater Search
Lab Chemistry

Bore ID	Reading date	Reading time	Interval from (m)	Interval to (m)	Parameter name	Parameter value	Unit of measure
109443	9/04/1981	0:00:00	42	48	Magnesium, as Mg	173	mg/L
109443	9/04/1981	0:00:00	42	48	Total Soluble Salts (Summation	4483	mg/L
109443	9/04/1981	1:00:00	42	48	Conductivity (µS/cm)	6450	µS/cm @ 25°C
109443	9/04/1981	1:00:00	42	48	Calcium, as Ca	16	mg/L
109443	9/04/1981	1:00:00	42	48	Chloride, as Cl	1715	mg/L
109443	9/04/1981	1:00:00	42	48	Carbonate, as CO3	50	mg/L
109443	9/04/1981	1:00:00	42	48	Hardness, as CaCO3 (calc.)	752	mg/L
109443	9/04/1981	1:00:00	42	48	Bicarbonate, as HCO3	989	mg/L
109443	9/04/1981	1:00:00	42	48	Potassium, as K	17	mg/L
109443	9/04/1981	1:00:00	42	48	Sodium, as Na	1282	mg/L
109443	9/04/1981	1:00:00	42	48	Nitrate, as N	2.483	mg/L
109443	9/04/1981	1:00:00	42	48	Sulphate, as SO4	176	mg/L
109443	9/04/1981	1:00:00	42	48	DME Silicate, as SIO3	54	mg/L
109443	9/04/1981	1:00:00	42	48	Iron, total as Fe	5	mg/L
109443	9/04/1981	1:00:00	42	48	Magnesium, as Mg	173	mg/L
109443	9/04/1981	1:00:00	42	48	Total Soluble Salts (Summation	4483	mg/L
109437	26/06/1978	0:00:00	62	66	Conductivity (µS/cm)	11400	µS/cm @ 25°C
109437	26/06/1978	0:00:00	62	66	Calcium, as Ca	132	mg/L
109437	26/06/1978	0:00:00	62	66	Chloride, as Cl	3760	mg/L
109437	26/06/1978	0:00:00	62	66	Hardness, as CaCO3 (calc.)	3528	mg/L
109437	26/06/1978	0:00:00	62	66	Bicarbonate, as HCO3	398	mg/L
109437	26/06/1978	0:00:00	62	66	Potassium, as K	19	mg/L
109437	26/06/1978	0:00:00	62	66	Sodium, as Na	1142	mg/L
109437	26/06/1978	0:00:00	62	66	Sulphate, as SO4	453	mg/L
109437	26/06/1978	0:00:00	62	66	DME Silicate, as SIO3	4	mg/L
109437	26/06/1978	0:00:00	62	66	Magnesium, as Mg	777	mg/L
109437	26/06/1978	0:00:00	62	66	Total Soluble Salts (Summation	6685	mg/L
109437	15/11/1978	0:00:00	62	66	Conductivity (µS/cm)	11250	µS/cm @ 25°C
109437	15/11/1978	0:00:00	62	66	Calcium, as Ca	125	mg/L
109437	15/11/1978	0:00:00	62	66	Chloride, as Cl	3780	mg/L
109437	15/11/1978	0:00:00	62	66	Hardness, as CaCO3 (calc.)	3482	mg/L
109437	15/11/1978	0:00:00	62	66	Bicarbonate, as HCO3	381	mg/L
109437	15/11/1978	0:00:00	62	66	Potassium, as K	21	mg/L
109437	15/11/1978	0:00:00	62	66	Sodium, as Na	1158	mg/L
109437	15/11/1978	0:00:00	62	66	Sulphate, as SO4	445	mg/L
109437	15/11/1978	0:00:00	62	66	DME Silicate, as SIO3	21	mg/L
109437	15/11/1978	0:00:00	62	66	Iron, total as Fe	2	mg/L
109437	15/11/1978	0:00:00	62	66	Magnesium, as Mg	770	mg/L
109437	15/11/1978	0:00:00	62	66	Total Soluble Salts (Summation	6701	mg/L
79250	17/10/1977	0:00:00	-	-	Conductivity (µS/cm)	10800	µS/cm @ 25°C
79250	17/10/1977	0:00:00	-	-	Calcium, as Ca	84	mg/L
79250	17/10/1977	0:00:00	-	-	Chloride, as Cl	3450	mg/L
79250	17/10/1977	0:00:00	-	-	Hardness, as CaCO3 (calc.)	2622	mg/L
79250	17/10/1977	0:00:00	-	-	Bicarbonate, as HCO3	1218	mg/L
79250	17/10/1977	0:00:00	-	-	Potassium, as K	28	mg/L
79250	17/10/1977	0:00:00	-	-	Sodium, as Na	1487	mg/L
79250	17/10/1977	0:00:00	-	-	Nitrate, as N	2.257	mg/L
79250	17/10/1977	0:00:00	-	-	Sulphate, as SO4	94	mg/L
79250	17/10/1977	0:00:00	-	-	DME Silicate, as SIO3	59	mg/L
79250	17/10/1977	0:00:00	-	-	Iron, total as Fe	1	mg/L
79250	17/10/1977	0:00:00	-	-	Magnesium, as Mg	586	mg/L
79250	17/10/1977	0:00:00	-	-	Total Soluble Salts (Summation	7016	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Conductivity (µS/cm)	3265	µS/cm @ 25°C
109434	16/06/1976	0:00:00	44.19	54.25	Calcium, as Ca	41	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Chloride, as Cl	694	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Hardness, as CaCO3 (calc.)	592	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Bicarbonate, as HCO3	810	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Potassium, as K	10	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Sodium, as Na	495	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Sulphate, as SO4	55	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	DME Silicate, as SIO3	59	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Magnesium, as Mg	119	mg/L
109434	16/06/1976	0:00:00	44.19	54.25	Total Soluble Salts (Summation	2283	mg/L
109422	4/04/1975	0:00:00	-	-	Conductivity (µS/cm)	4980	µS/cm @ 25°C
109422	4/04/1975	0:00:00	-	-	Calcium, as Ca	97	mg/L
109422	4/04/1975	0:00:00	-	-	Chloride, as Cl	1108	mg/L
109422	4/04/1975	0:00:00	-	-	Carbonate, as CO3	28	mg/L
109422	4/04/1975	0:00:00	-	-	Hardness, as CaCO3 (calc.)	1115	mg/L
109422	4/04/1975	0:00:00	-	-	Bicarbonate, as HCO3	444	mg/L
109422	4/04/1975	0:00:00	-	-	Potassium, as K	34	mg/L
109422	4/04/1975	0:00:00	-	-	Sodium, as Na	662	mg/L
109422	4/04/1975	0:00:00	-	-	Nitrate, as N	100.451	mg/L
109422	4/04/1975	0:00:00	-	-	Sulphate, as SO4	283	mg/L
109422	4/04/1975	0:00:00	-	-	DME Silicate, as SIO3	70	mg/L
109422	4/04/1975	0:00:00	-	-	Magnesium, as Mg	212	mg/L
109422	4/04/1975	0:00:00	-	-	Total Soluble Salts (Summation	3383	mg/L

Table 5
Visualising Victoria's Groundwater Search
Lab Chemistry

Bore ID	Reading date	Reading time	Interval from (m)	Interval to (m)	Parameter name	Parameter value	Unit of measure
109449	10/02/1988	0:00:00	70	77	Conductivity (µS/cm)	9200	µS/cm @ 25°C
109449	10/02/1988	0:00:00	70	77	Total Alkalinity, as CaCO3	380	mg/L
109449	10/02/1988	0:00:00	70	77	Calcium, as Ca	95	mg/L
109449	10/02/1988	0:00:00	70	77	Chloride, as Cl	2900	mg/L
109449	10/02/1988	0:00:00	70	77	Hardness, as CaCO3	2608.415	mg/L
109449	10/02/1988	0:00:00	70	77	Bicarbonate, as HCO3	463.415	mg/L
109449	10/02/1988	0:00:00	70	77	Potassium, as K	23	mg/L
109449	10/02/1988	0:00:00	70	77	Sodium, as Na	1200	mg/L
109449	10/02/1988	0:00:00	70	77	Nitrate + Nitrite, as N(0.003d	0.15	mg/L
109449	10/02/1988	0:00:00	70	77	Silica, total as SiO2	17	mg/L
109449	10/02/1988	0:00:00	70	77	Sulphate, as SO4	430	mg/L
109449	10/02/1988	0:00:00	70	77	Iron, total as Fe	1.8	mg/L
109449	10/02/1988	0:00:00	70	77	Magnesium, as Mg	570	mg/L
109449	10/02/1988	0:00:00	70	77	Total Dissolved Solids, 105C	5252.265	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Conductivity (µS/cm)	6280	µS/cm @ 25°C
79252	9/02/1974	0:00:00	27.43	32.61	Calcium, as Ca	6	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Chloride, as Cl	1727	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Carbonate, as CO3	189	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Hardness, as CaCO3 (calc.)	1551	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Bicarbonate, as HCO3	653	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Potassium, as K	19	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Sodium, as Na	796	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Nitrate, as N	1.806	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Sulphate, as SO4	65	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	DME Silicate, as SIO3	15	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Iron, total as Fe	4	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Magnesium, as Mg	373	mg/L
79252	9/02/1974	0:00:00	27.43	32.61	Total Soluble Salts (Summation	3851	mg/L
79255	14/03/1980	0:00:00	-	-	Conductivity (µS/cm)	9700	µS/cm @ 25°C
79255	14/03/1980	0:00:00	-	-	Calcium, as Ca	48	mg/L
79255	14/03/1980	0:00:00	-	-	Chloride, as Cl	3100	mg/L
79255	14/03/1980	0:00:00	-	-	Hardness, as CaCO3 (calc.)	2215	mg/L
79255	14/03/1980	0:00:00	-	-	Bicarbonate, as HCO3	648	mg/L
79255	14/03/1980	0:00:00	-	-	Potassium, as K	12	mg/L
79255	14/03/1980	0:00:00	-	-	Sodium, as Na	1297	mg/L
79255	14/03/1980	0:00:00	-	-	Nitrate, as N	0.451	mg/L
79255	14/03/1980	0:00:00	-	-	Sulphate, as SO4	204	mg/L
79255	14/03/1980	0:00:00	-	-	DME Silicate, as SIO3	20	mg/L
79255	14/03/1980	0:00:00	-	-	Magnesium, as Mg	509	mg/L
79255	14/03/1980	0:00:00	-	-	Total Soluble Salts (Summation	5840	mg/L
79256	14/03/1980	0:00:00	61	97	Conductivity (µS/cm)	8350	µS/cm @ 25°C
79256	14/03/1980	0:00:00	61	97	Calcium, as Ca	38	mg/L
79256	14/03/1980	0:00:00	61	97	Chloride, as Cl	2420	mg/L
79256	14/03/1980	0:00:00	61	97	Carbonate, as CO3	47	mg/L
79256	14/03/1980	0:00:00	61	97	Hardness, as CaCO3 (calc.)	1474	mg/L
79256	14/03/1980	0:00:00	61	97	Bicarbonate, as HCO3	655	mg/L
79256	14/03/1980	0:00:00	61	97	Potassium, as K	18	mg/L
79256	14/03/1980	0:00:00	61	97	Sodium, as Na	1319	mg/L
79256	14/03/1980	0:00:00	61	97	Nitrate, as N	0.451	mg/L
79256	14/03/1980	0:00:00	61	97	Sulphate, as SO4	343	mg/L
79256	14/03/1980	0:00:00	61	97	DME Silicate, as SIO3	12	mg/L
79256	14/03/1980	0:00:00	61	97	Iron, total as Fe	2	mg/L
79256	14/03/1980	0:00:00	61	97	Magnesium, as Mg	335	mg/L
79256	14/03/1980	0:00:00	61	97	Total Soluble Salts (Summation	5189	mg/L
79257	24/08/1980	0:00:00	78	84	Conductivity (µS/cm)	4340	µS/cm @ 25°C
79257	24/08/1980	0:00:00	78	84	Calcium, as Ca	36	mg/L
79257	24/08/1980	0:00:00	78	84	Chloride, as Cl	1074	mg/L
79257	24/08/1980	0:00:00	78	84	Carbonate, as CO3	26	mg/L
79257	24/08/1980	0:00:00	78	84	Hardness, as CaCO3 (calc.)	769	mg/L
79257	24/08/1980	0:00:00	78	84	Bicarbonate, as HCO3	542	mg/L
79257	24/08/1980	0:00:00	78	84	Potassium, as K	22	mg/L
79257	24/08/1980	0:00:00	78	84	Sodium, as Na	656	mg/L
79257	24/08/1980	0:00:00	78	84	Nitrate, as N	0.451	mg/L
79257	24/08/1980	0:00:00	78	84	Sulphate, as SO4	238	mg/L
79257	24/08/1980	0:00:00	78	84	DME Silicate, as SIO3	12	mg/L

Table 5
Visualising Victoria's Groundwater Search
Lab Chemistry

Bore ID	Reading date	Reading time	Interval from (m)	Interval to (m)	Parameter name	Parameter value	Unit of measure
79257	24/08/1980	0:00:00	78	84	Iron, total as Fe	2	mg/L
79257	24/08/1980	0:00:00	78	84	Magnesium, as Mg	165	mg/L
79257	24/08/1980	0:00:00	78	84	Total Soluble Salts (Summation	2773	mg/L
79257	20/10/1980	0:00:00	78	84	Conductivity (µS/cm)	4240	µS/cm @ 25°C
79257	20/10/1980	0:00:00	78	84	Calcium, as Ca	18	mg/L
79257	20/10/1980	0:00:00	78	84	Chloride, as Cl	1051	mg/L
79257	20/10/1980	0:00:00	78	84	Hardness, as CaCO3 (calc.)	877	mg/L
79257	20/10/1980	0:00:00	78	84	Bicarbonate, as HCO3	833	mg/L
79257	20/10/1980	0:00:00	78	84	Potassium, as K	17	mg/L
79257	20/10/1980	0:00:00	78	84	Sodium, as Na	603	mg/L
79257	20/10/1980	0:00:00	78	84	Nitrate, as N	1.354	mg/L
79257	20/10/1980	0:00:00	78	84	Sulphate, as SO4	71	mg/L
79257	20/10/1980	0:00:00	78	84	DME Silicate, as SIO3	34	mg/L
79257	20/10/1980	0:00:00	78	84	Iron, total as Fe	1	mg/L
79257	20/10/1980	0:00:00	78	84	Magnesium, as Mg	202	mg/L
79257	20/10/1980	0:00:00	78	84	Total Soluble Salts (Summation	2835	mg/L
79257	23/10/1980	0:00:00	78	84	Hardness, as CaCO3 (calc.)	816	mg/L
79257	23/10/1980	0:00:00	78	84	Total Soluble Salts (Conductiv	2600	mg/L
79268	5/04/1990	0:00:00	87	93	Conductivity (µS/cm)	4800	µS/cm @ 25°C
79268	5/04/1990	0:00:00	87	93	Total Alkalinity, as CaCO3	510	mg/L
79268	5/04/1990	0:00:00	87	93	Calcium, as Ca	48	mg/L
79268	5/04/1990	0:00:00	87	93	Chloride, as Cl	1200	mg/L
79268	5/04/1990	0:00:00	87	93	Hardness, as CaCO3	951.856	mg/L
79268	5/04/1990	0:00:00	87	93	Bicarbonate, as HCO3	621.951	mg/L
79268	5/04/1990	0:00:00	87	93	Potassium, as K	16	mg/L
79268	5/04/1990	0:00:00	87	93	Sodium, as Na	720	mg/L
79268	5/04/1990	0:00:00	87	93	Nitrate & Nitrite, as N(0.15de	0.15	mg/L
79268	5/04/1990	0:00:00	87	93	Silica, total as SiO2	21	mg/L
79268	5/04/1990	0:00:00	87	93	Sulphate, as SO4	260	mg/L
79268	5/04/1990	0:00:00	87	93	Iron (Undigested), as Fe	1	mg/L
79268	5/04/1990	0:00:00	87	93	Magnesium, as Mg	200	mg/L
79268	5/04/1990	0:00:00	87	93	Total Dissolved Solids, 105C	2806.2	mg/L
120765	20/12/1993	0:00:00	82	94	Conductivity (µS/cm)	2900	µS/cm @ 25°C
120765	20/12/1993	0:00:00	82	94	Calcium, as Ca	23	mg/L
120765	20/12/1993	0:00:00	82	94	Hardness, as CaCO3 (calc.)	432	mg/L
120765	20/12/1993	0:00:00	82	94	Sodium, as Na	450	mg/L
120765	20/12/1993	0:00:00	82	94	Nitrate & Nitrite, as N(0.15de	0.15	mg/L
120765	20/12/1993	0:00:00	82	94	Iron (Undigested), as Fe	5	mg/L
120765	20/12/1993	0:00:00	82	94	Magnesium, as Mg	90	mg/L
116348	1/09/1993	0:00:00	100	106	Conductivity (µS/cm)	4900	µS/cm @ 25°C
116348	1/09/1993	0:00:00	100	106	Total Alkalinity, as CaCO3	510	mg/L
116348	1/09/1993	0:00:00	100	106	Calcium, as Ca	28	mg/L
116348	1/09/1993	0:00:00	100	106	Chloride, as Cl	1300	mg/L
116348	1/09/1993	0:00:00	100	106	Hardness, as CaCO3 (calc.)	860	mg/L
116348	1/09/1993	0:00:00	100	106	Potassium, as K	30	mg/L
116348	1/09/1993	0:00:00	100	106	Sodium, as Na	740	mg/L
116348	1/09/1993	0:00:00	100	106	Nitrate & Nitrite, as N(0.15de	0.05	mg/L
116348	1/09/1993	0:00:00	100	106	Sulphate, as SO4	220	mg/L
116348	1/09/1993	0:00:00	100	106	Iron (Undigested), as Fe	0.69	mg/L
116348	1/09/1993	0:00:00	100	106	Magnesium, as Mg	190	mg/L
116348	1/09/1993	0:00:00	100	106	Total Soluble Salts (Summation	3130	mg/L
116348	1/09/1993	1:00:00	100	106	Conductivity (µS/cm)	4900	µS/cm @ 25°C
116348	1/09/1993	1:00:00	100	106	Total Alkalinity, as CaCO3	510	mg/L
116348	1/09/1993	1:00:00	100	106	Calcium, as Ca	28	mg/L
116348	1/09/1993	1:00:00	100	106	Chloride, as Cl	1300	mg/L
116348	1/09/1993	1:00:00	100	106	Hardness, as CaCO3 (calc.)	860	mg/L
116348	1/09/1993	1:00:00	100	106	Potassium, as K	30	mg/L
116348	1/09/1993	1:00:00	100	106	Sodium, as Na	740	mg/L
116348	1/09/1993	1:00:00	100	106	Nitrate & Nitrite, as N(0.15de	0.05	mg/L
116348	1/09/1993	1:00:00	100	106	Sulphate, as SO4	220	mg/L
116348	1/09/1993	1:00:00	100	106	Iron (Undigested), as Fe	0.69	mg/L
116348	1/09/1993	1:00:00	100	106	Magnesium, as Mg	190	mg/L
116348	1/09/1993	1:00:00	100	106	Total Soluble Salts (Summation	3130	mg/L
79264	4/03/1987	0:00:00	18	24	Conductivity (µS/cm)	6300	µS/cm @ 25°C
79264	4/03/1987	0:00:00	18	24	Total Alkalinity, as CaCO3	180	mg/L
79264	4/03/1987	0:00:00	18	24	Calcium, as Ca	67	mg/L
79264	4/03/1987	0:00:00	18	24	Chloride, as Cl	2000	mg/L
79264	4/03/1987	0:00:00	18	24	Hardness, as CaCO3	1332.099	mg/L
79264	4/03/1987	0:00:00	18	24	Bicarbonate, as HCO3	219.512	mg/L
79264	4/03/1987	0:00:00	18	24	Potassium, as K	9.4	mg/L
79264	4/03/1987	0:00:00	18	24	Sodium, as Na	860	mg/L
79264	4/03/1987	0:00:00	18	24	Nitrate + Nitrite, as N(0.003d	0.15	mg/L
79264	4/03/1987	0:00:00	18	24	Silica, total as SiO2	39	mg/L
79264	4/03/1987	0:00:00	18	24	Sulphate, as SO4	100	mg/L
79264	4/03/1987	0:00:00	18	24	Iron, total as Fe	12	mg/L
79264	4/03/1987	0:00:00	18	24	Magnesium, as Mg	280	mg/L
79264	4/03/1987	0:00:00	18	24	Total Dissolved Solids, 105C	3436.665	mg/L

Table 5
Visualising Victoria's Groundwater Search
Lab Chemistry

Bore ID	Reading date	Reading time	Interval from (m)	Interval to (m)	Parameter name	Parameter value	Unit of measure
52428	1899-12-30	0:00:00	30	36	Conductivity (µS/cm)	5100	µS/cm @ 25°C
52428	1899-12-30	0:00:00	30	36	Calcium, as Ca	15	mg/L
52428	1899-12-30	0:00:00	30	36	Chloride, as Cl	1300	mg/L
52428	1899-12-30	0:00:00	30	36	Carbonate, as CO3	7	mg/L
52428	1899-12-30	0:00:00	30	36	Hardness, as CaCO3 (calc.)	703	mg/L
52428	1899-12-30	0:00:00	30	36	Potassium, as K	10	mg/L
52428	1899-12-30	0:00:00	30	36	Sodium, as Na	840	mg/L
52428	1899-12-30	0:00:00	30	36	Nitrate, as N	1.129	mg/L
52428	1899-12-30	0:00:00	30	36	Sulphate, as SO4	91	mg/L
52428	1899-12-30	0:00:00	30	36	DME Silicate, as SIO3	55	mg/L
52428	1899-12-30	0:00:00	30	36	Magnesium, as Mg	160	mg/L
52428	1899-12-30	0:00:00	30	36	Total Soluble Salts (Summation	3245	mg/L
79266	1899-12-30	0:00:00	66	93	Conductivity (µS/cm)	8900	µS/cm @ 25°C
79266	1899-12-30	0:00:00	66	93	Calcium, as Ca	54	mg/L
79266	1899-12-30	0:00:00	66	93	Chloride, as Cl	2600	mg/L
79266	1899-12-30	0:00:00	66	93	Hardness, as CaCO3 (calc.)	1549	mg/L
79266	1899-12-30	0:00:00	66	93	Potassium, as K	21	mg/L
79266	1899-12-30	0:00:00	66	93	Sodium, as Na	1400	mg/L
79266	1899-12-30	0:00:00	66	93	Sulphate, as SO4	290	mg/L
79266	1899-12-30	0:00:00	66	93	DME Silicate, as SIO3	20	mg/L
79266	1899-12-30	0:00:00	66	93	Iron, total as Fe	29	mg/L
79266	1899-12-30	0:00:00	66	93	Magnesium, as Mg	340	mg/L
79266	1899-12-30	0:00:00	66	93	Total Soluble Salts (Summation	5498	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Conductivity (µS/cm)	13810	µS/cm @ 25°C
52418	19/09/1974	0:00:00	35.36	42.36	Calcium, as Ca	65	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Chloride, as Cl	4523	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Carbonate, as CO3	50	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Hardness, as CaCO3 (calc.)	1806	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Bicarbonate, as HCO3	699	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Potassium, as K	96	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Sodium, as Na	2520	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Nitrate, as N	4.289	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Sulphate, as SO4	451	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	DME Silicate, as SIO3	18	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Iron, total as Fe	4.5	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Magnesium, as Mg	399	mg/L
52418	19/09/1974	0:00:00	35.36	42.36	Total Soluble Salts (Summation	8840	mg/L
79259	26/02/1983	0:00:00	114	119	Conductivity (µS/cm)	9200	µS/cm @ 25°C
79259	26/02/1983	0:00:00	114	119	Total Alkalinity, as CaCO3	360	mg/L
79259	26/02/1983	0:00:00	114	119	Calcium, as Ca	70	mg/L
79259	26/02/1983	0:00:00	114	119	Chloride, as Cl	2700	mg/L
79259	26/02/1983	0:00:00	114	119	Hardness, as CaCO3	1422.79	mg/L
79259	26/02/1983	0:00:00	114	119	Bicarbonate, as HCO3	439.024	mg/L
79259	26/02/1983	0:00:00	114	119	Potassium, as K	22	mg/L
79259	26/02/1983	0:00:00	114	119	Sodium, as Na	1600	mg/L
79259	26/02/1983	0:00:00	114	119	Nitrate + Nitrite, as N(0.003d	0.2	mg/L
79259	26/02/1983	0:00:00	114	119	Silica, reactive as SiO2	17	mg/L
79259	26/02/1983	0:00:00	114	119	Sulphate, as SO4	660	mg/L
79259	26/02/1983	0:00:00	114	119	Iron, total as Fe	1.73	mg/L
79259	26/02/1983	0:00:00	114	119	Magnesium, as Mg	300	mg/L
79259	26/02/1983	0:00:00	114	119	Total Dissolved Solids, 105C	5132.086	mg/L
109453	1899-12-30	0:00:00	50	54	Conductivity (µS/cm)	4400	µS/cm @ 25°C
109453	1899-12-30	0:00:00	50	54	Calcium, as Ca	28	mg/L
109453	1899-12-30	0:00:00	50	54	Chloride, as Cl	1100	mg/L
109453	1899-12-30	0:00:00	50	54	Hardness, as CaCO3 (calc.)	777	mg/L
109453	1899-12-30	0:00:00	50	54	Potassium, as K	8	mg/L
109453	1899-12-30	0:00:00	50	54	Sodium, as Na	660	mg/L
109453	1899-12-30	0:00:00	50	54	Sulphate, as SO4	140	mg/L
109453	1899-12-30	0:00:00	50	54	DME Silicate, as SIO3	34	mg/L
109453	1899-12-30	0:00:00	50	54	Iron, total as Fe	16	mg/L
109453	1899-12-30	0:00:00	50	54	Magnesium, as Mg	170	mg/L
109453	1899-12-30	0:00:00	50	54	Total Soluble Salts (Summation	2606	mg/L
52415	16/08/1971	0:00:00	48.76	51.81	Conductivity (µS/cm)	7737	µS/cm @ 25°C
52415	16/08/1971	0:00:00	48.76	51.81	Calcium, as Ca	61	mg/L
52415	16/08/1971	0:00:00	48.76	51.81	Chloride, as Cl	2240	mg/L
52415	16/08/1971	0:00:00	48.76	51.81	Hardness, as CaCO3 (calc.)	1003	mg/L
52415	16/08/1971	0:00:00	48.76	51.81	Bicarbonate, as HCO3	628	mg/L
52415	16/08/1971	0:00:00	48.76	51.81	Magnesium, as Mg	207	mg/L
52415	16/08/1971	0:00:00	48.76	51.81	Total Soluble Salts (Conductiv	4668	mg/L
52415	16/08/1971	1:00:00	48.76	51.81	Conductivity (µS/cm)	7737	µS/cm @ 25°C
52415	16/08/1971	1:00:00	48.76	51.81	Calcium, as Ca	58	mg/L
52415	16/08/1971	1:00:00	48.76	51.81	Chloride, as Cl	2182	mg/L
52415	16/08/1971	1:00:00	48.76	51.81	Hardness, as CaCO3 (calc.)	982	mg/L
52415	16/08/1971	1:00:00	48.76	51.81	Bicarbonate, as HCO3	629	mg/L
52415	16/08/1971	1:00:00	48.76	51.81	Magnesium, as Mg	203	mg/L
52415	16/08/1971	1:00:00	48.76	51.81	Total Soluble Salts (Conductiv	4668	mg/L

Table 5
Visualising Victoria's Groundwater Search
Lab Chemistry

Bore ID	Reading date	Reading time	Interval from (m)	Interval to (m)	Parameter name	Parameter value	Unit of measure
79265	29/05/1976	0:00:00	32	42.67	Conductivity (µS/cm)	10730	µS/cm @ 25°C
79265	29/05/1976	0:00:00	32	42.67	Calcium, as Ca	30	mg/L
79265	29/05/1976	0:00:00	32	42.67	Chloride, as Cl	3100	mg/L
79265	29/05/1976	0:00:00	32	42.67	Hardness, as CaCO3 (calc.)	1808	mg/L
79265	29/05/1976	0:00:00	32	42.67	Bicarbonate, as HCO3	1479	mg/L
79265	29/05/1976	0:00:00	32	42.67	Potassium, as K	38	mg/L
79265	29/05/1976	0:00:00	32	42.67	Sodium, as Na	1796	mg/L
79265	29/05/1976	0:00:00	32	42.67	Sulphate, as SO4	138	mg/L
79265	29/05/1976	0:00:00	32	42.67	DME Silicate, as SIO3	50	mg/L
79265	29/05/1976	0:00:00	32	42.67	Iron, total as Fe	3	mg/L
79265	29/05/1976	0:00:00	32	42.67	Magnesium, as Mg	421	mg/L
79265	29/05/1976	0:00:00	32	42.67	Total Soluble Salts (Summation	7052	mg/L
109432	19/05/1975	0:00:00	20	39.5	Conductivity (µS/cm)	11799	µS/cm @ 25°C
109432	19/05/1975	0:00:00	20	39.5	Calcium, as Ca	83	mg/L
109432	19/05/1975	0:00:00	20	39.5	Chloride, as Cl	3552	mg/L
109432	19/05/1975	0:00:00	20	39.5	Hardness, as CaCO3 (calc.)	1561	mg/L
109432	19/05/1975	0:00:00	20	39.5	Bicarbonate, as HCO3	1022	mg/L
109432	19/05/1975	0:00:00	20	39.5	Potassium, as K	23	mg/L
109432	19/05/1975	0:00:00	20	39.5	Sodium, as Na	2125	mg/L
109432	19/05/1975	0:00:00	20	39.5	Sulphate, as SO4	393	mg/L
109432	19/05/1975	0:00:00	20	39.5	DME Silicate, as SIO3	45	mg/L
109432	19/05/1975	0:00:00	20	39.5	Iron, total as Fe	2	mg/L
109432	19/05/1975	0:00:00	20	39.5	Magnesium, as Mg	329	mg/L
109432	19/05/1975	0:00:00	20	39.5	Total Soluble Salts (Summation	7572	mg/L

Table 6
Visualising Victoria's Groundwater Search
Field Chemistry

Bore ID	Date	Time	Interval from	Interval to	pH
109442	29/04/1981	0:00:00	30	39	8.3
109450	22/04/1989	0:00:00	96	120	7.9
109429	1/11/1971	0:00:00	30.48	62.48	6.5
109429	29/08/1972	0:00:00	30.48	62.48	8.3
109440	26/09/1980	0:00:00	31	82	8
109428	13/12/1971	0:00:00	40.8	41.8	8.27
109443	9/04/1981	0:00:00	42	48	8.3
109443	9/04/1981	1:00:00	42	48	8.3
109437	26/06/1978	0:00:00	62	66	8.01
109437	15/11/1978	0:00:00	62	66	8.13
79250	17/10/1977	0:00:00	-	-	8.11
109434	16/06/1976	0:00:00	44.19	54.25	7.97
109422	4/04/1975	0:00:00	-	-	8.29
109449	10/02/1988	0:00:00	70	77	8.2
79252	9/02/1974	0:00:00	27.43	32.61	9
79255	14/03/1980	0:00:00	-	-	8
79256	14/03/1980	0:00:00	61	97	8.2
79257	24/08/1980	0:00:00	78	84	8.3
79257	20/10/1980	0:00:00	78	84	8
79257	23/10/1980	0:00:00	78	84	7.4
79268	5/04/1990	0:00:00	87	93	8.5
120765	20/12/1993	0:00:00	82	94	8.6
116348	1/09/1993	0:00:00	100	106	8.3
116348	1/09/1993	1:00:00	100	106	8.3
79264	4/03/1987	0:00:00	18	24	8
52428	1899-12-30	0:00:00	30	36	8.3
79266	1899-12-30	0:00:00	66	93	8.4
52418	19/09/1974	0:00:00	35.36	42.36	8.19
79259	26/02/1983	0:00:00	114	119	8
109453	1899-12-30	0:00:00	50	54	8.6
52415	16/08/1971	0:00:00	48.76	51.81	7.73
52415	16/08/1971	1:00:00	48.76	51.81	7.65
79265	29/05/1976	0:00:00	32	42.67	7.63
109432	19/05/1975	0:00:00	20	39.5	7.83

Table 7
Visualising Victoria's Groundwater Search
Pump Test

Bore ID	Start date	Time	Interval from (m	Interval to (r	Extraction m	Draw down (r	Pumping t	Recovery	Yield (L/s)	EC (uS/cm)	Pump leve	Water san	Final l	HGU Code	HGU name (for
109452	3/07/1989	14:00:00	78	121	AIR	-	-	-	3.7	-	-	FALSE	-	89	SRW
109442	29/04/1981	14:00:00	30	39	AIR	-	-	-	1.3	-	-	TRUE	-	89	SRW
109450	22/04/1989	14:00:00	96	120	AIR	-	-	-	0.51	-	-	FALSE	-	89	SRW
109445	1/03/1983	14:00:00	103	115	AIR	36	-	-	1.2	-	-	FALSE	-	89	SRW
109429	30/10/1971	13:00:00	30.48	62.48	BAL	-	180	80	-	-	47.24	FALSE	16.15	89	SRW
109429	30/10/1971	14:00:00	30.48	62.48	BAL	31.39	-	-	0.38	-	-	FALSE	-	89	SRW
109441	10/10/1980	14:00:00	80	93	AIR	-	-	-	1.2	-	-	TRUE	-	89	SRW
109440	4/08/1980	14:00:00	31	82	AIR	72	-	-	1	-	-	TRUE	-	89	SRW
WRK032473	31/01/1995	14:00:00	41	166	AIR	-	-	-	5	-	-	FALSE	-	89	SRW
109428	4/11/1971	14:00:00	40.8	41.8	BAL	0.6	-	-	0.19	-	-	FALSE	-	89	SRW
79261	5/08/1982	14:00:00	24	60	AIR	-	-	-	0.25	-	-	FALSE	-	89	SRW
WRK988836	26/01/2009	13:00:00	-	-	NKN	-	-	-	-	-	-	FALSE	30	89	SRW
WRK988836	26/01/2009	14:00:00	-	-	AIR	-	30	1	-	4000	-	FALSE	-	89	SRW
109436	7/02/1977	14:00:00	18	32.91	NKN	-	-	-	3.79	-	-	FALSE	-	89	SRW
109443	9/04/1981	14:00:00	42	48	AIR	12	-	-	0.06	-	-	FALSE	-	89	SRW
143984	11/12/1999	14:00:00	78	93	AIR	-	-	-	0.5	-	-	FALSE	-	89	SRW
109446	31/05/1985	14:00:00	135	150	AIR	-	-	-	1.26	-	-	FALSE	-	89	SRW
109437	26/06/1978	14:00:00	62	66	PUM	-	-	-	10.07	-	-	TRUE	-	89	SRW
139974	20/02/1999	14:00:00	73	85	AIR	-	-	-	0.88	-	-	TRUE	-	89	SRW
143839	9/09/1999	14:00:00	40	63	AIR	-	-	-	1	-	-	FALSE	-	89	SRW
109434	31/05/1976	14:00:00	44.19	54.25	NKN	-	-	-	0.19	-	-	FALSE	-	89	SRW
109419	21/05/1962	14:00:00	43.59	44.5	NKN	-	-	-	-	-	-	FALSE	-	0	(unknown)
109430	30/07/1973	14:00:00	76.2	99.06	PUM	-	-	-	1.26	-	-	FALSE	-	89	SRW
109449	10/02/1988	14:00:00	70	77	AIR	-	-	-	0.88	-	-	FALSE	-	89	SRW
79252	9/02/1974	14:00:00	27.43	32.61	NKN	-	-	-	0.32	-	-	FALSE	-	89	SRW
140205	24/01/2000	14:00:00	22	33.6	AIR	-	45	-	0.51	-	-	FALSE	-	89	SRW
79255	1/02/1980	14:00:00	-	-	BAL	-	-	-	0.05	-	-	TRUE	-	89	SRW
79260	1/06/1982	14:00:00	15	38	AIR	-	-	-	3	-	-	FALSE	-	89	SRW
79256	2/07/1982	14:00:00	61	97	BAL	-	-	-	0.11	-	-	FALSE	-	89	SRW
WRK043244	11/05/2003	13:00:00	-	-	AIR	-	60	15	3.6	-	51.5	FALSE	-	89	SRW
WRK979358	17/02/2007	13:00:00	-	-	NKN	-	-	-	-	-	-	FALSE	23.2	89	SRW
WRK979358	17/02/2007	14:00:00	-	-	AIR	-	30	30	-	-	-	FALSE	-	89	SRW
79257	14/09/1980	14:00:00	78	84	AIR	25	-	-	1.3	-	-	TRUE	-	89	SRW
79268	5/04/1990	14:00:00	87	93	NKN	-	-	-	-	-	-	FALSE	-	89	SRW

Table 7
Visualising Victoria's Groundwater Search
Pump Test

Bore ID	Start date	Time	Interval from (m)	Interval to (r	Extraction m	Draw down (r	Pumping t	Recovery	Yield (L/s)	EC (uS/cm)	Pump leve	Water sam	Final l	HGU Code	HGU name (for
WRK977450	16/02/2007	13:00:00	-	-	NKN	-	-	-	-	-	-	FALSE	34.3	89	SRW
WRK977450	16/02/2007	14:00:00	-	-	AIR	-	30	60	-	-	-	FALSE	-	89	SRW
120765	19/12/1993	0:00:00	82	94	NKN	-	-	-	-	-	-	TRUE	-	90	GMW
120765	19/12/1993	14:00:00	82	94	AIR	95	600	-	0.38	-	-	TRUE	-	90	GMW
116348	31/08/1993	14:00:00	100	106	AIR	-	-	-	0.38	-	-	TRUE	-	89	SRW
79264	4/03/1987	14:00:00	18	24	AIR	-	-	-	0.63	-	-	FALSE	-	89	SRW
WRK985085	21/02/2008	14:00:00	-	-	NKN	-	120	20	-	-	-	FALSE	-	89	SRW
52428	18/10/1989	14:00:00	30	36	AIR	-	-	-	0.25	-	-	FALSE	-	89	SRW
79266	8/12/1988	14:00:00	66	93	AIR	-	-	-	0.51	-	-	FALSE	-	89	SRW
WRK962170	14/08/2003	0:00:00	-	-	-	-	-	-	-	-	-	FALSE	-	89	SRW
52418	13/09/1974	14:00:00	35.36	42.36	AIR	12.49	1320	-	0.15	-	-	FALSE	-	89	SRW
WRK966931	20/09/2004	14:00:00	70	90.5	AIR	-	30	10	0.5	-	-	FALSE	-	89	SRW
79259	24/02/1983	14:00:00	114	119	AIR	57	-	-	0.9	-	-	FALSE	-	89	SRW
79254	1/12/1975	14:00:00	47	55	BAL	18	120	-	0.25	-	-	FALSE	-	89	SRW
109453	17/01/1989	14:00:00	50	54	AIR	-	-	-	0.76	-	-	FALSE	-	89	SRW
WRK991291	4/06/2009	13:00:00	-	-	NKN	-	-	-	-	-	-	FALSE	41	90	GMW
WRK991291	4/06/2009	14:00:00	-	-	AIR	-	60	20	-	0	-	FALSE	-	90	GMW
WRK964250	10/02/2004	14:00:00	66	80	AIR	-	10	20	0.4	-	-	FALSE	24.8	89	SRW
79258	23/10/1982	14:00:00	56	58	AIR	12	-	-	0.76	-	-	FALSE	-	89	SRW
79263	6/08/1982	14:00:00	27	74.67	AIR	-	-	-	1.9	-	-	FALSE	-	89	SRW
WRK960778	19/01/2003	14:00:00	57	63	AIR	-	10	15	0.3	-	-	FALSE	-	89	SRW
134012	11/03/1998	14:00:00	31.6	37.6	NKN	-	-	-	-	-	-	FALSE	-	89	SRW
52415	7/08/1971	14:00:00	48.76	51.81	NKN	4.87	-	-	1.14	-	-	FALSE	-	89	SRW
WRK032833	10/03/1999	14:00:00	23	31	AIR	-	-	-	0.38	-	-	FALSE	-	89	SRW
79265	10/05/1976	14:00:00	32	42.67	NKN	-	-	-	0.06	-	-	FALSE	-	89	SRW
134010	10/03/1998	14:00:00	30.3	36.3	NKN	-	-	-	-	-	-	FALSE	-	89	SRW
134011	11/03/1998	14:00:00	28.8	34.8	AIR	-	-	-	0.06	-	-	FALSE	-	89	SRW

Table 8
Visualising Victoria's Groundwater Search
SWL

Bore ID	Reading date	Reading	Depth to water (
WRK957997	15/11/2004	0:00:00	10.69
WRK957993	11/11/2004	0:00:00	14.9

APPENDIX D BOREHOLE LOGS

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BH01

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 1.3
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH01/0.0-0.1 BH01/0.0-0.1A 181212-S-D01 pH: 6.09 EC: 0.14
		0.5		CH - silty CLAY; high plasticity; brown; stiff; moist; no odour	NATURAL	M			
		1.0		From 1.1m: Soil getting firmer					BH01/1.2-1.3 pH: 7.65 EC: 0.45
		1.3		End of borehole at 1.3 m Auger refused at 1.3m					
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH02

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 2.0
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH02/0.0-0.1 ph: 7.43 EC: 0.24
				CH - silty CLAY; high plasticity; brown; stiff; moist; no odour	NATURAL	M			
		0.5							
		1.0							
		1.5							
				CH - silty CLAY; high plasticity; olive brown; firm; moist; no odour					
		2.0							BH02/1.9-2.0 pH: 7.24 EC: 0.88
				End of borehole at 2.0 m Auger refused at 2.0m					
		2.5							
		3.0							
		3.5							
		4.0							

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BH03

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 2.4
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH03/0.0-0.1 pH: 6.02 EC: 0.18
		0.5		CH - silty CLAT; high plasticity; brown; stiff; moist; no odour	NATURAL	M			
		1.0		CH - silty CLAY; high plasticity; yellowish brown; firm; moist; no odour					
		1.5							
		2.0							BH03/1.9-2.0 pH: 7.03 EC: 0.25
		2.5		End of borehole at 2.4 m Auger refused at 2.4m					
		3.0							
		3.5							
		4.0							

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BH04

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 2.0
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH04/0.0-0.1 pH: 5.92 EC: 0.24
		0.5		CH - silty CLAY; high plasticity; yellowish brown; stiff; moist; no odour	NATURAL	M			
		1.0							
		1.5							
		2.0							BH04/1.9-2.0 pH: 6.90 EC: 0.09
				Auger refused at 2.0 m End of borehole at 2.0 m					
		2.5							
		3.0							
		3.5							
		4.0							

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BH05

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.5
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.5		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH05/0.0-0.1 pH: 5.82 EC: 0.06
				CH - silty CLAY; high plasicity; yellowish brown/brown; stiff; moist; no odour	NATURAL	M			
		1.0		End of borehole at 0.5 m Auger refused at 0.5m					
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH06

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.3
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed			ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH06/0.0-0.1 pH: 5.79 EC: 0.16
				CH - silty CLAY; high plasticity; yellowish brown and brown; stiff; moist; no odour	NATURAL	M			
		0.5		End of borehole at 0.3 m Auger refused at 0.3m					
		1.0							
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH07

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 1.8
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH07/0.0-0.1 pH: 6.61 EC: 0.05
				CH - silty CLAY; high plasticity; brown; stiff; moist; no odour	NATURAL	M			
		0.5							
				CH - silty CLAY; high plasticity; yellowish brown and brown; stiff; moist; no odour					
		1.0							
		1.5		ML - clayey SILT; low plasticity; yellowish brown; firm; moist; no odour					BH07/1.7-1.8 pH: 7.86 EC: 0.15
		2.0		End of borehole at 1.8 m Auger refused at 1.8m on inferred siltstone					
		2.5							
		3.0							
		3.5							
		4.0							

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BH08

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.5
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.5		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH08/0.0-0.1 pH: 7.35 EC: 0.07
				CH - silty CLAY; high plasicity; yellowish brown/brown; stiff; moist; no odour	NATURAL	M			
				End of borehole at 0.5 m Auger refused at 0.5m					
		1.0							
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH09

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 1.1
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH09/0.0-0.1 pH: 6.40 EC: 0.06
		0.5		CH - silty CLAY; high plasticity; yellowish brown and grey; stiff; moist; no odour	NATURAL	M			
		1.0		End of borehole at 1.1 m Auger refused at 1.1m					
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH10

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.8
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH10/0.0-0.1 pH: 7.09 EC: 0.03
		0.5		CH - silty CLAY; high plasticity; yellowish brown and grey; stiff; moist; no odour	NATURAL	M			BH10/0.7-0.8 pH: 7.73 EC: 0.03
		0.8		End of borehole at 0.8 m Auger refused at 0.8m					
		1.0							
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH11

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 2.5
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH11/0.0-0.1 pH: 6.76 EC: 0.02
				CH - silty CLAY; high plasticity; brown; hard; moist; no odour	NATURAL	M			
		0.5							
		1.0		CH - silty CLAY; medium plasticity; yellowish brown and brown; firm; moist; no odour					
		1.5							
		2.0							BH11/1.9-2.0 pH: 7.07 EC: 0.05
		2.5							
				End of borehole at 2.5 m Auger refused at 2.5m on inferred basalt					
		3.0							
		3.5							
		4.0							

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BH12

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.7
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.5		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH12/0.0-0.1 pH: 6.55 EC: 0.04
				CH - silty CLAY; high plasticity; yellowish brown; stiff; moist; no odour	NATURAL	M			
		1.0		End of borehole at 0.7 m Auger refused at 0.7m					
		1.5							
		2.0							BH12/1.9-2.0 pH: 7.40 EC: 0.26
		2.5							
		3.0							
		3.5							
		4.0							

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BH13

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 3.0
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH13/0.0-0.1 BH13/0.0-0.1A 181212-S-D02 pH: 6.52 EC: 0.06
				CH - silty CLAT; high plasticity; brown; stiff; moist; no odour	NATURAL	M			
		0.5							
		1.0							
				From 1.3m: Increasing moisture					
		1.5							
		2.0							BH13/1.9-2.0 pH: 6.67 EC: 0.09
				CH - silty CLAY; high plasticity; light yellowish brown; soft; moist; no odour					
		2.5							
		3.0							
				End of borehole at 3.0 m					
		3.5							
		4.0							

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BH14

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 1.5
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH14/0.0-0.1 pH: 7.40 EC: 0.26
		0.5		CH - silty CLAY; high plasticity; yellowish brown and grey; stiff; moist; no odour	NATURAL	M			
		1.0							
		1.5							BH14/1.4-1.5 pH: 7.73 EC: 0.15
				End of borehole at 1.5 m Auger refused at 1.5m					
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH15

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 1.4
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		FILL (ML) - clayey SILT; grey; with gravel (fine grained, sub rounded); dry; no odour;	FILL	D			
		0.5		ML - clayey SILT; low plasticity; greyish brown; firm; moist; no odour	NATURAL	M			BH15/0.3-0.4 pH: 6.25 EC: 0.11
				CH - silty CLAY; high plasticity; brown; stiff; moist; no odour					
		1.0							BH15/1.3-1.4 pH: 6.74 EC: 0.18
		1.5		End of borehole at 1.4 m Auger refused a 1.4m					
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH16

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 1.3
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH16/0.0-0.1 pH: 6.16 EC: 0.05
		0.5		CH - silty CLAY; high plasicity; brown; stiff; moist; no odour	NATURAL	M			
		1.0		CH - silty CLAY; high plasticity; grey; firm; moist; no odour					BH16/0.9-1.0 pH: 7.84 EC: 0.21
		1.3		End of borehole at 1.3 m Auger refused at 1.3m					
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH17

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.5
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.5		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH17/0.0-0.1 pH: 7.14 EC: 0.01
				CH - silty CLAY; high plasticity; brown; stiff; moist; no odour;	NATURAL	M			
				End of borehole at 0.5 m Auger refused at 0.5m					
		1.0							
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

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BH18

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 3.0
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.0		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH18/0.0-0.1 pH: 6.60 EC: 0.07
				CH - silty CLAY; high plasicity; brown; stiff; moist; no odour	NATURAL	M			
		0.5							
		1.0		CH - sandy CLAY; medium plasticity; light brown; firm; moist; no odour					
		1.5							
		2.0							BH18/1.9-2.0 pH: 7.44 EC: 0.10
		2.5							
		3.0		SC - clayey gravelly SAND (medium to coarse grained, gap graded, sub angular); low plasticity; yellowish brown; dense; moist; no odour					
		3.5		End of borehole at 3.0 m					
		4.0							

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BH19

Soil Bore

Client:	Victorian Planning Authority	Project number:	1801684
Project:	Hydrogeological and Acid Sulphate Soil Assessment	Logged/prepared by:	A.HAYES/S.TOMKINSON
Location:	Craigieburn West Precinct	Checked by:	A.HAYES
Date started:	12/12/2018	Date completed: 12/12/2018	Borehole depth (m): 0.8
Driller:	Strata Drilling Pty Ltd		Borehole diameter (mm): 100
Drilling equipment:	Solid Auger		

Method	Water	Depth (m)	Graphic Log	Material Description	Observations	Moisture	PID (ppm)	Contamination Ranking	Sample details
Solid Auger	None observed	0.5		ML - clayey SILT; low plasticity; greyish brown; firm; dry; no odour;	NATURAL TOPSOIL	D			BH19/0.0-0.1 pH: 7.16 EC: 0.05
				CH - silty CLAY; high plasticity; brown; stiff; moist; no odour	NATURAL	M			
		1.0		End of borehole at 0.8 m Auger refused at 0.8m					
		1.5							
		2.0							
		2.5							
		3.0							
		3.5							
		4.0							

APPENDIX E GEOTECHNICAL REPORT (STRATA GEOSCIENCES AND ENVIRONMENTAL, 2018)

strata
geoscience and environmental

Preliminary Geotechnical Reconnaissance for

Craigieburn West Precinct Structure Plan

Craigieburn

Commissioned by

Beveridge Williams Pty Ltd

December 2018

Important Notes:

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Table of Contents

Abstract

Beveridge Williams Pty Ltd contracted Strata Geoscience and Environmental Pty Ltd to conduct a preliminary geotechnical reconnaissance of areas underlying the proposed Craigieburn West Precinct.

The investigation consisted of geotechnical drilling to a maximum of 3.0 meters below the existing ground surface to characterise the nature of soils/rock underlying the precinct.

The precinct is a composite of a number of rural/residential holdings underlain by Clayey SILTS (ML) and Silty CLAYS (CL/CH) with variable bore refusal over inferred Quaternary aged new volcanics. Near surface basalt rock outcroppings were observed over significant areas of the precinct, whilst minor areas in the south are underlain by inferred Devonian Granite and Silurian aged Siltstones. Samples of soil were submitted to laboratory testing and found to be highly dispersive.

Given these findings, precinct-specific geotechnical risks to site development are highlighted and preliminary recommendations for utility services, foundations systems, pavements and earthworks are made.

1. Introduction

1.1 Precinct Location and Investigation Context

The precinct is located at immediate south of Mt Ridley Road and immediately east of Mickleham Road, bordering the suburbs of Craigieburn and Mickleham. The ground surface is predominantly vegetated with grasses and remnant natives. Site photographs and a site plan showing existing site conditions is presented in Appendix 1/2. This investigation has been triggered as part of a due diligence process prior to development.

1.2 Scope of Investigation

It is the scope of this investigation to consider geotechnical factors affecting site development. These factors have been determined in consultation with the Beveridge Williams Pty Ltd and are subject to time and budgetary considerations. The investigation comprised initial briefings, review of all relevant literature and site specific investigation as detailed in Section 2.

1.3 Guidelines and Standards Referenced

This investigation is made in accordance to the following standards and guidelines:

- Standards Australia (1993) AS1726-Geotechnical Site Investigations
- Standards Australia (1997) AS1289.5.2.1 – Soil Testing for Engineering Purposes
- Standards Australia (2004) AS/NZS4360 - Risk Management
- Standards Australia (2007) AS3798 “Guidelines for Earthworks on commercial and residential subdivision”
- Standards Australia (2011) AS2870 “Residential Slabs and Footings”

2. Investigation

2.1 General

The investigation was carried out on 12-13 December 2018 with characterisation of the overburden soils by drilling of 19 geotechnical test bores to a maximum depth of 3.0 meters below the existing ground surface (mgs) across the precinct using a Dando Terrier Drilling Rig with Solid Flight Rotary Auger. In situ soil strength of cohesive soils was tested using a vane shear/DCP and pocket penetrometer and soil densities were noted where appropriate. Soil samples were taken for latter geotechnical testing.

2.2 Findings

2.2.1 Geology and Soils

Published geological mapping of the immediate area (Fig 1) indicates that the precinct is underlain by three geological unit, namely:

1. Quaternary aged Newer Volcanics (Qvn)
2. Silurian aged Siltstones (Sud)
3. Devonian aged Granite (Dug)

Geotechnical soils to a maximum depth of 3.0 meters below the existing ground surface (mbg) and found a variable veneer of Clayey Silts (ML) and Silty CLAYS (CH) overlying inferred Quaternary-aged Basalts. Stoney rises and rocky outcroppings of basalt were observed over significant areas of the precinct. Bore BH18 was associated with inferred Devonian aged Granites whilst BH 7 is thought to be associated with Silurian Siltstones. Bore logs and bore locations are presented in Appendix 2.

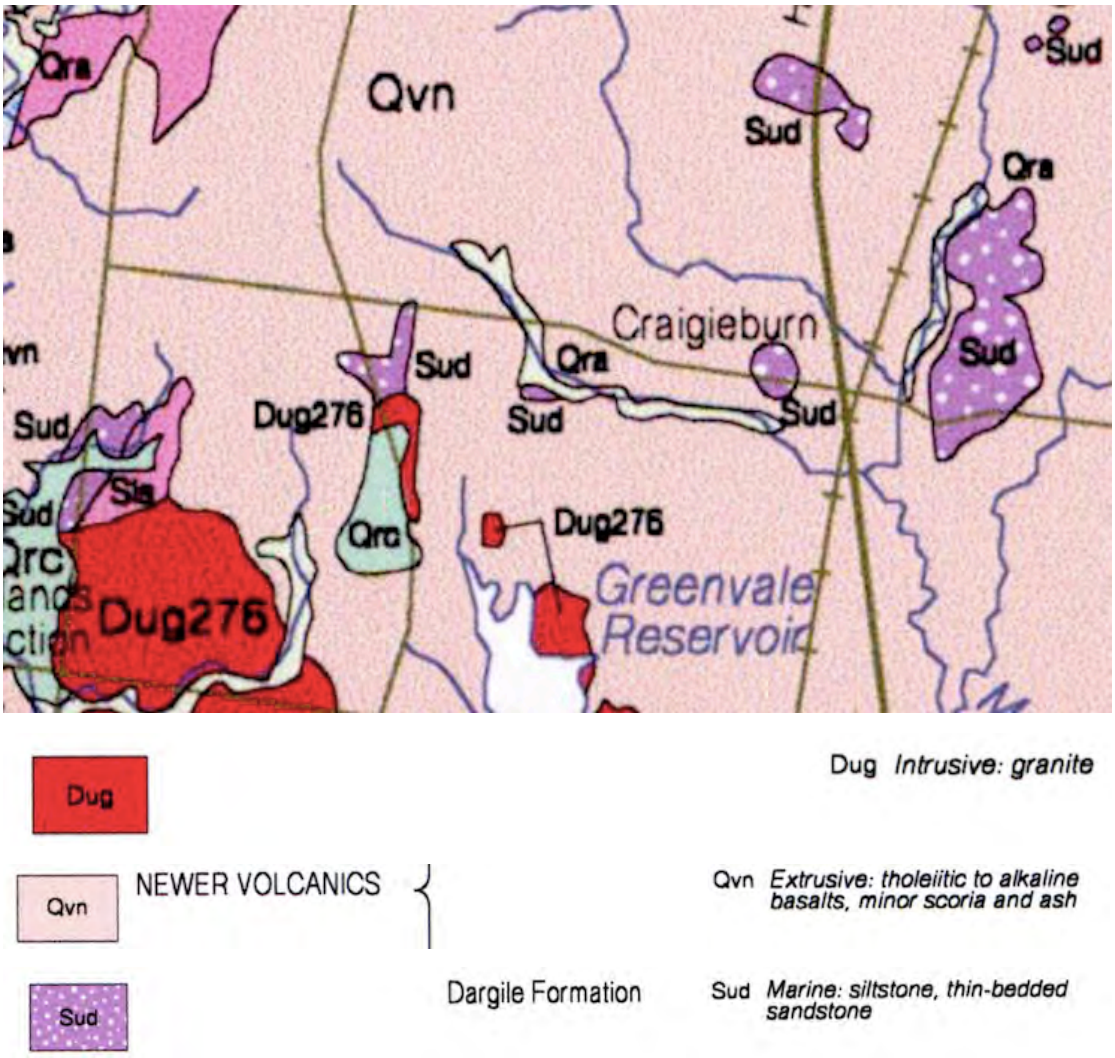

Figure 1 Surface Geology Underlying and Surrounding Investigation Area (Geoscience Australia 1:250000 Melbourne Map Sheet)

2.2.2 Near Surface Hydrogeology

No groundwater was encountered throughout geotechnical reconnaissance over the site. It is noteworthy that shallow ephemeral water tables may exist throughout wetter periods. Accordingly construction activities are not recommended preceding during or immediately post periods of high rainfall.

2.2.3 Laboratory Testing

Samples were submitted to Eurofins Laboratories for the following NATA accredited testing:

- Moisture Content
- Atterberg Limits
- Emmerson Class

Results are presented in Appendix 3 and are discussed in Section 3.

2.2.4 Geotechnical Risk Assessment

A brief geotechnical risk assessment based upon site reconnaissance, geotechnical drilling (Appendix 2) and laboratory results (Appendix 3) is presented below:

Table 1 Geotechnical Risk Assessment	
Geotechnical Parameter	**Results**
General Comments	Volcanic plain parting to rolling hills and gully to the south. Partially vegetated site with pockets of mature trees, numerous farm dams, minor disturbed areas.
Geotechnical Risks	
Earthworks	Shallow hard rock deposits likely over significant areas of the precinct. This will impact excavation activities including excavation of service trenches, road cutting, pile inserts and foundation construction.
Dust	Aerialisation of dust likely when bulk earthworks conducted in drier periods. Dust management measures to prevent aerialisation should be implemented.
Uncontrolled Fill	Low - Moderate risk – uncontrolled fill MUST not be used as a founding substrate for roads, buildings or services infrastructure. Fill may be created through site development or by bulk earthworks.
Slope Stability	Generally low risk
Bearing Capacity	Low risk if bearing pressures up to 100 kPa adopted in natural clays subject to adequate localised drainage.
Differential Settlement	Low to Moderate Risk- up to 25mm possible
Soil Reactivity	High Risk – design to predicted Ys up to 75 mm
Erosion Potential	Moderate risk – stabilise fill batters, capture and diver all stormwater flows
Flood Risk	Not known
Surface/Subsurface Water	Numerous farm dams. Groundwater not encountered – perched water tables over endemic clays (where present) likely throughout wetter months, drainage required where foundations/utilities/roading are founded in this zone. Existing dams should not be used as subdivisional development areas without further site specific intensive geotechnical assessment
Backfilling suitability	Suitable
Other – Aggressive Soils, Acid Sulphate Soils, Collapsible soils	Not likely

3. Geotechnical Recommendations for Precinct Development

It is noteworthy that development plans were unavailable at the time of this investigation and as a result the following construction recommendations must be treated as preliminary subject to ratification once plans are finalised.

3.1 Indicative Soil Design Parameters

Indicative materials design parameters for encountered materials onsite are provided below. The values are estimations based on well-known correlations. These values should not be overemphasized and specialized laboratory testing is recommended if a higher level of accuracy is desired or required. In addition, other factors that need to be considered for soil and rock parameter selection are: geological and geotechnical background information, possible modes of failure, ranges of in situ and imposed stresses, potential variability of the parameter values and the sensitivity of the design to these variabilities, extent of the zone of influence governing the soil behaviour, influence of workmanship on artificially placed or improved soils, effects of construction activities on the properties of the in situ soil, etc (clause 7.3.4. of AS 5100.3-2004).

Table 2 Indicative Soil Design Parameters

Material*[1]	Typical Depth to top of unit (mm)	Bulk Unit Weight *(kN/m^3)* *[2]	Ground Surface Movement (Ys) (mm)	UCS (kPa)	(ϕ)*[3]	ϕ'*[3]	Cu *[3]	Cu'*[3]	Bearing Pressure (Serviceable) (kPa) *[4]	Allowable Skin Friction	E (MPa)
CLAYEY SILTS (ML)	*0-300*	*15*	*10*	*20*	*0*	*30*	*10*	*0*	*50*	*0*	*0*
SILTY CLAYS(CL/CH)	*VARIABLE*	*18*	*Up to 75*	*100*	*0*	*25*	*20*	*0*	*100*	*15*	*5*

Legend:

Y = Unit Weight (kN/m^3), Y_s = Groundsurface Movement (mm), ϕ = Internal Angle of Friction (deg), ϕ' = Effective (drained) Internal Angle of Friction (deg), Cu = Undrained Soil Cohesion (kPa), Cu' = Effective (drained) Undrained Soil Cohesion (kPa), E = Youngs Modulus (MPa)

*[*1] Assumes soils are at a dry or slightly moist moisture content*

*[*2] Estimated from bore logs/strength test results as appropriate.*

*[*3] Apply to short term loading conditions eg windloads*

*[*4] Where allowable bearing pressure in rock is given, coring of excavated substrate and PLT testing must be commissioned to confirm. Recommended depth does not consider overturning parameters and this must be considered by the foundation designer.*

[5] The values provided for rock should be treated as a reference only as values provided are based on typical values provided in the literature and are not based on the actual rock conditions on site (i.e. rock testing was not undertaken). For further information related to the rock in-situ, additional investigation should be undertaken.

*[*6] Where depth to bedrock is given it is a guide only and will vary over the proposed development area(s). Refusal in geotechnical bores may be different than that of larger construction machinery and this may need to be factored into foundation design and contractor quotations.*

3.2 Building, Roading and Utility Recommendations

3.2.1 Pad, Strip and Slab Foundations

Pad, slab and strip footings are acceptable foundation solutions only when founding in underlying natural Silty CLAYS (CL/CH). The following loadings are appropriate:

Table 3 Ultimate Bearing Pressures (kPa) at 600 mm

Foundation Type	Silty CLAY (CL/CH)
Continuous Strip	*200*
Isolated Pad	*200*
Raft	*200*

3.2.2 Pier/Pile Systems

All piers/piles MUST:

- Penetrate through any uncontrolled fill, upper Clayey SILTS (ML) and into firm to stiff underlying Silty CLAYS (CL/CH)
- Be founded at a minimum of 1.5 m below the existing ground surface (or refusal). This recommendation may be revised subject to review of specific development plans when available.
- Have a maximum end bearing of 100 Kpa and a maximum skin friction of 15Kpa below the first meter of natural soils.

It is further recommended that:

- A maximum pile spacing of 2.0 m is recommended for Natural CLAYS (CL/CH)
- This will require reduction where piles are proximal to existing structures or in deep uncontrolled fill.
- Soils immediately in front of piles should be left in place until immediately before construction proceeds.
- Shotcerete in-filled walls MUST be constructed as soon as possible once infill is removed and reinforcing is placed
- Conduct excavation/construction excavations in drier months and not after significant prolonged rainfall or when perched water tables or significant groundwater recharge is occurring.
- All bulk excavations be regularly monitored.

3.2.3 Roading and Utility Infrastructure

Geotechnical drilling of the precinct revealed Clayey SILTS (ML)/Silty CLAYS (CL/CH). Based on experience with similar subgrades, it is recommended that:

- A CBR range value of 3-6 % be adopted for subgrade materials

This range is close to a lower bound value for these materials and are based

on the assumption that the topsoil will be stripped (where required) prior to pavement construction. It is also contingent upon adequate site preparation by proof rolling (to detect any unsuitable soft or loose material) and subgrade compaction.

Higher values may be achievable where subgrade materials comprise a high proportion of granular and rock materials potentially won from excavation. Furthermore remedial work associated with ripping, watering and reworking of high plasticity CLAYS may improve compaction and lead to an increase in adopted CBR design values. Such values can only be determined after a representative sample comprising similar plasticity content and particle size, as proposed to be used, is subjected to additional CBR testing.

The above recommendations are based on the provision and maintenance of adequate surface and subsurface drainage.

Excavation/directional drilling of underground servicing infrastructure will be in endemic clays and rock. Hard rock is likely to be encountered over significant areas of the precinct and will likely require specialist excavation techniques including rock breaking and or blasting.

3.3 Earthworks Specifications and Suitability of Endemic Soils For Reuse

Geotechnical drilling revealed that site excavation to would be in filling material/residual soils/rock. Geotechnical test pitting immediately prior to bulk excavations over the proposed excavation areas is recommended given the potential for shallow rock over some areas as encountered in some bores and observed over the landscape. This may affect the ability to cost effectively establish underground services in some areas.

Recommended safe generic batter angles for soil found are as follows:

Table 4 Recommended Safe Batter Angles for Soil Textural Classes

Material*	**Safe Batter Angle (degrees)**
Fill/SANDS (SW/SP/SC/SM)	*30*
Soft- Firm CLAYS (CL/CH)	*30*
Stiff CLAYS (CL/CH)	*45*
Dense Clayey SANDS (SC)	*45*
Dense Clayey Gravels (GC)	*45*

** Assumes soils are at a dry or slightly moist moisture content*

Given that soils will unlikely be at dry to slightly moist moisture contents, an engineered design solution for shoring and retaining of pit walls will be required.

Endemic soils (not uncontrolled fill) won from site is likely unsuitable for reuse given soil dispersion results. Further testing is recommended once development plans are available.

3.4 Retaining Wall Specifications Recommendations

Design and installation of retaining walls should comply with the following:

- Backfilling must
    - Comprise imported granular free draining material <5% fines.
    - Not be compacted
    - The top 10% of the total height can be backfilled with endemic reserved topsoil spoil. A geotextile liner should be place below this material to prevent fine ingress into granular material below.
- Checks for sliding/overturning can be made using above parameters.
- Surcharges to lateral earth pressures of a minimum of 5kPa be applied to all walls
- Walls MUST have adequate drainage installed. This drainage MUST:
    - Be comprised of geotextile encased commercially available agricultural pipe.
    - Have discharge points to stormwater pits/outlets
    - Have accessibility and flush points fitted.
    - Perched water tables associated with upper soil profiles may result in significant shallow groundwater discharge into excavations throughout wetter months. Accordingly it is highly recommended that all bulk earthworks occur throughout the drier months of the year and that construction begin immediately after excavations are complete.

3.5 Water Management Infrastructure Recommendations

Emmerson Class testing revealed that subsoils are generally prone to severe soil dispersion, it is recommended that bulk storages have excavated surfaces treated with gypsum and are lined to prevent potential soil dispersion/erosion and the resultant risks associated with structural infrastructure failure and water quality decline. It is further recommended that an Erosion Risk Assessment and Soil and Water Management Plan be commissioned and implemented prior to site development.

4. Conclusions and Further Recommendations

The following geotechnical risks have been identified throughout this investigation:

- **Areas of shallow rock or surface rock outcroppings**
- **Uncontrolled fill/disturbed soils**
- **Potential for soil dispersion and erosion**
- **Proximal trees within zone of influence for future foundations causing abnormal soil moisture gradients.**
- **Wet areas associated with existing farm dams, springs.**

These risks may be controlled by:

- **Minimising bulk earthworks, site cutting and underground services installation where possible. Employ suitable excavation techniques after test pitting which may involve specialist techniques such as blasting or hammering.**
- **Commissioning and implementing a Soil and Water Management Plan and Erosion Risk Assessment prior to site development.**
- **Installation/Maintenance of adequate site drainage.**
- **Adoption of recommended soil design parameters.**
- **Exclude farm dams and springs from future development – incorporate into stormwater design elements or retain as landscaping/recreation amenities.**

Prior to construction it is highly recommended that:

- **Results of this investigation MUST be ratified when specific development plans are finalised. Failure to ensure this will void the classifications and recommendations contained within this report. Further geotechnical investigation/testing may be required at this time.**
- Test pitting with construction machinery is recommended before construction commences to determine excavatability of refusing substrate (if found).
- Abnormal moisture conditions as defined in AS2870-2011 Clause 1.3.3 (a-d) must be considered in the design of competent footings. Without such consideration distresses of foundations may occur and result in non acceptable performance as defined in AS2870-2011 Clause 1.3.1.
- This investigation did not determine rock strength parameters of the refusing substrate (if found) and therefore no comment is made about the excavatability of rock at depth. Hard rock may be encountered which may be difficult to excavate and would therefore increase the costs associated with bulk earthworks. Test pitting is recommended before construction commences to determine rock excavatability.
- Rocks may be liberated from bulk earthworks or vertical boring. Where large rocks are liberated this may impact upon the ability to cost effectively build on the site and further advice should be sort from Strata. Such profiles may also significantly increase earthworks costs and or materials cost in foundations.

Throughout construction it is highly recommended that:

- Uncontrolled fill MUST NOT be used as a founding substrate. Such fill may be created after site investigation as part of site levelling activities.
- All earthworks onsite must follow the recommendations of AS 3798-2007.
- Consideration should be given to drainage and sediment control on site during and after construction. Specifically upslope interceptor drainage must be placed around footings areas and downpipes must be directed away from discharging into founding areas.
- All colluvial rocks and boulders in founding zones should be removed
- All large trees near the building envelope must be removed. If construction takes place in summer or autumn then moisture conditions should be stabilised by soaking of dry areas around the former tree.
- Vertical barriers to prevent root incursions around founding zones should be considered in areas where trees are proximal to foundations

Questions regarding any aspect of this report may be directed to the author via the email contact below.

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Strata Geoscience and Environmental Pty Ltd
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5. Appendices

This report contains the following appendices:

- **Appendix 1** Site Photos
- **Appendix 2** Bore Logs and Field Notes
- **Appendix 3** Laboratory Results
- **Appendix 4** Statement of Limitations

All appendices **must** accompany this report and be reproduced faithfully in **full colour**.

Appendix 1 Site Photos

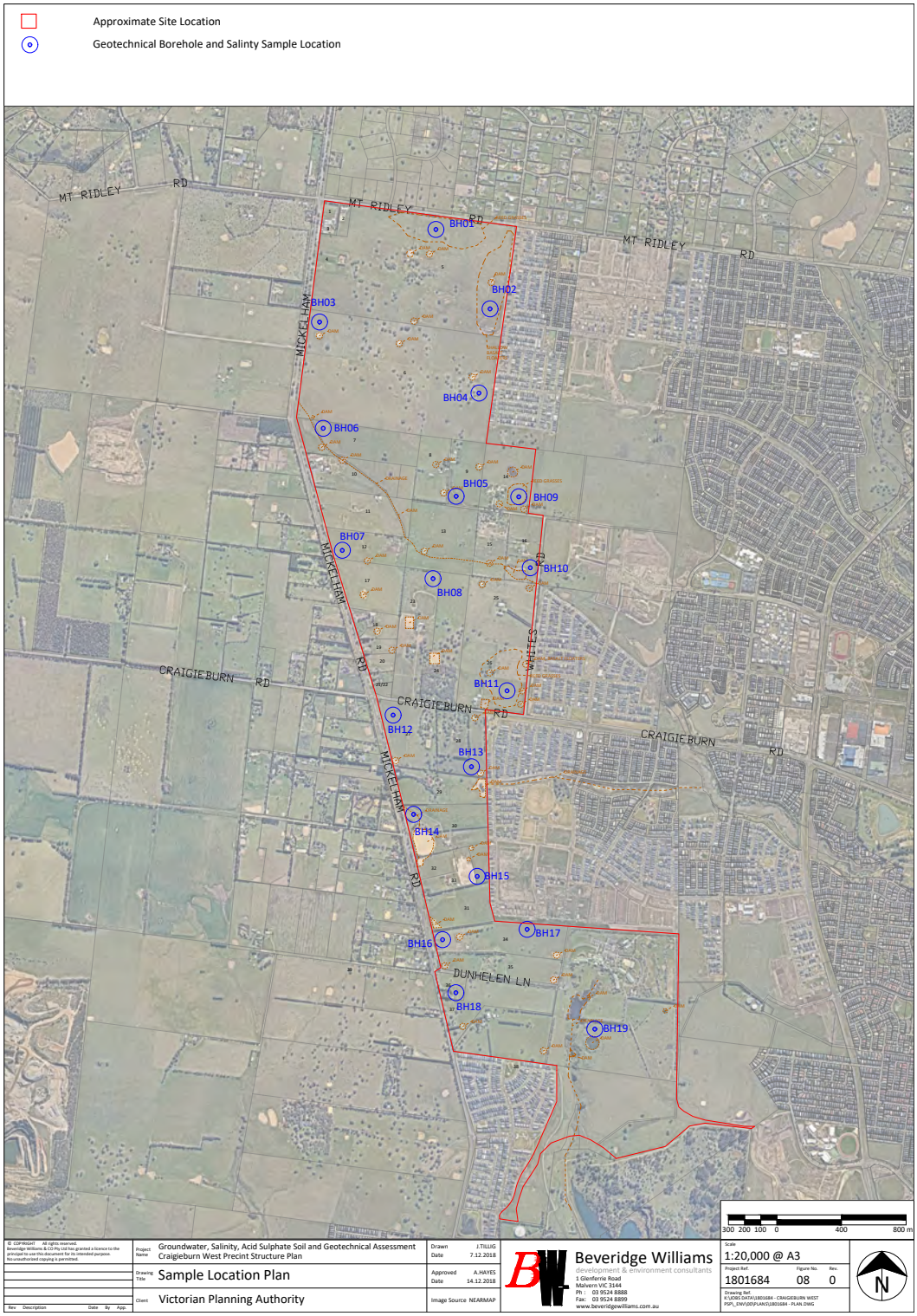
Plate 1 (above)Basalt rock outcroppings

Plate 2 (below) Look south east over northern areas showing stony rises.

Plate 3 (above) Drilling BH05

Plate 4 (above) Example of large farm dam within precinct.

Appendix 2 Bore Logs



Location	Easting	Northing
BH01	313181.37	5840470.76
BH02	313518.94	5839977.43
BH03	312456.91	5839895.91
BH04	313447.95	5839457.81
BH05	313307.14	5838818.76
BH06	312483.67	5839239.3
BH07	312602.04	5838483.87
BH08	313164.06	5838307.89
BH09	313694.74	5838814.89
BH10	313765.92	5838376.15
BH11	313622.11	5837613.6
BH12	312916.9	5837463.42
BH13	313401.53	5837143.36
BH14	313043.17	5836848.49
BH15	313437.08	5836464.28
BH16	313222.75	5836072.35
BH17	313746.15	5836136.17
BH18	313305.14	5835743.5
BH19	314165.05	5835518.24

strata

Bore Log

BH01

Client:	VICTORIAN PLANNING AUTHORITY	Coords	
Project:	CRAIGIEBURN WEST PSP		
Drill Type:	DANDO TERRIER DRILL RIG	Bearing:	Dip:
Drilling Met	ROTARY AUGER	R.L:	SEE WS
Fluid	Nil	Logged by:	SN
		Date:	12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose; Soft/Loose; Firm/M Dense; Stiff/Dense; V Stiff/V Dense	Rock: Ex Low; Very Low; Low; Medium; High; Very High; Extremely High	Weathering: EW; HW; MW; SW; FS; FR	Frac. Spacing (m): 0.01; 0.05; 0.1; 0.5; 1	Sampling and Insitu Testing: TYPE; RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP						
			TRENDING BROWN SILTY CLAY (CH): STIFF, HP						
	500								
	1000		TRENDING FIRM, GRADUAL REFUSAL						
	1500								
	2000								
	2500								
	3000								
	3500								
	4000								
	4500								
	5000								
			BORE TERMINATED AT 1.3 M						
	5500								
	6000								

strata

Bore Log

BH02

Client: VICTORIAN PLANNING AUTHORITY
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Drilling Met ROTARY AUGER
Fluid Nil

Coords
Bearing: Dip:
R.L: SEE WS
Logged by: SN
Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML) FIRM, LP																										
			TRENDING BROWN SILTY CLAY (CH) STIFF, HP																										
	500																												
	1000																												
	1500																												
			TRENDING OLIVE BROWN SILTY CLAY (CH) FIRM, HP, GRADUAL REFUSAL																										
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 2.0 M																										
	5500																												
	6000																												

strata

Bore Log

BH03

Client: VICTORIAN PLANNING AUTHORITY

Project: CRAIGIEBURN WEST PSP

Drill Type: DANDO TERRIER DRILL RIG

Drilling Met ROTARY AUGER

Fluid Nil

Coords

Bearing: Dip:

R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML) FIRM, LP																									
			TRENDING BROWN SILTY CLAY (CH) STIFF, HP																									
	500																											
	1000																											
			TRENDING YELLOWISH BROWN SILTY CLAY (CH) FIRM, HP, GRADUAL REFUSAL																									
	1500																											
	2000																											
	2500																											
	3000																											
	3500																											
	4000																											
	4500																											
	5000																											
			BORE TERMINATED AT 2.4 M																									
	5500																											
	6000																											

strata

Bore Log

BH04

Client:	VICTORIAN PLANNING AUTHORITY	Coords	
Project:	CRAIGIEBURN WEST PSP		
Drill Type:	DANDO TERRIER DRILL RIG	Bearing:	Dip:
Drilling Met	ROTARY AUGER	R.L:	SEE WS
Fluid	Nil	Logged by:	SN
		Date:	12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			MIXED YELLOWISH BROWN/ BROWN SILTY CLAY (CH) STIFF, HP																										
			GRADUAL REFUSAL																										
	500																												
	1000																												
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 2.0 M																										
	5500																												
	6000																												

strata

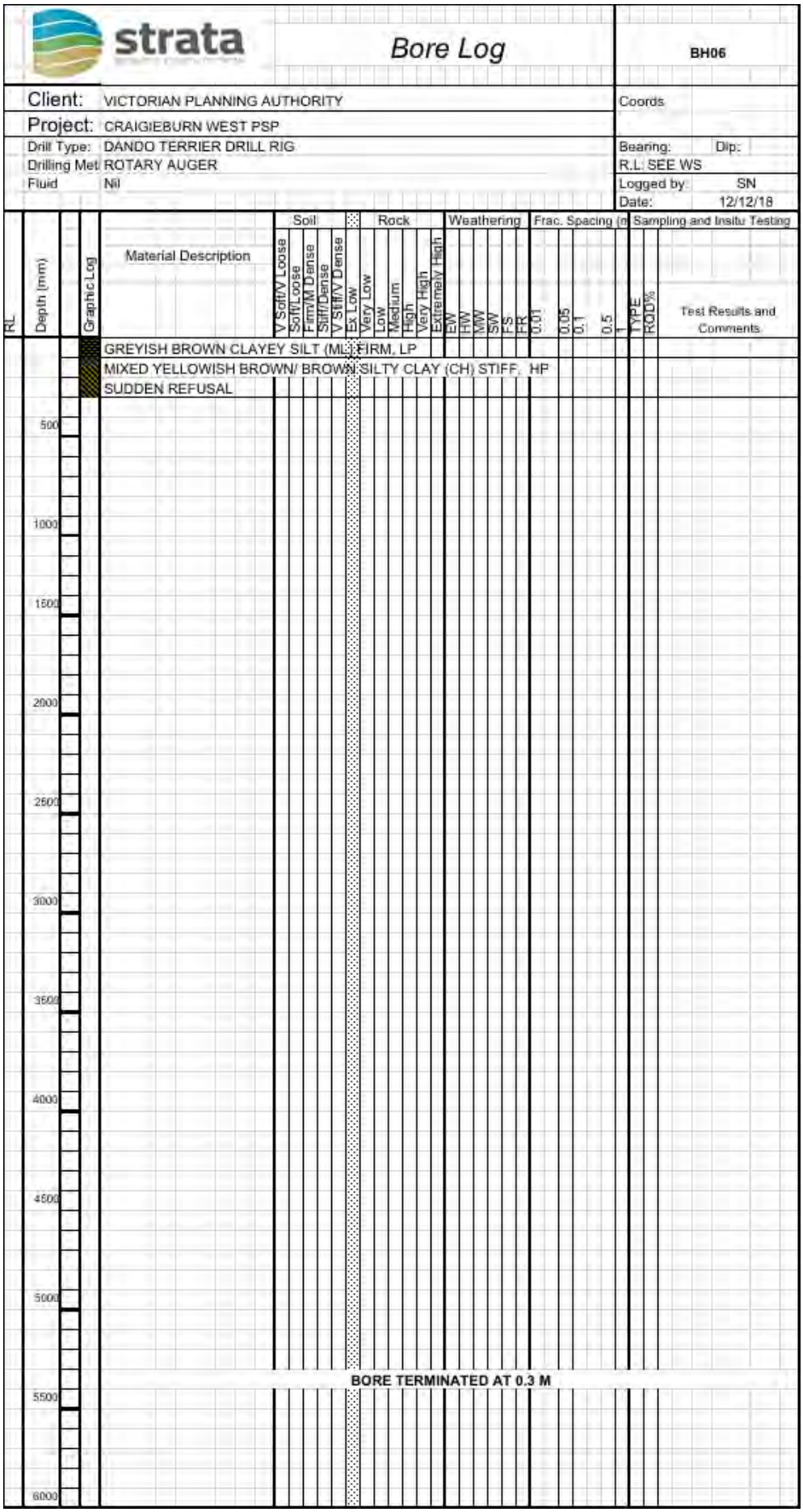
Bore Log

BH05

Client:	VICTORIAN PLANNING AUTHORITY
Project:	CRAIGIEBURN WEST PSP
Drill Type:	DANDO TERRIER DRILL RIG
Drilling Met	ROTARY AUGER
Fluid	Nil

Coords:
Bearing: Dip:
R.L: SEE WS
Logged by: SN
Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			MIXED YELLOWISH BROWN/ BROWN SILTY CLAY (CH) STIFF, HP																										
			SUDDEN REFUSAL																										
	500																												
	1000																												
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 0.5 M																										
	5500																												
	6000																												



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Bore Log

BH06

Client: VICTORIAN PLANNING AUTHORITY

Project: CRAIGIEBURN WEST PSP

Drill Type: DANDO TERRIER DRILL RIG

Drilling Met: ROTARY AUGER

Fluid: Nil

Coords:

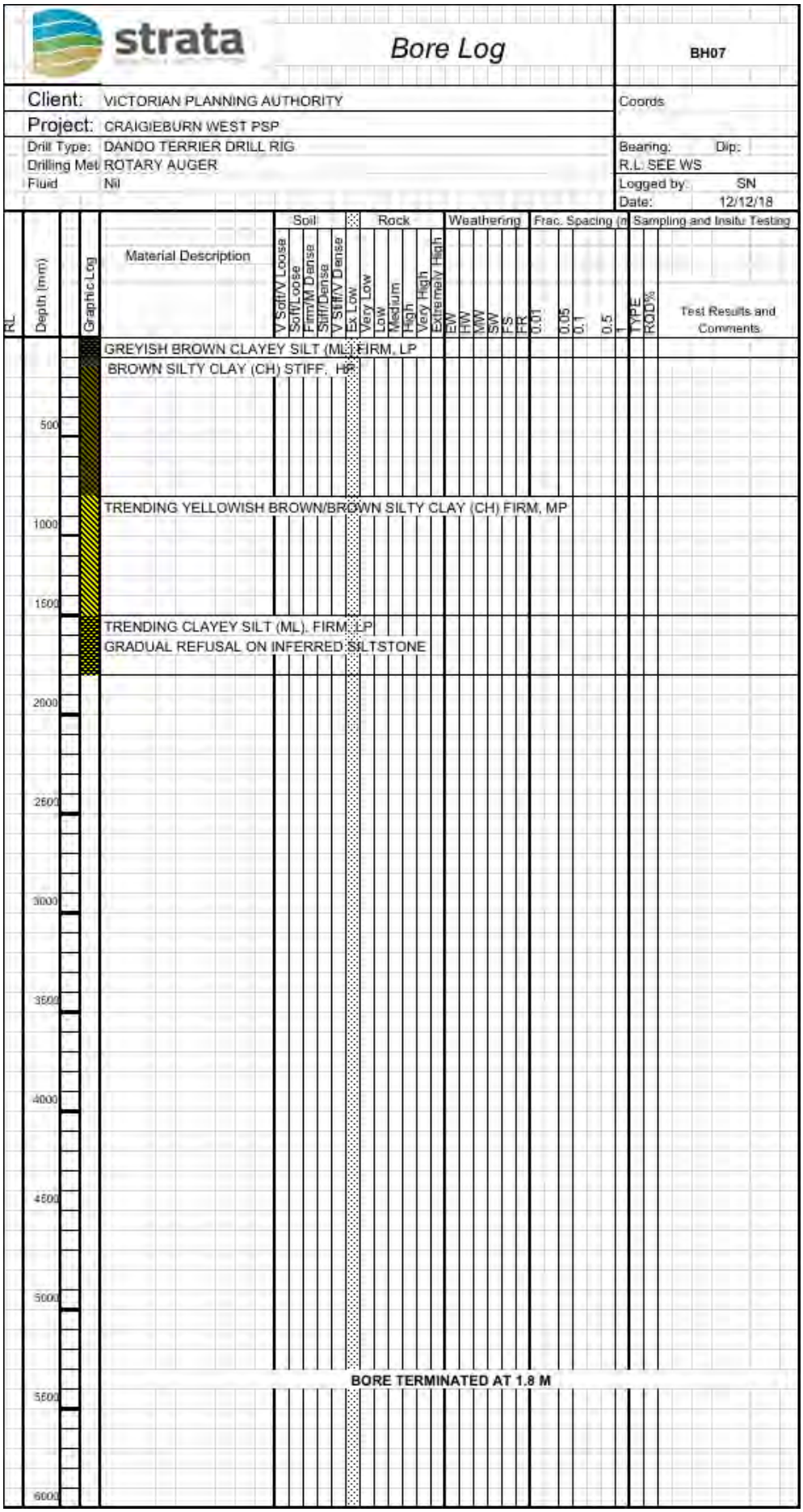
Bearing: Dip:

R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																									
			MIXED YELLOWISH BROWN/ BROWN SILTY CLAY (CH) STIFF, HP																									
			SUDDEN REFUSAL																									
	500																											
	1000																											
	1500																											
	2000																											
	2500																											
	3000																											
	3500																											
	4000																											
	4500																											
	5000																											
			BORE TERMINATED AT 0.3 M																									
	5500																											
	6000																											


strata
Bore Log
BH07
Client: VICTORIAN PLANNING AUTHORITY
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Drilling Met ROTARY AUGER
Fluid Nil
Coords
Bearing: Dip:
R.L: SEE WS
Logged by: SN
Date: 12/12/18
RL
Depth (mm)
Graphic Log
Material Description
Soil
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Rock
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
Weathering
EW
HW
MW
SW
FS
FR
Frac. Spacing (m
0.01
0.05
0.1
0.5
1
Sampling and Insitu Testing
TYPE
ROD%
Test Results and Comments
GREYISH BROWN CLAYEY SILT (ML), FIRM, LP
BROWN SILTY CLAY (CH) STIFF, HP
TRENDING YELLOWISH BROWN/BROWN SILTY CLAY (CH) FIRM, MP
TRENDING CLAYEY SILT (ML), FIRM, LP
GRADUAL REFUSAL ON INFERRED SILTSTONE
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
BORE TERMINATED AT 1.8 M

strata

Bore Log

BH08

Client: VICTORIAN PLANNING AUTHORITY
Coords:

Project: CRAIGIEBURN WEST PSP

Drill Type: DANDO TERRIER DRILL RIG
Bearing: Dip:

Drilling Met: ROTARY AUGER
R.L: SEE WS

Fluid: Nil
Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			MIXED YELLOWISH BROWN/ BROWN SILTY CLAY (CH) STIFF, HP																										
			SUDDEN REFUSAL																										
	500																												
	1000																												
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 0.5 M																										
	5500																												
	6000																												

strata

Bore Log

BH09

Client: VICTORIAN PLANNING AUTHORITY
Coords:

Project: CRAIGIEBURN WEST PSP

Drill Type: DANDO TERRIER DRILL RIG
Bearing: Dip:

Drilling Met: ROTARY AUGER
R.L: SEE WS

Fluid: Nil
Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose; Soft/Loose; Firm/M Dense; Stiff/Dense; V Stiff/V Dense	Rock: Ex Low; Very Low; Low; Medium; High; Very High; Extremely High	Weathering: EW; HW; MW; SW; FS; FR	Frac. Spacing (m): 0.01; 0.05; 0.1; 0.5; 1	Sampling and Insitu Testing: TYPE; RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML) FIRM, LP						
			MIXED YELLOWISH BROWN/GREY SILTY CLAY (CH) STIFF, HP						
	500								
	1000		TRENDING FIRM, GRADUAL REFUSAL						
	1500								
	2000								
	2500								
	3000								
	3500								
	4000								
	4500								
	5000								
			BORE TERMINATED AT 1.1 M						
	5500								
	6000								

strata

Bore Log

BH10

Client: VICTORIAN PLANNING AUTHORITY
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Drilling Met ROTARY AUGER
Fluid Nil

Coords
Bearing: Dip:
R.L: SEE WS
Logged by: SN
Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			MIXED YELLOWISH BROWN/GREY SILTY CLAY (CH) STIFF, HP GRADUAL REFUSAL																										
	500																												
	1000																												
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 0.8 M																										
	5500																												
	6000																												

strata

Bore Log

BH11

Client: VICTORIAN PLANNING AUTHORITY

Project: CRAIGIEBURN WEST PSP

Drill Type: DANDO TERRIER DRILL RIG

Drilling Met ROTARY AUGER

Fluid Nil

Coords

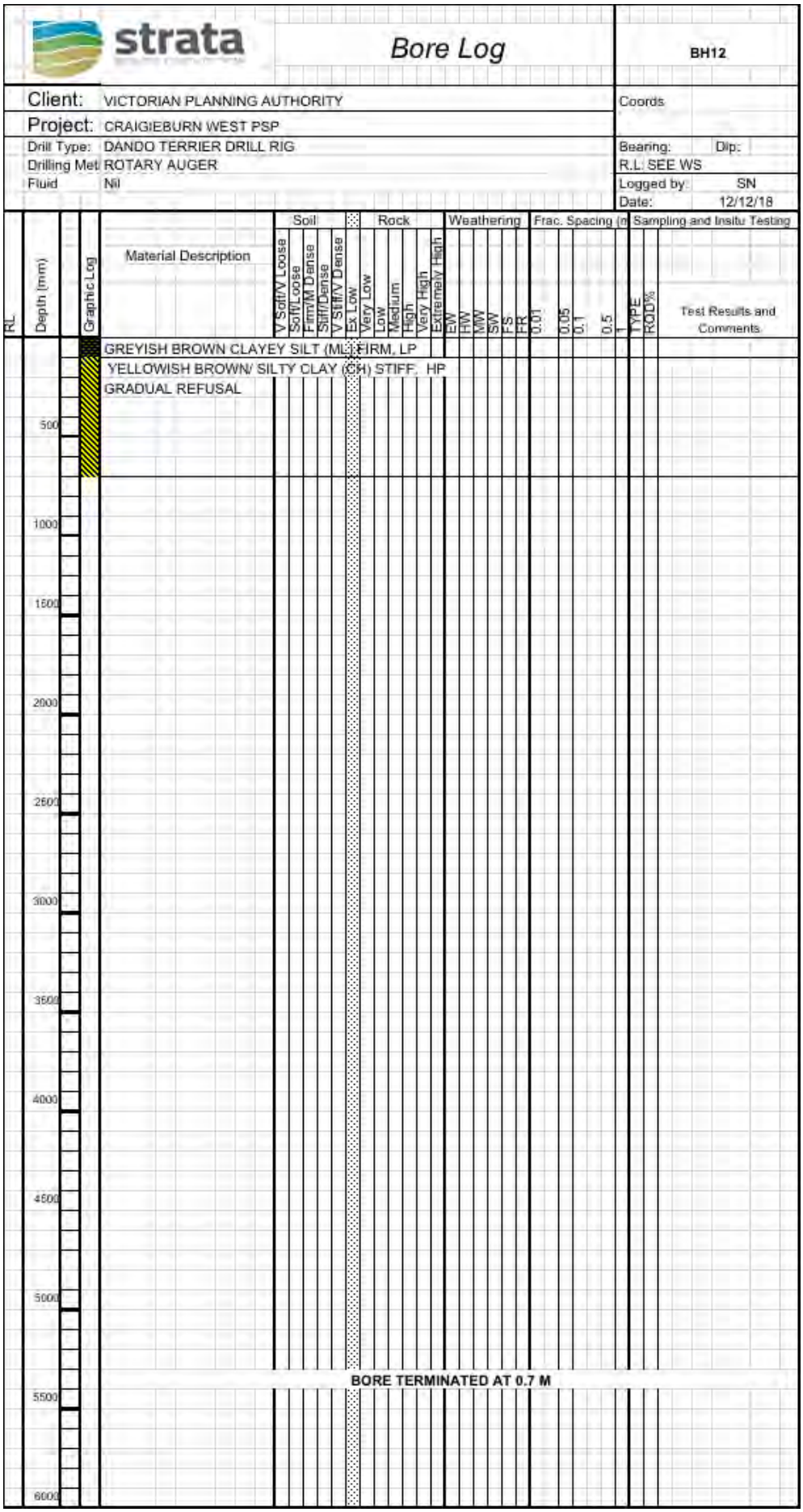
Bearing: Dip:

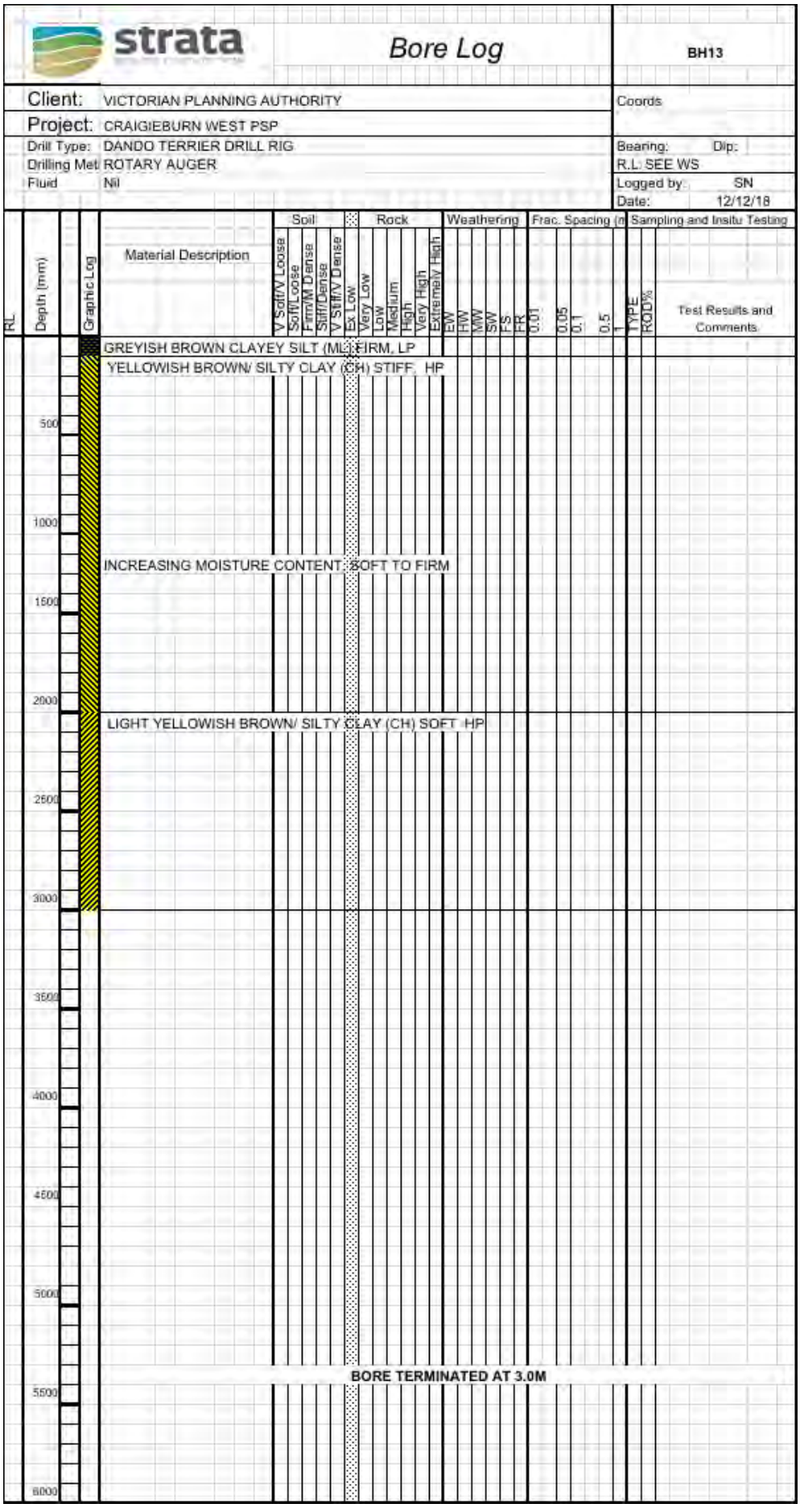
R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
	0		GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			BROWN SILTY CLAY (CH) HARD HP																										
	500																												
	1000																												
			TRENDING YELLOWISH BROWN/BROWN SILTY CLAY (CH) FIRM, MP																										
			GRADUAL REFUSAL ON INFERRED BASALT																										
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 1.8 M																										
	5500																												
	6000																												


strata
Bore Log
BH12
Client: VICTORIAN PLANNING AUTHORITY
Coords
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Bearing:
Dip:
Drilling Met ROTARY AUGER
R.L: SEE WS
Fluid Nil
Logged by: SN
Date: 12/12/18
RL
Depth (mm)
Graphic Log
Material Description
Soil
Rock
Weathering
Frac. Spacing (m
Sampling and Insitu Testing
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
EW
HW
MW
SW
FS
FR
0.01
0.05
0.1
0.5
1
TYPE
ROD%
Test Results and Comments
GREYISH BROWN CLAYEY SILT (ML): FIRM, LP
YELLOWISH BROWN/ SILTY CLAY (CH) STIFF, HP
GRADUAL REFUSAL
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
BORE TERMINATED AT 0.7 M


strata
Bore Log
BH13
Client: VICTORIAN PLANNING AUTHORITY
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Drilling Met ROTARY AUGER
Fluid Nil
Coords
Bearing: Dip:
R.L: SEE WS
Logged by: SN
Date: 12/12/18
RL
Depth (mm)
Graphic Log
Material Description
Soil
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Rock
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
Weathering
EW
HW
MW
SW
FS
FR
Frac. Spacing (m
0.01
0.05
0.1
0.5
1
Sampling and Insitu Testing
TYPE
RQD%
Test Results and Comments
GREYISH BROWN CLAYEY SILT (ML) FIRM, LP
YELLOWISH BROWN/ SILTY CLAY (CH) STIFF, HP
INCREASING MOISTURE CONTENT, SOFT TO FIRM
LIGHT YELLOWISH BROWN/ SILTY CLAY (CH) SOFT, HP
BORE TERMINATED AT 3.0M
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000

strata

Bore Log

BH14

Client:	VICTORIAN PLANNING AUTHORITY
Project:	CRAIGIEBURN WEST PSP
Drill Type:	DANDO TERRIER DRILL RIG
Drilling Met	ROTARY AUGER
Fluid	Nil

Coords

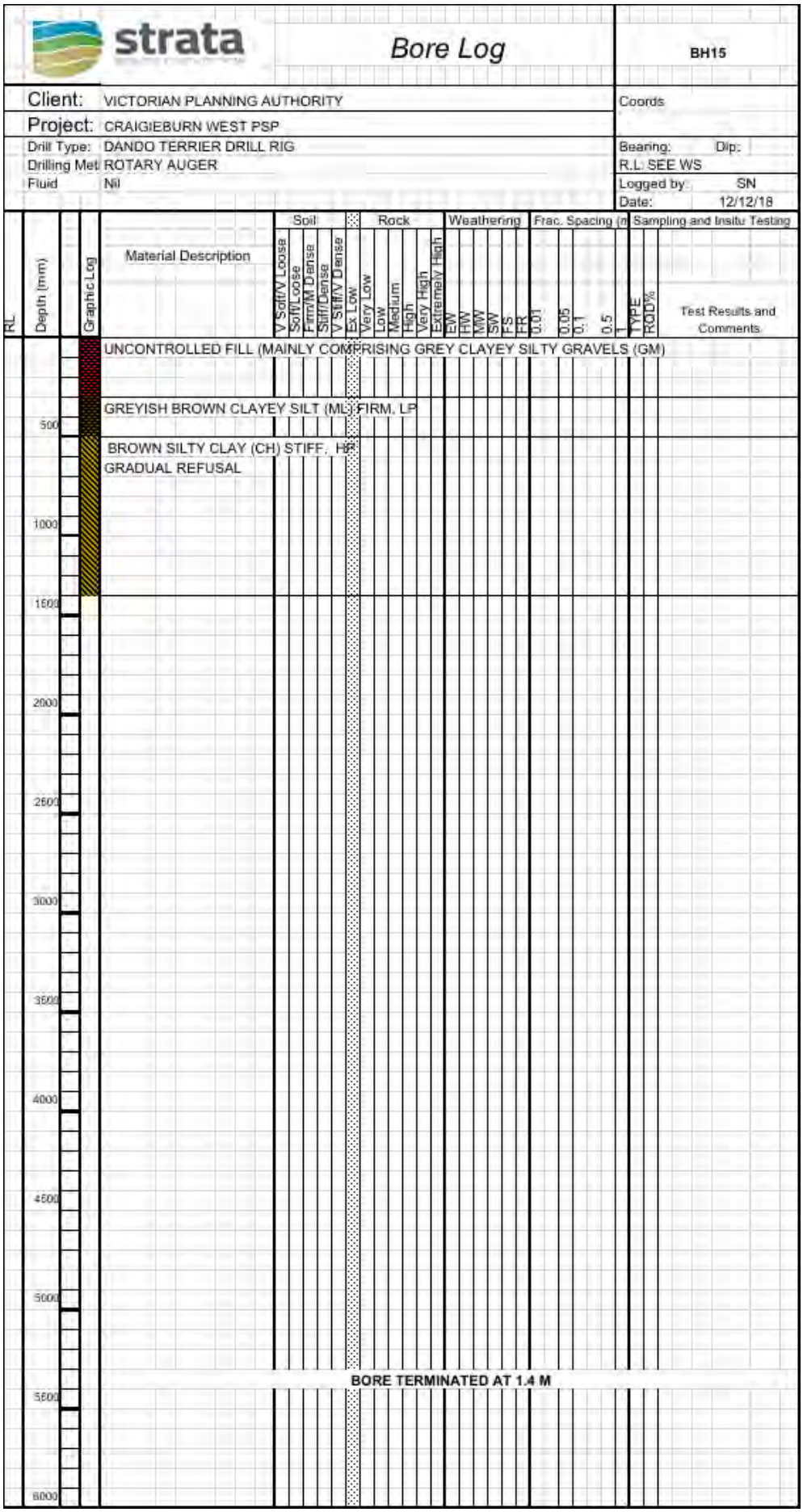
Bearing: Dip:

R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			MIXED YELLOWISH BROWN/GREY SILTY CLAY (CH) STIFF, HP																										
			GRADUAL REFUSAL																										
	500																												
	1000																												
	1500																												
			BORE TERMINATED AT 1.5 M																										
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
	5500																												
	6000																												



strata

Bore Log

BH15

Client: VICTORIAN PLANNING AUTHORITY

Project: CRAIGIEBURN WEST PSP

Drill Type: DANDO TERRIER DRILL RIG

Drilling Met ROTARY AUGER

Fluid Nil

Coords

Bearing: Dip:

R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL | Depth (mm) | Graphic Log | Material Description | Soil: V Soft/V Loose, Soft/Loose, Firm/M Dense, Stiff/Dense, V Stiff/V Dense | Rock: Ex Low, Very Low, Low, Medium, High, Very High, Extremely High | Weathering: EW, HW, MW, SW, FS, FR | Frac. Spacing (m): 0.01, 0.05, 0.1, 0.5, 1 | Sampling and Insitu Testing: TYPE, RQD% | Test Results and Comments

UNCONTROLLED FILL (MAINLY COMPRISING GREY CLAYEY SILTY GRAVELS (GM)

GREYISH BROWN CLAYEY SILT (ML) FIRM, LP

BROWN SILTY CLAY (CH) STIFF, HP

GRADUAL REFUSAL

BORE TERMINATED AT 1.4 M

500

1000

1500

2000

2500

3000

3500

4000

4500

5000

5500

6000

strata

Bore Log

BH16

Client:	VICTORIAN PLANNING AUTHORITY
Project:	CRAIGIEBURN WEST PSP
Drill Type:	DANDO TERRIER DRILL RIG
Drilling Met	ROTARY AUGER
Fluid	Nil

Coords

Bearing: Dip:

R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			BROWN CLAYEY SILT (ML) FIRM, LP																										
			BROWN SILTY CLAY (CH) STIFF, HP																										
	500																												
	1000		TRENDING GREY SILTY CLAY (CH) FIRM, HP GRADUAL REFUSAL																										
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 1.2M																										
	5500																												
	6000																												

strata

Bore Log

BH17

Client:	VICTORIAN PLANNING AUTHORITY
Project:	CRAIGIEBURN WEST PSP
Drill Type:	DANDO TERRIER DRILL RIG
Drilling Met	ROTARY AUGER
Fluid	Nil

Coords

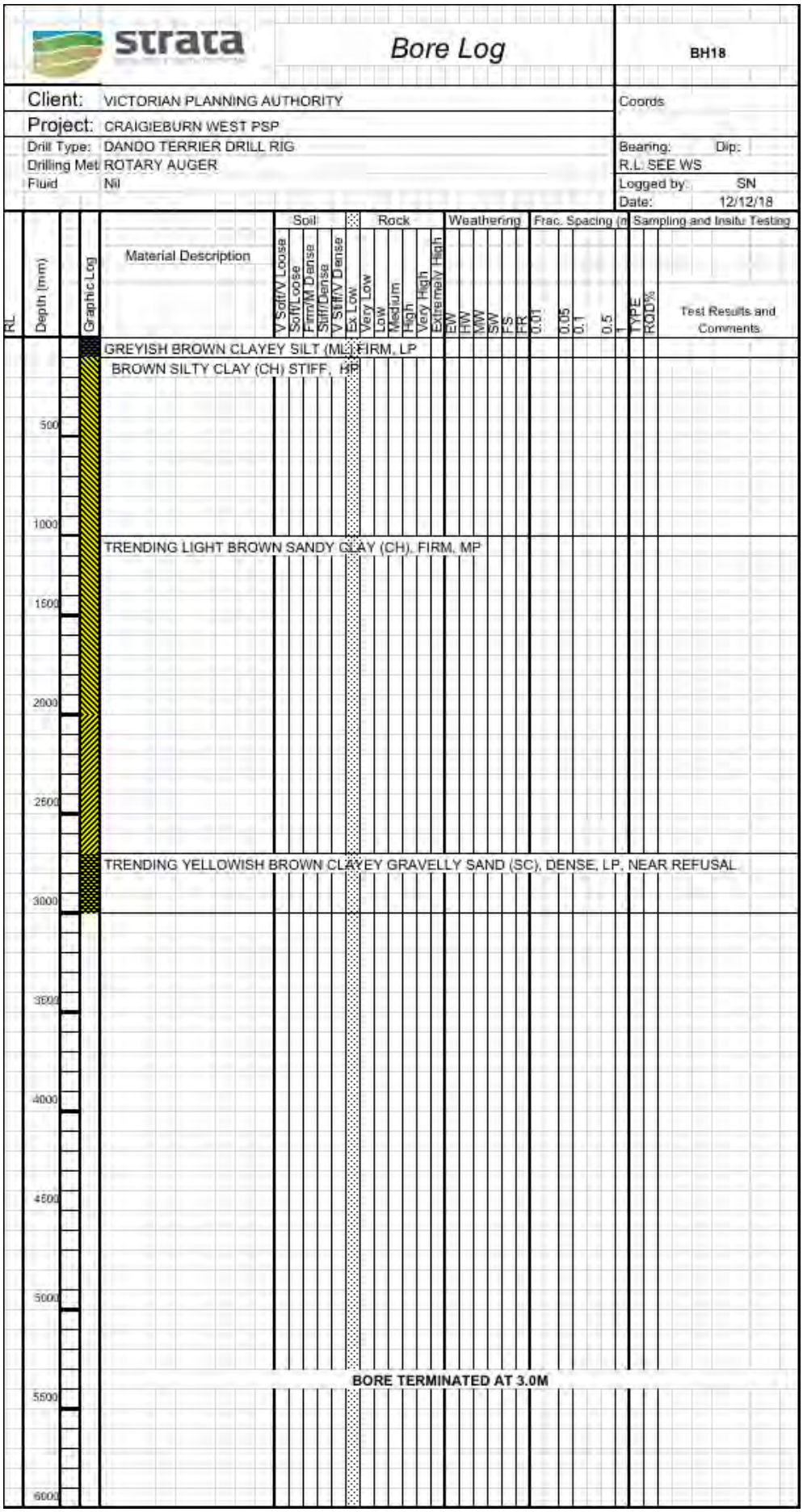
Bearing: Dip:

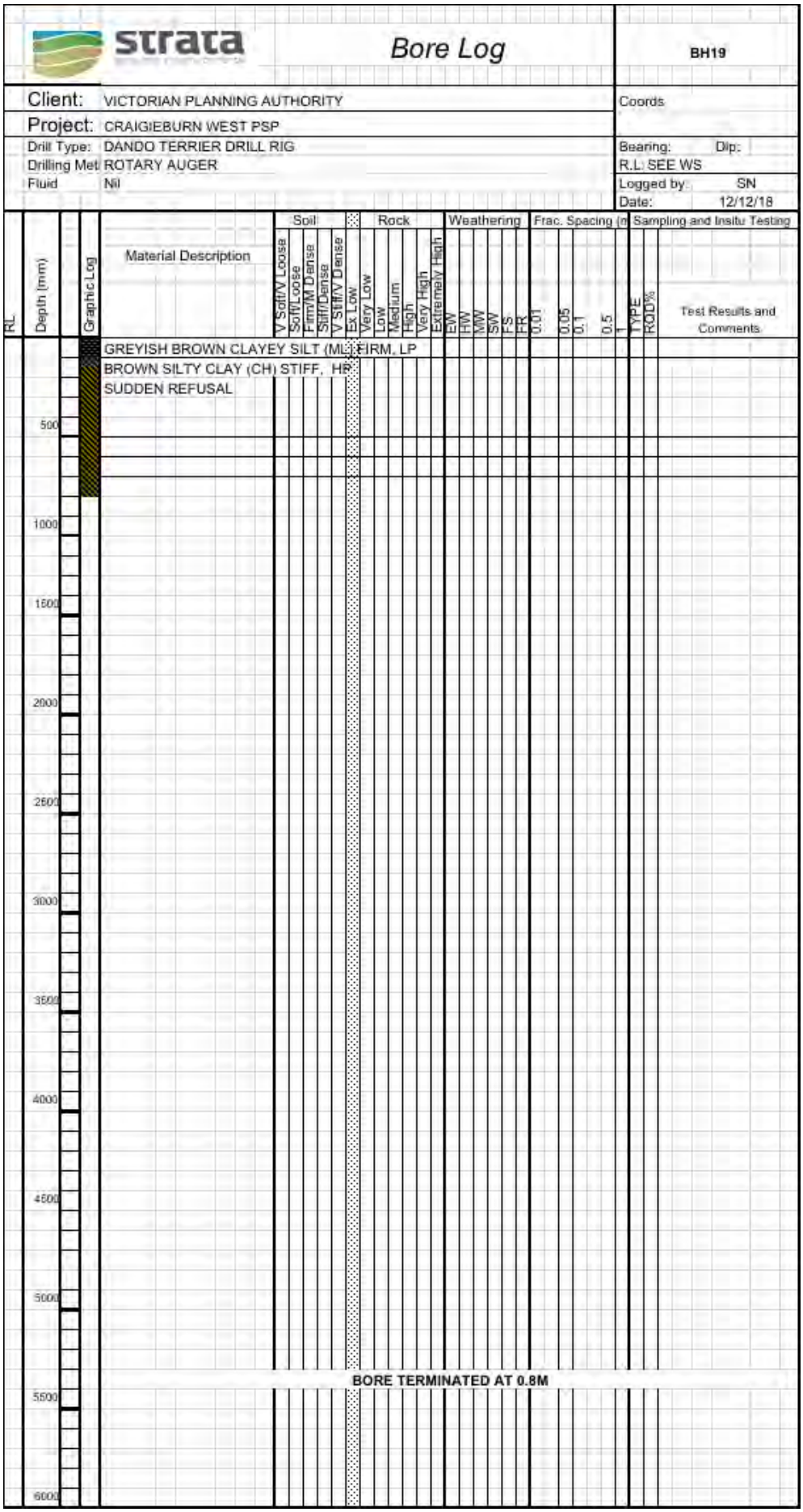
R.L: SEE WS

Logged by: SN

Date: 12/12/18

RL	Depth (mm)	Graphic Log	Material Description	Soil: V Soft/V Loose	Soft/Loose	Firm/M Dense	Stiff/Dense	V Stiff/V Dense	Rock: Ex Low	Very Low	Low	Medium	High	Very High	Extremely High	Weathering: EW	HW	MW	SW	FS	FR	Frac. Spacing (m): 0.01	0.05	0.1	0.5	1	Sampling and Insitu Testing: TYPE	RQD%	Test Results and Comments
			GREYISH BROWN CLAYEY SILT (ML): FIRM, LP																										
			BROWN SILTY CLAY (CH) STIFF, HP																										
			SUDDEN REFUSAL																										
	500																												
	1000																												
	1500																												
	2000																												
	2500																												
	3000																												
	3500																												
	4000																												
	4500																												
	5000																												
			BORE TERMINATED AT 0.5 M																										
	5500																												
	6000																												


strata
Bore Log
BH18
Client: VICTORIAN PLANNING AUTHORITY
Coords
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Bearing: Dip:
Drilling Met ROTARY AUGER
R.L: SEE WS
Fluid Nil
Logged by: SN
Date: 12/12/18
RL
Depth (mm)
Graphic Log
Material Description
Soil
Rock
Weathering
Frac. Spacing (m
Sampling and Insitu Testing
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
EW
HW
MW
SW
FS
FR
0.01
0.05
0.1
0.5
1
TYPE
RQD%
Test Results and Comments
GREYISH BROWN CLAYEY SILT (ML), FIRM, LP
BROWN SILTY CLAY (CH) STIFF, HP
TRENDING LIGHT BROWN SANDY CLAY (CH), FIRM, MP
TRENDING YELLOWISH BROWN CLAYEY GRAVELLY SAND (SC), DENSE, LP, NEAR REFUSAL
BORE TERMINATED AT 3.0M
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000


strata
Bore Log
BH19
Client: VICTORIAN PLANNING AUTHORITY
Project: CRAIGIEBURN WEST PSP
Drill Type: DANDO TERRIER DRILL RIG
Drilling Met ROTARY AUGER
Fluid Nil
Coords
Bearing: Dip:
R.L: SEE WS
Logged by: SN
Date: 12/12/18
RL
Depth (mm)
Graphic Log
Material Description
Soil
V Soft/V Loose
Soft/Loose
Firm/M Dense
Stiff/Dense
V Stiff/V Dense
Rock
Ex Low
Very Low
Low
Medium
High
Very High
Extremely High
Weathering
EW
HW
MW
SW
FS
FR
Frac. Spacing (m
0.01
0.05
0.1
0.5
1
Sampling and Insitu Testing
TYPE
RQD%
Test Results and Comments
GREYISH BROWN CLAYEY SILT (ML): FIRM, LP
BROWN SILTY CLAY (CH) STIFF, HP
SUDDEN REFUSAL
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
BORE TERMINATED AT 0.8M

Geotechnical Terms and Symbols

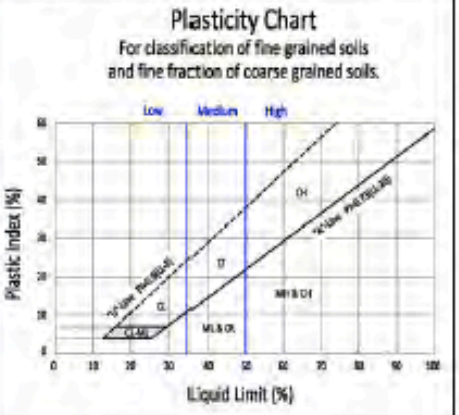
The following information is intended to assist in the interpretation of terms and symbols used in geotechnical borehole logs, test pit logs and reports issued by or for the Queensland Department of Transport and Main Roads (TMR). More detailed information relating to specific test methods is available in the TMR Materials Testing Manual (MTM) and the relevant Australian Standards.

Soil Descriptions

Description and Classification of Soils for Geotechnical Purposes: Refer to AS1726-1993 (Appendix A).

The following chart (adapted from AS1726-1993, Appendix A, Table A1) is based on the Unified Soil Classification System (USCS).

Major Divisions		Particle size mm	USCS Group Symbol	Typical Names	Laboratory Classification				
					% < 0.075 mm (2)	Plasticity of fine fraction	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{(D_{10} \times D_{60})}$	NOTES
COARSE GRAINED SOILS (more than half of material less than 63 mm is larger than 0.075 mm)	BOULDERS	200							
	COBBLES	63							
	GRAVELS (more than half of coarse fraction is larger than 2.36 mm)	coarse 20 medium 6 fine 2.36	GW	Well graded gravels and gravel-sand mixtures, little or no fines	0-5	—	>4	Between 1 and 3	(1) Identify fines by the method given for fine-grained soils. (2) Borderline classifications occur when the percentage of fines (fraction smaller than 0.075 mm size) is greater than 5% and less than 12%. Borderline classifications require the use of SP-SM, GW-GC.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels	0-5	—	Fails to comply with above		
			GM	Silty gravels, gravel-sand-silt mixtures (1)	12-50	Below 'A' line or PI<4	—	—	
			GC	Clayey gravels, gravel-sand-clay mixtures (1)	12-50	Above 'A' line and PI>7	—	—	
	SANDS (more than half of coarse fraction is smaller than 2.36 mm)	coarse 0.6 medium 0.2 fine 0.075	SW	Well graded sands and gravelly sands, little or no fines	0-5	—	>6	Between 1 and 3	
			SP	Poorly graded sands and gravelly sands, little or no fines	0-5	—	Fails to comply with above		
			SM	Silty sands, sand silt mixtures (1)	12-50	Below 'A' line or PI<4	—	—	
			SC	Clayey sands, sand-clay mixtures (1)	12-50	Above 'A' line and PI>7	—	—	
FINE GRAINED SOILS (more than half of material less than 63 mm is smaller than 0.075 mm	SILTS & CLAYS (Liquid Limit ≤50%)		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Use the gradation curve of material passing 63 mm for classification of fractions according to the criteria given in 'Major Divisions'				
			CL CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays					
			OL	Organic silts and clays of low plasticity					
	SILTS & CLAYS (Liquid Limit >50%)		MH	Inorganic silts, mic- aceous or diato-maceous fine sands or silts, elastic silts					
			CH	Inorganic clays of high plasticity, fat clays					
			OH	Organic silts and clays of high plasticity					
	HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils					



Geotechnical Terms and Symbols

Soil Colour: Is described in the moist condition using black, white, grey, red, brown, orange, yellow, green or blue. Borderline cases can be described as a combination of two colours, with the weaker followed by the stronger. Modifiers such as pale, dark or mottled, can be used as necessary. Where colour consists of a primary colour with secondary mottling, it should be described as follows:
(Primary) mottled (Secondary). Refer to AS 1726-1993, A2.4 and A3.3.

Soil Moisture Condition: Is based on the appearance and feel of soil. Refer to AS 1726-1993, A2.5.

Term	Description
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

Consistency of Cohesive Soils: May be estimated using simple field tests, or described in terms of a strength scale. In the field, the undrained shear strength (s_u) can be assessed using a simple field tool appropriate for cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A4.

Consistency - Essentially Cohesive Soils					
Term	Field Guide	Symbol	SPT "N" Value	Undrained Shear Strength s_u (kPa)	Unconfined Compressive Strength q_u (kPa)
Very soft	Oozes between fingers when squeezed in hand.	VS	0-2	<12	<25
Soft	Easily moulded with fingers.	S	2-4	12-25	25-50
Firm	Can be moulded by strong pressure of fingers.	F	4-8	25-50	50-100
Stiff	Not possible to mould with fingers.	St	8-15	50-100	100-200
Very stiff		VSt	15-30	100-200	200-400
Hard	Can be indented with difficulty by thumb nail.	H	>30	>200	>400

Soil Particle Sizes	
Term	Size Range
BOULDERS	>200 mm
COBBLES	63-200 mm
Coarse GRAVEL	20-63 mm
Medium GRAVEL	6-20 mm
Fine GRAVEL	2.36-6 mm
Coarse SAND	0.6-2.36 mm
Medium SAND	0.2-0.6 mm
Fine SAND	0.075-0.2 mm
SILT	0.002-0.075 mm
CLAY	<0.002 mm

Note: SPT - N to q_u correlation from Terzaghi and Peck, 1967. (General guide only).

Consistency of Non-Cohesive Soils: Is described in terms of the density index, as defined in AS 1289.0-2000. This can be assessed using a field tool appropriate for non-cohesive soils, in conjunction with the relevant calibration. Refer to AS 1726-1993, Table A5; BS5930-1999, p117.

Consistency - Essentially Non-Cohesive Soils				
Term	Symbol	SPT N Value	Field Guide	Density Index (%)
Very loose	VL	0-4	Foot imprints readily	0-15
Loose	L	4-10	Shovels Easily	15-35
Medium dense	MD	10-30	Shovelling difficult	35-65
Dense	D	30-50	Pick required	65-85
Very dense	VD	>50	Picking difficult	85-100

Standard Penetration Test (SPT): Refer to. AS 1289.6.3.1-2004. Example report formats for SPT results are shown below:

Test Report	Penetration Resistance (N)	Explanation / Comment
4, 7, 11	N=18	Full penetration; N is reported on engineering borehole log
18, 27, 32	N=59	Full penetration; N is reported on engineering borehole log
4, 18, 30/15 mm	N is not reported	30 blows causes less than 100 mm penetration (3rd interval) – test discontinued
30/80 mm	N is not reported	30 blows causes less than 100 mm penetration (1st interval) – test discontinued
rw	N<1	Rod weight only causes full penetration
hw	N<1	Hammer and rod weight only causes full penetration
hb	N is not reported	Hammer bouncing for 5 consecutive blows with no measurable penetration – test discontinued

Geotechnical Terms and Symbols

Rock Descriptions

Refer to AS 1726-1993 (Appendix A3.3) for the description and classification of rock material composition, including:

(a) Rock type (Table A6, (a) and (b))
(b) Grain size
(c) Texture and fabric
(d) Colour (describe as per soil).

The condition of a rock material refers to its weathering characteristics, strength characteristics and rock mass properties. Refer to AS 1726-1993 (Appendix A3 Tables A8, A9 and A10).

Weathering Condition (Degree of Weathering):

The degree of weathering is a continuum from fresh rock to soil. Boundaries between weathering grades may be abrupt or gradational.

Rock Material Weathering Classification		
Weathering Grade	**Symbol**	**Definition**
Residual Soil	RS	Soil-like material developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the material has not been significantly transported.
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water, but substance fabric and rock structure still recognisable.
Highly Weathered Rock	HW	Strong discolouration is evident throughout the rock mass, often with significant change in the constituent minerals. The intact rock strength is generally much weaker than that of the fresh rock.
Moderately Weathered Rock	MW	Modest discolouration is evident throughout the rock fabric, often with some change in the constituent minerals. The intact rock strength is usually noticeably weaker than that of the fresh rock.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

Notes:
1. Minor variations within broader weathering grade zones will be noted on the engineering borehole logs.
2. Extremely weathered rock is described in terms of soil engineering properties.
3. Weathering may be pervasive throughout the rock mass, or may penetrate inwards from discontinuities to some extent.
4. The 'Distinctly Weathered (DW)' class as defined in AS 1726-1993 is divided to incorporate HW and MW in the above table. The symbol DW should not be used.

Strength Condition (Intact Rock Strength):

Strength of Rock Material (Based on Point Load Strength Index, corrected to 50 mm diameter – $I_{s(50)}$. Field guide used if no tests available. Refer to AS 4133.4.1-2007.				
Term	**Symbol**	**Point Load Index (MPa)** $I_{s(50)}$		**Field Guide to Strength**
Extremely Low	EL	≤0.03		Easily remoulded by hand to a material with soil properties.
Very Low	VL	>0.03	≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	>0.1	≤0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	>0.3	≤1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	>1	≤3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	>3	≤10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	>10		Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:
1. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.
2. Anisotropy of rock material samples may affect the field assessment of strength.

Geotechnical Terms and Symbols

Discontinuity Description: Refer to AS 1726-1993, Table A10.

Anisotropic Fabric	
BED	Bedding
FOL	Foliation
LIN	Mineral lineation
Defect Type	
LP	Lamination Parting
BP	Bedding Parting
FP	Cleavage / Foliation Parting
J, Js	Joint, Joints
SZ	Sheared Zone
CZ	Crushed Zone
BZ	Broken Zone
HFZ	Highly Fractured Zone
AZ	Alteration Zone
VN	Vein

Roughness (e.g. Planar, Smooth is abbreviated Pl / Sm)		Class
Stepped (Stp)	Rough or Irregular (Ro)	I
	Smooth (Sm)	II
	Slickensided (Sl)	III
Undulating (Un)	Rough (Ro)	IV
	Smooth (Sm)	V
	Slickensided (Sl)	VI
Planar (Pl)	Rough (Ro)	VII
	Smooth (Sm)	VIII
	Slickensided (Sl)	IX

Aperture		Infilling		
Closed	CD	No visible coating or infil	Clean	Cn
Open	OP	Surfaces discoloured by mineral/s	Stain	St
Filled	FL	Visible mineral or soil infill <1mm	Veneer	Vr
Tight	TI	Visible mineral or soil infill >1mm	Coating	Ct

Other	
Cly	Clay
Fe	Iron
Co	Coal
Carb	Carbonaceous
Slnf	Soil Infill Zone
Qz	Quartz
CA	Calcite
Chl	Chlorite
Py	Pyrite
Int	Intersecting
Inc	Incipient
DI	Drilling Induced
H	Horizontal
V	Vertical

Note: Describe 'Zones' and 'Coatings' in terms of composition and thickness (mm).

Discontinuity Spacing: On the geotechnical borehole log, a graphical representation of defect spacing vs depth is shown. This representation takes into account all the natural rock defects occurring within a given depth interval, excluding breaks induced by the drilling / handling of core. Refer to AS 1726-1993, BS5930-1999.

Defect Spacing			Bedding Thickness (Sedimentary Rock Stratification)	
Spacing/Width (mm)	Descriptor	Symbol	Descriptor	Spacing/Width (mm)
			Thinly Laminated	< 6
<20	Extremely Close	EC	Thickly Laminated	6 – 20
20 – 60	Very Close	VC	Very Thinly Bedded	20 – 60
60 – 200	Close	C	Thinly Bedded	60 – 200
200 – 600	Medium	M	Medium Bedded	200 – 600
600 – 2000	Wide	W	Thickly Bedded	600 – 2000
2000 – 6000	Very Wide	VW	Very Thickly Bedded	> 2000
>6000	Extremely Wide	EW		

Defect Spacing in 3D	
Term	Description
Blocky	Equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greater than cross section

Defect Persistence (areal extent)
Trace length of defect given in metres

Symbols

The list below provides an explanation of terms and symbols used on the geotechnical borehole, test pit and penetrometer logs.

Test Results			
PI	Plasticity Index	c'	Effective Cohesion
LL	Liquid Limit	c_u	Undrained Cohesion
LI	Liquidity Index	c'_r	Residual Cohesion
DD	Dry Density	ϕ'	Effective Angle of Internal Friction
WD	Wet Density	ϕ_u	Undrained Angle of Internal Friction
LS	Linear Shrinkage	ϕ'_r	Residual Angle of Internal Friction
MC	Moisture Content	c_v	Coefficient of Consolidation
OC	Organic Content	m_v	Coefficient of Volume Compressibility
WPI	Weighted Plasticity Index	$c_{\alpha\varepsilon}$	Coefficient of Secondary Compression

Test Symbols	
DCP	Dynamic Cone Penetrometer
SPT	Standard Penetration Test
CPTu	Cone Penetrometer (Piezocone) Test
PANDA	Variable Energy DCP
PP	Pocket Penetrometer Test
U50	Undisturbed Sample 50 mm (nominal diameter)
U100	Undisturbed Sample 100mm (nominal diameter)
UCS	Uniaxial Compressive Strength
Pm	Pressuremeter

Geotechnical Terms and Symbols

Test Results			
WLS	Weighted Linear Shrinkage	e	Voids Ratio
DoS	Degree of Saturation	ϕ'_{cv}	Constant Volume Friction Angle
APD	Apparent Particle Density	q_t / q_c	Piezocone Tip Resistance (corrected / uncorrected)
s_u	Undrained Shear Strength	q_d	PANDA Cone Resistance
q_u	Unconfined Compressive Strength	$I_{s(50)}$	Point Load Strength Index
R	Total Core Recovery	RQD	Rock Quality Designation

Test Symbols	
FSV	Field Shear Vane
DST	Direct Shear Test
PR	Penetration Rate
A	Point Load Test (axial)
D	Point Load Test (diametral)
L	Point Load Test (irregular lump)

28/11/13 Groundwater level on the date shown	Water Inflow	Water Outflow

Appendix 3 Laboratory Results

GroundScience
ACN 31 105 704 078
13 Brock Street, Thomastown, VIC **P** 03 9464 4617 **Email** reception@groundscience.com.au

Test Results - Atterberg Limits

Client:	**STRATA GEOSCIENCES AND ENVIRONMENTAL PT**		Job No.	**GS4690/1**	
Project:	**CRAIGIEBURN PSP**		Report No.	**AR**	
Location:	**-**		Test Date:	**18-Dec-18**	
Sample identification		**BH2 (1000) @ 1.0m**	**BH3 (1000) @ 1.0m**	**BH13 (2500) @ 2.5m**	**BH18 (2500) @ 2.5m**
Purchase order number					
Sample number		**#17**	**#18**	**#19**	**#20**
Test methods		AS1289 3.1.2 3.2.1 3.3.1 3.4.1 2.1.1			
ATTERBERG LIMITS					
Liquid Limit	%	**64**	**75**	**89**	**73**
Plastic Limit	%	**20**	**22**	**25**	**20**
Plasticity Index	%	**44**	**53**	**64**	**53**
Linear Shrinkage	%	**10**	**9**	**10**	**10.5**
Curling/ Crumbling/ Cracking		**Cracking & Curling**	**Cracking & Curling**	**Cracking Curling**	**Cracking & Curling**
Sample History		Oven dried, Dry sieved	Oven dried, Dry sieved	Oven dried, Dry sieved	Oven dried, Dry sieved
Sample Description		**CLAY high plasticity brown.**	**CLAY high plasticity brown.**	**CLAY high plasticity light brown.**	**CLAY high plasticity brown.**
Comments:				**Sampling Method**	Sampled by client, tested as received

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National Standards

Approved Signatory **Chris Senserrick**
Date of issue 19/12/2018

GS018A/R V2 Nov 2018 App KC

GroundScience

EMERSON DISPERSION

AS 1289 3.8.1

client: **STRATA GEOSCIENCES AND ENVIRONMENTAL PTY LTD (HOBART)** job No. : GS4690/1

project: **CRAIGIEBURN PSP** date: 17/12/2018

location: **-** report No. AN

sample number: **#17**

sample identification **BH2 @ 1.0**

start time :

does the sample slake

[ ] no → [ ] **7** sample swells

[X] yes [ ] **8** no swell

time dispersion commences

start : 8.00

end: 10.00

[ ] **1** complete dispersion

[X] **2** partial dispersion

[ ] no dispersion

remoulded sample

[ ] **3** dispersion

time dispersion commences

start :

end:

[ ] no dispersion

calcite / gypsum present

[ ] **4** present

[ ] absent

5 :1 water: soil mix

10 mins of vigorous shaking

[ ] **5** disperses (remains cloudy)

[ ] **6** flocculates (clear at surface)

water type: *distilled*

water temp : *20.0"*

description : *CLAY, high plasticity, brown*

EMERSON CLASS NUMBER

2

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NATA Accredited Laboratory No. 15055

Approved signature

Chris Senserrick

Date: 19/12/2018

GS008/R V4 Aug 2016

GroundScience

EMERSON DISPERSION

AS 1289 3.8.1

client: **STRATA GEOSCIENCES AND ENVIRONMENTAL PTY LTD (HOBART)** job No. : GS4690/1

project: **CRAIGIEBURN PSP** date: 17/12/2018

location: **-** report No. AO

sample number: **#18**

sample identification **BH3 @ 1.0**

start time :

does the sample slake

[ ] no → [ ] **7** sample swells

[X] yes [ ] **8** no swell

time dispersion commences

start : 12.00

end: 14.00

[ ] **1** complete dispersion

[X] **2** partial dispersion

[ ] no dispersion

remoulded sample

[ ] **3** dispersion

time dispersion commences

start :

end:

[ ] no dispersion

calcite / gypsum present

[ ] **4** present

[ ] absent

5 :1 water: soil mix

10 mins of vigorous shaking

[ ] **5** disperses (remains cloudy)

[ ] **6** floculates (clear at surface)

water type: *distilled*

water temp : *20.0"*

description : *CLAY, high plasticity, brown*

EMERSON CLASS NUMBER

2

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NATA Accredited Laboratory No. 15055

Approved signature

Chris Senserrick

Date: 19/12/2018

GS008/R V4 Aug 2016

GroundScience

EMERSON DISPERSION

AS 1289 3.8.1

client: **STRATA GEOSCIENCES AND ENVIRONMENTAL PTY LTD (HOBART)** job No. : GS4690/1

project: **CRAIGIEBURN PSP** date: 17/12/2018

location: **-** report No. AN

sample number: **#17**

sample identification **BH2 @ 1.0**

start time :

does the sample slake

[ ] no → [ ] **7** sample swells

[X] yes [ ] **8** no swell

time dispersion commences

start : 8.00

end: 10.00

[ ] **1** complete dispersion

[X] **2** partial dispersion

[ ] no dispersion

remoulded sample

[ ] **3** dispersion

time dispersion commences

start :

end:

[ ] no dispersion

calcite / gypsum present

[ ] **4** present

[ ] absent

5 :1 water: soil mix

10 mins of vigorous shaking

[ ] **5** disperses (remains cloudy)

[ ] **6** flocculates (clear at surface)

water type: *distilled*

water temp : *20.0"*

description : *CLAY, high plasticity, brown*

EMERSON CLASS NUMBER

2

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Approved signature

Chris Senserrick

Date: 19/12/2018

GS008/R V4 Aug 2016

GroundScience

EMERSON DISPERSION

AS 1289 3.8.1

client: **STRATA GEOSCIENCES AND ENVIRONMENTAL PTY LTD (HOBART)** job No. : GS4690/1

project: **CRAIGIEBURN PSP** date: 17/12/2018

location: **-** report No. AP

sample number: **#19**

sample identification **BH13 @ 2.5m**

start time :

does the sample slake

[ ] no → [ ] **7** sample swells

[X] yes [ ] **8** no swell

time dispersion commences

start : 12.00

end: 14.00

[ ] **1** complete dispersion

[X] **2** partial dispersion

[ ] no dispersion

remoulded sample

[ ] **3** dispersion

time dispersion commences

start :

end:

[ ] no dispersion

calcite / gypsum present

[ ] **4** present

[ ] absent

5 :1 water: soil mix

10 mins of vigorous shaking

[ ] **5** disperses (remains cloudy)

[ ] **6** flocculates (clear at surface)

water type: *distilled*

water temp : *20.0"*

description : *CLAY, high plasticity, light brown*

EMERSON CLASS NUMBER

2

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NATA Accredited Laboratory No. 15055

Approved signature

Chris Senserrick

Date: 19/12/2018

GS008/R V4 Aug 2016

GroundScience

EMERSON DISPERSION

AS 1289 3.8.1

client: **STRATA GEOSCIENCES AND ENVIRONMENTAL PTY LTD (HOBART)** job No. : GS4690/1

project: **CRAIGIEBURN PSP** date: 17/12/2018

location: **-** report No. AQ

sample number: **#20**

sample identification **BH18 @ 2.5m**

start time :

does the sample slake

[ ] no → [ ] **7** sample swells

[X] yes [ ] **8** no swell

time dispersion commences

start : 12.00

end: 14.00

[ ] **1** complete dispersion

[X] **2** partial dispersion

[ ] no dispersion

remoulded sample

[ ] **3** dispersion

time dispersion commences

start :

end:

[ ] no dispersion

calcite / gypsum present

[ ] **4** present

[ ] absent

5 :1 water: soil mix

10 mins of vigorous shaking

[ ] **5** disperses (remains cloudy)

[ ] **6** floculates (clear at surface)

water type: *distilled*

water temp : *20.0"*

description : *CLAY, high plasticity, brown*

EMERSON CLASS NUMBER

2

NATA ACCREDITED FOR TECHNICAL COMPETENCE

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

Accredited for compliance with ISO/IEC 17025 - Testing

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian / national standards.

NATA Accredited Laboratory No. 15055

Approved signature

Chris Senserrick

Date: 19/12/2018

GS008/R V4 Aug 2016

Appendix 4 Terms and Conditions

Scope of Work
These Terms and Conditions apply to any services provided to you ("the Client") by Strata Geoscience and Environmental Pty Ltd ("Strata"). By continuing to instruct Strata to act after receiving the Terms and Conditions or by using this report and its findings for design and/or permit application processes and not objecting to any of the Terms and Conditions the Client agrees to be bound by these Terms and Conditions, and any other terms and conditions supplied by Strata from time to time at Strata's sole and absolute discretion. The scope of the services provided to the Client by Strata is limited to the services and specified purpose agreed between Strata and the Client and set out in the correspondence to which this document is enclosed or annexed ("the Services"). Strata does not purport to advise beyond the Services.

Third Parties
The Services are supplied to the Client for the sole benefit of the Client and must not be relied upon by any person or entity other than the Client. Strata is not responsible or liable to any third party. All parties other than the Client are advised to seek their own advice before proceeding with any course of action.

Provision of Information
The Client is responsible for the provision of all legal, survey and other particulars concerning the site on which Strata is providing the Services, including particulars of existing structures and services and features for the site and for adjoining sites and structures. The Client is also responsible for the provision of specialised services not provided by Strata. If Strata obtains these particulars or specialised services on the instruction of the Client, Strata does so as agent of the Client and at the Client's expense. Strata is not obliged to confirm the accuracy and completeness of information supplied by the Client or any third party service provider. The Client is responsible for the accuracy and completeness of all particulars or services provided by the Client or obtained on the Client's behalf. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person or entity resulting from the failure of the Client or third party to provide accurate and complete information. In the event additional information becomes available to the Client, the Client must inform Strata in writing of that information as soon as possible. Further advice will be provided at the Client's cost. Any report is prepared on the assumption that the instructions and information supplied to Strata has been provided in good faith and is all of the information relevant to the provision of the Services by Strata. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if Strata has been supplied with insufficient, incorrect, incomplete, false or misleading information.

Integrity
Any report provided by Strata presents the findings of the site assessment. While all reasonable care is taken when conducting site investigations and reporting to the Client, Strata does not warrant that the information contained in any report is free from errors or omissions. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from errors in a report. Any report should be read in its entirety, inclusive of any summary and annexures. Strata does not accept any responsibility where part of any report is relied upon without reference to the full report.

Project Specific Criteria
Any report provided by Strata will be prepared on the basis of unique project development plans which apply only to the site that is being investigated. Reports provided by Strata do not apply to any project other than that originally specified by the Client to Strata. The Report must not be used or relied upon if any changes to the project are made. The Client should engage Strata to further advise on the effect of any change to the project. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever where any change to the project is made without obtaining a further written report from Strata. Changes to the project may include, but are not limited to, changes to the investigated site or neighbouring sites, for instance, variation of the location of proposed building envelopes/footprints, changes to building design which may impact upon building settlement or slope stability, or changes to earthworks, including removal (site cutting) or deposition of sediments or rock from the site.

Classification to AS2870-2011
It must be emphasised that the site classification to AS2870-2011 and recommendations referred to in this report are based solely on the observed soil profile at the time of the investigation for this report and account has been taken of Clause 2.1.1 of AS2870 - 2011. Other abnormal moisture conditions as defined in AS2870 – 2011 Clause 1.3.3 (a) (b) (c) and (d) may need to be considered in the design of the structure. Without designing for the possibility of all abnormal moisture conditions as defined in Clause 1.3.3, distresses will occur and may result in non "acceptable probabilities of serviceability and safety of the building during its design life", as defined in AS2870 - 2011, Clause 1.3.1. Furthermore the classification is preliminary in nature and needs verification at the founding surface inspection phase . The classification may be changed at this time based upon the nature of the founding surface over the entire footprint of the project area. Any costs associated with a change in the site classification are to be incurred by the client. Furthermore any costs associated with delayed works associated with a founding surface inspection or a change in classification are to be borne by the client. Where founding surface inspections are not commissioned the classifications contained within this report are void. Classification is based upon a range of expected ground surface movement as indicated in AS2870-2011. Where the range of movement exceeds the stipulations for the nominated classification Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever suffered by the Client or any other person.

Slope Instability Risks
Where comment, modelling or treatment options are suggested to limit the risk of slope instability Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from actual slope instability or mass movement over the site at any point over the design life of any structures or neighbouring structures.

Subsurface Variations with Time

Any report provided by Strata is based upon subsurface conditions encountered at the time of the investigation. Conditions can and do change significantly and unexpectedly over a short period of time. For example groundwater levels may fluctuate over time, affecting latent soil bearing capacity and ex-situ/insitu fill sediments may be placed/removed from the site. Changes to the subsurface conditions that were encountered at the time of the investigation void all recommendations made by Strata in any report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any change to the subsurface conditions that were encountered at the time of the investigation. In the event of a delay in the commencement of a project or if additional information becomes available to the Client about a change in conditions becomes available to the Client, the Client should engage Strata to make a further investigation to ensure that the conditions initially encountered still exist. Further advice will be provided at the Client's cost. Without limiting the generality of the above statement, Strata does not accept liability where any report is relied upon after three months from the date of the report, (unless otherwise provided in the report or required by the Australian Standard which the report purports to comply with), or the date when the Client becomes aware of any change in condition. Any report should be reviewed regularly to ensure that it continues to be accurate and further advice requested from Strata where applicable.

Interpretation
Site investigation identifies subsurface conditions only at the discrete points of geotechnical drilling, and at the time of drilling. All data received from the geotechnical drilling is interpreted to report to the Client about overall site conditions as well as their anticipated impact upon the specific project. Actual site conditions may vary from those inferred to exist as it is virtually impossible to provide a definitive subsurface profile which accounts for all the possible variability inherent in earth materials. This is particularly pertinent to some weathered sedimentary geologies or colluvial/alluvial clast deposits which may show significant variability in depth to refusal over a development area. Rock incongruities such as joints, dips or faults may also result in subsurface variability. Soil depths and composition can vary due to natural and anthopogenic processes. Variability may lead to differences between the design depth of bored/driven piers compared with the actual depth of individual piers constructed onsite. It may also affect the founding depth of conventional strip, pier and beam or slab footings, which may result in increased costs associated with excavation (particularly of rock) or materials costs of foundations. Founding surface inspections should be commissioned by the Client prior to foundation construction to verify the results of initial site characterisation and failure to insure this will void the classifications and recommendations contained within this report. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from any variation from the site conditions inferred to exist.

Strata is not responsible for the interpretation of site data or report findings by other parties, including parties involved in the design and construction process. The Client must seek advice from Strata about the interpretation of the site data or report.

Report Recommendations
Any report recommendations provided by Strata are only preliminary. A report is based upon the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until earthworks and/or foundation construction is almost complete. Where variations in conditions are encountered, Strata should be engaged to provide further advice. Further advice will be provided at the Client's cost. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever if the results of selective point sampling are not indicative of actual conditions throughout an area or if the Client becomes aware of variations in conditions and does not engage Strata for further advice.

Geo-environmental Considerations
Where onsite wastewater site investigation and land application system designs are provided by Strata, reasonable effort will be made to minimise environmental and public health risks associated with the disposal of effluent within site boundaries with respect to relevant Australian guidelines and industry best practise at the time of investigation. Strata is not liable, and accepts no responsibility, for any claim, demand, charge, loss, damage, injury or expense whatsoever resulting from:

(i) changes to either the project or site conditions that affect the onsite wastewater land application system's ability to safely dispose of modelled wastewater flows; or
(ii) seepage, pollution or contamination or the cost of removing, nullifying or clearing up seepage, polluting or contaminating substances; or
(iii) poor system performance where septic tanks have not been de-sludged at maximum intervals of 3 years or AWTS systems have not been serviced in compliance with the manufacturers recommendations; or
(iv) failure of the client to commission both interim and final inspections by the designer throughout the system construction; or
(v) the selection of inappropriate plants for irrigation areas; or
(vi) damage to any infrastructure including but not limited to foundations, walls, driveways and pavements; or
(vii) land instability, soil erosion or dispersion; or
(viii) design changes requested by the Permit Authority.

Furthermore Strata does not guarantee septic trench and bed design life beyond 5 years from installation, given the influence various household chemicals have on soil structural decline and premature trench failure in some soil types

Strata does not consider site contamination, unless the Client specifically instructs Strata to consider the site contamination in writing. If a request is made by the Client to consider site contamination, Strata will provide additional terms and conditions that will apply to the engagement.

Copyright and Use of Documents
Copyright in all drawings, reports, specifications, calculations and other documents provided by Strata or its employees in connection with the Services remain vested in Strata. The Client has a licence to use the documents for the purpose of completing the project. However, the Client must not otherwise use the documents, make copies of the documents or amend the documents unless express approval in writing is given in advance by Strata. The Client must not publish or allow to be published, in whole or in part, any document provided by Strata or the name or professional affiliations of Strata, without first obtaining the written consent of Strata as to the form and context in which it is to appear.

If, during the course of providing the Services, Strata develops, discovers or first reduces to practice a concept, product or process which is capable of being patented then such concept, product or process is and remains the property of Strata and:

(i) the Client must not use, infringe or otherwise appropriate the same other than for the purpose of the project without first obtaining the written consent of Strata; and

(ii) the Client is entitled to a royalty free licence to use the same during the life of the works comprising the project.

Digital Copies of Report
If any report is provided to the Client in an electronic copy except directly from Strata, the Client should verify the report contents with Strata to ensure they have not been altered or varied from the report provided by Strata.

APPENDIX F LABORATORY CERTIFICATES OF ANALYSIS

Chain of Custody Form

Beveridge Williams
development & environment consultants

Job number	1801684	Page	1 of 2
Laboratory	ALS Water Resources Group		
Client	Department of Education and Early Childhood	Quote number	2013-146A LTP
Project	Site Suitability Assessment	Project Manager	A.Hayes
Location	155-175 Batten Road, Connewarre	Sampled by	A.Hayes

Sample ID	Date sampled	Matrix	No. of containers	Testing required: Heavy Metals (24)	OCP & OPP	Nitrate	ph(f) and pH(ox)	sulphate					
BH01/0.0-0.1	12/12/18	S	1	X	X	X	X	X					
BH01/1.2-1.3							X	X					
BH02/0.0-0.1	2x			X	X	X	X	X					
BH02/1.9-2.0	2y						X	X					
* BH03/0.0-0.1				X	X	X	X	X					
* BH03/1.9-2.0							X	X					
BH04/0.0-0.1				X	X	X	X	X					
BH04/1.9-2.0							X	X					
BH05/0.0-0.1	[illegible]			X	X	X	X	X					
BH06/0.0-0.1				X	X	X	X	X					
BH07/0.0-0.1				X	X	X	X	X					
BH07/1.7-1.8							X	X					
BH08/0.0-0.1				X	X	X	X	X					
BH09/0.0-0.1				X	X	X	X	X					
BH10/0.0-0.1	13.12.18			X	X	X	X	X					
* BH10/0.7-0.8	13.12.18						X	X					
BH11/0.0-0.1	12.12.18			X	X	X	X	X					
BH11/1.2-1.3							X	X					
BH12/0.0-0.1				X	X	X	X	X					
[illegible]													

Notes

Matrix: S = Soil GW = Groundwater W = Water R = Rinsate
Soluble Heavy Metals: Ag, As, B, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sn, V, Zn
Soil: A-S-BEV-W1 (HM/OCP) A-S-BEV-W2 (HM/PAH) A-S-BEV-W3 (HM/PAH/OCP) A-S-BEV-W4 (HM/TPH/PAH) A-S-BEV-W5 (EPA 621 w/ extra metals)
Water: A-W-BEV-W1 (EPA Table 2, TDS, pH, anions/cations, low level: PAH, OCP, TPH) A--BWANZLL (ANZECC screen, low level metals & organics)
All groundwater heavy metals testing must be for soluble metals unless otherwise indicated.

Turnaround time	24hr ☐	48hr ☐	72hr ☒	Standard ☐	Comments:

Chain of Custody

From	Company	Date	Received by	Company	Date	Time
A.Hayes	Beveridge Williams	13.12.18	SM	ALS	12/12	18:55

Quality control

		Initial
Sample preservation	Appropriate sample containers used, refrigerated or chilled samples supplied to laboratory	A.H
Sample holding times	Tests conducted within specified holding times	
Final certificates	Re-testing of results as requested. Tests conducted and reported as per CoC form.	

* Samples Not Received

ALS
BEV WILL
BEVWILL 18-55136
MEL-C-17 Due Date: 20/12/2018

Chain of Custody Form

Beveridge Williams
development & environment consultants

Job number	1801684	Page	2 of 2
Laboratory	ALS Water Resources Group		
Client	Department of Education and Early Childhood	Quote number	2013-146A LTP
Project	Site Suitability Assessment	Project Manager	A.Hayes
Location	155-175 Batten Road, Connewarre	Sampled by	A.Hayes

Sample ID	Date sampled	Matrix	No. of containers	Testing required: Heavy Metals (24)	OCP & OPP	Nitrate	ph(f) and pH(ox)	sulphate					
BH13/ 0.0-0.1	12.12.18	S	1	X	X	X	X	X					
BH13/ 1.9-2.0							X	X					
BH14/ 0.0-0.1				X	X	X	X	X					
* BH14/ 1.4-1.5							X	X					
BH15/ 0.3-0.4	DUP 1/12			X	X	X	X	X					
BH15/ 1.3-1.4							X	X					
BH16/ 0.0-0.1				X	X	X	X	X					
BH17/ 0.0-0.1				X	X	X	X	X					
* BH17/ 1.9-2.0					X		X	X					
BH18/ 0.0-0.1	13.12.18			X	X	X	X	X					
BH18/ 0.9-1.0							X	X					
[redacted]													
BH16/ 0.9-1.0							X	X					
BH19/ 0.0-0.1				X	X	X	X	X					
181212-S-D01	13.12.18			X	X	X	X	X					
181212-S-D02	12.12.18			X	X	X	X	X					
P.2	13/12												

Notes

Matrix: S = Soil GW = Groundwater W = Water R = Rinsate Soluble Heavy Metals: Ag, As, B, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sn, V, Zn

Soil: A-S-BEV-W1 (HM/OCP) A-S-BEV-W2 (HM/PAH) A-S-BEV-W3 (HM/PAH/OCP) A-S-BEV-W4 (HM/TPH/PAH) A-S-BEV-W5 (EPA 621 w/ extra metals)

Water: A-W-BEV-W1 (EPA Table 2, TDS, pH, anions/cations, low level: PAH, OCP, TPH) A--BWANZLL (ANZECC screen, low level metals & organics)

All groundwater heavy metals testing must be for soluble metals unless otherwise indicated.

Turnaround time	24hr ☐	48hr ☐	72hr ☒	Standard ☐	Comments:

Chain of Custody

From	Company	Date	Received by	Company	Date	Time
A.Hayes	Beveridge Williams	13.12.18	SM	ALS	13/12	13.01

Quality control		Initial
Sample preservation	Appropriate sample containers used, refrigerated or chilled samples supplied to laboratory	A.H
Sample holding times	Tests conducted within specified holding times	
Final certificates	Re-testing of results as requested. Tests conducted and reported as per CoC form.	

CERTIFICATE OF ANALYSIS

Batch No:	**18-55136**	*Page*	Page 1 of 26
Replacement Report	729987	*Laboratory*	Scoresby Laboratory
This report replaces Report Number:	**729679**	*Address*	Caribbean Business Park, 22 Dalmore Drive, Scoresby, VIC 3179
Client:	**Beveridge Williams & Co Pty Ltd**	*Phone*	03 8756 8000
		Fax	03 9763 1862
Contact:	**Andrew Mellett**	Contact:	Trang Phan Client Manager Le-Trang.Phan@alsglobal.com
Address:	PO Box 61 MALVERN VIC 3144		
Client Program Ref:	**1801684**	Date Sampled:	12-Dec-2018 - 13-Dec-2018
ALS Program Ref:	**BEVWILL**	Date Samples Received:	13-Dec-2018
PO No:	**Not Available**	*Date Issued:*	**20-Dec-2018**

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*
MS Total Metals	WG020B	Scoresby	**NO3 as N**	EG058GV	Scoresby	**OCP**	WP068A	Scoresby
OP	WP130	Scoresby	**SO4**	WD041G	Scoresby	**SPOCAS Field Tests**	# QASSIT-ASS H.1.2-3	Scoresby

Please note that this is an amended report replacing the one originally sent on 18/12/2018. The amendment involves re-testing and reporting Sulphate by a an alternate technique which is NON-NATA. The amendments were made by Le-Trang Phan on 20/12/2018.

Accreditation No. 992
Accredited for compliance with ISO/IEC 17025 - Testing

Signatories
Legionella species refers to Legionella species other than Legionella pneumophila
Measurement Uncertainties values for your compliance results are available at this link

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

Batch No: **18-55136**
Report Number: **729987**
Client: **Beveridge Williams & Co Pty Ltd**
Client Program Ref: **1801684**

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	5922923	5922924	5922925	5922926	5922929	5922930
				Client Sample ID	BH01/0.0-0.1	BH01/1.2-1.3	BH02/0.0-0.1	BH02/1.9-2.0	BH04/0.0-0.1	BH04/1.9-2.0
				Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Analysis	**Analyte**	**CAS #**	**LOR**							
OCP	BHC (alpha isomer)	319-84-6	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	a-Endosulphan	959-98-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Aldrin	309-00-2	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	BHC (beta isomer)	319-85-7	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	b-Endosulphan	33213-65-9	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Chlordane	57-74-9	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	cis-Chlordane	5103-71-9	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	trans-Chlordane	5103-74-2	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	BHC (delta isomer)	319-86-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	DDD	72-54-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	DDE	72-55-9	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	DDT	50-29-3	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Dieldrin	60-57-1	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Sum of alpha-, beta- and Endosulphan	115-29-7	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Endosulfan Sulfate	1031-07-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Endrin	72-20-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Endrin Aldehyde	7421-93-4	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Endrin Ketone	53494-70-5	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Hexachlorobenzene	118-74-1	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Heptachlor Epoxide	1024-57-3	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Heptachlor	76-44-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	BHC (gamma isomer) [Lindane]	58-89-9	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Methoxychlor	72-43-5	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Oxychlordane	27304-13-8	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Sum of DDD, DDE and DDT	DDT+DDE+DD	<0.05	mg/kg	<0.05		<0.05		<0.05	
OCP	Sum of Aldrin and Dieldrin	309-00-2 +	<0.05	mg/kg	<0.05		<0.05		<0.05	
Analysis	**Analyte**	**CAS #**	**LOR**							

Samples not collected by ALS and are tested as received.

A blank space indicates no test performed. Soil microbiological testing was commenced within 4 days from the day collected unless otherwise stated.
MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

					Sample No.	5922923	5922924	5922925	5922926	5922929	5922930
					Client Sample ID	BH01/0.0-0.1	BH01/1.2-1.3	BH02/0.0-0.1	BH02/1.9-2.0	BH04/0.0-0.1	BH04/1.9-2.0
					Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
OP	Chlorpyrifos	2921-88-2	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Diazinon	333-41-5	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Dichlorvos	62-73-7	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Ethion	563-12-2	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Fenthion	55-38-9	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Malathion	121-75-5	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Mevinphos	7786-34-7	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Parathion	56-38-2	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Ronnel (Fenchlorfos)	299-84-3	<0.5	mg/kg		<0.5		<0.5		<0.5	
OP	Stirofos	961-11-5	<0.5	mg/kg		<0.5		<0.5		<0.5	
Analysis	**Analyte**	**CAS #**	**LOR**								
SO4	Sulfate	14808-79-8	<10	mg/kg		1600 A	1400 A	850 A	560 A	1300 A	1400 A
NO3 as N	Nitrate, as N	14797-55-8(as	<0.2	mg/kg		<2.5 LINT		<5 LINT		<5 LINT	
Analysis	**Analyte**	**CAS #**	**LOR**								
MS Total Metals	Aluminium	7429-90-5	<5	mg/kg		15000		15000		13000	
MS Total Metals	Antimony	7440-36-0	<5	mg/kg		<5		<5		<5	
MS Total Metals	Arsenic	7440-38-2	<5	mg/kg		<5		9		<5	
MS Total Metals	Barium	7440-39-3	<5	mg/kg		32		30		16	
MS Total Metals	Beryllium	7440-41-7	<5	mg/kg		<5		<5		<5	
MS Total Metals	Boron	7440-42-8	<10	mg/kg		<10		<10		<10	
MS Total Metals	Cadmium	7440-43-9	<0.2	mg/kg		<0.2		<0.2		<0.2	
MS Total Metals	Chromium	7440-47-3	<5	mg/kg		31		70		25	
MS Total Metals	Cobalt	7440-48-4	<5	mg/kg		7		11		<5	
MS Total Metals	Copper	7440-50-8	<5	mg/kg		<5		5		<5	
MS Total Metals	Iron	7439-89-6	<10	mg/kg		17000		60000		17000	
MS Total Metals	Lanthanum	7439-91-0	<5	mg/kg		24		22		18	
MS Total Metals	Lead	7439-92-1	<5	mg/kg		8		17		9	
MS Total Metals	Manganese	7439-96-5	<5	mg/kg		28		62		16	
MS Total Metals	Mercury	7439-97-6	<0.05	mg/kg		<0.05		<0.05		<0.05	
MS Total Metals	Molybdenum	7439-98-7	<5	mg/kg		<5		<5		<5	
MS Total Metals	Nickel	7440-02-0	<5	mg/kg		12		19		6	

Samples not collected by ALS and are tested as received.

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MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

					Sample No.	5922923	5922924	5922925	5922926	5922929	5922930
					Client Sample ID	BH01/0.0-0.1	BH01/1.2-1.3	BH02/0.0-0.1	BH02/1.9-2.0	BH04/0.0-0.1	BH04/1.9-2.0
					Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
MS Total Metals	Selenium	7782-49-2	<3	mg/kg		<3		<3		<3	
MS Total Metals	Silver	7440-22-4	<5	mg/kg		<5		<5		<5	
MS Total Metals	Strontium	7440-24-6	<5	mg/kg		18		13		10	
MS Total Metals	Thallium	7440-28-0	<5	mg/kg		<5		<5		<5	
MS Total Metals	Thorium	7440-29-1	<5	mg/kg		5		6		7	
MS Total Metals	Tin	7440-31-5	<5	mg/kg		<5		<5		<5	
MS Total Metals	Titanium	7440-32-6	<5	mg/kg		33		96		42	
MS Total Metals	Uranium	7440-61-1	<5	mg/kg		<5		<5		<5	
MS Total Metals	Vanadium	7440-62-2	<5	mg/kg		31		210		35	
MS Total Metals	Zinc	7440-66-6	<5	mg/kg		9		10		6	
Analysis	**Analyte**	**CAS #**	**LOR**								
SPOCAS Field	Field pH	pH_FIELD	<0.1	Units		7.2	7.4	5.6	7.3	5.2	7.3
SPOCAS Field	Field pH of Peroxide extract	pHfox	<0.1	Units		5.9	6.1	4.1	6.4	3.7	6.7
SPOCAS Field	Reaction Rate	REACTION_RA				Slight	Slight	Slight	Slight	Slight	Slight

A Analysed by an alternate technique
LINT Level of Reporting raised due to interferences in the sample matrix

Samples not collected by ALS and are tested as received.

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MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
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Calculated results are based on raw data.

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	5922931	5922932	5922933	5922934	5922935	5922936
				Client Sample ID	BH05/0.0-0.1	BH06/0.0-0.1	BH07/0.0-0.1	BH07/1.7-1.8	BH08/0.0-0.1	BH09/0.0-0.1
				Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18	13/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Analysis	**Analyte**	**CAS #**	**LOR**							
OCP	BHC (alpha isomer)	319-84-6	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	a-Endosulphan	959-98-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Aldrin	309-00-2	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	BHC (beta isomer)	319-85-7	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	b-Endosulphan	33213-65-9	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Chlordane	57-74-9	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	cis-Chlordane	5103-71-9	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	trans-Chlordane	5103-74-2	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	BHC (delta isomer)	319-86-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	DDD	72-54-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	DDE	72-55-9	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	DDT	50-29-3	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Dieldrin	60-57-1	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Sum of alpha-, beta- and Endosulphan	115-29-7	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Endosulfan Sulfate	1031-07-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Endrin	72-20-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Endrin Aldehyde	7421-93-4	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Endrin Ketone	53494-70-5	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Hexachlorobenzene	118-74-1	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Heptachlor Epoxide	1024-57-3	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Heptachlor	76-44-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	BHC (gamma isomer) [Lindane]	58-89-9	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Methoxychlor	72-43-5	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Oxychlordane	27304-13-8	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Sum of DDD, DDE and DDT	DDT+DDE+DD	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
OCP	Sum of Aldrin and Dieldrin	309-00-2 +	<0.05	mg/kg	<0.05	<0.05	<0.05		<0.05	<0.05
Analysis	**Analyte**	**CAS #**	**LOR**							

Samples not collected by ALS and are tested as received.

A blank space indicates no test performed. Soil microbiological testing was commenced within 4 days from the day collected unless otherwise stated.
MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

					Sample No.	5922931	5922932	5922933	5922934	5922935	5922936
					Client Sample ID	BH05/0.0-0.1	BH06/0.0-0.1	BH07/0.0-0.1	BH07/1.7-1.8	BH08/0.0-0.1	BH09/0.0-0.1
					Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18	13/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
OP	Chlorpyrifos	2921-88-2	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Diazinon	333-41-5	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Dichlorvos	62-73-7	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Ethion	563-12-2	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Fenthion	55-38-9	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Malathion	121-75-5	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Mevinphos	7786-34-7	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Parathion	56-38-2	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Ronnel (Fenchlorfos)	299-84-3	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
OP	Stirofos	961-11-5	<0.5	mg/kg		<0.5	<0.5	<0.5		<0.5	<0.5
Analysis	**Analyte**	**CAS #**	**LOR**								
SO4	Sulfate	14808-79-8	<10	mg/kg		400 A	330 A	3100 A	1400 A	1200 A	1600 A
NO3 as N	Nitrate, as N	14797-55-8(as	<0.2	mg/kg		0.9	<1 LINT	93		18	<25 LINT
Analysis	**Analyte**	**CAS #**	**LOR**								
MS Total Metals	Aluminium	7429-90-5	<5	mg/kg		8300	13000	18000		12000	9200
MS Total Metals	Antimony	7440-36-0	<5	mg/kg		<5	<5	<5		<5	<5
MS Total Metals	Arsenic	7440-38-2	<5	mg/kg		<5	<5	<5		<5	<5
MS Total Metals	Barium	7440-39-3	<5	mg/kg		36	66	260		93	47
MS Total Metals	Beryllium	7440-41-7	<5	mg/kg		<5	<5	<5		<5	<5
MS Total Metals	Boron	7440-42-8	<10	mg/kg		<10	<10	<10		<10	<10
MS Total Metals	Cadmium	7440-43-9	<0.2	mg/kg		<0.2	<0.2	<0.2		<0.2	<0.2
MS Total Metals	Chromium	7440-47-3	<5	mg/kg		24	49	37		40	31
MS Total Metals	Cobalt	7440-48-4	<5	mg/kg		<5	9	11		9	12
MS Total Metals	Copper	7440-50-8	<5	mg/kg		5	8	7		9	5
MS Total Metals	Iron	7439-89-6	<10	mg/kg		16000	27000	20000		30000	21000
MS Total Metals	Lanthanum	7439-91-0	<5	mg/kg		16	23	28		19	23
MS Total Metals	Lead	7439-92-1	<5	mg/kg		12	13	8		16	11
MS Total Metals	Manganese	7439-96-5	<5	mg/kg		68	300	34		55	92
MS Total Metals	Mercury	7439-97-6	<0.05	mg/kg		<0.05	<0.05	<0.05		<0.05	<0.05
MS Total Metals	Molybdenum	7439-98-7	<5	mg/kg		<5	<5	<5		<5	<5
MS Total Metals	Nickel	7440-02-0	<5	mg/kg		10	16	24		19	15

Samples not collected by ALS and are tested as received.

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MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

				Sample No.	5922931	5922932	5922933	5922934	5922935	5922936
				Client Sample ID	BH05/0.0-0.1	BH06/0.0-0.1	BH07/0.0-0.1	BH07/1.7-1.8	BH08/0.0-0.1	BH09/0.0-0.1
				Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18	13/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
MS Total Metals	Selenium	7782-49-2	<3	mg/kg	<3	<3	<3		<3	<3
MS Total Metals	Silver	7440-22-4	<5	mg/kg	<5	<5	<5		<5	<5
MS Total Metals	Strontium	7440-24-6	<5	mg/kg	13	15	18		17	14
MS Total Metals	Thallium	7440-28-0	<5	mg/kg	<5	<5	<5		<5	<5
MS Total Metals	Thorium	7440-29-1	<5	mg/kg	<5	<5	6		<5	<5
MS Total Metals	Tin	7440-31-5	<5	mg/kg	<5	<5	<5		<5	<5
MS Total Metals	Titanium	7440-32-6	<5	mg/kg	65	54	32		76	140
MS Total Metals	Uranium	7440-61-1	<5	mg/kg	<5	<5	<5		<5	<5
MS Total Metals	Vanadium	7440-62-2	<5	mg/kg	53	84	32		120	80
MS Total Metals	Zinc	7440-66-6	<5	mg/kg	16	16	10		18	9
Analysis	**Analyte**	**CAS #**	**LOR**							
SPOCAS Field	Field pH	pH_FIELD	<0.1	Units	5.8	5.9	7.1	7.9	7.3	6.8
SPOCAS Field	Field pH of Peroxide extract	pHfox	<0.1	Units	3.0	3.4	5.1	7.1	3.7	5.2
SPOCAS Field	Reaction Rate	REACTION_RA			Moderate	Slight	Slight	Slight	Slight	Slight

A Analysed by an alternate technique
LINT Level of Reporting raised due to interferences in the sample matrix

Samples not collected by ALS and are tested as received.

A blank space indicates no test performed. Soil microbiological testing was commenced within 4 days from the day collected unless otherwise stated.
MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	5922937	5922939	5922940	5922941	5922942	5922943
				Client Sample ID	BH10/0.0-0.1	BH11/0.0-0.1	BH11/1.9-2.0	BH12/0.0-0.1	BH13/1.9-2.0	BH14/0.0-0.1
				Sample Date	13/12/18	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Analysis	**Analyte**	**CAS #**	**LOR**							
OCP	BHC (alpha isomer)	319-84-6	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	a-Endosulphan	959-98-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Aldrin	309-00-2	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	BHC (beta isomer)	319-85-7	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	b-Endosulphan	33213-65-9	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Chlordane	57-74-9	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	cis-Chlordane	5103-71-9	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	trans-Chlordane	5103-74-2	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	BHC (delta isomer)	319-86-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	DDD	72-54-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	DDE	72-55-9	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	DDT	50-29-3	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Dieldrin	60-57-1	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Sum of alpha-, beta- and Endosulphan	115-29-7	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Endosulfan Sulfate	1031-07-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Endrin	72-20-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Endrin Aldehyde	7421-93-4	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Endrin Ketone	53494-70-5	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Hexachlorobenzene	118-74-1	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Heptachlor Epoxide	1024-57-3	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Heptachlor	76-44-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	BHC (gamma isomer) [Lindane]	58-89-9	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Methoxychlor	72-43-5	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Oxychlordane	27304-13-8	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Sum of DDD, DDE and DDT	DDT+DDE+DD	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
OCP	Sum of Aldrin and Dieldrin	309-00-2 +	<0.05	mg/kg	<0.05	<0.05		<0.05		<0.05
Analysis	**Analyte**	**CAS #**	**LOR**							

Samples not collected by ALS and are tested as received.

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MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

					Sample No.	5922937	5922939	5922940	5922941	5922942	5922943
					Client Sample ID	BH10/0.0-0.1	BH11/0.0-0.1	BH11/1.9-2.0	BH12/0.0-0.1	BH13/1.9-2.0	BH14/0.0-0.1
					Sample Date	13/12/18	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
OP	Chlorpyrifos	2921-88-2	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Diazinon	333-41-5	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Dichlorvos	62-73-7	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Ethion	563-12-2	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Fenthion	55-38-9	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Malathion	121-75-5	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Mevinphos	7786-34-7	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Parathion	56-38-2	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Ronnel (Fenchlorfos)	299-84-3	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
OP	Stirofos	961-11-5	<0.5	mg/kg		<0.5	<0.5		<0.5		<0.5
Analysis	**Analyte**	**CAS #**	**LOR**								
SO4	Sulfate	14808-79-8	<10	mg/kg		1100 A	1100 A	1600 A	2800 A	1600 A	2800 A
NO3 as N	Nitrate, as N	14797-55-8(as	<0.2	mg/kg		<50 LINT	<2.5 LINT		<5 LINT		21
Analysis	**Analyte**	**CAS #**	**LOR**								
MS Total Metals	Aluminium	7429-90-5	<5	mg/kg		9100	11000		18000		25000
MS Total Metals	Antimony	7440-36-0	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Arsenic	7440-38-2	<5	mg/kg		<5	<5		7		18
MS Total Metals	Barium	7440-39-3	<5	mg/kg		22	58		360		950
MS Total Metals	Beryllium	7440-41-7	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Boron	7440-42-8	<10	mg/kg		<10	<10		<10		<10
MS Total Metals	Cadmium	7440-43-9	<0.2	mg/kg		<0.2	<0.2		<0.2		<0.2
MS Total Metals	Chromium	7440-47-3	<5	mg/kg		25	38		56		68
MS Total Metals	Cobalt	7440-48-4	<5	mg/kg		11	5		11		7
MS Total Metals	Copper	7440-50-8	<5	mg/kg		<5	8		6		8
MS Total Metals	Iron	7439-89-6	<10	mg/kg		12000	29000		43000		37000
MS Total Metals	Lanthanum	7439-91-0	<5	mg/kg		25	20		24		52
MS Total Metals	Lead	7439-92-1	<5	mg/kg		9	15		13		17
MS Total Metals	Manganese	7439-96-5	<5	mg/kg		29	79		29		38
MS Total Metals	Mercury	7439-97-6	<0.05	mg/kg		<0.05	<0.05		<0.05		<0.05
MS Total Metals	Molybdenum	7439-98-7	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Nickel	7440-02-0	<5	mg/kg		11	10		27		13

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MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

					Sample No.	5922937	5922939	5922940	5922941	5922942	5922943
					Client Sample ID	BH10/0.0-0.1	BH11/0.0-0.1	BH11/1.9-2.0	BH12/0.0-0.1	BH13/1.9-2.0	BH14/0.0-0.1
					Sample Date	13/12/18	12/12/18	12/12/18	12/12/18	12/12/18	12/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
MS Total Metals	Selenium	7782-49-2	<3	mg/kg		<3	<3		<3		<3
MS Total Metals	Silver	7440-22-4	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Strontium	7440-24-6	<5	mg/kg		5	12		25		17
MS Total Metals	Thallium	7440-28-0	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Thorium	7440-29-1	<5	mg/kg		6	6		7		12
MS Total Metals	Tin	7440-31-5	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Titanium	7440-32-6	<5	mg/kg		260	67		60		22
MS Total Metals	Uranium	7440-61-1	<5	mg/kg		<5	<5		<5		<5
MS Total Metals	Vanadium	7440-62-2	<5	mg/kg		32	110		140		92
MS Total Metals	Zinc	7440-66-6	<5	mg/kg		6	15		10		15
Analysis	**Analyte**	**CAS #**	**LOR**								
SPOCAS Field	Field pH	pH_FIELD	<0.1	Units		7.0	6.0	8.3	6.4	6.6	7.0
SPOCAS Field	Field pH of Peroxide extract	pHfox	<0.1	Units		4.5	3.8	7.1	4.6	5.0	5.6
SPOCAS Field	Reaction Rate	REACTION_RA				Slight	Slight	Slight	Slight	Slight	Slight

A Analysed by an alternate technique
LINT Level of Reporting raised due to interferences in the sample matrix

Samples not collected by ALS and are tested as received.

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MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

Batch No: 18-55136
Report Number: 729987
Client: Beveridge Williams & Co Pty Ltd
Client Program Ref: 1801684

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	5922945	5922946	5922947	5922948	5922950	5922951
				Client Sample ID	BH15/0.3-0.4	BH15/1.3-1.4	BH16/0.0-0.1	BH17/0.0-0.1	BH18/0.0-0.1	BH18/1.9-2.0
				Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	13/12/18	13/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Analysis	**Analyte**	**CAS #**	**LOR**							
OCP	BHC (alpha isomer)	319-84-6	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	a-Endosulphan	959-98-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Aldrin	309-00-2	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	BHC (beta isomer)	319-85-7	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	b-Endosulphan	33213-65-9	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Chlordane	57-74-9	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	cis-Chlordane	5103-71-9	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	trans-Chlordane	5103-74-2	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	BHC (delta isomer)	319-86-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	DDD	72-54-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	DDE	72-55-9	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	DDT	50-29-3	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Dieldrin	60-57-1	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Sum of alpha-, beta- and Endosulphan	115-29-7	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Endosulfan Sulfate	1031-07-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Endrin	72-20-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Endrin Aldehyde	7421-93-4	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Endrin Ketone	53494-70-5	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Hexachlorobenzene	118-74-1	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Heptachlor Epoxide	1024-57-3	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Heptachlor	76-44-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	BHC (gamma isomer) [Lindane]	58-89-9	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Methoxychlor	72-43-5	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Oxychlordane	27304-13-8	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Sum of DDD, DDE and DDT	DDT+DDE+DD	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
OCP	Sum of Aldrin and Dieldrin	309-00-2 +	<0.05	mg/kg	<0.05		<0.05	<0.05	<0.05	
Analysis	**Analyte**	**CAS #**	**LOR**							

Samples not collected by ALS and are tested as received.

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MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

					Sample No.	5922945	5922946	5922947	5922948	5922950	5922951
					Client Sample ID	BH15/0.3-0.4	BH15/1.3-1.4	BH16/0.0-0.1	BH17/0.0-0.1	BH18/0.0-0.1	BH18/1.9-2.0
					Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	13/12/18	13/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
OP	Chlorpyrifos	2921-88-2	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Diazinon	333-41-5	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Dichlorvos	62-73-7	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Ethion	563-12-2	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Fenthion	55-38-9	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Malathion	121-75-5	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Mevinphos	7786-34-7	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Parathion	56-38-2	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Ronnel (Fenchlorfos)	299-84-3	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
OP	Stirofos	961-11-5	<0.5	mg/kg		<0.5		<0.5	<0.5	<0.5	
Analysis	**Analyte**	**CAS #**	**LOR**								
SO4	Sulfate	14808-79-8	<10	mg/kg		1100 A	2400 A	230 A	730 A	1800 A	1100 A
NO3 as N	Nitrate, as N	14797-55-8(as	<0.2	mg/kg		<25 LINT		<2.5 LINT	<0.25 LINT	<50 LINT	
Analysis	**Analyte**	**CAS #**	**LOR**								
MS Total Metals	Aluminium	7429-90-5	<5	mg/kg		12000		20000	19000	20000	
MS Total Metals	Antimony	7440-36-0	<5	mg/kg		<5		<5	<5	<5	
MS Total Metals	Arsenic	7440-38-2	<5	mg/kg		17		<5	<5	<5	
MS Total Metals	Barium	7440-39-3	<5	mg/kg		33		130	180	350	
MS Total Metals	Beryllium	7440-41-7	<5	mg/kg		<5		<5	<5	<5	
MS Total Metals	Boron	7440-42-8	<10	mg/kg		<10		<10	<10	<10	
MS Total Metals	Cadmium	7440-43-9	<0.2	mg/kg		<0.2		<0.2	<0.2	<0.2	
MS Total Metals	Chromium	7440-47-3	<5	mg/kg		58		64	53	35	
MS Total Metals	Cobalt	7440-48-4	<5	mg/kg		5		9	19	11	
MS Total Metals	Copper	7440-50-8	<5	mg/kg		<5		13	11	5	
MS Total Metals	Iron	7439-89-6	<10	mg/kg		52000		28000	32000	20000	
MS Total Metals	Lanthanum	7439-91-0	<5	mg/kg		14		34	38	27	
MS Total Metals	Lead	7439-92-1	<5	mg/kg		13		9	12	9	
MS Total Metals	Manganese	7439-96-5	<5	mg/kg		28		84	250	55	
MS Total Metals	Mercury	7439-97-6	<0.05	mg/kg		<0.05		<0.05	<0.05	<0.05	
MS Total Metals	Molybdenum	7439-98-7	<5	mg/kg		<5		<5	<5	<5	
MS Total Metals	Nickel	7440-02-0	<5	mg/kg		11		29	31	18	

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MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

				Sample No.	5922945	5922946	5922947	5922948	5922950	5922951
				Client Sample ID	BH15/0.3-0.4	BH15/1.3-1.4	BH16/0.0-0.1	BH17/0.0-0.1	BH18/0.0-0.1	BH18/1.9-2.0
				Sample Date	12/12/18	12/12/18	12/12/18	12/12/18	13/12/18	13/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
MS Total Metals	Selenium	7782-49-2	<3	mg/kg	<3		<3	<3	<3	
MS Total Metals	Silver	7440-22-4	<5	mg/kg	<5		<5	<5	<5	
MS Total Metals	Strontium	7440-24-6	<5	mg/kg	8		39	32	21	
MS Total Metals	Thallium	7440-28-0	<5	mg/kg	<5		<5	<5	<5	
MS Total Metals	Thorium	7440-29-1	<5	mg/kg	6		6	6	7	
MS Total Metals	Tin	7440-31-5	<5	mg/kg	<5		<5	<5	<5	
MS Total Metals	Titanium	7440-32-6	<5	mg/kg	140		130	240	66	
MS Total Metals	Uranium	7440-61-1	<5	mg/kg	<5		<5	<5	<5	
MS Total Metals	Vanadium	7440-62-2	<5	mg/kg	200		42	73	34	
MS Total Metals	Zinc	7440-66-6	<5	mg/kg	7		26	25	14	
Analysis	**Analyte**	**CAS #**	**LOR**							
SPOCAS Field	Field pH	pH_FIELD	<0.1	Units	5.5	6.9	6.0	6.3	7.2	7.4
SPOCAS Field	Field pH of Peroxide extract	pHfox	<0.1	Units	3.2	4.7	3.5	3.9	5.1	6.2
SPOCAS Field	Reaction Rate	REACTION_RA			Slight	Slight	Slight	Moderate	Slight	Slight

A Analysed by an alternate technique
LINT Level of Reporting raised due to interferences in the sample matrix

Samples not collected by ALS and are tested as received.

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MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	5922952	5922953	5922954	5922955	5923098
				Client Sample ID	BH16/0.9-1.0	BH19/0.0-0.1	181212-S-D01	181212-S-D02	BH13/0.0-0.1
				Sample Date	13/12/18	13/12/18	12/12/18	12/12/18	12/12/18
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Analysis	**Analyte**	**CAS #**	**LOR**						
OCP	BHC (alpha isomer)	319-84-6	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	a-Endosulphan	959-98-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Aldrin	309-00-2	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	BHC (beta isomer)	319-85-7	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	b-Endosulphan	33213-65-9	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Chlordane	57-74-9	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	cis-Chlordane	5103-71-9	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	trans-Chlordane	5103-74-2	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	BHC (delta isomer)	319-86-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	DDD	72-54-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	DDE	72-55-9	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	DDT	50-29-3	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Dieldrin	60-57-1	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Sum of alpha-, beta- and Endosulphan	115-29-7	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Endosulfan Sulfate	1031-07-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Endrin	72-20-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Endrin Aldehyde	7421-93-4	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Endrin Ketone	53494-70-5	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Hexachlorobenzene	118-74-1	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Heptachlor Epoxide	1024-57-3	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Heptachlor	76-44-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	BHC (gamma isomer) [Lindane]	58-89-9	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Methoxychlor	72-43-5	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Oxychlordane	27304-13-8	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Sum of DDD, DDE and DDT	DDT+DDE+DD	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
OCP	Sum of Aldrin and Dieldrin	309-00-2 +	<0.05	mg/kg		<0.05	<0.05	<0.05	<0.05
Analysis	**Analyte**	**CAS #**	**LOR**						

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Calculated results are based on raw data.

					Sample No.	5922952	5922953	5922954	5922955	5923098
					Client Sample ID	BH16/0.9-1.0	BH19/0.0-0.1	181212-S-D01	181212-S-D02	BH13/0.0-0.1
					Sample Date	13/12/18	13/12/18	12/12/18	12/12/18	12/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
OP	Chlorpyrifos	2921-88-2	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Diazinon	333-41-5	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Dichlorvos	62-73-7	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Ethion	563-12-2	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Fenthion	55-38-9	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Malathion	121-75-5	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Mevinphos	7786-34-7	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Parathion	56-38-2	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Ronnel (Fenchlorfos)	299-84-3	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
OP	Stirofos	961-11-5	<0.5	mg/kg			<0.5	<0.5	<0.5	<0.5
Analysis	**Analyte**	**CAS #**	**LOR**							
SO4	Sulfate	14808-79-8	<10	mg/kg		2200 A	2300 A	770 A	2700 A	3700 A
NO3 as N	Nitrate, as N	14797-55-8(as	<0.2	mg/kg			<25 LINT	8.8	<25 LINT	<25 LINT
Analysis	**Analyte**	**CAS #**	**LOR**							
MS Total Metals	Aluminium	7429-90-5	<5	mg/kg			20000	15000	19000	21000
MS Total Metals	Antimony	7440-36-0	<5	mg/kg			<5	<5	<5	<5
MS Total Metals	Arsenic	7440-38-2	<5	mg/kg			<5	<5	<5	<5
MS Total Metals	Barium	7440-39-3	<5	mg/kg			150	22	26	27
MS Total Metals	Beryllium	7440-41-7	<5	mg/kg			<5	<5	<5	<5
MS Total Metals	Boron	7440-42-8	<10	mg/kg			<10	<10	<10	<10
MS Total Metals	Cadmium	7440-43-9	<0.2	mg/kg			<0.2	<0.2	<0.2	<0.2
MS Total Metals	Chromium	7440-47-3	<5	mg/kg			55	33	42	45
MS Total Metals	Cobalt	7440-48-4	<5	mg/kg			8	7	7	8
MS Total Metals	Copper	7440-50-8	<5	mg/kg			7	<5	7	8
MS Total Metals	Iron	7439-89-6	<10	mg/kg			41000	21000	32000	37000
MS Total Metals	Lanthanum	7439-91-0	<5	mg/kg			24	22	22	25
MS Total Metals	Lead	7439-92-1	<5	mg/kg			8	9	13	15
MS Total Metals	Manganese	7439-96-5	<5	mg/kg			50	42	23	27
MS Total Metals	Mercury	7439-97-6	<0.05	mg/kg			<0.05	<0.05	<0.05	<0.05
MS Total Metals	Molybdenum	7439-98-7	<5	mg/kg			<5	<5	<5	<5
MS Total Metals	Nickel	7440-02-0	<5	mg/kg			26	11	13	15

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					Sample No.	5922952	5922953	5922954	5922955	5923098
					Client Sample ID	BH16/0.9-1.0	BH19/0.0-0.1	181212-S-D01	181212-S-D02	BH13/0.0-0.1
					Sample Date	13/12/18	13/12/18	12/12/18	12/12/18	12/12/18
					Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
MS Total Metals	Selenium	7782-49-2	<3	mg/kg		<3	<3	<3	<3	<3
MS Total Metals	Silver	7440-22-4	<5	mg/kg		<5	<5	<5	<5	<5
MS Total Metals	Strontium	7440-24-6	<5	mg/kg		35	14	9	10	
MS Total Metals	Thallium	7440-28-0	<5	mg/kg		<5	<5	<5	<5	
MS Total Metals	Thorium	7440-29-1	<5	mg/kg		6	6	9	10	
MS Total Metals	Tin	7440-31-5	<5	mg/kg		<5	<5	<5	<5	
MS Total Metals	Titanium	7440-32-6	<5	mg/kg		210	56	42	41	
MS Total Metals	Uranium	7440-61-1	<5	mg/kg		<5	<5	<5	<5	
MS Total Metals	Vanadium	7440-62-2	<5	mg/kg		120	45	60	66	
MS Total Metals	Zinc	7440-66-6	<5	mg/kg		18	10	8	9	
Analysis	**Analyte**	**CAS #**	**LOR**							
SPOCAS Field	Field pH	pH_FIELD	<0.1	Units		7.6	7.1	5.2	6.2	6.2
SPOCAS Field	Field pH of Peroxide extract	pHfox	<0.1	Units		6.3	5.2	3.1	3.8	4.2
SPOCAS Field	Reaction Rate	REACTION_RA				Moderate	Slight	Slight	Slight	Slight

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QUALITY CONTROL - BLANKS

QC Blanks are an 'analyte free' matrix in which all applicable reagents have been added in the same proportion as in standard samples and are an internal monitor for laboratory contamination.

					Value
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**		
5925851	QC - Blank	MS Total Metals	Aluminium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Antimony	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Arsenic	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Barium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Beryllium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Boron	mg/kg	<10
5925851	QC - Blank	MS Total Metals	Cadmium	mg/kg	<0.2
5925851	QC - Blank	MS Total Metals	Chromium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Cobalt	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Copper	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Iron	mg/kg	<10
5925851	QC - Blank	MS Total Metals	Lanthanum	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Lead	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Manganese	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Mercury	mg/kg	<0.05
5925851	QC - Blank	MS Total Metals	Molybdenum	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Nickel	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Selenium	mg/kg	<3
5925851	QC - Blank	MS Total Metals	Silver	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Strontium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Thallium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Thorium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Tin	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Titanium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Uranium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Vanadium	mg/kg	<5
5925851	QC - Blank	MS Total Metals	Zinc	mg/kg	<5

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					Value
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**		
5926257	QC - Blank	OCP	BHC (alpha isomer)	mg/kg	<0.05
5926257	QC - Blank	OCP	a-Endosulphan	mg/kg	<0.05
5926257	QC - Blank	OCP	Aldrin	mg/kg	<0.05
5926257	QC - Blank	OCP	BHC (beta isomer)	mg/kg	<0.05
5926257	QC - Blank	OCP	b-Endosulphan	mg/kg	<0.05
5926257	QC - Blank	OCP	Chlordane	mg/kg	<0.05
5926257	QC - Blank	OCP	cis-Chlordane	mg/kg	<0.05
5926257	QC - Blank	OCP	trans-Chlordane	mg/kg	<0.05
5926257	QC - Blank	OCP	BHC (delta isomer)	mg/kg	<0.05
5926257	QC - Blank	OCP	DDD	mg/kg	<0.05
5926257	QC - Blank	OCP	DDE	mg/kg	<0.05
5926257	QC - Blank	OCP	DDT	mg/kg	<0.05
5926257	QC - Blank	OCP	Dieldrin	mg/kg	<0.05
5926257	QC - Blank	OCP	Sum of alpha-, beta- and Endosulphan	mg/kg	<0.05
5926257	QC - Blank	OCP	Endosulfan Sulfate	mg/kg	<0.05
5926257	QC - Blank	OCP	Endrin	mg/kg	<0.05
5926257	QC - Blank	OCP	Endrin Aldehyde	mg/kg	<0.05
5926257	QC - Blank	OCP	Endrin Ketone	mg/kg	<0.05
5926257	QC - Blank	OCP	Hexachlorobenzene	mg/kg	<0.05
5926257	QC - Blank	OCP	Heptachlor Epoxide	mg/kg	<0.05
5926257	QC - Blank	OCP	Heptachlor	mg/kg	<0.05
5926257	QC - Blank	OCP	BHC (gamma isomer) [Lindane]	mg/kg	<0.05
5926257	QC - Blank	OCP	Methoxychlor	mg/kg	<0.05
5926257	QC - Blank	OCP	Oxychlordane	mg/kg	<0.05
5926257	QC - Blank	OCP	Sum of DDD, DDE and DDT	mg/kg	<0.05
5926257	QC - Blank	OCP	Sum of Aldrin and Dieldrin	mg/kg	<0.05
5926362	QC - Blank	OCP	BHC (alpha isomer)	mg/kg	<0.05
5926362	QC - Blank	OCP	a-Endosulphan	mg/kg	<0.05
5926362	QC - Blank	OCP	Aldrin	mg/kg	<0.05
5926362	QC - Blank	OCP	BHC (beta isomer)	mg/kg	<0.05
5926362	QC - Blank	OCP	b-Endosulphan	mg/kg	<0.05
5926362	QC - Blank	OCP	Chlordane	mg/kg	<0.05
5926362	QC - Blank	OCP	cis-Chlordane	mg/kg	<0.05

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Calculated results are based on raw data.

					Value
5926362	QC - Blank	OCP	trans-Chlordane	mg/kg	<0.05
5926362	QC - Blank	OCP	BHC (delta isomer)	mg/kg	<0.05
5926362	QC - Blank	OCP	DDD	mg/kg	<0.05
5926362	QC - Blank	OCP	DDE	mg/kg	<0.05
5926362	QC - Blank	OCP	DDT	mg/kg	<0.05
5926362	QC - Blank	OCP	Dieldrin	mg/kg	<0.05
5926362	QC - Blank	OCP	Sum of alpha-, beta- and Endosulphan	mg/kg	<0.05
5926362	QC - Blank	OCP	Endosulfan Sulfate	mg/kg	<0.05
5926362	QC - Blank	OCP	Endrin	mg/kg	<0.05
5926362	QC - Blank	OCP	Endrin Aldehyde	mg/kg	<0.05
5926362	QC - Blank	OCP	Endrin Ketone	mg/kg	<0.05
5926362	QC - Blank	OCP	Hexachlorobenzene	mg/kg	<0.05
5926362	QC - Blank	OCP	Heptachlor Epoxide	mg/kg	<0.05
5926362	QC - Blank	OCP	Heptachlor	mg/kg	<0.05
5926362	QC - Blank	OCP	BHC (gamma isomer) [Lindane]	mg/kg	<0.05
5926362	QC - Blank	OCP	Methoxychlor	mg/kg	<0.05
5926362	QC - Blank	OCP	Oxychlordane	mg/kg	<0.05
5926362	QC - Blank	OCP	Sum of DDD, DDE and DDT	mg/kg	<0.05
5926362	QC - Blank	OCP	Sum of Aldrin and Dieldrin	mg/kg	<0.05
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**		
5926261	QC - Blank	OP	Chlorpyrifos	mg/kg	<0.5
5926261	QC - Blank	OP	Diazinon	mg/kg	<0.5
5926261	QC - Blank	OP	Dichlorvos	mg/kg	<0.5
5926261	QC - Blank	OP	Ethion	mg/kg	<0.5
5926261	QC - Blank	OP	Fenthion	mg/kg	<0.5
5926261	QC - Blank	OP	Malathion	mg/kg	<0.5
5926261	QC - Blank	OP	Mevinphos	mg/kg	<0.5
5926261	QC - Blank	OP	Parathion	mg/kg	<0.5
5926261	QC - Blank	OP	Ronnel (Fenchlorfos)	mg/kg	<0.5
5926261	QC - Blank	OP	Stirofos	mg/kg	<0.5
5926365	QC - Blank	OP	Chlorpyrifos	mg/kg	<0.5
5926365	QC - Blank	OP	Diazinon	mg/kg	<0.5
5926365	QC - Blank	OP	Dichlorvos	mg/kg	<0.5
5926365	QC - Blank	OP	Ethion	mg/kg	<0.5

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					Value
5926365	QC - Blank	OP	Fenthion	mg/kg	<0.5
5926365	QC - Blank	OP	Malathion	mg/kg	<0.5
5926365	QC - Blank	OP	Mevinphos	mg/kg	<0.5
5926365	QC - Blank	OP	Parathion	mg/kg	<0.5
5926365	QC - Blank	OP	Ronnel (Fenchlorfos)	mg/kg	<0.5
5926365	QC - Blank	OP	Stirofos	mg/kg	<0.5

QUALITY CONTROL - DUPLICATES

QC Data for duplicates is calculated on raw 'unrounded' values. Laboratory duplicates are randomly selected samples tested by the laboratory to maintain method precision and provide information on sample homogeniety.
RPD = Relative Percentage Difference for duplicate determinations. RPD's that fall outside the general acceptance criteria will be attributed to non-homogeneity of samples or results of low magnitudes.

					Sample Value	Duplicate Value	% RPD
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5928123	NCP	SO4	Sulfate	mg/kg	<25	<25	0
5928549	BH05/0.0-0.1	NO3 as N	Nitrate, as N	mg/kg	0.9	0.9	4.9
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5925858	BH11/0.0-0.1	MS Total Metals	Aluminium	mg/kg	11000	12000	11.9
5925858	BH11/0.0-0.1	MS Total Metals	Antimony	mg/kg	<5	<5	0
5925858	BH11/0.0-0.1	MS Total Metals	Barium	mg/kg	58	63	7.8
5925858	BH11/0.0-0.1	MS Total Metals	Beryllium	mg/kg	<5	<5	0
5925858	BH11/0.0-0.1	MS Total Metals	Boron	mg/kg	<10	<10	0
5925858	BH11/0.0-0.1	MS Total Metals	Cadmium	mg/kg	<0.2	<0.2	0
5925858	BH11/0.0-0.1	MS Total Metals	Chromium	mg/kg	38	33	12.0
5925858	BH11/0.0-0.1	MS Total Metals	Cobalt	mg/kg	5	5	2.7
5925858	BH11/0.0-0.1	MS Total Metals	Copper	mg/kg	8	7	11.0
5925858	BH11/0.0-0.1	MS Total Metals	Lanthanum	mg/kg	20	22	7.5
5925858	BH11/0.0-0.1	MS Total Metals	Lead	mg/kg	15	13	13.2
5925858	BH11/0.0-0.1	MS Total Metals	Manganese	mg/kg	79	83	5.5
5925858	BH11/0.0-0.1	MS Total Metals	Mercury	mg/kg	<0.05	<0.05	0
5925858	BH11/0.0-0.1	MS Total Metals	Nickel	mg/kg	10	10	1.0
5925858	BH11/0.0-0.1	MS Total Metals	Selenium	mg/kg	<3	<3	0
5925858	BH11/0.0-0.1	MS Total Metals	Silver	mg/kg	<5	<5	0

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					Sample Value	Duplicate Value	% RPD
5925858	BH11/0.0-0.1	MS Total Metals	Strontium	mg/kg	12	14	11.5
5925858	BH11/0.0-0.1	MS Total Metals	Thallium	mg/kg	<5	<5	0
5925858	BH11/0.0-0.1	MS Total Metals	Thorium	mg/kg	6	6	0.9
5925858	BH11/0.0-0.1	MS Total Metals	Titanium	mg/kg	67	65	2.3
5925858	BH11/0.0-0.1	MS Total Metals	Uranium	mg/kg	<5	<5	0
5925858	BH11/0.0-0.1	MS Total Metals	Zinc	mg/kg	15	17	9.7
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5929091	BH01/0.0-0.1	SPOCAS Field Tests	Field pH	Units	7.2	7.2	0.1
5929091	BH01/0.0-0.1	SPOCAS Field Tests	Field pH of Peroxide extract	Units	5.9	5.9	0.0
5929091	BH01/0.0-0.1	SPOCAS Field Tests	Reaction Rate		Slight	Slight	NA
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5926254	BH05/0.0-0.1	OCP	BHC (alpha isomer)	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	a-Endosulphan	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Aldrin	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	BHC (beta isomer)	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	b-Endosulphan	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Chlordane	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	cis-Chlordane	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	trans-Chlordane	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	BHC (delta isomer)	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	DDD	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	DDE	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	DDT	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Dieldrin	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Sum of alpha-, beta- and Endosulphan	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Endosulfan Sulfate	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Endrin	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Endrin Aldehyde	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Endrin Ketone	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Hexachlorobenzene	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Heptachlor Epoxide	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Heptachlor	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	BHC (gamma isomer) [Lindane]	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Methoxychlor	mg/kg	<0.05	<0.05	0

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					Sample Value	Duplicate Value	% RPD
5926254	BH05/0.0-0.1	OCP	Oxychlordane	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Sum of DDD, DDE and DDT	mg/kg	<0.05	<0.05	0
5926254	BH05/0.0-0.1	OCP	Sum of Aldrin and Dieldrin	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	BHC (alpha isomer)	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	a-Endosulphan	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Aldrin	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	BHC (beta isomer)	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	b-Endosulphan	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Chlordane	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	cis-Chlordane	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	trans-Chlordane	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	BHC (delta isomer)	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	DDD	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	DDE	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	DDT	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Dieldrin	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Sum of alpha-, beta- and Endosulphan	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Endosulfan Sulfate	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Endrin	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Endrin Aldehyde	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Endrin Ketone	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Hexachlorobenzene	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Heptachlor Epoxide	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Heptachlor	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	BHC (gamma isomer) [Lindane]	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Methoxychlor	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Oxychlordane	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Sum of DDD, DDE and DDT	mg/kg	<0.05	<0.05	0
5926354	BH16/0.0-0.1	OCP	Sum of Aldrin and Dieldrin	mg/kg	<0.05	<0.05	0
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5926258	BH05/0.0-0.1	OP	Chlorpyrifos	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Diazinon	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Dichlorvos	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Ethion	mg/kg	<0.5	<0.5	0

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					Sample Value	Duplicate Value	% RPD
5926258	BH05/0.0-0.1	OP	Fenthion	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Malathion	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Mevinphos	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Parathion	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Ronnel (Fenchlorfos)	mg/kg	<0.5	<0.5	0
5926258	BH05/0.0-0.1	OP	Stirofos	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Chlorpyrifos	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Diazinon	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Dichlorvos	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Ethion	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Fenthion	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Malathion	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Mevinphos	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Parathion	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Ronnel (Fenchlorfos)	mg/kg	<0.5	<0.5	0
5926363	BH16/0.0-0.1	OP	Stirofos	mg/kg	<0.5	<0.5	0

QUALITY CONTROL - SPIKES

QC Data for spikes is calculated on raw 'unrounded' values. Laboratory spikes are randomly selected samples in which the analytes in question have been artificially introduced and recovered via standard analysis and are used to provide information on potential matrix effects on analyte recoveries.
Spike recoveries that fall outside the general acceptance criteria will be attributed to sample matrix interference or results of high magnitudes.
NCP: Non-Customer Parent (sample quality is representative of the analytical batch but the sample that was QC tested belongs to a customer not pertaining to the report.)

					Sample Value	Expected Value	% Recovery
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5928124	NCP	SO4	Sulfate	mg/kg	<25	1000	120
5928130	BH05/0.0-0.1	NO3 as N	Nitrate, as N	mg/kg	0.9	41	108
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5925859	BH11/0.0-0.1	MS Total Metals	Arsenic	mg/kg	<5	100	81.7
5925859	BH11/0.0-0.1	MS Total Metals	Barium	mg/kg	58	150	106
5925859	BH11/0.0-0.1	MS Total Metals	Beryllium	mg/kg	<5	100	91.5
5925859	BH11/0.0-0.1	MS Total Metals	Boron	mg/kg	<10	100	80.8
5925859	BH11/0.0-0.1	MS Total Metals	Cadmium	mg/kg	<0.2	100	103
5925859	BH11/0.0-0.1	MS Total Metals	Chromium	mg/kg	38	130	92.6

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					Sample Value	Expected Value	% Recovery
5925859	BH11/0.0-0.1	MS Total Metals	Cobalt	mg/kg	5	100	89.1
5925859	BH11/0.0-0.1	MS Total Metals	Copper	mg/kg	8	110	88.0
5925859	BH11/0.0-0.1	MS Total Metals	Lead	mg/kg	15	110	98.2
5925859	BH11/0.0-0.1	MS Total Metals	Manganese	mg/kg	79	170	108
5925859	BH11/0.0-0.1	MS Total Metals	Mercury	mg/kg	<0.05	1.0	90.4
5925859	BH11/0.0-0.1	MS Total Metals	Molybdenum	mg/kg	<5	100	84.1
5925859	BH11/0.0-0.1	MS Total Metals	Nickel	mg/kg	10	110	86.8
5925859	BH11/0.0-0.1	MS Total Metals	Selenium	mg/kg	<3	100	83.1
5925859	BH11/0.0-0.1	MS Total Metals	Silver	mg/kg	<5	1.0	80.2
5925859	BH11/0.0-0.1	MS Total Metals	Strontium	mg/kg	12	110	87.8
5925859	BH11/0.0-0.1	MS Total Metals	Thallium	mg/kg	<5	100	88.8
5925859	BH11/0.0-0.1	MS Total Metals	Tin	mg/kg	<5	100	96.5
5925859	BH11/0.0-0.1	MS Total Metals	Uranium	mg/kg	<5	100	95.6
5925859	BH11/0.0-0.1	MS Total Metals	Vanadium	mg/kg	110	190	82.2
5925859	BH11/0.0-0.1	MS Total Metals	Zinc	mg/kg	15	110	97.2
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5926256	BH07/0.0-0.1	OCP	BHC (alpha isomer)	mg/kg	<0.05	1.4	85.2
5926256	BH07/0.0-0.1	OCP	a-Endosulphan	mg/kg	<0.05	1.4	82.2
5926256	BH07/0.0-0.1	OCP	Aldrin	mg/kg	<0.05	1.4	113
5926256	BH07/0.0-0.1	OCP	BHC (beta isomer)	mg/kg	<0.05	1.4	85.8
5926256	BH07/0.0-0.1	OCP	b-Endosulphan	mg/kg	<0.05	1.4	73.4
5926256	BH07/0.0-0.1	OCP	Chlordane	mg/kg	<0.05	2.9	96.9
5926256	BH07/0.0-0.1	OCP	cis-Chlordane	mg/kg	<0.05	1.4	97.0
5926256	BH07/0.0-0.1	OCP	trans-Chlordane	mg/kg	<0.05	1.4	96.4
5926256	BH07/0.0-0.1	OCP	BHC (delta isomer)	mg/kg	<0.05	1.4	80.2
5926256	BH07/0.0-0.1	OCP	DDD	mg/kg	<0.05	1.4	121
5926256	BH07/0.0-0.1	OCP	DDE	mg/kg	<0.05	1.4	99.2
5926256	BH07/0.0-0.1	OCP	Dieldrin	mg/kg	<0.05	1.4	76.2
5926256	BH07/0.0-0.1	OCP	Endosulfan Sulfate	mg/kg	<0.05	1.4	75.4
5926256	BH07/0.0-0.1	OCP	Endrin	mg/kg	<0.05	1.4	64.6
5926256	BH07/0.0-0.1	OCP	Endrin Aldehyde	mg/kg	<0.05	1.4	89.6
5926256	BH07/0.0-0.1	OCP	Endrin Ketone	mg/kg	<0.05	1.4	104
5926256	BH07/0.0-0.1	OCP	Hexachlorobenzene	mg/kg	<0.05	1.4	94.8
5926256	BH07/0.0-0.1	OCP	Heptachlor Epoxide	mg/kg	<0.05	1.4	92.8

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					Sample Value	Expected Value	% Recovery
5926256	BH07/0.0-0.1	OCP	Heptachlor	mg/kg	<0.05	1.4	85.6
5926256	BH07/0.0-0.1	OCP	BHC (gamma isomer) [Lindane]	mg/kg	<0.05	1.4	85.8
5926361	181212-S-D02	OCP	BHC (alpha isomer)	mg/kg	<0.05	1.4	103
5926361	181212-S-D02	OCP	a-Endosulphan	mg/kg	<0.05	1.4	98.2
5926361	181212-S-D02	OCP	Aldrin	mg/kg	<0.05	1.4	124
5926361	181212-S-D02	OCP	BHC (beta isomer)	mg/kg	<0.05	1.4	102
5926361	181212-S-D02	OCP	b-Endosulphan	mg/kg	<0.05	1.4	97.6
5926361	181212-S-D02	OCP	Chlordane	mg/kg	<0.05	2.7	109
5926361	181212-S-D02	OCP	cis-Chlordane	mg/kg	<0.05	1.4	107
5926361	181212-S-D02	OCP	trans-Chlordane	mg/kg	<0.05	1.4	110
5926361	181212-S-D02	OCP	BHC (delta isomer)	mg/kg	<0.05	1.4	105
5926361	181212-S-D02	OCP	DDD	mg/kg	<0.05	1.4	98.6
5926361	181212-S-D02	OCP	DDE	mg/kg	<0.05	1.4	98.2
5926361	181212-S-D02	OCP	DDT	mg/kg	<0.05	1.4	73.2
5926361	181212-S-D02	OCP	Dieldrin	mg/kg	<0.05	1.4	101
5926361	181212-S-D02	OCP	Endosulfan Sulfate	mg/kg	<0.05	1.4	96.8
5926361	181212-S-D02	OCP	Endrin	mg/kg	<0.05	1.4	107
5926361	181212-S-D02	OCP	Endrin Aldehyde	mg/kg	<0.05	1.4	105
5926361	181212-S-D02	OCP	Endrin Ketone	mg/kg	<0.05	1.4	95.6
5926361	181212-S-D02	OCP	Hexachlorobenzene	mg/kg	<0.05	1.4	111
5926361	181212-S-D02	OCP	Heptachlor Epoxide	mg/kg	<0.05	1.4	109
5926361	181212-S-D02	OCP	Heptachlor	mg/kg	<0.05	1.4	100
5926361	181212-S-D02	OCP	BHC (gamma isomer) [Lindane]	mg/kg	<0.05	1.4	102
5926361	181212-S-D02	OCP	Methoxychlor	mg/kg	<0.05	1.4	75.6
5926361	181212-S-D02	OCP	Oxychlordane	mg/kg	<0.05	N/A	
Lab Sample ID	**Client Sample ID**	**Analysis**	**Analyte**				
5926259	BH07/0.0-0.1	OP	Chlorpyrifos	mg/kg	<0.5	1.4	87.2
5926259	BH07/0.0-0.1	OP	Diazinon	mg/kg	<0.5	1.4	82.6
5926259	BH07/0.0-0.1	OP	Dichlorvos	mg/kg	<0.5	1.4	79.8
5926259	BH07/0.0-0.1	OP	Ethion	mg/kg	<0.5	1.4	94.0
5926259	BH07/0.0-0.1	OP	Fenthion	mg/kg	<0.5	1.4	85.4
5926259	BH07/0.0-0.1	OP	Malathion	mg/kg	<0.5	1.4	73.2
5926259	BH07/0.0-0.1	OP	Mevinphos	mg/kg	<0.5	1.4	88.2
5926259	BH07/0.0-0.1	OP	Parathion	mg/kg	<0.5	1.4	75.0

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					Sample Value	Expected Value	% Recovery
5926259	BH07/0.0-0.1	OP	Ronnel (Fenchlorfos)	mg/kg	<0.5	1.4	78.0
5926259	BH07/0.0-0.1	OP	Stirofos	mg/kg	<0.5	1.4	52.6
5926364	181212-S-D02	OP	Chlorpyrifos	mg/kg	<0.5	1.4	62.0
5926364	181212-S-D02	OP	Diazinon	mg/kg	<0.5	1.4	66.0
5926364	181212-S-D02	OP	Dichlorvos	mg/kg	<0.5	1.4	80.0
5926364	181212-S-D02	OP	Ethion	mg/kg	<0.5	1.4	70.0
5926364	181212-S-D02	OP	Fenthion	mg/kg	<0.5	1.4	70.0
5926364	181212-S-D02	OP	Malathion	mg/kg	<0.5	1.4	60.0
5926364	181212-S-D02	OP	Mevinphos	mg/kg	<0.5	1.4	62.0
5926364	181212-S-D02	OP	Parathion	mg/kg	<0.5	1.4	60.0
5926364	181212-S-D02	OP	Ronnel (Fenchlorfos)	mg/kg	<0.5	1.4	66.0
5926364	181212-S-D02	OP	Stirofos	mg/kg	<0.5	1.4	70.0

Samples not collected by ALS and are tested as received.

A blank space indicates no test performed. Soil microbiological testing was commenced within 4 days from the day collected unless otherwise stated.
MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate.
MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate.
Calculated results are based on raw data.

632794

Chain of Custody Form

Beveridge Williams
development & environment consultants

Job number	1801684	Page 1 of 1	
Laboratory	Eurofins|MGT		
Client	Victorian Planning Authority	Quote number	180618BEV-2
Project	Geotechnical, Hyrdogeological and Salinity Assessment	Project Manager	A.Hayes
Location	Craigieburn West	Sampled by	A.Hayes

Sample ID	Date sampled	Matrix	No. of containers	Testing required: M-17	OCP & OPP	Sulphate	Nitrate	pH(f) pH(ox)
BH01/0.0-0.1A	12/12/18	S	1	X	X	X	X	X
BH13/0.0-0.1A	12/12/18	S	1	X	X	X	X	X

Notes

Matrix: S = Soil GW = Groundwater W = Water R = Rinsate Soluble Heavy Metals: Ag, As, B, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sn, V, Zn

Soil: A-S-BEV-W1 (HM/OCP) A-S-BEV-W2 (HM/PAH) A-S-BEV-W3 (HM/PAH/OCP) A-S-BEV-W4 (HM/TPH/PAH) A-S-BEV-W5 (EPA 621 w/ extra metals)

Water: A-W-BEV-W1 (EPA Table 2, TDS, pH, anions/cations, low level: PAH, OCP, TPH) A--BWANZLL (ANZECC screen, low level metals & organics)

All groundwater heavy metals testing must be for soluble metals unless otherwise indicated.

Turnaround time	24hr ☐	48hr ☐	72hr ☒	Standard ☐	Comments:

Chain of Custody

From	Company	Date	Received by	Company	Date	Time
Adam Hayes	Beveridge Williams	13.12.18	CANH TO	EF/MGT	13/12/18	1.34pm

Quality control

		Initial
Sample preservation	Appropriate sample containers used, refrigerated or chilled samples supplied to laboratory	AH
Sample holding times	Tests conducted within specified holding times	
Final certificates	Re-testing of results as requested. Tests conducted and reported as per CoC form.	

Enviro Sample Vic

From: Adam Hayes <hayesa@bevwill.com.au>
Sent: Friday, 14 December 2018 6:55 AM
To: Enviro Sample Vic
Subject: RE: Eurofins | mgt Sample Receipt Advice - Report 632794 : Site GEOTECHNICAL HYDROGEOLOGICAL AND SALINITY ASSESSMENT (1801684)
Attachments: image003.png; image004.png; 632794_COC.PDF; 632794_sample_receipt_coc.pdf; 632794_summary.pdf

Yes pHf and pHox is required, we only had access to limited sample volumes.

Regards,

Adam Hayes
Senior Environmental Scientist

Beveridge Williams
www.beveridgewilliams.com.au
Melbourne Office p: 03 9524 8888 d: +61 3 9524 8867 m: 0439 632 314

From the Beveridge Williams team, we wish you a Merry Christmas and a happy and prosperous New Year. Please be advised our offices will be closed from 1pm on 21st December 2018 and will reopen Monday 7th January 2019.

From: EnviroSampleVic@eurofins.com <EnviroSampleVic@eurofins.com>
Sent: Thursday, 13 December 2018 2:38 PM
To: Adam Hayes <hayesa@bevwill.com.au>
Subject: Eurofins | mgt Sample Receipt Advice - Report 632794 : Site GEOTECHNICAL HYDROGEOLOGICAL AND SALINITY ASSESSMENT (1801684)

Dear Valued Client,

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins | mgt Analytical Services Manager as soon as possible to make certain that they get changed.

Regards

Jonathan Mete
Sample Receipt

Eurofins | mgt
2-5 Kingston Town Close
OAKLEIGH VIC 3166

Beveridge William & Co Pty Ltd
PO Box 61
Malvern
VIC 3144

NATA Accredited
Accreditation Number 1261
Site Number 1254

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

Attention: **Adam Hayes**

Report **632794-S**
Project name GEOTECHNICAL HYDROGEOLOGICAL AND SALINITY ASSESSMENT
Project ID 1801684
Received Date Dec 13, 2018

Client Sample ID			**BH01/0.0-0.1A**	**BH13/0.0-0.1A**
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De17142**	**M18-De17143**
Date Sampled			**Dec 12, 2018**	**Dec 12, 2018**
Test/Reference	LOR	Unit		
Organochlorine Pesticides				
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05
Toxaphene	1	mg/kg	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	115	88
Tetrachloro-m-xylene (surr.)	1	%	61	52
Organophosphorus Pesticides				
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2

Client Sample ID			BH01/0.0-0.1A	BH13/0.0-0.1A
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De17142**	**M18-De17143**
Date Sampled			**Dec 12, 2018**	**Dec 12, 2018**
Test/Reference	LOR	Unit		
Organophosphorus Pesticides				
Demeton-O	0.2	mg/kg	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2
Omethoate	2	mg/kg	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	129	89
Nitrate (as N)	5	mg/kg	< 5	< 5
Sulphate (as SO4)	30	mg/kg	340	280
% Moisture	1	%	17	14
Heavy Metals				
Arsenic	2	mg/kg	< 2	2.5
Barium	10	mg/kg	45	23
Beryllium	2	mg/kg	< 2	< 2
Boron	10	mg/kg	< 10	< 10
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	37	46
Cobalt	5	mg/kg	13	9.1
Copper	5	mg/kg	6.0	8.9
Lead	5	mg/kg	9.6	15
Manganese	5	mg/kg	35	30
Mercury	0.1	mg/kg	< 0.1	< 0.1
Molybdenum	5	mg/kg	< 5	< 5
Nickel	5	mg/kg	18	16
Selenium	2	mg/kg	< 2	< 2
Silver	0.2	mg/kg	< 0.2	< 0.2
Tin	10	mg/kg	< 10	< 10
Zinc	5	mg/kg	7.9	6.2

Client Sample ID			BH01/0.0-0.1A	BH13/0.0-0.1A
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**M18-De17142**	**M18-De17143**
Date Sampled			**Dec 12, 2018**	**Dec 12, 2018**
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	7.6	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.1	4.9
Reaction Ratings*[S05]		comment	4.0	4.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Nitrate (as N)	Melbourne	Dec 13, 2018	28 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as SO4)	Melbourne	Dec 13, 2018	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
VIC EPA Metals : Metals M17	Melbourne	Dec 13, 2018	28 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Acid Sulfate Soils Field pH Test	Brisbane	Dec 17, 2018	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Melbourne	Dec 13, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Beveridge Williams & Co Pty Ltd	**Order No.:**		**Received:**	Dec 13, 2018 1:34 PM
Address:	PO Box 61	**Report #:**	632794	**Due:**	Dec 18, 2018
	Malvern	**Phone:**	9524 8888	**Priority:**	3 Day
	VIC 3144	**Fax:**	9524 8899	**Contact Name:**	Adam Hayes
Project Name:	GEOTECHNICAL HYDROGEOLOGICAL AND SALINITY ASSESSMENT				
Project ID:	1801684				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Nitrate (as N)	Sulphate (as SO4)	Organochlorine Pesticides	Organophosphorus Pesticides	Acid Sulfate Soils Field pH Test	VIC EPA Metals : Metals M17	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794										X		
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	BH01/0.0-0.1A	Dec 12, 2018		Soil	M18-De17142	X	X	X	X	X	X	X
2	BH13/0.0-0.1A	Dec 12, 2018		Soil	M18-De17143	X	X	X	X	X	X	X
Test Counts						2	2	2	2	2	2	2

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Nitrate (as N)	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 0.2			0.2	Pass	
Tin	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	77			70-130	Pass	
4.4'-DDD	%	71			70-130	Pass	
4.4'-DDE	%	119			70-130	Pass	
4.4'-DDT	%	73			70-130	Pass	
a-BHC	%	124			70-130	Pass	
Aldrin	%	112			70-130	Pass	
b-BHC	%	101			70-130	Pass	
d-BHC	%	123			70-130	Pass	
Dieldrin	%	115			70-130	Pass	
Endosulfan I	%	121			70-130	Pass	
Endosulfan II	%	123			70-130	Pass	
Endosulfan sulphate	%	113			70-130	Pass	
Endrin	%	104			70-130	Pass	
Endrin aldehyde	%	118			70-130	Pass	
Endrin ketone	%	101			70-130	Pass	
g-BHC (Lindane)	%	117			70-130	Pass	
Heptachlor	%	86			70-130	Pass	
Heptachlor epoxide	%	116			70-130	Pass	
Hexachlorobenzene	%	128			70-130	Pass	
Methoxychlor	%	99			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	117			70-130	Pass	
Dimethoate	%	76			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ethion	%	101			70-130	Pass	
Fenitrothion	%	121			70-130	Pass	
Methyl parathion	%	109			70-130	Pass	
Mevinphos	%	112			70-130	Pass	
LCS - % Recovery							
Nitrate (as N)	%	116			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	108			80-120	Pass	
Barium	%	112			80-120	Pass	
Beryllium	%	105			80-120	Pass	
Boron	%	106			80-120	Pass	
Cadmium	%	106			80-120	Pass	
Chromium	%	115			80-120	Pass	
Cobalt	%	117			80-120	Pass	
Copper	%	110			80-120	Pass	
Lead	%	119			80-120	Pass	
Manganese	%	116			80-120	Pass	
Mercury	%	112			75-125	Pass	
Molybdenum	%	107			80-120	Pass	
Nickel	%	109			80-120	Pass	
Selenium	%	102			80-120	Pass	
Silver	%	109			80-120	Pass	
Tin	%	110			80-120	Pass	
Zinc	%	105			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S18-De08409	NCP	%	120			70-130	Pass	
a-BHC	S18-De08409	NCP	%	116			70-130	Pass	
Aldrin	S18-De08409	NCP	%	101			70-130	Pass	
b-BHC	S18-De08409	NCP	%	111			70-130	Pass	
d-BHC	S18-De08409	NCP	%	110			70-130	Pass	
Endosulfan I	S18-De08409	NCP	%	116			70-130	Pass	
Endosulfan II	S18-De08409	NCP	%	122			70-130	Pass	
Endosulfan sulphate	S18-De08409	NCP	%	103			70-130	Pass	
Endrin	S18-De08409	NCP	%	109			70-130	Pass	
Endrin aldehyde	S18-De08409	NCP	%	108			70-130	Pass	
Endrin ketone	S18-De08409	NCP	%	92			70-130	Pass	
g-BHC (Lindane)	S18-De08409	NCP	%	112			70-130	Pass	
Heptachlor epoxide	S18-De08409	NCP	%	98			70-130	Pass	
Hexachlorobenzene	S18-De11597	NCP	%	130			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	M18-De10609	NCP	%	90			70-130	Pass	
Ethion	M18-De10609	NCP	%	126			70-130	Pass	
Fenitrothion	M18-De10609	NCP	%	82			70-130	Pass	
Methyl parathion	M18-De10609	NCP	%	74			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M18-De10990	NCP	%	101			75-125	Pass	
Barium	M18-De10990	NCP	%	112			75-125	Pass	
Beryllium	M18-De10990	NCP	%	96			75-125	Pass	
Boron	M18-De10990	NCP	%	69			75-125	Fail	Q08

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	M18-De10990	NCP	%	104			75-125	Pass	
Chromium	M18-De10990	NCP	%	104			75-125	Pass	
Cobalt	M18-De10990	NCP	%	98			75-125	Pass	
Copper	M18-De10990	NCP	%	90			75-125	Pass	
Lead	M18-De10990	NCP	%	101			75-125	Pass	
Manganese	M18-De10990	NCP	%	119			75-125	Pass	
Mercury	M18-De10990	NCP	%	103			70-130	Pass	
Molybdenum	M18-De10990	NCP	%	100			75-125	Pass	
Nickel	M18-De10990	NCP	%	94			75-125	Pass	
Selenium	M18-De10990	NCP	%	87			75-125	Pass	
Silver	M18-De10990	NCP	%	108			75-125	Pass	
Tin	M18-De10990	NCP	%	102			75-125	Pass	
Zinc	M18-De10990	NCP	%	119			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S18-De08410	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S18-De08410	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-De08410	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Fenitrothion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-De08410	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-De08410	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-De08410	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Nitrate (as N)	M18-De10673	NCP	mg/kg	40	39	2.0	30%	Pass	
% Moisture	M18-De17196	NCP	%	8.0	8.1	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M18-De17131	NCP	mg/kg	5.6	5.5	1.0	30%	Pass	
Barium	M18-De17131	NCP	mg/kg	33	35	6.0	30%	Pass	
Boron	M18-De17131	NCP	mg/kg	< 10	14	71	30%	Fail	Q15
Cadmium	M18-De17131	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M18-De17131	NCP	mg/kg	21	21	<1	30%	Pass	
Cobalt	M18-De17131	NCP	mg/kg	< 5	5.5	15	30%	Pass	
Copper	M18-De17131	NCP	mg/kg	27	28	5.0	30%	Pass	
Lead	M18-De17131	NCP	mg/kg	7.3	6.7	8.0	30%	Pass	
Manganese	M18-De17131	NCP	mg/kg	66	84	24	30%	Pass	
Mercury	M18-De17131	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M18-De17131	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	M18-De17131	NCP	mg/kg	17	19	16	30%	Pass	
Selenium	M18-De17131	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M18-De17131	NCP	mg/kg	0.4	0.4	13	30%	Pass	
Tin	M18-De17131	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M18-De17131	NCP	mg/kg	120	140	17	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	M18-De17142	CP	pH Units	7.6	7.5	pass	30%	Pass	
Reaction Ratings*	M18-De17142	CP	comment	4.0	4.0	pass	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	No
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Mary Makarios	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Myles Clark	Senior Analyst-SPOCAS (QLD)
Julie Kay	Senior Analyst-Inorganic (VIC)
Chris Bennett	Senior Analyst-Metal (VIC)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.