

**PRELIMINARY  
SITE INVESTIGATION**

**PROPOSED  
LAKE ALBERT HEIGHTS  
SUBDIVISION**

**LAKE ALBERT NSW**

**MAY 2019**

**REPORT NO. 5796**

**DM McMahon Pty Ltd**

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**Report type**

Preliminary Site Investigation

**Site address**

Part of land bound by Brunskill, Mitchell, Silverwood and Birch Roads, Lake Albert NSW 2650

**Report number**

5796




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## 1.0 Executive summary

DM McMahon Pty Ltd (McMahon) carried out a Preliminary Site Investigation on a 22.4ha parcel of land zoned as Large Lot Residential. The subject site is vacant land that makes up the rear of a number of adjoining low density residential “lifestyle” lots. The owners of the subject site plan to amalgamate then subdivide the land for a low/medium density housing development. This PSI assesses the potential contamination risk to human health and/or the environment from historical and current potential contamination sources and provides recommendations for further assessment and/or investigation.

The site lies on the urban fringe of Wagga Wagga in the southern suburb of Lake Albert in an area of low density residential and rural lots. Nearby hydrological features include Lake Albert, a man-made water body which lies 1.5km to the west, the Murrumbidgee River 5km to the north and Kyeamba Creek, 8km to the east. The site lies on undulating tablelands characterised by mesotrophic red and yellow chromosols derived from the Silurian Wantabadgery and Burrandana granites. The site has an elevation range of approximately 205-230m AHD with a general north westerly aspect. Groundwater in the locale is characterised by deep fractured or fissured extensive aquifers of low to moderate productivity.

The site has a history of broad acre agriculture from European settlement until subdivision in the 1970s for low density lifestyle residential blocks. There is no evidence of commercial agricultural practices having been carried out on subject site since the subdivision in the 1970s.

The assessment objectives include the following:

- Research the current and historical use of the site and report on any matters that could prevent the site from being developed with reference to contamination.
- Conduct the Preliminary Site Investigation in consideration of the Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites NSW OEH (2011), State Environmental Planning Policy 55 – Remediation of Land (SEPP 55) and the National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (2013).
- Advise on the potential of contamination risk and the need, or otherwise, for further investigation and/or assessment.

A site investigation conducted on 28 March 2019 by McMahon consultant Zach Bradley identified the following site features and potential contamination sources:

- The subject site is vacant land forming part of a number of different lifestyle blocks, see **Figure 1**. Improvements include agricultural internal and boundary fencing, five small horse shelters and two small farm dams. All horse shelters are built from steel and corrugated iron and appear to be in a reasonable condition.
- Defined areas of soil stockpiles exist in Lots 3 & 8 (DP239050), Lot 17 (DP242227) and Lot 19 (DP242904). Most of the stockpiles are relatively small (<1m<sup>3</sup>), aged and are assessed to be excavated natural material likely to be from on-site sources but this cannot be confirmed. One stockpile on Lot 3 (measuring 9m x 9m x 1m) has been more recently placed is also assessed to be excavated natural material likely to be from on-site sources but this cannot be confirmed. The fill material has the potential to be contaminated as the source of the material cannot be confirmed, however no stained, odorous or deleterious material was observed within at the time of inspection.
- A defined area approximately 4m<sup>3</sup> in volume of bonded Asbestos Containing Material (ACM) amongst building waste and rubble was present on Lot 19 (DP 242904). This stockpile of bonded Asbestos Containing Material (ACM) amongst building waste and rubble on Lot 19 DP 242904 will need to be disposed of at a licensed waste facility.

After removal of this stockpile it is required that a clearance certificate be issued by a licenced asbestos assessor to validate the remediation of the site.

- Agricultural activities are assessed as presenting low risk to human health and/or the environment owing to no evidence of commercial agriculture having been carried out on site since subdivision as lifestyle blocks in the 1970s.
- Farm scrap materials was noted in isolated areas across the site, usually one or two items per lot. Material included fencing wire, tyres, bricks, rubble, scrap steel and gates of reasonable condition and low environmental concern. Farm scrap materials were assessed as presenting a low risk to human health and the environment based on the defined limited distribution, limited amounts and low likelihood of being a contamination source.
- Up to 12 empty 205 litre recycled oil drums in a sealed and good condition were noted in Lot 17 that are being used as part of horse jumping facilities. A visual and olfactory inspection of the recycled drums noted a lack of product inside, staining or odours and the risk of potential contamination from such is assessed to be low.

As a result of the soil material identified on Lots 3 & 8 (DP239050), Lot 17 (DP242227) and Lot 19 (DP242904) being from an unknown source and therefore potentially contaminated a Sampling and Analysis Quality Plan (SAQP) was developed to assess such. In summary the sampling and analysis of the fill material includes the following:

- Six samples taken from four stockpile locations.
- Three samples taken from the more recent large stockpile and one from each other stockpile area.
- Representative samples to be taken from each point.
- One duplicate (intra-laboratory) and one split (inter-laboratory) and one rinsate sample taken for Quality Control and Quality Assurance (QA/QC) purposes.
- Samples analysed for heavy metals, Total Recoverable Hydrocarbons (TRH), Benzene Toluene Ethylbenzene Xylene and Naphthalene (BTEXN), Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Organochlorine Pesticides (OCPs) and asbestos.
- Results compared against the adopted criteria for residential land use.

The results of the soil analysis from the stockpiles on Lots 3 & 8 (DP239050), Lot 17 (DP242227) and Lot 19 (DP242904) returned the following:

- Heavy metals below Method Detection Limits (MDLs) and/or the adopted criteria for residential land use.
- TRH below MDLs and the adopted criteria for residential land use.
- BTEXN below MDLs and the adopted criteria for residential land use.
- PAHs below MDLs and the adopted criteria for residential land use.
- PCBs below MDLs and the adopted criteria for residential land use.
- OCPs below MDLs and the adopted criteria for residential land use.
- No asbestos was detected within the stockpiles at the time of sampling by a licenced asbestos assessor or during laboratory analysis.

McMahon offer the following conclusions based on the findings of this PSI:

- The site history, desktop review and site walkover are considered adequate for the purpose of the PSI to support the development application.
- The potential contamination sources, pathways and receptors have been identified along with the areas of concern, and if unexpected findings occur then further assessment is recommended.

- McMahon assesses, from as far as research and records can ascertain, a site history of extensive broad acre agricultural from European settlement to the 1970s when the site was subdivided for a large lot residential subdivision which continues until present day.
- The site inspections, review, research, sampling and analysis assess no historical or current gross contaminating activities across the site.
- The results of the soil sampling and analysis returned results below MDLs and/or the adopted criteria for residential land use.
- The 4m<sup>3</sup> stockpile on Lot 19 containing bonded ACM fragments amongst builder's waste and rubble requires removal and subsequent site validation as recommended in this report.
- Based on the above the site is suitable for the proposed use of a low/medium density housing development with low risk to human health and/or the environment from the potential contamination sources identified as part of this PSI.

In conclusion, this report assesses that the site is suitable for the proposed residential subdivision, pending the adoption of the above recommendations, with a low risk of harm from potential contamination to human health and/or the environment. This conclusion is based on the site research, enquiries, records, investigations, environmental sampling, laboratory analysis and comparison of results to the adopted residential land use criteria.



## 2.0 Introduction

### 2.1 Background

McMahon carried out a PSI at the request of Kyan Hyde of Salvestro Planning, on part of land bound by Brunskill, Mitchell, Silverwood and Birch Roads, Lake Albert NSW. McMahon consultant Zach Bradley carried out a site inspection on 28 March 2019 and environmental sampling on 12 April 2019 and this report was produced thereafter.

### 2.2 Scope of work

The scope of work included a desktop study and site inspection to formulate the PSI for the subject site for the proposed development. The objective of this report, which dictates the scope of work, is to identify any potential contamination from current and/or previous activities to provide an assessment of site contamination. This report also aims to determine the site suitability in regard to the proposed development. Works were undertaken in accordance with the relevant standards, legislation and guidelines, namely:

- NSW OEH Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites (2011).
- State Environmental Planning Policy 55 – Remediation of Land (SEPP 55).
- National Environment Protection (Assessment of Site Contamination) Measure (NEPM), (2013).

## 3.0 Site identification

Details of the site identification can be seen as follows, **Table 1**.

**Table 1:** *Site identification*

Identifier	Details
<b>Address</b>	Part of land bound by Brunskill, Mitchell, Silverwood and Birch Roads, Lake Albert NSW 2650
<b>Real property description</b>	Part of Lots 1,2 & 3 DP 241596 Part of Lots 16, 17 & 18 DP 242227 Part of Lots 19 & 20 DP 242904 Part of Lots 1, 2, 3, 4, 5, 6, 7, & 8 DP239050
<b>Centre co-ordinate</b>	536235E 6108209N MGA GDA z55
<b>Development size</b>	22.4 hectares
<b>Owner(s)</b>	Multiple
<b>Local Government Area</b>	Wagga Wagga City Council
<b>Present use</b>	Low density residential lifestyle blocks
<b>Development Application Reference</b>	Unknown

As follows are maps showing the location of the development boundary overlaid on a 2018 aerial photograph and the location of the site in relation to the wider locale, **Figure 1** and **Figure 2**. A concept plan of the development can be seen in **Attachment A**.

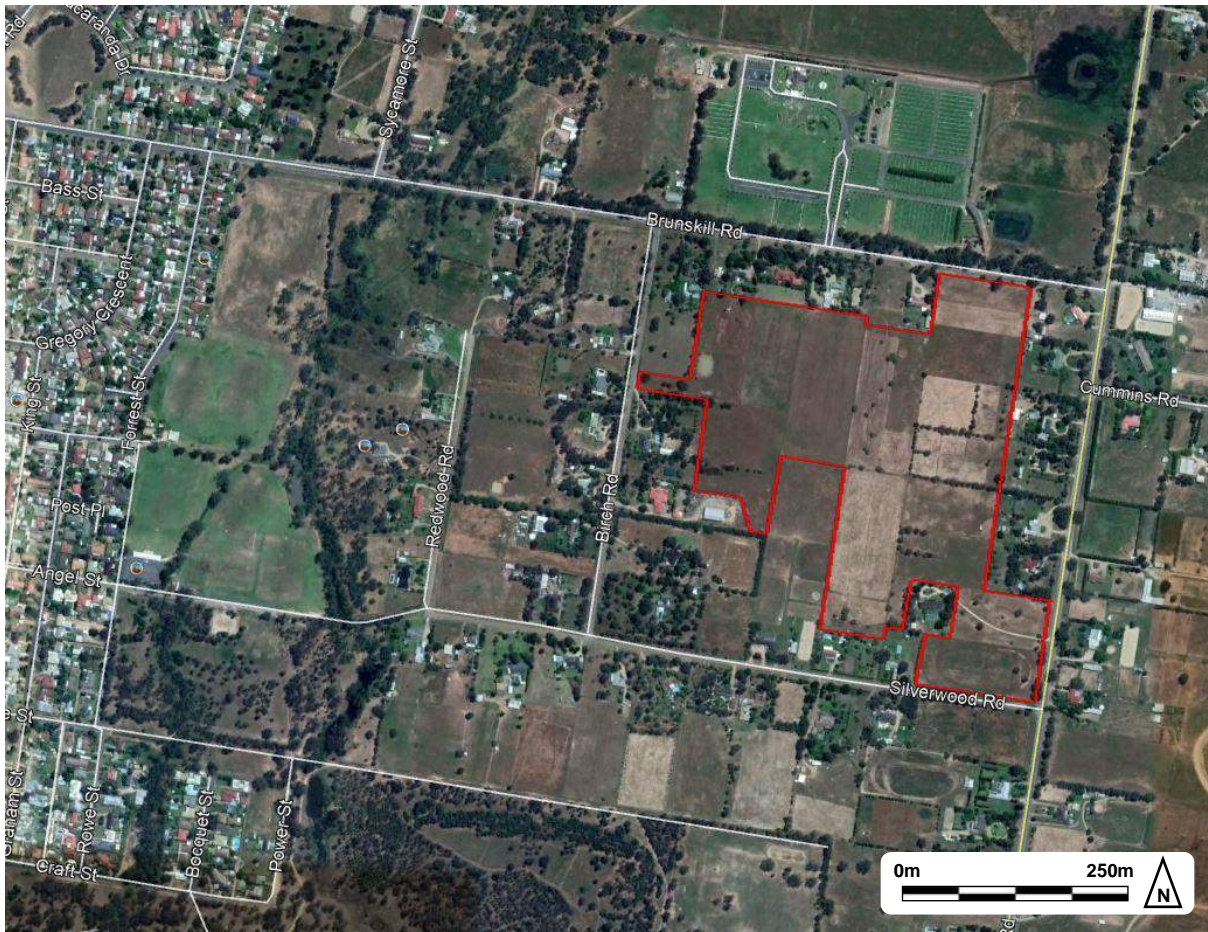
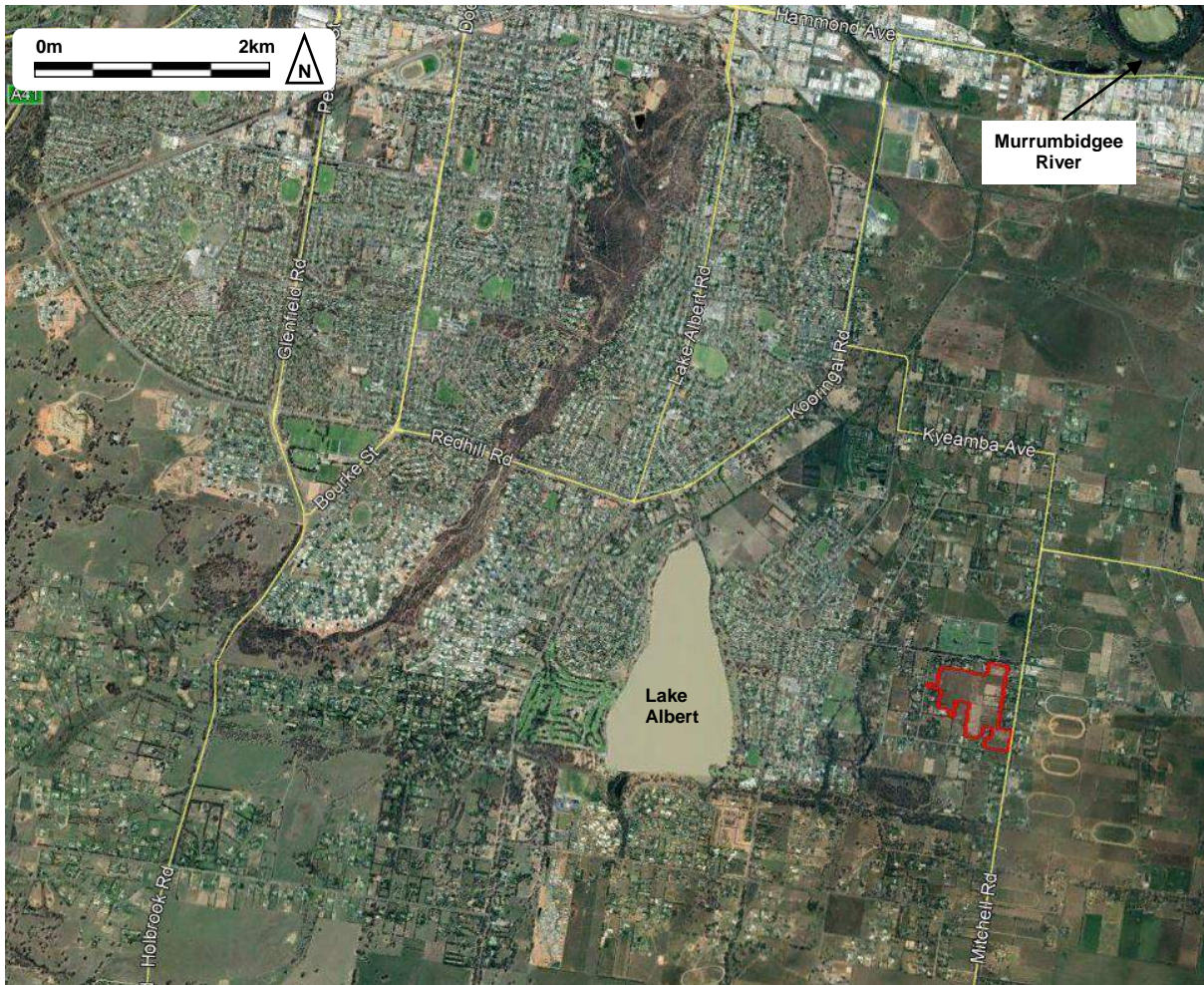


Figure 1: Proposed development boundary



**Figure 2:** Location of the site

#### 4.0 Site history and setting

Wagga Wagga is a regional city in south western New South Wales with a population of 55,000. The city sits on the Murrumbidgee River with a history of broad acre farming after European settlement in the 1830s. The site lies on the urban fringe of the southern suburb of Lake Albert with low-density residential development to the north, south and east, high density residential land to west and broad acre agricultural land to the further south and east. The Wagga Wagga Crematorium and Lawn Cemetery lies to the north of the subject site on Brunskill Road.

#### 4.1 Zoning

The site zoning lies within R5 Residential– Large Lots, with neighbouring properties zoned as RU4 Primary Production – Small Lots, SP1 Special Activities, RE1 Public Recreation, R1 General Residential and W1 Natural Waterways, **Figure 3**. The SP1 Infrastructure zoning is associated with the Wagga Wagga Crematorium and Lawn Cemetery located north of the site.



Figure 3: Zoning map (Wagga Wagga Local Environment Plan 2010)

#### 4.2 Land use and site history

The CSU Regional Archives, National Library of Australia: Trove Database and the Historical Land Records Viewer database was investigated for details of land use, ownership history, previous owner occupations and any other points of interest, **Table 3**. A description of previous lot and address numbers has also been provided, **Table 2**. There are some gaps in the data due to the nature of historical document filing and preservation, but the data demonstrates lot sizes are maintained throughout the ownership, which indicates congruency of land use. A copy of the obtainable historical records can be seen in **Attachment B**.

**Table 2: Previous lot and address numbers**

Current Address	Current Lot No.	Previous Lot No.	Source
2 Brunskill Road	Lot 17 DP242227	Lot 145/146	Town Planning Scheme November 1953
4 Brunskill Road	Lot 18 DP242227	Lot 145/146	Town Planning Scheme November 1953
6 Brunskill Road	Lot 1 DP241596	Lot 145/146	Town Planning Scheme November 1953
8 Brunskill Road	Lot 2 DP241596	Lot 145/146	Town Planning Scheme November 1953
10 Brunskill Road	Lot 3 DP241596	Lot 145/146	Town Planning Scheme November 1953
222 Mitchell Road	Lot 1 DP 239050	Lot 145/146	Town Planning Scheme November 1953
232 Mitchell Road	Lot 2 DP 239050	Lot 145/146	Town Planning Scheme November 1953
240 Mitchell Road	Lot 3 DP 239050	Lot 145/146	Town Planning Scheme November 1953
244 Mitchell Road	Lot 4 DP 239050	Lot 145/146	Town Planning Scheme November 1953
252 Mitchell Road	Lot 5 DP 239050	Lot 145/146	Town Planning Scheme November 1953
262 Mitchell Road	Lot 6 DP 239050	Lot 145/146	Town Planning Scheme November 1953
274 Mitchell Road	Lot 7 DP 239050	Lot 145/146	Town Planning Scheme November 1953
1A Silverwood road	Lot 8 DP 239050	Lot 145/146	Town Planning Scheme November 1953
1 Silverwood Road	Lot 16 DP 242227	Lot 145/146	Town Planning Scheme November 1953
1 Birch Road	Lot 20 DP 242904	Lot 145/146	Town Planning Scheme November 1953
3 Birch Road	Lot 19 DP 242904	Lot 145/146	Town Planning Scheme November 1953

**Table 3: Site history from LPI records**

Year	Data	Address	Owner (Occupation)	Notes/Details
1889	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1910	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1921	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1928	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1937	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1953	Town Planning Scheme November 1953	Lot 145	-	260 acres reserved for agricultural and grazing purposes.
1955	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1961	CSU: Valuation book	Lot 145	Martin Cummins	Cottage farm buildings have been constructed.
1967	HLRV: Parish Map	Lot 145	George Dixey (Grazier)	134ac, used for agriculture
1971	CSU: Valuation book	Lot 3 DP 241596	Theodorus & Paula Mathot	Incomplete building listed.
1971	CSU: Valuation book	Lot 2 DP 241596	William & Kere Skyring	Rural improvements.

1971	CSU: Valuation book	<b>Lot 1 DP 241596</b>	Bernardus & Johanna Hoitink	Incomplete building listed
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### 4.3 Review of aerial photographs

A review of the available historical aerial photography is summarised as follows, **Table 4**. The aerial photographs can be seen in **Attachment C**.

**Table 4:** Observations from historical aerial photography

Year	Site	Surrounding land
1953	The site consists of a number of large agricultural paddocks. Mitchell and Brunskill Roads appear to be unsealed.	The site is part of wider agricultural land in the area. Numerous established trees exist in a cluster to the south of the site.
1961	No significant changes have taken place on site.	No significant changes have taken place on surrounding land.
1971	The site consists of larger vacant paddocks and some smaller sized paddocks along the eastern boundary. Some building associated with the large lot residential subdivision has taken place in two of the smaller paddocks	The surrounding areas consist of low-density residential lots and agricultural land. Agricultural land is to the further north, east and south whilst the outer suburbs of Wagga are to the north west. The Lake Albert village exists to the south west. The Wagga Wagga Crematorium and Lawn Cemetery can be seen to the north.
1980	The site has now been developed as low-residential lifestyle blocks. Silverwood and Birch roads have been constructed. All parts of the site are the rear paddocks to the developed lifestyle paddocks. No agriculture can be seen taking place.	Further lifestyle blocks can be seen in the immediate area and the lawn cemetery can be seen to the immediate north. The Lake Albert village has undergone significant development towards Wagga Wagga, residential development can still be seen taking place.
1990	All lots remain as lifestyle blocks with no agricultural practices evident from the aerial photograph.	Significant residential development has taken place in all directions with low-medium density blocks dominating the area. The Lake Albert village is now part of the Wagga Wagga township.
2003	5 small horse shelters exist of the site, three on lot 3, and one on both lot 2 and 16.	Minor residential development has taken place in nearby areas
2006	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.
2009	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.
2013	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.
2014	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.
2016	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.
2018	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.
2019	No significant changes have taken place on site.	Minor residential development has taken place in nearby areas.

### 4.4 Review of development applications

A review of the available Development Applications (DA) for the lifestyle blocks comprising the site, from the undertaken *Government Information (Public Access) Act 2009* (NSW)

(GIPA) search is summarised as follows, **Table 5**. It is important to note that the below information relates to the developed part of the address and does not pertain to the proposed subdivision site which is vacant land.

**Table 5: Available Development Applications**

Address	Date	Document	Details
<b>1 Birch Road</b>	1972	BA350/72	Proposed country dwelling, garage and shed
	1974	BA790/74	Proposed swimming pool
	1987	DA78/87	Proposed erection of dual occupancy building as an addition to the existing residence
	1993	BA292/03	Proposed rural shed
	2002	DA020013	Proposed manufacturing business in existing shed – assembling compu-weigh scales.
	2005	DA05/0825	Proposed replacement of existing roof on garage and carport; enclose patio with glass windows and door
<b>4 Brunskill Road</b>	2017	DA17/0198	Existing swimming pool and gazebo
<b>240 Mitchell Road</b>	1971	BA367/71	Proposed dwelling and garage
	1975	BA136/75	Proposed extension to dwelling and erection of garage and shed
	1976	BA119/76	Proposed shed (garage)
	1978	BA950/78	Proposed swimming pool
	1981	BA534/81	Proposed farm machinery shed
	2015	DA15/0442	Proposed shed to rear of property (11m x 18m)

A copy of the GIPA search results can be supplied on request.

#### 4.5 Database searches

A search of the NSW EPA Contaminated Lands Register and the NSW Licensing, Applications and Notices Register returned no results for the subject site in relation to current licences, applications, notices, audits, pollution studies and reduction programs, Preliminary Investigation Orders, Declaration of Significantly Contaminated Land, Approved Voluntary Management Plans, Management Orders, Ongoing Maintenance Orders, Repeal Revocation or Variation Notice, Site Audit Statement, or Notice of Completion or Withdrawal of Approved VMP. Anecdotal evidence from current owners/ occupants also raised no issues with the aforementioned issues above. The search results can be seen in **Attachment D**.

A search of Council's contamination register was requested for any records of potential contaminating activities being undertaken on the subject Lots. The search returned none of the subject Lots being listed on this register, **Attachment D**.

A SafeWork NSW Hazardous Chemicals on premises site search was not undertaken owing to budgetary constraints however the results of the NSW EPA, Council records search, previous DAs search, historical records search, and site inspections assesses that the likelihood of Hazardous Goods being present on the development site as low.

#### **4.6 Data gaps**

During the desktop review of the site, there were a number of data gaps identified within the site history, previous reports and relevant information which include the following:

- Historical titles and ownership records, especially those proceeding 1889 and post 1971.
- Occupation of all historical owners which may have influenced land use.
- Historical business directory search.
- Historical chemical storage uses and disposal documentation.
- SafeWork NSW Hazardous Goods on premises site search.

Data gaps were identified where information did not exist, was not available, was not undertaken or had become misplaced over time.

#### **4.7 Historical data integrity assessment**

Accurate information on the subject site identification, history and condition has been presented in this report by DM McMahon Pty Ltd. This is justified firstly by sourcing information from reliable sources including the NSW EPA, Wagga Wagga City Council, The Bureau of Meteorology, NSW Land Registry Services and the Land and Property Information Agency. Information presented in this report is directed by requirements set out by the applicable guidelines and regulations. This in turn highlights specific assessment criteria for consultants to direct research around. Research was carried out by reference to guidelines adopted in NSW, specifically NSW OEH Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites (2011), DUAP/EPA Managing Land Contamination: Planning Guidelines, SEPP55-Remediation of Land, 1998 and National Environment Protection (Assessment of Site Contamination) Measure (2013).

DM McMahon Pty Ltd used a site modified uniform approach when conducting field studies and desktop reviews, to maintain data consistency and cover all areas of consideration. This is directed by sourcing site specific information from reliable information databases and implementing in field quality assurance procedures such as revised site-specific field sheets and best practice methods for assessment. In conducting this assessment, particular reliance has been placed on data provided by DM McMahon Pty Ltd employees, which through revised and documented training and experience, have been recognised as suitably qualified to deliver. There are limitations to the accuracy of sourced information used by DM McMahon Pty Ltd and the information provided in this report is subject of all the limitations of previous reports, data and information.

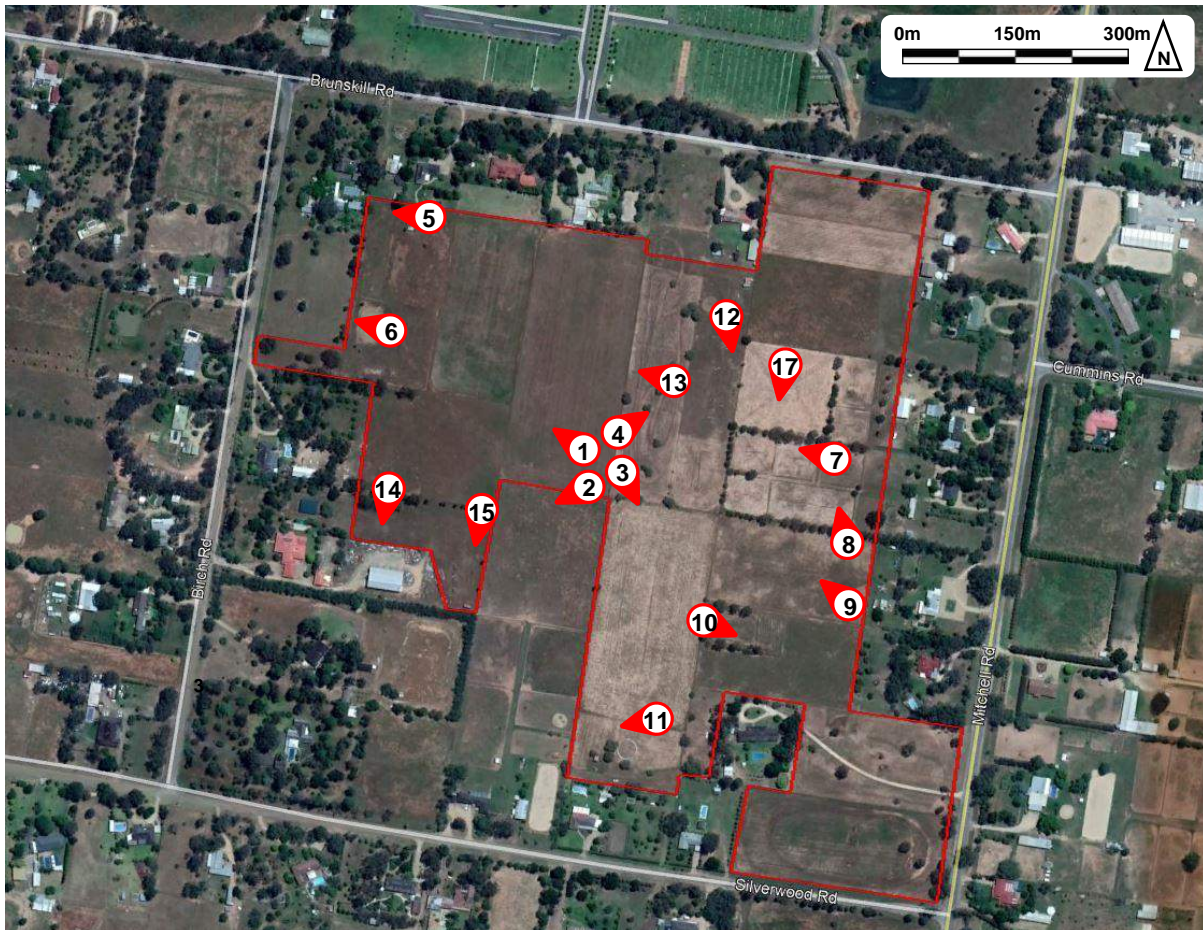
Based on the above, the data used for the collation of the site history is deemed suitable and reliable for the purposes of the PSI.



## 5.0 Site condition and surrounding environment

### 5.1 Site inspection and photographs

A walk over of the site took place on 28 March 2019, with detail paid to any observable potential contaminating sources and any areas of interest identified from the historical research undertaken. The site photograph locations with the direction of the lens can be seen as follows in **Figure 4**.



**Figure 4:** Site photograph locations and camera lens direction

Photograph 1 is taken from the middle of the site looking towards the northwest across Lot 18 (DP242227) on Brunskill Road.



**Photograph 1**

Photograph 2 is taken from the middle of the site looking towards the southwest across Lot 18 (DP242227) on Brunskill Road.



**Photograph 2**

Photograph 3 is taken from the middle of the site looking towards the southeast across Lot 17 (DP242227) on Brunskill Road.



**Photograph 3**

Photograph 4 is taken from the middle of the site looking towards the northeast across Lot 17 (DP242227) on Brunskill Road.



**Photograph 4**

Photograph 5 shows an existing horse shelter used for stock feed storage, taken on Lot 2 (DP241596) on Brunskill Road.



**Photograph 5**

Photograph 6 shows a small farm dam with some concrete noted on water's edge, taken on the rear of Lot 2 (DP241596) on Brunskill Road.



**Photograph 6**

Photograph 7 shows three existing horse shelters, taken on Lot 4 (DP239050) on Mitchell Road.



**Photograph 7**

Photograph 8 shows paddock fences, gates and tree belts, taken on Lot 4 (DP239050) on Mitchell Road.



**Photograph 8**

Photograph 9 shows a horse shelter, taken on Lot 5 (DP239050) on Mitchell Road.



**Photograph 9**

Photograph 10 shows existing tree belts, taken on Lot 6 (DP239050) on Mitchell Road.



**Photograph 10**

Photograph 11 shows horse paddocks including temporary round yards, taken in the middle yard of Lot 16 (DP242227) on Silverwood Road.



**Photograph 11**

Photograph 12 shows horse jumps including the recycled 205 litre oil drums, taken at the rear of Lot 17 (DP242227) on Brunskill Road.



**Photograph 12**

Photograph 13 shows existing motorbike jumps, taken in the rear of Lot 17 (DP242227) on Brunskill Road.



**Photograph 13**

Photograph 14 shows a small farm dam, taken on the rear of Lot 19 (DP242904) on Birch Road.



**Photograph 14**



Photograph 15 shows the soil stockpiles, taken in the rear of Lot 17 (DP242227) on Brunskill Road.



**Photograph 15**

Photograph 16 shows stockpiled firewood, taken in the rear of Lot 3 (DP239050) on Mitchell Road.



**Photograph 16**

Photograph 17 shows fresh soil stockpiles, taken in the rear of Lot 3 (DP239050) on Mitchell Road. This soil stockpile was approximately 9m x 9m x 1m.



Photograph 17

### **5.2 Site condition**

At the time of the site inspection, ground surfaces of the site consisted of a range of annual grasses, broadleaf weeds and perennial pasture. Medium-sized established tree belts were noted on site usually running along property and paddock boundaries. Tree species on site included planted native eucalypts as well as pine, willow, peppercorn and olive trees. There are two small farm dams on site used for stock watering and surface water management. Both dams were in a reasonable condition given their environmental setting and dry seasonal conditions at the time of reporting.

### **5.3 Site improvements**

The site consists of various small paddocks used for rural lifestyle purposes fenced with steel posts, hinge joint, plain and barbed wire in poor to fair condition. Five small horse shelters exist on site with three on Lot 4 (DP239050), one on Lot 2 (DP241596) and one on Lot 5 (DP239050). All shelters are in good conditions and are constructed from steel and corrugated iron.

One paddock had horse jumps throughout made of recycled timber, sealed recycled oil drums and steel gates. A visual inspection of the sealed recycled oil drums highlighted a lack of odours, staining or product inside the containers and the risk of potential contamination from such is assessed to be low.

### **5.4 Services**

No electricity, gas, plumbing or telephone services were visually observed during the site inspection within the subject site footprint. Services were known to run to the adjacent houses

from the surrounding roads from the Dial Before You Dig records which can be supplied upon request.

### 5.5 Environmental characteristics of the site and surrounds

A desktop review and investigation of the topography, hydrology, soil, lithology, geology and hydrogeology of the site has been undertaken and are as follows:

#### Topography

The Lake Albert 1:25,000 Topographic Map (Sheet 8327-1S) indicates that the site is located at an elevation range of approximately 204 to 230m AHD. The site landform is classed as a simple slope with a general north easterly aspect, **Figure 5**.

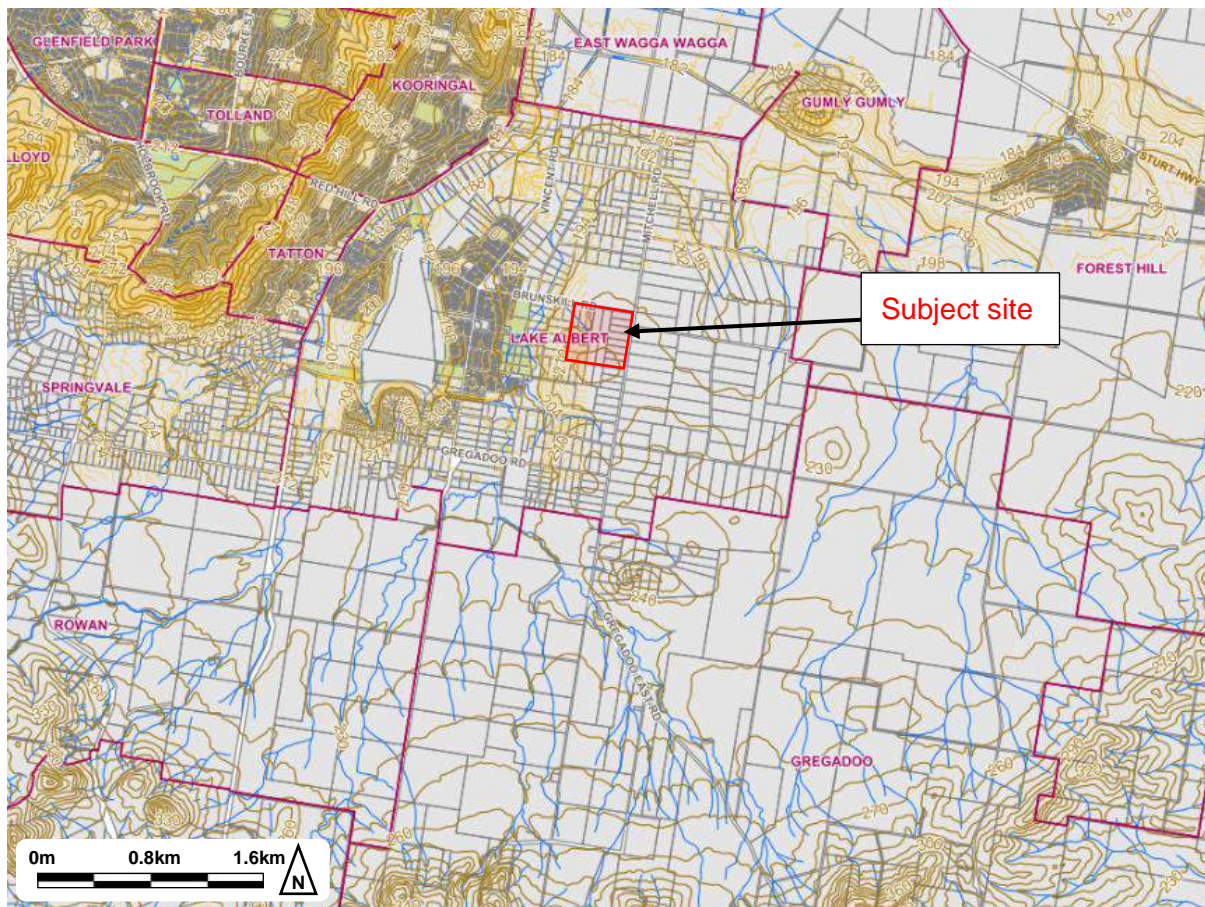


Figure 5: Topographic map

#### Vegetation

Native and introduced trees and shrubs are planted mainly around fence lines and boundaries with some scattered paddock trees throughout. Annual and perennial grasses and broadleaf species occur throughout the property.

#### Natural Resources Sensitivity

The site is not situated within the mapped vulnerable land, riparian lands and waterways or groundwater vulnerability areas. Pockets of biodiversity areas were present in the site which included Lot 1 and 3 DP241596; Lot 17 and 18 DP242227; Lot 1, 3, 4, 5, 6, 7 and 8 DP 239050; and Lots 19 and 20 DP 242904. No significant biodiversity characteristics were observed during the site inspection. A biodiversity order applies to the site, WWCC (2018).

## Hydrology

The site is part of the water sharing plan for the Murrumbidgee River and is part of the Murrumbidgee River catchment. Majority of the surface water on site runs through a drainage line from the on-site dam north through Rawlings Park and into Marshalls Creek, a tributary of the Murrumbidgee River, **Figure 6**. No run on occurs at the site with runoff flowing in all directions, predominantly to the north west. The site is not within the boundaries of the flood planning layer, WWCC (2019).



**Figure 6:** Site hydrology

## Weather

The average rainfall for Lake Albert is approximately 526.8mm per annum, with the wettest months being October, June and July. Annual mean evaporation for the region is 1715.5mm with mean daily evaporation ranges from 1.2mm in July to 9.2mm in January. Lake Albert is characterised by cold wet winters and hot dry summers with mean maximum temperatures ranging from 12.9°C in July to 31.9 °C in January and mean minimum temperatures ranging from 1.3°C in July to 15.9°C in February. Rainfall, temperature and evaporation data from Wagga Wagga Agricultural Institute 73127 ([www.bom.gov.au](http://www.bom.gov.au)).

## Soil & Landform

The site lies within the mapping unit fh from the Soil Landscapes of the Wagga Wagga 1:100 000 Sheet (DLWC, 1997). The map unit fh is described as:

**fh – Forest Hill (Residual Landscapes)**

**Landscape:** — undulating tableland of Silurian Wantabadgery and Burrandana Granites. Local relief <20m; slope gradients <10% (commonly 2-5%). Extensive tableland, shallow and narrow drainage lines. Almost completely cleared tall-woodland

**Soils:** moderately deep (60 - 120 cm) Mesotrophic Red Chromosols on tableland and rises; moderately deep (80 - 150 cm) Bleached Brown Chromosols in drainage lines.

**Limitations:** erosion hazard, strong acidity and locally shallow soil.

The soils and landform on site are typical of the Forest Hill soil landscape.

**Geology & Regolith**

Wantabadgery Granite (minor granodiorite) and Burrandana Granite. Relatively thick (>2 m) residual and slope-washed sandy clays with windblown clay addition occur on the tableland. Over several metres of slope-washed and alluvial clays with minor sand sequences occur near drainage depressions.

**Hydrogeology**

From the Geoscience Australia hydrogeology dataset, the groundwater beneath the site is described as fractured or fissured extensive aquifers of low to moderate productivity. Five registered groundwater bores are located within 1km of the site boundary, **Figure 7** (DPI, 2018). The details of the bores can be seen in **Table 6**.



**Figure 7:** Registered groundwater bores

**Table 6:** Registered groundwater bores in the locale

Bore ID	Drilled depth (m)	Water bearing zone (m)	Standing water level (m)	Location compared to subject site	AHD	Purpose
GW416516	192.00	130.00-130.05	66.00	South 241m	220m	Stock/Domestic
GW063548	18.00	-	-	North West 593m	196m	Stock/Domestic
GW404670	11.00	8.00-10.00	-	South West 948m	202m	Monitoring
GW400481	5.84	-	-	South West 963m	203m	Monitoring/Test
GW400482	11.96	-	-	East 966m	203m	Monitoring/Test

From the above, it is assessed that groundwater is unlikely to be encountered within the near surface on site.

## 6.0 Initial Conceptual Site Model

The initial Conceptual Site Model has been developed in accordance with Section 4 of Schedule B2 of the NEPM (2013) and NSW OEH Guidelines for Consultants Reporting on Contaminated Sites (2011).

### 6.1 Known and potential sources of contamination

By reference to the SEPP 55 Guideline (2018) and NSW OEH (2011) the historical and current land use has the following contamination risk from the potential contamination source on site, **Table 7**.

**Table 7:** Potential contamination sources

Source	Type of potential chemical/contamination	Associated chemicals/contaminant
<b>Stockpiled soils</b>	Metals, Fuels and Oils, asbestos.	15 Metals, TRH, BTEXN, PAH, PCBs, OCPs and asbestos
<b>Stockpiled bonded ACM on Lot 19 DP 242904</b>	Asbestos	Chrysotile, amosite and crocidolite asbestos fibres

The following sources have been assessed as having a low likelihood of potential contamination and as such have not been included in the initial Conceptual Site Model owing to:

- The farm scrap materials noted in isolated areas across the site (usually one or two items per lot) are assessed to present low risk to the proposed development owing to the composition and limited distribution of the items.
- The sealed recycled 205 litre oil drums used for horse jumping on Lot 17 are assessed to present a low risk of contamination from a visual and olfactory inspection noting a lack of product inside, staining or odours.
- Historical broadacre agriculture is assessed to present a low risk to the proposed development as there is no evidence of commercial agriculture having been carried out on site since the 1970s.

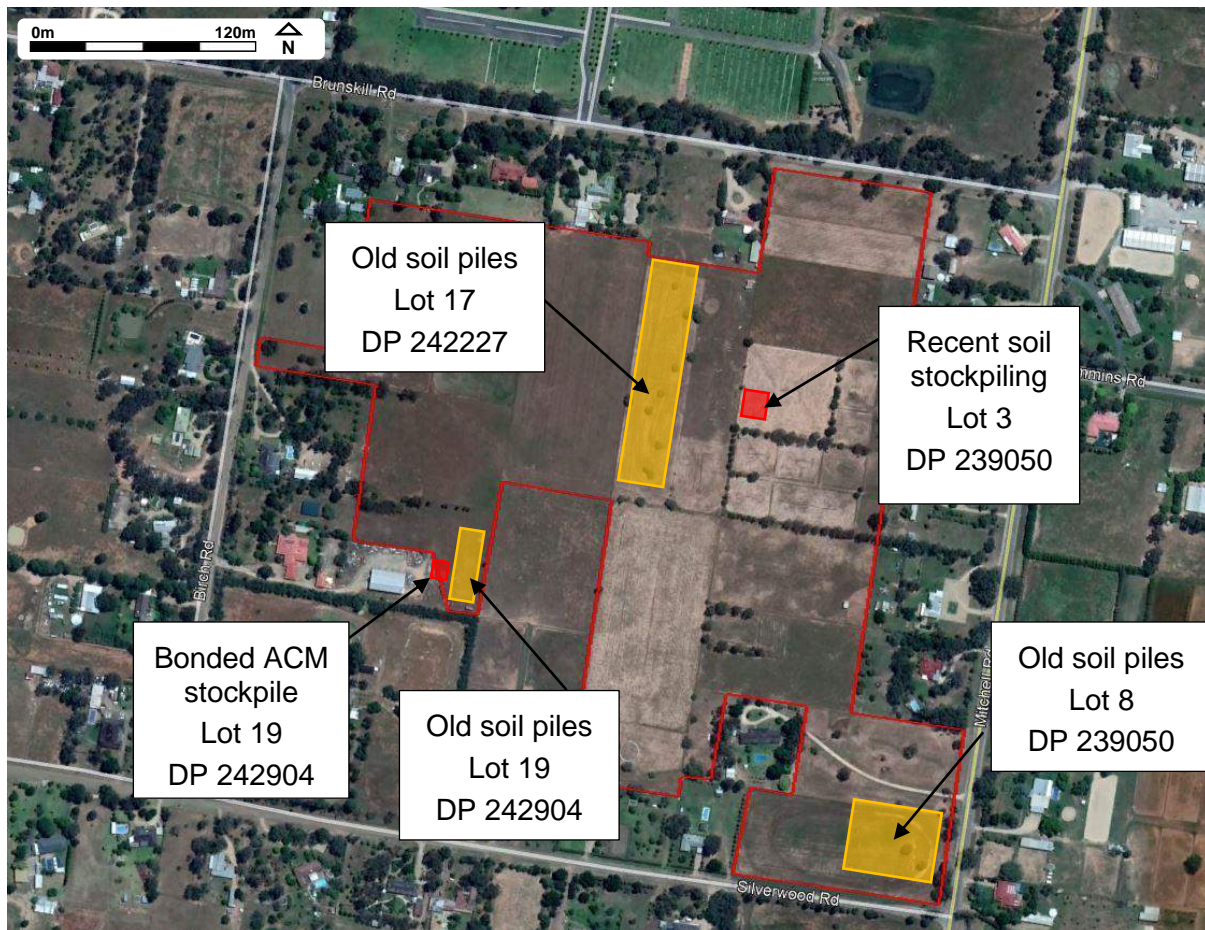
### 6.2 Potentially affected media

The following potentially affected media have been considered as part of the initial conceptual site model from the known and potential sources of contamination:

- Surface soils from potential contamination sources;
- In-situ natural soils underneath site due to potential vertical and horizontal leaching of contaminants;
- Surface water down gradient of potentially contaminated areas from run off and interflow; and
- Groundwater contamination due to potential vertical migration of contaminants through the soil profile, regolith and bedrock into underlying aquifers.

### 6.3 Areas of concern

The areas of concern on site in the form of the soil stockpiles and the bonded ACM stockpile can be seen as follows, **Figure 8**.



**Figure 8:** Areas of concern

### 6.4 Potential receptors and exposure pathways

Based on the proposed use of the site and potential sources of contamination outlined above, potential receptors from contamination, if present, were considered to comprise of:

- Future residential users of the site from incidental contact (ingestion and dermal) with contaminants in fill material, surface and subsurface soils.
- Future residential users of the site from vapour intrusion of volatile contaminants into proposed residential buildings on site.
- Shallow and intrusive maintenance and construction/excavation workers from:
  - Direct contact (dermal contact and ingestion) with contaminated soil, dust and fibres;
  - Vapour inhalation from contaminated soil and surface water; and
- Environmental parameters including nearby downstream aquatic ecosystems via:
  - Direct contact with contaminated sediment and surface water.

### **6.5 Summary of the initial Conceptual Site Model**

Based on the findings of the site history, observations and environmental characteristics, it is assessed that there is risk of soil contamination from the identified areas of concern on site, being the areas identified in **Figure 8**.

From contamination, there is a risk of exposure to site workers and future users during occupation and/or redevelopment of the site and as such soil sampling and analysis is required to be carried out in these areas. The initial conceptual site model in tabular format can be seen as follows, as follows, **Table 8**.



**Table 8: Initial Conceptual Site Model**

Known and Potential Contamination Sources	Impacted Media	Contaminants of Concern <small>Note: Should correlate with DQO's</small>	Existing and Potential Exposure routes	Human & Ecological Receptors		
				<i>Current</i>	<i>Future</i>	Comments
<b>Soil stockpiles on Lot 3 DP 239050 Lot 8 DP 239050 Lot 17 DP 242227 Lot 19 DP 242904</b>	<i>Groundwater</i>	15 Metals, TRH, BTEXN, PAH, PCBs, OCPs and asbestos	Ingestion (Drinking)	Residents, aquatic ecosystems.	Residents, workers, aquatic ecosystems.	Deep and limited groundwater in the locale. Low risk
	<i>Soil</i>		Ingestion Inhalation of vapours Dermal absorption	Residents	Residents, workers	The stockpiles are assessed to be from on-site sources, but this cannot be confirmed. Small size and defined area. Limited pathways and receptors. Low risk
	<i>Air</i>		Inhalation of vapours	Residents	Residents, workers	Low risk
	<i>Surface waters</i>		Ingestion (Drinking) Bioaccumulation	Residents, aquatic ecosystems.	Residents, workers, aquatic ecosystems.	Possible impact from run off to downstream users but unlikely. Limited pathways and receptors. Low risk.
<b>Stockpiled bonded ACM on Lot 19 DP 242904</b>	<i>Groundwater</i>	Asbestos fibres	Ingestion (Drinking)	Residents, aquatic ecosystems.	Residents, workers, aquatic ecosystems.	Deep and limited groundwater in the locale. Low risk
	<i>Soil</i>		Accumulation Inhalation of fibres	Residents	Construction Worker Residents	Recommend remediation of asbestos occurrences before subdivision construction commences.
	<i>Air</i>		Inhalation of fibres	Residents	Construction Worker Residents	Depends on the condition and disturbances to asbestos items.
	<i>Surface waters</i>		Ingestion (Drinking) Bioaccumulation	Residents, aquatic ecosystems.	Residents, workers, aquatic ecosystems.	Possible impact from run off to downstream users but unlikely. Limited pathways and receptors. Low risk.

## 7.0 Sampling and analysis plan and sampling methodology

### 7.1 Data Quality Objectives

The data quality objectives (DQO) of the site assessment have been developed to define the type and quality of data to meet the project objectives for the assessment of potential harm to human health and/or the environment identified from the initial Conceptual Site Model. DQOs have been identified against the main media of concern for investigation, identified to be soil based on the environmental parameters and potential contamination sources. Potential soil contamination has the main potential impact on site suitability due to the existing and potential exposure routes identified in the initial Conceptual Site Model. The DQOs have been developed generally in accordance with the seven step DQO process as outlined in AS 4482.1.2005 and NEPM (2013). The DQOs developed for the investigation can be seen as follows, **Table 9**.

**Table 9: Data Quality Objectives**

DQO	Comment
<b>1. State the problem</b>	<ul style="list-style-type: none"> <li>- Is there contamination that will affect the suitability, or otherwise, of the site for the proposed use.</li> <li>- Possible contamination from stockpiled soil.</li> <li>- With soil access this could cause risk to human health for residents and site workers.</li> <li>- The planned development could cause risk to human health and/or the environment.</li> </ul>
<b>2. Identify the decision</b>	<ul style="list-style-type: none"> <li>- Is there any contamination within the soil that will pose a risk to current and future receptors from the planned development?</li> <li>- Does the assessment follow NSW OEH &amp; NEPM guidelines?</li> <li>- Have soils been assessed against the adopted criteria?</li> <li>- Have human health impact of contaminant been assessed?</li> <li>- Is there evidence of or potential for contaminant migration off site?</li> <li>- Is a site management strategy required?</li> </ul>
<b>3. Identify inputs to the decision</b>	<ul style="list-style-type: none"> <li>- Visual and olfactory indications.</li> <li>- Soil analytical data as collected by soil sampling and analysis.</li> <li>- Soil criteria to be achieved on the site as defined by the basis for assessment criteria.</li> <li>- Site condition.</li> <li>- Geology, regolith and hydrogeology.</li> <li>- Site history.</li> <li>- Initial Conceptual Site Model developed as part of the PSI.</li> </ul>
<b>4. Define the study boundaries</b>	<ul style="list-style-type: none"> <li>- Soil sampling of soil stockpiles on Lots 3 &amp; 8 (DP239050), Lot 17 (DP242227) and Lot 19 (DP242904).</li> </ul>
<b>5. Develop a decision rule</b>	<p>The key decision rules for the PSI were:</p> <ol style="list-style-type: none"> <li>1) Have the analytical data collected as part of the sampling and analysis met the data quality indicators identified below? If they have then the data can be used to answer the decision rule/s and the decision statements developed in Step 2. If not, then the need to collect additional data may be required.</li> <li>2) Do contaminant concentrations exceed the investigation and screening criteria defined in <b>Section 10</b>? If not, then the contamination does not pose an above low level of risk. Where results exceed the investigation and screening criteria, this may indicate an unacceptable level of risk. Further risk assessment and investigations may be warranted to determine the potential for impacts.</li> </ol>

**6. Specify limits on decision errors**

There are two key types of decision errors that can occur for the assessment:  
 Accepting the null hypothesis (false acceptance decision error). The consequences of this is expense of remediation where it is not required.  
 Rejecting the null hypothesis (false rejection decision error). The consequence of this is risk to human health and/or the environment. Liability for future damages and/or remediation costs.

It can be seen that the more extreme consequence from decision errors resides with potential impact on health and/or the environment. Therefore, a conservative approach has been adopted to minimise the likelihood of this decision error. In addition to the above the following predetermined data quality indicators have been adopted;

- Precision: A quantitative measure of the reproducibility of data;
- Accuracy: A quantitative measure of the proximity of reported data to the calculated correct value;
- Representativeness: A quantitative measure of the confidence that data is representative of its respective media;
- Completeness: A measurement of the amount of useable data from data collection; and
- Comparability: A quantitative measure of the confidence that data may be considered to be similar for each sampling/analysis activity. This specifically involves:
  - The collection of samples in a judgemental pattern.
  - The samples will not be composited so as the direct reading of contaminant levels will be found from each sample point on which an appropriate decision can be based off.
  - Determining the 95% upper confidence limit (UCL) of the arithmetic average concentration if above criteria laboratory results are returned.
  - If contaminants levels exceed the adopted criteria further investigation and assessment will be considered.

**7. Optimise the design for obtaining data**

- Sampling plan was done with consideration of NEPM (2013), NSW OEH (2011) and NSW EPA (2014).
- Over the nominated areas, a judgemental sampling pattern was developed.
- Six samples taken from four sample locations
- Three samples taken from the large stockpile (Stockpile area 4) and 1 from each other area (Stockpile areas 1 – 3), **Figure 9**.
- Representative samples to be taken from each point
- One duplicate (intra-laboratory), One split (inter-laboratory) and one rinsate sample taken for QAQC purposes.

**7.2 Sampling objectives**

The nature and extent of potential contamination needs to be assessed and if significant contamination is present on site it is recommended that further sampling be undertaken to further assess risk and provide a sufficient scope for remediation if required. Further sampling should be undertaken following remediation, if required, on the areas of concern to validate the removal area from the contamination sources. It is recommended the following sampling objectives are used to assess the level and extent of contamination of the subject site, **Table 10**.

**Table 10: Sampling objectives**

Sampling Objective	Comments
Assess Contamination in Soil	Assess soil as per the adopted sampling pattern and strategy and if soils are above adopted investigation and screening criteria, further assessment may be required.
Assess Contamination in Groundwater	If soil assessment indicates gross contamination on site, groundwater investigation may be required.
Assess Contamination in Surface Water	If soil and/or groundwater contamination indicate gross contamination on site, surface water investigation may be required.
Assess Contamination in Air / Vapour	PID survey to be undertaken for as part of assessment. Health Screening Levels as outlined in the screening criteria will be adopted as part of the assessment.
Assess Contamination Dust	Assess soil against the adopted health screening level outlined in the screening criteria if required.

### 7.3 Sampling pattern and strategy

The sampling pattern and strategy allows for and dictates the extent of potential contamination for suitable delineation and remediation. As such, a sampling pattern and strategy devised on site history, land uses, aerial imagery, site inspection, database search and applicable sampling design guidelines, contaminants of concern and areas of concern was utilised. The requirements of NEPM (2013) and NSW OEH (2011) guidelines were also considered when compiling the sampling pattern and strategy. A sampling and analysis quality plan were developed by reference to AS 4482.1-2005. As follows is a description of the sampling pattern and strategy used, **Table 11** and **Table 12**, while a map of the locations from where samples were taken can be seen in **Figures 9**.

**Table 11: Sampling pattern**

Four types of sampling pattern	N/A	Applied	Notes
<b>1) Judgemental sampling pattern</b> -Sample points chosen on the basis of the investigator’s knowledge of probable distribution of the site. - utilises site history and field observations.	-	✓	Targeted areas of concern were based on most likely contamination sources and preferential pathways.
<b>2) Random sampling pattern</b> A random number generator determines the sampling points (not recommended in contaminated site investigations).	✓	-	-
<b>3) Systematic sampling pattern</b> -Sample points are selected at regular and even intervals - Statistically unbiased once the initial sample point is chosen at random.	✓	-	-
<b>4) Stratified sampling pattern</b> -The subject site is divided into sub-areas based on: Geological and geographical features, nature of contamination, former usage pattern of the site, intended future use of the sub area, and other relevant factors. - Each sub area can then be treated as individual sites with different sampling patterns and sampling densities. - Suited to large sites with complex contaminant distributions.	-	✓	Areas of concern were divided into sub areas to delineate areas of potential contamination

**Table 12: Sampling strategy**

Option	Sampling Objective	Comments
A)	-Determine number and location of samples based on the most suitable sampling pattern.	Judgemental sampling used.
B)	Number of samples required for determining the average concentration. (validation sampling only).	N/A
C)	Field screening of sampling for volatiles and solvents	PID used on all samples including duplicates.
D)	Number of samples required for determining the proportion and distribution of contamination.	Judgemental sampling undertaken to delineate areas of contamination.
E)	Determining the 95% upper confidence limit (UCL) of the arithmetic average concentration.	To be used if above screening/investigation criteria found.
F)	Determining the proportion of the contaminated area	From sampling plan.

By reference to the DQOs, sampling objectives, pattern and strategy as follows is a map of the soil sample points, derived from the identified areas of concern, **Figure 9**.



Figure 9: Location of sampling area

#### 7.4 Sampling methods and procedures

Sampling within the soil stockpiles was carried out at depths of greater than 500mm. This sampling depth ensured minimising skewing of findings as a result of weathering and aging on the outside surface of the stockpile and more representative sample concentrations when sampling for semi-volatiles and volatiles.

Excavation were undertaken with using a hand-held stainless-steel spade to collect sample material from sample points. Equipment was decontaminated after excavation allows access to the sample material and after the sample material has been collected. Equipment was also be decontaminated between each sample point. Disposable nitrile gloves were worn by personnel where the manual handling of soils was required by the sampling process. The preparation of a site-specific safety plan was prepared proceeding sampling works. Soil sampling and soil descriptions were undertaken by reference to:

- AS 4482.1:2005 - Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds;
- AS 4482.2:1999 - Guide to the sampling and investigation of potentially contaminated soil Part 2: Volatile substances; and
- AS 1726:2017 – Geotechnical site investigations.

**7.5 Analytes and parameters to be monitored/tested**

Following sampling of the site, samples were tested against the following parameters outlined in **Table 13**.

**Table 13:** *Material testing parameters*

<b>Material</b>	<b>Guidelines</b>	<b>Analytes</b>
Soils (NEPM Suite)	HILs, HSLs, EILs and ESLs for soil contaminants & vapour intrusion	-15 Metals, TRH, BTEXN, PAH, PCBs & OCPs laboratory analysis. -Asbestos in soil laboratory analysis. -PID screening. -Visual inspection for bonded ACM.

## 8.0 Quality assurance and quality control

The following Quality Assurances and Quality Control (QA/QC) procedures have been carried out during field works, **Table 14**.

**Table 14:** *Field QA/QC procedures*

<b>Field QA/QC</b>	
Sampling team	David McMahon – Team leader Zach Bradley – Environmental consultant & asbestos assessor
Decontamination procedures between sampling events	-Removal of soils adhering to the sampling device by brush or knife. -Washing of the sampling device thoroughly in a Decon 90 solution. -Rinsing the sampling device in potable water
Sampling receptacles	Glass jar with Teflon lined lid
Preservation technique	Esky and ice bricks
Withholding period	7 days maximum
Laboratory used	ALS Sydney
Borelogs for each sample	No Borelogs due to grab sampling utilised
Chain of Custody	Documented in <b>Attachment E</b>
Sample splitting techniques	Sample splitting adopted
Duplicate frequency	- One for every 20 field samples (company procedure) - One duplicate to be taken for soil
Field blank results	Not seen as necessary owing to the preliminary nature of the testing
Background sample results	Not seen as necessary owing to the preliminary nature of the testing
Rinsate sample results	Rinsate sample adopted
Laboratory prepared trip spike results	Not seen as necessary owing to the preliminary nature of the testing
Trip blank results	Not seen as necessary owing to the preliminary nature of the testing
Instrument calibration certificate	PID calibration certificate in <b>Attachment F</b>

The following laboratory Quality Assurances and Quality Control (QA/QC) procedures have been adopted, **Table 15**.

**Table 15:** *Laboratory QA/QC procedures*

<b>Laboratory Quality Assurance &amp; Quality Control (QA/QC)</b>	
Accreditation	NATA 6649
Signed Chain of Custody forms	Laboratory chain of custody in <b>Attachment E</b>
Record of holding times & comparison with method specifications	Sample receipt notification in <b>Attachment E</b>
Analytical Methods Used	- QCI report in <b>Attachment E</b>



	- QA/QC compliance assessment with quality review in <b>Attachment E</b>
Description of surrogates and spikes used	-Certificate of analysis in <b>Attachment E</b> -Quality control report in <b>Attachment E</b>

### 9.0 QA/QC data evaluation

Data Quality Indicators (DQIs) are typically developed to provide goals for the quality of data required to sufficiently meet the site-specific objectives of an investigation. Precision, accuracy, representativeness, comparability and completeness (PARCC), are all indicators of data quality. The DQIs for the soil and soil vapour investigation were reviewed following the compilation of the report. The DQIs used to assess the PARCC parameters for this investigation are as follows, **Table 16**.

**Table 16: Data Quality Indicators**

DQI	Comment
<b>Precision</b>	<ul style="list-style-type: none"> <li>- Standard operating practices (SOPs) appropriate and complied with.</li> <li>- Inter and intra laboratory duplicates tested.</li> <li>- Calculation of RPD between sample and duplicate(s).</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>- Methodology and procedures appropriate and complied with.</li> <li>- Standard operating practices (SOPs) appropriate and complied with.</li> <li>- Analysis of sample duplicates.</li> <li>- Limited available bias opportunity.</li> </ul>
<b>Representativeness</b>	<ul style="list-style-type: none"> <li>- Appropriate media and locations investigated.</li> <li>- All samples analysed according to sampling plan.</li> <li>- Appropriate collection, storage and preservation techniques.</li> <li>- Sample homogeneity.</li> <li>- Samples representative of wider medium.</li> </ul>
<b>Comparability</b>	<ul style="list-style-type: none"> <li>- Use of appropriate techniques for PID screening.</li> <li>- Repeated standard operating practices on each sample point.</li> <li>- Uniform sample sizes and weather conditions.</li> <li>- Analysis undertaken in single laboratory with intra and inter laboratory duplicates tested.</li> <li>- Uniform analysis methods.</li> </ul>
<b>Completeness</b>	<ul style="list-style-type: none"> <li>- Soil stockpiles investigated.</li> <li>- All samples and locations PID screened.</li> <li>- Standard operating practices (SOPs) appropriate and complied with.</li> <li>- Experienced and qualified samplers.</li> <li>- Sample documentation complete.</li> <li>- Holding times complied with.</li> </ul>

One sample was taken for inter-laboratory duplicate testing. The inter-laboratory analysis returned identical results for volatile parameters tested (TPH, TRH and BTEXN) and within 30% RPD for metals. With these conditions considered, the data was considered fit for purpose.

One sample was taken for intra-laboratory duplicate testing. The inter-laboratory analysis returned identical results for the volatile parameters tested (TPH, TRH and BTEXN). All metals analysis results returned a Relative Percentage Difference (RPD) below the adopted limit of 30%. With these conditions considered, the data was considered fit for purpose.

One rinsate sample was taken for laboratory analysis with all results below laboratory MDLs. With these conditions considered, the data was considered fit for purpose.

The QA/QC criteria and DQOs have been evaluated and the relevant sampling and analysis requirements have been met.

## 10.0 Basis for assessment criteria

The following are to be used for the future investigation as per the Tier 1 Assessment Criteria. Health Investigation Level (HIL) A is recommended to be applied for the subject site which is defined as: *Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.*

### 10.1 Soil

#### NEPM (2013) Health Based Investigation Level A (HILs A)

HILs are Tier 1 risk based generic assessment criteria used for the assessment of potential risks to human health from chronic exposure to contaminants in soil. They are intentionally conservative and based on a reasonable worst-case scenario for generic land use settings including Residential (HILs A/B), Open Space / Recreational (HILs C) and Commercial Industrial (HILs D).

- HILs A soil assessment criteria are adopted based on the proposed land use.

#### NEPM (2013) Management Limits for TPH fractions F1-F4 in soil

Management limits are relevant for sites where spills and leaks of petroleum compounds may have occurred. They are applied after consideration of relevant ESLs and HSLs.

- Management limits A for residential sites are adopted based on the proposed land use.

### 10.2 Vapour

#### NEPM (2013) Health Screening Levels A (HSLs A)

HSLs are Tier 1 risk based generic assessment criteria used for the assessment of potential risks to human health from chronic inhalation exposure of petroleum vapours emanating off petroleum contaminated soils (Vapour Risk). They are intentionally conservative and based on a reasonable worst-case scenario for generic soil types, contamination depth and land use settings including Residential (HSLs A/B), Open Space / Recreational (HSLs C) and Commercial Industrial (HSLs D).

- HSLs A are adopted based on the proposed land use. HSLs for clayey soil should be adopted based on the soil type encountered across the site.
- Field screening using a PID will also be undertaken with readings of less than 10ppm being regarded as negligible.

### 10.3 Ecological

Soil ecological assessment were considered warranted for the following reasoning:

- There may be onsite or nearby offsite ecological receptors.
- There will be landscaped areas within the proposed development and as such the relevant EILs will be applied to these areas where applicable

Ecological investigation for contaminants against aged EILs/ESLs will be utilised to assess potential ecological risk. 'Aged' EILs will be utilised for the investigation based on the likely nature of the contaminants on site and readily available comparative guidelines.

## 10.4 Groundwater

### NEPM Groundwater Investigation Levels (GILs)

GILs are adopted from the Australian Drinking Water Guidelines and ANZECC 2000 Guidelines for Fresh and Marine Water Quality. They are not acceptance criteria, rather they are used to trigger further consideration of groundwater contamination when GILs are exceeded.

- Drinking Water GILs may not be relevant owing to the depth to groundwater in the locale.

### NEPM Groundwater Health Screening Levels (GHSLs A)

GHSLs are Tier 1 risk based generic assessment criteria used for the assessment of potential risks to human health from chronic inhalation exposure to petroleum vapours emanating off petroleum contaminated groundwater (Vapour Risk). They are intentionally conservative and based on a reasonable worst-case scenario for generic soil types, contamination depth and land use settings including Residential (GHSLs A/B), Open Space / Recreational (GHSLs C) and Commercial Industrial (GHSLs D).

- GHSLs may not be relevant owing to the depth to groundwater in the locale.

## 10.5 Asbestos in soil assessment criteria

### NEPM Asbestos Health Screening Levels (HSLs)

Health screening levels for asbestos was warranted due to the possibility of asbestos in the stockpiled soil, the following criteria were used from the NEPM (2013) Table 7: *Health Screening Levels for Asbestos in Soils*:

- 0.01% for non-friable (bonded) asbestos fragments.
- 0.001% for friable asbestos materials
- No visible asbestos material to be found in surface soils.

## 11.0 Results

A summary of the field PID and laboratory results, including duplicates can be seen as follows, **Table 17**. Laboratory reports can be found in **Attachment E**.

**Table 17: Sample results**

Parameter	Unit	Limit	Sample Identification					
			1	2	3	4.1	4.2	4.3
Sample depth (m)			0.5-0.8	0.5-0.8	0.5-0.8	0.5-0.8	0.5-0.8	0.5-0.8
Arsenic	mg/kg	100 <sup>ACD</sup>	<5	5	<5	<5	<5	<5
Cadmium	mg/kg	20 <sup>A</sup>	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	100 <sup>A</sup> / 190 <sup>C</sup>	21	21	32	20	37	23
Copper	mg/kg	6000 <sup>A</sup> / 95 <sup>C</sup>	8	11	12	10	16	10
Lead	mg/kg	300 <sup>A</sup> / 1100 <sup>C</sup>	7	25	14	11	13	11
Nickel	mg/kg	400 <sup>A</sup> / 30 <sup>C</sup>	8	7	11	11	15	10
Zinc	mg/kg	7400 <sup>A</sup> / 180 <sup>C</sup>	16	97	30	26	24	25
Mercury	mg/kg	40 <sup>A</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene (HCB)	mg/kg	10 <sup>A</sup>	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	mg/kg	6 <sup>A</sup>	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Chlordane	mg/kg	50 <sup>A</sup>	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	mg/kg	300 <sup>A</sup>	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sum of PAHs	mg/kg	300 <sup>A</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenols	mg/kg	3000 <sup>A</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCBs	mg/kg	1 <sup>A</sup>	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of Aldrin + Dieldrin	mg/kg	6 <sup>A</sup>	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	mg/kg	0.7 <sup>E</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
DDT	mg/kg	180 <sup>D</sup>	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sum of DDD + DDE + DDT	mg/kg	240 <sup>A</sup>	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C16 - C34 Fraction	mg/kg	300 <sup>E</sup>	<100	<100	<100	<100	<100	<100
C34 - C40 Fraction	mg/kg	2800 <sup>E</sup>	<100	<100	<100	<100	<100	<100
F1	mg/kg	45 <sup>B</sup> / 180 <sup>E</sup>	<10	<10	<10	<10	<10	<10
F2	mg/kg	110 <sup>B</sup> / 120 <sup>E</sup>	<50	<50	<50	<50	<50	<50
Benzene	mg/kg	0.5 <sup>B</sup> / 50 <sup>E</sup>	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	160 <sup>B</sup> / 85 <sup>E</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	55 <sup>B</sup> / 70 <sup>E</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	mg/kg	40 <sup>B</sup> / 45 <sup>E</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	3 <sup>B</sup> / 170 <sup>D</sup>	<1	<1	<1	<1	<1	<1
Asbestos detected	g/kg	-	No	No	No	No	No	No
PID Reading	ppm	-	0.1	0.1	0.2	0.1	0.1	0.2

<sup>A</sup> NEPM (2013). Table 1A (1) Health Investigation levels for soil contaminants: Residential A

<sup>B</sup> NEPM (2013). Table 1A (3) Soil HSLs for vapour intrusion (mg/kg): Low – High Density Residential (0-1.0m sand)

<sup>C</sup> NEPM (2013). Table 1B (1-4) Added Contaminant Limits: Urban Residential/Public Open Space. (pH 5.5/most sensitive value)

<sup>D</sup> NEPM (2013). Table 1B (5) Ecological Investigation Levels: Urban Residential/Public Open Space

<sup>E</sup> NEPM (2013). Table 1B (6) Ecological Screening Levels: Urban Residential/Public Open Space (Most sensitive)

## 12.0 Site characterisation

From the assessment undertaken the following conclusions can be drawn in relation to site characterisation.

Soils on site had no visible indications of contamination such as staining, or odours noted during the site visit conducted on 28 March 2019. Soil stockpiles were noted in defined areas on site, old stockpiles of limited amounts (<1m<sup>2</sup>) were noted on lots 8, 17 and 19. The older stockpiles are assessed to be excavated natural material likely to be from on-site sources, but this cannot be confirmed. These stockpiles were used for motorbike jumps or dumped as material overburden. Lot 3 on Mitchell Road had a recently constructed stockpile of soil from an unknown source covering an area of 9m x 9m x 1m. This stockpile is also assessed to likely be from on-site sources but cannot be confirmed. Soil testing carried out on these stockpiles returned results below MDLs and/or the adopted criteria for residential land use and is therefore assessed to present low risk to human health and/or the environment in regard to the proposed development.

The stockpile of bonded Asbestos Containing Material (ACM) amongst building waste and rubble on Lot 19 DP 242904 and as such will need to be disposed of at a licensed waste facility. After removal of this stockpile it is required that a clearance certificate be issued by a licenced asbestos assessor to validate the remediation of the site.

Agricultural activities are assessed as presenting low risk to human health and/or the environment owing to no evidence of commercial agriculture having been carried out on site since subdivision as lifestyle blocks in the 1970s.

Farm scrap and rubbish was noted in isolated areas across the site, usually one or two items per lot. Material included fencing wire, tyres, bricks, rubble, scrap steel and gates of poor to fair condition. These items are in a reasonable to good condition and are easily managed during site development.

There were no identified off-site sources of potential contamination that would have a direct impact on human health and/or the environment from the development proposal.

### 12.1 Review of Conceptual Site Model

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways.

The potential source of contamination identified on site was the soil stockpiles with the pathways being primarily from soil contact during construction and residency and vapour risk during residency and the receivers being construction workers and future residents. The stockpiled material returned results below the adopted criteria for residential land use and is assessed to present low risk to the identified receivers during the development.

The bonded ACM found in the 4m<sup>3</sup> stockpile of builder's waste and rubble on Lot 19 is assessed to be a risk to construction workers and as such will need to be disposed of at a licensed waste facility. After removal of this stockpile it is required that a clearance certificate be issued by a licenced asbestos assessor to validate the remediation of the site

It is considered that the CSM adopted is sufficient to assess risk to receptors via pathways from contamination sources.

### 13.0 Conclusions and recommendations

The Preliminary Site Investigation has been undertaken in accordance with the relevant standards, legislation and guidelines, namely:

- NSW OEH Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites (2011);
- State Environmental Planning Policy 55 – Remediation of Land (SEPP 55); and
- National Environment Protection (Assessment of Site Contamination) Measure (NEPM), (2013).

McMahon offer the following conclusions based on the findings of this PSI:

- The site history, desktop review and site walkover are considered adequate for the purpose of the PSI to support the development application.
- The potential contamination sources, pathways and receptors have been identified along with the areas of concern, and if unexpected findings occur then further assessment is recommended.
- McMahon assesses, from as far as research and records can ascertain, a site history of extensive broad acre agricultural from European settlement to the 1970s when the site was subdivided for a large lot residential subdivision which continues until present day.
- The site inspections, review, research, sampling and analysis assess no historical or current gross contaminating activities across the site.
- The results of the soil sampling and analysis returned results below MDLs and/or the adopted criteria for residential land use.
- The 4m<sup>3</sup> stockpile on Lot 19 containing bonded ACM fragments amongst builders waste and rubble requires removal and subsequent site validation as recommended in this report.
- Based on the above the site is suitable for the proposed use of a low/medium density housing development with low risk to human health and/or the environment from the potential contamination sources identified as part of this PSI.

In conclusion, this report assesses that the site is suitable for the proposed residential subdivision, pending the adoption of the above recommendations, with a low risk of harm from potential contamination to human health and/or the environment. This conclusion is based on the site research, enquiries, records, investigations, environmental sampling, laboratory analysis and comparison of results to the adopted residential land use criteria.

### 14.0 Unexpected findings

If any unconsolidated, odorous, stained or deleterious soils are encountered during any further excavation, suspected historical contaminating activities are encountered, or conditions that are not alike the above descriptions, the site supervisor should be informed, the work stopped, and this office be contacted immediately for further evaluation by an appropriately qualified environmental consultant. The unexpected findings may trigger the need for more investigation and assessment dependant on the scope and context of the unexpected finding.

### 15.0 Disclaimer

The information contained in this report has been extracted from field and laboratory sources believed to be reliable and accurate. DM McMahon Pty Ltd nor the Certified Site Contamination Specialist assume any responsibility for the misinterpretation of information

supplied in this report. The accuracy and reliability of recommendations identified in this report need to be evaluated with due care according to individual circumstances. It should be noted that the recommendations and findings in this report are based solely upon the said site location and the ground level conditions at the time of testing. The results of the said investigations undertaken are an overall representation of the conditions encountered. The properties of the soil within the location may change due to variations in ground conditions outside of the tested area. The author has no control or liability over site variability that may warrant further investigation that may lead to significant design changes.

Temporal and spatial limitations to the CSM and recommendations of this report apply, if a change of land use is noted between the time of writing this report and the proposed development then further assessment may need to be carried out.

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## 17.0 References

Australian Drinking Water Guidelines (2011), Paper 6 National Water Quality Management Strategy. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

AS 1726:2017 – Geotechnical site investigations.

AS 4482.1:2005 - Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds;

AS 4482.2:1999 - Guide to the sampling and investigation of potentially contaminated soil Part 2: Volatile substances; and

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) 2018

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## 18.0 Attachments

Attachments proceeding this document:

Attachments	Details
A. Site concept plan	1 page
B. Historical data	19 pages
C. Aerial photographs	10 pages
D. Database search results	2 pages
E. Laboratory reports	66 pages
F. PID calibration certificate	1 page





# DOCUMENT ATTACHMENTS

REPORT 2019

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**Attachment A : Bore logs**



Job No: 5892	Landform: Crest, Simple Slope
Client: MJM Consulting Engineers	Slope: Gently Inclined
Site: 177 Pine Gully Road	Vegetation/Surface: Bare, Grazing, Road Base
Date: 20/03/2019	Logged By: ZB & ZD

Sheet: 'Geotech Field Sheet\_rev2'

Sampling Method: AS1289.1.2.1-1998: cl. [ ] 6.5.1 - Hand Excavated [ ] 6.5.2 - Hand Auger [ ] 6.5.3 - Power Auger [ ] 6.5.4 - Machine Excavated Other: \_\_\_\_\_

Site Identity	Sample	Co-ordinates MGA GDA94 z55	Depth to Top of Layer (m)	Depth to Bottom of Layer (m)	Classification (AS1726:2017 Table 9 & 10)	Soil Name (BLOCK LETTERS)	Grain Size (Fine / Coarse)	Primary Colour	Mottle Colour	Plasticity	Consistency (Cohesive soils)	Relative Density (Non-cohesive)	Moisture	Soil Origin	Comments (Coarse Fragments (CF), Size, %, Structure (Zoning, Defects, Cementing etc.))
BH1	-	531491 E	0.00	0.05	OL	sandy SILT	C	-B	-	L	S	-	D	C	-
	1/1	6119609 N	0.05	0.25	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	PID= 0.3, Duplicated (D1)
	1/2		0.25	1.00	CL	sandy CLAY	C/F	YR	-	M	VSt	-	D	C	PID=0.1
BH2	-	531499 E	0.00	0.05	OL	sandy SILT	C	-B	-	L	S	-	D	C	-
	2/1	6119615 N	0.05	0.30	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	PID=0.0 , Split Sample
	2/2		0.30	1.00	CL	sandy CLAY	C/F	YR	-	M	VSt	-	D	C	PID=0.5
BH3	-	531506 E	0.00	0.05	OL	sandy SILT	C	-B	-	L	S	-	D	C	-
	3/1	6119603 N	0.05	0.20	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	PID=0.0
	3/2		0.20	1.00	CL	sandy CLAY	C/F	YR	-	M	VSt	-	D	C	PID=0.1
BH4	4/1	531495 E	0.00	0.20	SC	GRAVEL SAND	C	-B	-	L	S	-	D	C	CF<30mm, Road base; PID=0.2
	-	6119586 N	0.20	0.40	CL	sandy SILT	C/F	RB	-	L	S	-	D	C	-
	4/2		0.40	1.00	CL	sandy CLAY	C/F	YR	-	M	St	-	D	C	PID=0.2
BH5	5/1	531494 E	0.00	0.20	SC	GRAVEL SAND	C	-B	-	L	S	-	D	C	CF<30mm, Road base; PID=0.0
	-	6119592 N	0.20	0.70	CL	sandy SILT	C/F	YB	-	M	St	-	D	C	-
	5/2		0.70	1.00	CL	sandy CLAY	-	RB	-	M	St	-	D	C	PID=0.0
BH6	6/1	531493 E	0.00	0.20	SC	GRAVEL SAND	C	-B	-	L	S	-	D	C	CF<30mm, Road base; PID=0.1
	-	6119598 N	0.20	0.40	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	-
	6/2		0.40	1.00	CL	sandy CLAY	-	YR	-	M	St	-	D	C	PID=0.1

Job No: 5892	Landform: Crest, Simple Slope
Client: MJM Consulting Engineers	Slope: Gently Inclined
Site: 177 Pine Gully Road	Vegetation/Surface: Bare, Grazing, Road Base
Date: 20/03/2019	Logged By: ZB & ZD

Sampling Method: AS1289.1.2.1-1998: cl. [ ] 6.5.1 - Hand Excavated [ ] 6.5.2 - Hand Auger [ ] 6.5.3 - Power Auger [ ] 6.5.4 - Machine Excavated Other: \_\_\_\_\_

Site Identity	Sample	Co-ordinates MGA GDA94 z55	Depth to Top of Layer (m)	Depth to Bottom of Layer (m)	Classification (AS1726:2017 Table 9 & 10)	Soil Name (BLOCK LETTERS)	Grain Size (Fine / Coarse)	Primary Colour	Mottle Colour	Plasticity	Consistency (Cohesive soils)	Relative Density (Non-cohesive)	Moisture	Soil Origin	Comments (Coarse Fragments (CF), Size, %, Structure (Zoning, Defects, Cementing etc.))
BH7	-	531377 E	0.00	0.05	OL	sandy SILT	F/C	-B	-	L	S	-	D	C	High organic matter
	7/1	6119568 N	0.05	0.25	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	PID= 0.1
	7/2		0.25	1.00	CL	sandy CLAY	C/F	YR	-	M	VSt	-	D	C	PID=0.1
BH8	-	531378 E	0.00	0.05	OL	sandy SILT	F/C	-B	-	L	S	-	D	C	High organic matter
	8/1	6119563 N	0.05	0.20	CL	z sandy CLAY	F/C	YB	-	M	St	-	D	C	PID= 0.2
	8/2		0.20	1.00	CL	sandy CLAY	F/C	R	-	M	VSt	-	D	C	PID=0.4
BH9	-	531372 E	0.00	0.05	OL	sandy SILT	F/C	-B	-	L	S	-	D	C	High organic matter
	9/1	6119562 N	0.05	0.20	CL	z sandy CLAY	F/C	YB	-	M	St	-	D	C	PID= 0.2
	9/2		0.20	1.00	CL	sandy CLAY	F/C	R	-	M	VSt	-	D	C	PID=0.1
BH11	-	531556 E	0.00	0.05	OL	sandy SILT	C	-B	-	L	S	-	D	C	-
	11/1	6119606 N	0.05	0.20	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	PID=0.0
	11/2		0.20	1.00	CL	sandy CLAY	C/F	YR	-	M	VSt	-	D	C	PID=0.1
BH12	12/1	531574 E	0.00	0.20	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	CF<50mm ; PID=0.0
	12/2	6119569 N	0.20	1.00	CL	sandy CLAY	F	YR	-	H	VSt	-	D	C	PID=0.2
BH13	-	531557 E	0.00	0.05	OL	sandy SILT	C	-B	-	L	S	-	D	C	-
	13/1	61196583 N	0.05	0.20	CL	z sandy CLAY	C/F	YB	-	M	St	-	D	C	PID=0.0
	13/2		0.20	1.00	CL	sandy CLAY	C/F	YR	-	M	VSt	-	D	C	PID=0.0





**Attachment B** : *Laboratory certificates*



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## **CERTIFICATE OF ANALYSIS 214147**

### **Client Details**

<b>Client</b>	DM McMahon Pty Ltd
<b>Attention</b>	Zach Bradley
<b>Address</b>	6 Jones St, Wagga Wagga, NSW, 2650

### **Sample Details**

<b>Your Reference</b>	<b><u>Pine Gully Rd 6-9</u></b>
<b>Number of Samples</b>	1 soil
<b>Date samples received</b>	25/03/2019
<b>Date completed instructions received</b>	26/03/2019

### **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.

### **Report Details**

<b>Date results requested by</b>	01/04/2019
<b>Date of Issue</b>	01/04/2019
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b>	

#### **Results Approved By**

Giovanni Agosti, Group Technical Manager  
Jaimie Loa-Kum-Cheung, Metals Supervisor  
Steven Luong, Organics Supervisor

#### **Authorised By**

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		214147-1
Your Reference	UNITS	2/1
Date Sampled		22/03/2019
Type of sample		soil
Date extracted	-	27/03/2019
Date analysed	-	28/03/2019
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	<25
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	<25
vTPH C <sub>6</sub> - C <sub>10</sub> 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
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	114



svTRH (C10-C40) in Soil		
Our Reference		214147-1
Your Reference	UNITS	2/1
Date Sampled		22/03/2019
Type of sample		soil
Date extracted	-	27/03/2019
Date analysed	-	28/03/2019
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	<50
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	<100
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	<100
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	<50
TRH >C <sub>10</sub> - C <sub>16</sub> less Naphthalene (F2)	mg/kg	<50
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	<100
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	96

Acid Extractable metals in soil		
Our Reference		214147-1
Your Reference	UNITS	2/1
Date Sampled		22/03/2019
Type of sample		soil
Date prepared	-	27/03/2019
Date analysed	-	27/03/2019
Arsenic	mg/kg	7
Cadmium	mg/kg	<0.4
Chromium	mg/kg	25
Copper	mg/kg	11
Lead	mg/kg	12
Mercury	mg/kg	<0.1
Nickel	mg/kg	7
Zinc	mg/kg	40
Boron	mg/kg	<3
Barium	mg/kg	53
Beryllium	mg/kg	<1
Cobalt	mg/kg	6
Manganese	mg/kg	320
Selenium	mg/kg	<2
Vanadium	mg/kg	30

Client Reference: Pine Gully Rd 6-9

Moisture		
Our Reference		214147-1
Your Reference	UNITS	2/1
Date Sampled		22/03/2019
Type of sample		soil
Date prepared	-	27/03/2019
Date analysed	-	28/03/2019
Moisture	%	4.4

**Client Reference: Pine Gully Rd 6-9**

Method ID	Methodology Summary
<b>Inorg-008</b>	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
<b>Metals-020</b>	Determination of various metals by ICP-AES.
<b>Metals-021</b>	Determination of Mercury by Cold Vapour AAS.
<b>Org-003</b>	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.
<b>Org-003</b>	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.  Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
<b>Org-014</b>	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
<b>Org-016</b>	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.
<b>Org-016</b>	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.  Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

Client Reference: Pine Gully Rd 6-9

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Date analysed	-			28/03/2019	[NT]	[NT]	[NT]	[NT]	28/03/2019	[NT]
TRH C <sub>6</sub> - C <sub>9</sub>	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C <sub>6</sub> - C <sub>10</sub>	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	91	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	95	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	95	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	117	[NT]	[NT]	[NT]	[NT]	119	[NT]

Client Reference: Pine Gully Rd 6-9

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Date analysed	-			28/03/2019	[NT]	[NT]	[NT]	[NT]	28/03/2019	[NT]
TRH C <sub>10</sub> - C <sub>14</sub>	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	78	[NT]
TRH C <sub>15</sub> - C <sub>28</sub>	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	89	[NT]
TRH C <sub>29</sub> - C <sub>36</sub>	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C <sub>10</sub> -C <sub>16</sub>	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	78	[NT]
TRH >C <sub>16</sub> -C <sub>34</sub>	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	89	[NT]
TRH >C <sub>34</sub> -C <sub>40</sub>	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-003	81	[NT]	[NT]	[NT]	[NT]	92	[NT]

Client Reference: Pine Gully Rd 6-9

QUALITY CONTROL: Acid Extractable metals in soil				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Date analysed	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	113	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	111	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Boron	mg/kg	3	Metals-020	<3	[NT]	[NT]	[NT]	[NT]	102	[NT]
Barium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Beryllium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Cobalt	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Manganese	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	122	[NT]
Selenium	mg/kg	2	Metals-020	<2	[NT]	[NT]	[NT]	[NT]	101	[NT]
Vanadium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	117	[NT]

## Result Definitions

<b>NT</b>	Not tested
<b>NA</b>	Test not required
<b>INS</b>	Insufficient sample for this test
<b>PQL</b>	Practical Quantitation Limit
<b>&lt;</b>	Less than
<b>&gt;</b>	Greater than
<b>RPD</b>	Relative Percent Difference
<b>LCS</b>	Laboratory Control Sample
<b>NS</b>	Not specified
<b>NEPM</b>	National Environmental Protection Measure
<b>NR</b>	Not Reported

## Quality Control Definitions

<b>Blank</b>	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.
<b>Duplicate</b>	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.
<b>Matrix Spike</b>	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.
<b>LCS (Laboratory Control Sample)</b>	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.
<b>Surrogate Spike</b>	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.
<p>Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, &amp; E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC &amp; ARMC 2011.</p>	



## 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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

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**

DM McMahon Pty Ltd  
 PO Box 6118  
 6 Jones St, Wagga Wagga NSW 2650  
 Ph: (02) 69 310 510

Turnaround Requirements:  Standard TAT  Non Standard or Urgent TAT (List Due Date):

Analysing Laboratory: Envirolab - Sydney  
 Project: Pine Gully Rd 6-9  
 Order No.: 5892  
 Project Manager: Zach Bradley  
 Contact Ph: (02) 69 310 510  
 Sampling Officer: Z. Bradley  
 Report Format: Default  
 Email Reports to: admin@dmmcmahon.com.au  
 cc: zach@dmmcmahon.com.au  
 Email Invoice to: admin@dmmcmahon.com.au

**For Laboratory Use Only (Circle)**  
 Custody Seal Intact? Yes No N/A  
 Free Ice / Frozen ice bricks present upon sample Yes No N/A  
 Random sample temp on receipt: °C  
 Other comments:

Relinquished by: Zach Bradley  
 Date: 22/03/2019  
 Signature:

Received by: *ECS 1114 NDT*  
 Date: 25/3/19 10:34  
 Signature:

Relinquished by:  
 Date:  
 Signature:

Received by:  
 Date:  
 Signature:

QUOTE NO.:

COC SEQUENCE NUMBER

COC:	1	2	3	4	5	6	7	8
OF:	1	2	3	4	5	6	7	8

Lab Comments:

LAB USE	SAMPLE DETAILS			CONTAINER INFORMATION		ANALYSIS REQUIRED								Additional Information							
	LAB ID	SAMPLE ID	DATE/TIME	MATRIX (ref below)	TYPE & PRESERVATIVE (see codes below)	TOTAL CONTAINERS	15 Metals	TRH	BTEXN												
		2/1	22/03/2019	Soil	Glass Jar	1	X	X	X												
<b>TOTAL</b>						<b>1</b>															

**ENVIROLAB**  
 Envirolab Services  
 12 Ashley St  
 Chatswood NSW 2067  
 Ph: (02) 9910 6200  
 Job No: 214147  
 Date Received: 25/3/19  
 Time Received: 10:34  
 Received by: LN  
 Temp: Cool/Ambient  
 Cooling: Ice/No pack  
 Security: Intact/Broken/None

**Matrix**  
 W - Water; S - Soil; Sed - Sediment; Sl - Sludge; A - Air; D - Dust.

**Container Codes:**  
 P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES1909130**  
**Client** : **DM MCMAHON PTY LTD**  
**Contact** : ZACH  
**Address** : 6 JONES ST  
                   Wagga Wagga NSW, AUSTRALIA 2650  
**Telephone** : ----  
**Project** : Pine Gully Road 6-9  
**Order number** : 5892  
**C-O-C number** : ----  
**Sampler** : ----  
**Site** : ----  
**Quote number** : EN/222  
**No. of samples received** : 17  
**No. of samples analysed** : 17

**Page** : 1 of 18  
**Laboratory** : Environmental Division Sydney  
**Contact** : Customer Services ES  
**Address** : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : +61-2-8784 8555  
**Date Samples Received** : 25-Mar-2019 13:00  
**Date Analysis Commenced** : 26-Mar-2019  
**Issue Date** : 29-Mar-2019 17:14



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
^ = This result is computed from individual analyte detections at or above the level of reporting  
ø = ALS is not NATA accredited for these tests.  
~ = Indicates an estimated value.

- EG048G: : LOR raised for Alkyl Hexavalent Chromium on various samples due to sample matrix.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero
- EG048G: Poor spike recovery for Alkyl Hexavalent Chromium due to Sample heterogeneity.
- EP068: Positive result has been confirmed by re-extraction and re analysis.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No\*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
				1/1	2/1	3/1	4/1	5/1
Client sampling date / time				22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1909130-001	ES1909130-002	ES1909130-003	ES1909130-004	ES1909130-005
				Result	Result	Result	Result	Result
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
Moisture Content	----	1.0	%	4.3	4.7	4.8	4.5	4.4
<b>EG005(ED093)T: Total Metals by ICP-AES</b>								
Arsenic	7440-38-2	5	mg/kg	5	6	8	7	7
Barium	7440-39-3	10	mg/kg	50	60	50	70	90
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	<50
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	27	25	27	24	23
Cobalt	7440-48-4	2	mg/kg	6	6	6	5	7
Copper	7440-50-8	5	mg/kg	8	11	12	11	12
Lead	7439-92-1	5	mg/kg	12	12	16	19	32
Manganese	7439-96-5	5	mg/kg	306	354	175	200	293
Nickel	7440-02-0	2	mg/kg	6	7	8	8	8
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5
Vanadium	7440-62-2	5	mg/kg	29	35	40	32	31
Zinc	7440-66-6	5	mg/kg	87	43	46	66	94
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
<b>EG048: Hexavalent Chromium (Alkaline Digest)</b>								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<5.0	<5.0	<5.0	<5.0	<5.0
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser</b>								
Weak Acid Dissociable Cyanide	----	1	mg/kg	3	<1	<1	<1	1
<b>EP066: Polychlorinated Biphenyls (PCB)</b>								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
<b>EP068A: Organochlorine Pesticides (OC)</b>								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
Client sampling date / time				1/1	2/1	3/1	4/1	5/1
22-Mar-2019 00:00								
Compound	CAS Number	LOR	Unit	ES1909130-001	ES1909130-002	ES1909130-003	ES1909130-004	ES1909130-005
				Result	Result	Result	Result	Result
<b>EP068A: Organochlorine Pesticides (OC) - Continued</b>								
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Mirex	2385-85-5	0.20	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
<b>EP068B: Organophosphorus Pesticides (OP)</b>								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	1/1	2/1	3/1	4/1	5/1
Client sampling date / time					22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1909130-001	ES1909130-002	ES1909130-003	ES1909130-004	ES1909130-005	
				Result	Result	Result	Result	Result	
<b>EP068B: Organophosphorus Pesticides (OP) - Continued</b>									
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP068C: Triazines</b>									
Atrazine	1912-24-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP068D: Pyrethroids</b>									
Bifenthrin	82657-04-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP075(SIM)A: Phenolic Compounds</b>									
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	<1	
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	<2	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
Client sampling date / time				1/1	2/1	3/1	4/1	5/1
Compound				22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
CAS Number	LOR	Unit		ES1909130-001	ES1909130-002	ES1909130-003	ES1909130-004	ES1909130-005
				Result	Result	Result	Result	Result
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
<b>EP080: BTEXN</b>								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
<b>EP066S: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	<b>94.7</b>	<b>82.5</b>	<b>90.1</b>	<b>91.4</b>	<b>84.3</b>
<b>EP068S: Organochlorine Pesticide Surrogate</b>								





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	1/1	2/1	3/1	4/1	5/1
Client sampling date / time					22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1909130-001	ES1909130-002	ES1909130-003	ES1909130-004	ES1909130-005	
				Result	Result	Result	Result	Result	
<b>EP068S: Organochlorine Pesticide Surrogate - Continued</b>									
Dibromo-DDE	21655-73-2	0.05	%	113	96.8	113	108	109	
<b>EP068T: Organophosphorus Pesticide Surrogate</b>									
DEF	78-48-8	0.05	%	106	65.8	79.7	86.4	84.3	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	78.6	82.6	79.6	80.1	77.2	
2-Chlorophenol-D4	93951-73-6	0.5	%	84.2	87.5	85.1	86.3	82.7	
2,4,6-Tribromophenol	118-79-6	0.5	%	69.2	60.4	54.8	53.8	52.0	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	91.3	95.8	94.0	94.1	91.6	
Anthracene-d10	1719-06-8	0.5	%	88.4	95.6	93.3	92.9	91.1	
4-Terphenyl-d14	1718-51-0	0.5	%	83.0	84.7	84.8	86.8	83.1	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	92.9	92.6	87.7	110	95.5	
Toluene-D8	2037-26-5	0.2	%	96.4	92.5	83.4	108	95.5	
4-Bromofluorobenzene	460-00-4	0.2	%	105	104	87.0	111	95.9	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
				6/1	7/1	8/1	9/1	11/1
Client sampling date / time				22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1909130-006	ES1909130-007	ES1909130-008	ES1909130-009	ES1909130-010
				Result	Result	Result	Result	Result
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
Moisture Content	----	0.1	%	----	----	----	----	5.6
Moisture Content	----	1.0	%	4.6	3.6	2.9	2.9	----
<b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b>								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	----	----	No
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	----	----	No
Asbestos Type	1332-21-4	-	--	----	----	----	----	-
Sample weight (dry)	----	0.01	g	----	----	----	----	51.8
APPROVED IDENTIFIER:	----	-	--	----	----	----	----	A. SMYLIE
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	----	----	No
Organic Fibre	----	0.1	g/kg	----	----	----	----	No
<b>EG005(ED093)T: Total Metals by ICP-AES</b>								
Arsenic	7440-38-2	5	mg/kg	7	6	<5	<5	----
Barium	7440-39-3	10	mg/kg	60	60	60	40	----
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	----
Boron	7440-42-8	50	mg/kg	<50	<50	<50	<50	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	25	20	17	17	----
Cobalt	7440-48-4	2	mg/kg	6	6	5	4	----
Copper	7440-50-8	5	mg/kg	12	7	9	6	----
Lead	7439-92-1	5	mg/kg	17	15	9	8	14
Manganese	7439-96-5	5	mg/kg	204	261	234	152	----
Nickel	7440-02-0	2	mg/kg	9	5	6	4	----
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	----
Vanadium	7440-62-2	5	mg/kg	32	29	24	23	----
Zinc	7440-66-6	5	mg/kg	57	23	48	95	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
<b>EG048: Hexavalent Chromium (Alkaline Digest)</b>								
Hexavalent Chromium	18540-29-9	0.5	mg/kg	<5.0	<5.0	<5.0	<5.0	----
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser</b>								
Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	2	2	1	----
<b>EP066: Polychlorinated Biphenyls (PCB)</b>								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
<b>EP068A: Organochlorine Pesticides (OC)</b>								



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	6/1	7/1	8/1	9/1	11/1
Client sampling date / time					22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1909130-006	ES1909130-007	ES1909130-008	ES1909130-009	ES1909130-010
					Result	Result	Result	Result	Result
<b>EP068A: Organochlorine Pesticides (OC) - Continued</b>									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
4,4'-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
4,4'-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
4,4'-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Mirex	2385-85-5	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
<b>EP068B: Organophosphorus Pesticides (OP)</b>									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	----



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	6/1	7/1	8/1	9/1	11/1
Client sampling date / time					22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1909130-006	ES1909130-007	ES1909130-008	ES1909130-009	ES1909130-010	
				Result	Result	Result	Result	Result	
<b>EP068B: Organophosphorus Pesticides (OP) - Continued</b>									
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	----	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
<b>EP068C: Triazines</b>									
Atrazine	1912-24-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	----	
<b>EP068D: Pyrethroids</b>									
Bifenthrin	82657-04-3	0.05	mg/kg	0.14	<0.05	<0.05	<0.05	----	
<b>EP075(SIM)A: Phenolic Compounds</b>									
Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	<1	<1	----	
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	<2	<2	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	6/1	7/1	8/1	9/1	11/1
Client sampling date / time					22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1909130-006	ES1909130-007	ES1909130-008	ES1909130-009	ES1909130-010
					Result	Result	Result	Result	Result
<b>EP080: BTEXN - Continued</b>									
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
<b>EP066S: PCB Surrogate</b>									
Decachlorobiphenyl	2051-24-3	0.1	%		84.2	85.2	87.2	91.2	----
<b>EP068S: Organochlorine Pesticide Surrogate</b>									
Dibromo-DDE	21655-73-2	0.05	%		109	103	107	103	----
<b>EP068T: Organophosphorus Pesticide Surrogate</b>									
DEF	78-48-8	0.05	%		82.8	60.7	74.9	60.6	----
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%		81.1	78.7	74.4	73.4	----
2-Chlorophenol-D4	93951-73-6	0.5	%		87.3	84.7	80.8	79.6	----
2,4,6-Tribromophenol	118-79-6	0.5	%		52.4	54.6	47.2	39.4	----
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.5	%		95.2	93.0	90.1	87.3	----
Anthracene-d10	1719-06-8	0.5	%		94.2	90.3	88.9	86.9	----
4-Terphenyl-d14	1718-51-0	0.5	%		85.6	87.6	88.6	82.6	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		106	108	93.5	97.8	----
Toluene-D8	2037-26-5	0.2	%		103	107	91.3	96.8	----
4-Bromofluorobenzene	460-00-4	0.2	%		107	108	89.9	97.2	----



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID				
				12/1	13/1	14/1	15/1	16/1
Client sampling date / time				22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00	22-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1909130-011	ES1909130-012	ES1909130-013	ES1909130-014	ES1909130-015
				Result	Result	Result	Result	Result
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
Moisture Content	----	0.1	%	3.5	4.2	6.0	4.4	5.3
<b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b>								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Sample weight (dry)	----	0.01	g	38.8	46.2	43.2	41.7	48.0
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	No	No	No
Organic Fibre	----	0.1	g/kg	No	No	No	No	No
<b>EG005(ED093)T: Total Metals by ICP-AES</b>								
Lead	7439-92-1	5	mg/kg	10	18	18	14	12



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	D1	----	----	----	----
Client sampling date / time			22-Mar-2019 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1909130-016	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
Moisture Content	----	1.0	%	3.4	----	----	----	----
<b>EG005(ED093)T: Total Metals by ICP-AES</b>								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Barium	7440-39-3	10	mg/kg	50	----	----	----	----
Beryllium	7440-41-7	1	mg/kg	<1	----	----	----	----
Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	20	----	----	----	----
Cobalt	7440-48-4	2	mg/kg	6	----	----	----	----
Copper	7440-50-8	5	mg/kg	8	----	----	----	----
Lead	7439-92-1	5	mg/kg	12	----	----	----	----
Manganese	7439-96-5	5	mg/kg	313	----	----	----	----
Nickel	7440-02-0	2	mg/kg	6	----	----	----	----
Selenium	7782-49-2	5	mg/kg	<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg	28	----	----	----	----
Zinc	7440-66-6	5	mg/kg	93	----	----	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----





### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	D1	----	----	----	----
Client sampling date / time				22-Mar-2019 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	ES1909130-016	-----	-----	-----	-----	
				Result	----	----	----	----	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	91.5	----	----	----	----	
Toluene-D8	2037-26-5	0.2	%	92.0	----	----	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	91.6	----	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RINSATE	----	----	----	----
Client sampling date / time				22-Mar-2019 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	ES1909130-017	-----	-----	-----	-----	
				Result	----	----	----	----	
<b>EG020T: Total Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----	
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----	
Barium	7440-39-3	0.001	mg/L	<0.001	----	----	----	----	
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----	
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----	
Manganese	7439-96-5	0.001	mg/L	<0.001	----	----	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----	
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----	
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----	
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----	
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----	
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----	
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	1	µg/L	<1	----	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RINSATE	----	----	----	----
Client sampling date / time				22-Mar-2019 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1909130-017	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
<b>EP080: BTEXN - Continued</b>									
Toluene	108-88-3	2	µg/L	<2	----	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----	----
^ Total Xylenes	----	2	µg/L	<2	----	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	111	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	117	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	107	----	----	----	----	----

## Analytical Results

### Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
<b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b>		
EA200: Description	11/1 - 22-Mar-2019 00:00	Mid brown soil.
EA200: Description	12/1 - 22-Mar-2019 00:00	Mid brown soil.
EA200: Description	13/1 - 22-Mar-2019 00:00	Mid brown soil.
EA200: Description	14/1 - 22-Mar-2019 00:00	Mid brown soil.
EA200: Description	15/1 - 22-Mar-2019 00:00	Mid brown soil.
EA200: Description	16/1 - 22-Mar-2019 00:00	Mid brown soil.



## Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP066S: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	39	149
<b>EP068S: Organochlorine Pesticide Surrogate</b>			
Dibromo-DDE	21655-73-2	49	147
<b>EP068T: Organophosphorus Pesticide Surrogate</b>			
DEF	78-48-8	35	143
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>ES1909130</b>	Page	: 1 of 14
Client	: <b>DM MCMAHON PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: ZACH	Contact	: Customer Services ES
Address	: 6 JONES ST Wagga Wagga NSW, AUSTRALIA 2650	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Pine Gully Road 6-9	Date Samples Received	: 25-Mar-2019
Order number	: 5892	Date Analysis Commenced	: 26-Mar-2019
C-O-C number	: ----	Issue Date	: 29-Mar-2019
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 17		
No. of samples analysed	: 17		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

- Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
  - CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
  - LOR = Limit of reporting
  - RPD = Relative Percentage Difference
  - # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2263643)</b>									
ES1909130-011	12/1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	50	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	25	5.13	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	4	5	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	7	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	20	26	22.9	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	273	298	8.80	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	31	33	4.82	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	34	35	0.00	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
ES1909130-001	1/1	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	50	50	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	27	20	29.6	0% - 50%
		EG005T: Cobalt	7440-48-4	2	mg/kg	6	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	8	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	13	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	306	297	3.23	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2263643) - continued</b>									
ES1909130-001	1/1	EG005T: Vanadium	7440-62-2	5	mg/kg	29	28	4.49	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	87	94	6.99	0% - 50%
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2261499)</b>									
ES1909111-005	Anonymous	EA055: Moisture Content	----	0.1	%	18.0	18.2	1.05	0% - 20%
ES1909121-002	Anonymous	EA055: Moisture Content	----	0.1	%	8.6	8.5	0.00	No Limit
<b>EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2261500)</b>									
ES1909130-009	9/1	EA055: Moisture Content	----	0.1	%	2.9	3.0	0.00	No Limit
ES1909141-001	Anonymous	EA055: Moisture Content	----	0.1	%	14.4	14.3	1.30	0% - 20%
<b>EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2263644)</b>									
ES1909130-001	1/1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
<b>EG048: Hexavalent Chromium (Alkaline Digest) (QC Lot: 2259488)</b>									
ES1909130-001	1/1	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<5.0	<5.0	0.00	No Limit
ES1909130-008	8/1	EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<5.0	<5.0	0.00	No Limit
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QC Lot: 2261829)</b>									
ES1909130-001	1/1	EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	3	3	0.00	No Limit
<b>EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2259332)</b>									
ES1909080-030	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
<b>EP068A: Organochlorine Pesticides (OC) (QC Lot: 2259331)</b>									
ES1909080-030	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP068A: Organochlorine Pesticides (OC) (QC Lot: 2259331) - continued</b>									
ES1909080-030	Anonymous	EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
<b>EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2259331)</b>									
ES1909080-030	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit		
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit		
<b>EP068C: Triazines (QC Lot: 2259331)</b>									
ES1909080-030	Anonymous	EP068: Atrazine	1912-24-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
<b>EP075(SIM)A: Phenolic Compounds (QC Lot: 2259330)</b>									
ES1909080-030	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
		<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2259330)</b>							
ES1909080-030	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit





Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2259330) - continued</b>										
ES1909080-030	Anonymous	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
			205-82-3							
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit			
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2259329)</b>										
ES1909130-016	D1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit	
ES1909080-030	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit	
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2259737)</b>										
ES1909130-001	1/1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit	
ES1909130-009	9/1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2259329)</b>										
ES1909130-016	D1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit	
ES1909080-030	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2259737)</b>										
ES1909130-001	1/1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
ES1909130-009	9/1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080: BTEXN (QC Lot: 2259737)</b>										



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP080: BTEXN (QC Lot: 2259737) - continued</b>									
ES1909130-001	1/1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1909130-009	9/1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EG020T: Total Metals by ICP-MS (QC Lot: 2259432)</b>									
ES1909142-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1909048-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.001	<0.001	0.00	No Limit		



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EG020T: Total Metals by ICP-MS (QC Lot: 2259432) - continued</b>									
ES1909048-001	Anonymous	EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
<b>EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2260037)</b>									
ES1909139-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
WN1902032-006	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2259462)</b>									
EB1907557-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1909144-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2259462)</b>									
EB1907557-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1909144-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 2259462)</b>									
EB1907557-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1909144-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



## Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2263643)</b>									
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86	126	
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	105	85	115	
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	113	90	113	
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----	
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	104	83	113	
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	96.0	76	128	
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	109	88	120	
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	107	86	120	
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	102	80	114	
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	107	85	117	
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	106	87	123	
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	102	75	131	
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	113	92	122	
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	112	80	122	
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 2263644)</b>									
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	86.0	70	105	
<b>EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2259488)</b>									
EG048G: Hexavalent Chromium	18540-29-9	0.5	mg/kg	<0.5	40 mg/kg	100	68	114	
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2261829)</b>									
EK028SF: Weak Acid Dissociable Cyanide	----	1	mg/kg	<1	20 mg/kg	113	70	130	
<b>EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2259332)</b>									
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	108	62	126	
<b>EP068A: Organochlorine Pesticides (OC) (QCLot: 2259331)</b>									
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	89.2	69	113	
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	91.2	65	117	
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	95.2	67	119	
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	68	116	
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	65	117	
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	67	115	
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	101	69	115	
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	62	118	
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	63	117	
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	66	116	
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.5	64	116	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>EP068A: Organochlorine Pesticides (OC) (QCLot: 2259331) - continued</b>									
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	97.7	66	116	
EP068: 4.4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	67	115	
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	67	123	
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	101	69	115	
EP068: 4.4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.6	69	121	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.6	56	120	
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	62	124	
EP068: 4.4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	96.4	66	120	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	90.0	64	122	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	95.0	54	130	
EP068: Mirex	2385-85-5	----	mg/kg	----	0.5 mg/kg	94.8	65	129	
<b>EP068B: Organophosphorus Pesticides (OP) (QCLot: 2259331)</b>									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	82.6	59	119	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	105	62	128	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	103	54	126	
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	105	67	119	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	101	70	120	
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	97.1	72	120	
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	96.5	68	120	
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	103	68	122	
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	99.8	69	117	
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	103	76	118	
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	98.7	64	122	
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	70	116	
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	101	69	121	
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	96.9	66	118	
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.2	68	124	
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	97.9	62	112	
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.4	68	120	
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	96.7	65	127	
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	41	123	
<b>EP068C: Triazines (QCLot: 2259331)</b>									
EP068: Atrazine	1912-24-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.6	68	116	
<b>EP068D: Pyrethroids (QCLot: 2259331)</b>									
EP068: Bifenthrin	82657-04-3	----	mg/kg	----	0.5 mg/kg	102	66	128	
<b>EP075(SIM)A: Phenolic Compounds (QCLot: 2259330)</b>									
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	100.0	71	125	
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	105	72	124	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>EP075(SIM)A: Phenolic Compounds (QCLot: 2259330) - continued</b>									
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	107	71	123	
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	110	67	127	
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	63.7	54	114	
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	72.1	68	126	
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	94.9	66	120	
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	97.2	70	120	
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	94.8	70	116	
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	93.7	54	114	
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	98.8	60	114	
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	22.2	10	57	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2259330)</b>									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	100	77	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	111	72	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	110	73	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	111	72	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	111	75	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	113	77	127	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	115	73	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	116	74	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	102	69	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	101	75	127	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	89.3	68	116	
	205-82-3								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	96.2	74	126	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	106	70	126	
EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	95.5	61	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	96.0	62	118	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	92.4	63	121	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2259329)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	107	75	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	108	77	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	108	71	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2259737)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	80.8	68	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2259329)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	105	77	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	107	74	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	110	63	131	



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2259737)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	82.0	68	128	
<b>EP080: BTEXN (QCLot: 2259737)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	85.6	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	85.2	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	86.3	65	117	
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	85.8	66	118	
	106-42-3								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	88.7	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	95.8	63	119	

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EG020T: Total Metals by ICP-MS (QCLot: 2259432)</b>									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.9	82	114	
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	99.7	79	119	
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.1	84	116	
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.7	84	112	
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.8	86	116	
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.9	84	116	
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.0	83	118	
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.0	85	115	
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	113	
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.4	84	116	
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	97.6	68	126	
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.9	85	113	
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.9	79	117	
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	98.3	75	129	
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 2260037)</b>									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.3	77	111	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2258583)</b>									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	75.2	70	113	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.4	81	111	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	102	67	117	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2259462)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	93.4	75	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2258583)</b>									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	87.3	76	112	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	101	65	118	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2258583) - continued</b>									
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	101	77	119	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2259462)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	96.6	75	127	
<b>EP080: BTEXN (QCLot: 2259462)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	100	70	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.0	69	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	97.0	70	120	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	97.8	69	121	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	99.7	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	85.4	70	120	

### Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Low	High
<b>EG005(ED093): Total Metals by ICP-AES (QCLot: 2263643)</b>							
ES1909130-001	1/1	EG005T: Arsenic	7440-38-2	50 mg/kg	90.5	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.3	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	89.5	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	96.2	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	97.1	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	99.6	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	100	70	130
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 2263644)</b>							
ES1909130-001	1/1	EG035T: Mercury	7439-97-6	5 mg/kg	105	70	130
<b>EG048: Hexavalent Chromium (Alkaline Digest) (QCLot: 2259488)</b>							
ES1909130-001	1/1	EG048G: Hexavalent Chromium	18540-29-9	40 mg/kg	# 4.70	70	130
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser (QCLot: 2261829)</b>							
ES1909130-001	1/1	EK028SF: Weak Acid Dissociable Cyanide	----	40 mg/kg	89.2	70	130
<b>EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2259332)</b>							
ES1909080-030	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	103	70	130
<b>EP068A: Organochlorine Pesticides (OC) (QCLot: 2259331)</b>							
ES1909080-030	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	81.9	70	130





Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP068A: Organochlorine Pesticides (OC) (QCLot: 2259331) - continued</b>							
ES1909080-030	Anonymous	EP068: Heptachlor	76-44-8	0.5 mg/kg	84.5	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	75.8	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	91.7	70	130
		EP068: Endrin	72-20-8	2 mg/kg	104	70	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	82.0	70	130
<b>EP068B: Organophosphorus Pesticides (OP) (QCLot: 2259331)</b>							
ES1909080-030	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	82.8	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	96.7	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	94.3	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	78.6	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	95.7	70	130
<b>EP075(SIM)A: Phenolic Compounds (QCLot: 2259330)</b>							
ES1909080-030	Anonymous	EP075(SIM): Phenol	108-95-2	10 mg/kg	93.6	70	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	97.7	70	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	71.8	60	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	87.6	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	40.0	20	130
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2259330)</b>							
ES1909080-030	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	102	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	108	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2259329)</b>							
ES1909080-030	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	111	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	123	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	130	52	132
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2259737)</b>							
ES1909130-001	1/1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	107	70	130
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2259329)</b>							
ES1909080-030	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	115	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	118	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	121	52	132
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2259737)</b>							
ES1909130-001	1/1	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	105	70	130
<b>EP080: BTEXN (QCLot: 2259737)</b>							
ES1909130-001	1/1	EP080: Benzene	71-43-2	2.5 mg/kg	99.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	99.0	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	101	70	130



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report				
				Spike	SpikeRecovery(%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
<b>EP080: BTEXN (QCLot: 2259737) - continued</b>								
ES1909130-001	1/1	EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	99.4	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	100	70	130	
		EP080: Naphthalene	91-20-3	2.5 mg/kg	107	70	130	

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report				
				Spike	SpikeRecovery(%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
<b>EG020T: Total Metals by ICP-MS (QCLot: 2259432)</b>								
ES1909048-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	91.1	70	130	
		EG020A-T: Beryllium	7440-41-7	1 mg/L	94.6	70	130	
		EG020A-T: Barium	7440-39-3	1 mg/L	93.6	70	130	
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	94.6	70	130	
		EG020A-T: Chromium	7440-47-3	1 mg/L	92.5	70	130	
		EG020A-T: Cobalt	7440-48-4	1 mg/L	94.5	70	130	
		EG020A-T: Copper	7440-50-8	1 mg/L	93.4	70	130	
		EG020A-T: Lead	7439-92-1	1 mg/L	91.4	70	130	
		EG020A-T: Manganese	7439-96-5	1 mg/L	90.1	70	130	
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.8	70	130	
		EG020A-T: Vanadium	7440-62-2	1 mg/L	92.6	70	130	
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.6	70	130	
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 2260037)</b>								
ES1909130-017	RINSATE	EG035T: Mercury	7439-97-6	0.01 mg/L	88.6	70	130	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 2259462)</b>								
EB1907557-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	118	70	130	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2259462)</b>								
EB1907557-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	118	70	130	
<b>EP080: BTEXN (QCLot: 2259462)</b>								
EB1907557-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.0	70	130	
		EP080: Toluene	108-88-3	25 µg/L	94.5	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.1	70	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	94.1	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	100	70	130	
EP080: Naphthalene	91-20-3	25 µg/L	91.4	70	130			



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1909130	Page	: 1 of 10
Client	: DM MCMAHON PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: ZACH	Telephone	: +61-2-8784 8555
Project	: Pine Gully Road 6-9	Date Samples Received	: 25-Mar-2019
Site	: ----	Issue Date	: 29-Mar-2019
Sampler	: ----	No. of samples received	: 17
Order number	: 5892	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
EG048: Hexavalent Chromium (Alkaline Digest)	ES1909130--001	1/1	Hexavalent Chromium	18540-29-9	4.70 %	70-130%	Recovery less than lower data quality objective

### Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Samples Submitted</b>							
EP075(SIM)S: Phenolic Compound Surrogates	ES1909130-009	9/1	2.4.6-Tribromophenol	118-79-6	39.4 %	40-138 %	Recovery less than lower data quality objective

### Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
<b>Laboratory Duplicates (DUP)</b>					
TRH - Semivolatile Fraction	0	12	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>					
TRH - Semivolatile Fraction	0	12	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

### Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EA055: Moisture Content (Dried @ 105-110°C)</b>								
<b>Soil Glass Jar - Unpreserved (EA055)</b>								
1/1, 3/1, 5/1, 7/1, 9/1, 12/1, 14/1, 16/1,	2/1, 4/1, 6/1, 8/1, 11/1, 13/1, 15/1, D1	22-Mar-2019	----	----	----	27-Mar-2019	05-Apr-2019	✓



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b>								
<b>Snap Lock Bag - Subsampled by ALS (EA200)</b>								
11/1, 13/1, 15/1,	12/1, 14/1, 16/1	22-Mar-2019	----	----	----	28-Mar-2019	18-Sep-2019	✓
<b>EG005(ED093)T: Total Metals by ICP-AES</b>								
<b>Soil Glass Jar - Unpreserved (EG005T)</b>								
1/1, 3/1, 5/1, 7/1, 9/1, 12/1, 14/1, 16/1,	2/1, 4/1, 6/1, 8/1, 11/1, 13/1, 15/1, D1	22-Mar-2019	28-Mar-2019	18-Sep-2019	✓	28-Mar-2019	18-Sep-2019	✓
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
<b>Soil Glass Jar - Unpreserved (EG035T)</b>								
1/1, 3/1, 5/1, 7/1, 9/1,	2/1, 4/1, 6/1, 8/1, D1	22-Mar-2019	28-Mar-2019	19-Apr-2019	✓	29-Mar-2019	19-Apr-2019	✓
<b>EG048: Hexavalent Chromium (Alkaline Digest)</b>								
<b>Soil Glass Jar - Unpreserved (EG048G)</b>								
1/1, 3/1, 5/1, 7/1, 9/1	2/1, 4/1, 6/1, 8/1,	22-Mar-2019	27-Mar-2019	19-Apr-2019	✓	27-Mar-2019	03-Apr-2019	✓
<b>EK028SF: Weak Acid Dissociable CN by Segmented Flow Analyser</b>								
<b>Soil Glass Jar - Unpreserved (EK028SF)</b>								
1/1, 3/1, 5/1, 7/1, 9/1	2/1, 4/1, 6/1, 8/1,	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	28-Mar-2019	10-Apr-2019	✓



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP066: Polychlorinated Biphenyls (PCB)</b>								
<b>Soil Glass Jar - Unpreserved (EP066)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✔	27-Mar-2019	06-May-2019	✔	
<b>EP068A: Organochlorine Pesticides (OC)</b>								
<b>Soil Glass Jar - Unpreserved (EP068)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✔	27-Mar-2019	06-May-2019	✔	
<b>EP068B: Organophosphorus Pesticides (OP)</b>								
<b>Soil Glass Jar - Unpreserved (EP068)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✔	27-Mar-2019	06-May-2019	✔	
<b>EP068C: Triazines</b>								
<b>Soil Glass Jar - Unpreserved (EP068)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✔	27-Mar-2019	06-May-2019	✔	
<b>EP068D: Pyrethroids</b>								
<b>Soil Glass Jar - Unpreserved (EP068)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✔	27-Mar-2019	06-May-2019	✔	
<b>EP075(SIM)A: Phenolic Compounds</b>								
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✔	27-Mar-2019	06-May-2019	✔	



Matrix: **SOIL**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>								
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	06-May-2019	✓	
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>Soil Glass Jar - Unpreserved (EP080)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1, D1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	05-Apr-2019	✓	
<b>Soil Glass Jar - Unpreserved (EP071)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1, D1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	28-Mar-2019	06-May-2019	✓	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
<b>Soil Glass Jar - Unpreserved (EP080)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1, D1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	05-Apr-2019	✓	
<b>Soil Glass Jar - Unpreserved (EP071)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1, D1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	28-Mar-2019	06-May-2019	✓	
<b>EP080: BTEXN</b>								
<b>Soil Glass Jar - Unpreserved (EP080)</b>								
1/1, 2/1, 3/1, 4/1, 5/1, 6/1, 7/1, 8/1, 9/1, D1	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	05-Apr-2019	✓	

Matrix: **WATER**

Evaluation: \* = Holding time breach ; ✓ = Within holding time.



Matrix: **WATER** Evaluation: \* = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EG020T: Total Metals by ICP-MS</b>							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RINSATE	22-Mar-2019	27-Mar-2019	18-Sep-2019	✓	27-Mar-2019	18-Sep-2019	✓
<b>EG035T: Total Recoverable Mercury by FIMS</b>							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RINSATE	22-Mar-2019	----	----	----	27-Mar-2019	19-Apr-2019	✓
<b>EP080/071: Total Petroleum Hydrocarbons</b>							
Amber Glass Bottle - Unpreserved (EP071) RINSATE	22-Mar-2019	26-Mar-2019	29-Mar-2019	✓	28-Mar-2019	05-May-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) RINSATE	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	05-Apr-2019	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>							
Amber Glass Bottle - Unpreserved (EP071) RINSATE	22-Mar-2019	26-Mar-2019	29-Mar-2019	✓	28-Mar-2019	05-May-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) RINSATE	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	05-Apr-2019	✓
<b>EP080: BTEXN</b>							
Amber VOC Vial - Sulfuric Acid (EP080) RINSATE	22-Mar-2019	27-Mar-2019	05-Apr-2019	✓	27-Mar-2019	05-Apr-2019	✓





## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Matrix Spikes (MS) - Continued</b>							
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
WAD Cyanide by Segmented Flow Analyser	EK028SF	1	9	11.11	5.00	✔	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	12	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	12	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> ) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Hexavalent Chromium by Alkaline Digestion and DA Finish	EG048G	SOIL	In house: Referenced to USEPA SW846, Method 3060A. Hexavalent chromium is extracted by alkaline digestion. The digest is determined by photometrically by automatic discrete analyser, following pH adjustment. The instrument uses colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
WAD Cyanide by Segmented Flow Analyser	EK028SF	SOIL	In house: Referenced to APHA 4500-CN-O. Caustic leachates of soil samples are introduced into an automated segmented flow analyser. Hydrogen cyanide is liberated from a slightly acidified (pH 4.5) and is dialysed. Tight cyanide complexes that would not be amenable to oxidation by chlorine are not converted. Iron cyanide complexes are precipitated with zinc acetate. Liberated HCN diffuses through a membrane into a stream of sodium hydroxide where it is carried as CN- The cyanide in caustic solution is buffered to pH 5.2 and further converted to cyanogen chloride by reaction with chloramine-T. Cyanogen chloride subsequently reacts with 4-pyridine carboxylic and 1,3-dimethylbarbituric acids to give a red colour complex. This colour is measured at 600 nm. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)



Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl <sub>2</sub> )(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl <sub>2</sub> which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
NaOH leach for CN in Soils	CN-PR	SOIL	In house: APHA 4500 CN. Samples are extracted by end-over-end tumbling with NaOH.
Alkaline digestion for Hexavalent Chromium	EG048PR	SOIL	In house: Referenced to USEPA SW846, Method 3060A.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na <sub>2</sub> SO <sub>4</sub> and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.



**Chain of Custody**  
 Environmental Laboratory  
 100 Macquarie Street  
 Sydney NSW 2000  
 Phone: (02) 9550 1111

Relinquished by: Zach Bradley  
 Date: 22/03/2019  
 Signature: *[Signature]*

Received by: *[Signature]*  
 Date: 21.03.19  
 Signature: *[Signature]*

Turnaround Requirements:  Standard TAT  Non Standard or Urgent TAT (List Due Date):  
 Analysing Laboratory: ALS-Sydney  
 Project: Pine Gully Rd 6-9  
 Order No.: 5892  
 Project Manager: Zach Bradley  
 Contact Ph: (02) 69 310 510  
 Sampling Officer: Z. Bradley  
 Report Format: Default  
 Email Reports to: [admin@dmcmahon.com.au](mailto:admin@dmcmahon.com.au)  
 Email Invoice to: [admin@dmcmahon.com.au](mailto:admin@dmcmahon.com.au)  
 Lab Comments:

QUOTE NO.: EN/222/18  
 COC SEQUENCE NUMBER  
 COC: 1 2 3 4 5 6 7 8  
 OF: 1 2 3 4 5 6 7 8

LAB ID	SAMPLE ID	DATE/TIME	MATRIX (ref below)	TYPE & PRESERVATIVE (see codes below)	TOTAL CONTAINERS	P - 21/1	EG005T - Lead	EA200	Comments on likely contaminant levels, dilutions, or samples resulting specific QC analysis etc.
1	1/1	22/03/2019	Soil	Glass Jar	1	✓			
2	2/1	22/03/2019	Soil	Glass Jar	1	✓			
3	3/1	22/03/2019	Soil	Glass Jar	1	✓			
4	4/1	22/03/2019	Soil	Glass Jar	1	✓			
5	5/1	22/03/2019	Soil	Glass Jar	1	✓			
6	6/1	22/03/2019	Soil	Glass Jar	1	✓			
7	7/1	22/03/2019	Soil	Glass Jar	1	✓			
8	8/1	22/03/2019	Soil	Glass Jar	1	✓			
9	9/1	22/03/2019	Soil	Glass Jar	1	✓			
10	11/1	22/03/2019	Soil	Glass Jar	1	✓			
					10				

*Handwritten notes:*  
 Relinquished By / Date:  
 Organised By / Date:  
 Relinquished By / Date:  
 Canote / Courier:  
 WOTter  
 Attach By PO / Internal Sheet

W: Water; S: Soil; P: Unreserved Plastic; N: Nitric Preserved Plastic; ORC: Nitric Preserved ORC; SH: Sodium Hydroxide/Ca Preserved; S: Sodium Hydroxide Preserved Plastic; AG: Amber Glass Unreserved; AP: Airtight Unreserved; Sed: Sediment; SI: Sludge; A: Air; D: Dust; Sodium Bisulphate Preserved; VS: VOA Vial Sulphur Preserved; AV: Airtight Unreserved Vial SG: Sulphur Preserved Amber Glass; H: HDI Preserved Plastic; HS: HDI Preserved Speciation bottles; SP: Sulphur Preser; Acetate Preserved Bottle; E: EDTA Preserved Bottles; ST: Sterile Bottle; ASS: Plastic Bag for Acid Sulphate Soils; B: Unreserved Bag.

Environmental Division  
 Sydney  
 Work Order Reference  
**ES1909130**  
 Telephone: +61-2-8794 9555



McMahon Earth Science  
 1100 ...  
 ...

Relinquished by: Zach Bradley  
 Date: 22/03/2019  
 Signature: *[Signature]*

Received by: *[Signature]*  
 Date: 22/03/2019  
 Signature: *[Signature]*

Relinquished by: *[Signature]*  
 Date: *[Signature]*

Received by: *[Signature]*  
 Date: *[Signature]*

Turnaround Requirements:  Standard TAT  Non Standard or Urgent TAT (List Due Date):

Analysing Laboratory: ALS - Sydney  
 Project: Pine Gully Rd 6-9  
 Order No.: 5892  
 Project Manager: Zach Bradley  
 Contact Ph: (02) 69 310 510  
 Reporting Officer: Z. Bradley  
 Report Format: Default  
 Email Reports to: admin@dmcmahon.com.au  
 cc: zach@dmcmahon.com.au  
 Email Invoice to: admin@dmcmahon.com.au

Lab Comments:

QUOTE NO.: EN/222/18

COC SEQUENCE NUMBER

COC: 1 2 3 4 5 6 7 8  
 OF: 1 2 3 4 5 6 7 8

LAB ID	SAMPLE ID	DATE/TIME	MATRIX (ref below)	TYPE & PRESERVATIVE (see codes below)	TOTAL CONTAINERS	EG005T - Lead	EA200	S - 3	S - 4	W - 3	W - 4	Comments on likely contaminant levels, dilutions, or samples requiring specific OC analysis etc.
11	12/1	22/03/2019	Soil	Glass Jar	1	✓	✓					
12	13/1	22/03/2019	Soil	Glass Jar	1	✓	✓					
13	14/1	22/03/2019	Soil	Glass Jar	1	✓	✓					
14	15/1	22/03/2019	Soil	Glass Jar	1	✓	✓					
15	16/1	22/03/2019	Soil	Glass Jar	1	✓	✓					
16	D1	22/03/2019	Soil	Glass Jar	1			✓				
17	RINSATE	22/03/2019	Water	N, VOA(2), AG	3					✓	✓	
					9							

AV = Vialers' Soil  
 Sed = Sediment; Sl = Sludge;  
 A = Air; D = Dust

P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SM = Sodium Hydroxide/Cl Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Air/Right Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Air/Right Unpreserved Vial SG = Sulfuric Preserved Amber Glass; N = HCl Preserved Plastic; HS = HCl Preserved Speedation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag



**Attachment C** : *PID calibration certificate*

**PID Calibration Certificate**

Instrument **PhoCheck Tiger**  
 Serial No. **T-107188**



**Air-Met Scientific Pty Ltd**  
 1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

**Certificate of Calibration**

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode      Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
PID Lamp		98ppm Isobutylene	NATA	SY137	97.9ppm

Calibrated by: *Sarah Lian* Sarah Lian

Calibration date: 12/03/2019

Next calibration due: 8/09/2019