# **SOIL SALINITY REPORT**

230 Sixth Avenue, 80 Edmondson Avenue and 155 Fifth Avenue Austral, NSW 2179

Austral 1 Pty Ltd – October 2016





# **DOCUMENT CONTROL**

# **SOIL SALINITY REPORT**

230 Sixth Avenue, 80 Edmondson Avenue & 155 Fifth Avenue Austral, NSW 2179

#### **PREPARED FOR**

Austral 1 Pty Ltd C/- Denis Ghersinich Vantage Property Suite 205, 12 O'Connell Street Sydney NSW 2000

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# **ATTACHMENTS**

Attachment A: Test Pit Logs Attachment B: Laboratory Reports



# **1. INTRODUCTION**

Geo-Logix Pty Ltd (Geo-Logix) was commissioned by Vantage Property Pty Ltd on behalf of Austral 1 Pty Ltd to conduct a soil salinity investigation of the site located at the adjoining properties of 230 Sixth Avenue, 155 Fifth Avenue and 80 Edmondson Avenue, Austral NSW (Figure 1).

# **1.1 Objectives and Scope of Work**

The objective of the investigation was to assess the subsurface soil strata to provide soil salinity data for future construction works.

To satisfy the above objective, Geo-Logix completed the following scope of work:

- Visual appraisal of the site conditions and locality;
- Review of geological and soil maps for the area;
- Excavation of eight test pits (TP1 to TP8) across the site;
- Logging of test pits in accordance with the Unified Soil Classification System (USCS);
- Collection of representative soil samples for salinity testing;
- · Backfilling and compaction of test pits with on-site soils; and
- Provision of this report detailing results of soil salinity testing.

The field investigation was conducted on 4 October 2016.

# **2. SITE INFORMATION**

# 2.1 Site Identification and Description

The investigation area comprises the following properties:

Street Address	Lot and Deposited Plan (DP)	Approximate Area (m <sup>2</sup> )
230 Sixth Avenue, Austral NSW 2179	Lot 1067 DP 2475	12,140
155 Fifth Avenue, Austral NSW 2179	Lot B DP 416093	18,194
80 Edmondson Avenue, Austral NSW 2179	Lot A DP 416093	18,205

The site is located within a rural/residential area on the western side of Edmondson Avenue, within the western Sydney suburb of Austral, NSW (Figure 2). The site consists of two rectangular-shaped lots and one L-shaped lot, encompassing a total area of 48,539 m<sup>2</sup>. At the time of Geo-Logix investigation, the properties contained five houses, three swimming pools, large grassed paddocks with sheep, a vehicle wreckage area and a tennis court. No salt scalds or distressed vegetation were observed during the investigation.

# 2.2 Topography

The site slopes moderately down to the northeast from an elevation of 76 mAHD to 70 mAHD. The southern portion of 230 Sixth Avenue was raised and level compared to the rest of site.



# 2.3 Regional Geology

Review of the NSW 1:100,000 Penrith Map (Geological Survey of NSW, 1981) indicates the site is underlain by Triassic age Bringelly Shale of the Wianamatta Group, comprising shale and claystone laminate and fine to medium grained lithic sandstone.

Review of the Soil Landscapes of the Penrith Region 1:100,000 Sheet (Bannerman and Hazelton, 1990) indicates soils at the site consist of residual Blacktown soil group comprising of brownish black loams, brown clay loams, mottled brown light clays and light grey plastic mottled clays.

## 2.4 Regional Hydrology

The nearest surface water is an unnamed tributary of Kemps Creek, located approximately 110 m north east of the site.

It is expected that groundwater would follow the natural regional topography and generally flow north– east. Reference to the NSW Water Groundwater Works Report (NSW Government, 2016) indicates there are no registered groundwater bores within a 500 m radius of the site.

# **3. METHOD OF INVESTIGATION**

Fieldwork undertaken by Geo-Logix comprised:

- Excavation and logging of eight test pits (TP1 to TP8) with an excavator;
- Collection of soil samples for salinity testing; and
- Backfilling test pits at the conclusion of sampling and logging.

# **3.1 Test Pit Excavation**

Prior to commencing the excavations, each location was cross-checked with the results of a Dial Before You Dig (DBYD) search.

Test pits were completed to a maximum depth of 1.5 metres below grade (mbg) using an excavator and positioned at locations spread across the site. Test pit locations were selected to provide coverage of each landform type encountered onsite (crest, slope, and channel).

During excavation, encountered soils were logged in accordance with the USCS. Representative samples of soil were collected and submitted to Eurofins MGT Pty Ltd (Eurofins) for salinity tests.

The location of each test pit was estimated using measurements from existing landmarks. A copy of the test pit logs is provided in Attachment A.



# **4. INVESTIGATION RESULTS**

## 4.1 Site Geology

The geology encountered at the site typically comprised:

- Moderate brown, damp, loose, Sandy Silty Topsoil, with clay and gravel between 0.0 to 0.2 mbg;
- Brownish yellow, damp, soft to firm low plasticity Clay (CL) between 0.2 to 1.4 mbg; and
- Reddish yellow, damp, stiff, low plasticity Clay (CL) below 1.4 mbg.

In test pits TP6 to TP8, moderate brown, moist, moderately compacted Sandy Clayey Fill was encountered to maximum depth, between 0.3 and 1.5 mbg.

## 4.2 Groundwater

Groundwater was not encountered within the depth of the investigation.

## **4.3 Laboratory Results**

Representative samples of each soil stratum were collected in test pits TP1 to TP8 and submitted to Eurofins for NATA accredited testing of pH, sulphate, chloride and electrical conductivity to determine the salinity of soils from 0 to 1.5 mbg across the site.

Electrical conductivity was determined by the laboratory using a 1:5 soil water extract. Electrical conductivity results were then converted to Extract Electrical Conductivity (EC<sub>e</sub>) in accordance with NSW Department of Land and Water Conservation *Site Investigations for Urban Salinity* (2002) using a multiplication factor of 14 (Sandy Loam) for Fill, 10 (Loam) for topsoil, 9 (Clay Loam) for Sandy Clay soils and 6 (Heavy clay) for Low Plasticity Clay soils.

A summary of the soil analytical results is provided in the following table:

Location / Depth (m)	1:5 Electrical Conductivity (dS/m)	Soil Texture Factor	Extract Electrical Conductivity (dS/m)	рН	Chloride (mg/kg)	Sulphate (mg/kg)
TP1/0.1	0.020	10	0.20	7.8	11	120
TP1/0.5	0.570	7	3.99	5.3	1000	470
TP1/1.4	0.650	9	5.85	6.1	1000	310
TP2/0.1	0.024	10	0.24	7.1	64	280
TP2/1.0	0.580	6	3.48	5.2	930	450
TP3/0.1	0.072	10	0.72	6.1	33	170
TP3/0.2	0.310	6	1.86	5.8	440	340
TP3/1.4	0.710	6	4.26	5.5	1600	320
TP4/0.1	0.019	10	0.19	6.6	21	280
TP4/0.2	0.053	6	0.32	6.6	29	370
TP4/0.5	0.780	6	4.68	5.6	1500	500
TP5/0.1	0.033	10	0.33	6.7	8.1	95



Location / Depth (m)	1:5 Electrical Conductivity (dS/m)	Soil Texture Factor	Extract Electrical Conductivity (dS/m)	рН	Chloride (mg/kg)	Sulphate (mg/kg)
TP5/0.5	0.540	6	3.24	5.5	1100	110
TP6/0.1	0.023	10	0.23	6.5	85	420
TP6/0.3	0.460	6	2.76	6.1	920	270
TP7/0.1	0.031	10	0.31	6.6	5.8	82
TP7/0.3	0.034	6	0.20	7.3	18	130
TP7/0.5	0.570	6	3.42	6.5	940	370
TP8/0.1	0.059	10	0.59	7.3	< 5	< 30
TP8/0.3	0.080	10	0.80	7.9	5.4	< 30

A copy of the laboratory report is included in Attachment B.

# **5. SALINITY RISK**

The Department of Land and Water Conservation NSW (2002) defines five soil salinity classes based on the EC<sub>e</sub>. These classes include:

- Non-saline soils (EC<sub>e</sub> <2);
- Slightly saline soils (2< EC<sub>e</sub> <4);
- Moderately saline soils (4< EC<sub>e</sub> <8);</li>
- Very saline soils (8< EC<sub>e</sub> <16); and
- Highly saline soils (EC<sub>e</sub> >16).

Laboratory results indicate that soil salinity increases with depth across the site; no correlation was observed between salinity and landform features. The  $EC_e$  of soil in each location is plotted against depth in the following chart:





Geo-Logix assessed the salinity class of each soil type based on the range and average of  $EC_e$  values. Topsoil and Fill appear to be generally 'Non-saline', with an  $EC_e$  range of 0.20 to 0.80 dS/m. Underlying low plasticity clays appear to be 'Slightly saline' to 'Moderately saline' with a  $EC_e$  range of 1.86 to 5.85 dS/m.

# **6. SALINITY MANAGEMENT**

The goal of salinity management is to prevent future salt mobilisation and ensure design and construction are appropriate for present and future site conditions. In order to minimise impacts to the site salinity profile, the following best practices should be adhered to during design and construction:

- Water infiltration during construction should be minimised by providing proper drainage of the construction site and avoiding ponding;
- Any stormwater detention ponds should be sealed (onsite Clay are considered suitable for stormwater detention pond lining);
- Disturbance of natural onsite drainage lines should be minimised;
- Existing deep rooted vegetation should be retained where possible and native vegetation used in landscaping;
- Soil disturbance including cut and fill should be minimised;
- Concrete/steel structures in contact with soil should be designed for moderately saline conditions in accordance with Australian Standards AS3600–2009 and AS2159–2009 and
- Floor slabs should be water proofed and any damp proof courses carefully installed.

# 7. LIMITATIONS

The recommendations in this report are based on the available project information and the subsurface information obtained by Geo-Logix. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Geo-Logix should be notified immediately to determine if there are consequences to the recommendations provided in this report. If Geo-Logix is not retained to perform these functions, Geo-Logix cannot be responsible for the impact of those conditions on the performance of the project.

After the plans and specifications are more complete, the geotechnical engineer should be provided with the opportunity to review the final design plans and specifications to assess whether our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Austral 1 Pty Ltd and their consultants for the specific application to the proposed construction of the proposed residential development at 230 Sixth Avenue, 80 Edmondson Avenue and 155 Fifth Avenue, Austral NSW.



# 8. REFERENCES

Australian Standard (2009) AS3600-2009: Concrete Structures, Standards Australia.

Department of Land and Water Conservation NSW (2002) Site Investigations for Urban Salinity.

Clark N.R. and Jones D.C., 1991, *Penrith 1:100 000 Geological Sheet 9030, 1st edition*. Geological Survey of New South Wales, Sydney.

Bannerman S.M. and Hazelton P.A., 1990, *Soil Landscapes of the Penrith 1:100,000 Sheet* map and report, Soil Conservation Service of NSW, Sydney.

**FIGURES** 





# SITE LAYOUT AND SAMPLING LOCATIONS

Soil Salinity Report 230 Sixth Avenue, 155 Fifth Avenue and 80 Edmondson Avenue Austral, New South Wales

Figure 2

Project No. 1601112

COPYRIGHT Other than for the sole purpose of work associated with the Soil Salinity Report as detailed herein, the use, reproduction and/or publication of this figure wholly, or in part, whether or not modified or altered, is strictly prohibited.

Geo-Logix environment · geotech **ATTACHMENT A** 

												Test Pit Log	
			>		10 10.		ea.			Geo-Logix Pty Ltd	Hole	e ID. <b>TP01</b>	
	6	<			Ge	0-	L	0	ai	Building Q2, Level 3	Proje	ect Number: 1601114	
					enviror	nmen	t ·	ae	ote	Unit 2309 / 4 Daydream Street	Hole	Depth: <b>1.50 m</b>	
								9-		www.geo-logix.com.au	Shee	et: 1 of 1	
_	Dre	niant	Nor		Austral S	olinit				5			
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Σ	3	ă	ő	ĭ	Š	Ā	Σ	ő	ō		ž		
	+								<u> 4 14 - 14</u>	TOPSOIL - moderate brown (5VP 3/4) 20%	damp	No odour. No staining	
		0.1	П	7	TP01 / 0 1	0.0			12 . <u>24</u>	clay, 30% silt, 30% sand, 20% gravel, moderately	damp	No odour. No staining.	
					11 01 / 0.1	0.0			<u>1/ 1/1</u>	compacted.			
		0.20								CLAY, trace Sand - dark yellowish orange	damp	No odour. No staining.	
		-0.3								(10YR 6/6), 90% clay, 10% sand, low plasticity, soft.			
		0.4											
		_0.5	D	Z	TP01 / 0.5	0.0							
		_0.6											
5		0.7											
avatic		<b>–</b>					Itural						
EXC	i	-0.8					Z	CL					
		_0.9											
		1.0											
		Γ											
		- 1.1											
		_ 1.2											
		13											
		1.40	D	z	TP01 / 1.4	0.0				Clavey SAND - light grey (N7), 30% clay, 70%	damp	No odour. No staining.	
		1.5						sc		sand, medium dense.		······	
		1.6								End of Hole at 1.50 m Target depth.			
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51:30		1.8											
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AUS		Image:											

Log Drawn By: Laurie White	Logged By:	Aidan McKenzie	Date: 4/10/2016
Contact: laurie.white@reumad.com.au	Checked By:	Ben Pearce	Date: 12/10/2016

									Test Pit Log
Project N Location	lame: / Site:	Geo-Logix Pty Ltd Building Q2, Level 3 Unit 2309 / 4 Daydream Street Warriewood NSW 2102 www.geo-logix.com.au Austral Salinity Assessment 155 Fifth Avenue, 80 Edmondson Avenue, 230 Sixth Avenue, Austral I							ID.       TP02         ect Number:       1601114         Depth:       1.50 m         et:       1 of 1         Started:       4/10/2016         Completed:       4/10/2016
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Method Water Level Depth (mBGL)	Sample Type HC Odour	Sample ID	(mqq) OIA	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
Locardation Locar	D Z	TP02 / 0.1	0.0	Natural	CL		TOPSOIL - moderate brown (5YR 3/4), 20% clay, 30% silt, 30% sand, 20% gravel, moderately compacted. CLAY, trace Sand - dark yellowish orange (10YR 6/6), mottled light grey (N7), 90% clay, 10% sand, low plasticity, firm.	damp	No odour. No staining.
_ 1.6 _ 1.7 _ 1.8 _ 1.9							End of Hole at 1.50 m Target depth.		
Abbreviation	ns			<u> </u>	I		Additional Comments		

GL LOG 2 AUSTRAL 1601114.GPJ GL.GDT 7/10/16 4:51:32 PM Hydrocarbon Odour H High M Medium L Low Z Zero 
 Strength Testing

 SPT
 Standard Penetration Test

 DCP
 Dynamic Cone Penetrometer

 PP
 Pocket Penetrometer
 Sample TypeDDisturbedUUndisturbedBBulkRRepresentativeCContinuous Encountered Groundwater Stabilised Groundwater Logged By: Log Drawn By: Laurie White Aidan McKenzie Date: 4/10/2016 UMA Contact: laurie.white@reumad.com.au Checked By: Ben Pearce Date: 12/10/2016

												Test Pit Log
					Ge	<b>O-</b> nmen	L	<b>O</b> ge	gi	Ch Geo-Logix Pty Ltd Building Q2, Level 3 Unit 2309 / 4 Daydream Street Warriewood NSW 2102 www.geo-logix.com.au	Hole Proje Hole Shee	TP03       ect Number:     1601114       Depth:     1.60 m       et:     1 of 1
	Proje Loca Clier Cont Meth	ect I atior nt: trac nod:	Nan h / S tor:	ne: iite:	Austral Salinity AssessmentDate Started:155 Fifth Avenue, 80 Edmondson Avenue, 230 Sixth Avenue, Austral NSWDate CompletedAustral 1 Pty LtdC & D Camilleri Excavations Pty LtdHere is a started:3.5t excavator, 400mm bucketHere is a started:Here is a started:							Started:         4/10/2016           Completed:         4/10/2016
Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	PID (ppm)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
	-	.0.1 0.20	D D	z z	TP03 / 0.1 TP03 / 0.2	0.0				TOPSOIL - moderate brown (5YR 3/4), 20% clay, 30% silt, 30% sand, 20% gravel, moderately compacted. CLAY, trace Sand and Gravel - yellowish red (5YR 5/8), 80% clay, 10% sand, 10% gravel, low	damp moist	No odour. No staining. No odour. No staining.
Excavation		0.4 0.5 0.6 0.7 0.8					Natural	CL		plasticity, stiff.		
	-	1.00 1.1 1.2 1.3	D	Z	TP03 / 1.0	0.0		CL		CLAY, trace Sand and Gravel - reddish yellow (5YR 7/6), 80% clay, 10% sand, 10% gravel, low plasticity, stiff.	moist	No odour. No staining.
		1.5 1.6	D	Z	TP03 / 1.4	0.0		CL		CLAY, trace Sand - light grey (N7), 90% clay, 10% sand, low plasticity, firm.	moist	No odour. No staining.
		1.7 1.8 1.9 2.0								Target depth.		

AUSTRAL 1601114.GPJ GL.GDT 7/10/16 4:51:34 PM Abbreviations

Hydrocarbon Odour H High M Medium L Low Z Zero Encountered Groundwater

 Sample Type

 D
 Disturbed

 U
 Undisturbed

 B
 Bulk

 R
 Representative

 C
 Continuous

 Strength Testing

 SPT
 Standard Penetration Test

 DCP
 Dynamic Cone Penetrometer

 PP
 Pocket Penetrometer

Stabilised Groundwater

Log Drawn By:	Laurie White	Logged By:	Aidan McKenzie	Date:	4/10/2016	
Contact:	laurie.white@reumad.com.au	Checked By:	Ben Pearce	Date:	12/10/2016	

Additional Comments

											lest Pit Log
	ject	Nan n / S	ne:	Geo-Logix Pty Ltd Building Q2, Level 3 Unit 2309 / 4 Daydream Street Warriewood NSW 2102 www.geo-logix.com.au Austral Salinity Assessment						Hole Proje Hole Shee Date	ID.         TP04           ect Number:         1601114           Depth:         1.50 m           et:         1 of 1           Started:         4/10/2016           Completed:         4/10/2016
Clie Cor Vet	ent: htrac thod	ctor:		Austral 1 C & D Ca 3.5t exca	Pty L mille vator,	.td ri E , 40	Exca 10mr	ivati m bu	ons Pty Ltd cket		
Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	PID (ppm)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
								<u>X 18</u> <u>X</u> 1	<b>TOPSOIL</b> - moderate brown (5YR 3/4), 10%	damp	No odour. No staining.
	0.1 <b>0.15</b>	D	z	TP04 / 0.1	0.0			11 <u>24</u> <u>NG N</u> 11 NU	clay, 40% silt, 30% sand, 20% gravel, moderately compacted.		<u> </u>
	_0.2	D	z	TP04 / 0.2	0.0		CL		<b>CLAY with Sand, trace Gravel</b> - dark yellowish orange (10YR 6/6), 70% clay, 20% sand, 10% gravel, low plasticity, firm.	damp	No odour. No staining.
	0.30 $0.4$ $0.5$ $0.6$ $0.7$ $0.7$ $0.8$ $0.9$ $1.0$ $1.1$ $1.2$ $1.3$ $1.4$ $1.5$	D	z	TP04 / 0.5	0.0	Natural	CL		CLAY, trace Sand - reddish yellow (5YR 7/6), 90% clay, 10% sand, low plasticity, stiff.	damp	No odour. No staining.
	1.6 1.7 1.8 1.9 2.0								End of Hole at 1.50 m Target depth.		
	Mater Level Mater Level	Project Locatio Client: Contrac Method 10 10 11 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.0 1.1 1.2 1.3 1.1 1.1 1.2 1.3 1.1 1.1 1.2 1.3 1.1 1.1 1.2 1.3 1.1 1.1 1.2 1.3 1.1 1.1 1.2 1.3 1.1 1.1 1.2 1.1 1.1 1.1 1.2 1.1 1.1 1.1	Project Nan Location / S Client: Contractor: Method:	Project Name: Location / Site: Client: Authod:	Image: Constraint of the second se	Open of the second se	Image: Constraint of the second se	Openet Name:         Austral Salinity Asse           Location / Site:         155 Fifth Avenue, 80           Austral 1 Pty Ltd         Austral 1 Pty Ltd           Contractor:         C & D Camilleri Exca           Method:         3.5t excavator, 400mm           Image: Site of Sit	Image: Contractor       Second Contractor       Se	Geo-Logix Pty Ltd Building 02, Level 3 Unit 2309 /4 Daydream Street Warwood NSW 2102 www.geo-logix.com.au         Project Name:       Austral Salinity Assessment 155 Fifth Avenue, 80 Edmondson Avenue, 230 Sixth Avenue, Austral NS Dilent:         Austral TPy Ltd       Material Description         Project Name:       C & D Camilleri Excavations Pty Ltd         Austral TPy Ltd       Material Description         Project Name:       C & D Camilleri Excavations Pty Ltd         Austral TPy Ltd       Material Description         Project Name:       C & D Camilleri Excavations Pty Ltd         Material Description       Material Description         Project Name:       C & D Camilleri Excavations Pty Ltd         Material Description       Class 400% still, 30% sand, 20% gravel, moderately compacted         Project Name:       C Provi / 0.1       0.0       Provide Still St	Specific Section Sectin Section Section Sectin Section Section Section Section Section

GL LOG 2 AUSTRAL 1601114.GPJ GL.GDT 7/10/16 4:51:36 PM Abbreviations Additional Comments Sample TypeDDisturbedUUndisturbedBBulkRRepresentativeCContinuous 
 Strength Testing

 SPT
 Standard Penetration Test

 DCP
 Dynamic Cone Penetrometer

 PP
 Pocket Penetrometer
 Hydrocarbon Odour High Medium Low Zero H M L Z Encountered Groundwater Stabilised Groundwater Logged By: Log Drawn By: Laurie White Aidan McKenzie Date: 4/10/2016 UMA

Checked By:

Ben Pearce

Date: 12/10/2016

Contact: laurie.white@reumad.com.au

												Test Pit Log
					Ge environ	Geo-Logix Pty Ltd Building Q2, Level 3 Unit 2309 / 4 Daydream Street Warriewood NSW 2102 www.geo-logix.com.au						TP05       ect Number:     1601114       Depth:     1.50 m       et:     1 of 1
Project Name: Location / Site: Client: Contractor: Method:					Austral S 155 Fifth Austral 1 C & D Ca 3.5t exca	Salinit Aven Pty L amille wator	y A ue, td ri E , 40	sse 80 Exca 0mi	ssmo Edm avati m bu	ent ondson Avenue, 230 Sixth Avenue, Austral ons Pty Ltd cket	Date	Started:         4/10/2016           Completed:         4/10/2016
Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	(mqq) OIA	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		<u>0.10</u>	D	z	TP05 / 0.1	0.0				TOPSOIL - moderate brown (5YR 3/4), 60% silt, 20% sand, 20% gravel, moderately compacted. CLAY with Sandy and Gravel - dark yellowish orange (10YR 6/6), 60% clay, 20% sand, 20%	damp damp	No odour. No staining. No odour. No staining.
		_ <sup>0.3</sup>	D	z	TP05 / 0.3	0.0		CL		gravel, firm.		
0.4       0.50       D       Z       TP05 / 0.5         0.6       0.6       0.7       0.8       0.8         0.7       0.8       0.9       0.9       0.9         1.0       1.0       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.1       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.2       0.1       0.1       0.1         1.1       1.5       0.1       0.1       0.1         1.5       0.1       0.1       0.1       0.1         1.7       0.1       0.1       0.1       0.1				0.0	Natural	CL		CLAY, trace Silt - reddish yellow (5YR 7/6), 90% clay, 10% sand, stiff.	damp	No odour. No staining.		
	Abbr lydro	reviat ocarbo High Mediur Low Zero	n Odo n Enco	unterec	Sample Type D Disturbed U Undisturbe B Bulk R Represent C Continuous I Groundwater	ative	SPT DCF PP	ngth 1 Stan Dyna Pock	<b>Testing</b> Idard Pe amic Co ket Pene	netration Test ne Penetrometer trometer oundwater		

GL LOG 2 AUSTRAL 1601114.GPJ GL.GDT 7/10/16 4:51:38 PM Date: 4/10/2016 eumad Log Drawn By: Laurie White Logged By: Aidan McKenzie Contact: laurie.white@reumad.com.au Checked By: Date: 12/10/2016 Ben Pearce

	Test Pit Log												
					Geo-Logix environment · geotech					<b>(</b> h	Geo-Logix Pty Ltd Building Q2, Level 3 Unit 2309 / 4 Daydream Street Warriewood NSW 2102 www.geo-logix.com.au	Hole Proje Hole Shee	ID.     TP06       act Number:     1601114       Depth:     1.50 m       att:     1 of 1
Project Name:       Austral Salinity Assess         Location / Site:       155 Fifth Avenue, 80 Ed         Client:       Austral 1 Pty Ltd         Contractor:       C & D Camilleri Excave         Method:       3.5t excavator, 400mm						Salinit Aven Pty L amille wator,	y Ass ue, 80 td ri Exc , 400n	ess ) Ec ava	atio	nt ondso ns P :ket	on Avenue, 230 Sixth Avenue, Austral N	Date	Started:         4/10/2016           Completed:         4/10/2016
Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	PID (ppm)	DUP / TRIP	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
		0.1	D	Z	TP06 / 0.1	0.0		Eill			FILL - moderate orange pink (5YR 8/4), 10% clay, 60% sand, 30% gravel, moderately compacted.	damp	No odour. No staining.
Excavation		0.30 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 eviat	tions	Z	TP06 / 0.3	0.0	DS1 TS1	Natural	CL		CLAY, trace Sand - strong orange (5YR 7/12), 85% clay, 15% sand, low plasticity, soft.	moist	No odour. No staining.
F F L Z	lydro	<b>carbo</b> High Mediur Low Zero	m	bur	Sample Type D Disturbed U Undisturbe B Bulk R Represent C Continuous	ed ative s	Strengt SPT Sta DCP Dy PP Pc	<b>h Test</b> andar namic ocket F	ting d Pena c Cona Penetri	etration e Penetr ometer	Test ometer		

GL LOG 2 AUSTRAL 1601114.GPJ GL.GDT 7/10/16 4:51:40 PM

Zero R C Encountered Groundwater

Stabilised Groundwater

Log Drawn By: Laurie White Logged By: Aidan McKenzie Date: 4/10/2016 UMA Contact: laurie.white@reumad.com.au Checked By: Date: 12/10/2016 Ben Pearce

												Test Pit Log
		/	>		100-20				-	Geo-Logix Pty Ltd	Hole	e ID. <b>TP07</b>
	6	<	-		Ge	0-	L	00	ai	Building Q2, Level 3	Proje	ect Number: 1601114
					enviro	nmen	t •	ge	ote	ch Warriewood NSW 2102	Hole	Depth: <b>1.50 m</b>
								J		www.geo-logix.com.au	Shee	et: 1 of 1
	Droiget Name: Austral Calinity Accomment								eem	ant	Date	Started: <b>//10/2016</b>
		natio	n / 9	lic.	155 Fifth	Δνοη	א ע 110	80 80	Edm	ondson Avenue, 230 Sixth Avenue, Austral N		Completed: 4/10/2016
	Clie	ont.	17 0	<i>n</i> .c.	Austral 1	Ptv I	td,		Lam		Date Date	
	Coi	ntrac	tor:		C & D Ca	mille	ri E					
	Ме	thod	:		3.5t exca	vator.	40	0mr	n bu	cket		
_						,						
		L)	0				e a	0				
	Level	(mBG	e Type	our	Ð	(mq	al Typ	Symb	c Log	Material Description	ē	Observations / Comments
1ethod	Vater	epth (n	ample	IC Od	ample	d D	lateria	SCS	iraphic		loistu	
2	>		S	Т	٥ ٥	<u> </u>	2	-	0		2	
									<u>x 1</u> / <u>x</u> 1	<b>TOPSOIL</b> - moderate brown (5YR 3/4), 20%	damp	No odour. No staining.
		0.10	D	z	TP07 / 0.1	0.0			12 - <u>14</u> - 14 - 14	clay, 40% silt, 20% sand, 20% gravel, moderately		
										FILL - moderate brown (5YR 3/4), 70% clay,	J damp	No odour. No staining.
							=			20% sand, 10% gravel, low plasticity, soft.		
		-0.3	D	z	TP07 / 0.3	0.0						
		0.4										
									$\bigotimes$			
		0.50	D	Z	TP07 / 0.5	0.0				CLAY, trace Sand - dark yellowish orange	moist	No odour. No staining.
		_0.6								(10YR 6/6), 90% clay, 10% sand, low plasticity, firm		
		0.7										
vatio		- 0/										
Exca		-0.8										
		0.9										
							<u>a</u>					
							Natu	CL				
		_ 1.1										
		1.2										
		-1.3										
		1.4										
		<u>1.</u> 5										
										End of Hole at 1.50 m		
		- 1.6								ימושבו עבאנוו.		
Z		1.7										
:43 P		1.9										
6 4:5		<b>-</b>										
7/10/1		1.9										
GDT		2.0										
- - -	Abbr	eviat	ions							Additional Comments		
H.GP, H	lydro	<b>carbor</b> High	n Odo	ur	Sample Type D Disturbed		SPT	ngth T Stan	<b>Festing</b> dard Pe	netration Test		
60111 4 T V		Mediun ∟ow Zero	ı		U Undisturbe B Bulk B Pepresent	d ative	DCF PP	' Dyna Pock	amic Co ket Pene	re Penetrometer rrometer		
RAL 1	. 4		_		C Continuous	3 3						
AUST	-	<u>¥</u>	FUCOL	Intered	a Groundwater	-	<u> </u>	Stabi	ilised Gi	ounawater		

01						
	Log Drawn By:	Laurie White	Logged By:	Aidan McKenzie	Date:	4/10/2016
	Contact:	laurie.white@reumad.com.au	Checked By:	Ben Pearce	Date:	12/10/2016

# Test Pit I on

													ັງ
		~	2		Geo-Logix					Geo-Logix Pty Ltd	Hole	ID. <b>TP</b>	08
									<b>y</b> L	Unit 2309 / 4 Daydream Street	Proje	ct Number: 16011	114
					enviror	nmen	t •	ge	eote	ch Warriewood NSW 2102	Hole	Depth: <b>1.50</b>	) m
										www.geo-logix.com.au	Shee	it: <b>1 o</b>	f 1
I	Proj	ect	Nan	ne:	Austral S	alinit	y A	sse	ssme	ent	Date	Started: 4/10/20	)16
I	_0Ca	atio	n / S	Site:	155 Fifth	Aven	ue,	80	Edm	ondson Avenue, 230 Sixth Avenue, Austral N	SW Date	Completed: 4/10/20	016
(	Clie	nt:			Austral 1	Pty L	td						
(	Con	trac	ctor:		C & D Ca	mille	ri E	xca	avati	ons Pty Ltd			
I	Vetl	hod	:		3.5t exca	vator,	40	0mi	m bu	cket			
						1	1	r	1		1		
Method	Water Level	Depth (mBGL)	Sample Type	Sample Type HC Odour Sample ID PID (ppm) Material Type USCS Symbol Graphic Log			USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments		
	_	0.1	D	z	TP08 / 0.1	0.0				<b>TOPSOIL</b> - moderate brown (5YR 4/4), 40% silt, 30% sand, 30% gravel, moderately compacted.	damp	No odour. No staining.	
	ŀ	0.20								FILL - moderate brown (5YR 4/4), 30% clay,	moist	No odour. No staining.	
	╞	-0.3	D	z	TP08 / 0.3	0.0				20% silt, 30% sand, 20% gravel, moderately compacted.			
		0.4											
	┢	0.5											
	╞	-0.6											
۶		0.7					Ē						
avatic	ſ	-											
Exci	┝	0.8											

.GDT 7/10/16 4:51:46 PM GL LOG 2 AUSTRAL 1601114.GPJ GL.

1.9 Abbreviations Hydrocarbon Odour H High M Medium L Low Z Zero High Medium Low Zero Encountered Groundwater

1.0

1.1

1.2

1.30

1.4

1.5

1.6

\_ 1.7

1.8

D Z

TP08 / 1.3

Sample TypeDDisturbedUUndisturbedBBulkRRepresentativeCContinuous

0.0

CL

Natural

 Strength Testing

 SPT
 Standard Penetration Test

 DCP
 Dynamic Cone Penetrometer

 PP
 Pocket Penetrometer

End of Hole at 1.50 m Target depth.

Stabilised Groundwater

Logged By: Aidan McKenzie Date: 4/10/2016							
	Log	J Drawn By: Laurie White	Logged By:	Aidan McKenzie	Date:	4/10/2016	
Contact: laurie.white@reumad.com.au Checked By: Ben Pearce Date: 12/10/2016		Contact: laurie.white@reumad.com.au	Checked By:	Ben Pearce	Date:	12/10/2016	

Additional Comments

**CLAY with Sand** - strong orange (5YR 7/12), 80% clay, 20% sand, low plasticity, soft.

moist

No odour. No staining.

**ATTACHMENT B** 



#### Geo-Logix P/L Bld Q2 Level 3, 2309/4 Daydream St Warriewood **NSW 2102**

Attention:	I
Report	:
Project name	
Project ID	
Received Date	

Ben Pearce
518300-S

010000 0
AUSTRAL
1601112
Oct 05, 2016

Client Sample ID			TP1/0.1	TP1/0.5	TP1/1.4	TP2/0.1
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins   mgt Sample No.			S16-Oc02234	S16-Oc02235	S16-Oc02236	S16-Oc02237
Date Sampled			Oct 04, 2016	Oct 04, 2016	Oct 04, 2016	Oct 04, 2016
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	11	1000	1000	64
Conductivity (1:5 aqueous extract at 25°C)	10	uS/cm	20	570	650	24
pH (1:5 Aqueous extract)	0.1	pH Units	7.8	5.3	6.1	7.1
Sulphate (as SO4)	30	mg/kg	120	470	310	280
% Moisture	1	%	14	21	12	14

Client Sample ID Sample Matrix			TP2/1.0 Solid	TP3/0.1 Solid	TP3/0.2 Solid	TP3/1.4 Solid
Eurofins   mgt Sample No.			S16-Oc02238	S16-Oc02239	S16-Oc02240	S16-Oc02241
Date Sampled			Oct 04, 2016	Oct 04, 2016	Oct 04, 2016	Oct 04, 2016
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	930	33	440	1600
Conductivity (1:5 aqueous extract at 25°C)	10	uS/cm	580	72	310	710
pH (1:5 Aqueous extract)	0.1	pH Units	5.2	6.1	5.8	5.5
Sulphate (as SO4)	30	mg/kg	450	170	340	320
% Moisture	1	%	13	15	20	20

Client Sample ID Sample Matrix			TP4/0.1 Solid	TP4/0.2 Solid	TP4/0.5 Solid	TP5/0.1 Solid
Eurofins   mgt Sample No.			S16-Oc02242	S16-Oc02243	S16-Oc02244	S16-Oc02245
Date Sampled			Oct 04, 2016	Oct 04, 2016	Oct 04, 2016	Oct 04, 2016
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	21	29	1500	8.1
Conductivity (1:5 aqueous extract at 25°C)	10	uS/cm	19	53	780	33
pH (1:5 Aqueous extract)	0.1	pH Units	6.6	6.6	5.6	6.7
Sulphate (as SO4)	30	mg/kg	280	370	500	95
% Moisture	1	%	15	20	21	11





NATA Accredited Accreditation Number 1261 Site Number 18217

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.



Client Sample ID Sample Matrix			TP5/0.5 Solid	TP6/0.1 Solid	TP6/0.3 Solid	TP7/0.1 Solid
Eurofins   mgt Sample No.			S16-Oc02246	S16-Oc02247	S16-Oc02248	S16-Oc02249
Date Sampled			Oct 04, 2016	Oct 04, 2016	Oct 04, 2016	Oct 04, 2016
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	1100	85	920	5.8
Conductivity (1:5 aqueous extract at 25°C)	10	uS/cm	540	23	460	31
pH (1:5 Aqueous extract)	0.1	pH Units	5.5	6.5	6.1	6.6
Sulphate (as SO4)	30	mg/kg	110	420	270	82
% Moisture	1	%	17	11	15	12

Client Sample ID Sample Matrix Eurofins   mgt Sample No. Date Sampled	100		TP7/0.3 Solid S16-Oc02250 Oct 04, 2016	TP7/0.5 Solid S16-Oc02251 Oct 04, 2016	TP8/0.1 Solid S16-Oc02252 Oct 04, 2016	TP8/0.3 Solid S16-Oc02253 Oct 04, 2016
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	18	940	< 5	5.4
Conductivity (1:5 aqueous extract at 25°C)	10	uS/cm	34	570	59	80
pH (1:5 Aqueous extract)	0.1	pH Units	7.3	6.5	7.3	7.9
Sulphate (as SO4)	30	mg/kg	130	370	< 30	< 30
% Moisture	1	%	15	15	12	13



#### 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
Eurofins   mgt Suite B18			
Chloride	Melbourne	Oct 06, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
pH (1:5 Aqueous extract)	Melbourne	Oct 06, 2016	7 Day
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Melbourne	Oct 06, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Conductivity (1:5 aqueous extract at 25°C)	Melbourne	Oct 06, 2016	7 Day
- Method: LTM-INO-4030			
% Moisture	Melbourne	Oct 05, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			



ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271 Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 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

Co Ad Pro Pro	mpany Name: Idress: Dject Name: Dject ID:	Geo-Logix P, Bld Q2 Level Warriewood NSW 2102 AUSTRAL 1601112	′L 3, 2309/4 Da	ydream St			Ore Re Phe Fax	der No port # one: <:	D.: ::	po 5 02 02	01538 18300 2 9979 1722 2 9979 1222 Euro	Received: Due: Priority: Contact Name: fins   mgt Analytical S	Oct 5, 2016 11:20 AM Oct 10, 2016 3 Day Ben Pearce ervices Manager : Nibha Vaidya
		Sa	mple Detail			Conductivity (1:5 aqueous extract at 25°C)	НОГР	НОГр	Eurofins   mgt Suite B18	Moisture Set			
Melb	ourne Laborato	ory - NATA Site	# 1254 & 142	71		х	Х		х	Х			
Sydr	ney Laboratory	- NATA Site # 1	8217					Х					
Bris	bane Laboratory	y - NATA Site #	20794										
Exte	rnal Laboratory	Sample Date	Compling	Motrix									
NO	Sample ID	Sample Date	Time	watrix									
1	TP1/0.1	Oct 04, 2016		Solid	S16-Oc02234	х			х	Х			
2	TP1/0.5	Oct 04, 2016		Solid	S16-Oc02235	Х			Х	Х			
3	TP1/1.4	Oct 04, 2016		Solid	S16-Oc02236	Х			Х	Х			
4	TP2/0.1	Oct 04, 2016		Solid	S16-Oc02237	Х			Х	Х			
5	TP2/1.0	Oct 04, 2016		Solid	S16-Oc02238	Х			Х	Х			
6	TP3/0.1	Oct 04, 2016		Solid	S16-Oc02239	Х			Х	Х			
7	TP3/0.2	Oct 04, 2016		Solid	S16-Oc02240	Х			Х	Х			
8	TP3/1.4	Oct 04, 2016		Solid	S16-Oc02241	Х			Х	Х			
9	TP4/0.1	Oct 04, 2016		Solid	S16-Oc02242	Х			Х	Х			
10	TP4/0.2	Oct 04, 2016		Solid	S16-Oc02243	Х			Х	Х			



ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

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Co Ad Pro	ompany Name: Idress: oject Name: oject ID:	Geo-Logix P/L Bld Q2 Level 3, 2309/4 I Warriewood NSW 2102 AUSTRAL 1601112	Daydream St			Ore Re Phe Fax	der No port # one: <:	D.: ::	p 5 0: 0:	o1538 18300 2 9979 1722 2 9979 1222 Eurofii	Received: Due: Priority: Contact Name: ns   mgt Analytical Se	Oct 5, 2016 11:20 AM Oct 10, 2016 3 Day Ben Pearce <b>rvices Manager : Nibha Vaidya</b>
		Sample Detai			Conductivity (1:5 aqueous extract at 25°C)	HOLD	HOLD	Eurofins   mgt Suite B18	Moisture Set			
Melk	oourne Laborato	ry - NATA Site # 1254 & 14	1271		Х	Х		Х	Х			
Syd	ney Laboratory -	NATA Site # 18217					Х					
Bris	bane Laboratory	<sup>•</sup> - NATA Site # 20794										
11	TP4/0.5	Oct 04 2016	Solid	S16-Oc02244	x			х	Х			
12	TP5/0.1	Oct 04, 2016	Solid	S16-Oc02245	X			X	Х			
13	TP5/0.5	Oct 04, 2016	Solid	S16-Oc02246	Х			Х	Х			
14	TP6/0.1	Oct 04, 2016	Solid	S16-Oc02247	Х			х	х			
15	TP6/0.3	Oct 04, 2016	Solid	S16-Oc02248	Х			Х	Х			
16	TP7/0.1	Oct 04, 2016	Solid	S16-Oc02249	Х			Х	Х			
17	TP7/0.3	Oct 04, 2016	Solid	S16-Oc02250	Х			Х	Х			
18	TP7/0.5	Oct 04, 2016	Solid	S16-Oc02251	Х			Х	Х			
19	TP8/0.1	Oct 04, 2016	Solid	S16-Oc02252	Х			Х	Х			
20	TP8/0.3	Oct 04, 2016	Solid	S16-Oc02253	Х			Х	Х			
21	TP3/1.0	Oct 04, 2016	Solid	S16-Oc02254		X						
22	TP5/0.3	Oct 04, 2016	Solid	S16-Oc02255		Х				]		



ABN - 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Melbourne 2-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271 Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 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

Co Ad Pro Pro	mpany Name: dress: bject Name: bject ID:	Geo-Logix P/ Bld Q2 Level Warriewood NSW 2102 AUSTRAL 1601112	/L 3, 2309/4 Da	ydream St			Ore Re Ph Fa	der Ne port # one: x:	0.: #:	po 5 <sup>-</sup> 02 02	o1538 18300 2 9979 1722 2 9979 1222 Eu	Received Due: Priority: Contact N rofins   mgt An	l: Name: nalytical Se	Oct 5, 2016 11:20 AM Oct 10, 2016 3 Day Ben Pearce rvices Manager : Nibha Vaidya
		Sa	mple Detail			Conductivity (1:5 aqueous extract at 25°C)	HOLD	HOLD	Eurofins   mgt Suite B18	Moisture Set				
Melb	ourne Laborato	ory - NATA Site	# 1254 & 142	71		Х	Х		Х	Х	4			
Sydr	ey Laboratory	- NATA Site # 1	8217					X			4			
Brisi	pane Laboratory	y - NATA Site #	20794								4			
23	TP8/1 3	Oct 04 2016		Solid	S16-Oc02256		х				1			
24	DS1	Oct 04, 2016		Solid	S16-Oc02257		X				1			
25	TS1	Oct 04, 2016		Solid	S16-Oc02258			х			1			
Test	Counts			-		20	5	5	20	20	]			



#### 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. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 4. Results are uncorrected for matrix spikes or surrogate recoveries.
- 5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 6. Samples were analysed on an 'as received' basis. 7. 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 Sample Receipt Advice.

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.

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

#### Units

Tormo

 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
 Hercentage

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.
	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.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
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 20-130%

#### **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									
Chloride			mg/kg	< 5			5	Pass	
Conductivity (1:5 aqueous extract at	25°C)		uS/cm	< 10			10	Pass	
Sulphate (as SO4)			mg/kg	< 30			30	Pass	
LCS - % Recovery									
Chloride			%	96			70-130	Pass	
Sulphate (as SO4)			%	97			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery							_		
				Result 1					
Chloride	S16-Oc02235	CP	%	117			70-130	Pass	
Spike - % Recovery									
		_		Result 1					
Chloride	S16-Oc02245	CP	%	119			70-130	Pass	
Sulphate (as SO4)	S16-Oc02245	CP	%	98			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S16-Oc02234	CP	mg/kg	11	11	6.7	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C)	S16-Oc02234	СР	uS/cm	20	21	9.0	30%	Pass	
pH (1:5 Aqueous extract)	S16-Oc02234	CP	pH Units	7.8	7.8	pass	30%	Pass	
Sulphate (as SO4)	S16-Oc02234	CP	mg/kg	120	110	11	30%	Pass	
% Moisture	S16-Oc02234	CP	%	14	15	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S16-Oc02244	CP	mg/kg	1500	1500	1.4	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C)	S16-Oc02244	СР	uS/cm	780	720	8.0	30%	Pass	
pH (1:5 Aqueous extract)	S16-Oc02244	CP	pH Units	5.6	5.5	pass	30%	Pass	
Sulphate (as SO4)	S16-Oc02244	CP	mg/kg	500	540	6.8	30%	Pass	
% Moisture	S16-Oc02244	CP	%	21	21	3.0	30%	Pass	



#### Comments

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	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

#### Authorised By

Nibha Vaidya Alex Petridis Huong Le Analytical Services Manager Senior Analyst-Metal (VIC) Senior Analyst-Inorganic (VIC)

Glenn Jackson National Operations 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.

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 Site # 1254 & 14271

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# Sample Receipt Advice

Company name.	Geo-Logix P/L
Contact name:	Ben Pearce
Project name:	AUSTRAL
Project ID:	1601112
COC number:	Not provided
Turn around time:	3 Day
Date/Time received:	Oct 5, 2016 11:20 AM
Eurofins   mgt reference:	518300

## Sample information

Company nome

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 2.2 degrees Celsius.
- All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

#### Notes

Extra samples DS1, TS1 received, logged on HOLD.

# Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Ben Pearce - bpearce@geo-logix.com.au.



Environmental Laboratory Air Analysis Water Analysis Soil Contamination Analysis

NATA Accreditation Stack Emission Sampling & Analysis Trade Waste Sampling & Analysis Groundwater Sampling & Analysis



38 Years of Environmental Analysis & Experience

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Chain of Custody Relinquished by: Ben Peerce Date/Time: 5/10/16 Signature: VIIA Received by -Signal

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