Salinity, Aggressivity, and Sodicity Assessment

200 Aldington Road, Kemps Creek NSW

Prepared for: Fife Kemps Creek Limited

21.1994 | SASA1.v2f | Date: 23 March 2022

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Document Information

Report Title: Salinity, Aggressivity, and Sodicity Assessment
Prepared for: Fife Kemps Creek Limited
Source Site Address: 200 Aldington Road, Kemps Creek NSW
File Reference: 21.1994
Report Reference: 21.1994 / SASA1 / v2f
Date: 23 March 2022

Document Control

Version	Date	Author	Revision description	Reviewer
V2f	23/03/2022	Grace Tuckwell	Final for issue – Inclusion of Salinity Management Plan	Santo Ragusa

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2. Site Identification and Details

2.1 Site Location

The site is located at 200 Aldington Road, Kemps Creek, NSW and is shown in *Appendix A - Figures*. Relevant site information is provided in **Table 1** below.

Table 1. Site Information

Feature	Details
Street Address	200 Aldington Road, Kemps Creek, NSW
Site Area (Approximate)	72.09 hectares (ha)
Historical Land use	Agriculture
Lot and Deposit Plan	Lots 20-23, DP 255560 Lots 30-32, DP 258949
Local Government Area	Penrith City Council
Land Use Zoning	IN1 General Industrial

The site is located approximately 4km north-west of the future Western Sydney Nancy-Bird Walton Airport, 13km south-east of the Penrith CBD and 40km west of the Sydney CBD. The site boundary is shown in Appendix I – Figures.

Surrounding environment and features as reported in Douglas Partners Preliminary Site Investigation (PSI) (2019) are summarised in **Table 2**.

Table 2. Site Information

Direction	Description
North	The Erskine Business Park followed by the M4 motorway.
East	Farmland followed by the M7 motorway.
South	Predominately farmland until Kemps Creek CBD.
West	Mostly comprises of farmland almost all the way to the Nepean River.

2.2 Environmental Setting

The site lies on the western side of the Sydney Basin before the Blue Mountains. The Douglas Partners PSI (2019) identified that the area is underlain by Triassic age Bringelly Shale from the Wianamatta Group. The formation comprises shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone and some minor coal bands. The Northeastern corner of the project has underlying fluvial sediments of Quaternary age. Primarily being made up of fine-grained sands, silts, and clays.

Localised surface water flow direction at the site is expected to flow towards an unnamed tributary to the north-east and then into Ropes creek. Regionally, the surface water flows are expected to flow to the north-east following the natural slope of the gullies into Ropes Creek then onto South Creek which flows into the Nepean River.

Douglas Partners PSI (2019) inferred moderate salinity potential for the site as Ropes Creek to the north-east has known salinity and high salinity potential around the primary creek line based on Map of Salinity Potential in Western Sydney (2002). It was noted that the mapping is based on soil type, surface level and general groundwater considerations and, as such is approximate only.

A review of the NSW Government Office of Environment and Heritage Acid Sulfate Soils Risk mapping indicates that the site is classed as having 'no known occurrence of acid sulfate soil'.

1. Introduction

1.1 General Information and Background

This Salinity, Aggressivity, and Sodicity Assessment (SASA) has been developed to determine the salinity, aggressivity and sodicity at the proposed industrial estate at 200 Aldington Road, Kemps Creek, NSW 2178, within Lots 20-23 in DP 255560 and Lots 30-32 in DP 258949. The area subject to the investigation is approximately 72.09 hectares and is shown in *Appendix A - Figures* (hereafter referred to as 'the site').

1.2 Proposed Development

ADE understands that the site is to be upgraded for the full property frontage and will include kerb & gutter, street drainage, path paving, landscaping, and undergrounding of all utility assets (Refer to *Appendix A - Figures* for development plans). An overview of proposed Stage 1 works include:

- Demolition and clearing of all existing built form structures
- Drainage and infill of existing farm dams and any ground dewatering
- Clearing of all existing vegetation
- Bulk earthworks including 'cut and fill' to create flat development platforms for the warehouse buildings, and site stabilization works (if required)
- Roadworks and access infrastructure
- Stormwater and drainage work including stormwater basins, diversion of stormwater lines, gross pollutant traps and associated swale works
- Sewer and potable water reticulation
- Inter-allotment, road and boundary retaining walls
- Subdivision of the site into 15 individual lots
- Construction of a warehouse building with a total of 50,930 sqm of GFA, including: 48,430 sqm of warehouse GFA, 2,500 sqm of ancillary office GFA, 231 car parking spaces (Appendix A Figure 2).

1.3 Objectives

The objective of the works is to undertake a salinity, aggressivity, and sodicity assessment of the in-situ soil and imported fill material present within the site, in the context of NSW Government guidelines. ADE were additionally requested to provide recommendations for management of identified saline soils in conjunction with the proposed development.

1.4 Scope of Works

The preparation of this SASA includes the following scope of works:

- Review all previous data for the site
- Collect additional samples for the assessment of salinity, aggressivity and sodicity
- Compare available data against the adopted site assessment criteria

1.5 Regulatory Framework

The regulatory framework for this report is based on Australian Standards, principal acts and regulations, and guidelines that have been made or approved by the NSW Environment Protection Authority (EPA) and includes the following:

- DLWC (2002) Site Investigations for Urban Salinity. NSW Department of Land and Water Conservation
- Standards Australia. (2009). Australian Standard AS 2159 2009: Piling – Design and Installation
- RICHARDS, L. A. Diagnosis and Improvement of Saline and Alkali Soils, Soil Science: August 1954

3. Previous Environmental Investigations

3.1 Summary of previous reports

Both KPMG SGA Property Consultancy Pty Ltd (KPMG) Site Review of Contamination and Assessment (KPMG 2019) and Douglas Partners Report on Preliminary Geotechnical Investigation and Preliminary Salinity Assessment - Proposed Commercial/Industrial Subdivision 144-228 Aldington Rd, Kemps Creek NSW Project: 92364, October 2019 (DP, 2019) recognise the potential for moderate to high potential for this site to be contaminated; particularly from the previous and current activity surrounding the market gardens and their associated chemicals use.

DP's Preliminary Geotechnical and Salinity Assessment identified the geotechnical and topographical landscape of the site. The 50 salinity samples produced results that demonstrated that only one sample was highly saline and 80% of samples were slightly to not saline. The 19 test pits that were excavated provided a general lithology outlay of the site which was predominantly silty clay fill to approximately 1.4m followed by stiff and hard clays to approximately 3.3m and a bedrock and sandstone and shale.

DP references the Map of Salinity Potential for Western Sydney which indicates known salinity and high salinity potential around the primary creek line/dam in the northeast corner of the site and moderate salinity potential for the remainder of the site. The mapping is based on soil type, surface level and general groundwater considerations and thus is approximation only. The tests conducted on salinity of 50 samples showed results of the following:

- 14 samples non saline
- 25 samples slightly saline
- 10 samples moderately saline
- one sample very saline.

Douglas Partners Contamination Status Summary Report- Proposed Industrial Development 200 Aldington Road Kemps Creek NSW Project: 92421, September 2021 (DP, 2021) detailed the seven AEC's that were identified in the PSI which were investigated and determined by DP to be possible to be remediated and made suitable for the proposed development.

4. Salinity, Aggressivity, and Sodicity Assessment

4.1 Sampling Design

Field activities were conducted by an experienced Environmental Scientist. The samples were placed in 250 mL amber glass jars with Teflon lined lids. The samples were transferred to a cooler box which contained ice packs in order to maintain the samples at a temperature below approximately 4 ^{0}C.

Soil samples collected by ADE between the 15th of December and 20th of December 2021 for analysis of pH, EC, Sulfates, Chlorides, Sodium, CEC and Clay were submitted to Eurofins Environment Testing in Lane Cove West. A summary of the samples collected by ADE and Douglas Partners (2019) are presented in **Table 3** on the following page (Refer to *Appendix A – Figures* for sample locations).

Table 3. Summary of ADE Soil Samples Collected and Douglas Partners (DP 2019) within the subject area.

Sample I.D	Date and consultant	Sample Location (refer to *Appendix I – Aerial Figure*)	Sample Type / Analyses	Sample Description	Sample Depth (m BGL)
TP24 (0-0.3)	20.12.2021 ADE	Easting: 296575 Northing: 6252427	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, dark brown with fine gravels, well sorted, moist	0-0.3
TP37 (0-0.3)	16.12.2021 ADE	Easting: 296368 Northing: 6252608	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, medium brown with small to medium gravels, moist	0-0.3
TP39 (0-0.6)	17.12.2021 ADE	Easting: 296525 Northing: 6252589	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	CLAY (CL): medium plasticity, light grey and brown, dry	0-0.6
TP47 (0-0.3)	20.12.2021 ADE	Easting: 296531 Northing: 6252651	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	CLAY (CL): medium plasticity, red with white and grey staining with fine gravels, moist	0-0.3
TP59 (0-0.2)	15.12.2021 ADE	Easting: 296366 Northing: 6252799	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, dark brown with small to medium gravels, dry	0-0.2
TP65 (0-0.3)	15.12.2021 ADE	Easting: 296847 Northing: 6252752	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, medium brown with small to medium gravels, moist	0-0.3
TP71 (0-0.3)	15.12.2021 ADE	Easting: 296775 Northing: 6252862	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, medium brown with small to medium gravels, moist	0-0.3
TP77 (0-0.5)	16.12.2021 ADE	Easting: 296585 Northing: 6252923	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, medium brown with small to medium gravels, moist	0-0.5
TP83 (0-0.3)	16.12.2021 ADE	Easting: 296876 Northing: 6252897	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, medium brown with small to medium gravels, moist	0-0.3
TP92 (0-0.3)	16.12.2021 ADE	Easting: 296373 Northing: 6252956	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, Clay)	Clayey SAND (SC): fine to medium grained, dark brown with cobbles and gravels, moist	0-0.3
TP2 (0.5)	30.07.2019 DP	Easting: 296761 Northing: 6253027	Soil (Na, CEC, ESP%)	Silty CLAY (CL): medium plasticity, brown and red, trace gravel, moist	0.5
TP (1.0)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		1.0
TP2 (1.5)	30.07.2019 DP		Soil (pH, EC)		1.5
TP2 (2.0)	30.07.2019 DP		Soil (pH, EC)		2.0
TP2 (2.5)	30.07.2019 DP		Soil (pH, EC)		2.5
TP2 (3.0)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		3.0
TP4 (0.5)	30.07.2019 DP	Easting: 296566 Northing: 6252795	Soil (pH, EC)	Silty CLAY (CL): medium plasticity, brown and red, trace gravel, moist	0.5
TP4 (1.0)	30.07.2019 DP		Soil (Na, CEC, ESP%)		1.0
TP4 (1.5)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		1.5
TP4 (2.0)	30.07.2019 DP		Soil (pH, EC)		2.0
TP4 (3.0)	30.07.2019 DP		Soil (pH, EC)		3.0

Table 3. Continued…

Sample I.D	Date and consultant	Sample Location (refer to *Appendix I – Aerial Figure*)	Sample Type / Analyses	Sample Description	Sample Depth (m BGL)
TP5 (0.5)	30.07.2019 DP	Easting: 296819 Northing: 6252776	Soil (pH, EC)	Silty CLAY (CL): high plasticity, brown-red, trace ironstone gravel, very stiff, moist	0.5
TP5 (1.0)	30.07.2019 DP		Soil (pH, EC)		1.0
TP5 (1.5)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		1.5
TP5 (2.0)	30.07.2019 DP		Soil (pH, EC)		2.0
TP5 (2.5)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		2.5
TP5 (3.0)	30.07.2019 DP		Soil (pH, EC)		3.0
TP6 (0.5)	30.07.2019 DP	Easting: 296307 Northing: 6252715	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, ESP%)	Silty CLAY (CL): medium plasticity, red, very stiff, moist	0.5
TP6 (1.0)	30.07.2019 DP		Soil (pH, EC)		1.0
TP6 (1.5)	30.07.2019 DP		Soil (pH, EC)		1.5
TP6 (2.0)	30.07.2019 DP		Soil (pH, EC)		2.0
TP9 (0.5)	30.07.2019 DP	Easting: 296820 Northing: 6252578	Soil (pH, EC)	FILL/Silty CLAY (CL): medium plasticity, brown, with rootlets, trace metallic wires and ceramic tile, moist	0.5
TP9 (1.0)	30.07.2019 DP		Soil (pH, EC)	Silty CLAY (CL): medium plasticity, brown-red, trace gravel, moist	1.0
TP9 (1.5)	30.07.2019 DP		Soil (pH, EC)		1.5
TP9 (2.0)	30.07.2019 DP		Soil (pH, EC)		2.0
TP9 (2.5)	30.07.2019 DP		Soil (pH, EC)		2.5
TP9 (3.0)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		3.0
TP11 (0.5)	30.07.2019 DP	Easting: 296235 Northing: 6252516	Soil (Chlorides, Sulfates, pH, EC, Na, CEC, ESP%)	Silty CLAY (CL): high plasticity, red-brown, trace gravel, stiff, moist	0.5
TP11 (1.0)	30.07.2019 DP		Soil (pH, EC)		1.0
TP11 (1.5)	30.07.2019 DP		Soil (pH, EC)		1.5
TP11 (2.0)	30.07.2019 DP		Soil (pH, EC)		2.0
TP11 (2.5)	30.07.2019 DP		Soil (pH, EC)		2.5
TP11 (3.0)	30.07.2019 DP		Soil (pH, EC)		3.0
TP13 (0.5)	30.07.2019 DP	Easting: 296691 Northing: 6252472	Soil (Chlorides, Sulfates, pH, EC)	Silty CLAY (CL): high plasticity, red-brown, trace limestone gravel, stiff, moist	0.5
TP13 (1.0)	30.07.2019 DP		Soil (pH, EC)		1.0

Table 3. Continued…

Sample I.D	Date and consultant	Sample Location (refer to *Appendix I – Aerial Figure*)	Sample Type / Analyses	Sample Description	Sample Depth (m BGL)
TP13 (1.5)	30.07.2019 DP	Easting: 296691 Northing: 6252472	Soil (pH, EC)	Silty CLAY (CL): high plasticity, red-brown, trace limestone gravel, stiff, moist	1.5
TP13 (2.0)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		2.0
TP13 (2.5)	30.07.2019 DP		Soil (pH, EC)		2.5
TP13 (3.0)	30.07.2019 DP		Soil (pH, EC)		3.0
TP14 (0.5)	30.07.2019 DP	Easting: 296231 Northing: 6252333	Soil (Na, CEC, ESP%)	Silty CLAY (CL): high plasticity, red-brown, trace gravel, hard, moist	0.5
TP14 (1.0)	30.07.2019 DP		Soil (pH, EC)		1.0
TP14 (1.5)	30.07.2019 DP		Soil (pH, EC)		1.5
TP14 (2.0)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		2.0
TP14 (2.5)	30.07.2019 DP		Soil (pH, EC)		2.5
TP14 (3.0)	30.07.2019 DP		Soil (pH, EC)		3.0
TP15 (0.5)	30.07.2019 DP	Easting: 296689 Northing: 6252284	Soil (pH, EC)	Silty CLAY (CL): medium plasticity, brown, with gravel, hard, moist	0.5
TP15 (1.0)	30.07.2019 DP		Soil (pH, EC)		1.0
TP15 (1.5)	30.07.2019 DP		Soil (pH, EC)		1.5
TP15 (2.0)	30.07.2019 DP		Soil (Chlorides, Sulfates, pH, EC)		2.0
TP15 (2.5)	30.07.2019 DP		Soil (pH, EC)		2.5

5. Assessment criteria

5.1 Salinity

Soil salinity is often assessed with respect to electrical conductivity of a 1:5 soil to water extract (EC 1:5). This value can be converted to electrical conductivity of a saturated extract (ECe) by multiplication with a factor dependent on soil texture, ranging from 6 to 17, based on the soil matrix. Richards (1954) classified soil salinity based on ECe and described the implications of the salinity classes on agriculture as seen below in **Table 4**.

Table 4. Soil Salinity Classification.

Class	ECe (dS/m)	Implication
Non Saline	<2	Salinity effects mostly negligible
Slightly Saline	2 – 4	Yields of sensitive crops affected
Moderately Saline	4 – 8	Yields of many crops affected
Very Saline	8 – 16	Only tolerant crops yield satisfactorily
Highly Saline	>16	Only a few very tolerant crops yield satisfactorily

Note: This classification scheme is based on agricultural sensitivity. At this point in time no structure-based classification system exists.

5.2 Aggressivity

The following tables are developed from AS 2159 – 2009 Piling Design and Installation. The guidelines presented below in **Table 5** and **Table 6** were used to classify the soils for aggressivity.

Table 5. Aggressivity Classification for Concrete Piles.

Sulfates SO_4^{-2} (ppm) in soil	pH	Classification
<5000	>5.5	Non-aggressive
5000 – 10000	4.5 – 5.5	Mild
10000 – 20000	4 – 4.5	Moderate
> 20000	<4	Severe

Table 6. Aggressivity Classification for Steel Piles.

Chlorides (ppm in soil)	pH	Classification
<5000	>5	Non-aggressive
5000 – 20000	4 – 5	Non-aggressive
20000 – 50000	3 – 4	Mild
> 50000	<3	Moderate

5.3 Sodicity

Sodicity is expressed as the amount of exchangeable sodium as a percentage of the Cation Exchange Capacity (CEC), or ESP%. Sodic soils may be affected by very severe surface crusting, very low infiltration and hydraulic conductivity, very hard and dense subsoils as well as high susceptibility to gully and tunnel erosion. Sodicity also affects the shrink – swell properties of a soil. The general rating of sodicity as shown in DLWC (2002) is given in **Table 7** below.

Table 7. DLWC (2002) Sodicity Classification System.

ESP%	Classification
<5	Non-sodic
5 – 15	Sodic
>15	Highly Sodic

A summary of the analytical results from samples collected compared against the assessment criteria is presented in **Table 8** on the following pages.

5.4 Hydraulic Conductivity

Hydraulic conductivity refers to the rate at which water passes through a water-soil interface expressed as millimeters per hour (mm/hr). The typical soil types and associated saturated hydraulic conductivity as shown in LDG (2007) is provided within **Table 8** below.

Table 8. LDG (2007) Saturated Hydraulic Conductivity.

Soil Type	Saturated Hydrailic Conductivity (mm/hr)
Course Sand	>360
Sand	180-360
Sandy Loam	36-180
Sandy Clay	3.6-36
Medium Clay	0.36-3.6
Heavy Clay	0.0036-0.36

6. Results

Table 8. Summary of Soil Analytical Results and Assessment.

Sample Name	Soil Matrix	pH Value	Electrical Conductivity @ 25°C (1:5)	Soil Texture Multiplication factor	ECe	Sulfate as $SO4^{2-}$	Chloride	Sodium	CEC	Hydraulic Conductivity	Salinity, Aggressivity, and Sodicity Assessment			
		pH	dS/cm		ds/cm	mg/kg	mg/kg	mg/kg	ESP%	mm/hr	Salinity	Aggressivity (Concrete)	Aggressivity (Steel)	Sodicity
TP24 (0-0.3) (ADE 2021)	CLAY (CL)	6.3	0.011	7	0.077	14	<10	84	10	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Sodic
TP37 (0-0.3) (ADE 2021)		6.2	0.025	7	0.175	30	14	260	35	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Highly Sodic
TP39 (0-0.6) (ADE 2021)		7.7	0.039	7	0.273	<10	15	340	26	0.36-3.6	Non-Saline	Non-aggressive	Non-aggressive	Highly Sodic
TP47 (0-0.3) (ADE 2021)		7.1	0.042	9	0.378	29	16	140	12	0.36-3.6	Non-Saline	Non-aggressive	Non-aggressive	Sodic
TP59 (0-0.2) (ADE 2021)		5.8	0.021	7	0.147	<10	18	350	47	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Highly Sodic
TP65 (0-0.3) (ADE 2021)		6.0	0.021	8	0.168	<10	<10	260	29	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Highly Sodic
TP71 (0-0.3) (ADE 2021)		7.0	0.180	9	1.62	<10	14	2100	115	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Highly Sodic
TP77 (0-0.5) (ADE 2021)		6.5	0.026	7	0.182	<10	<10	100	8	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Sodic
TP83 (0-0.3) (ADE 2021)		6.2	0.034	7	0.238	21	<10	140	17	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Highly Sodic
TP92 (0-0.3) (ADE 2021)		7.1	0.054	7	0.378	51	<10	150	10	3.6-36	Non-Saline	Non-aggressive	Non-aggressive	Sodic
TP2 (0.5) (DP 2019)		5.4	1.5	6	9.0	-	-	209	29	0.36-3.6	Very Saline	-	-	Highly Sodic
TP2 (1.0) (DP 2019)		5.5	0.64	9	5.4	100	670	-	-	0.36-3.6	Moderately Saline	Non-aggressive	Non-aggressive	-

Table 8. Summary of Soil Analytical Results and Assessment continued.

Sample Name	Soil Matrix	pH Value	Electrical Conductivity @ 25°C (1:5)	Soil Texture Multiplication factor	ECe	Sulfate as $SO4^{2-}$	Chloride	Sodium	CEC	Hydraulic Conductivity	Salinity, Aggressivity and Sodicity Assessment			
		pH	dS/cm		ds/cm	mg/kg	mg/kg	mg/kg	ESP%	mm/hr	Salinity	Aggressivity (Concrete)	Aggressivity (Steel)	Sodicity
TP2 (1.5) (DP 2019)	CLAY (CL)	5.4	0.66	7	4.6	-	-	-	-	0.36-3.6	Moderately Saline	-	-	-
TP2 (2.0) (DP 2019)		5.3	0.74	6	4.4	-	-	-	-	0.36-3.6	Moderately Saline	-	-	-
TP2 (2.5) (DP 2019)		5.7	0.79	7	5.5	-	-	-	-	0.36-3.6	Moderately Saline	-	-	-
TP2 (3.0) (DP 2019)		6.0	1.0	7	7.0	370	2400	-	-	0.36-3.6	Moderately Saline	Non-aggressive	Non-aggressive	-
TP4 (0.5) (DP 2019)		4.8	0.38	6	2.3	-	-	-	-	0.36-3.6	Slightly Saline	-	-	-
TP4 (1.0) (DP 2019)		4.7	0.50	7	3.5	-	-	158	6	0.36-3.6	Slightly Saline	-	-	Sodic
TP4 (1.5) (DP 2019)		5.2	0.34	7	2.4	190	210	-	-	0.36-3.6	Slightly Saline	Non-aggressive	Non-aggressive	-
TP4 (2.0) (DP 2019)		5.9	0.25	6	1.5	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP4 (3.0) (DP 2019)		6.0	0.30	6	1.3	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP5 (0.5) (DP 2019)		5.8	0.11	7	2.1	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP5 (1.0) (DP 2019)		5.8	0.25	7	0.8	-	-	-	-	0.0036-0.036	Non-Saline	-	-	-
TP5 (1.5) (DP 2019)		5.8	0.47	8	2.0	160	470	-	-	0.0036-0.036	Slightly Saline	Non-aggressive	Non-aggressive	-
TP5 (2.0) (DP 2019)		6.1	0.47	7	3.3	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP5 (2.5) (DP 2019)		6.5	0.48	9	4.0	190	620	-	-	0.0036-0.036	Slightly Saline	Non-aggressive	Non-aggressive	-
TP5 (3.0) (DP 2019)		6.8	0.40	7	3.4	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-

Table 8. Summary of Soil Analytical Results and Assessment continued.

Sample Name	Soil Matrix	pH Value	Electrical Conductivity @ 25°C (1:5)	Soil Texture Multiplication factor	ECe	Sulfate as $SO4^{2-}$	Chloride	Sodium	CEC	Hydraulic Conductivity	Salinity, Aggressivity and Sodicity Assessment			
		pH	dS/cm		ds/cm	mg/kg	mg/kg	mg/kg	ESP%	mm/hr	Salinity	Aggressivity (Concrete)	Aggressivity (Steel)	Sodicity
TP6 (0.5) (DP 2019)		6.6	0.07	7	2.8	21	50	253	8	0.36-3.6	Slightly Saline	Non-aggressive	Non-aggressive	Sodic
TP6 (1.0) (DP 2019)	CLAY (CL)	7.1	0.32	8	0.5	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP6 (1.5) (DP 2019)		6.5	0.51	7	2.2	-	-	-	-	0.36-3.6	Slightly Saline	-	-	-
TP6 (2.0) (DP 2019)		7.5	0.36	7	3.6	-	-	-	-	0.36-3.6	Slightly Saline	-	-	-
TP9 (0.5) (DP 2019)		8.4	0.32	7	2.5	-	-	-	-	0.36-3.6	Slightly Saline	-	-	-
TP9 (1.0) (DP 2019)		5.7	0.09	6	1.9	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP9 (1.5) (DP 2019)		5.7	0.25	8	0.8	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP9 (2.0) (DP 2019)		5.7	0.35	7	1.8	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP9 (2.5) (DP 2019)		6.2	0.40	8	2.8	-	-	-	-	0.36-3.6	Slightly Saline	-	-	-
TP9 (3.0) (DP 2019)		6.4	0.41	7	2.8	180	350	-	-	0.36-3.6	Slightly Saline	Non-aggressive	Non-aggressive	-
TP11 (0.5) (DP 2019)		5.7	0.08	7	2.9	96	43	152	9	0.0036-0.036	Slightly Saline	Non-aggressive	Non-aggressive	Sodic
TP11 (1.0) (DP 2019)		5.2	0.39	6	0.5	-	-	-	-	0.0036-0.036	Non-Saline	-	-	-
TP11 (1.5) (DP 2019)		5.3	0.40	7	2.7	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP11 (2.0) (DP 2019)		5.4	0.30	6	2.4	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP11 (2.5) (DP 2019)		5.2	0.42	7	2.1	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP11 (3.0) (DP 2019)		5.4	0.38	7	2.9	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-

Sample Name	Soil Matrix	pH Value	Electrical Conductivity @ 25°C (1:5)	Soil Texture Multiplication factor	ECe	Sulfate as $SO4^{2-}$	Chloride	Sodium	CEC	Hydraulic Conductivity	Salinity, Aggressivity and Sodicity Assessment			
		pH	dS/cm		ds/cm	mg/kg	mg/kg	mg/kg	ESP%	mm/hr	Salinity	Aggressivity (Concrete)	Aggressivity (Steel)	Sodicity
TP13 (0.5) (DP 2019)		5.7	0.10	7	2.7	92	45	-	-	0.0036-0.036	Slightly Saline	Non-aggressive	Non-aggressive	-
TP13 (1.0) (DP 2019)	CLAY (CL)	5.5	0.28	7	0.7	-	-	-	-	0.0036-0.036	Non-Saline	-	-	-
TP13 (1.5) (DP 2019)		5.6	0.35	6	1.7	-	-	-	-	0.0036-0.036	Non-Saline	-	-	-
TP13 (2.0) (DP 2019)		5.8	0.34	6	2.1	130	340	-	-	0.0036-0.036	Slightly Saline	Non-aggressive	Non-aggressive	-
TP13 (2.5) (DP 2019)		6.1	0.32	6	2.0	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP13 (3.0) (DP 2019)		6.1	0.30	7	2.2	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP14 (0.5) (DP 2019)		6.7	0.47	7	2.1	-	-	345	11	0.0036-0.036	Slightly Saline	-	-	Sodic
TP14 (1.0) (DP 2019)		5.3	1.0	6	2.8	-	-	-	-	0.0036-0.036	Slightly Saline	-	-	-
TP14 (1.5) (DP 2019)		5.9	1.0	6	6.0	-	-	-	-	0.0036-0.036	Moderately Saline	-	-	-
TP14 (2.0) (DP 2019)		7.7	0.64	7	7.0	140	760	-	-	0.0036-0.036	Moderately Saline	Non-aggressive	Non-aggressive	-
TP14 (2.5) (DP 2019)		87	0.73	7	4.5	-	-	-	-	0.0036-0.036	Moderately Saline	-	-	-
TP14 (3.0) (DP 2019)		7.4	0.64	7	5.1	-	-	-	-	0.0036-0.036	Moderately Saline	-	-	-
TP15 (0.5) (DP 2019)		6.3	0.06	7	4.5	-	-	-	-	0.36-3.6	Moderately Saline	-	-	-
TP15 (1.0) (DP 2019)		8.7	0.09	6	0.3	-	-	-	-	0.36-3.6	Non-Saline	-	-	-

Sample Name	Soil Matrix	pH Value	Electrical Conductivity @ 25°C (1:5)	Soil Texture Multiplication factor	ECe	Sulfate as $SO4^{2-}$	Chloride	Sodium	CEC	Hydraulic Conductivity	Salinity, Aggressivity and Sodicity Assessment			
		pH	dS/cm		ds/cm	mg/kg	mg/kg	mg/kg	ESP%	mm/hr	Salinity	Aggressivity (Concrete)	Aggressivity (Steel)	Sodicity
TP15 (1.5) (DP 2019)		8.6	0.07	6	0.6	-	-	-	-	0.36-3.6	Non-Saline	-	-	-
TP15 (2.0) (DP 2019)		9.2	0.10	7	0.5	10	20	-	-	0.36-3.6	Non-Saline	Non-aggressive	Non-aggressive	-
TP15 (2.5) (DP 2019)		6.3	0.21	7	0.7	-	-	-	-	0.36-3.6	Non-Saline	-	-	-

7. Salinity Management

The majority of the site is classified as non-saline to slightly saline with only ten (10) as moderately saline and one (1) as very saline. Additionally, the soils are identified as non-aggressive to concrete and steel. The following management controls are to limit the potential impact on the development proposed (namely for moderately to highly saline soils; mild aggressivity to concrete and mild to moderate aggressivity to steel):

- Managing disturbance of the soil - focus on capping of the soil surface, both exposed when excavating and filling, with more permeable material which will prevent ponding and reduce capillary rise. This will also act as a drainage layer and reduce potential erosion.
- Minimising cut and fill - where possible use excavated soils in fill areas with similar salinity characteristics and placed back in the original order
- Minimising water infiltration - ensuring cut and fill areas are compacted well
- Maintain vegetation where possible and plant salt tolerant species - plants will also reduce soil erosion so should be considered in areas of disturbed soil
- Ensure the site is well drained

Most of the surface area of the site once constructed will be hardstand. This along with the water management systems in place (gutters, rainwater collectors, etc) will considerably decreases the interaction of the saline soils with the proposed buildings.

8. Conclusion

Based on the data and evidence collected during the investigation, the following conclusions were drawn regarding the salinity, aggressivity, and sodicity of the site:

- Of the sixty (60) samples collected in total by DP and ADE, twenty-four (24) were classified as non saline, twenty-five (25) as slightly saline, ten (10) as moderately saline and one (1) as very saline (TP2 0.5). The very saline soil observed was located in the north-eastern area of the site, which generally conforms to the salinity potential mapping (*Figure 5 – Refer to Appendix A Figures*)
- Soils were identified to be non-aggressive to concrete and non-aggressive to steel
- Of the fifteen (15) samples analysed for sodicity, eight (8) were characterised as sodic and seven (7) were characterised as highly sodic. The majority of the highly sodic soil observed was located in the southern area of the site and the sodic soil was located in the northern area of the site
- The salinity, aggressivity, and sodicity levels are considered naturally occurring features of the local landscape. Provided that appropriate management techniques are utilised, they are not considered to be significant impediments to the proposed development
- Topsoils observed on site ranged from 0.3-0.5mbgl, which consisted mostly of sandy clays and medium clays with an estimated saturated hydraulic conductivity of 0.36 to 36 mm/hr
- The underlying natural strata consisted of medium to heavy clays with an estimated saturated hydraulic conductivity of 0.0036 to 3.6 mm/hr
- Based on a review of the available information, ADE does not consider that the proposed development will adversely impact soil salinity and sodicity.

9. Limitations and Disclaimer

This SASA has been prepared for the exclusive use of the client and is limited to the scope of the work agreed in the terms and conditions of contract (including assumptions, limitations and qualifications, circumstances, and constraints). ADE has relied upon the accuracy of information and data provided to it by the client and others.

ADE has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia. No other warranty, expressed or implied, is made or intended. No one section or part of a section, of this SASA should be taken as giving an overall idea of this document. Each section must be read in conjunction with the whole of this report, including its appendixes and attachments. The report is an integral document and must be read in its entirety. To the fullest extent permitted by law, ADE does not accept or assume responsibility to any third party (other than the client) for the investigative work, the report or the opinions given.

The scope of work conducted, and report herein may not meet the specific needs (of which ADE is not aware) of third parties. ADE cannot be held liable for third party reliance on this document. Any third party who relies upon this report does so at its own risk. ADE does not verify the accuracy or completeness of, or adopt as its own, the information or data supplied by others and excludes all liability with respect to such information and data. To the extent that conditions differ from assumptions set out in the SASA, and to the extent that information provided to ADE is inaccurate or incomplete or has changed since it was provided to ADE, the opinions expressed in this report may not be valid and should be reviewed.

ADE's professional opinions are based upon its professional judgement, experience, training, and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and/or opinions. ADE has limited its investigation to the scope agreed upon with its client. This Limitation and Disclaimer must accompany every copy of this SASA.

10. References

- KPMG SGA Property Consultancy Pty Ltd (KPMG) Site Review of Contamination and Assessment, 2019 (KPMG, 2019)
- Map of Salinity Potential in Western Sydney (Department of Land and Water Conservation, 2002)
- Douglas Partners (DP) Preliminary Site Investigation (PSI) - Proposed Commercial/Industrial Subdivision 144-228 Aldington Rd, Kemps Creek NSW Project: 92364, October 2019 (DP, 2019)
- Douglas Partners (DP) Report on Preliminary Geotechnical Investigation and Preliminary Salinity Assessment - Proposed Commercial/Industrial Subdivision 144-228 Aldington Rd, Kemps Creek NSW Project: 92364, October 2019 (DP, 2019)
- Douglas Partners (DP): Preliminary Salinity Management Plan Proposed Industrial Subdivision 200 Aldington Road, Kemps Creek NSW Project: 92421.01, March 2021 (DP, 3/2021)
- Douglas Partners (DP) Contamination Status Summary Report- Proposed Industrial Development 200 Aldington Road Kemps Creek NSW Project: 92421, September 2021 (DP, 2021)

Appendix A - Figures

Figure 1. Assessment area and Site boundary.

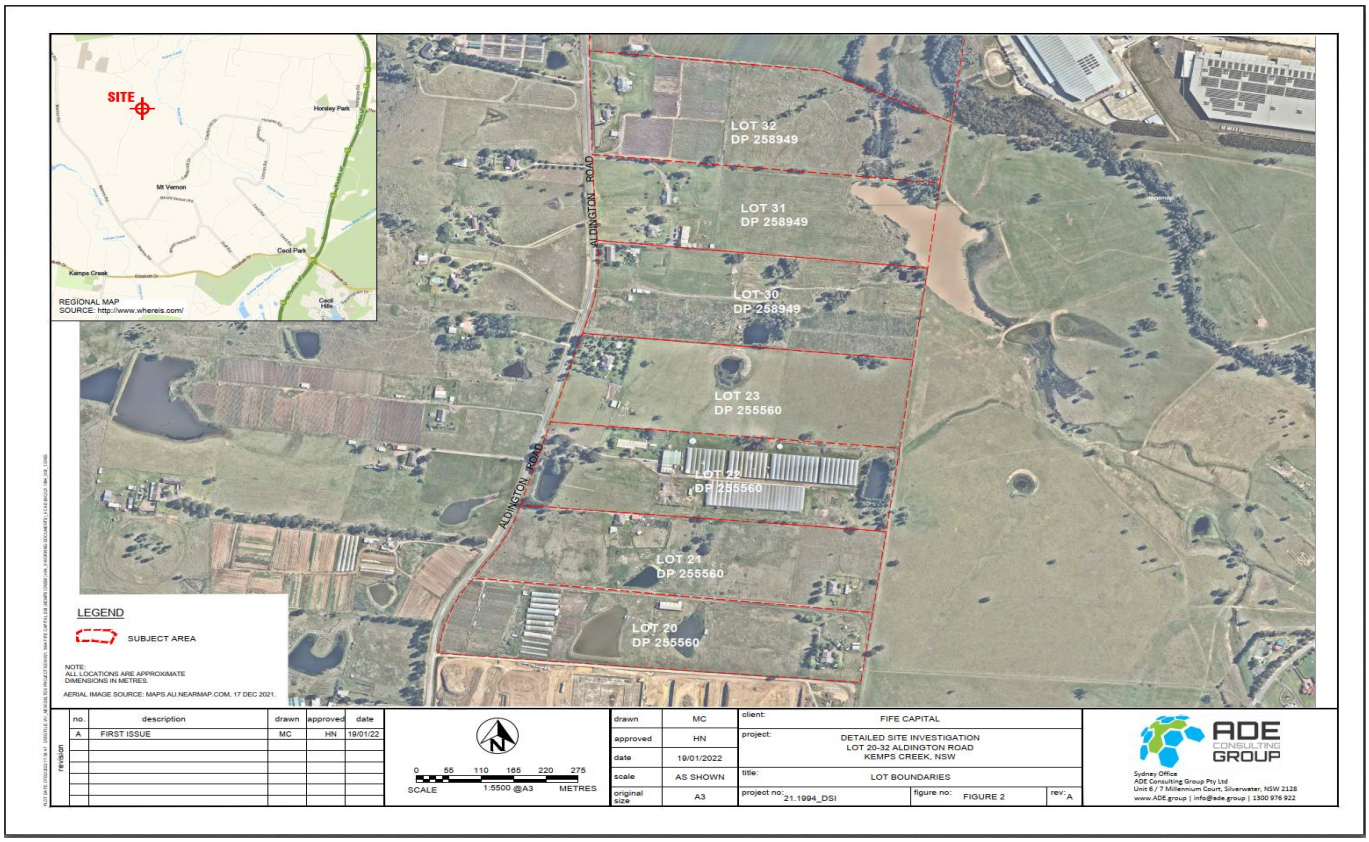
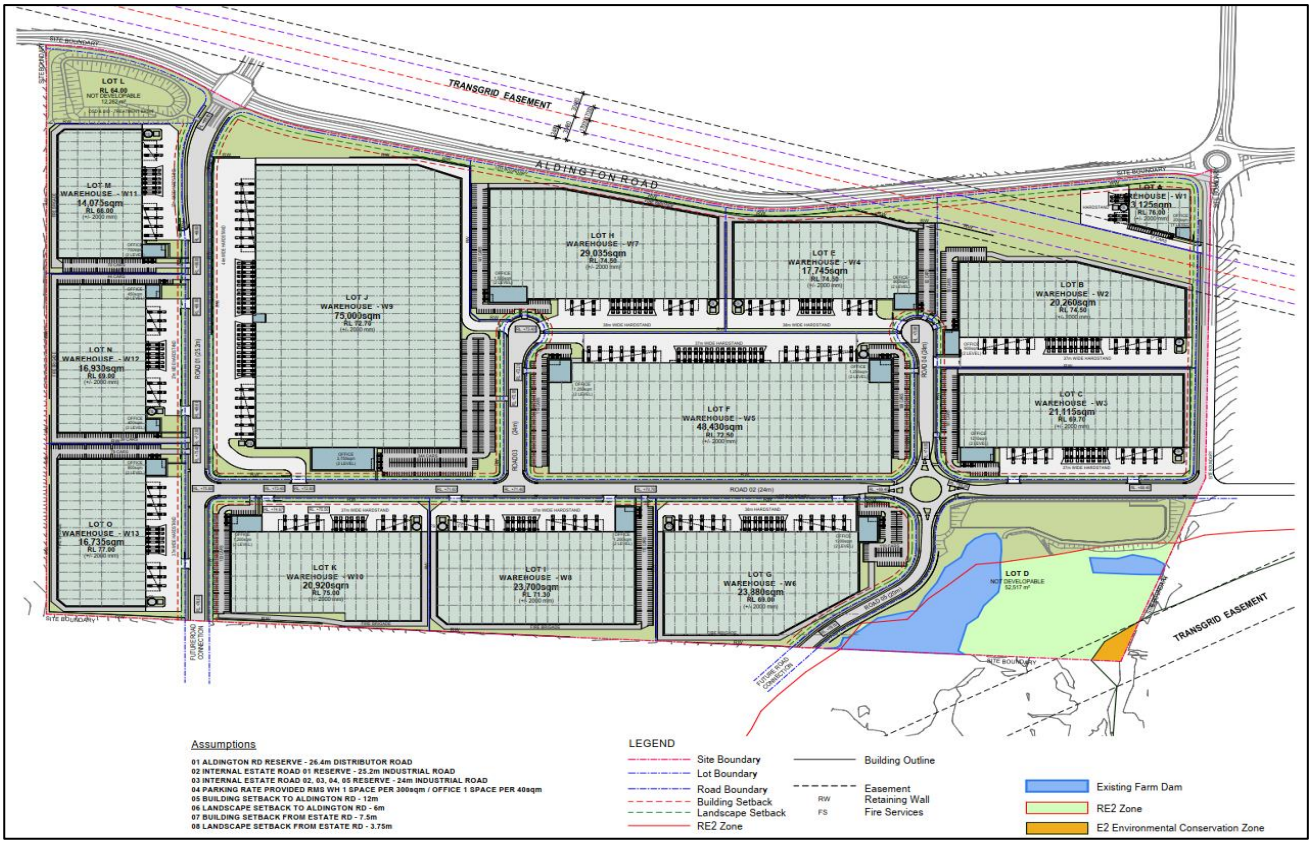


Figure 2. Site markup for proposed Industrial Estate.



REGIONAL MAP
SOURCE: http://www.wheris.com/

ALDINGTON ROAD

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10 TP11 TP12 TP13 TP14 TP15 TP16 TP17 TP18 TP19 TP20 TP21 TP22 TP23 TP24 TP25 TP26 TP27 TP29 TP30 TP31 TP32 TP33 TP34 TP35 TP36 TP37 TP38 TP39 TP40 TP41 TP42 TP43 TP44 TP45 TP46 TP47 TP48 TP49 TP50 TP51 TP52 TP53 TP54 TP55 TP56 TP57 TP58 TP59 TP60 TP61 TP62 TP63 TP64 TP65 TP66 TP67 TP68 TP69 TP70 TP71 TP72 TP73 TP74 TP75 TP76 TP77 TP78 TP79 TP80 TP81 TP82 TP83 TP84 TP85 TP86 TP87 TP88 TP89 TP90 TP91 TP92 TP93 TP94 TP95 TP96 TP97 TP98 TP99 TP100 TP101 TP102 TP103 TP104 TP105 TP106 TP107 TP108 TP109 TP110 TP111 TP112 TP113 TP114 TP115 TP116 TP117 TP118 TP119 TP120 TP122 TP123 TP124 TP125 TP126 TP127 TP128 TP129 TP130

LEGEND

SUBJECT AREA

TP TEST PIT LOCATION

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 17 DEC 2021.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	HN	19/01/22

0 55 110 165 220 275
SCALE 1:5500 @A3 METRES

drawn	MC
approved	HN
date	19/01/2022
scale	AS SHOWN
original size	A3

client: FIFE CAPITAL

project: DETAILED SITE INVESTIGATION
LOT 20-32 ALDINGTON ROAD
KEMPS CREEK, NSW

title: SAMPLE LOCATION AND SITE LOCATION PLAN

project no: 21.1994_DSI | figure no: FIGURE 3 | rev: A

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PLOT DATE: 20/01/2022 23:30:09 DWG FILE: W:_NEW DELTEK PROJECTS ENV\21.1994 FIFE CAPITAL DSI (KEMPS CREEK) HN_6 WORKING DOCUMENTS_4 CAD (MC)\21.1994_DSI.DWG

LEGEND

- SUBJECT AREA
- 1 TEST PIT LOCATION (DOUGLAS PARTNERS, 2019)
- 1 SURFACE SAMPLE LOCATION (DOUGLAS PARTNERS, 2019)

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 17 DEC 2021.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	HN	19/01/22

0 55 110 165 220 275
SCALE 1:5500 @A3 METRES

drawn	MC
approved	HN
date	19/01/2022
scale	AS SHOWN
original size	A3

client: FIFE CAPITAL

project: DETAILED SITE INVESTIGATION
LOT 20-32 ALDINGTON ROAD
KEMPS CREEK, NSW

title: PREVIOUS SAMPLE LOCATION

project no: 21.1994_DSI | figure no: FIGURE 4 | rev: A

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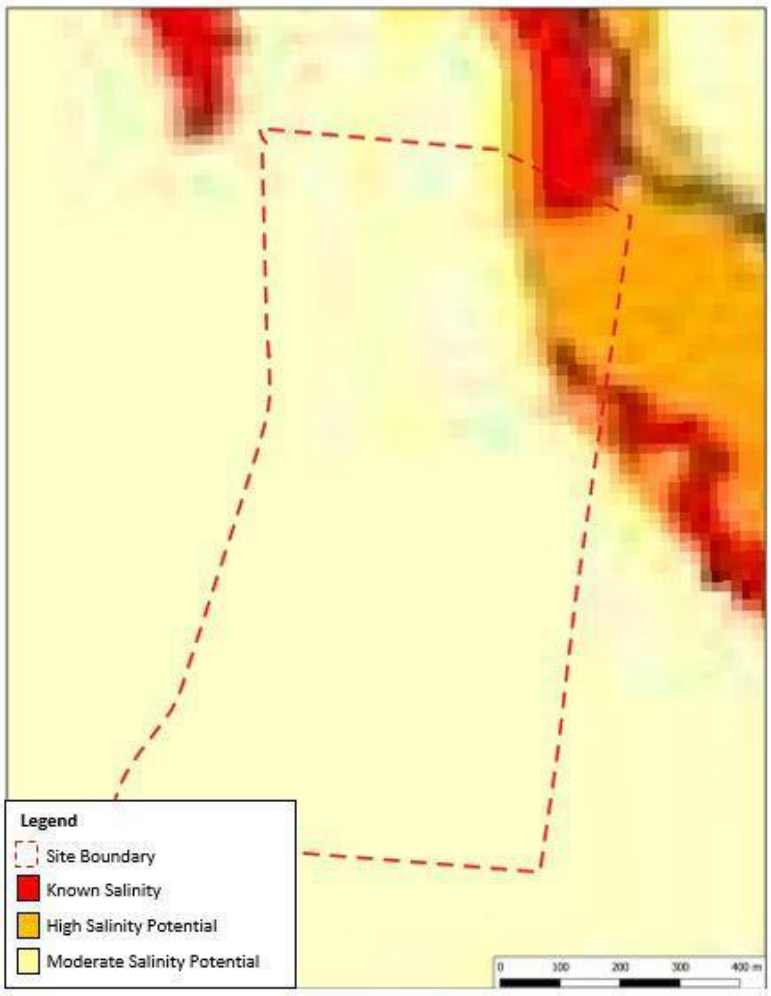
PLOT DATE: 10/02/2022 16:28:24 DWG FILE: W:_NEW DELTEK PROJECTS ENV\21.1994 FIFE CAPITAL DSI (KEMPS CREEK) HN_6 WORKING DOCUMENTS_4 CAD (MC)\21.1994_DSI_1.DWG

Figure 3. Salinity Mapping.



Appendix B – Analytical results and chain of custody

ADE Consulting Group Pty Ltd
Unit 6/7 Millennium Court
Silverwater
NSW 2128

Attention: **Hayden Nancarrow**

Report **864544-S**
Project name ADDITIONAL: 21.1994 DSI1
Project ID 200 ALDINGTON RD KEMPS CREEK
Received Date Feb 18, 2022

Client Sample ID			**21.1994-TP59**	**21.1994-TP65**	**21.1994-TP71**	**21.1994-TP37**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-Fe36636**	**S22-Fe36637**	**S22-Fe36638**	**S22-Fe36639**
Date Sampled			**Dec 15, 2021**	**Dec 15, 2021**	**Dec 15, 2021**	**Dec 16, 2021**
Test/Reference	LOR	Unit				
% Clay	1	%	9.0	13	8.0	8.0
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	48	28	87	31
% Moisture	1	%	22	20	18	17
Alkali Metals						
Sodium	5	mg/kg	350	260	2100	260
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	3.2	3.8	7.9	3.1

Client Sample ID			**21.1994-TP83**	**21.1994-TP77**	**21.1994-TP92**	**21.1994-TP39**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-Fe36640**	**S22-Fe36641**	**S22-Fe36642**	**S22-Fe36643**
Date Sampled			**Dec 16, 2021**	**Dec 16, 2021**	**Dec 16, 2021**	**Dec 17, 2021**
Test/Reference	LOR	Unit				
% Clay	1	%	13	4.0	13	20
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	26	41	70	100
% Moisture	1	%	18	18	21	16
Alkali Metals						
Sodium	5	mg/kg	140	100	150	340
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	3.5	5.3	7.1	5.7

Client Sample ID			**21.1994-TP47**	**21.1994-TP24**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S22-Fe36644**	**S22-Fe36645**
Date Sampled			**Dec 20, 2021**	**Dec 20, 2021**
Test/Reference	LOR	Unit		
% Clay	1	%	4.0	8.0
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	110	26
% Moisture	1	%	19	18
Alkali Metals				
Sodium	5	mg/kg	140	84

Client Sample ID			21.1994-TP47	21.1994-TP24
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S22-Fe36644**	**S22-Fe36645**
Date Sampled			**Dec 20, 2021**	**Dec 20, 2021**
Test/Reference	LOR	Unit		
Cation Exchange Capacity				
Cation Exchange Capacity	0.05	meq/100g	5.1	4.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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
% Clay	Brisbane	Feb 21, 2022	14 Days
- Method: LTM-GEN-7040			
Alkali Metals	Melbourne	Feb 21, 2022	180 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Feb 18, 2022	7 Days
- Method: LTM-INO-4030 Conductivity			
Cation Exchange Capacity	Melbourne	Feb 21, 2022	28 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
% Moisture	Sydney	Feb 18, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

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Project Name: ADDITIONAL: 21.1994 DSI1
Project ID: 200 ALDINGTON RD KEMPS CREEK

Order No.:
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Fax: 02 9401 0097

Received: Feb 18, 2022 9:40 AM
Due: Feb 22, 2022
Priority: 2 Day
Contact Name: Hayden Nancarrow

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	Sodium	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217								X	X
Brisbane Laboratory - NATA # 1261 Site # 20794						X			
Mayfield Laboratory - NATA # 1261 Site # 25079									
Perth Laboratory - NATA # 2377 Site # 2370									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	21.1994-TP59	Dec 15, 2021		Soil	S22-Fe36636	X	X	X	X
2	21.1994-TP65	Dec 15, 2021		Soil	S22-Fe36637	X	X	X	X
3	21.1994-TP71	Dec 15, 2021		Soil	S22-Fe36638	X	X	X	X
4	21.1994-TP37	Dec 16, 2021		Soil	S22-Fe36639	X	X	X	X
5	21.1994-TP83	Dec 16, 2021		Soil	S22-Fe36640	X	X	X	X
6	21.1994-TP77	Dec 16, 2021		Soil	S22-Fe36641	X	X	X	X
7	21.1994-TP92	Dec 16, 2021		Soil	S22-Fe36642	X	X	X	X
8	21.1994-TP39	Dec 17, 2021		Soil	S22-Fe36643	X	X	X	X
9	21.1994-TP47	Dec 20, 2021		Soil	S22-Fe36644	X	X	X	X

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Project Name: ADDITIONAL: 21.1994 DSI1
Project ID: 200 ALDINGTON RD KEMPS CREEK

Order No.:
Report #: 864544
Phone: 02 9400 7711
Fax: 02 9401 0097

Received: Feb 18, 2022 9:40 AM
Due: Feb 22, 2022
Priority: 2 Day
Contact Name: Hayden Nancarrow

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	Sodium	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217								X	X
Brisbane Laboratory - NATA # 1261 Site # 20794						X			
Mayfield Laboratory - NATA # 1261 Site # 25079									
Perth Laboratory - NATA # 2377 Site # 2370									
External Laboratory									
10	21.1994-TP24	Dec 20, 2021		Soil	S22-Fe36645	X	X	X	X
Test Counts						10	10	10	10

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid 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. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. 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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
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.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. 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							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
LCS - % Recovery							
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	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			
Conductivity (1:5 aqueous extract at 25°C as rec.)	N22-Fe32034	NCP	uS/cm	80	83	3.6	30%	Pass	
% Moisture	S22-Fe37441	NCP	%	9.8	9.1	8.0	30%	Pass	
Duplicate									
Cation Exchange Capacity				Result 1	Result 2	RPD			
Cation Exchange Capacity	S22-Fe36644	CP	meq/100g	5.1	5.2	1.0	30%	Pass	

Comments

Eurofins | Environment Testing accreditation number 1261, site 18217 is currently in progress of a controlled transition to a new custom built location at 179 Magowar Road, Girraween, NSW 2145. All results on this report denoted as being performed by Eurofins | Environment Testing Unit F3, Building F, 16 Mars road, Lane Cove West, NSW 2066, corporate site 18217, will have been performed on either Lane Cove or new Girraween 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	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Emma Beesley	Analytical Services Manager
Charl Du Preez	Senior Analyst-Inorganic (NSW)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Jonathon Angell	Senior Analyst-Inorganic (QLD)

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.

eurofins | Environment Testing

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43 Detroit Drive
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Phone : 0800 856 450
IANZ # 1290

Company Name: ADE Consulting Group Pty Ltd
Address: Unit 6/7 Millennium Court
Silverwater
NSW 2128

Project Name: ADDITIONAL: 21.1994 DSI1
Project ID: 200 ALDINGTON RD KEMPS CREEK

Order No.:
Report #: 864544
Phone: 02 9400 7711
Fax: 02 9401 0097

Received: Feb 18, 2022 9:40 AM
Due: Feb 22, 2022
Priority: 2 Day
Contact Name: Hayden Nancarrow

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	Sodium	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217								X	X
Brisbane Laboratory - NATA # 1261 Site # 20794						X			
Mayfield Laboratory - NATA # 1261 Site # 25079									
Perth Laboratory - NATA # 2377 Site # 2370									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	21.1994-TP59	Dec 15, 2021		Soil	S22-Fe36636	X	X	X	X
2	21.1994-TP65	Dec 15, 2021		Soil	S22-Fe36637	X	X	X	X
3	21.1994-TP71	Dec 15, 2021		Soil	S22-Fe36638	X	X	X	X
4	21.1994-TP37	Dec 16, 2021		Soil	S22-Fe36639	X	X	X	X
5	21.1994-TP83	Dec 16, 2021		Soil	S22-Fe36640	X	X	X	X
6	21.1994-TP77	Dec 16, 2021		Soil	S22-Fe36641	X	X	X	X
7	21.1994-TP92	Dec 16, 2021		Soil	S22-Fe36642	X	X	X	X
8	21.1994-TP39	Dec 17, 2021		Soil	S22-Fe36643	X	X	X	X
9	21.1994-TP47	Dec 20, 2021		Soil	S22-Fe36644	X	X	X	X

eurofins | Environment Testing

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email: EnviroSales@eurofins.com

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IANZ # 1290

Company Name: ADE Consulting Group Pty Ltd
Address: Unit 6/7 Millennium Court
Silverwater
NSW 2128

Project Name: ADDITIONAL: 21.1994 DSI1
Project ID: 200 ALDINGTON RD KEMPS CREEK

Order No.:
Report #: 864544
Phone: 02 9400 7711
Fax: 02 9401 0097

Received: Feb 18, 2022 9:40 AM
Due: Feb 22, 2022
Priority: 2 Day
Contact Name: Hayden Nancarrow

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						% Clay	Sodium	Moisture Set	Cation Exchange Capacity
Melbourne Laboratory - NATA # 1261 Site # 1254							X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217								X	X
Brisbane Laboratory - NATA # 1261 Site # 20794						X			
Mayfield Laboratory - NATA # 1261 Site # 25079									
Perth Laboratory - NATA # 2377 Site # 2370									
External Laboratory									
10	21.1994-TP24	Dec 20, 2021		Soil	S22-Fe36645	X	X	X	X
Test Counts						10	10	10	10

eurofins | Environment Testing

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	ADE Consulting Group Pty Ltd
Contact name:	Hayden Nancarrow
Project name:	ADDITIONAL: 21.1994 DSI1
Project ID:	200 ALDINGTON RD KEMPS CREEK
Turnaround time:	2 Day
Date/Time received	Feb 18, 2022 9:40 AM
Eurofins reference	864544

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	Sample Temperature of chilled sample on the batch as recorded by Eurofins Sample Receipt : 25.1 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.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Asim Khan on phone : or by email: AsimKhan@eurofins.com

Results will be delivered electronically via email to Hayden Nancarrow - Hayden.Nancarrow@ade.group.

Note: A copy of these results will also be delivered to the general ADE Consulting Group Pty Ltd email address.

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

Sydney Laboratory
Unit F3 Bld.F 16 Mars Road Lane Cove West NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2 91 Leach Highway Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	ADE Consulting Group
Address	6/7 Millennium Ct, Silverwater NSW 2128
Contact Name	Grace Tuckwell
Phone №	0449 886 533
Special Directions	
Purchase Order	
Quote ID №	

Project №	200 Aldington Rd Kemps Creek
Project Name	21.1994 DSI1
Project Manager	Hayden Nancarrow
EDD Format (ESdat, EQuIS etc)	ESdat

Sampler(s)	Grace Tuckwell
Handed over by	Grace Tuckwell
Email for Invoice	Hayden Nancarrow
Email for Results	hayden.nancarrow@ade.group; matthew.salmon@ade.group

Analyses
Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Containers
Change container type & size if necessary.

Required Turnaround Time (TAT)
Default will be 5 days if not ticked.

♦Surcharge will apply
- ☐ Overnight (reporting by 9am)♦
- ☐ Same day♦ ☐ 1 day♦
- ☑ 2 days♦ ☐ 3 days♦
- ☐ 5 days (Standard)
- Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Na, CEC, Clay	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
21	21.1994-TP59	15/12/21		X									851691: S21-De46871
22	21.1994-TP65	15/12/21		X									851691: S21-De46872
23	21.1994-TP71	15/12/21		X									851691: S21-De46873
24	21.1994-TP37	16/12/21		X									851699: S21-De46984
25	21.1994-TP83	16/12/21		X									851699: S21-De46985
26	21.1994-TP77	16/12/21		X									851699: S21-De46986
27	21.1994-TP92	16/12/21		X									851699: S21-De46987
28	21.1994-TP39	17/12/21		X									852482: S21-De52622
29	21.1994-TP47	20/12/21		X									852775: S21-De55159
30	21.1994-TP24	20/12/21		X									852775: S21-De55160
	Total Counts			10									

Method of Shipment: ☑ Courier (#) ☐ Hand Delivered ☐ Postal | Name: Grace Tuckwell | Signature: | Date: | Time: | Temperature:

Laboratory Use Only

Received By	MR	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	18/12	Time 9:40AM
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time

Temperature: 25.1°C
Report №: 864544

ADECONSULTINGGROUP

SOLUTIONS THROUGH INNOVATION

Further details regarding ADE's Services are available via

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