DLA Environmental Services

Soil Salinity & Aggressivity Assessment

West Schofields Precinct
Schofields NSW 2762

Department of Planning

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This report is limited to the scope defined herein. Sampling and chemical analysis of environmental media are based on representative samples, the intensity of those samples being in accordance with the usual levels of testing carried out for this type of investigation and appropriate for the objectives of this report. Due to the inherent variability in environmental media, DLA cannot warrant that the whole overall condition of the Site is identical or substantially similar to the representative samples.

ABBREVIATIONS

ASS	Acid Sulphate Soil
BGL	Below Ground Level
BH	Borehole
CEC	Cation Exchange Capacity
COC	Chain of Custody documentation
DA	Development Application
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DLA	DLA Environmental Services
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority (NSW)
ESP	Exchangeable Sodium Capacity
LOR	Limit of Reporting
NATA	National Association of Testing Authorities, Australia
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OEH	Office of Environmental and Heritage
OH&S	Occupational Health and Safety
PQL	Practical Quantification Limit
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SAC	Site Acceptance Criteria
SAQP	Sampling Analysis and Quality Plan
SEPP	State Environmental Planning Policy
UCL	Upper Confidence Limit
WHS	Work Health Safety

EXECUTIVE SUMMARY

DLA Environmental Services (DLA) was commissioned by the Department of Planning to conduct a Soil Salinity and Aggressivity Assessment of the following site:

West Schofields Precinct, Schofields, NSW, 2762 (the Site).

The purpose of this report is to assess the Site's soil salinity and aggressivity condition by reviewing available desktop information combined with field studies and sampling. This report is designed to be utilised in Precinct development plans, by indicating suitability of land within the Precinct to be rezoned for potential commercial, open space and residential land uses.

The assessment of the site was conducted in two parts, referred to as the southern and northern parts. The southern part was investigated in May 2016, the northern part in May 2017. The findings of these investigations were reported in two separate documents – *Salinity and Aggressivity Assessment (DLA, 2016, H00789)* and *Salinity and Aggressivity Assessment (DLA, 2017, S006978)*. This report has amalgamated the findings of both investigations.

The *Salinity Potential in Western Sydney* map (DIPNR, 2002) indicates the areas of the Site directly adjacent to Bells Creek and Eastern Creek are of high salinity potential. The remaining areas of the Site are indicated as of moderate salinity potential.

On 24th May 2016 a total of eight properties (properties A – J) in the southern part were inspected for evidence of salinity. Each property was inspected for evidence of salinity. There were no salinity indicators, such as bare soil patches, salt crystals at the surface or die back of trees, observed on any of the properties. Soil characteristics ranged from silty brown topsoils to silty sands. Salinity and aggressivity analysis of twenty soil samples concluded that the majority of soils in the southern part were non-saline to slightly saline, non-sodic to sodic and non-aggressive.

On 31st May and 1st June 2017, a total of 18 properties and nine verges were inspected for evidence of salinity in the northern part. There were no salinity indicators, such as bare soil patches, salt crystals at the surface or die back of trees, observed on any of the properties. Soil profile characteristics ranged from brown silty topsoils to orange clay. Salinity analysis of 48 samples and aggressivity analysis of 24 samples concluded that the majority of soils in the northern part were non-saline and non-aggressive. The northern part samples that were moderately saline were collected from surface soils from an active market garden, and as such are not considered representative of natural soils in the area and ongoing management is not required.

As the intended land use for the Site includes rezoning from rural residential to a higher density residential and open space land use, no irrigation or effluent disposal is likely to take place on Site. DLA is therefore of the opinion that a Salinity Management Plan is not required for the precinct if the intended residential land use is implemented without development in the riparian zone of Bells Creek or Eastern Creek. The Draft Indicative Layout Plan (ILP) is therefore deemed suitable from a salinity and aggressivity perspective, as development zones appear to be within lower risk areas.

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1.0 INTRODUCTION

1.1 General

DLA Environmental Services (DLA) was engaged by the Department of Planning to conduct a Salinity and Aggressivity Analysis with Soil Sampling of the following area:

West Schofields Precinct, Schofields, NSW, 2762 (the Site).

The purpose of this report is to assess the Site's potential soil salinity and aggressivity condition by reviewing desktop information combined with field studies and sampling.

1.2 Development Controls

This assessment is designed to be utilised in Precinct planning and development, by indicating suitability of land within the Precinct to be rezoned for potential commercial, open space and residential land uses. It is suitable for review by the NSW EPA, Department of Primary Industries (DPI) and Blacktown City Council.

1.3 Objectives

The project objectives of this Salinity and Aggressivity Assessment are to conduct the investigation in accordance with the general requirements of the *Site Investigation for Urban Salinity* (Department of Land and Water Conservation, 2002). This assessment aims to provide an indication of the potential risk of salinity and aggressivity occurring within the proposed West Schofields precinct.

1.4 Scope of Works

To achieve this objective, DLA carried out the following works:

- Review of the Salinity Potential in Western Sydney 2002 map produced by the former Department of Infrastructure, Planning and Natural Resources (DIPNR) and an analysis of the potential presence of soil and groundwater salinity within the study area;
- Review of the influence of regional conditions on salinity surrounding the area including maps of the extent, degree and locations of potential saline soils;
- Site walkover;

- A comprehensive soil sampling program consistent with the requirements of Department of Land and Water Conservation (DLWC) booklet No. 3 'Site Investigations for Urban Salinity' including:

    - Soil sampling in southern and northern parts;
    - Groundwater sampling in southern part;
    - Laboratory analysis;
    - Results interpretation; and
    - Assessment as to whether the preparation of a management plan is required that incorporates appropriate development controls for the management of salinity and related issues

- The identification of any saline environments must be incorporated into the overall planning process by way of advising other Specialist Contractors whose areas of investigation and recommendations are potentially affected by salinity issues; and,

- The recommendations are to determine which concepts of Water Sensitive Urban Design (WSUD) are possible, and which are not, in areas of elevated soil salinity within the subject site. This is to ensure consistency is achieved between WSUD and any future Salinity Management Plans.

1.5 Soils and Groundwater Planning Strategy in Western Sydney

In order to manage salinity issues in Western Sydney and integrate sustainable management practices into new developments, the Department of Land & Water Conservation released "Site Investigation for Urban Salinity – 2002." This document addresses salinity issues and provides a framework for management whereby no adverse salinity impacts or significant increases in the water table level are incurred via the design and construction of new developments.

2.0 SITE DESCRIPTION

2.1 Site Identification

The Site identification details are summarised in **Table 3a** below:

Table 3a – Site Identification Summary

ITEMS	DETAILS
Site Name	West Schofields Precinct
Address	Schofields, NSW, 2762; Riverstone, NSW, 2765
Local Government Authority	Blacktown City Council
Lot and Deposited Plan	Multiple (Refer to **Section 3.2)**
Development Controls	Blacktown LEP 2015
Site Zoning	RU4 Primary Production Small Lots, RE1 Public Recreation
Current Use (NEPM 2013 Table 1A(1)	Commercial / industrial, public open space and residential with gardens / accessible soil
Proposed Use (NEPM 2013 Table 1A(1)	Residential with gardens / accessible soil, Environmental Living, public open space
Site Area (approx.)	Approximately 5,350,000 m^2 (535 ha)
Locality Map	Refer to **Figure 1** – Site Location
Site Layout	Refer to **Figure 2** – Southern Site Layout and Sampling Locations, **Figure 3** - Northern Site Layout and Sampling Locations

2.2 Properties Associated with the Proposed West Schofields Precinct

The majority of lots and part lots within the precinct are currently zoned RU4 Primary Production Small Lots within the Blacktown City Council LEP 2015, with some exceptions. South Road, Townson Road, Meadow Road and their associated verges are zoned SP2 Infrastructure. Grange Avenue Reserve and Basil Andrews Park are zoned RE1 Public Recreation.

2.2.1 Boundaries and Surrounding Land Use

The boundary and surrounding landscape features of the Site are summarised in **Table 3b** below:

Table 3b – Boundaries and Surrounding Land Use

DIRECTION	DETAILS
North	Garfield Road West, Riverstone Cemetery, Environmental Conservation area and largely vacant primary production lots.
East	Eastern Creek, Environmental Conservation areas and low density residential lots, Schofields Defence Depot.
South	Townson Road, Colebee Release Area and Stonecutters Ridge Golf Club
West	Bells Creek, Environmental Management areas and lots including primary production, low and medium density residential, Richmond Road and Marsden Park Industrial Area.

2.3 Site Geology and Soils

The Penrith 1: 100,000 Geological Map Sheet (NSW Department of Mineral and Energy 1991) was reviewed and the Site was assessed to be underlain by Bringelly Shale, with the formation comprising of shale, carbonaceous claystone, claystone, lithic sandstone and tuff. The areas adjacent to Eastern Creek and Bells Creek comprise fine-grained sand, silt and clay.

A surficial weathering profile of weathered shale comprising of silt clay soils with lateritic developments is also present. Underlying the weathered material is weathered shales, laminated with various degrees of carbonaceous cementations.

2.4 Site Topography

The PGH/CSR Site has an overall topographic gradient falling from the west (approximately 40m AHD) to the east (approximately 30m AHD), with the main plant area being elevated above the Site. The Site is dominated by the former quarry pit void that is estimated to be a depth of 30m below natural ground level (BGL). The quarry pit is currently undergoing filling works to elevate the Site back to natural contour levels.

The remainder of the southern part has undulating gradual slopes and rises of up to 30m. Overall the Site slopes towards Eastern Creek in the east and Bells Creek in the West with a general slope from the north-west (30m AHD) to the south-east portion (20m AHD).

The majority of the northern part is located on relatively flat floodplain between Eastern Creek and Bells Creek (between 10m and 20m AHD), with a general slope from the south-west to the north. The south-western portion is slightly higher (approximately 30m AHD) with gradual undulating slopes down to the flood plain.

2.5 Salinity Potential Map

A review of the NSW Department of Natural Resources, *Sydney Metropolitan Catchment Management Authority Guidelines to Accompany Map of Salinity Potential in Western Sydney* August 2002, indicate that scattered areas of scalding and salinity indicator plants have been noted throughout the Site, however no concentrations have been mapped. It is also noted that salinity has been found to affect buildings in these areas, however this is due to localised factors that have combined to create a salinity problem at a particular site.

The *Salinity Potential in Western Sydney* map (DIPNR, 2002) indicates the areas of the Site within the riparian zone of Bells Creek and Eastern Creek are of high salinity potential. The remaining areas of the Site are indicated to be of moderate salinity potential.

The underlying Bringelly Shale formations have been known to contain saline groundwater and outbreaks of salt scalds. Salinity has been found to affect buildings in the areas of high potential, however these are site specific and based on previous land use combined with the salinity potential of the location.

Refer to **Appendix A** – Salinity Potential in Western Sydney Map.

2.6 Hydrology and Hydrogeology

The local Bringelly Shale formation, within the Wianamatta Group, has been known to contain saline groundwater. There are two aquifers, *regolith aquifer* (upper aquifer system) and *shale bedrock aquifer* (lower aquifer system) operating in the Wianamatta shales. The regolith aquifer system comprises water contained within the residual soil and colluvium derived from the shales and in the shale weathering profile itself, to a typical depth of 3-10 m. The lower shale bedrock aquifer system occurs below the base of weathering. Both aquifer systems have low permeability.

The Site is located outside of the Sydney Basin – Central Groundwater Management Area and management of groundwater within the Site area is controlled under the Blacktown Local Environment Plan (LEP) 2015. The LEP aims to ensure that appropriate development occurs in the landscape with consideration of future population demands, economic issues and the protection of

natural resources and environmental assets in the area. With respect to groundwater, the LEP aims ensure that development is prevented or restricted in locations where there is a high likelihood of groundwater contamination or the potential for development to increase salinity within the landscape. As the majority of the surrounding area is rural residential, minimal aquifer contamination is expected. The salinity potential for the Site is discussed in **Section 6**.

Approximately 80% of the Site is unsealed and situated on permeable grass and soils. As such, rainfall is expected to mainly infiltrate the unsealed surfaces of the Site. Excess rainfall and that falling on the sealed surface is expected to follow natural drainage lines and flow into either Eastern Creek or Bells Creek. All runoff within the PGH/CSR site is trapped in on-Site dams and only discharged into natural waterways following testing and compliance with NSW EPA guidelines for water discharge.

Assessment of the southern part included a search of the NSW Department of Primary Industries (DPI) Water groundwater data search which identified 10 registered groundwater wells to be present within 2.1 km of the southern part precinct. Of the 10 wells, five (GW103957, GW103958, GW103959, GW103960 and GW103961) have been identified as being located within the southern part. On Site investigations did not locate any of the registered wells.

All bores had minimal information available, however groundwater well GW110658 located south west of the Site identified groundwater to be present at a depth of 9.82 metres extending to 10m below ground level. No other wells identified groundwater depths in the logs available for review. The data obtained from the NSW DPI Water groundwater data search is summarised in **Table 3c** below:

Table 3c – Regional Groundwater Summary Data

WELL ID	DISTANCE FROM SITE (m)	PURPOSE	DEPTH (m)	STANDING WATER LEVEL (m)	SALINITY (µS/cm)
GW103957	On-site	Monitoring	15.00	No Data	No Data
GW103958	On-site	Monitoring	20.00	No Data	No Data
GW103959	On-site	Monitoring	19.20	No Data	No Data
GW103960	On-site	Monitoring	20.00	No Data	No Data
GW103961	On-site	Monitoring	20.00	No Data	No Data
GW104310	NW – 1.4Km	Monitoring	9.00	No Data	No Data
GW104311	NW – 1.5Km	Monitoring	17.00	No Data	No Data
GW104308	NW – 1.7Km	Monitoring	14.00	No Data	No Data
GW112289	NE - 1.5Km	Monitoring	10.00	No Data	No Data
GW112290	NE - 1.5Km	Monitoring	10.00	No Data	No Data
GW110658	SW – 2.1Km	Monitoring	10.00	No Data	No Data

Refer to **Appendix C –** Groundwater Works Database Search

3.0 SITE INSPECTION

Site inspections were completed on 24th May 2016, 31st May 2017 and 1st June 2017. Overall the precinct consists of predominantly rural land with open paddocks, rural residential housing and remnant bushland vegetation. There are several properties which appear to have sheds and machinery present and numerous active market gardens. The southern part includes a 78ha property occupied by the PGH Brick factory and associated former quarry areas and landfill. The northern part includes two former landfills, which have been capped, and monitoring equipment installed to observe on Site conditions for health and environmental risk.

On 24th May 2016, 8 properties in the southern part were inspected and twenty samples collected for salinity/aggressivity/sodicity analysis. On 31st May 2017, 12 properties were inspected and 25 samples collected for salinity/aggressivity analysis. On 1st June 2017, six properties and nine verges were inspected with 23 samples collected for salinity and aggressivity analysis. In total 24 soil samples were analysed for salinity and 24 for salinity and aggressivity in the northern part.

There were no salinity indicators, such as bare soil patches, salt crystals at the surface or die back of trees, observed on any of the properties. Soil characteristics ranged from brown silty topsoils to orange clay.

4.0 SAMPLING ANALYSIS AND QUALITY PLAN

4.1 Field Investigation Procedure

The likelihood of salinity was assessed by comparison of assessment results with *Site Investigations for Urban Salinity* (DLWC, 2002). Sampling was performed on a systematic basis (as much as property access permissions allowed). Not all lots within the Site were able to be accessed at the time of assessment however it is considered the lots assessed are sufficient to determine salinity potential within the Site.

The number of samples required for an initial site investigation is based on the total area of the Site and the variation of soil characteristics, the proposed future land use and the potential for development to disturb and mobilise any salt present in soils.

Sampling densities for the Site were in accordance with those outlined in the *Site Investigations for Urban Salinity* (DLWC, 2002). Sections of the northern part have the potential for rezoning as residential land and as such these areas were sampled at a higher density than the remainder of the part precinct. The ILP had not yet been drafted when the southern part was assessed, and sampling densities were more consistent throughout this area.

Field investigation comprised of the following:

- A review of Site history and aerial photographs to identify appropriate sampling locations prior to the commencement of work;
- Inspection of the Site;
- Collection of 20 soil salinity/aggressivity/sodicity samples in the southern part; and,
- Collection of 48 soil salinity/aggressivity samples in the northern part.

The Site is approximately 535 ha with little variation in the natural soil characteristics. Additionally, the intended development on Site includes rezoning from primary production small lots to a residential or open space land use. No irrigation or effluent disposal is planned to take place on Site. DLA considers that the collection of 68 soil samples from across the Site is appropriate to adequately characterise the Site's salinity and aggressivity condition, in accordance with the Site area, soil type and proposed land use. The majority of samples (33) in the northern part were located within the area that may potentially be rezoned as residential according to the Draft ILP.

Refer to **Figure 2** –Southern Site Layout and Sampling Locations and **Figure 3** – Northern Site Layout and Sampling Locations.

4.1.1 Soil Collection

Soil samples for chemical analysis were collected in accordance with DLWC (2002), *Western Sydney Salinity Code of Practice* (WSROC, 2003) and Australian Standard: AS 2159-2009. Samples were obtained between 0.1 and 1.5m BGL using a decontaminated trowel and immediately transferred to sample containers of appropriate composition (glass jars). Job number; sample identification number; sampler's initials and date of sampling were recorded on sample labels affixed to the sample containers. The samples were transported under standard DLA chain-of-custody protocols to the NATA accredited laboratory – Envirolab Services Pty Ltd.

All samples were collected by DLA staff who are specifically trained in field investigation techniques and health and safety procedures. All techniques used are specified in the DLA Field Manual for Site Investigation, which is based on methods specified by the United States Environment Protection Agency (US EPA) and NEPM (NEPC, 2013).

4.1.2 Groundwater Collection

Three groundwater bores (BH01, BH02, BH03) were installed within the southern section as part of the associated Preliminary Environmental Site Assessment (DLA, 2016; H00792) with the aim of assessing groundwater conditions.

Groundwater samples were collected from each well in general accordance with the NEPM (NEPC, 2013) and the *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007). Wells were purged and sampled using dedicated disposable bailers that were replaced between each well.

Groundwater samples were collected into laboratory prepared and supplied sample containers for specific analytes (i.e. plastic unpreserved, plastic preserved, glass amber unpreserved, and preserved glass vials). All samples were collected and filled into the respective sample containers with no head space remaining and no loss of preservation agents occurring, where present. Groundwater samples collected for analysis for heavy metals were field filtered prior to placement into acid preserved plastic containers. Job number; sample identification number; sampler's initials and date of sampling were recorded on sample labels affixed to the sample containers.

Samples for chemical analysis were immediately placed into a chilled cooler to minimise the likelihood for the loss of potential volatile components, if any. Samples were stored and transported at temperatures below 4°C. Samples were transported under standard DLA chain-of-custody protocols to the NATA accredited laboratories – Envirolab Services Pty Ltd.

Refer to **Figure 3** – Southern Site Layout and Sampling Locations.

4.2 Soil Analytical Strategy

48 samples were analysed for the following parameters to allow assessment of all representative areas of the Site:

Salinity parameters: salinity class, texture, ECe, electrical conductivity
Aggressivity parameters: chloride, sulphate, pH
Sodicity parameters: ESP (exchangeable sodium percentage), CEC (cation exchange capacity)

Aggressivity analysis in the northern part was only conducted on samples located in areas that may potentially be rezoned as residential according to the Draft ILP provided by the Client.

Table 5a – Sample Collection and Analysis

Sample	Depth	Analysis
A-TP1	0.5	Salinity, Aggressivity and Sodicity
A-TP2	0.3	Salinity, Aggressivity and Sodicity
B-TP1	0.4	Salinity, Aggressivity and Sodicity
B-TP2	0.3	Salinity, Aggressivity and Sodicity
C-TP2	0.5	Salinity, Aggressivity and Sodicity
C-TP4	1	Salinity, Aggressivity and Sodicity
D-TP2	0.4	Salinity, Aggressivity and Sodicity
D-TP4	0.2	Salinity, Aggressivity and Sodicity
E-TP2	0.3	Salinity, Aggressivity and Sodicity
E-TP4	0.2	Salinity, Aggressivity and Sodicity
F-TP1	0.2	Salinity, Aggressivity and Sodicity
F-TP2	3	Salinity, Aggressivity and Sodicity
G-TP1	0.2	Salinity, Aggressivity and Sodicity
G-TP2	0.2	Salinity, Aggressivity and Sodicity
1m-31 south	1	Salinity, Aggressivity and Sodicity
0.5-31 south	0.5	Salinity, Aggressivity and Sodicity
1.5-4 durham	1.5	Salinity, Aggressivity and Sodicity
0.5-4 durham	0.5	Salinity, Aggressivity and Sodicity
0.5-46 durham	0.5	Salinity, Aggressivity and Sodicity
0.2-46 durham	0.2	Salinity, Aggressivity and Sodicity
SAL1	0.2	Salinity and Aggressivity
SAL2	0.3	Salinity

Sample	Depth	Analysis
SAL3	0.3	Salinity and Aggressivity
SAL4	0.4	Salinity and Aggressivity
SAL5	0.2	Salinity and Aggressivity
SAL6	0.3	Salinity
SAL7	0.5	Salinity and Aggressivity
SAL8	0.3	Salinity and Aggressivity
SAL9	0.2	Salinity and Aggressivity
SAL10	0.6	Salinity
SAL11	0.3	Salinity and Aggressivity
SAL12	0.3	Salinity and Aggressivity
SAL13	0.2	Salinity
SAL14	0.1	Salinity
SAL15	0.3	Salinity and Aggressivity
SAL16	0.3	Salinity and Aggressivity
SAL17	0.2	Salinity
SAL18	0.3	Salinity and Aggressivity
SAL19	0.3	Salinity and Aggressivity
SAL20	0.3	Salinity and Aggressivity
SAL21	0.2	Salinity
SAL22	0.2	Salinity and Aggressivity
SAL23	0.1	Salinity and Aggressivity
SAL24	0.1	Salinity and Aggressivity
SAL25	0.1	Salinity
SAL26	0.3	Salinity
SAL27	0.3	Salinity
SAL28	0.5	Salinity
SAL29	0.5	Salinity
SAL30	0.2	Salinity and Aggressivity
SAL31	0.2	Salinity
SAL32	0.2	Salinity and Aggressivity
SAL33	0.2	Salinity
SAL34	0.2	Salinity and Aggressivity
SAL35	0.1	Salinity
SAL36	0.1	Salinity and Aggressivity

Sample	Depth	Analysis
SAL37	0.1	Salinity and Aggressivity
SAL38	0.1	Salinity and Aggressivity
SAL39	0.2	Salinity
SAL40	0.1	Salinity and Aggressivity
SAL41	0.4	Salinity
SAL42	0.2	Salinity
SAL43	0.2	Salinity
SAL44	0.1	Salinity
SAL45	0.2	Salinity
SAL46	0.2	Salinity
SAL47	0.1	Salinity
SAL48	0.2	Salinity

Refer to **Figure 2** – Southern Site Layout and Sample Locations and **Figure 3** – Northern Site Layout and Sample Locations.

4.3 Groundwater Analytical Strategy

Three groundwater samples were analysed for the following parameters:

- pH/EC;
- Chloride;
- Sulphate;
- Ionic balance;
- Carbonates; and,
- Dissolved Cations (Potassium, Calcium, Magnesium, Sodium).

Table 5b – Sample Collection and Analysis

Sample	Location	Analysis
BH01	31 South St	pH/EC, choride, sulphate, ionic balance, carbonates, dissolved cations
BH02	4 Durham St	
BH03	46 Durham St	

4.4 Soil Assessment Criteria

The guidelines for the Salinity assessment are outlined in DLWC (2002) and Department of Conservation and Land Management (DCLM) '*A Guide for the Interpretation of Soil Test Results 1992*'. The number of samples and analysis are based upon the guidelines in the *Site Investigations for Urban Salinity* (DLWC, 2002) and *Western Sydney Salinity Code of Practice* (WSROC, 2003).

Refer to **Figure 2** –Southern Site Layout and Sampling Locations and **Figure 3** – Northern Site Layout and Sampling Locations.

4.4.1 Salinity

The criteria for assessing soil salinity is based on soil electrical conductivity (EC) and is shown in **Table 5b** below:

Table 5b – Electrical Conductivity Criteria for Soils

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

4.4.2 Sodicity

Sodic soils are dispersible and are vulnerable to erosion and tunnelling. Sodicity is measured by Exchangeable Sodium Percentage (ESP) and Cation Exchange Capacity (CEC). As soil salinity is a function of soil stability and structure, parameters such as CEC and ESP must be considered to provide a holistic understanding of potential degradation. Soil Sodicity and CEC criteria are listed in **Table 5c**.

Table 5c – Measure of Soil Sodicity and Cation Exchange Capacity

CLASS - ESP	RATING
<5	Non-sodic
5-15	Sodic
>15	Highly-sodic
CEC (cmol+/kg)	**RATING**

<6	Very Low
6-12	Low
13-25	Moderate
26-40	High
>40	Very High

4.4.3 Aggressivity

In addition to the above, the presence of sulphate, chloride and moderately acidic soils has the potential to cause high soil aggressivity to concrete and steel structures, particularly if the structures are in direct contact with the soil. The following sulphate measure of soil aggressivity is based on the criteria outlined in the Australian Standard, AS 2159-2009 *"Piling – Design and Installation" 2009* and are summarised in **Tables 5d** and **5e**.

Table 5d – Measure of Aggressivity to Concrete

Sulphate expressed as SO_3* (mg/kg)	pH	Low Permeability Soils/ All Soils above Groundwater
<5,000	>5.5	Non-Aggressive
5,000-10,000	4.5-5.5	Mild
10,000-20,000	4-4.5	Moderate
>20,000	<4	Severe

*Approximate 100mg/kg of SO_4 = 80mg/kg of SO_3

Table 5e – Measure of Aggressivity to Steel

Chlorides in Soil (mg/kg)	pH	Low Permeability Soils/ All Soils above Groundwater
<5,000	>5	Non-Aggressive
5,000-20,000	4-5	Mild
20,000-50,000	3-4	Moderate
>50,000	<3	Severe

4.5 Groundwater Assessment Criteria

Measurement of salinity in groundwater can be used to provide a reference for salinity, for a given point in time, and is useful to complement measurements of soil salinity. It should be noted large variations in groundwater salinity can occur in short time periods due to factors such as levels of water

through soil, time since rain, permeability and porosity of soil and the position sampled. Still waters would be expected to have higher salinity in comparison to flowing waters.

Salinity criteria which is available for freshwaters is based on criteria to assess waters as suitable for farming and irrigation (ANZECC 2000) and is listed in **Table 5f** to **Table 5h**.

Table 5f – Electrical Conductivity Criteria for Waters for Plant Salt Tolerance (ANZECC 2000)

Plant	Water salinity rating	Average root zone salinity (EC, dS/m)
Sensitive crops	Very low	<0.95
Moderately sensitive crops	Low	0.95-1.9
Moderately tolerant crops	Medium	1.9-4.5
Tolerant crops	High	4.5-7.7
Very tolerant crops	Very high	7.7-12.2
Too saline	extreme	>12.2

Table 5g – Chloride (mg/L) for Waters for Plant Salt Tolerance (ANZECC 2000)

Plant	Average root zone chloride (mg/L)
Sensitive crops	<175
Moderately sensitive crops	175-350
Moderately tolerant crops	350-700
Tolerant crops	700

Table 5h – Sodium (mg/L) for Waters for Plant Salt Tolerance (ANZECC 2000)

Plant	Average root zone chloride (mg/L)
Sensitive crops	<115
Moderately sensitive crops	115-230
Moderately tolerant crops	230-460
Tolerant crops	>460

5.0 RESULTS

5.1 Soils

The sampling regime for soils involved the collection of 68 representative samples from across the precinct, which were analysed for a combination of salinity, aggressivity and sodicity parameters. The sampling results were compared to the soil assessment criteria listed in **Section 4.3**. The results of the assessments conducted at the Site are summarised below.

5.1.1 Soil Salinity

Salinity parameters, including electrical conductivity (EC) and ECe are provided in **Table 6a**. The following results were found:

- 57 of the 68 samples were found to be non-saline, with negligible salinity effects;
- 8 of the 68 samples (B-TP1, B-TP2, E-TP4, G-TP3, 1m-31 south, 0.5-4 Durham, 0.5-46 Durham, SAL44) were found to be slightly saline, where yields of very sensitive crops may be affected;
- 4 of the 68 samples (A-TP2, 1.5-4 Durham, SAL22, SAL23) were found to be moderately saline, where yields of many crops may be affected.

Table 6a –Salinity Results

SAMPLE	TEXTURE	CLASS (BASED ON ECE CRITERIA)	EC (µS/CM)	ECE (DS/M)	COMMENT
A-TP1	Clay Loam	SLIGHTLY SALINE	150	<2	Yields of very sensitive crops may be affected
A-TP2	Clay Loam	MODERATELY SALINE	490	4	Salinity effects mostly negligible
B-TP1	Clay Loam	NON SALINE	280	3	Salinity effects mostly negligible
B-TP2	Light Clay	NON SALINE	440	4	Salinity effects mostly negligible
C-TP2	Light Medium Clay	NON SALINE	84	<2	Salinity effects mostly negligible
C-TP4	Light Medium Clay	NON SALINE	92	<2	Salinity effects mostly negligible
D-TP2	Light Clay	SLIGHTLY SALINE	180	2	Yields of very sensitive crops may be affected
D-TP4	Light Clay	NON SALINE	100	<2	Salinity effects mostly negligible
E-TP2	Clay Loam	NON SALINE	220	2	Salinity effects mostly negligible
E-TP4	Loam	NON SALINE	310	3	Salinity effects mostly negligible
F-TP1	Loam	SLIGHTLY SALINE	78	<2	Yields of very sensitive crops may be affected
F-TP2	Loam	SLIGHTLY SALINE	110	<2	Yields of very sensitive crops may be affected
G-TP1	Loam	NON SALINE	160	2	Salinity effects mostly negligible
G-TP2	Loam	MODERATELY SALINE	320	3	Yields of many crops may be affected
1M-31 SOUTH	Medium Clay	SLIGHTLY SALINE	330	2	Yields of very sensitive crops may be affected

SAMPLE	TEXTURE	CLASS (BASED ON ECE CRITERIA)	EC (µS/CM)	ECE (DS/M)	COMMENT
0.5-31 SOUTH	Loam	SLIGHTLY SALINE	64	<2	Yields of very sensitive crops may be affected
1.5-4 DURHAM	Light medium clay	NON SALINE	560	4	Salinity effects mostly negligible
0.5-4 DURHAM	Medium clay	SLIGHTLY SALINE	420	3	Yields of very sensitive crops may be affected
0.5-46 DURHAM	Light clay	NON SALINE	270	2	Salinity effects mostly negligible
0.2-46 DURHAM	Clay loam	NON SALINE	65	<2	Salinity effects mostly negligible
SAL1	Clay Loam	NON SALINE	52	<2	Salinity effects mostly negligible
SAL2	Clay Loam	NON SALINE	67	<2	Salinity effects mostly negligible
SAL3	Clay Loam	NON SALINE	200	2	Yields of very sensitive crops may be affected
SAL4	Clay Loam	NON SALINE	41	<2	Salinity effects mostly negligible
SAL5	Clay Loam	NON SALINE	42	<2	Salinity effects mostly negligible
SAL6	Clay Loam	NON SALINE	40	<2	Salinity effects mostly negligible
SAL7	Clay Loam	NON SALINE	41	<2	Salinity effects mostly negligible
SAL8	Clay Loam	NON SALINE	69	<2	Salinity effects mostly negligible
SAL9	Clay Loam	NON SALINE	93	<2	Salinity effects mostly negligible
SAL10	Light Medium Clay	NON SALINE	190	<2	Salinity effects mostly negligible
SAL11	Clay Loam	NON SALINE	23	<2	Salinity effects mostly negligible
SAL12	Clay Loam	NON SALINE	36	<2	Salinity effects mostly negligible
SAL13	Clay Loam	NON SALINE	130	<2	Salinity effects mostly negligible

SAMPLE	TEXTURE	CLASS (BASED ON ECE CRITERIA)	EC (µS/CM)	ECE (DS/M)	COMMENT
SAL14	Clay Loam	NON SALINE	92	<2	Salinity effects mostly negligible
SAL15	Clay Loam	NON SALINE	34	<2	Salinity effects mostly negligible
SAL16	Light Medium Clay	NON SALINE	37	<2	Salinity effects mostly negligible
SAL17	Clay Loam	NON SALINE	36	<2	Salinity effects mostly negligible
SAL18	Clay Loam	NON SALINE	32	<2	Salinity effects mostly negligible
SAL19	Clay Loam	NON SALINE	36	<2	Salinity effects mostly negligible
SAL20	Sandy Loam	NON SALINE	14	<2	Salinity effects mostly negligible
SAL21	Medium Clay	NON SALINE	110	<2	Salinity effects mostly negligible
SAL22	Clay Loam	MODERATELY SALINE	540	5	Yields of many crops may be affected
SAL23	Clay Loam	MODERATELY SALINE	480	4	Yields of many crops may be affected
SAL24	Clay Loam	NON SALINE	55	<2	Salinity effects mostly negligible
SAL25	Clay Loam	NON SALINE	42	<2	Salinity effects mostly negligible
SAL26	Clay Loam	NON SALINE	42	<2	Salinity effects mostly negligible
SAL27	Clay Loam	NON SALINE	98	<2	Salinity effects mostly negligible
SAL28	Medium Clay	NON SALINE	22	<2	Salinity effects mostly negligible
SAL29	Medium Clay	NON SALINE	20	<2	Salinity effects mostly negligible
SAL30	Clay Loam	NON SALINE	30	<2	Salinity effects mostly negligible

SAMPLE	TEXTURE	CLASS (BASED ON ECE CRITERIA)	EC (µS/CM)	ECE (DS/M)	COMMENT
SAL31	Sandy Loam	NON SALINE	17	<2	Salinity effects mostly negligible
SAL32	Sandy Loam	NON SALINE	34	<2	Salinity effects mostly negligible
SAL33	Sandy Loam	NON SALINE	24	<2	Salinity effects mostly negligible
SAL34	Clay Loam	NON SALINE	31	<2	Salinity effects mostly negligible
SAL35	Clay Loam	NON SALINE	64	<2	Salinity effects mostly negligible
SAL36	Clay Loam	NON SALINE	65	<2	Salinity effects mostly negligible
SAL37	Clay Loam	NON SALINE	52	<2	Salinity effects mostly negligible
SAL38	Clay Loam	NON SALINE	47	<2	Salinity effects mostly negligible
SAL39	Light Medium Clay	NON SALINE	120	<2	Salinity effects mostly negligible
SAL40	Clay Loam	NON SALINE	87	<2	Salinity effects mostly negligible
SAL41	Sandy Loam	NON SALINE	75	<2	Salinity effects mostly negligible
SAL42	Clay Loam	NON SALINE	44	<2	Salinity effects mostly negligible
SAL43	Sandy Loam	NON SALINE	120	2	Yields of very sensitive crops may be affected
SAL44	Sandy Loam	SLIGHTLY SALINE	150	2	Yields of very sensitive crops may be affected
SAL45	Sandy Loam	NON SALINE	110	2	Yields of very sensitive crops may be affected
SAL46	Clay Loam	NON SALINE	65	<2	Salinity effects mostly negligible
SAL47	Sandy Loam	NON SALINE	57	<2	Salinity effects mostly negligible
SAL48	Clay Loam	NON SALINE	51	<2	Salinity effects mostly negligible

SAMPLE		TEXTURE	CLASS (BASED ON ECE CRITERIA)	EC (µS/CM)	ECE (DS/M)	COMMENT
ECE (DS/M) CRITERIA	Non-Saline	-	-	-	<2	Salinity effects mostly negligible
	Slightly Saline	-	-	-	2-4	Yields of very sensitive crops may be affected
	Moderately Saline	-	-	-	4-8	Yields of many crops may be affected
	Very Saline	-	-	-	8-16	Only tolerant crops yield satisfactorily
	Highly Saline	-	-	-	>16	Only a few very tolerant crops yield satisfactorily

Refer to **Appendix B** – NATA Certified Analytical Results

5.1.2 Soil Aggressivity

The results for soil aggressivity are shown in **Table 6b**. All samples in the northern part were non-aggressive towards concrete and steel, with very low sulphate and chloride concentrations. In the southern part, all samples except C-TP2 and 1m-31 south were non-aggressive towards concrete and steel. C-TP2 was identified as mildly aggressive to concrete, due to a pH value below 5.5. Sample 1m-31 south was mildly aggressive to steel and concrete, due to a pH of 5.

Sample B-TP1, E-TP2 and SAL-22 were slightly alkaline with a pH of 8.2, 8.3 and 8, respectively. Samples C-TP2, F-TP1, 1m-31 south, 0.5-46 Durham, 0.2-46 Durham, SAL4, SAL11, SAL16, SAL18, SAL20 and SAL32 were slightly acidic with a pH of less than 6. All other samples were close to pH neutral (i.e. ranging between 6-8).

Table 6b – Results for Soil Aggressivity

SAMPLE	Sulphate (mg/kg)	Chloride (mg/kg)	pH	Aggressivity to concrete	Aggressivity to steel
A-TP1	20	160	6.8	Non-Aggressive	Non-Aggressive
A-TP2	20	760	6	Non-Aggressive	Non-Aggressive
B-TP1	100	290	8.2	Non-Aggressive	Non-Aggressive
B-TP2	72	650	7.8	Non-Aggressive	Non-Aggressive
C-TP2	110	ND	5.3	Mild	Non-Aggressive
C-TP4	61	45	6.8	Non-Aggressive	Non-Aggressive
D-TP2	52	53	6.5	Non-Aggressive	Non-Aggressive
D-TP4	20	21	6.2	Non-Aggressive	Non-Aggressive
E-TP2	38	75	8.3	Non-Aggressive	Non-Aggressive
E-TP4	70	23	7.1	Non-Aggressive	Non-Aggressive
F-TP1	54	10	5.6	Non-Aggressive	Non-Aggressive
F-TP2	29	20	6.4	Non-Aggressive	Non-Aggressive
G-TP1	77	37	6.4	Non-Aggressive	Non-Aggressive
G-TP2	160	140	7.1	Non-Aggressive	Non-Aggressive
1m-31 south	130	480	5	Mild	Mild
0.5-31 south	ND	ND	6.3	Non-Aggressive	Non-Aggressive
1.5-4 durham	71	730	6.4	Non-Aggressive	Non-Aggressive
0.5-4 durham	290	370	6.3	Non-Aggressive	Non-Aggressive

0.5-46 durham	110	120	5.6	Non-Aggressive	Non-Aggressive
0.2-46 durham	20	10	5.7	Non-Aggressive	Non-Aggressive
SAL1	20	<10	6.3	Non-Aggressive	Non-Aggressive
SAL3	36	190	6.4	Non-Aggressive	Non-Aggressive
SAL4	10	10	5.8	Non-Aggressive	Non-Aggressive
SAL5	10	20	6.4	Non-Aggressive	Non-Aggressive
SAL7	<10	<10	6.9	Non-Aggressive	Non-Aggressive
SAL8	<10	20	7.2	Non-Aggressive	Non-Aggressive
SAL9	20	<10	7.3	Non-Aggressive	Non-Aggressive
SAL11	<10	<10	5.9	Non-Aggressive	Non-Aggressive
SAL12	10	<10	6.3	Non-Aggressive	Non-Aggressive
SAL15	<10	<10	6.2	Non-Aggressive	Non-Aggressive
SAL16	<10	<10	5.7	Non-Aggressive	Non-Aggressive
SAL18	<10	10	5.6	Non-Aggressive	Non-Aggressive
SAL19	<10	<10	6.7	Non-Aggressive	Non-Aggressive
SAL20	<10	<10	5.9	Non-Aggressive	Non-Aggressive
SAL22	230	310	8	Non-Aggressive	Non-Aggressive
SAL23	220	75	7	Non-Aggressive	Non-Aggressive
SAL24	<10	20	6.6	Non-Aggressive	Non-Aggressive
SAL30	<10	<10	6.4	Non-Aggressive	Non-Aggressive
SAL32	<10	10	5.7	Non-Aggressive	Non-Aggressive
SAL34	<10	<10	6	Non-Aggressive	Non-Aggressive
SAL36	25	10	6.1	Non-Aggressive	Non-Aggressive
SAL37	<10	10	6.3	Non-Aggressive	Non-Aggressive
SAL38	20	10	6.9	Non-Aggressive	Non-Aggressive
SAL40	<10	<10	6.9	Non-Aggressive	Non-Aggressive
Criteria – Aggressivity to Concrete	**<5,000**	**-**	**>5.5**		**Non-aggressive**
	5,000-10,000	**-**	**4.5-5.5**		**Mild**
	10,000-20,000	**-**	**4-4.5**		**Moderate**
	>20,000	**-**	**<4**		**Severe**

Criteria – Aggressivity to Steel	**-**	**<5,000**	**>5**	**Non-aggressive**
	-	**5,000-20,000**	**4-5**	**Mild**
	-	**20,000-**	**3-4**	**Moderate**
	-	**>50,000**	**<3**	**Severe**

Refer to **Appendix B** – NATA Certified Analytical Results

5.1.3 Soil Sodicity

Sodicity parameters, including the Exchangeable Sodium Percentage (ESP) and Cation Exchange Capacity (CEC) of the southern soil samples are provided in **Table 6c**. The ESP of the soil samples ranged from non-sodic to highly sodic, with six samples in the sodic range (B-TP1, B-TP2, C-TP2, C-TP4, 1m - 31 south and 0.5 - 4 Durham) and two samples in the highly sodic range (1.5 - 4 Durham and 0.5 - 46 Durham). The CEC of the soil samples ranged from very low to moderate with 14 samples in the very low or low range. Six samples were in the moderate range (C-TP4, D-TP2, E-TP2, E-TP4, F-TP1 and F-TP2).

Table 6c – Results for Soil Sodicity and Cation Exchange Capacity

Sample	Depth (m)	Exchangeable Ca (meg/100g)	Exchangeable K (meg/100g)	Exchangeable Mg (meg/100g)	Exchangeable Na (meg/100g)	ESP (%)	CEC (meg/100g)	COMMENT
A-TP1	0.5	2.3	<0.1	0.96	<0.1	N/E	3.4	Non-sodic and very low CEC
A-TP2	0.3	1.8	<0.1	1.4	0.14	4	3.4	Non-sodic and very low CEC
B-TP1	0.4	2.9	<0.1	3.3	0.8	11	7	Sodic and low CEC
B-TP2	0.3	5.1	0.1	5.4	1.1	9	12	Sodic and low CEC.
C-TP2	0.5	0.7	0.2	7.9	1.3	13	10	Sodic and low CEC
C-TP4	1	8.1	0.3	9	0.99	5	18	Sodic and moderate CEC
D-TP2	0.4	15	0.3	3.6	0.18	<1	19	Non-sodic and moderate CEC
D-TP4	0.2	4.3	0.3	4.3	0.14	2	9.1	Non-sodic and low CEC
E-TP2	0.3	7.5	3.6	4.2	0.42	3	16	Non-sodic and moderate CEC
E-TP4	0.2	9.3	2.3	3.8	<0.1	<1	15	Non-sodic and moderate CEC
F-TP1	0.2	7.2	0.5	5.7	0.13	<1	14	Non-sodic and moderate CEC
F-TP2	3	11	0.7	5.2	<0.1	<1	17	Non-sodic and moderate CEC
G-TP1	0.2	5.3	0.4	2.8	<0.1	N/E	8.6	Non-sodic and low CEC.
G-TP3	0.2	9.3	0.4	2	<0.1	<1	12	Non-sodic and low CEC
1m - 31 south	1	0.3	0.3	7	1.5	16	9	Sodic and low CEC
0.5 - 31 south	0.5	5.1	0.2	1.4	<0.1	N/E	6.8	Non- sodic and low CEC
1.5 - 4 Durham	1.5	<0.1	<0.1	6.4	2.2	25	8.7	Highly sodic and low CEC
0.5 - 4 Durham	0.5	0.3	0.1	3.6	1.1	21	5.2	Sodic and very low CEC
0.5 - 46 Durham	0.5	0.4	0.1	5.6	1.5	20	7.7	Highly sodic and low CEC

Sample	Depth (m)	Exchangeable Ca (meg/100g)	Exchangeable K (meg/100g)	Exchangeable Mg (meg/100g)	Exchangeable Na (meg/100g)	ESP (%)	CEC (meg/100g)	COMMENT
0.2 - 46 Durham	0.2	3.6	0.7	4.9	0.25	3	9.4	Non- sodic and low CEC
ESP (%) Criteria	**Non-sodic**					**<5**		
	Sodic					**5-15**		
	Highly-sodic					**>15**		
CEC (cmol+/kg) Criteria	**Very low**						**<6**	
	Low						**6-12**	
	Moderate						**13-25**	
	High						**26-40**	
	Very high						**>40**	

Refer to **Appendix B** – NATA Certified Analytical Results

5.2 Groundwater Results

5.2.1 Groundwater Salinity

Salinity parameters measured in the three groundwater samples is shown in **Table 6d**.

The results for groundwater indicate that the salinity of the groundwater samples is high. There is no specific criteria for salinity in groundwater, instead the ANZECC (2000) criteria for irrigation waters was used as a guide. The following results were found:

- The three groundwater samples exceeded the criteria for sodium (Na) of >460 mg/L for irrigation waters for salt tolerant crops;
- The three groundwater samples exceeded the criteria for chloride of 700mg/L for irrigation waters for salt tolerant crops.; and
- Two samples exceeded the criteria for EC of >12.2 dS/m for irrigation waters that are too saline for crop growth. One sample fell within the criteria for EC of 4.5-7.7 dS/m for irrigation waters that are suitable for salt tolerant crops.

Table 6d – Results of Groundwater Salinity

SAMPLE		Dissolved Ions (mg/L)				Hydroxide Alkalinity (OH-) as CaCO3 (mg/L)	Bicarbonate Alkalinity as CaCO3 (mg/L)	Carbonate Alkalinity as CaCO3 (mg/L)	Total Alkalinity as CaCO3 (mg/L)	Sulphate, SO4 (mg/L)
		Ca	K	Na	Mg					
BH01		160	30	7100	1000	<5	570	<5	570	920
BH02		13	33	1400	130	<5	170	<5	170	170
BH03		10	11	5700	390	<5	130	<5	130	750
Criteria for Sodium (mg/L)	**Sensitive crops**			**<115**						
	Moderately sensitive crops			**115-230**						
	Moderately tolerant crops			**230-460**						
	Tolerant crops			**>460**						

Refer to **Appendix B** – NATA Certified Analytical Results

Table 6d (continued) – Results of Groundwater Salinity

SAMPLE			Chloride, Cl (mg/L)	Ionic Balance (%)	pH	Electrical Conductivity (ds/m)
BH01			8800	18	6.8	26
BH02			1600	18	6.4	5.1
BH03			6500	17	6.4	18
Criteria for EC (dS/m)	**Sensitive crops**	**Very low**				**<0.95**
	Moderately sensitive crops	**Low**				**0.95-1.9**
	Moderately tolerant crops	**Medium**				**1.9-4.5**
	Tolerant crops	**High**				**4.5-7.7**
	Very tolerant crops	**Very high**				**7.7-12.2**
	Too saline	**extreme**				**>12.2**
Criteria for Chloride (mg/L)	**Sensitive crops**		**<175**			
	Moderately sensitive crops		**175-350**			
	Moderately tolerant crops		**350-700**			
	Tolerant crops		**700**			

Refer to **Appendix B** – NATA Certified Analytical Results

6.0 DISCUSSION

This report has been completed to assess the present soil salinity, aggressivity and sodicity conditions within the West Schofields Precinct by reviewing available desktop information combined with field inspections and soil/groundwater sampling.

Overall the precinct consists of predominantly rural land with open paddocks, rural residential housing and remnant bushland vegetation. There are several properties which appear to have sheds and machinery present. Commercial enterprises located in the northern part include a public bar, car dealership, baking supplies dispatch yard, recycling facility, stock feed warehouses, scrap yards and numerous market gardens. There are two former landfills which are no longer in use but continue to be monitored for health and environmental risks. The majority of these sites were unable to be assessed due to access restrictions. The southern part includes a 78ha property occupied by the CSR Brick factory and associated former quarry areas.

The *Salinity Potential in Western Sydney* map (DIPNR, 2002) indicates the areas of the Site directly adjacent to Bells Creek and Eastern Creek are of high salinity potential. The remaining areas of the Site are indicated as of moderate salinity potential.

In total, 48 samples were analysed for salinity/aggressivity in the northern part from 18 properties and nine verges. From the southern part, 20 samples were analysed for salinity/aggressivity/sodicity parameters from eight properties. Sampling was performed on a systematic basis depending on property access permissions. Not all lots within the Site were able to be accessed at the time of assessment. It is considered the lots assessed are sufficient to determine salinity potential within the precinct.

There were no salinity indicators, such as bare soil patches, salt crystals at the surface or die back of trees, observed on any of the properties. Soil characteristics ranged from brown silty topsoils to orange clay. Salinity and aggressivity analysis of the 68 soil samples collected indicates that the majority of soils within the precinct are considered non-saline and non-aggressive to concrete and steel.

Salinity analysis showed two moderately saline results in the northern part. These samples were collected from surface soils of an active market garden, and as such are not considered to be representative of natural soils in the area and ongoing management is not required.
The southern part results showed seven slightly saline and two moderately saline samples, indicating potential salinity issues in this section of the Site. Sodicity results for the southern part showed that the ESP of the soil samples ranged from non-sodic to highly sodic, with six samples in the sodic range

(B-TP1, B-TP2, C-TP2, C-TP4, 1m - 31 south and 0.5 - 4 Durham) and two samples in the highly sodic range (1.5 - 4 Durham and 0.5 - 46 Durham).

The saline and sodic samples were located in areas that may potentially be rezoned as very low to low density residential and a playing field. Two moderately saline and two highly sodic samples were identified, which may affect the growth of certain plants. As the site is a future urban area, the localised effects of salinity and sodicity is not considered a significant issue.

The results for soil aggressivity found that all samples in the northern part were non-aggressive towards concrete and steel, with very low sulphate and chloride concentrations. In the southern part, all samples except C-TP2 and 1m-31 south were non-aggressive towards concrete and steel. C-TP2 was identified as mildly aggressive to concrete, due to a pH value below 5.5. Sample 1m-31 south was mildly aggressive to steel and concrete, due to a pH of 5. Ongoing management of these soils is not required, as they are only mildly aggressive to steel and/or concrete, which can be overcome through selection of suitable construction materials.

Groundwater results indicate that groundwater is relatively saline. There is no specific criteria for salinity in groundwater, instead the ANZECC (2000) criteria for irrigation waters was used as a guide. Exceedances were recorded for sodium, chloride and EC. These results should be viewed with caution as soil results are considered more suitable assessments of land salinity as groundwater can vary considerably in short time periods. Regional bores indicate groundwater levels to be approximately 9-10m below ground level.

As the intended land use for the Site includes rezoning from rural residential to a higher density residential and open space land use, no irrigation or effluent disposal is likely to take place on Site. DLA is therefore of the opinion that a Salinity Management Plan is not required for the precinct if the intended residential land use is implemented without development in the riparian zone of Bells Creek or Eastern Creek. The Draft Indicative Layout Plan (ILP) is therefore deemed suitable from a salinity and aggressivity perspective, as development zones appear to be within lower risk areas.

7.0 CONCLUSION

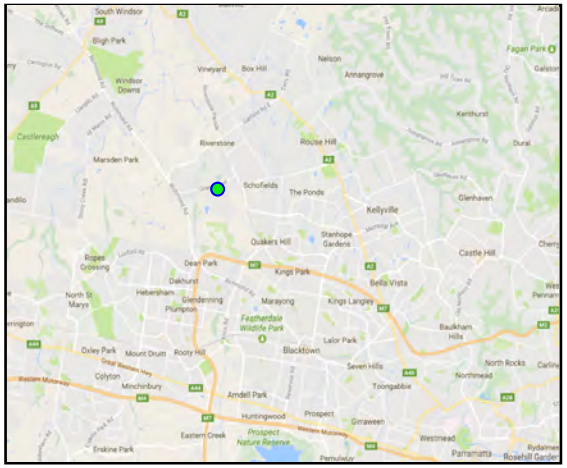
The sampling regime and subsequent assessment and reporting of the precinct are considered to be adequate for assessment purposes to determine the salinity and aggressivity conditions of soils in accordance with *Site Investigations for Urban Salinity* (DLWC, 2002).

It is therefore the opinion of DLA that the Site assessment objectives of this report have been achieved. The assessment of 68 soil samples concluded that the majority of soils within the precinct are non-saline and non-aggressive to concrete and steel. If the intended future land use of the Site is to be residential, without development in the riparian zone of Bells Creek or Eastern Creek, DLA are of the opinion a Salinity Management Plan is not required.

8.0 REFERENCES

- *AS 2159-2009 Piling – Design and Installation* (Australian Standards 2159-2009)
- *Guidelines to Accompany Map of Salinity Potential in Western Sydney (*Department of Land and Water Conservation, 2002);
- *Map of Salinity Potential in Western Sydney (*Department of Land and Water Conservation, 2002);
- *Site Investigation for Urban Salinity* (Department of Land and Water Conservation, 2002);

FIGURE 1 – SITE LOCATION



Locality Map

Legend

Site Boundary

Site Location

N
W E
S

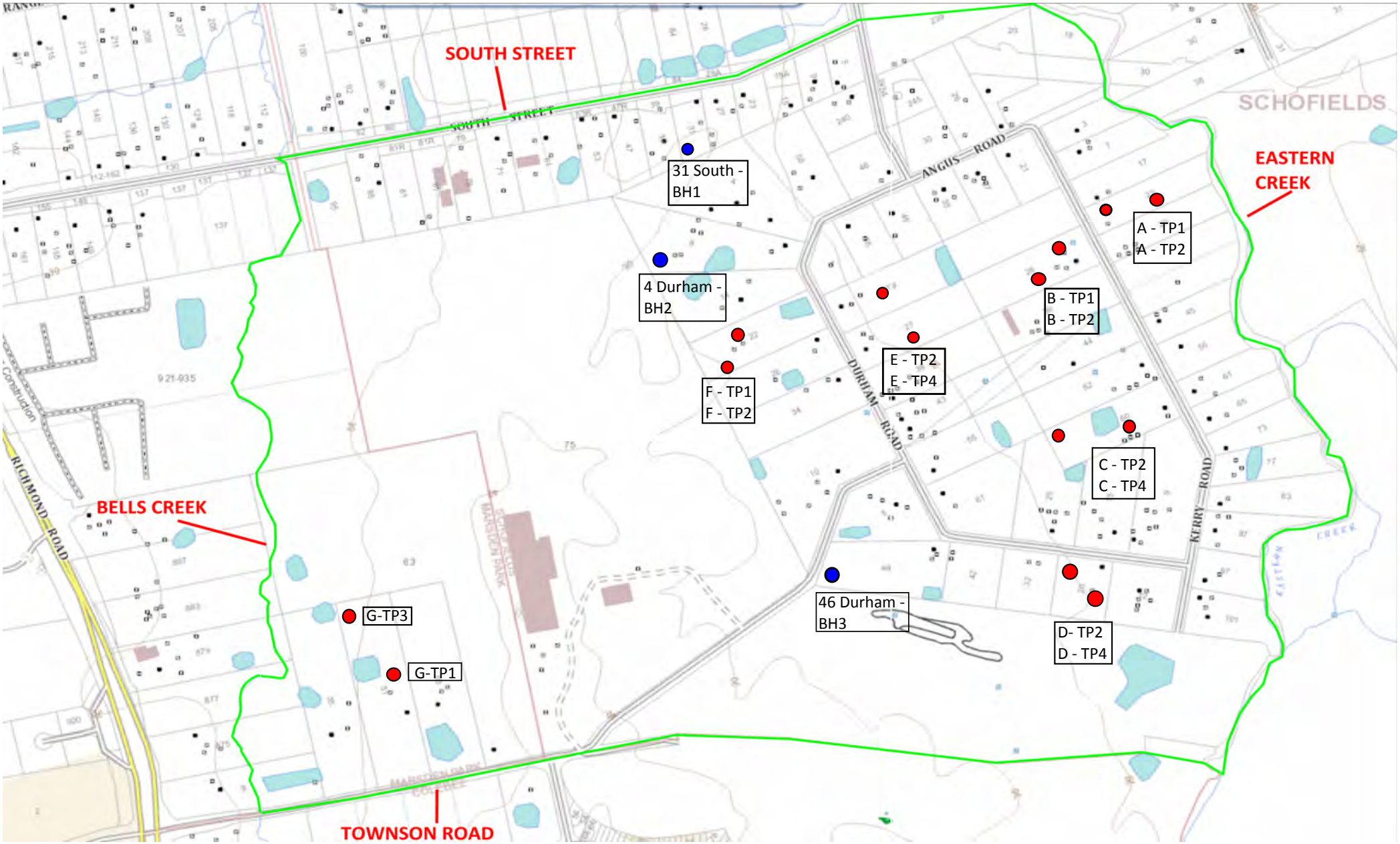
DLA Environmental Services
A Pacific Environment company

Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

Maitland Office
Phone (02) 4933 0001

Title: Site Location - West Schofields Precinct			
Site Address: Schofields/Riverstone	Project No.: DL4101	Figure No: 1	Date: 3/08/2017
Client: Department of Planning	Scale: Not to Scale	Compiled: AD	Revision: Version 1.0

FIGURE 2 – SOUTHERN SITE LAYOUT AND SAMPLING LOCATIONS



Legend

- Site Boundary
- Soil Sampling Location
- Soil / Groundwater Sampling Location

N

Approximate Scale

0m 100m 200m

DLA Environmental Services
A Pacific Environment company

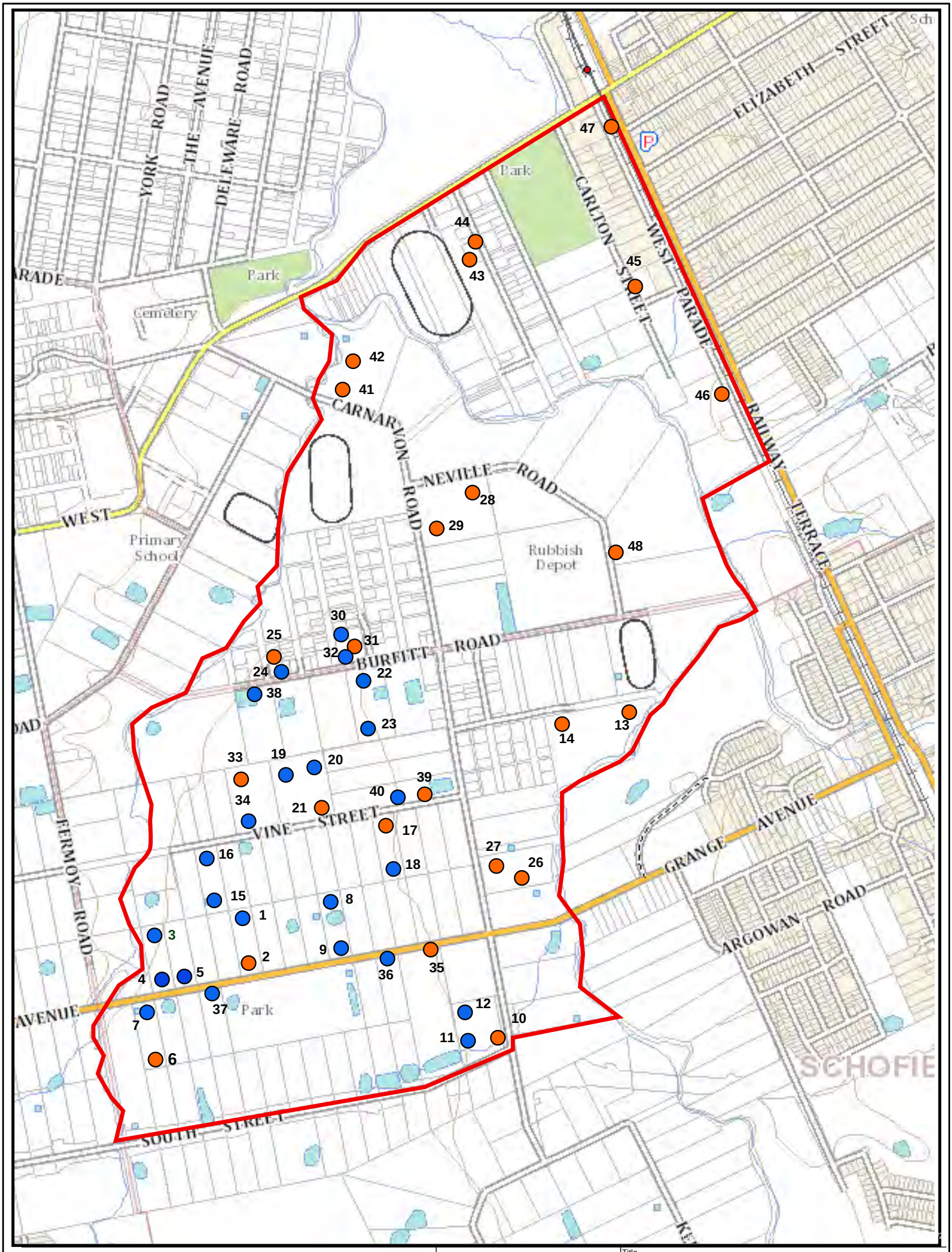
Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

Maitland Office
Phone (02) 4933 0001

Title: Site Layout and Sample Locations

Client	Project No.	Figure No	Date
Calibre Consulting	DL3788	2	20/07/2016
	Scale: As Shown	Compiled: JM	Revision: R00

FIGURE 3 – NORTHERN SITE LAYOUT AND SAMPLING LOCATIONS



Legend

- Site boundary
- Salinity Borehole Locations
- Salinity & Aggressivity Borehole Locations

N

Approximate Scale

0m 300m 600m

DLA Environmental Services
A Pacific Environment company

Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

Maitland Office
Phone (02) 4933 0001

Title			
Site Layout and Sampling Locations			
Client: Department of Planning	Figure No: Figure 2		Date: 7/06/2017
Project No.: DL4101	Scale: As Shown	Compiled: AD	Revision: R00

APPENDIX A – MAP OF SALINITY POTENTIAL IN WESTERN SYDNEY

Department of Infrastructure, Planning and Natural Resources

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES

SALINITY POTENTIAL IN WESTERN SYDNEY 2002

LOCALITY MAP

(SHOWING STUDY AREA AND LOCAL GOVERNMENT AREAS)

STUDY AREA

LOCAL GOVERNMENT AREA — CAMDEN

N

West Schofields Precinct - Northern Portion

SCALE

0 1 2 3 4 5 6 7 8 9 10 Kilometers

LEGEND

RIVER or CREEK

MOTORWAY or HIGHWAY

MAIN ROAD

WATERBODY, LAKE or SWAMP

LOCAL GOVERNMENT AREA — CAMDEN

MAPPING CATEGORY	ASSOCIATED SOIL LANDSCAPES	LANDFORM - GEOLOGY
KNOWN SALINITY Areas where there is a known occurrence of saline soil, or where air photo interpretation and field observations have confirmed more than one of these: a - scalding b - salt efflorescence c - vegetation dieback d - salt tolerant plant species e - waterlogging A high relative wetness index occurs in these areas.	* Salinity outbreaks occur in Blacktown (bt), Luddenham (lu) and Richmond (ri) Soil Landscapes - common at breaks of slope, lower slopes and drainage lines. * Berkshire Park (bp) and Upper Castlereagh (up) Soil Landscapes have localised salinity due to the impermeable nature of the clay parent material. * South Creek (sc), Monkey Creek (mk), Freemans Reach (fr) and Theresa Park (tp) Soil Landscapes have common saline outbreaks due to high run-on and low local relief. * Soils in the above landscapes have high clay content in subsoils and are imperfectly to poorly drained.	* Break of slope, lower slope and drainage lines of Wianamatta Shales (Rwb,Rwa and Rwn). * Localised salinity also occurs at the geological boundary between Tertiary Gravels (Tl, Tr) and underlaying Wianamatta Shales (Rwb,Rwa/ Quaternary Alluvials (Qpd, Qpa, Qpl, Qal). * Localised salinity occurs in Quaternary Alluvium (Qal, Qpn. Qpd) which underlies many of the drainage systems and wetland margins.
HIGH SALINITY POTENTIAL Areas where soil, geology, topography and groundwater conditions predispose a site to salinity. These conditions are similar to areas of known salinity (see above). These areas are most common in lower slopes and drainage systems where water accumulation is high (ie. high relative wetness index).	* Soil Landscapes include Birrong (bi), Blacktown (bt) Berkshire Park (bp), Freemans Reach (fr), South Creek(sc0, Theresa Park (tp), Richmond (ri) and Luddenham (lu). Drainage systems and convergent slopes are areas of highest risk. * Soils in these landscapes have high clay content in the subsoils, low permeability and high run-on. * Soil profiles may display signs of high salt concentrations at depth (i.e. >0.5m).	* Salinity is most likely to occur in lower slopes, foot-slopes, floodplains and creek lines on Quaternary Sediments (Qal, Qpn, Qpd, Qpc, Qpp, Qha)/Wianamatta Shales (Rwb, Rwn, Rwa) where run-on is high, resulting in seasonally high water tables and soil saturation.
MODERATE SALINITY POTENTIAL Areas on Wianamatta Group Shales and Tertiary Alluvial Terraces. Scattered areas of scalding and indicator vegetation have been noted but no concentrations have been mapped. Saline areas may occur in this zone, which have not yet been identified or may occur if risk factors change adversely.	* Areas of Agnes Banks (ab), Berkshire Park (bp), Blacktown (bt), Luddenham (lu) and Lucas Heights (lh). * Steeper areas with moderate to high local relief and well drained subsoils such as Picton (pn), West Pennant Hills (wp) and Gymea (gn) are at a lower risk of developing salinity. * Soils are moderate to well-drained due to their elevated position in the landscape.	* Hill-slopes and hill-crests on Wianamatta Shales (Rwb, Rwn , Rwa). * Raised abandoned alluvial terraces and drainage lines on Quaternary Alluvium (Qal, Qpn, Qpd, Qpc, Qpp) from Richmond to Camden and east to Rookwood. Localised areas of elevated, well-drained Tertiary Gravels (Ta, Tl, Tr).
VERY LOW SALINITY POTENTIAL Areas where salinity processes do not operate or are of minor significance. Soils are rapidly drained and underlaying strata (Hawkesbury/Narrabeen Sandstone) are highly permeable, resulting in continual flushing and removal of salts in the landscape. No salinity has been observed in these areas and is not expected to occur.	* Rapidly drained soil landscapes with shallow soils include Warragamba (wb) and Hawkesbury (ha). * Gymea (gy) and Faulconbridge (fb) Soil Landscapes consist of highly permeable sands with well-drained subsoils. * Soils are well to rapidly drained. * Soils have high sand content.	* Occurring on Hawkesbury and Narrabeen Sandstone (Rh, Rno). * Groundwater is relatively fresh in these areas due to the sandstone's elevated position in the landscape and highly permeable nature, resulting in continuous flushing of the system (removal of any accumulated salts).

DISCLAIMERS

The State of New South Wales and the Department of Infrastructure, Planning and Natural Resources and its' employees, agents or servants are not responsible for the result of any actions taken on the basis of the information contained on this map or for any errors, omissions or inaccuracies contained in this map. The State of New South Wales and its' employees, officers, agents or servants expressly disclaim all and any liability and responsibility to any person in respect of anything and of the consequences, of anything done or omitted to be done by any such person in reliance, whether wholly or partially upon the information contained on the map.

This map is an extension of the November 2000 study and all areas showing signs of salinity in August 2002 may not appear as red on this map. The area covered by the November 2000 map has been incorporated in this map, but not reassessed, and salinity is a dynamic process. Additionally, locating salinity using aerial photograph interpretation is difficult in established urban areas.

Map boundaries are valid at 1:100,000 scale and have been smoothed to accommodate uncertainties and anomalies. Boundaries should not be used at property scale and appropriate investigation should be undertaken on a site-specific basis. This Salinity Map is not a substitute for on site investigation. This map should also be used in conjunction with the document "Guidelines to Accompany Map of Salinity Potential for Western Sydney - 2002". Failure to do so may result in an inaccurate assessment of the potential for salinity hazard at a particular site.

PREPARED BY SYDNEY SOUTH COAST GIS PARRAMATTA

DATE OF MAP: MARCH 2003

ISBN 0 7347 5303 9

GS912

APPENDIX B – NATA CERTIFIED ANALYTICAL RESULTS

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envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 149577

Client:

DLA Environmental Services Pty Ltd
Unit 3, 38 Leighton Pl
Hornsby
NSW 2077

Attention: John Mansfield

Sample log in details:

Your Reference:	**DL3788, West Schofields Precinct**
No. of samples:	6 Soils
Date samples received / completed instructions received	05/07/16 / 05/07/16

This report supercedes (R00) due to amendment to the salinity results 0.5-31 south (149577-2) and 0.5-4 Durham (149577 -4). Salinity results have been switched between the above mentioned samples. Spoke to Matthew Junghans 20/07/2016 after hours.

This report replaces R01 due to the addition of pH testing.

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	12/07/16 / 26/07/16
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	149577-1	149577-2	149577-3	149577-4	149577-5
Your Reference	---------- -	1m - 31 south	0.5 - 31 south	1.5 - 4 Durham	0.5 - 4 Durham	0.5 - 46 Durham
Depth	----------	1m	0.5m	1.5m	0.5m	0.5m
Date Sampled		1/07/2016	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	07/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	87	92	105	93	93

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	149577-6
Your Reference	---------- -	0.2 - 46 Durham
Depth	----------	0.2m
Date Sampled		1/07/2016
Type of sample		Soil
Date extracted	-	06/07/2016
Date analysed	-	07/07/2016
TRHC$_6$ - C$_9$	mg/kg	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	88

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	149577-1	149577-2	149577-3	149577-4	149577-5
Your Reference	---------- -	1m - 31 south	0.5 - 31 south	1.5 - 4 Durham	0.5 - 4 Durham	0.5 - 46 Durham
Depth	----------	1m	0.5m	1.5m	0.5m	0.5m
Date Sampled		1/07/2016	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	07/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	92	96	100	73	85

svTRH (C10-C40) in Soil		
Our Reference:	UNITS	149577-6
Your Reference	---------- -	0.2 - 46 Durham
Depth	----------	0.2m
Date Sampled		1/07/2016
Type of sample		Soil
Date extracted	-	06/07/2016
Date analysed	-	07/07/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100
Surrogate o-Terphenyl	%	85

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	149577-1 1m - 31 south 1m 1/07/2016 Soil	149577-2 0.5 - 31 south 0.5m 1/07/2016 Soil	149577-3 1.5 - 4 Durham 1.5m 1/07/2016 Soil	149577-4 0.5 - 4 Durham 0.5m 1/07/2016 Soil	149577-5 0.5 - 46 Durham 0.5m 1/07/2016 Soil
Date extracted	-	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	104	99	110	111	104

PAHs in Soil		
Our Reference:	UNITS	149577-6
Your Reference	---------- -	0.2 - 46 Durham
Depth	----------	0.2m
Date Sampled		1/07/2016
Type of sample		Soil
Date extracted	-	06/07/2016
Date analysed	-	06/07/2016
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE
Surrogate p-Terphenyl-d14	%	106

Organochlorine Pesticides in soil				
Our Reference:	UNITS	149577-2	149577-4	149577-6
Your Reference	---------- -	0.5 - 31 south	0.5 - 4 Durham	0.2 - 46 Durham
Depth	----------	0.5m	0.5m	0.2m
Date Sampled		1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil
Date extracted	-	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	07/07/2016	07/07/2016	07/07/2016
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	92	96	94

Organophosphorus Pesticides Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	149577-2 0.5 - 31 south 0.5m 1/07/2016 Soil	149577-4 0.5 - 4 Durham 0.5m 1/07/2016 Soil	149577-6 0.2 - 46 Durham 0.2m 1/07/2016 Soil
Date extracted	-	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	07/07/2016	07/07/2016	07/07/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	92	96	94

PCBs in Soil				
Our Reference:	UNITS	149577-2	149577-4	149577-6
Your Reference	---------- -	0.5 - 31 south	0.5 - 4 Durham	0.2 - 46 Durham
Depth	----------	0.5m	0.5m	0.2m
Date Sampled		1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil
Date extracted	-	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	07/07/2016	07/07/2016	07/07/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	92	96	94

Acid Extractable metals in soil						
Our Reference:	UNITS	149577-1	149577-2	149577-3	149577-4	149577-5
Your Reference	---------- -	1m - 31 south	0.5 - 31 south	1.5 - 4 Durham	0.5 - 4 Durham	0.5 - 46 Durham
Depth	----------	1m	0.5m	1.5m	0.5m	0.5m
Date Sampled		1/07/2016	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Date analysed	-	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Arsenic	mg/kg	<4	6	<4	7	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	19	5	18	20
Copper	mg/kg	4	6	9	13	24
Lead	mg/kg	3	19	6	12	21
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	3	2	2	9
Zinc	mg/kg	3	47	7	31	37

Acid Extractable metals in soil		
Our Reference:	UNITS	149577-6
Your Reference	---------- -	0.2 - 46 Durham
Depth	----------	0.2m
Date Sampled		1/07/2016
Type of sample		Soil
Date prepared	-	06/07/2016
Date analysed	-	06/07/2016
Arsenic	mg/kg	6
Cadmium	mg/kg	<0.4
Chromium	mg/kg	14
Copper	mg/kg	18
Lead	mg/kg	21
Mercury	mg/kg	<0.1
Nickel	mg/kg	8
Zinc	mg/kg	38

Moisture						
Our Reference:	UNITS	149577-1	149577-2	149577-3	149577-4	149577-5
Your Reference	---------- -	1m - 31 south	0.5 - 31 south	1.5 - 4 Durham	0.5 - 4 Durham	0.5 - 46 Durham
Depth	----------	1m	0.5m	1.5m	0.5m	0.5m
Date Sampled		1/07/2016	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	6/07/2016	6/07/2016	6/07/2016	6/07/2016	6/07/2016
Date analysed	-	7/07/2016	7/07/2016	7/07/2016	7/07/2016	7/07/2016
Moisture	%	14	8.7	15	16	13

Moisture		
Our Reference:	UNITS	149577-6
Your Reference	---------- -	0.2 - 46 Durham
Depth	----------	0.2m
Date Sampled		1/07/2016
Type of sample		Soil
Date prepared	-	6/07/2016
Date analysed	-	7/07/2016
Moisture	%	20

Misc Inorg - Soil						
Our Reference:	UNITS	149577-1	149577-2	149577-3	149577-4	149577-5
Your Reference	---------- -	1m - 31 south	0.5 - 31 south	1.5 - 4 Durham	0.5 - 4 Durham	0.5 - 46 Durham
Depth	----------	1m	0.5m	1.5m	0.5m	0.5m
Date Sampled		1/07/2016	1/07/2016	1/07/2016	1/07/2016	1/07/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
Date analysed	-	07/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
Estimated Salinity*	mg/kg	1,100	220	1,900	1,400	900
pH 1:5 soil:water	pH Units	5.0	6.3	6.4	6.3	5.6

Misc Inorg - Soil		
Our Reference:	UNITS	149577-6
Your Reference	---------- -	0.2 - 46 Durham
Depth	----------	0.2m
Date Sampled		1/07/2016
Type of sample		Soil
Date prepared	-	07/07/2016
Date analysed	-	07/07/2016
Estimated Salinity*	mg/kg	220
pH 1:5 soil:water	pH Units	5.7

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
Inorg-034	Soil samples are extracted and measured using a conductivity cell and dedicated meter.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			07/07/2016	149577-6	07/07/2016 || 07/07/2016	LCS-3	07/07/2016
$TRHC_6$ - C_9	mg/kg	25	Org-016	<25	149577-6	<25 || <25	LCS-3	102%
$TRHC_6$ - C_{10}	mg/kg	25	Org-016	<25	149577-6	<25 || <25	LCS-3	102%
Benzene	mg/kg	0.2	Org-016	<0.2	149577-6	<0.2 || <0.2	LCS-3	95%
Toluene	mg/kg	0.5	Org-016	<0.5	149577-6	<0.5 || <0.5	LCS-3	105%
Ethylbenzene	mg/kg	1	Org-016	<1	149577-6	<1 || <1	LCS-3	105%
m+p-xylene	mg/kg	2	Org-016	<2	149577-6	<2 || <2	LCS-3	103%
o-Xylene	mg/kg	1	Org-016	<1	149577-6	<1 || <1	LCS-3	103%
naphthalene	mg/kg	1	Org-014	<1	149577-6	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	95	149577-6	88 || 87 || RPD: 1	LCS-3	96%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			06/07/2016	149577-6	07/07/2016 || 07/07/2016	LCS-3	06/07/2016
$TRHC_{10}$ - C_{14}	mg/kg	50	Org-003	<50	149577-6	<50 || <50	LCS-3	126%
$TRHC_{15}$ - C_{28}	mg/kg	100	Org-003	<100	149577-6	<100 || <100	LCS-3	118%
$TRHC_{29}$ - C_{36}	mg/kg	100	Org-003	<100	149577-6	<100 || <100	LCS-3	123%
$TRH>C_{10}$-C_{16}	mg/kg	50	Org-003	<50	149577-6	<50 || <50	LCS-3	126%
$TRH>C_{16}$-C_{34}	mg/kg	100	Org-003	<100	149577-6	<100 || <100	LCS-3	118%
$TRH>C_{34}$-C_{40}	mg/kg	100	Org-003	<100	149577-6	<100 || <100	LCS-3	123%
Surrogate o-Terphenyl	%		Org-003	102	149577-6	85 || 84 || RPD: 1	LCS-3	119%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Naphthalene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	LCS-3	86%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	LCS-3	92%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	LCS-3	117%
Anthracene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	LCS-3	104%
Pyrene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	LCS-3	97%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	LCS-3	94%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	149577-6	<0.2 || <0.2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	149577-6	<0.05 || <0.05	LCS-3	79%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	88	149577-6	106 || 109 || RPD: 3	LCS-3	114%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			07/07/2016	149577-6	07/07/2016 || 07/07/2016	LCS-3	07/07/2016
HCB	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	90%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	102%
Heptachlor	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	89%
delta-BHC	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	99%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	103%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	108%
Dieldrin	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	105%
Endrin	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	110%
pp-DDD	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	97%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	LCS-3	63%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	94	149577-6	94 || 95 || RPD: 1	LCS-3	108%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			07/07/2016	149577-6	07/07/2016 || 07/07/2016	LCS-3	07/07/2016
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	90%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	100%
Dimethoate	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	102%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	87%
Malathion	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	93%
Parathion	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	97%
Ronnel	mg/kg	0.1	Org-008	<0.1	149577-6	<0.1 || <0.1	LCS-3	92%
Surrogate TCMX	%		Org-008	94	149577-6	94 || 95 || RPD: 1	LCS-3	93%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			07/07/2016	149577-6	07/07/2016 || 07/07/2016	LCS-3	07/07/2016
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	LCS-3	103%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	149577-6	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	94	149577-6	94 || 95 || RPD: 1	LCS-3	93%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Date analysed	-			06/07/2016	149577-6	06/07/2016 || 06/07/2016	LCS-3	06/07/2016
Arsenic	mg/kg	4	Metals-020	<4	149577-6	6 || 6 || RPD: 0	LCS-3	111%
Cadmium	mg/kg	0.4	Metals-020	<0.4	149577-6	<0.4 || <0.4	LCS-3	107%
Chromium	mg/kg	1	Metals-020	<1	149577-6	14 || 14 || RPD: 0	LCS-3	110%
Copper	mg/kg	1	Metals-020	<1	149577-6	18 || 17 || RPD: 6	LCS-3	110%
Lead	mg/kg	1	Metals-020	<1	149577-6	21 || 22 || RPD: 5	LCS-3	107%
Mercury	mg/kg	0.1	Metals-021	<0.1	149577-6	<0.1 || <0.1	LCS-3	95%
Nickel	mg/kg	1	Metals-020	<1	149577-6	8 || 8 || RPD: 0	LCS-3	102%
Zinc	mg/kg	1	Metals-020	<1	149577-6	38 || 33 || RPD: 14	LCS-3	106%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD
Date prepared	-			07/07/2016	149577-1	07/07/2016 || 07/07/2016
Date analysed	-			07/07/2016	149577-1	07/07/2016 || 07/07/2016
Estimated Salinity*	mg/kg	5	Inorg-034	<5	149577-1	1100 || 1100 || RPD: 0
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	149577-1	5.0 || 5.0 || RPD: 0

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Combo1=TRH/BTEX/Pb
Combo2=TRH/BTEX/PAH/Pb
Combo3=TRH/BTEX/PAH/Met
Combo4=TRH/BTEX/PAH/Met/Phen
Combo5=TRH/BTEX/PAH/OC/PCB/Met
Combo6=TRH/BTEX/PAH/OC/OP/PCB/Met
Combo7=TRH/BTEX/PAH/OC/PCB/Met/Phen
Combo8=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen
Combo9=TRH/BTEX/PAH/OC/PCB/Met/Phen/CN
Combo10=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen/CN
Combo11=TRH/BTEX/PAH/OC/PCB/12met/Phen/CN
Combo12=TRH/BTEX/PAH/OC/PCB/Met/TCLP-PAH ,6 Met
Combo13=TRH/BTEX/PAH/OC/OP/PCB/Met/TCLP-PAH ,6Met

A Combo with an `A' indicates Asbestos is also needed.

Client: DLA	**Client Project Name / Number / Site etc (ie report title):** 3788 West Schofields Precinct
Contact Person: ~~Sam~~ John Mansfield	**PO No.:**
Project Mgr: " "	**Envirolab Quote No. :**
Sampler: Sam Butler	**Date results required:**
Address: Unit 3/38 Leighton Place, Hornsby	**Or choose:** standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: **Mob:**	**Report format:** esdat / equis /
Email: sydney@dlaenvironmental.com.au	**Lab Comments:**

Sample information					Tests Required															Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Combo3	Combo6	Salinity													Provide as much information about the sample as you can
1	1m ~~Bore~~ -31 south	1m	1/7/16		X		X													
2	0.5 -31 south	0.5m				X	X													
3	1.5 - 4 Durham	1.5m			X		X													
4	0.5 - 4 Durham	0.5m				X	X													
5	0.5 - 46 Durham	0.5m			X		X													
6	0.2 - 46 Durham	0.2m				X	X													

ENVIROLAB GROUP
~~Envirolab Services~~
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 149577
Date Received: 05/07/16
Time Received: 13:00
Received by: HL
Temp: Cool/Ambient
~~Cooling: Ice/Icepack~~
~~Security: Intact/Broken/None~~

Relinquished by (Company):	DLA	**Received by (Company):**	ELS
Print Name:	Sam Butler	**Print Name:**	HINDO
Date & Time:	5/7/16	**Date & Time:**	05/07/16 13:00
Signature:		**Signature:**	

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: **(if applicable)**
~~Transported by:~~ Hand delivered / courier

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Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 147388

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Jon Mansfield, S Challinor

Sample log in details:

Your Reference:	**DL3788 West Schofields**		
No. of samples:	19 soils		
Date samples received / completed instructions received	26/05/16	/	26/05/16

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	2/06/16	/	1/06/16
Date of Preliminary Report:	Not Issued		

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Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-5
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	C-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.5
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	100	98	98	102	98

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	147388-6	147388-7	147388-8	147388-9	147388-10
Your Reference	---------- -	C-TP4	D-TP2	D-TP4	E-TP2	E-TP4
Depth	----------	1.0	0.4	0.2	0.3	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	99	100	99	99

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	147388-11	147388-12	147388-13	147388-14	147388-15
Your Reference	---------- -	F-TP1	F-TP2	G-TP1	G-TP1A	G-TP3
Depth	----------	0.2	03	0.2	0.2	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	97	99	96	99	99

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	147388-16
Your Reference	---------- -	G-TP3A
Depth	----------	0.2
Date Sampled		24/05/2016
Type of sample		soil
Date extracted	-	26/05/2016
Date analysed	-	27/05/2016
TRHC$_6$ - C$_9$	mg/kg	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	100

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-5
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	C-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.5
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	29/05/2016	29/05/2016	29/05/2016	29/05/2016	29/05/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	79	80	81	78	81

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	147388-6	147388-7	147388-8	147388-9	147388-10
Your Reference	---------- -	C-TP4	D-TP2	D-TP4	E-TP2	E-TP4
Depth	----------	1.0	0.4	0.2	0.3	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	29/05/2016	29/05/2016	29/05/2016	29/05/2016	29/05/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	79	107	82	79	80

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	147388-11	147388-12	147388-13	147388-14	147388-15
Your Reference	---------- -	F-TP1	F-TP2	G-TP1	G-TP1A	G-TP3
Depth	----------	0.2	03	0.2	0.2	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	29/05/2016	29/05/2016	29/05/2016	29/05/2016	29/05/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	160	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	420	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	480	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	230	<100	<100	<100
Surrogate o-Terphenyl	%	83	85	83	83	87

svTRH (C10-C40) in Soil		
Our Reference:	UNITS	147388-16
Your Reference	---------- -	G-TP3A
Depth	----------	0.2
Date Sampled		24/05/2016
Type of sample		soil
Date extracted	-	26/05/2016
Date analysed	-	29/05/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100
Surrogate o-Terphenyl	%	86

PAHs in Soil Our Reference: Your Reference	UNITS ----------	147388-1 A-TP1	147388-2 A-TP2	147388-3 B-TP1	147388-4 B-TP2	147388-5 C-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.5
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	106	104	105	107	112

PAHs in Soil Our Reference: Your Reference	UNITS ----------	147388-6 C-TP4	147388-7 D-TP2	147388-8 D-TP4	147388-9 E-TP2	147388-10 E-TP4
Depth	----------	1.0	0.4	0.2	0.3	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.7	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.52	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	0.7	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.7	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.8	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	3.7	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	101	115	112	112	110

PAHs in Soil Our Reference: Your Reference	UNITS ----------	147388-11 F-TP1	147388-12 F-TP2	147388-13 G-TP1	147388-14 G-TP1A	147388-15 G-TP3
Depth	----------	0.2	03	0.2	0.2	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.1	0.6	0.6
Pyrene	mg/kg	<0.1	<0.1	0.2	0.7	0.6
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.3	0.3
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.3	0.2
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.3	0.6	0.5
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.2	0.4	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.1	0.2	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.2	0.3	0.3
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	0.6	0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	1.1	3.5	3.3
Surrogate p-Terphenyl-d14	%	111	113	117	119	116

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	147388-16 G-TP3A 0.2 24/05/2016 soil	147388-17 G-TP3-BITUMEN - 24/05/2016 soil
Date extracted	-	26/05/2016	26/05/2016
Date analysed	-	26/05/2016	26/05/2016
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.5	<0.1
Pyrene	mg/kg	0.5	<0.1
Benzo(a)anthracene	mg/kg	0.2	<0.1
Chrysene	mg/kg	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.5	<0.2
Benzo(a)pyrene	mg/kg	0.3	0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	<0.5
Total Positive PAHs	mg/kg	2.8	0.05
Surrogate p-Terphenyl-d14	%	118	117

Organochlorine Pesticides in soil						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-7
Your Reference	----------	A-TP1	A-TP2	B-TP1	B-TP2	D-TP2
	-					
Depth	----------	0.5	0.3	0.4	0.3	0.4
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	28/05/2016	28/05/2016	28/05/2016	28/05/2016	28/05/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	84	86	88	86

Organochlorine Pesticides in soil						
Our Reference:	UNITS	147388-8	147388-9	147388-10	147388-11	147388-12
Your Reference	----------	D-TP4	E-TP2	E-TP4	F-TP1	F-TP2
	-					
Depth	----------	0.2	0.3	0.2	0.2	03
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	28/05/2016	28/05/2016	28/05/2016	28/05/2016	28/05/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	86	82	86	88

Organophosphorus Pesticides						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-7
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	D-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.4
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	28/05/2016	28/05/2016	28/05/2016	28/05/2016	28/05/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	84	86	88	86

Organophosphorus Pesticides						
Our Reference:	UNITS	147388-8	147388-9	147388-10	147388-11	147388-12
Your Reference	---------- -	D-TP4	E-TP2	E-TP4	F-TP1	F-TP2
Depth	----------	0.2	0.3	0.2	0.2	03
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	28/05/2016	28/05/2016	28/05/2016	28/05/2016	28/05/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	86	82	86	88

PCBs in Soil						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-7
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	D-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.4
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	28/05/2016	28/05/2016	28/05/2016	28/05/2016	28/05/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	84	86	88	86

PCBs in Soil						
Our Reference:	UNITS	147388-8	147388-9	147388-10	147388-11	147388-12
Your Reference	---------- -	D-TP4	E-TP2	E-TP4	F-TP1	F-TP2
Depth	----------	0.2	0.3	0.2	0.2	03
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	28/05/2016	28/05/2016	28/05/2016	28/05/2016	28/05/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	86	86	82	86	88

Acid Extractable metals in soil						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-5
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	C-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.5
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
Arsenic	mg/kg	<4	<4	<4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	8	8	11	11	20
Copper	mg/kg	6	4	10	17	8
Lead	mg/kg	13	10	13	16	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	3	5	9	3
Zinc	mg/kg	19	6	9	13	8

Acid Extractable metals in soil						
Our Reference:	UNITS	147388-6	147388-7	147388-8	147388-9	147388-10
Your Reference	---------- -	C-TP4	D-TP2	D-TP4	E-TP2	E-TP4
Depth	----------	1.0	0.4	0.2	0.3	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
Arsenic	mg/kg	4	6	5	13	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	1	<0.4
Chromium	mg/kg	16	18	13	31	15
Copper	mg/kg	13	15	10	27	19
Lead	mg/kg	13	54	24	44	22
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	9	5	8	6
Zinc	mg/kg	10	52	28	150	98

Acid Extractable metals in soil						
Our Reference:	UNITS	147388-11	147388-12	147388-13	147388-14	147388-15
Your Reference	---------- -	F-TP1	F-TP2	G-TP1	G-TP1A	G-TP3
Depth	----------	0.2	03	0.2	0.2	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
Arsenic	mg/kg	10	10	6	6	6
Cadmium	mg/kg	0.5	2	<0.4	<0.4	<0.4
Chromium	mg/kg	25	23	19	23	18
Copper	mg/kg	16	39	10	8	31
Lead	mg/kg	29	120	19	18	24
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	10	6	6	13
Zinc	mg/kg	64	220	34	23	140

Acid Extractable metals in soil		
Our Reference:	UNITS	147388-16
Your Reference	---------- -	G-TP3A
Depth	----------	0.2
Date Sampled		24/05/2016
Type of sample		soil
Date prepared	-	26/05/2016
Date analysed	-	27/05/2016
Arsenic	mg/kg	7
Cadmium	mg/kg	<0.4
Chromium	mg/kg	21
Copper	mg/kg	34
Lead	mg/kg	24
Mercury	mg/kg	<0.1
Nickel	mg/kg	13
Zinc	mg/kg	140

Misc Inorg - Soil						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-5
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	C-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.5
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	30/05/2016	30/05/2016	30/05/2016	30/05/2016	30/05/2016
Date analysed	-	30/05/2016	30/05/2016	30/05/2016	30/05/2016	30/05/2016
pH 1:5 soil:water	pH Units	6.8	6.0	8.2	7.8	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	150	490	280	440	84
Chloride, Cl 1:5 soil:water	mg/kg	160	760	290	650	<10
Sulphate, SO4 1:5 soil:water	mg/kg	20	20	100	72	110
Estimated Salinity*	mg/kg	520	1,700	960	1,500	280

Misc Inorg - Soil						
Our Reference:	UNITS	147388-6	147388-7	147388-8	147388-9	147388-10
Your Reference	---------- -	C-TP4	D-TP2	D-TP4	E-TP2	E-TP4
Depth	----------	1.0	0.4	0.2	0.3	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	30/05/2016	30/05/2016	30/05/2016	30/05/2016	30/05/2016
Date analysed	-	30/05/2016	30/05/2016	30/05/2016	30/05/2016	30/05/2016
pH 1:5 soil:water	pH Units	6.8	6.5	6.2	8.3	7.1
Electrical Conductivity 1:5 soil:water	µS/cm	92	180	100	220	310
Chloride, Cl 1:5 soil:water	mg/kg	45	53	21	75	23
Sulphate, SO4 1:5 soil:water	mg/kg	61	52	20	38	70
Estimated Salinity*	mg/kg	310	620	340	740	1,000

Misc Inorg - Soil					
Our Reference:	UNITS	147388-11	147388-12	147388-13	147388-15
Your Reference	---------- -	F-TP1	F-TP2	G-TP1	G-TP3
Depth	----------	0.2	03	0.2	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil
Date prepared	-	30/05/2016	30/05/2016	30/05/2016	30/05/2016
Date analysed	-	30/05/2016	30/05/2016	30/05/2016	30/05/2016
pH 1:5 soil:water	pH Units	5.6	6.4	6.4	7.1
Electrical Conductivity 1:5 soil:water	µS/cm	78	110	160	320
Chloride, Cl 1:5 soil:water	mg/kg	10	20	37	140
Sulphate, SO4 1:5 soil:water	mg/kg	54	29	77	160
Estimated Salinity*	mg/kg	260	390	540	1,100

Moisture						
Our Reference:	UNITS	147388-1	147388-2	147388-3	147388-4	147388-5
Your Reference	---------- -	A-TP1	A-TP2	B-TP1	B-TP2	C-TP2
Depth	----------	0.5	0.3	0.4	0.3	0.5
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
Moisture	%	8.9	9.0	10	13	18

Moisture						
Our Reference:	UNITS	147388-6	147388-7	147388-8	147388-9	147388-10
Your Reference	---------- -	C-TP4	D-TP2	D-TP4	E-TP2	E-TP4
Depth	----------	1.0	0.4	0.2	0.3	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
Moisture	%	19	8.4	8.7	20	12

Moisture						
Our Reference:	UNITS	147388-11	147388-12	147388-13	147388-14	147388-15
Your Reference	---------- -	F-TP1	F-TP2	G-TP1	G-TP1A	G-TP3
Depth	----------	0.2	03	0.2	0.2	0.2
Date Sampled		24/05/2016	24/05/2016	24/05/2016	24/05/2016	24/05/2016
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	26/05/2016	26/05/2016	26/05/2016	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016	27/05/2016	27/05/2016	27/05/2016
Moisture	%	12	10	6.0	8.0	5.1

Moisture			
Our Reference:	UNITS	147388-16	147388-17
Your Reference	---------- -	G-TP3A	G-TP3-BITUMEN
Depth	----------	0.2	-
Date Sampled		24/05/2016	24/05/2016
Type of sample		soil	soil
Date prepared	-	26/05/2016	26/05/2016
Date analysed	-	27/05/2016	27/05/2016
Moisture	%	5.2	0.9

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.
Inorg-034	Soil samples are extracted and measured using a conductivity cell and dedicated meter.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-8	26/05/2016
Date analysed	-			27/05/2016	147388-1	27/05/2016 || 27/05/2016	LCS-8	27/05/2016
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	147388-1	<25 || <25	LCS-8	108%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	147388-1	<25 || <25	LCS-8	108%
Benzene	mg/kg	0.2	Org-016	<0.2	147388-1	<0.2 || <0.2	LCS-8	97%
Toluene	mg/kg	0.5	Org-016	<0.5	147388-1	<0.5 || <0.5	LCS-8	103%
Ethylbenzene	mg/kg	1	Org-016	<1	147388-1	<1 || <1	LCS-8	111%
m+p-xylene	mg/kg	2	Org-016	<2	147388-1	<2 || <2	LCS-8	115%
o-Xylene	mg/kg	1	Org-016	<1	147388-1	<1 || <1	LCS-8	110%
naphthalene	mg/kg	1	Org-014	<1	147388-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	102	147388-1	100 || 98 || RPD: 2	LCS-8	104%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-8	26/05/2016
Date analysed	-			29/05/2016	147388-1	29/05/2016 || 29/05/2016	LCS-8	29/05/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	147388-1	<50 || <50	LCS-8	111%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	147388-1	<100 || <100	LCS-8	107%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	147388-1	<100 || <100	LCS-8	122%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	147388-1	<50 || <50	LCS-8	111%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	147388-1	<100 || <100	LCS-8	107%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	147388-1	<100 || <100	LCS-8	122%
Surrogate o-Terphenyl	%		Org-003	80	147388-1	79 || 79 || RPD: 0	LCS-8	74%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-7	26/05/2016
Date analysed	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-7	26/05/2016
Naphthalene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	LCS-7	104%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	LCS-7	105%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	LCS-7	111%
Anthracene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	LCS-7	110%
Pyrene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	LCS-7	117%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	LCS-7	84%
Benzo(b,j +k)fluoranthene	mg/kg	0.2	Org-012	<0.2	147388-1	<0.2 || <0.2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	147388-1	<0.05 || <0.05	LCS-7	113%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	114	147388-1	106 || 106 || RPD: 0	LCS-7	111%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-7	26/05/2016
Date analysed	-			28/05/2016	147388-1	28/05/2016 || 28/05/2016	LCS-7	28/05/2016
HCB	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	101%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	99%
Heptachlor	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	91%
delta-BHC	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	104%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	106%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	106%
Dieldrin	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	108%
Endrin	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	115%
pp-DDD	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	102%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	LCS-7	76%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	83	147388-1	84 || 86 || RPD: 2	LCS-7	101%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-7	26/05/2016
Date analysed	-			28/05/2016	147388-1	28/05/2016 || 28/05/2016	LCS-7	28/05/2016
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	99%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	105%
Dimethoate	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	93%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	91%
Malathion	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	100%
Parathion	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	93%
Ronnel	mg/kg	0.1	Org-008	<0.1	147388-1	<0.1 || <0.1	LCS-7	97%
Surrogate TCMX	%		Org-008	83	147388-1	84 || 86 || RPD: 2	LCS-7	85%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-7	26/05/2016
Date analysed	-			28/05/2016	147388-1	28/05/2016 || 28/05/2016	LCS-7	28/05/2016
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	LCS-7	111%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	147388-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	83	147388-1	84 || 86 || RPD: 2	LCS-7	85%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			26/05/2016	147388-1	26/05/2016 || 26/05/2016	LCS-8	26/05/2016
Date analysed	-			27/05/2016	147388-1	27/05/2016 || 27/05/2016	LCS-8	27/05/2016
Arsenic	mg/kg	4	Metals-020	<4	147388-1	<4 || <4	LCS-8	104%
Cadmium	mg/kg	0.4	Metals-020	<0.4	147388-1	<0.4 || <0.4	LCS-8	100%
Chromium	mg/kg	1	Metals-020	<1	147388-1	8 || 8 || RPD: 0	LCS-8	102%
Copper	mg/kg	1	Metals-020	<1	147388-1	6 || 6 || RPD: 0	LCS-8	101%
Lead	mg/kg	1	Metals-020	<1	147388-1	13 || 12 || RPD: 8	LCS-8	97%
Mercury	mg/kg	0.1	Metals-021	<0.1	147388-1	<0.1 || <0.1	LCS-8	84%
Nickel	mg/kg	1	Metals-020	<1	147388-1	3 || 3 || RPD: 0	LCS-8	97%
Zinc	mg/kg	1	Metals-020	<1	147388-1	19 || 17 || RPD: 11	LCS-8	99%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			30/05/2016	147388-1	30/05/2016 || 30/05/2016	LCS-1	30/05/2016
Date analysed	-			30/05/2016	147388-1	30/05/2016 || 30/05/2016	LCS-1	30/05/2016
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	147388-1	6.8 || 6.8 || RPD: 0	LCS-1	101%
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	147388-1	150 || 180 || RPD: 18	LCS-1	96%
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	147388-1	160 || 210 || RPD: 27	LCS-1	97%
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	147388-1	20 || 25 || RPD: 22	LCS-1	107%
Estimated Salinity*	mg/kg	5	Inorg-034	<5	147388-1	520 || 620 || RPD: 18	[NR]	[NR]

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	27/05/2016 || 27/05/2016	147388-2	27/05/2016
TRHC6 - C9	mg/kg	147388-11	<25 || <25	147388-2	101%
TRHC6 - C10	mg/kg	147388-11	<25 || <25	147388-2	101%
Benzene	mg/kg	147388-11	<0.2 || <0.2	147388-2	90%
Toluene	mg/kg	147388-11	<0.5 || <0.5	147388-2	97%
Ethylbenzene	mg/kg	147388-11	<1 || <1	147388-2	103%
m+p-xylene	mg/kg	147388-11	<2 || <2	147388-2	107%
o-Xylene	mg/kg	147388-11	<1 || <1	147388-2	104%
naphthalene	mg/kg	147388-11	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	147388-11	97 || 100 || RPD: 3	147388-2	99%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	29/05/2016 || 29/05/2016	147388-2	29/05/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	147388-11	<50 || <50	147388-2	114%
TRHC$_{15}$ - C$_{28}$	mg/kg	147388-11	<100 || <100	147388-2	115%
TRHC$_{29}$ - C$_{36}$	mg/kg	147388-11	<100 || <100	147388-2	86%
TRH>C$_{10}$-C$_{16}$	mg/kg	147388-11	<50 || <50	147388-2	114%
TRH>C$_{16}$-C$_{34}$	mg/kg	147388-11	<100 || <100	147388-2	115%
TRH>C$_{34}$-C$_{40}$	mg/kg	147388-11	<100 || <100	147388-2	86%
Surrogate o-Terphenyl	%	147388-11	83 || 82 || RPD: 1	147388-2	80%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Naphthalene	mg/kg	147388-11	<0.1 || <0.1	147388-2	99%
Acenaphthylene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	147388-11	<0.1 || <0.1	147388-2	100%
Phenanthrene	mg/kg	147388-11	<0.1 || <0.1	147388-2	107%
Anthracene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	147388-11	<0.1 || <0.1	147388-2	108%
Pyrene	mg/kg	147388-11	<0.1 || <0.1	147388-2	114%
Benzo(a)anthracene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	147388-11	<0.1 || <0.1	147388-2	82%
Benzo(b,j+k)fluoranthene	mg/kg	147388-11	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	147388-11	<0.05 || <0.05	147388-2	108%
Indeno(1,2,3-c,d)pyrene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	147388-11	111 || 113 || RPD: 2	147388-2	108%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	28/05/2016 || 28/05/2016	147388-2	28/05/2016
HCB	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	147388-11	<0.1 || <0.1	147388-2	130%
gamma-BHC	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	147388-11	<0.1 || <0.1	147388-2	121%
Heptachlor	mg/kg	147388-11	<0.1 || <0.1	147388-2	129%
delta-BHC	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	147388-11	<0.1 || <0.1	147388-2	111%
Heptachlor Epoxide	mg/kg	147388-11	<0.1 || <0.1	147388-2	121%
gamma-Chlordane	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	147388-11	<0.1 || <0.1	147388-2	132%
Dieldrin	mg/kg	147388-11	<0.1 || <0.1	147388-2	130%
Endrin	mg/kg	147388-11	<0.1 || <0.1	147388-2	137%
pp-DDD	mg/kg	147388-11	<0.1 || <0.1	147388-2	132%
Endosulfan II	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	147388-11	<0.1 || <0.1	147388-2	129%
Methoxychlor	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	147388-11	86 || 88 || RPD: 2	147388-2	88%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	28/05/2016 || 28/05/2016	147388-2	28/05/2016
Azinphos-methyl (Guthion)	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	147388-11	<0.1 || <0.1	147388-2	89%
Chlorpyriphos-methyl	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	147388-11	<0.1 || <0.1	147388-2	94%
Dimethoate	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	147388-11	<0.1 || <0.1	147388-2	97%
Fenitrothion	mg/kg	147388-11	<0.1 || <0.1	147388-2	83%
Malathion	mg/kg	147388-11	<0.1 || <0.1	147388-2	84%
Parathion	mg/kg	147388-11	<0.1 || <0.1	147388-2	79%
Ronnel	mg/kg	147388-11	<0.1 || <0.1	147388-2	89%
Surrogate TCMX	%	147388-11	86 || 88 || RPD: 2	147388-2	76%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	28/05/2016 || 28/05/2016	147388-2	28/05/2016
Aroclor 1016	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	147388-11	<0.1 || <0.1	147388-2	103%
Aroclor 1260	mg/kg	147388-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	147388-11	86 || 88 || RPD: 2	147388-2	76%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	147388-11	26/05/2016 || 26/05/2016	147388-2	26/05/2016
Date analysed	-	147388-11	27/05/2016 || 27/05/2016	147388-2	27/05/2016
Arsenic	mg/kg	147388-11	10 || 10 || RPD: 0	147388-2	92%
Cadmium	mg/kg	147388-11	0.5 || 0.6 || RPD: 18	147388-2	98%
Chromium	mg/kg	147388-11	25 || 23 || RPD: 8	147388-2	98%
Copper	mg/kg	147388-11	16 || 20 || RPD: 22	147388-2	101%
Lead	mg/kg	147388-11	29 || 40 || RPD: 32	147388-2	97%
Mercury	mg/kg	147388-11	<0.1 || <0.1	147388-2	117%
Nickel	mg/kg	147388-11	6 || 10 || RPD: 50	147388-2	94%
Zinc	mg/kg	147388-11	64 || 100 || RPD: 44	147388-2	94%

QUALITY CONTROL Misc Inorg - Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	147388-11	30/05/2016 || 30/05/2016
Date analysed	-	147388-11	30/05/2016 || 30/05/2016
pH 1:5 soil:water	pH Units	147388-11	5.6 || 5.5 || RPD: 2
Electrical Conductivity 1:5 soil:water	µS/cm	147388-11	78 || 72 || RPD: 8
Chloride, Cl 1:5 soil:water	mg/kg	147388-11	10 || 10 || RPD: 0
Sulphate, SO4 1:5 soil:water	mg/kg	147388-11	54 || 50 || RPD: 8
Estimated Salinity*	mg/kg	147388-11	260 || 250 || RPD: 4

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Combo1=TRH/BTEX/Pb
Combo2=TRH/BTEX/PAH/Pb
Combo3=TRH/BTEX/PAH/Met
Combo4=TRH/BTEX/PAH/Met/Phen
Combo5=TRH/BTEX/PAH/OC/PCB/Met
Combo6=TRH/BTEX/PAH/OC/OP/PCB/Met
Combo7=TRH/BTEX/PAH/OC/PCB/Met/Phen
Combo8=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen
Combo9=TRH/BTEX/PAH/OC/PCB/Met/Phen/CN
Combo10=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen/CN
Combo11=TRH/BTEX/PAH/OC/PCB/12met/Phen/CN
Combo12=TRH/BTEX/PAH/OC/PCB/Met/TCLP-PAH ,6 Met
Combo13=TRH/BTEX/PAH/OC/OP/PCB/Met/TCLP-PAH ,6Met

Client: DLA Environmental	**Client Project Name / Number / Site etc (ie report title):** DL3788 West Schofields
Contact Person: Jon Mansfield	
Project Mgr: Stephen Challinor	**PO No.:**
Sampler: Mark Disher	**Envirolab Quote No. :** STANDARD
Address: 42b Church St Maitland	**Date results required:**
	Or choose: 24hr turn around
	Note: Inform lab in advance if urgent turnaround is required -
Phone: (02) 49 33 0001 **Mob:** 0411 364 354	**Report format:** esdat / equis /
Email:	**Lab Comments:**

Envirolab Sample ID	Client Sample ID or information	Depth	Date	Type of sample	Combo 3	Combo 6	Salinity	Aggressivity	PAHs										Comments
	Sample information				**Tests Required**														
1	A-TP1-0.5		24/05/2016	SOIL		x	X	X											1 X JAR
2	A-TP2-0.3		24/05/2016	SOIL		X	X	X											1 X JAR
3	B-TP1-0.4		24/05/2016	SOIL		X	X	X											1 X JAR
4	B-TP2-0.3		24/05/2016	SOIL		X	X	X											1 X JAR
5	C-TP2-0.5		24/05/2016	SOIL	X		X	X											1 X JAR
6	C-TP4-1.0		24/05/2016	SOIL	X		X	X											1 X JAR
7	D-TP2-0.4		24/05/2016	SOIL		X	X	X											1 X JAR
8	D-TP4-0.2		24/05/2016	SOIL		X	X	X											1 X JAR
9	E-TP2-0.3		24/05/2016	SOIL		X	X	X											1 X JAR
10	E-TP4-0.2		24/05/2016	SOIL		X	X	X											1 X JAR
11	F-TP1-0.2		24/05/2016	SOIL		x	X	X											1 X JAR
12	F-TP2-0.3		24/05/2016	SOIL		x	X	X											1 X JAR
13	G-TP1-0.2		24/05/2016	SOIL	X		X	X											1 X JAR
14	G-TP1A-0.2		24/05/2016	SOIL	X		~~X~~	~~X~~											1 X JAR
15	G-TP3-0.2		24/05/2016	SOIL	X		X	X	> NOT THESE										1 X JAR
16	G-TP3A-0.2		24/05/2016	SOIL	X		~~X~~	~~X~~											1 X JAR
17	G-TP3-BITUMEN		24/05/2016	SOIL					X										1 X JAR
18	TRIP SPIKE		24/05/2016	SOIL															1 X JAR
19	TRIP BLANK		24/05/2016	SOIL															1 X JAR

Relinquished by (Company):	**Received by (Company):** Env	***Lab use only:***
Print Name: Jon Mansfield	**Print Name:** P Ray	**Samples Received: Cool or Ambient (circle one)**
Date & Time: 25/05/2016 5:00PM	**Date & Time:** 26/05/2016 11.00.	**Temperature Received at: (if applicable)**
Signature:	**Signature:**	**Transported by: Hand delivered / courier**

White - Lab copy / Blue - Client copy / Pink - Retain in Book Page No:

ENVIROLAB GROUP

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 147388
Date Received: 26-5-16
Time Received: 11.00
Received by: PR
Temp: Cool/Ambient 16.4.
Cooling: Ice/Icepack
Security: Intact/Broken/None

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 150045

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Jon Mansfield

Sample log in details:

Your Reference:	**DL3788 Schofields**		
No. of samples:	3 waters		
Date samples received / completed instructions received	13/07/16	/	13/07/16

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	20/07/16	/	20/07/16
Date of Preliminary Report:	Not Issued		

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Water			
Our Reference:	UNITS	150045-1	150045-3
Your Reference	---------- -	BH01	BH03
Date Sampled	----------	12/07/2016	12/07/2016
Type of sample		WATER	WATER
Date extracted	-	14/07/2016	14/07/2016
Date analysed	-	15/07/2016	15/07/2016
TRHC6 - C9	µg/L	<10	<10
TRHC6 - C10	µg/L	<10	<10
TRHC6 - C10 less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	102	101
Surrogate toluene-d8	%	98	97
Surrogate 4-BFB	%	105	106

svTRH (C10-C40) in Water			
Our Reference:	UNITS	150045-1	150045-3
Your Reference	----------	BH01	BH03
	-		
Date Sampled	----------	12/07/2016	12/07/2016
Type of sample		WATER	WATER
Date extracted	-	14/07/2016	14/07/2016
Date analysed	-	14/07/2016	14/07/2016
$TRHC_{10}$ - C_{14}	µg/L	<50	<50
$TRHC_{15}$ - C_{28}	µg/L	<100	<100
$TRHC_{29}$ - C_{36}	µg/L	<100	<100
$TRH>C_{10}$ - C_{16}	µg/L	<50	<50
$TRH>C_{10}$ - C_{16} less Naphthalene (F2)	µg/L	<50	<50
$TRH>C_{16}$ - C_{34}	µg/L	<100	<100
$TRH>C_{34}$ - C_{40}	µg/L	<100	<100
Surrogate o-Terphenyl	%	83	87

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	150045-1 BH01 12/07/2016 WATER	150045-3 BH03 12/07/2016 WATER
Date extracted	-	14/07/2016	14/07/2016
Date analysed	-	14/07/2016	14/07/2016
Naphthalene	µg/L	<1	<1
Acenaphthylene	µg/L	<1	<1
Acenaphthene	µg/L	<1	<1
Fluorene	µg/L	<1	<1
Phenanthrene	µg/L	<1	<1
Anthracene	µg/L	<1	<1
Fluoranthene	µg/L	<1	<1
Pyrene	µg/L	<1	<1
Benzo(a)anthracene	µg/L	<1	<1
Chrysene	µg/L	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2
Benzo(a)pyrene	µg/L	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	83	88

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	150045-1 BH01 12/07/2016 WATER	150045-2 BH02 12/07/2016 WATER	150045-3 BH03 12/07/2016 WATER
Date prepared	-	15/07/2016	15/07/2016	15/07/2016
Date analysed	-	15/07/2016	15/07/2016	15/07/2016
Arsenic-Dissolved	µg/L	1	<1	<1
Cadmium-Dissolved	µg/L	0.1	0.4	0.3
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	1	<1	1
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	18	57	26
Zinc-Dissolved	µg/L	53	41	33

Miscellaneous Inorganics				
Our Reference:	UNITS	150045-1	150045-2	150045-3
Your Reference	----------	BH01	BH02	BH03
	-			
Date Sampled	----------	12/07/2016	12/07/2016	12/07/2016
Type of sample		WATER	WATER	WATER
Date prepared	-	14/07/2016	14/07/2016	14/07/2016
Date analysed	-	14/07/2016	14/07/2016	14/07/2016
pH	pH Units	6.8	6.4	6.4
Electrical Conductivity	µS/cm	26,000	5,100	18,000

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA latest edition 2510 and Rayment & Lyons.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/07/2016	[NT]	[NT]	LCS-W2	14/07/2016
Date analysed	-			15/07/2016	[NT]	[NT]	LCS-W2	15/07/2016
$TRHC_6$ - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W2	97%
$TRHC_6$ - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W2	97%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W2	98%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W2	97%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W2	97%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W2	97%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W2	98%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	100	[NT]	[NT]	LCS-W2	99%
Surrogate toluene-d8	%		Org-016	98	[NT]	[NT]	LCS-W2	100%
Surrogate 4-BFB	%		Org-016	104	[NT]	[NT]	LCS-W2	101%
QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/07/2016	[NT]	[NT]	LCS-W1	14/07/2016
Date analysed	-			14/07/2016	[NT]	[NT]	LCS-W1	14/07/2016
$TRHC_{10}$ - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	117%
$TRHC_{15}$ - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	113%
$TRHC_{29}$ - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	68%
$TRH>C_{10}$ - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	117%
$TRH>C_{16}$ - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	113%
$TRH>C_{34}$ - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	68%
Surrogate o-Terphenyl	%		Org-003	62	[NT]	[NT]	LCS-W1	90%
QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/07/2016	[NT]	[NT]	LCS-W2	14/07/2016
Date analysed	-			14/07/2016	[NT]	[NT]	LCS-W2	14/07/2016
Naphthalene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	73%
Acenaphthylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	94%
Phenanthrene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	86%
Anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	79%
Pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	75%
Benzo(a)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Chrysene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	85%
Benzo(b,j +k)fluoranthene	µg/L	2	Org-012	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	LCS-W2	87%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	75	[NT]	[NT]	LCS-W2	80%
QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			15/07/2016	[NT]	[NT]	LCS-W3	15/07/2016
Date analysed	-			15/07/2016	[NT]	[NT]	LCS-W3	15/07/2016
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W3	86%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-W3	93%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W3	81%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W3	85%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W3	97%
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	LCS-W3	109%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W3	89%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-W3	86%

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			14/07/2016	[NT]	[NT]	LCS-W1	14/07/2016
Date analysed	-			14/07/2016	[NT]	[NT]	LCS-W1	14/07/2016
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-W1	101%
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	LCS-W1	103%

Report Comments:

Dissolved Metals: no filtered, preserved sample was received, therefore the unpreserved sample was filtered through 0.45um filter at the lab.
Note: there is a possibility some elements may be underestimated.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Combo1=TRH/BTEX/Pb
Combo2=TRH/BTEX/PAH/Pb
Combo3=TRH/BTEX/PAH/Met
Combo4=TRH/BTEX/PAH/Met/Phen
Combo5=TRH/BTEX/PAH/OC/PCB/Met
Combo6=TRH/BTEX/PAH/OC/OP/PCB/Met
Combo7=TRH/BTEX/PAH/OC/PCB/Met/Phen
Combo8=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen
Combo9=TRH/BTEX/PAH/OC/PCB/Met/Phen/CN
Combo10=TRH/BTEX/PAH/OC/OP/PCB/Met/Phen/CN
Combo11=TRH/BTEX/PAH/OC/PCB/12met/Phen/CN
Combo12=TRH/BTEX/PAH/OC/PCB/Met/TCLP-PAH ,6 Met
Combo13=TRH/BTEX/PAH/OC/OP/PCB/Met/TCLP-PAH ,6Met

Client: DLA
Contact Person: ~~Richard Doi~~ Jon Mansfield
Project Mgr: "
Sampler: Matthew Junghans
Address: Unit 3/38 Leighton Place, Hornsby
Phone: **Mob:**
Email: ~~Sydney~~ Hunter@DLAEnvironmental.com.au

Client Project Name / Number / Site etc (ie report title): DL 3788 - Schofields
PO No.:
Envirolab Quote No. :
Date results required:
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required -
Report format: esdat / equis /
Lab Comments:

Sample information					Tests Required															Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Combo 3	PH/EC	8 metal													
1	BH01		12-7-16	water	X	X														*metals need filtering*
2	BH02		↓	↓	X	X	X													
3	BH03				X	X														
																				* Note BH02 has Limited Sample *

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 150045
Date Received: 13/7
Time Received: 1530
Received by: PH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (Company): DLA
Print Name: Matthew Junghans
Date & Time: 12-7-16
Signature:

Received by (Company): ELS
Print Name: PH
Date & Time: 13/7 1530
Signature:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: (if applicable)
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 150045-A

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Jon Mansfield

Sample log in details:

Your Reference:	**DL3788 Schofields**		
No. of samples:	3 waters		
Date samples received / completed instructions received	13/07/16	/	19/07/16

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	20/07/16	/	20/07/16
Date of Preliminary Report:	Not Issued		

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

Ion Balance Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- - ---------- 	150045-A-1 BH01 12/07/2016 WATER	150045-A-2 BH02 12/07/2016 WATER	150045-A-3 BH03 12/07/2016 WATER
Date prepared	-	19/07/2016	19/07/2016	19/07/2016
Date analysed	-	19/07/2016	19/07/2016	19/07/2016
Calcium - Dissolved	mg/L	160	13	10
Potassium - Dissolved	mg/L	30	33	11
Sodium - Dissolved	mg/L	7,100	1,400	5,700
Magnesium - Dissolved	mg/L	1,000	130	390
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	570	170	130
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	570	170	130
Sulphate, SO4	mg/L	920	170	750
Chloride, Cl	mg/L	8,800	1,600	6,500
Ionic Balance	%	18	18	17

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.

QUALITY CONTROL Ion Balance	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			19/07/2016	[NT]	[NT]	LCS-W1	19/07/2016
Date analysed	-			19/07/2016	[NT]	[NT]	LCS-W1	19/07/2016
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	LCS-W1	104%
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	LCS-W1	102%
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	LCS-W1	92%
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	LCS-W1	102%
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NR]	[NR]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	LCS-W1	114%
Sulphate, SO4	mg/L	1	Inorg-081	<1	[NT]	[NT]	LCS-W1	114%
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	LCS-W1	87%
Ionic Balance	%		Inorg-040	[NT]	[NT]	[NT]	[NR]	[NR]

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

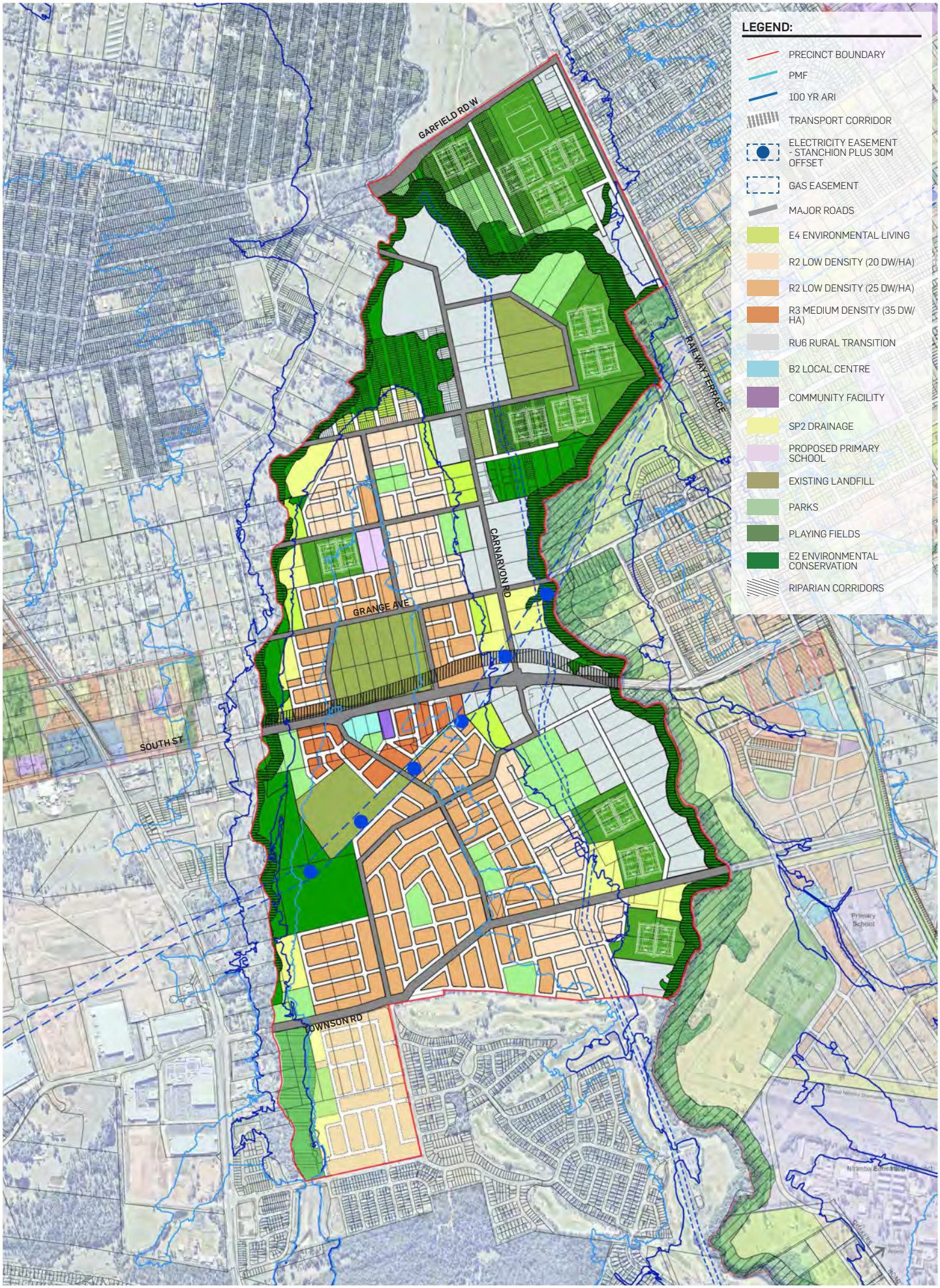
Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

APPENDIX C – DRAFT ILP



URBIS

WEST SCHOFIELDS
DRAFT ILP

DATE: 24.04.2018

1:15,000 @ A3

0 200 400 600 800