

# **GROUND TECHNOLOGIES**

## **Geotechnical Testing Services**

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Dear Sir,

**RE: Preliminary Geotechnical and Environmental Investigation  
at Lots 23 & 24 Hollingsworth Road, Marsden Park.**

This letter presents a report on the inspection and testing services associated with the geotechnical investigation at the above mentioned location.

Should you have any questions related to this report please do not hesitate to contact the undersigned.

For and on behalf of  
**Ground Technologies Pty Ltd**



**A. Bennett**  
*Senior Geotechnical Engineer*

**Reviewed By**



**J. Harendran**  
*Geotechnical Engineer*

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## 1. EXECUTIVE SUMMARY

Ground Technologies Pty Ltd (Ground Tech) has prepared this report to provide a preliminary geotechnical and environmental model for Lot Nos.23 and 24 Hollingsworth Road, Marsden Park (herein referred to as the “site”). It is understood that the site is to be re-developed for industrial use and will require cut to fill operations in order to create level building pads. No further design details were available at the time of preparing this report.

The subject site is located at the end of the cul-de-sac constructed at the western end of Hollingsworth Road. Covering almost 22 hectares, the semi rural allotment is vacant except for two dams that have been constructed within the western end of the site. The ground is covered by a healthy grass and contains numerous large native trees, all of which appear in good health. Ground slopes within the eastern portion of the site feature a drainage channel that traverses the site in a north to south direction. Ground slopes fall towards this drainage channel by slopes of between approximately 2°-25°. Ground slopes within the western portion fall towards the west by slopes of between approximately 2°-10°.

The site appears to have been historically utilized for rural/residential purposes. No market gardening or heavy agriculture was identified within the site during the desktop study. No heavy industrial operations were identified within the site during the desktop study. A search of the NSW EPA Contaminated Land Management record of notices revealed that there were no notices issued to the subject site. No history of dangerous manufacturing utilizing heavy chemicals or metals was documented. No history of heavy chemicals or metals storage was documented.

The geotechnical investigation included drilling thirteen (13) boreholes using 4WD Toyota Landcruiser Drill Rig with flight augers at locations shown on Figure 7. Two (2) bulk samples were recovered for geotechnical testing, twelve (12) samples were recovered for environmental testing and seven (7) samples were recovered for salinity testing.

The 1:100,000 scale Geological Series Map of the Sydney region indicates that the subject site is underlain by Bringelly Shale of the Wianamatta Group dating back to the Middle Triassic period and generally comprises *shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, and rare coal / tuff*. The boreholes confirmed this profile with the subsurface soils to comprise a medium to high plasticity clay soil extending to a sandstone or shale bedrock at depths of between 0.7-3.2m below existing ground surface levels.

Ground slopes within the site were observed as being relatively smooth and no major stockpiles of dumped soils were observed. The majority of the demolition rubble from the removal of the structures had been removed. This indicates a low risk of widespread filling / dumping across the site. Minor pockets of site filling were observed during the site walk over. Preliminary testing indicates that the material located at Fill area 1 will need to be excavated and disposed of as Restricted Solid Waste – Asbestos Contaminated Material. This could be downgraded to General Solid Waste – Asbestos Contaminated Material subject to further Toxicity Characteristic Leachate Potential (TCLP) testing. The material located at Fill areas 2 through 4 can be classified as General Solid Waste. This material has the potential to be classified as Excavated Natural Material (ENM) subject to further laboratory analysis.

The subsurface profile encountered was consistent with the surrounding regional geology. Subject to the filling and being validated and controlled, the site is suitable for the proposed development.

Laboratory test results indicate that the soil salinity is predominately moderately saline. Ground slabs should have a minimum 25MPa concrete and 50mm cover. The laboratory test values of sulphates, chlorides and pH indicate that the soil is mildly aggressive to both steel and concrete. Piles should have a minimum 32MPa concrete and 60mm cover.

The results of the desk top study and chemical analyses indicate that the site does not present a significant contamination risk to human health or the environment in a ‘Commercial / Industrial’ (‘D’).

## 2. INTRODUCTION

Ground Technologies Pty Ltd (Ground Tech) has prepared this report to provide a preliminary geotechnical and environmental model for Lot Nos.23 and 24 Hollingsworth Road, Marsden Park (herein referred to as the “site”). It is understood that the site is to be re-developed for industrial use and will require cut to fill operations in order to create level building pads. No further design details were available at the time of preparing this report.

The geotechnical investigation included drilling thirteen (13) boreholes using 4WD Toyota Landcruiser Drill Rig with flight augers at locations shown on Figure 7. Two (2) bulk samples were recovered for geotechnical testing, twelve (12) samples were recovered for environmental testing and seven (7) samples were recovered for salinity testing. This report provides a preliminary geotechnical and environmental assessment of the existing soil and rock conditions.

This report is based only on the information provided at the time of this report preparation and may not be valid if changes are made to the site or to the construction method.

### 2.1 Site Details

The following information, presented in Table 1, describes the site.

**Table 1: Summary of Site Details**

|                          |                                      |
|--------------------------|--------------------------------------|
| <b>Site Address</b>      | Hollingsworth Road, Marsden Park NSW |
| <b>Council Area</b>      | Blacktown City Council               |
| <b>Lot &amp; DP. No.</b> | Lots 23 & 24 in DP262886             |

**Figure 1 – Site Location**



## 2.2 Geology

The 1:100,000 scale Geological Series Map of the Sydney region indicates that the subject site is underlain by Bringelly Shale of the Wianamatta Group dating back to the Middle Triassic period and generally comprises *shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, and rare coal / tuff.*

## 2.3 Site Description

The subject site is located at the end of the cul-de-sac constructed at the western end of Hollingsworth Road. Covering almost 22 hectares, the semi rural allotment is vacant except for two dams that have been constructed within the western end of the site. The ground is covered by a healthy grass and contains numerous large native trees, all of which appear in good health.

Ground slopes within the eastern portion of the site feature a drainage channel that traverses the site in a north to south direction. Ground slopes fall towards this drainage channel by slopes of between approximately 2°-25°. Ground slopes within the western portion fall towards the west by slopes of between approximately 2°-10°.

**Photograph 1 – South East Corner of Site**



**Photograph 2 – Central Portion of Site**



**Photograph 3 – Western Portion of Site**



## 2.4 Site History

A review of Historical Aerial Photographs was undertaken in order to provide a greater insight into the site history.

1955 – In 1955, the site is vacant. Hollingsworth Road has not been constructed. The region appears to be vacant and covered with trees. The quarry to the north-west of the site is not yet in operation. The approximate location of the subject site is highlighted in figure 2.

**Figure 2 – Aerial Photograph from 1955**



1971 – In 1971, the site is still vacant. Hollingsworth Road has not been constructed. The region appears to be vacant and covered with trees with minor agricultural operations underway to the south of the site. The location of the subject site is highlighted in Figure 3.

**Figure 3 – Aerial Photograph from 1971**



1986 – In 1986, the site is has been cleared. Minor structures and dams have been constructed. No discernible land use can be determined from the aerial photograph, however no significant agricultural operations are observed. Hollingsworth Road has been constructed to service the site. The residential facility to the north of the site has been constructed and the Plumpton subdivision has been established to the south. The location of the subject site is highlighted in Figure 4.

**Figure 4 – Aerial Photograph from 1986**



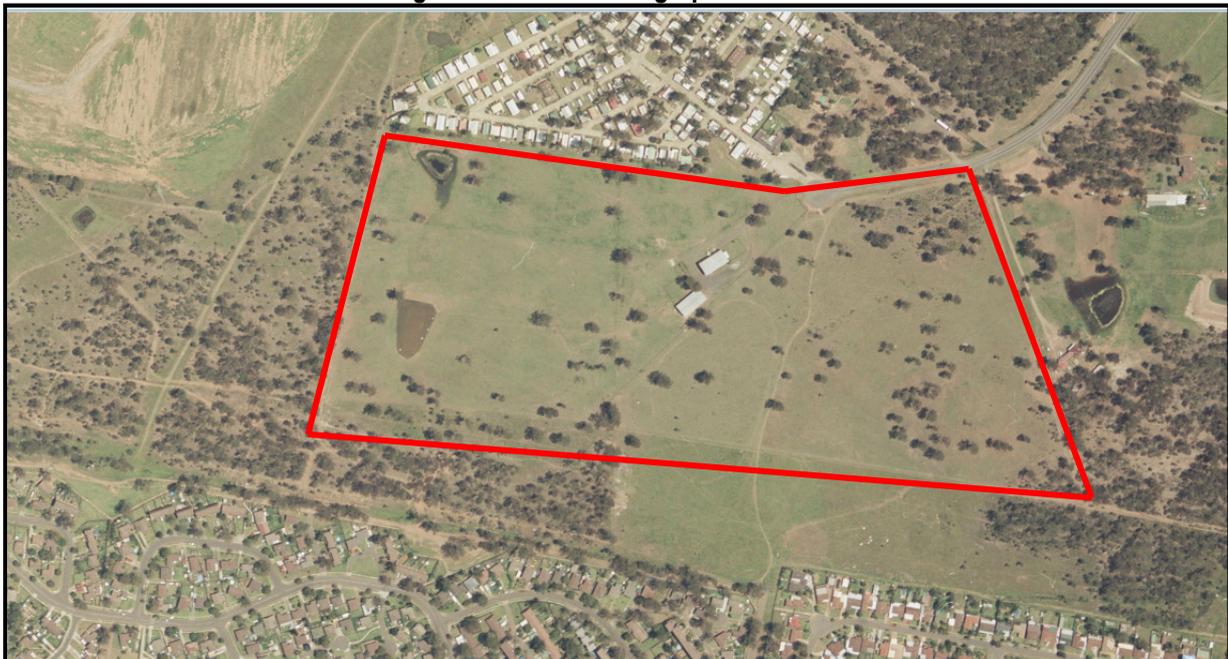
1995 – In 1995, the farm dam in the south-west corner of the site has been constructed. The minor structures within the central portion of the site remain. No discernible land use can be determined from the aerial photograph, however no significant agricultural operations are observed. Hollingsworth Road has been constructed to service the site. The location of the subject site is highlighted in Figure 5.

**Figure 5 – Aerial Photograph from 1995**



2005 – In 2005, no significant changes to the site were observed since 1995. No discernible land use can be determined from the aerial photograph, however no significant agricultural operations are observed. The location of the subject site is highlighted in Figure 6.

**Figure 6 – Aerial Photograph from 2005**



### 3. GEOTECHNICAL INVESTIGATION

Fieldwork was undertaken on the 29<sup>th</sup> of March 2016 and included drilling thirteen boreholes (BH1 – BH13) using a 4WD Toyota Landcruiser Ute mounted drill rig with 100 mm solid flight spiral augers at the locations shown on Figure 7. Pocket Penetrometer tests were undertaken within the clay profile recovered from the boreholes. Two bulk samples were recovered and sent to the Ground Technologies NATA accredited laboratory in order to determine the California Bearing Ratio (CBR) and Atterberg Limits of the subgrade profile.

**Figure 7 – Borehole Locations**



#### 3.1 Soil Profiles

Six (6) distinct geological units were encountered during the field investigation. These units are detailed in Table 2 and the approximate depth of each unit is detailed in Table 3. Full borehole log and field observations are presented in Appendix A.

**Table 2: Summary of Geological Units**

| UNIT   | SOIL TYPE  |
|--------|--|
| UNIT A | FILL, admixed Silty Clay, with minor sand and ironstone gravels, brown, grey, red, white, orange. The fill appeared to be well compacted   |
| UNIT B | TOPSOIL: Sandy SILT, pale brown, pale grey/brown   |
| UNIT C | NATURAL CLAY: Silty CLAY, medium plasticity, mottled yellow, orange, white or mottled red/brown and orange or mottled orange and pale grey/brown OR Sandy CLAY, pale brown with yellow mottling. Mostly stiff to very stiff, dry to slightly moist |
| UNIT D | NATURAL: Silty CLAY / Completely Weathered Rock (Shale or Sandstone) predominately pale grey with red minor red with pale grey and white mottling  |
| UNIT E | BEDROCK: Sandstone, extremely weathered, low strength, grey, pale grey, red, white, brown, orange  |
| UNIT F | BEDROCK: SHALE, extremely weathered, low strength, brown, grey, dark grey  |

Note: The completely weathered rock (Unit D) is a material with the appearance of clay. It is differentiated from the overlying residual clay profile by the presence of a rock texture (i.e. remnant bedding) and a 'soapy' feel with polishing of excavated surface.

**Table 3: Depth of each Geological Unit**

| Borehole | Geological Unit |         |              |                        |                        |                    |
|----------|-----------------|---------|--------------|------------------------|------------------------|--------------------|
|          | Unit A          | Unit B  | Unit C       | Unit D                 | Unit E                 | Unit E             |
|          | FILL            | Topsoil | Natural Clay | Natural Clay / CW Rock | Low Strength Sandstone | Low Strength Shale |
| BH1      | -               | 0-0.2m  | 0.2-0.7m     | 0.7-3.1m               | -                      | 3.1-4.5m           |
| BH2      | -               | 0-0.1m  | 0.1-1.0m     | 1.0-2.3m               | 2.3-3.2m               | 3.2-4.5m           |
| BH3      | -               | 0-0.1m  | 0.1-0.7m     | 0.7-1.8m               | -                      | 1.8-4.5m           |
| BH4      | -               | 0-0.3m  | 0.3-0.9m     | 0.9-3.2m               | -                      | 3.2-4.5m           |
| BH5      | -               | 0-0.1m  | 0.1-0.8m     | 0.8-3.2m               | -                      | 3.2-4.5m           |
| BH6      | -               | 0-0.1m  | 0.1-0.5m     | 0.5-3.7m               | 1.5-1.8m               | 3.7-4.5m           |
| BH7      | -               | -       | 0-0.5m       | 0.5-1.2m               | 1.2-2.7m               | 2.7-4.5m           |
| BH8      | -               | 0-0.1m  | 0.1-0.7m     | 0.7-1.9m               | 1.9-2.9m*              | -                  |
| BH9      | 0-1.2m          | -       | -            | 1.2-1.9m               | 1.9-4.5m               | -                  |
| BH10     | -               | 0-0.2m  | 0.2-1.0m     | 1.0-1.9m               | 1.9-3.0m               | -                  |
| BH11     | -               | 0-0.2m  | 0.2-0.8m     | -                      | 0.8-3.0m               | -                  |
| BH12     | -               | 0-0.2m  | -            | 0.2-2.2m               | 2.2-3.0m               | -                  |
| BH13     | -               | 0-0.3m  | -            | 0.3-1.2m               | 1.2-4.5m               | -                  |

Note\* - Borehole terminated at 2.9m due to rig refusal on sandstone bedrock

### 3.2 Groundwater

Groundwater was not encountered during the course of the investigation

### 3.3 Laboratory Testing

Two (2) representative soil sample of the subgrade material (Unit C and Unit D) were submitted to Ground Technologies NATA accredited soil laboratory for testing to determine the four day soaked California Bearing Ratio (CBR) value and Atterberg Limits. The laboratory test results are provided in Appendix B and are summarised in Table 4 below.

**Table 4: California Bearing Ratio Test Results**

| Soil Type  | Unit | CBR  | Liquid Limit | Plastic Limit | Plasticity Index |
|--|------|------|--------------|---------------|------------------|
| Silty Clay, medium plasticity, mottled yellow, orange, white | C    | 2%   | 59%          | 20%           | 39%              |
| Silty Clay / Completely Weathered Shale, pale grey with red  | D    | 2.5% | 72%          | 19%           | 53%              |

### 3.4 Site Fill

Ground slopes within the site were observed as being relatively smooth and no major stockpiles of dumped soils were observed. The majority of the demolition rubble from the removal of the structures had been removed. This indicates a low risk of widespread filling / dumping across the site.

Minor pockets of site filling were observed during the site walk over, at the locations shown in Figure 8. The origin of this fill was unknown.

Fill area 1 was approximately 20m by 20m and up to 1.2m deep. The material comprised sand, clay, gravel and minor foreign material (brick, glass).

Fill area 2 was a raised platform constructed as a foundation for one of the previous structures. The platform was approximately 20m by 10m and up to 1.0m deep. The material comprised a silty clay with minor sand and gravel. Minor cement sheeting (see photograph 4) was observed within this area. Although not suspected of being asbestos, this material was nonetheless submitted for asbestos identification

**Photograph 4 – Cement Sheeting**



Fill area 3 comprised several small stockpiles of dumped soil spoil. The platform was approximately 20m by 10m and up to 1.0m deep. The material comprised a silty clay with minor sand and gravel.

Fill area 4 was identified during the drilling of borehole BH9 and is suspected to be a farm dam identified in Figure 5 that has been filled in.

**Figure 8 – Location of Identified Fill**



It is possible that other minor pockets of fill exist across the site, however these can only be revealed once site vegetation has been stripped.

Preliminary contamination testing and classification of the fill has been undertaken within section 5.7 of this report.

### 3.5 Conclusion

The subsurface profile encountered was consistent with the surrounding regional geology. Subject to the filling and being validated and controlled, the site is suitable for the proposed development.

#### 4. PRELIMINARY SALINITY ASSESSMENT

Salt is a naturally occurring mineral that forms in a number of ways. It is a product of rock weathering, especially marine sedimentary rocks. It is picked up by wind blowing over the oceans and carried inland as salt laden moisture. Dispersed salt on the soil surface can be concentrated by the action of the wind. These salt deposits are buried over millions of years, but can later be exposed by erosion or the salt can be mobilised by groundwater.

Salt is a natural part of some landscapes, for example, in inland salt pans, brackish streams, coastal salt marshes and naturally saline soils. However, where human activities such as vegetation clearing, cropping, and housing development have disturbed natural ecosystems and changed the hydrology of the landscape, the movement of salt into rivers and on land is accelerated. This is affecting the natural environment, reducing the viability of the agricultural sector and damaging infrastructure.

Salinity is a dynamic process with the potential for the movement and accumulation of salts to change over time and as a result of land use and management practices. The processes of salinity vary at different scales such as individual sites, regions and whole river catchments, so the impacts can be close to or distant from the cause, depending on the landscape and groundwater characteristics.

The impacts of salinity depend on factors such as the susceptibility of the landscape, land use practices, the type of salt, length and frequency of wetting and drying cycles, the salt concentration in the landscape and the amount of water available.

Urban salinity is mainly caused by rising groundwater bringing salts to the land surface. Towns are often located in areas prone to salinity (such as plains, valleys, or at the foot of a ridge). In addition to the regional causes a rise in groundwater levels (see dry land salinity), urban development itself can lead to localized salinity because of:

- Clearing of native vegetation for urban development
- Over-watering of gardens, parks and sporting fields
- Water leaking from pipes, drains, tanks
- Seepage from sillage pits, and
- Blocking or changing natural drainage paths (such as by building roads).

Recognizing the solubility of salt in water is the key to understanding urban salinity processes. When water comes into contact with buildings and other infrastructure, salt can be carried with it. As the water evaporates (or dries) the salt crystals grow and expand, causing physical damage to bricks, mortar and other construction materials. The salt crystals often form a white crust on the surface of bricks. Homeowners often try to wash off the unsightly residue, but this only helps the salt crystals grow even bigger, worsening the problem.

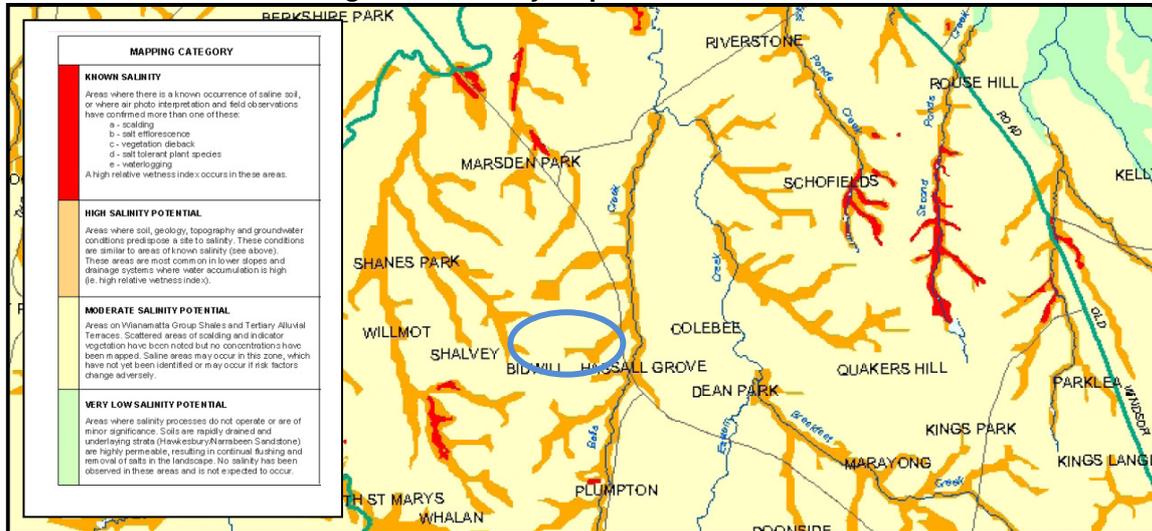
Urban salinity affects built infrastructure, due to the chemical and physical impact of salt on concrete, bricks and metal. The salt moves with water into the pores of bricks and concrete when they are exposed to damp, salt-laden soils. As the water is evaporated from the material, the salt concentrates and over time this can be substantial enough to cause corrosion and damage the material's structure. This is seen as crumbling, eroded or powdering mortar or bricks, the flaking of brick facing and the cracking or corrosion of concrete. The salt within the material can also have a corrosive effect on steel reinforcing. The long-term consequences can be structural damage.

Some building methods may also contribute to the development of salinity. Compacted surfaces can restrict groundwater flow and concentrate salt in one area. By cutting into slopes to build, groundwater or saline soil may be intercepted and exposed. In addition, fill used to build up an area may be a source of salt, or it may be less permeable, preventing good drainage.

## 4.1 Salinity Potential

The Department of Infrastructure and Planning (2002) Salinity Potential in Western Sydney map “Salinity Potential in Western Sydney 2002” indicates that the subject site is situated in a region with a moderate to high risk of saline soils.

**Figure 2 - Salinity Map with Site Identified**



The moderate classification is attributed to scattered areas of scalding and vegetation indicators in areas where the concentrations have not been mapped. There is the possibility of encountering saline areas which were not identified due to localised factors. Saline soils could occur within areas of lower slopes and drainage systems where water accumulation is high or where movement of water through the soil profile is low.

Seven (7) preliminary screening tests were collected as a part of this assessment in order to gain a limited view on the risk of saline soils. This assessment is based on the booklet “Site Investigations for Urban Salinity” published by Department of Land and Water Conservation 2002. Laboratory analysis was completed by Australian Laboratory Services (ALS) Pty Ltd, a NATA accredited laboratory, Certificate Reference number ES16070001.

## 4.2 Electrical Conductivity

Salinity refers to the presence of excessive salt, which is toxic to most plants. Because salt separates into positively and negatively charged ions when dissolved in water, the electrical conductivity of the water increases as the amount of salt increases. To test the electrical conductivity of soil one part of soil is mixed with 5 parts of water. The result is then multiplied by the soil texture conversion factor to give the final figure. This result is known as extract electrical conductivity ( $EC_e$ ). The  $EC_e$  values of soil salinity class is given below which has been adopted from the booklet “Site Investigations for Urban Salinity” published by Department of Land and Water Conservation 2002. The salinity exposure classification for various concrete strengths ( $F'_c$ ) is detailed in Section 5.1 of AS 2870-2011 “Residential Slabs and Footings” code.

**Table 5:  $EC_e$  values of Soil Salinity Class and Exposure Classification for Concrete**

| Class             | $EC_e$ | Exposure Classification for Concrete<br>(AS 2870 – 2011 from Tables 5.1 & 5.3) |
|-------------------|--------|--|
| Non Saline        | <2     | A1 (min. $F'_c$ = 20 MPa)  |
| Slightly Saline   | 2-4    | A1 (min. $F'_c$ =20 MPa)   |
| Moderately Saline | 4-8    | A2 (min. $F'_c$ =25 MPa)   |
| Very Saline       | 8-16   | B1 (min. $F'_c$ =32 MPa)   |
| Highly Saline     | >16    | B2 (min. $F'_c$ =40MPa)  |

### 4.3 Chlorides

Chlorides are negatively charged ions (anions) which are corrosive to building material, particularly steels. In concrete, chlorides react with the steel reinforcement causing it to corrode and expand putting physical stress on the concrete.

### 4.4 Sulphates

Sulphates are negatively charged particles (anions) which are corrosive to building materials, particularly concrete. Sulphates react with the hydrated calcium aluminate in concrete. The products of the reaction have a greater volume than the original material, producing physical stress in the concrete.

**Table 6: Sulphate and Chloride Values and Aggressivity**

| Concrete Structure                       |                | Steel Structure       |                |
|--|----------------|-----------------------|----------------|
| Sulphate (SO <sub>4</sub> ) Units(mg/kg) | Classification | Chloride Units(mg/kg) | Classification |
| <5,000                                   | Non-aggressive | <20,000               | Non-aggressive |
| 5,000-10,000                             | Mild           | 20,000-50,000         | Mild           |
| 10,000-20,000                            | Moderate       | >50,000               | Moderate       |
| >20,000                                  | Severe         |                       |                |

Source: Australian Standard 2159:2009 Piling – Design and Installation Guidelines

### 4.5 pH

pH Measures acidity or alkalinity of soil and is important in determining the aggressiveness of the soil to building materials. Acids combine with the calcium hydroxide component of cement to form soluble calcium compounds which can leach from the concrete increasing its porosity and decreasing its strength.

**Table 7: pH Values and Aggressivity**

| Concrete Structure |                | Steel Structures |                |
|--------------------|----------------|------------------|----------------|
| pH                 | Classification | pH               | Classification |
| >5                 | Non-aggressive | >4               | Non-aggressive |
| 4.5-5              | Mild           | 3-4              | Mild           |
| 4.0-4.5            | Moderate       | <3               | Moderate       |
| <4.0               | Severe         |                  |                |

Source: Australian Standard 2159:2009 Piling – Design and Installation Guidelines

#### 4.6 Laboratory Test Results

Test results are tabulated and presented in table 8 & 9 below. The laboratory test certificate is located in Appendix C. A discussion of the test data is presented in Section 3.7.

**Table 8: Analysis of the Soil Samples (Salinity)**

| Sample | Borehole | Depth (m) | EC $\mu\text{S/cm}$ | Texture Factor | ECe | Salinity Class    |
|--------|----------|-----------|---------------------|----------------|-----|-------------------|
| S1     | BH5      | 0.5       | 0.299               | 7              | 2.1 | Slightly Saline   |
| S2     | BH5      | 1.5       | 0.706               | 7              | 4.9 | Moderately Saline |
| S3     | BH5      | 2.5       | 0.739               | 7              | 5.2 | Moderately Saline |
| S4     | BH5      | 3.5       | 0.725               | 9              | 6.5 | Moderately Saline |
| S5     | BH5      | 4.5       | 0.840               | 9              | 7.6 | Moderately Saline |
| S6     | BH11     | 1.5       | 0.388               | 14             | 5.4 | Moderately Saline |
| S7     | BH11     | 2.5       | 0.509               | 14             | 7.1 | Moderately Saline |

**Table 9: Analysis of the Soil Samples (Aggressiveness)**

| Sample | Borehole | Depth (m) | pH       | Chloride | Sulphate | Resistivity | Aggressivity to Concrete | Aggressivity to Steel |
|--------|----------|-----------|----------|----------|----------|-------------|--------------------------|-----------------------|
|        |          |           | pH Units | mg/kg    | mg/kg    | Ohm.cm      |                          |                       |
| S1     | BH5      | 0.5       | 5.0      | 290      | 260      | 3340        | Mild                     | Not Agg               |
| S2     | BH5      | 1.5       | 4.8      | 800      | 660      | 1420        | Mild                     | Mild                  |
| S3     | BH5      | 2.5       | 4.7      | 880      | 550      | 1350        | Mild                     | Mild                  |
| S4     | BH5      | 3.5       | 5.1      | 970      | 570      | 1380        | Mild                     | Mild                  |
| S5     | BH5      | 4.5       | 5.7      | 1330     | 730      | 1190        | Not Agg                  | Mild                  |
| S6     | BH11     | 1.5       | 5.6      | 460      | 160      | 2580        | Not Agg                  | Not Agg               |
| S7     | BH11     | 2.5       | 5.2      | 780      | 190      | 1960        | Mild                     | Mild                  |

**Abbreviations:**

**Not Agg** Non-Aggressive

**Mild** Mildly Aggressive

#### 4.7 Results Discussion

From the results presented in Table 8, the electrical conductivity results indicate that the soil salinity is predominately moderately saline. No highly saline results were recorded. The laboratory test values of sulphates, chlorides and pH (table 9) indicate that the soil samples are mildly aggressive to both steel and concrete. Structural designs should take into account the following minimum design recommendations for concrete reinforced structures

**Table 10: Structural Design Recommendations**

| Ground Slabs <sup>1</sup> |       | Concrete Bored Piers <sup>2</sup> |                             |                              |
|---------------------------|-------|-----------------------------------|-----------------------------|------------------------------|
| F'c                       | Cover | F'c                               | Cover (50 year design life) | Cover (100 year design life) |
| 25MPa                     | 50mm  | 32MPa                             | 60mm                        | 75mm                         |

Note 1 – Reference AS2870 Residential Slabs and Footings

Note 2 – Reference AS2159:2009 Piling – Design and Installation Guidelines

## **5. PRELIMINARY ACID SULPHATE SOILS ASSESSMENT**

Acid Sulfate Soils (ASS) are naturally occurring and usually form in low lying coastal areas, creeks, rivers and flood plains. The sulfates present in the soil are stable when in the saturated/waterlogged state, but react to form sulphuric acid when disturbed and exposed to oxygen.

The Department of Land and Water Conservation has no record of Acid Sulphate soils within the Marsden Park region. No alluvial or water logged soils were observed within the borehole excavation. The risk of Acid Sulphate Soils is very low.

## 6. PRELIMINARY CONTAMINATION ASSESSMENT

### 6.1 Search of the Contaminated Land Management Register (NSW EPA)

A summary of the search of the NSW EPA Contaminated Land Management record of notices for the Blacktown City Council Area can be found in Appendix D. No notices have been issued to the subject site. Two (2) sites are listed on this register however they are situated at such a distance (greater than 500m) so as not to pose a potential contamination risk to the subject property.

### 6.2 Search of the Protection of the Environment operations Public Register (POEO) of Licensed and Delicensed Premises:

A search of the POEO public register of licensed and delicensed premises (DECC) provided the details of 46 premises in the Blacktown City Council area and one in Marsden Park. No licensed or delicensed premises were located within the immediate surrounding area of the site (within 500m). Full results of the search can be found in Appendix D.

### 6.3 Summary of Potential Sources of Contamination:

No market gardening or heavy agriculture was identified within the site during the desktop study. No heavy industrial operations were identified within the site during the desktop study.

A search of the NSW EPA Contaminated Land Management record of notices revealed that there were no notices issued to the subject site. No history of dangerous manufacturing utilizing heavy chemicals or metals was documented. No history of heavy chemicals or metals storage was documented.

The neighbouring properties are residential and not considered to have posed a risk for potential contamination to the site.

According to the interpretation of the sub-surface soil profile for this site, clay soils are present beneath the site. This material would provide a relatively impermeable layer and prevent the migration of any contamination into deeper soils or groundwater.

No industrial estates are located within 500m of the subject site. Therefore the risk of contamination migration caused by surface run-off from adjoining sites is minimal.

Whilst the potential for site contamination was low, minor laboratory screening testing was undertaken as a part of this investigation. Routine testing for metals such as Arsenic, Chromium Copper, Lead, Mercury Nickel and Zinc was undertaken whilst Organochlorine Pesticides (OCP), Organophosphorous Pesticides (OPP) was also undertaken within the soil profile.

Minor filling was identified during the site walk over. Limited screening testing of the fill was undertaken as a part of this preliminary investigation

### 6.4 Sampling Methodology:

Each sample location was excavated utilizing a truck mounted solid flight auger drill rig. The sample was collected from the auger using a stainless steel trowel, which had been decontaminated prior to use to prevent cross contamination occurring.

The samples were placed in 250g laboratory prepared glass jars which were capped using Teflon-sealed screw caps and then placed in a chilled container. The sample jars were transported to our West Hoxton office and placed in a refrigerator.

The samples were then forwarded to Australian Laboratory Services Pty Ltd (ALS) for analysis along with a Chain of Custody which was subsequently returned to confirm the receipt of all samples. ALS are accredited by the National Association of Testing Authorities (NATA) for the analyses carried out and are also accredited for compliance with ISO/IEC 17025.

**6.5 Soil Assessment Criteria:**

The Assessment criteria used in this investigation have been obtained from the “Guidelines for Assessing Former Orchards and Market Gardens” (FOMG) prepared by Department of Environment and Conservation (NSW) and the National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013). This document presents risk-based Health Investigation Levels based on a variety of exposure settings for a number of organic and inorganic contaminants. To assess the risk to human health the results of the laboratory analysis are compared against the Health Investigation Levels (HIL) for the exposure setting; ‘Commercial / Industrial’ (‘D’).

The selected assessment criteria used in this assessment are summarized on table 11 below:

**Table 11: Site Assessment Criteria**

| Contaminant       | Health Based Investigation Level (HIL'D') | FOMG   |
|-------------------|---|--------|
| Arsenic (total)   | 3,000                                     | 500    |
| Cadmium           | 900                                       | 100    |
| Chromium          | 3,600                                     | -      |
| Copper            | 240,000                                   | 250    |
| Lead              | 1,500                                     | 1500   |
| Mercury           | 730                                       | 75     |
| Nickel            | 6,000                                     | -      |
| Zinc              | 400,000                                   | 35,000 |
| Aldrin + Dieldrin | 45  | 50     |
| Chlordane         | 530                                       | 100    |
| Endosulfan        | 2,000                                     | -      |
| Endrin            | 100                                       | -      |
| Heptachlor        | 50  | 1000   |
| Mothoxychlor      | 2,500                                     | -      |
| DDD+DDE+DDT       | 3,600                                     | 5,000  |
| C6-C10            | 800                                       | -      |
| C10-C16           | 1,000                                     | -      |
| C16-C34           | 5,000                                     | -      |
| C34-C40           | 10,000                                    | -      |
| Benzene           | 65  | -      |
| Toulene           | 105                                       | -      |
| Ethylbenzene      | 125                                       | -      |
| Xylenes           | 45  | -      |
| Total PAH         | 4000                                      | -      |
| Benzo(a)pyrene    | 0.7                                       | -      |
| Carcinogenic PAH  | 4   | -      |

**6.6 Laboratory Test Results – Agricultural Land:**

Routine testing for metals such as Arsenic, Chromium Copper, Lead, Mercury Nickel and Zinc was undertaken whilst Organochlorine Pesticides (OCP), Organophosphorous Pesticides (OPP) was also undertaken within the soil profile. Test results are tabulated and presented below (Tables 12 & 13) along with the relevant assessment criteria. Laboratory test certificates (ES1607001) are located in Appendix C.

**Table 12: Heavy Metals in Natural Soils**

| Location                         | Sample No. | Depth (m) | Arsenic     | Cadmium    | Chromium    | Copper        | Lead        | Mercury    | Nickel      | Zinc          |
|----------------------------------|------------|-----------|-------------|------------|-------------|---------------|-------------|------------|-------------|---------------|
| BH2                              | C1         | 0.1m      | 17          | <1         | 18          | 12            | 17          | <0.1       | 8           | 31            |
| BH3                              | C2         | 0.2m      | 6           | <1         | 14          | 24            | 15          | <0.1       | 14          | 50            |
| BH4                              | C3         | 0.2m      | 10          | <1         | 18          | 19            | 26          | <0.1       | 14          | 39            |
| BH8                              | C4         | 0.1m      | 13          | <1         | 13          | 9             | 19          | <0.1       | 5           | 21            |
| BH10                             | C5         | 0.1m      | <5          | <1         | 9           | <5            | 13          | <0.1       | 3           | 17            |
| BH11                             | C6         | 0.1m      | 8           | <1         | 12          | 9             | 13          | <0.1       | 3           | 29            |
| BH12                             | C7         | 0.1m      | 18          | <1         | 20          | 6             | 20          | <0.1       | 4           | 9             |
| BH13                             | C8         | 0.1m      | 12          | <1         | 35          | 15            | 25          | <0.1       | 7           | 17            |
| <b>NEPM Health Investigation</b> |            |           | <b>3000</b> | <b>900</b> | <b>3600</b> | <b>240000</b> | <b>1500</b> | <b>730</b> | <b>6000</b> | <b>400000</b> |
| <b>FOMG</b>                      |            |           | <b>500</b>  | <b>100</b> | <b>-</b>    | <b>250</b>    | <b>1500</b> | <b>75</b>  | <b>-</b>    | <b>35000</b>  |

**Table 13: Pesticides in Natural Soils**

| Location                         | Sample No. | Depth (m) | Aldrin + Dieldrin | Chlordane  | Endosulfan  | Endrin     | Heptachlor  | Mothoxychlor | DDD+DDE+DDT |
|----------------------------------|------------|-----------|-------------------|------------|-------------|------------|-------------|--------------|-------------|
| BH2                              | C1         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH3                              | C2         | 0.2m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH4                              | C3         | 0.2m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH8                              | C4         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH10                             | C5         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH11                             | C6         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH12                             | C7         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH13                             | C8         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| <b>NEPM Health Investigation</b> |            |           | <b>45</b>         | <b>530</b> | <b>2000</b> | <b>100</b> | <b>50</b>   | <b>2500</b>  | <b>3600</b> |
| <b>FOMG</b>                      |            |           | <b>50</b>         | <b>100</b> | <b>-</b>    | <b>-</b>   | <b>1000</b> | <b>-</b>     | <b>5000</b> |

**6.7 Laboratory Test Results – Fill Material:**

Minor filling was identified during the site walk over. Limited screening testing of the fill was undertaken as a part of this preliminary investigation. Test results are tabulated and presented below (Tables 14, 15 & 16) along with the relevant assessment criteria. Laboratory test certificates (ES1607001) are located in Appendix C.

**Table 14: Heavy Metal Test Results in Fill Material**

| Location                         | Sample No. | Depth (m) | Arsenic     | Cadmium    | Chromium    | Copper        | Lead        | Mercury    | Nickel      | Zinc          |
|----------------------------------|------------|-----------|-------------|------------|-------------|---------------|-------------|------------|-------------|---------------|
| Fill Area 1                      | F1         | 0.1m      | 12          | <1         | 22          | 34            | 128         | 0.2        | 13          | 1600          |
| Fill Area 2                      | F2         | 0.2m      | 7           | <1         | 18          | 15            | 19          | <0.1       | 7           | 23            |
| Fill Area 3                      | F3         | 0.2m      | 5           | <1         | 11          | 8             | 14          | <0.1       | 4           | 26            |
| Fill Area 4                      | F4         | 0.1m      | <5          | <1         | 9           | 8             | 18          | <0.1       | 2           | 10            |
| <b>NEPM Health Investigation</b> |            |           | <b>3000</b> | <b>900</b> | <b>3600</b> | <b>240000</b> | <b>1500</b> | <b>730</b> | <b>6000</b> | <b>400000</b> |
| <b>FOMG</b>                      |            |           | <b>500</b>  | <b>100</b> | <b>-</b>    | <b>250</b>    | <b>1500</b> | <b>75</b>  | <b>-</b>    | <b>35000</b>  |

**Table 15: Hydrocarbons in Fill Material**

| Location                         | Sample No. | Depth (m) | C6-C10     | C10-C16      | C16-C34      | C34-C40       | Benzene   | Toulene    | Ethylbenzene | Xylenes   | Total PAH   | Carcinogenic PAH | Benzo(a)pyrene |
|----------------------------------|------------|-----------|------------|--------------|--------------|---------------|-----------|------------|--------------|-----------|-------------|------------------|----------------|
| Fill Area 1                      | F1         | 0.1m      | <10        | <50          | <100         | <100          | <0.2      | <0.5       | <0.5         | <0.5      | <0.5        | <0.5             | <0.5           |
| Fill Area 2                      | F2         | 0.2m      | <10        | <50          | <100         | <100          | <0.2      | <0.5       | <0.5         | <0.5      | <0.5        | <0.5             | <0.5           |
| Fill Area 3                      | F3         | 0.2m      | <10        | <50          | <100         | <100          | <0.2      | <0.5       | <0.5         | <0.5      | <0.5        | <0.5             | <0.5           |
| Fill Area 4                      | F4         | 0.1m      | <10        | <50          | <100         | <100          | <0.2      | <0.5       | <0.5         | <0.5      | <0.5        | <0.5             | <0.5           |
| <b>NEPM Health Investigation</b> |            |           | <b>800</b> | <b>1,000</b> | <b>5,000</b> | <b>10,000</b> | <b>65</b> | <b>105</b> | <b>125</b>   | <b>45</b> | <b>4000</b> | <b>4</b>         | <b>0.7</b>     |

**Table 16: Pesticides in Fill Material**

| Location                         | Sample No. | Depth (m) | Aldrin + Dieldrin | Chlordane  | Endosulfan  | Endrin     | Heptachlor  | Mothoxychlor | DDD+DDE+DDT |
|----------------------------------|------------|-----------|-------------------|------------|-------------|------------|-------------|--------------|-------------|
| BH2                              | F1         | 0.1m      | <0.05             | 0.05       | <0.05       | <0.05      | <0.05       | <0.2         | 0.15        |
| BH3                              | F2         | 0.2m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH4                              | F3         | 0.2m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| BH8                              | F4         | 0.1m      | <0.05             | <0.05      | <0.05       | <0.05      | <0.05       | <0.2         | <0.05       |
| <b>NEPM Health Investigation</b> |            |           | <b>45</b>         | <b>530</b> | <b>2000</b> | <b>100</b> | <b>50</b>   | <b>2500</b>  | <b>3600</b> |
| <b>FOMG</b>                      |            |           | <b>50</b>         | <b>100</b> | <b>-</b>    | <b>-</b>   | <b>1000</b> | <b>-</b>     | <b>5000</b> |

Small fragments of asbestos were identified during the course of the inspection. One sample of the fibre-cement sheet (sample F2asb) was sampled and submitted to ALS for analysis. Two soil samples (F1asb and F3asb) were submitted for asbestos fibre analysis. The results of the asbestos identification are attached and have been summarized in the table below.

**Table 17: Analysis of the Solid Sample (Asbestos)**

| <b>Sample Id</b> | <b>Sample Description</b> | <b>Analysis Result</b>               |
|------------------|---------------------------|--------------------------------------|
| <b>F1asb</b>     | Soil, minor gravel        | Chrysotile (white) Asbestos Detected |
| <b>F2asb</b>     | Vinyl Tile                | No Asbestos Detected                 |
| <b>F3asb</b>     | Soil, minor gravel        | No Asbestos Detected                 |

### **6.8 Conclusions from Preliminary Contamination Assessment:**

The results of the desk top study and chemical analyses indicate that the site does not present a significant risk to human health or the environment in a 'Commercial / Industrial' ('D').

Minor filling was observed across the site. Preliminary testing indicates that the material located at Fill area 1 should be removed as Restricted Solid Waste – Asbestos Contaminated Material. This could be downgraded to General Solid Waste – Asbestos Contaminated Material subject to further Toxicity Characteristic Leachate Potential (TCLP) testing.

The material located at Fill areas 2 through 4 can be classified as General Solid Waste. This material has the potential to be classified as Excavated Natural Material (ENM) subject to further laboratory analysis.

7.

## 8. PRELIMINARY GEOTECHNICAL DESIGN PARAMETERS AND RECOMMENDATIONS

### 8.1 Site Classification

As defined in AS 2870-2011, Table 2.1 and section 2.2.3, the filled portion of the site, where filling is placed as controlled fill in accordance with AS3798, will be classified as a **Class “H1”** site. Based on the geology, and the natural / fill soil profiles encountered on this limited scope investigation, the site is estimated to have a Characteristic Surface Movement (ys) in the range between **40mm** and **60m** which is typical for clay soils derived from shale, which has been extensively weathered. The general definition of a Class “H1” site as presented in Table 2.1 of AS 2870–2011 is described as a highly reactive site which can experience high ground movement from moisture changes.

Within Cut Portions of the site, where bedrock is encountered at depths of less than 1.4m the site classification may be downgraded to a Class M or lower. This is subject to re-classification at the end of bulk earthworks.

### 8.2 Footings – Allowable End Bearing Capacity

It is envisaged that footings for the superstructures will comprise high level strip or pad type footings. Such strip or pad footings shall be proportioned using a maximum allowable bearing pressure not exceeding 150kPa within the natural clays and controlled fill platform. Adopt minimum founding depths of not less than 0.4m (below surrounding finished surface level) for all strip / pad footings.

Strip or pad footings constructed within the shale / sandstone bedrock (Unit E and Unit F) may be proportioned using a maximum allowable bearing pressure not exceeding 700kPa.

Bored Pier footings constructed within the shale / sandstone bedrock (Unit E and Unit F) may be proportioned using a maximum allowable bearing pressure not exceeding 700kPa and an allowable skin friction of 70kPa.

### 8.3 Floor Slab / Pavements

Preliminary design for floor slabs and pavements can be designed upon a Sub-grade Reaction Modulus (k) of 20kPa or a CBR of 2%. This adopted value is based on the assumption that drainage is suitably detailed to prevent any saturation of sub-grade or pavement materials. Higher values may be achieved within cut portions of the site where shale bedrock is exposed. All pavement design parameters should be confirmed at the completion of bulk earthworks.

Rigid pavements should incorporate a regular spacing of construction joints in order that minor post construction vertical differential movement of the sub-grade does not detrimentally affect pavement performance.

Differential vertical movement within the sub-grade profile present across the site is inevitable beneath pavement areas. Such movement may induce pavement distortion, longitudinal cracking at pavement edges & ‘rolling-out’ of kerbs. Minimisation of such movements can be achieved by adopting the following measures:

- continue sub-base crushed rock at least 500mm past kerbs
- Avoid garden beds which can act as a conduit for rainfall (or watering) causing wetting of subgrade clays to adjacent paving.
- Install perimeter cut-off drains at the edge of pavements. Soils drains should penetrate to approx. 200mm below the clay interface & be connected to drainage points.
- Ensure that tree planting does not promote drying of subgrade clays to adjacent pavements.

## 8.4 Batter Slopes

We understand that excavation operations will form part of the development. Resultant embankments should either be retained or battered back to the following recommended slopes:

- Short term Unretained batters in controlled fill, residual clay and completely weathered bedrock (Units A to D) should be cut no steeper than 1 Vertical to 1 Horizontal.
- Short term unretained batters in extremely weathered bedrock (Unit E and Unit F) should be cut no steeper than 1 Vertical to 0.5 Horizontal.
- Long term Unretained batters in controlled fill, residual clay and completely weathered bedrock (Units A to D) should be cut no steeper than 1 Vertical to 2 Horizontal.
- Long term unretained batters in extremely weathered bedrock (Units E and Unit F) should be cut no steeper than 1 Vertical to 1 Horizontal.

Unretained excavations should not extend below the “zone of influence” of adjacent structures. That is, a line drawn 45° down from the foundation level of adjacent structures or features. If excavations are to extend below this line, proposed excavations are to be retained prior to excavation.

## 8.5 Site Excavations

Excavations within Units A to D should be achieved with bucket attachment to a midsized excavator. Excavations within a medium strength bedrock, possibly encountered at a depth below drill rig refusal (BH8), may require pre-loosening using rock breaking or ripping attachments.

## 8.6 Retaining Wall Design Parameters

The material being retained will comprise natural silty clay and completely / extremely weathered bedrock. These materials may be apportioned an effective friction angle of 25 degrees.

For cut slopes in clay the lateral earth pressure is not entirely dependent on the so called coefficient of lateral earth pressure  $K$ , as the presence of cohesion between clay particles enables the excavation face to remain stable (to a finite height) providing saturated conditions or tension cracks do not develop.

The lateral earth pressure which should be considered in the design needs to incorporate the reduced lateral earth pressure as a result of cohesion as well as potential swelling pressures and the development of tension cracks which may fill with water. Also the lateral earth pressure exerted by the granular backfill needs to be considered.

Where retaining walls are designed to allow for a small amount of lateral strain (nominally 1/1000<sup>th</sup> of wall height) the lateral pressure acting on the wall can be calculated assuming distribution of  $7.5H$  (kPa) where  $H$  equals the height of retained material in metres. The resultant lateral thrust will be  $3.75H^2$  (KN) and will act at a height of  $H/3$  above the base.

The design of rigid retaining walls should allow for a lateral earth pressure acting on the wall of  $10.0H$  (kPa). The resultant lateral thrust will be  $5.0H^2$  (KN) and will act at a height of  $H/3$  above the base.

Surcharge loads (if applicable) will ADD to the earth pressure acting on retaining walls. In the case of non rigid walls, assume  $K_a$  x surcharge load will be converted to lateral thrust. For rigid walls assume  $K_o$  x surcharge load will be converted to loaded thrust. Allowance should be made for sloping backfill (if applicable).

Walls should be constructed as soon as possible after cutting operations. Subsurface drains should be provided in any backfill material, discharge from subsurface drains should be to an approved discharge point. It is recommended that a minimum of 300mm width of free draining aggregate is provided as a drainage medium behind the retaining walls.

## 9. CONDITIONS OF THE RECOMMENDATIONS

This report is a geotechnical report only and the classification stated shall not be regarded as an engineering design nor shall it replace a design by engineering principles although it may contribute information for such designs. When this report is to be used as a reference by the engineer or builder or other relevant party, this report must be reproduced in total.

The advice given in this report is based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that actual conditions in some parts of the building site may differ from those found in the test holes. If excavations reveal soil conditions significantly different from those shown in our attached Soil Log(s), Ground Tech must be consulted and excavations stopped immediately.

The foundation depths quoted in this report are measured from the surface during our testing and may vary accordingly if any filling or excavation works are carried out. The description of the foundation material for has been provided for its easy recognition over the whole building site.

Any sketches in this report should be considered as only an approximate pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions or slope information should not be used for any building cost calculations and/or positioning of the building. Dimensions on logs are correct.

## 10. LIMITATIONS

This type of investigation (as per our commission) is not designed or capable of locating all ground conditions, (which can vary even over short distances). The advice given in this report is based on the assumption that the test results are representative of the overall ground conditions. However, it should be noted that actual conditions in some parts of the site might differ from those found. If excavations reveal ground conditions significantly different from those shown in our findings, Ground Tech must be consulted.

The scope and the period of Ground Tech services are described in the report and are subject to restrictions and limitations. Ground Tech did not perform a complete assessment of all possible conditions or circumstances that may exist at the Site. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Ground Tech in regards to it.

Where data has been supplied by the client or a third party, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by Ground Tech for incomplete or inaccurate data supplied by others.

Any drawings or figures presented in this report should be considered only as pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions should not be used for accurate calculations or dimensioning.

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The advice given in this report is based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that actual conditions in some parts of the building site may differ from those found in the test holes. If excavations reveal subsurface conditions significantly different from those shown in our attached Soil/Rock Log(s), Ground Tech must be consulted and excavations stopped immediately.

The foundation depths quoted in this report are measured from the surface during our testing and may vary accordingly if any filling or excavation works are carried out. The description of the foundation material for has been provided for its easy recognition over the whole building site.

Any sketches in this report should be considered as only an approximate pictorial evidence of our work. Therefore, unless otherwise stated, any dimensions or slope information should not be used for any building cost calculations and/or positioning of the building. Dimensions on logs are correct.

## **APPENDIX A**

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### **Borehole Logs**

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

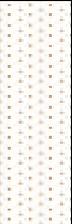
**TEST SITE NO. 1**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS   |
|-------------|-----------|------------------------|--|---|---------------------|--------|---|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale brown   |    |                     |        |   |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium to high plasticity, mottled yellow, orange, white, dry, very stiff                          |    | 300                 |        |   |
|             | 1         | CH                     | Natural Silty Clay / Completely Weathered Shale, high plasticity, pale grey with minor red, slightly moist, very stiff |   | 350                 |        |   |
|             | 2         |                        |  |   | 400                 |        | Extremely weathered, low strength shale bands from 1.8m |
|             | 3         |                        |  |   |                     |        |   |
|             | 3.5       | BEDROCK                | Shale, extremely weathered, low strength, brown, grey, dark, grey  |  |                     |        |   |
|             | 4         |                        |  |   |                     |        |   |
|             | 4.5       |                        | Borehole terminated at 4.5m  |   |                     |        |   |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 2**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|--|---|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale brown   |    |                     | C1     |         |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium plasticity, mottled red/brown, orange, slightly moist, stiff  |    | 150                 |        |         |
|             |           |                        | Natural Silty Clay, medium plasticity, mottled orange and pale grey/brown, slightly moist, stiff   |   | 150                 |        |         |
|             | 1         | CH                     | Natural Silty Clay / Completely Weathered Sandstone, medium to high plasticity, pale grey with minor red, slightly moist, very stiff to hard |   | 250                 |        |         |
|             | 1.5       |                        |  |   |                     |        |         |
|             | 2         |                        |  |   | 450                 |        |         |
|             | 2.5       | BEDROCK                | Sandstone, extremely weathered, low strength, brown, yellow, white, red  |  |                     |        |         |
| 3           |           |                        |  |   |                     |        |         |
| 3.5         |           |                        | Shale, extremely weathered, low strength, brown, grey, dark, grey  |  |                     |        |         |
| 4           |           |                        |  |   |                     |        |         |
| 4.5         |           |                        | Borehole terminated at 4.5m  |   |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers

Date of Drilling: 29/3/2014

Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 3**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION  | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG  | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|---|--|--|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL   | Sandy Silt, pale brown   |   |                     |        |         |
|             | 0.5       | CI/CH   | Natural Silty Clay, medium plasticity, mottled red/brown, orange, slightly moist, stiff  |   | 150                 | C2     |         |
|             |           |   | Natural Silty Clay, medium to high plasticity, mottled orange and pale grey/brown, moist, stiff                                  |  | 200                 |        |         |
|             | 1         | CH  | Natural Silty Clay / Completely Weathered Shale, medium to high plasticity, pale grey with minor red, slightly moist, very stiff |  | 300                 |        |         |
|             | 1.5       |   |  |  |                     |        |         |
| 2           | BEDROCK   | Shale, extremely weathered, low strength, brown, grey, dark, grey |   |  |                     |        |         |
| 2.5         |           |   |  |  |                     |        |         |
| 3           |           |   |  |  |                     |        |         |
| 3.5         |           |   |  |  |                     |        |         |
| 4           |           |   |  |  |                     |        |         |
| 4.5         |           |   | Borehole terminated at 4.5m  |  |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 4**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|--|-------------|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale brown   |             |                     | C3     |         |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium to high plasticity, mottled red/brown and orange, white, dry to slightly moist, very stiff  |             | 250                 |        |         |
|             | 1         | CH                     | Natural Silty Clay / Completely Weathered Shale, high plasticity, pale grey with minor red, slightly moist, very stiff |             | 300                 |        |         |
|             | 1.5       |                        |  |             |                     |        |         |
|             | 2         |                        |  |             |                     |        |         |
|             | 2.5       |                        |  |             |                     |        |         |
|             | 3         |                        |  |             |                     |        |         |
|             | 3.5       | BEDROCK                | Shale, extremely weathered, low strength, brown, grey, dark, grey  |             |                     |        |         |
|             | 4         |                        |  |             |                     |        |         |
|             | 4.5       |                        | Borehole terminated at 4.5m  |             |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 5**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|--|-------------|---------------------|--------|---------|
| N<br>I<br>L | 0.5       | TOPSOIL<br>CI          | Sandy Silt, pale brown<br>Natural Silty Clay, medium to high plasticity, mottled red/brown and orange, dry, very stiff |             | 200                 | S1     |         |
|             | 1         | CI/CH                  | Natural Silty Clay / Completely Weathered Shale, high plasticity, pale grey with minor red, slightly moist, very stiff |             | 250                 |        |         |
|             | 1.5       |                        |  |             | 300                 | S2     |         |
|             | 2.5       |                        |  |             |                     | S3     |         |
|             | 3.5       | BEDROCK                | Shale, extremely weathered, low strength, brown, grey, dark, grey  |             |                     | S4     |         |
| 4.5         |           |                        | Borehole terminated at 4.5m  |             | S5                  |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 6**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|--|---|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale brown   |    |                     |        |         |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium to high plasticity, mottled red/brown and orange, dry, very stiff                                   |    | 240                 |        |         |
|             | 1         | CH                     | Natural Sandy Clay / Completely Weathered Sandstone, high plasticity, pale grey with minor yellow, dry to slightly moist, hard |   | 450                 |        |         |
|             | 1.5       | BEDROCK                | Sandstone, extremely weathered, low strength, brown, yellow, white, red  |  |                     |        |         |
|             | 2         | CH                     | Natural Silty Clay / Completely Weathered Shale, high plasticity, pale grey with minor red, slightly moist, very stiff         |  | 380                 |        |         |
|             | 4         | BEDROCK                | Shale, extremely weathered, low strength, brown, grey, dark, grey  |  |                     |        |         |
|             | 4.5       |                        |  | Borehole terminated at 4.5m   |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 7**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>  | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|--|---|---------------------|--------|---------|
| N<br>I<br>L | 0.5       | CI                     | Natural Silty Sandy Clay, medium plasticity, pale brown with yellow mottling, slightly moist, very stiff                       |   | 200                 |        |         |
|             | 1         | CH                     | Natural Sandy Clay / Completely Weathered Sandstone, high plasticity, pale grey with minor yellow, dry to slightly moist, hard |   | 400                 |        |         |
|             | 1.5       | BEDROCK                | Sandstone, with shale banding, extremely weathered, low strength, grey, pale grey, red, white                                  |  |                     |        |         |
|             | 3         |                        | Shale, with sandstone banding, extremely weathered, low strength, grey, pale grey, brown                                       |   |                     |        |         |
|             | 4.5       |                        | Borehole terminated at 4.5m  |   |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 8**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>   | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|---|---|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale brown  |   |                     | C4     |         |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium to high plasticity, mottled pale grey/brown with orange mottling slightly moist, stiff                   |    | 180                 |        |         |
|             | 1         | CH                     | Natural Silty Clay / Completely Weathered Sandstone, high plasticity, red and with with minor pale grey, slightly moist, very stiff |   | 350                 |        |         |
|             | 2         | BEDROCK                | Sandstone, with shale banding, extremely weathered, low strength, red, brown, white, orange   |  |                     |        |         |
|             | 3         |                        | Borehole terminated at 2.9m due to rig refusal on bedrock   |   |                     |        |         |
|             | 3.5       |                        |   |   |                     |        |         |
|             | 4         |                        |   |   |                     |        |         |
|             | 4.5       |                        |   |   |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers

Date of Drilling: 29/3/2014

Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

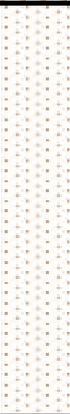
**TEST SITE NO. 9**

| WATER | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>   | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS                     |
|-------|-----------|------------------------|---|---|---------------------|--------|-----------------------------|
| NIL   | 0.5       | FILL                   | Admixed Silty Clay with minor sand and rounded ironstone gravels, brown, grey, red, white, orange   |   |                     | F4     | Fill appears well compacted |
|       | 1         |                        |   |   |                     |        |                             |
|       | 1.5       | CH                     | Natural Silty Clay / Completely Weathered Sandstone, medium to high plasticity, red and with with minor pale grey, slightly moist, very stiff to hard |  | 250                 |        |                             |
|       | 2         | BEDROCK                | Sandstone, with shale banding, extremely weathered, low strength, red, brown, white, orange   |  | 450                 |        |                             |
|       | 2.5       |                        |   |   |                     |        |                             |
|       | 3         |                        |   |   |                     |        |                             |
|       | 3.5       |                        |   |   |                     |        |                             |
|       | 4         |                        |   |   |                     |        |                             |
|       | 4.5       |                        | Borehole terminated at 4.5m   |   |                     |        |                             |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 10**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>   | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|---|---|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale grey/brown   |    |                     | C5     |         |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium to high plasticity, Mottled pale grey/brown and pale orange/brown, slightly moist, stiff                                   |   | 180                 |        |         |
|             | 1         | CH                     | Natural Silty Clay / Completely Weathered Sandstone, medium to high plasticity, red and with with minor pale grey, slightly moist, very stiff to hard |   | 350                 |        |         |
|             | 1.5       | BEDROCK                | Sandstone, extremely weathered, low strength, red, white, minor grey and brown  |  | 400                 |        |         |
|             | 3         |                        | <i>borehole terminated at 3.0m</i>  |   |                     |        |         |
|             | 3.5       |                        |   |   |                     |        |         |
|             | 4         |                        |   |   |                     |        |         |
|             | 4.5       |                        |   |   |                     |        |         |

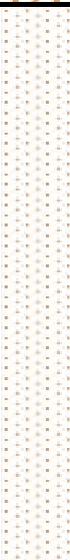
Method: 4WD Mounted Rig/Solid FlightSpiral Augers

Date of Drilling: 29/3/2014

Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 11**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>   | GRAPHIC LOG  | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|---|--|---------------------|--------|---------|
| N<br>I<br>L | 0.5       | TOPSOIL                | Sandy Silt, pale grey/brown   |   | 300                 | C6     |         |
|             |           | CH                     | Natural Silty Clay / Completely Weathered Sandstone, high plasticity, mottled pale grey and red, slightly moist, very stiff |   |                     |        |         |
|             |           | BEDROCK                | Sandstone, interbedded completely weathered and extremely weathered, very low strength, white, red, orange                  |  |                     |        |         |
|             | 1         |                        |   | S6   |                     |        |         |
|             | 1.5       |                        |   |  |                     | S7     |         |
|             | 2         |                        |   |  |                     |        |         |
|             | 2.5       |                        |   |  |                     |        |         |
|             | 3         |                        | <i>borehole terminated at 3.0m</i>  |  |                     |        |         |
|             | 3.5       |                        |   |  |                     |        |         |
|             | 4         |                        |   |  |                     |        |         |
|             | 4.5       |                        |   |  |                     |        |         |

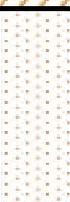
Method: 4WD Mounted Rig/Solid FlightSpiral Augers

Date of Drilling: 29/3/2014

Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 12**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>                    | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|--|---|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale grey/brown  |    |                     | C8     |         |
|             | 0.5       | CI/CH                  | Natural Silty Clay, medium to high plasticity, red with grey and dark grey mottling              |   | 120                 |        |         |
|             | 1         |                        |  |   |                     |        |         |
|             | 1.5       | CH                     | Natural Silty Clay / Completely Weathered Sandstone, high plasticity, mottled pale grey and red, |  | 250                 |        |         |
|             | 2         |                        |  |   |                     |        |         |
|             | 2.5       | BEDROCK                | Sandstone, extremely weathered, low strength, red, white, minor grey and brown                   |  |                     |        |         |
|             | 3         |                        | <i>borehole terminated at 3.0m</i>   |   |                     |        |         |
|             | 3.5       |                        |  |   |                     |        |         |
|             | 4         |                        |  |   |                     |        |         |
|             | 4.5       |                        |  |   |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

**SITE LOCATION:** Lots 24 & 24 Hollingsworth Road, Marsden Park

**TEST SITE NO. 13**

| WATER       | DEPTH (m) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION<br><small>(SOIL TYPE, COLOUR, MOISTURE, CONSISTENCY)</small>   | GRAPHIC LOG   | POCKET PENETROMETER | SAMPLE | REMARKS |
|-------------|-----------|------------------------|---|---|---------------------|--------|---------|
| N<br>I<br>L |           | TOPSOIL                | Sandy Silt, pale grey/brown   |    | 150                 | C9     |         |
|             | 0.5       | CH                     | Natural Silty Clay / Completely Weathered Sandstone, high plasticity, red with grey and dark grey mottling moist, stiff |   |                     |        |         |
|             | 1         | BEDROCK                | Sandstone, interbedded completely weathered and extremely weathered, very low strength, white, red, orange              |  |                     |        |         |
|             | 4.5       |                        | Borehole terminated at 4.5m   |   |                     |        |         |

Method: 4WD Mounted Rig/Solid FlightSpiral Augers  
 Date of Drilling: 29/3/2014  
 Logged and Drilled by: AB

## **APPENDIX B**

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### **Ground Technologies Laboratory Test Results**

## Test Results - Atterberg Limits

|   |  |                                     |                          |
|---|--|-------------------------------------|--------------------------|
| Client:   | logos Properties                       | Job No.                             | GTE817                   |
| Project:  | Commercial Subdivision                 | Report No.                          | GTER817-L2               |
| Location:   | Hollingsworth Road, Marsden Park       | Test date:                          | 10-Apr-16                |
| Sample Location   | N/A                                    | N/A                                 |                          |
| Sample Number   | L1                                     | L2                                  |                          |
| Test procedure  | AS1289 3.1.2,3.2.1,3.3.1,3.4.1, 2.1.1  |                                     |                          |
| <b>ATTERBERG LIMITS</b>   |  |                                     |                          |
| Liquid Limit  | %                                      | <b>59</b>                           | <b>72</b>                |
| Plastic limit   | %                                      | <b>20</b>                           | <b>19</b>                |
| Plasticity Index  | %                                      | <b>39</b>                           | <b>53</b>                |
| Linear Shrinkage  | %                                      | <b>ND</b>                           | <b>ND</b>                |
| Curling/ Crumbling/ Cracking  |  | <b>NA</b>                           | <b>NA</b>                |
| sample history  | Low Temperature Oven Dried, Dry Sieved |                                     |                          |
| Sample description  | <b>Red Silty Clay</b>                  | <b>White Mottled Red Silty Clay</b> |                          |
| Comments:   | Sampling Method: AS1289.1.2.1 (6.5.3)  |                                     |                          |
|  <p>NATA Accredited Laboratory No. 14343<br/>         Accredited for compliance with ISO/IEC 17025<br/>         The results of the tests, calibrations and/or<br/>         measurements in this document are traceable<br/>         to Australian/National Standards</p> |  |                                     |                          |
|   |  |                                     | Approved Signatory       |
|   |  |                                     | Date of issue 11/04/2016 |

**CALIFORNIAN BEARING RATIO**

|          |   |             |                   |
|----------|---|-------------|-------------------|
| Client   | <b>Logos Properties</b>                 | Job no :    | <b>GTE817</b>     |
| Project  | <b>Commercial Subdivision</b>           | Test date : | <b>8-Apr-16</b>   |
| Location | <b>Hollingsworth Road, Marsden Park</b> | Report No.  | <b>GTER817-L1</b> |

|               |           |           |  |  |
|---------------|-----------|-----------|--|--|
| Sample Number | L1        | L2        |  |  |
| Date Sampled  | 29-Mar-16 | 29-Mar-16 |  |  |
| Depth         | -         | -         |  |  |
| Location      | N/A       | N/A       |  |  |

**Laboratory Compaction AS1289 5.1.1 standard**

|                              |                  |      |      |  |  |
|------------------------------|------------------|------|------|--|--|
| Oversize Material 19mm Sieve | %                | 0.0  | 0.0  |  |  |
| Maximum Dry Density          | t/m <sup>3</sup> | 1.58 | 1.68 |  |  |
| Optimum Moisture Content     | %                | 21.7 | 18.0 |  |  |
| Field Moisture Content       | %                | 18.7 | 20.2 |  |  |

**Test Results AS 1289 6.1.1**

|   |                              |            |          |  |  |
|---|------------------------------|------------|----------|--|--|
| <b>Before Soaking</b>                   | Dry Density t/m <sup>3</sup> | 1.59       | 1.70     |  |  |
|   | Moisture Ratio %             | 98.5       | 96.0     |  |  |
|   | Density Ratio %              | 100.5      | 101.0    |  |  |
| <b>After Soaking</b>                    | Dry Density t/m <sup>3</sup> | 1.54       | 1.62     |  |  |
|   | Moisture Content %           | 25.3       | 21.8     |  |  |
| Moisture Content after test - remainder | %                            | 24.1       | 21.6     |  |  |
| Moisture Content after test - top 30mm  | %                            | 28.2       | 23.1     |  |  |
| Number of days soaking                  | days                         | 4          | 4        |  |  |
| Mass of Surcharge                       | Kg                           | 4.5        | 4.5      |  |  |
| Swell after soaking                     | %                            | 3.0        | 4.5      |  |  |
| CBR penetration                         | mm                           | 5.0        | 5.0      |  |  |
| <b>CBR VALUE</b>                        | %                            | <b>2.5</b> | <b>2</b> |  |  |

Material Description : L1: Red Silty Clay, L2: White Mottled Red Silty Clay

Test Methods: AS1289 6.1.1, 5.1.1, 2.1.1 Sampling : AS1289 1.2.1 (6.5.3)



NATA Accredited Laboratory No. 14343  
 Accredited for compliance with ISO/IEC 17025

Approved Signatory  
 Date

11-Apr-16

## **APPENDIX C**

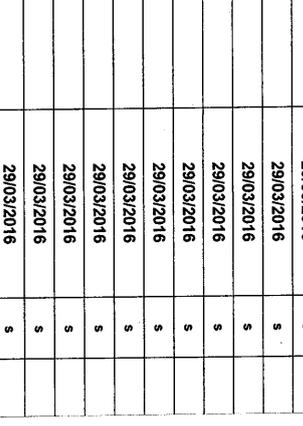
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### **ALS Laboratory Test Results**

| ALS USE | SAMPLE DETAILS<br>MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). | Additional Information   |                  |     |    |   |     |             |   |  |  |  |  |  |  |  |
|---------|---|-----------------------|---|--|------------------|-----|----|---|-----|-------------|---|--|--|--|--|--|--|--|
|         |   |                       |   | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. |                  |     |    |   |     |             |   |  |  |  |  |  |  |  |
| LAB ID  | SAMPLE ID                                     | DATE / TIME           | MATRIX  | TYPE & PRESERVATIVE (refer to codes below)   | TOTAL CONTAINERS |     |    |   |     |             |   |  |  |  |  |  |  |  |
| 1       | C1  | 29/03/2016            | S   |  |                  | S11 | S2 | pH, eC, Sulphates, Chlorides, resistivity | S16 | Asbestos ID |   |  |  |  |  |  |  |  |
| 2       | C2  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 3       | C3  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 4       | C4  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 5       | C5  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 6       | C6  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 7       | C7  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 8       | C8  | 29/03/2016            | S   |  |                  | X   | X  |   |     |             |   |  |  |  |  |  |  |  |
| 9       | S1  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 10      | S2  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 11      | S3  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 12      | S4  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 13      | S5  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 14      | S6  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 15      | S7  | 29/03/2016            | S   |  |                  |     |    | X   |     |             |   |  |  |  |  |  |  |  |
| 16      | F1  | 29/03/2016            | S   |  |                  |     |    |   | X   |             |   |  |  |  |  |  |  |  |
| 17      | F2  | 29/03/2016            | S   |  |                  |     |    |   | X   |             |   |  |  |  |  |  |  |  |
| 18      | F3  | 29/03/2016            | S   |  |                  |     |    |   | X   |             |   |  |  |  |  |  |  |  |
| 19      | F4  | 29/03/2016            | S   |  |                  |     |    |   | X   |             |   |  |  |  |  |  |  |  |
| 20      | F1asb   | 29/03/2016            | S   |  |                  |     |    |   |     | X           |   |  |  |  |  |  |  |  |
| 21      | F2asb   | 29/03/2016            | S   |  |                  |     |    |   |     | X           |   |  |  |  |  |  |  |  |
| 22      | F3asb   | 29/03/2016            | S   |  |                  |     |    |   |     | X           |   |  |  |  |  |  |  |  |
| TOTAL   |   |                       |   |  |                  | 22  | 8  | 8   | 7   | 4           | 3 |  |  |  |  |  |  |  |

Environmental Division  
 Sydney  
 Work Order Reference  
**ES1607001**

Organised By / Date: *Neu*  
 Relinquished By / Date: *Neu*  
 Collected / Courier: *Neu*  
 VVO No: *ES1607001*  
 Attach By PO / Internal Sheet: *Neu*



Water 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 - Airflight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airflight 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 Solids; B = Unpreserved Bag

## CERTIFICATE OF ANALYSIS

**Work Order** : **ES1607001**  
**Client** : **GROUND TECHNOLOGIES**  
**Contact** : MR ANTHONY BENNETT  
**Address** : PO BOX 1121  
 GREEN VALLEY NSW,AUSTRALIA 2168  
**Telephone** : +61 02 8783 8200  
**Project** : gte817 Marsden Park  
**Order number** : ----  
**C-O-C number** : ----  
**Sampler** : ANTHONY BENNETT  
**Site** : ----  
**Quote number** : ----  
**No. of samples received** : 22  
**No. of samples analysed** : 22

**Page** : 1 of 29  
**Laboratory** : Environmental Division Sydney  
**Contact** :  
**Address** : 277-289 Woodpark Road Smithfield NSW Australia 2164  
**Telephone** : +61-2-8784 8555  
**Date Samples Received** : 31-Mar-2016 17:30  
**Date Analysis Commenced** : 01-Apr-2016  
**Issue Date** : 08-Apr-2016 10:56



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

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>            |
|--------------------|-----------------------|--|
| Ankit Joshi        | Inorganic Chemist     | Sydney Inorganics, Smithfield, NSW       |
| Ashesh Patel       | Inorganic Chemist     | Sydney Inorganics, Smithfield, NSW       |
| Celine Conceicao   | Senior Spectroscopist | Sydney Inorganics, Smithfield, NSW       |
| Dian Dao           |                       | Sydney Inorganics, Smithfield, NSW       |
| Edwandy Fadjar     | Organic Coordinator   | Sydney Organics, Smithfield, NSW         |
| Gerrad Morgan      | Asbestos Identifier   | Newcastle - Asbestos, Mayfield West, NSW |
| Lana Nguyen        | Senior LCMS Chemist   | Sydney Organics, Smithfield, NSW         |
| RICHARD TEA        | Lab technician        | Sydney Inorganics, Smithfield, NSW       |
| Shaun Spooner      | Asbestos Identifier   | Newcastle - Asbestos, Mayfield West, 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.

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  
∅ = ALS is not NATA accredited for these tests.

- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- EA200 Legend
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Ch' Chrysotile (white asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EP068: Positive result has been confirmed by re-extraction and re-analysis.
- 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
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.  
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- 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



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                               |            |      |         | Client sample ID | C1            | C2            | C3            | C4            | C5 |
|--|------------|------|---------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                                      |            |      |         | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound   | CAS Number | LOR  | Unit    | ES1607001-001    | ES1607001-002 | ES1607001-003 | ES1607001-004 | ES1607001-005 |    |
|  |            |      |         | Result           | Result        | Result        | Result        | Result        |    |
| <b>EA002 : pH (Soils)</b>  |            |      |         |                  |               |               |               |               |    |
| pH Value   | ----       | 0.1  | pH Unit | ----             | ----          | ----          | ----          | ----          |    |
| <b>EA010: Conductivity</b>                                       |            |      |         |                  |               |               |               |               |    |
| Electrical Conductivity @ 25°C                                   | ----       | 1    | µS/cm   | ----             | ----          | ----          | ----          | ----          |    |
| <b>EA055: Moisture Content</b>                                   |            |      |         |                  |               |               |               |               |    |
| Moisture Content (dried @ 103°C)                                 | ----       | 1    | %       | 7.0              | 13.8          | 9.8           | 5.7           | 8.1           |    |
| <b>EA080: Resistivity</b>  |            |      |         |                  |               |               |               |               |    |
| Resistivity at 25°C  | ----       | 1    | ohm cm  | ----             | ----          | ----          | ----          | ----          |    |
| <b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b> |            |      |         |                  |               |               |               |               |    |
| Asbestos Detected  | 1332-21-4  | 0.1  | g/kg    | ----             | ----          | ----          | ----          | ----          |    |
| Asbestos Type  | 1332-21-4  | -    | --      | ----             | ----          | ----          | ----          | ----          |    |
| Sample weight (dry)  | ----       | 0.01 | g       | ----             | ----          | ----          | ----          | ----          |    |
| APPROVED IDENTIFIER:   | ----       | -    | --      | ----             | ----          | ----          | ----          | ----          |    |
| <b>ED040S : Soluble Sulfate by ICPAES</b>                        |            |      |         |                  |               |               |               |               |    |
| Sulfate as SO4 2-  | 14808-79-8 | 10   | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| <b>ED045G: Chloride by Discrete Analyser</b>                     |            |      |         |                  |               |               |               |               |    |
| Chloride   | 16887-00-6 | 10   | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| <b>EG005T: Total Metals by ICP-AES</b>                           |            |      |         |                  |               |               |               |               |    |
| Arsenic  | 7440-38-2  | 5    | mg/kg   | 17               | 6             | 10            | 13            | <5            |    |
| Cadmium  | 7440-43-9  | 1    | mg/kg   | <1               | <1            | <1            | <1            | <1            |    |
| Chromium   | 7440-47-3  | 2    | mg/kg   | 18               | 14            | 18            | 13            | 9             |    |
| Copper   | 7440-50-8  | 5    | mg/kg   | 12               | 24            | 19            | 9             | <5            |    |
| Lead   | 7439-92-1  | 5    | mg/kg   | 17               | 15            | 26            | 19            | 13            |    |
| Nickel   | 7440-02-0  | 2    | mg/kg   | 8                | 14            | 14            | 5             | 3             |    |
| Zinc   | 7440-66-6  | 5    | mg/kg   | 31               | 50            | 39            | 21            | 17            |    |
| <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>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         |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                        |                      |      |       | Client sample ID | C1            | C2            | C3            | C4            | C5            |
|---|----------------------|------|-------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                               |                      |      |       |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number           | LOR  | Unit  |                  | ES1607001-001 | ES1607001-002 | ES1607001-003 | ES1607001-004 | ES1607001-005 |
|   |                      |      |       |                  | Result        | Result        | Result        | Result        | Result        |
| <b>EP068A: Organochlorine Pesticides (OC) - Continued</b> |                      |      |       |                  |               |               |               |               |               |
| 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         |
| ^ Total Chlordane (sum)                                   | ----                 | 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         |
| 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          |
| ^ 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 |                  | ----          | ----          | ----          | ----          | ----          |
| Demeton-S-methyl  | 919-86-8             | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Monocrotophos   | 6923-22-4            | 0.2  | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Dimethoate  | 60-51-5              | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Diazinon  | 333-41-5             | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Chlorpyrifos-methyl                                       | 5598-13-0            | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Parathion-methyl  | 298-00-0             | 0.2  | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Malathion   | 121-75-5             | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Fenthion  | 55-38-9              | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Chlorpyrifos  | 2921-88-2            | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Parathion   | 56-38-2              | 0.2  | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Pirimphos-ethyl   | 23505-41-1           | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                          |                   |      |       | Client sample ID | C1            | C2            | C3            | C4            | C5 |
|---|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                                 |                   |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound  | CAS Number        | LOR  | Unit  | ES1607001-001    | ES1607001-002 | ES1607001-003 | ES1607001-004 | ES1607001-005 |    |
|   |                   |      |       | Result           | Result        | Result        | Result        | Result        |    |
| <b>EP068B: Organophosphorus Pesticides (OP) - Continued</b> |                   |      |       |                  |               |               |               |               |    |
| Chlorfenvinphos   | 470-90-6          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Bromophos-ethyl   | 4824-78-6         | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fenamiphos  | 22224-92-6        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Prothiofos  | 34643-46-4        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Ethion  | 563-12-2          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Carbophenothion   | 786-19-6          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Azinphos Methyl   | 86-50-0           | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>       |                   |      |       |                  |               |               |               |               |    |
| Naphthalene   | 91-20-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Acenaphthylene  | 208-96-8          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Acenaphthene  | 83-32-9           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fluorene  | 86-73-7           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Phenanthrene  | 85-01-8           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Anthracene  | 120-12-7          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fluoranthene  | 206-44-0          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Pyrene  | 129-00-0          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benz(a)anthracene   | 56-55-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Chrysene  | 218-01-9          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(b+j)fluoranthene                                      | 205-99-2 205-82-3 | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(k)fluoranthene  | 207-08-9          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(a)pyrene  | 50-32-8           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Indeno(1.2.3.cd)pyrene                                      | 193-39-5          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Dibenz(a.h)anthracene                                       | 53-70-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(g.h.i)perylene  | 191-24-2          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of polycyclic aromatic hydrocarbons                   | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (zero)                                 | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (half LOR)                             | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (LOR)                                  | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080/071: Total Petroleum Hydrocarbons</b>              |                   |      |       |                  |               |               |               |               |    |
| C6 - C9 Fraction  | ----              | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C10 - C14 Fraction  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C15 - C28 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C29 - C36 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ C10 - C36 Fraction (sum)                                  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                                     |                   |      |       | Client sample ID | C1            | C2            | C3            | C4            | C5            |
|--|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time  |                   |      |       |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound   | CAS Number        | LOR  | Unit  | ES1607001-001    | ES1607001-002 | ES1607001-003 | ES1607001-004 | ES1607001-005 |               |
|  |                   |      |       | Result           | Result        | Result        | Result        | Result        |               |
| <b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b> |                   |      |       |                  |               |               |               |               |               |
| C6 - C10 Fraction  | C6_C10            | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| ^ C6 - C10 Fraction minus BTEX (F1)                                    | C6_C10-BTEX       | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| >C10 - C16 Fraction  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| >C16 - C34 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| >C34 - C40 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| ^ >C10 - C40 Fraction (sum)  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| ^ >C10 - C16 Fraction minus Naphthalene (F2)                           | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| <b>EP080: BTEXN</b>  |                   |      |       |                  |               |               |               |               |               |
| Benzene  | 71-43-2           | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| Toluene  | 108-88-3          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| Ethylbenzene   | 100-41-4          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| meta- & para-Xylene  | 108-38-3 106-42-3 | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| ortho-Xylene   | 95-47-6           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| ^ Sum of BTEX  | ----              | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| ^ Total Xylenes  | 1330-20-7         | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| Naphthalene  | 91-20-3           | 1    | mg/kg | ----             | ----          | ----          | ----          | ----          | ----          |
| <b>EP066S: PCB Surrogate</b>   |                   |      |       |                  |               |               |               |               |               |
| Decachlorobiphenyl   | 2051-24-3         | 0.1  | %     | 109              | 112           | 118           | 120           | 108           |               |
| <b>EP068S: Organochlorine Pesticide Surrogate</b>                      |                   |      |       |                  |               |               |               |               |               |
| Dibromo-DDE  | 21655-73-2        | 0.05 | %     | 101              | 100           | 107           | 113           | 101           |               |
| <b>EP068T: Organophosphorus Pesticide Surrogate</b>                    |                   |      |       |                  |               |               |               |               |               |
| DEF  | 78-48-8           | 0.05 | %     | 97.2             | 96.6          | 100           | 105           | 90.2          |               |
| <b>EP075(SIM)S: Phenolic Compound Surrogates</b>                       |                   |      |       |                  |               |               |               |               |               |
| Phenol-d6  | 13127-88-3        | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |               |
| 2-Chlorophenol-D4  | 93951-73-6        | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |               |
| 2,4,6-Tribromophenol   | 118-79-6          | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |               |
| <b>EP075(SIM)T: PAH Surrogates</b>                                     |                   |      |       |                  |               |               |               |               |               |
| 2-Fluorobiphenyl   | 321-60-8          | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |               |
| Anthracene-d10   | 1719-06-8         | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |               |
| 4-Terphenyl-d14  | 1718-51-0         | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |               |
| <b>EP080S: TPH(V)/BTEX Surrogates</b>                                  |                   |      |       |                  |               |               |               |               |               |
| 1,2-Dichloroethane-D4  | 17060-07-0        | 0.2  | %     | ----             | ----          | ----          | ----          | ----          |               |



**Analytical Results**

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                |            |     |      | Client sample ID | C1            | C2            | C3            | C4            | C5            |
|---|------------|-----|------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                       |            |     |      |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number | LOR | Unit |                  | ES1607001-001 | ES1607001-002 | ES1607001-003 | ES1607001-004 | ES1607001-005 |
|   |            |     |      |                  | Result        | Result        | Result        | Result        | Result        |
| <b>EP080S: TPH(V)/BTEX Surrogates - Continued</b> |            |     |      |                  |               |               |               |               |               |
| Toluene-D8  | 2037-26-5  | 0.2 | %    |                  | ----          | ----          | ----          | ----          | ----          |
| 4-Bromofluorobenzene                              | 460-00-4   | 0.2 | %    |                  | ----          | ----          | ----          | ----          | ----          |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                               |            |      |         | Client sample ID | C6            | C7            | C8            | S1            | S2 |
|--|------------|------|---------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                                      |            |      |         | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound   | CAS Number | LOR  | Unit    | ES1607001-006    | ES1607001-007 | ES1607001-008 | ES1607001-009 | ES1607001-010 |    |
|  |            |      |         | Result           | Result        | Result        | Result        | Result        |    |
| <b>EA002 : pH (Soils)</b>  |            |      |         |                  |               |               |               |               |    |
| pH Value   | ----       | 0.1  | pH Unit | ----             | ----          | ----          | 5.0           | 4.8           |    |
| <b>EA010: Conductivity</b>                                       |            |      |         |                  |               |               |               |               |    |
| Electrical Conductivity @ 25°C                                   | ----       | 1    | µS/cm   | ----             | ----          | ----          | 299           | 706           |    |
| <b>EA055: Moisture Content</b>                                   |            |      |         |                  |               |               |               |               |    |
| Moisture Content (dried @ 103°C)                                 | ----       | 1    | %       | 14.5             | 5.6           | 17.2          | 18.2          | 18.3          |    |
| <b>EA080: Resistivity</b>  |            |      |         |                  |               |               |               |               |    |
| Resistivity at 25°C  | ----       | 1    | ohm cm  | ----             | ----          | ----          | 3340          | 1420          |    |
| <b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b> |            |      |         |                  |               |               |               |               |    |
| Asbestos Detected  | 1332-21-4  | 0.1  | g/kg    | ----             | ----          | ----          | ----          | ----          |    |
| Asbestos Type  | 1332-21-4  | -    | --      | ----             | ----          | ----          | ----          | ----          |    |
| Sample weight (dry)  | ----       | 0.01 | g       | ----             | ----          | ----          | ----          | ----          |    |
| APPROVED IDENTIFIER:   | ----       | -    | --      | ----             | ----          | ----          | ----          | ----          |    |
| <b>ED040S : Soluble Sulfate by ICPAES</b>                        |            |      |         |                  |               |               |               |               |    |
| Sulfate as SO4 2-  | 14808-79-8 | 10   | mg/kg   | ----             | ----          | ----          | 260           | 660           |    |
| <b>ED045G: Chloride by Discrete Analyser</b>                     |            |      |         |                  |               |               |               |               |    |
| Chloride   | 16887-00-6 | 10   | mg/kg   | ----             | ----          | ----          | 290           | 800           |    |
| <b>EG005T: Total Metals by ICP-AES</b>                           |            |      |         |                  |               |               |               |               |    |
| Arsenic  | 7440-38-2  | 5    | mg/kg   | 8                | 18            | 12            | ----          | ----          |    |
| Cadmium  | 7440-43-9  | 1    | mg/kg   | <1               | <1            | <1            | ----          | ----          |    |
| Chromium   | 7440-47-3  | 2    | mg/kg   | 12               | 20            | 35            | ----          | ----          |    |
| Copper   | 7440-50-8  | 5    | mg/kg   | 9                | 6             | 10            | ----          | ----          |    |
| Lead   | 7439-92-1  | 5    | mg/kg   | 13               | 20            | 25            | ----          | ----          |    |
| Nickel   | 7440-02-0  | 2    | mg/kg   | 3                | 4             | 7             | ----          | ----          |    |
| Zinc   | 7440-66-6  | 5    | mg/kg   | 29               | 9             | 17            | ----          | ----          |    |
| <b>EG035T: Total Recoverable Mercury by FIMS</b>                 |            |      |         |                  |               |               |               |               |    |
| Mercury  | 7439-97-6  | 0.1  | mg/kg   | <0.1             | <0.1          | <0.1          | ----          | ----          |    |
| <b>EP066: Polychlorinated Biphenyls (PCB)</b>                    |            |      |         |                  |               |               |               |               |    |
| Total Polychlorinated biphenyls                                  | ----       | 0.1  | mg/kg   | <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         | ----          | ----          |    |
| Hexachlorobenzene (HCB)  | 118-74-1   | 0.05 | mg/kg   | <0.05            | <0.05         | <0.05         | ----          | ----          |    |
| beta-BHC   | 319-85-7   | 0.05 | mg/kg   | <0.05            | <0.05         | <0.05         | ----          | ----          |    |
| gamma-BHC  | 58-89-9    | 0.05 | mg/kg   | <0.05            | <0.05         | <0.05         | ----          | ----          |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                        |                      |      |       | Client sample ID | C6            | C7            | C8            | S1            | S2            |
|---|----------------------|------|-------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                               |                      |      |       |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number           | LOR  | Unit  |                  | ES1607001-006 | ES1607001-007 | ES1607001-008 | ES1607001-009 | ES1607001-010 |
|   |                      |      |       |                  | Result        | Result        | Result        | Result        | Result        |
| <b>EP068A: Organochlorine Pesticides (OC) - Continued</b> |                      |      |       |                  |               |               |               |               |               |
| delta-BHC   | 319-86-8             | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Heptachlor  | 76-44-8              | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Aldrin  | 309-00-2             | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Heptachlor epoxide  | 1024-57-3            | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| ^ Total Chlordane (sum)                                   | ----                 | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| trans-Chlordane   | 5103-74-2            | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| alpha-Endosulfan  | 959-98-8             | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| cis-Chlordane   | 5103-71-9            | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Dieldrin  | 60-57-1              | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| 4,4'-DDE  | 72-55-9              | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Endrin  | 72-20-8              | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| beta-Endosulfan   | 33213-65-9           | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| ^ Endosulfan (sum)  | 115-29-7             | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| 4,4'-DDD  | 72-54-8              | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Endrin aldehyde   | 7421-93-4            | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Endosulfan sulfate  | 1031-07-8            | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| 4,4'-DDT  | 50-29-3              | 0.2  | mg/kg |                  | <0.2          | <0.2          | <0.2          | ----          | ----          |
| Endrin ketone   | 53494-70-5           | 0.05 | mg/kg |                  | <0.05         | <0.05         | <0.05         | ----          | ----          |
| Methoxychlor  | 72-43-5              | 0.2  | mg/kg |                  | <0.2          | <0.2          | <0.2          | ----          | ----          |
| ^ Sum of Aldrin + Dieldrin                                | 309-00-2/60-57-1     | 0.05 | mg/kg |                  | <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         | ----          | ----          |
| <b>EP068B: Organophosphorus Pesticides (OP)</b>           |                      |      |       |                  |               |               |               |               |               |
| Dichlorvos  | 62-73-7              | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Demeton-S-methyl  | 919-86-8             | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Monocrotophos   | 6923-22-4            | 0.2  | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Dimethoate  | 60-51-5              | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Diazinon  | 333-41-5             | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Chlorpyrifos-methyl                                       | 5598-13-0            | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Parathion-methyl  | 298-00-0             | 0.2  | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Malathion   | 121-75-5             | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Fenthion  | 55-38-9              | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Chlorpyrifos  | 2921-88-2            | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Parathion   | 56-38-2              | 0.2  | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |
| Pirimphos-ethyl   | 23505-41-1           | 0.05 | mg/kg |                  | ----          | ----          | ----          | ----          | ----          |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                          |                   |      |       | Client sample ID | C6            | C7            | C8            | S1            | S2 |
|---|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                                 |                   |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound  | CAS Number        | LOR  | Unit  | ES1607001-006    | ES1607001-007 | ES1607001-008 | ES1607001-009 | ES1607001-010 |    |
|   |                   |      |       | Result           | Result        | Result        | Result        | Result        |    |
| <b>EP068B: Organophosphorus Pesticides (OP) - Continued</b> |                   |      |       |                  |               |               |               |               |    |
| Chlorfenvinphos   | 470-90-6          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Bromophos-ethyl   | 4824-78-6         | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fenamiphos  | 22224-92-6        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Prothiofos  | 34643-46-4        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Ethion  | 563-12-2          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Carbophenothion   | 786-19-6          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Azinphos Methyl   | 86-50-0           | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>       |                   |      |       |                  |               |               |               |               |    |
| Naphthalene   | 91-20-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Acenaphthylene  | 208-96-8          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Acenaphthene  | 83-32-9           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fluorene  | 86-73-7           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Phenanthrene  | 85-01-8           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Anthracene  | 120-12-7          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fluoranthene  | 206-44-0          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Pyrene  | 129-00-0          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benz(a)anthracene   | 56-55-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Chrysene  | 218-01-9          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(b+j)fluoranthene                                      | 205-99-2 205-82-3 | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(k)fluoranthene  | 207-08-9          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(a)pyrene  | 50-32-8           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Indeno(1.2.3.cd)pyrene                                      | 193-39-5          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Dibenz(a.h)anthracene                                       | 53-70-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(g.h.i)perylene  | 191-24-2          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of polycyclic aromatic hydrocarbons                   | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (zero)                                 | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (half LOR)                             | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (LOR)                                  | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080/071: Total Petroleum Hydrocarbons</b>              |                   |      |       |                  |               |               |               |               |    |
| C6 - C9 Fraction  | ----              | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C10 - C14 Fraction  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C15 - C28 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C29 - C36 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ C10 - C36 Fraction (sum)                                  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                                     |                   |      |       | Client sample ID | C6            | C7            | C8            | S1            | S2 |
|--|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time  |                   |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound   | CAS Number        | LOR  | Unit  | ES1607001-006    | ES1607001-007 | ES1607001-008 | ES1607001-009 | ES1607001-010 |    |
|  |                   |      |       | Result           | Result        | Result        | Result        | Result        |    |
| <b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b> |                   |      |       |                  |               |               |               |               |    |
| C6 - C10 Fraction  | C6_C10            | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ C6 - C10 Fraction minus BTEX (F1)                                    | C6_C10-BTEX       | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| >C10 - C16 Fraction  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| >C16 - C34 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| >C34 - C40 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ >C10 - C40 Fraction (sum)  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ >C10 - C16 Fraction minus Naphthalene (F2)                           | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080: BTEXN</b>  |                   |      |       |                  |               |               |               |               |    |
| Benzene  | 71-43-2           | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Toluene  | 108-88-3          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Ethylbenzene   | 100-41-4          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| meta- & para-Xylene  | 108-38-3 106-42-3 | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ortho-Xylene   | 95-47-6           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of BTEX  | ----              | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Total Xylenes  | 1330-20-7         | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Naphthalene  | 91-20-3           | 1    | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP066S: PCB Surrogate</b>   |                   |      |       |                  |               |               |               |               |    |
| Decachlorobiphenyl   | 2051-24-3         | 0.1  | %     | 128              | 111           | 107           | ----          | ----          |    |
| <b>EP068S: Organochlorine Pesticide Surrogate</b>                      |                   |      |       |                  |               |               |               |               |    |
| Dibromo-DDE  | 21655-73-2        | 0.05 | %     | 122              | 94.7          | 95.2          | ----          | ----          |    |
| <b>EP068T: Organophosphorus Pesticide Surrogate</b>                    |                   |      |       |                  |               |               |               |               |    |
| DEF  | 78-48-8           | 0.05 | %     | 114              | 81.1          | 83.2          | ----          | ----          |    |
| <b>EP075(SIM)S: Phenolic Compound Surrogates</b>                       |                   |      |       |                  |               |               |               |               |    |
| Phenol-d6  | 13127-88-3        | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| 2-Chlorophenol-D4  | 93951-73-6        | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| 2,4,6-Tribromophenol   | 118-79-6          | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP075(SIM)T: PAH Surrogates</b>                                     |                   |      |       |                  |               |               |               |               |    |
| 2-Fluorobiphenyl   | 321-60-8          | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| Anthracene-d10   | 1719-06-8         | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| 4-Terphenyl-d14  | 1718-51-0         | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080S: TPH(V)/BTEX Surrogates</b>                                  |                   |      |       |                  |               |               |               |               |    |
| 1,2-Dichloroethane-D4  | 17060-07-0        | 0.2  | %     | ----             | ----          | ----          | ----          | ----          |    |



### Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                |            |     |      | Client sample ID | C6            | C7            | C8            | S1            | S2            |
|---|------------|-----|------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                       |            |     |      |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number | LOR | Unit |                  | ES1607001-006 | ES1607001-007 | ES1607001-008 | ES1607001-009 | ES1607001-010 |
|   |            |     |      |                  | Result        | Result        | Result        | Result        | Result        |
| <b>EP080S: TPH(V)/BTEX Surrogates - Continued</b> |            |     |      |                  |               |               |               |               |               |
| Toluene-D8  | 2037-26-5  | 0.2 | %    |                  | ----          | ----          | ----          | ----          | ----          |
| 4-Bromofluorobenzene                              | 460-00-4   | 0.2 | %    |                  | ----          | ----          | ----          | ----          | ----          |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                               |            |      |         | Client sample ID | S3            | S4            | S5            | S6            | S7 |
|--|------------|------|---------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                                      |            |      |         | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound   | CAS Number | LOR  | Unit    | ES1607001-011    | ES1607001-012 | ES1607001-013 | ES1607001-014 | ES1607001-015 |    |
|  |            |      |         | Result           | Result        | Result        | Result        | Result        |    |
| <b>EA002 : pH (Soils)</b>  |            |      |         |                  |               |               |               |               |    |
| pH Value   | ----       | 0.1  | pH Unit | 4.7              | 5.1           | 5.7           | 5.6           | 5.2           |    |
| <b>EA010: Conductivity</b>                                       |            |      |         |                  |               |               |               |               |    |
| Electrical Conductivity @ 25°C                                   | ----       | 1    | µS/cm   | 739              | 725           | 840           | 388           | 509           |    |
| <b>EA055: Moisture Content</b>                                   |            |      |         |                  |               |               |               |               |    |
| Moisture Content (dried @ 103°C)                                 | ----       | 1    | %       | 16.0             | 12.9          | 15.9          | 12.0          | 7.6           |    |
| <b>EA080: Resistivity</b>  |            |      |         |                  |               |               |               |               |    |
| Resistivity at 25°C  | ----       | 1    | ohm cm  | 1350             | 1380          | 1190          | 2580          | 1960          |    |
| <b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b> |            |      |         |                  |               |               |               |               |    |
| Asbestos Detected  | 1332-21-4  | 0.1  | g/kg    | ----             | ----          | ----          | ----          | ----          |    |
| Asbestos Type  | 1332-21-4  | -    | --      | ----             | ----          | ----          | ----          | ----          |    |
| Sample weight (dry)  | ----       | 0.01 | g       | ----             | ----          | ----          | ----          | ----          |    |
| APPROVED IDENTIFIER:   | ----       | -    | --      | ----             | ----          | ----          | ----          | ----          |    |
| <b>ED040S : Soluble Sulfate by ICPAES</b>                        |            |      |         |                  |               |               |               |               |    |
| Sulfate as SO4 2-  | 14808-79-8 | 10   | mg/kg   | 550              | 570           | 730           | 160           | 190           |    |
| <b>ED045G: Chloride by Discrete Analyser</b>                     |            |      |         |                  |               |               |               |               |    |
| Chloride   | 16887-00-6 | 10   | mg/kg   | 880              | 970           | 1330          | 460           | 780           |    |
| <b>EG005T: Total Metals by ICP-AES</b>                           |            |      |         |                  |               |               |               |               |    |
| Arsenic  | 7440-38-2  | 5    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Cadmium  | 7440-43-9  | 1    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Chromium   | 7440-47-3  | 2    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Copper   | 7440-50-8  | 5    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Lead   | 7439-92-1  | 5    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Nickel   | 7440-02-0  | 2    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Zinc   | 7440-66-6  | 5    | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| <b>EG035T: Total Recoverable Mercury by FIMS</b>                 |            |      |         |                  |               |               |               |               |    |
| Mercury  | 7439-97-6  | 0.1  | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP066: Polychlorinated Biphenyls (PCB)</b>                    |            |      |         |                  |               |               |               |               |    |
| Total Polychlorinated biphenyls                                  | ----       | 0.1  | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP068A: Organochlorine Pesticides (OC)</b>                    |            |      |         |                  |               |               |               |               |    |
| alpha-BHC  | 319-84-6   | 0.05 | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| Hexachlorobenzene (HCB)  | 118-74-1   | 0.05 | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| beta-BHC   | 319-85-7   | 0.05 | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |
| gamma-BHC  | 58-89-9    | 0.05 | mg/kg   | ----             | ----          | ----          | ----          | ----          |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                        |                         |      |       | Client sample ID | S3            | S4            | S5            | S6            | S7 |
|---|-------------------------|------|-------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                               |                         |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound  | CAS Number              | LOR  | Unit  | ES1607001-011    | ES1607001-012 | ES1607001-013 | ES1607001-014 | ES1607001-015 |    |
|   |                         |      |       | Result           | Result        | Result        | Result        | Result        |    |
| <b>EP068A: Organochlorine Pesticides (OC) - Continued</b> |                         |      |       |                  |               |               |               |               |    |
| delta-BHC   | 319-86-8                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Heptachlor  | 76-44-8                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Aldrin  | 309-00-2                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Heptachlor epoxide  | 1024-57-3               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Total Chlordane (sum)                                   | ----                    | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| trans-Chlordane   | 5103-74-2               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| alpha-Endosulfan  | 959-98-8                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| cis-Chlordane   | 5103-71-9               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Dieldrin  | 60-57-1                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| 4,4'-DDE  | 72-55-9                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Endrin  | 72-20-8                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| beta-Endosulfan   | 33213-65-9              | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Endosulfan (sum)  | 115-29-7                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| 4,4'-DDD  | 72-54-8                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Endrin aldehyde   | 7421-93-4               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Endosulfan sulfate  | 1031-07-8               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| 4,4'-DDT  | 50-29-3                 | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Endrin ketone   | 53494-70-5              | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Methoxychlor  | 72-43-5                 | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of Aldrin + Dieldrin                                | 309-00-2/60-57-1        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of DDD + DDE + DDT                                  | 72-54-8/72-55-9/50-29-3 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP068B: Organophosphorus Pesticides (OP)</b>           |                         |      |       |                  |               |               |               |               |    |
| Dichlorvos  | 62-73-7                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Demeton-S-methyl  | 919-86-8                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Monocrotophos   | 6923-22-4               | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Dimethoate  | 60-51-5                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Diazinon  | 333-41-5                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Chlorpyrifos-methyl                                       | 5598-13-0               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Parathion-methyl  | 298-00-0                | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Malathion   | 121-75-5                | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fenthion  | 55-38-9                 | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Chlorpyrifos  | 2921-88-2               | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Parathion   | 56-38-2                 | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Pirimphos-ethyl   | 23505-41-1              | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                          |                   |      |       | Client sample ID | S3            | S4            | S5            | S6            | S7 |
|---|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time                                 |                   |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound  | CAS Number        | LOR  | Unit  | ES1607001-011    | ES1607001-012 | ES1607001-013 | ES1607001-014 | ES1607001-015 |    |
|   |                   |      |       | Result           | Result        | Result        | Result        | Result        |    |
| <b>EP068B: Organophosphorus Pesticides (OP) - Continued</b> |                   |      |       |                  |               |               |               |               |    |
| Chlorfenvinphos   | 470-90-6          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Bromophos-ethyl   | 4824-78-6         | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fenamiphos  | 22224-92-6        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Prothiofos  | 34643-46-4        | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Ethion  | 563-12-2          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Carbophenothion   | 786-19-6          | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Azinphos Methyl   | 86-50-0           | 0.05 | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>       |                   |      |       |                  |               |               |               |               |    |
| Naphthalene   | 91-20-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Acenaphthylene  | 208-96-8          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Acenaphthene  | 83-32-9           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fluorene  | 86-73-7           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Phenanthrene  | 85-01-8           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Anthracene  | 120-12-7          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Fluoranthene  | 206-44-0          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Pyrene  | 129-00-0          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benz(a)anthracene   | 56-55-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Chrysene  | 218-01-9          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(b+j)fluoranthene                                      | 205-99-2 205-82-3 | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(k)fluoranthene  | 207-08-9          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(a)pyrene  | 50-32-8           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Indeno(1.2.3.cd)pyrene                                      | 193-39-5          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Dibenz(a.h)anthracene                                       | 53-70-3           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Benzo(g.h.i)perylene  | 191-24-2          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of polycyclic aromatic hydrocarbons                   | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (zero)                                 | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (half LOR)                             | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Benzo(a)pyrene TEQ (LOR)                                  | ----              | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080/071: Total Petroleum Hydrocarbons</b>              |                   |      |       |                  |               |               |               |               |    |
| C6 - C9 Fraction  | ----              | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C10 - C14 Fraction  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C15 - C28 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| C29 - C36 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ C10 - C36 Fraction (sum)                                  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                                     |                   |      |       | Client sample ID | S3            | S4            | S5            | S6            | S7 |
|--|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|----|
| Client sampling date / time  |                   |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |    |
| Compound   | CAS Number        | LOR  | Unit  | ES1607001-011    | ES1607001-012 | ES1607001-013 | ES1607001-014 | ES1607001-015 |    |
|  |                   |      |       | Result           | Result        | Result        | Result        | Result        |    |
| <b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b> |                   |      |       |                  |               |               |               |               |    |
| C6 - C10 Fraction  | C6_C10            | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ C6 - C10 Fraction minus BTEX (F1)                                    | C6_C10-BTEX       | 10   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| >C10 - C16 Fraction  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| >C16 - C34 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| >C34 - C40 Fraction  | ----              | 100  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ >C10 - C40 Fraction (sum)  | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ >C10 - C16 Fraction minus Naphthalene (F2)                           | ----              | 50   | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080: BTEXN</b>  |                   |      |       |                  |               |               |               |               |    |
| Benzene  | 71-43-2           | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Toluene  | 108-88-3          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Ethylbenzene   | 100-41-4          | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| meta- & para-Xylene  | 108-38-3 106-42-3 | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ortho-Xylene   | 95-47-6           | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Sum of BTEX  | ----              | 0.2  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| ^ Total Xylenes  | 1330-20-7         | 0.5  | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| Naphthalene  | 91-20-3           | 1    | mg/kg | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP066S: PCB Surrogate</b>   |                   |      |       |                  |               |               |               |               |    |
| Decachlorobiphenyl   | 2051-24-3         | 0.1  | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP068S: Organochlorine Pesticide Surrogate</b>                      |                   |      |       |                  |               |               |               |               |    |
| Dibromo-DDE  | 21655-73-2        | 0.05 | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP068T: Organophosphorus Pesticide Surrogate</b>                    |                   |      |       |                  |               |               |               |               |    |
| DEF  | 78-48-8           | 0.05 | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP075(SIM)S: Phenolic Compound Surrogates</b>                       |                   |      |       |                  |               |               |               |               |    |
| Phenol-d6  | 13127-88-3        | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| 2-Chlorophenol-D4  | 93951-73-6        | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| 2,4,6-Tribromophenol   | 118-79-6          | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP075(SIM)T: PAH Surrogates</b>                                     |                   |      |       |                  |               |               |               |               |    |
| 2-Fluorobiphenyl   | 321-60-8          | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| Anthracene-d10   | 1719-06-8         | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| 4-Terphenyl-d14  | 1718-51-0         | 0.5  | %     | ----             | ----          | ----          | ----          | ----          |    |
| <b>EP080S: TPH(V)/BTEX Surrogates</b>                                  |                   |      |       |                  |               |               |               |               |    |
| 1,2-Dichloroethane-D4  | 17060-07-0        | 0.2  | %     | ----             | ----          | ----          | ----          | ----          |    |



**Analytical Results**

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                |            |     |      | Client sample ID | S3            | S4            | S5            | S6            | S7            |
|---|------------|-----|------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                       |            |     |      |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number | LOR | Unit |                  | ES1607001-011 | ES1607001-012 | ES1607001-013 | ES1607001-014 | ES1607001-015 |
|   |            |     |      |                  | Result        | Result        | Result        | Result        | Result        |
| <b>EP080S: TPH(V)/BTEX Surrogates - Continued</b> |            |     |      |                  |               |               |               |               |               |
| Toluene-D8  | 2037-26-5  | 0.2 | %    |                  | ----          | ----          | ----          | ----          | ----          |
| 4-Bromofluorobenzene                              | 460-00-4   | 0.2 | %    |                  | ----          | ----          | ----          | ----          | ----          |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                               |            |      |         | Client sample ID | F1            | F2            | F3            | F4            | F1asb     |
|--|------------|------|---------|------------------|---------------|---------------|---------------|---------------|-----------|
| Client sampling date / time                                      |            |      |         | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |           |
| Compound   | CAS Number | LOR  | Unit    | ES1607001-016    | ES1607001-017 | ES1607001-018 | ES1607001-019 | ES1607001-020 |           |
|  |            |      |         | Result           | Result        | Result        | Result        | Result        |           |
| <b>EA002 : pH (Soils)</b>  |            |      |         |                  |               |               |               |               |           |
| pH Value   | ----       | 0.1  | pH Unit | ----             | ----          | ----          | ----          | ----          | ----      |
| <b>EA010: Conductivity</b>                                       |            |      |         |                  |               |               |               |               |           |
| Electrical Conductivity @ 25°C                                   | ----       | 1    | µS/cm   | ----             | ----          | ----          | ----          | ----          | ----      |
| <b>EA055: Moisture Content</b>                                   |            |      |         |                  |               |               |               |               |           |
| Moisture Content (dried @ 103°C)                                 | ----       | 1    | %       | 36.2             | 8.4           | 10.5          | 16.6          | ----          | ----      |
| <b>EA080: Resistivity</b>  |            |      |         |                  |               |               |               |               |           |
| Resistivity at 25°C  | ----       | 1    | ohm cm  | ----             | ----          | ----          | ----          | ----          | ----      |
| <b>EA200: AS 4964 - 2004 Identification of Asbestos in Soils</b> |            |      |         |                  |               |               |               |               |           |
| Asbestos Detected  | 1332-21-4  | 0.1  | g/kg    | ----             | ----          | ----          | ----          | ----          | Yes       |
| Asbestos Type  | 1332-21-4  | -    | --      | ----             | ----          | ----          | ----          | ----          | Ch        |
| Sample weight (dry)  | ----       | 0.01 | g       | ----             | ----          | ----          | ----          | ----          | 335       |
| APPROVED IDENTIFIER:   | ----       | -    | --      | ----             | ----          | ----          | ----          | ----          | S.SPOONER |
| <b>ED040S : Soluble Sulfate by ICPAES</b>                        |            |      |         |                  |               |               |               |               |           |
| Sulfate as SO4 2-  | 14808-79-8 | 10   | mg/kg   | ----             | ----          | ----          | ----          | ----          | ----      |
| <b>ED045G: Chloride by Discrete Analyser</b>                     |            |      |         |                  |               |               |               |               |           |
| Chloride   | 16887-00-6 | 10   | mg/kg   | ----             | ----          | ----          | ----          | ----          | ----      |
| <b>EG005T: Total Metals by ICP-AES</b>                           |            |      |         |                  |               |               |               |               |           |
| Arsenic  | 7440-38-2  | 5    | mg/kg   | 12               | 7             | 5             | <5            | ----          | ----      |
| Cadmium  | 7440-43-9  | 1    | mg/kg   | <1               | <1            | <1            | <1            | ----          | ----      |
| Chromium   | 7440-47-3  | 2    | mg/kg   | 22               | 18            | 11            | 9             | ----          | ----      |
| Copper   | 7440-50-8  | 5    | mg/kg   | 34               | 15            | 8             | 8             | ----          | ----      |
| Lead   | 7439-92-1  | 5    | mg/kg   | 128              | 19            | 14            | 8             | ----          | ----      |
| Nickel   | 7440-02-0  | 2    | mg/kg   | 13               | 7             | 4             | 2             | ----          | ----      |
| Zinc   | 7440-66-6  | 5    | mg/kg   | 1600             | 23            | 26            | 10            | ----          | ----      |
| <b>EG035T: Total Recoverable Mercury by FIMS</b>                 |            |      |         |                  |               |               |               |               |           |
| Mercury  | 7439-97-6  | 0.1  | mg/kg   | 0.2              | <0.1          | <0.1          | <0.1          | ----          | ----      |
| <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>                    |            |      |         |                  |               |               |               |               |           |
| 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         | ----          | ----      |





## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                          |                   |      |       | Client sample ID | F1            | F2            | F3            | F4            | F1asb         |
|---|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                                 |                   |      |       |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number        | LOR  | Unit  |                  | ES1607001-016 | ES1607001-017 | ES1607001-018 | ES1607001-019 | ES1607001-020 |
|   |                   |      |       |                  | Result        | Result        | Result        | Result        | Result        |
| <b>EP068B: Organophosphorus Pesticides (OP) - Continued</b> |                   |      |       |                  |               |               |               |               |               |
| 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>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          | ----          |
| Anthracene  | 120-12-7          | 0.5  | mg/kg |                  | <0.5          | <0.5          | <0.5          | <0.5          | ----          |
| Fluoranthene  | 206-44-0          | 0.5  | mg/kg |                  | <0.5          | <0.5          | <0.5          | <0.5          | ----          |
| Pyrene  | 129-00-0          | 0.5  | mg/kg |                  | <0.5          | <0.5          | <0.5          | <0.5          | ----          |
| Benzo(a)anthracene  | 56-55-3           | 0.5  | mg/kg |                  | <0.5          | <0.5          | <0.5          | <0.5          | ----          |
| Chrysene  | 218-01-9          | 0.5  | mg/kg |                  | <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          | ----          |
| Benzo(k)fluoranthene  | 207-08-9          | 0.5  | mg/kg |                  | <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          | ----          |
| Indeno(1.2.3.cd)pyrene                                      | 193-39-5          | 0.5  | mg/kg |                  | <0.5          | <0.5          | <0.5          | <0.5          | ----          |
| Dibenz(a.h)anthracene                                       | 53-70-3           | 0.5  | mg/kg |                  | <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          | ----          |
| ^ Sum of polycyclic aromatic hydrocarbons                   | ----              | 0.5  | mg/kg |                  | <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          | ----          |
| ^ 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>    | ----          |
| ^ 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>EP080/071: Total Petroleum Hydrocarbons</b>              |                   |      |       |                  |               |               |               |               |               |
| C6 - C9 Fraction  | ----              | 10   | mg/kg |                  | <10           | <10           | <10           | <10           | ----          |
| C10 - C14 Fraction  | ----              | 50   | mg/kg |                  | <50           | <50           | <50           | <50           | ----          |
| C15 - C28 Fraction  | ----              | 100  | mg/kg |                  | <100          | <100          | <100          | <100          | ----          |
| C29 - C36 Fraction  | ----              | 100  | mg/kg |                  | <100          | <100          | <100          | <100          | ----          |
| ^ C10 - C36 Fraction (sum)                                  | ----              | 50   | mg/kg |                  | <50           | <50           | <50           | <50           | ----          |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                                     |                   |      |       | Client sample ID | F1            | F2            | F3            | F4            | F1asb |
|--|-------------------|------|-------|------------------|---------------|---------------|---------------|---------------|-------|
| Client sampling date / time  |                   |      |       | [29-Mar-2016]    | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |       |
| Compound   | CAS Number        | LOR  | Unit  | ES1607001-016    | ES1607001-017 | ES1607001-018 | ES1607001-019 | ES1607001-020 |       |
|  |                   |      |       | Result           | Result        | Result        | Result        | Result        |       |
| <b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b> |                   |      |       |                  |               |               |               |               |       |
| C6 - C10 Fraction  | C6_C10            | 10   | mg/kg | <10              | <10           | <10           | <10           | ----          |       |
| ^ C6 - C10 Fraction minus BTEX (F1)                                    | C6_C10-BTEX       | 10   | mg/kg | <10              | <10           | <10           | <10           | ----          |       |
| >C10 - C16 Fraction  | ----              | 50   | mg/kg | <50              | <50           | <50           | <50           | ----          |       |
| >C16 - C34 Fraction  | ----              | 100  | mg/kg | <100             | <100          | <100          | <100          | ----          |       |
| >C34 - C40 Fraction  | ----              | 100  | mg/kg | <100             | <100          | <100          | <100          | ----          |       |
| ^ >C10 - C40 Fraction (sum)  | ----              | 50   | mg/kg | <50              | <50           | <50           | <50           | ----          |       |
| ^ >C10 - C16 Fraction minus Naphthalene (F2)                           | ----              | 50   | mg/kg | <50              | <50           | <50           | <50           | ----          |       |
| <b>EP080: BTEXN</b>  |                   |      |       |                  |               |               |               |               |       |
| Benzene  | 71-43-2           | 0.2  | mg/kg | <0.2             | <0.2          | <0.2          | <0.2          | ----          |       |
| Toluene  | 108-88-3          | 0.5  | mg/kg | <0.5             | <0.5          | <0.5          | <0.5          | ----          |       |
| Ethylbenzene   | 100-41-4          | 0.5  | mg/kg | <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          | ----          |       |
| 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  | 1330-20-7         | 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  | %     | 102              | 104           | 121           | 126           | ----          |       |
| <b>EP068S: Organochlorine Pesticide Surrogate</b>                      |                   |      |       |                  |               |               |               |               |       |
| Dibromo-DDE  | 21655-73-2        | 0.05 | %     | 96.7             | 110           | 92.1          | 93.6          | ----          |       |
| <b>EP068T: Organophosphorus Pesticide Surrogate</b>                    |                   |      |       |                  |               |               |               |               |       |
| DEF  | 78-48-8           | 0.05 | %     | 84.0             | 95.8          | 77.8          | 83.9          | ----          |       |
| <b>EP075(SIM)S: Phenolic Compound Surrogates</b>                       |                   |      |       |                  |               |               |               |               |       |
| Phenol-d6  | 13127-88-3        | 0.5  | %     | 88.8             | 99.3          | 83.9          | 84.7          | ----          |       |
| 2-Chlorophenol-D4  | 93951-73-6        | 0.5  | %     | 91.7             | 104           | 87.3          | 90.9          | ----          |       |
| 2,4,6-Tribromophenol   | 118-79-6          | 0.5  | %     | 77.6             | 89.1          | 70.7          | 73.6          | ----          |       |
| <b>EP075(SIM)T: PAH Surrogates</b>                                     |                   |      |       |                  |               |               |               |               |       |
| 2-Fluorobiphenyl   | 321-60-8          | 0.5  | %     | 111              | 124           | 104           | 109           | ----          |       |
| Anthracene-d10   | 1719-06-8         | 0.5  | %     | 111              | 122           | 103           | 108           | ----          |       |
| 4-Terphenyl-d14  | 1718-51-0         | 0.5  | %     | 113              | 126           | 104           | 110           | ----          |       |
| <b>EP080S: TPH(V)/BTEX Surrogates</b>                                  |                   |      |       |                  |               |               |               |               |       |
| 1,2-Dichloroethane-D4  | 17060-07-0        | 0.2  | %     | 93.6             | 118           | 113           | 104           | ----          |       |



**Analytical Results**

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                |            |     |      | Client sample ID | F1            | F2            | F3            | F4            | F1asb         |
|---|------------|-----|------|------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time                       |            |     |      |                  | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] | [29-Mar-2016] |
| Compound  | CAS Number | LOR | Unit | ES1607001-016    | ES1607001-017 | ES1607001-018 | ES1607001-019 | ES1607001-020 | ES1607001-020 |
|   |            |     |      | Result           | Result        | Result        | Result        | Result        | Result        |
| <b>EP080S: TPH(V)/BTEX Surrogates - Continued</b> |            |     |      |                  |               |               |               |               |               |
| Toluene-D8  | 2037-26-5  | 0.2 | %    | 82.2             | 102           | 96.2          | 92.6          | ----          | ----          |
| 4-Bromofluorobenzene                              | 460-00-4   | 0.2 | %    | 93.4             | 114           | 110           | 105           | ----          | ----          |





## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                        |                         |      |       | Client sample ID | F3asb  | ----   | ----   | ----   | ---- |
|---|-------------------------|------|-------|------------------|--------|--------|--------|--------|------|
| Client sampling date / time                               |                         |      |       | [29-Mar-2016]    | ----   | ----   | ----   | ----   |      |
| Compound  | CAS Number              | LOR  | Unit  | ES1607001-022    | -----  | -----  | -----  | -----  |      |
|   |                         |      |       | Result           | Result | Result | Result | Result |      |
| <b>EP068A: Organochlorine Pesticides (OC) - Continued</b> |                         |      |       |                  |        |        |        |        |      |
| delta-BHC   | 319-86-8                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Heptachlor  | 76-44-8                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Aldrin  | 309-00-2                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Heptachlor epoxide  | 1024-57-3               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Total Chlordane (sum)                                   | ----                    | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| trans-Chlordane   | 5103-74-2               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| alpha-Endosulfan  | 959-98-8                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| cis-Chlordane   | 5103-71-9               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Dieldrin  | 60-57-1                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| 4,4'-DDE  | 72-55-9                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Endrin  | 72-20-8                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| beta-Endosulfan   | 33213-65-9              | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Endosulfan (sum)  | 115-29-7                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| 4,4'-DDD  | 72-54-8                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Endrin aldehyde   | 7421-93-4               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Endosulfan sulfate  | 1031-07-8               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| 4,4'-DDT  | 50-29-3                 | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Endrin ketone   | 53494-70-5              | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Methoxychlor  | 72-43-5                 | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Sum of Aldrin + Dieldrin                                | 309-00-2/60-57-1        | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Sum of DDD + DDE + DDT                                  | 72-54-8/72-55-9/50-29-3 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP068B: Organophosphorus Pesticides (OP)</b>           |                         |      |       |                  |        |        |        |        |      |
| Dichlorvos  | 62-73-7                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Demeton-S-methyl  | 919-86-8                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Monocrotophos   | 6923-22-4               | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Dimethoate  | 60-51-5                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Diazinon  | 333-41-5                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Chlorpyrifos-methyl                                       | 5598-13-0               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Parathion-methyl  | 298-00-0                | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Malathion   | 121-75-5                | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Fenthion  | 55-38-9                 | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Chlorpyrifos  | 2921-88-2               | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Parathion   | 56-38-2                 | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Pirimphos-ethyl   | 23505-41-1              | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                          |                   |      |       | Client sample ID | F3asb  | ----   | ----   | ----   | ---- |
|---|-------------------|------|-------|------------------|--------|--------|--------|--------|------|
| Client sampling date / time                                 |                   |      |       | [29-Mar-2016]    | ----   | ----   | ----   | ----   |      |
| Compound  | CAS Number        | LOR  | Unit  | ES1607001-022    | -----  | -----  | -----  | -----  |      |
|   |                   |      |       | Result           | Result | Result | Result | Result |      |
| <b>EP068B: Organophosphorus Pesticides (OP) - Continued</b> |                   |      |       |                  |        |        |        |        |      |
| Chlorfenvinphos   | 470-90-6          | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Bromophos-ethyl   | 4824-78-6         | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Fenamiphos  | 22224-92-6        | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Prothiofos  | 34643-46-4        | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Ethion  | 563-12-2          | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Carbophenothion   | 786-19-6          | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Azinphos Methyl   | 86-50-0           | 0.05 | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>       |                   |      |       |                  |        |        |        |        |      |
| Naphthalene   | 91-20-3           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Acenaphthylene  | 208-96-8          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Acenaphthene  | 83-32-9           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Fluorene  | 86-73-7           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Phenanthrene  | 85-01-8           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Anthracene  | 120-12-7          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Fluoranthene  | 206-44-0          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Pyrene  | 129-00-0          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Benz(a)anthracene   | 56-55-3           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Chrysene  | 218-01-9          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Benzo(b+j)fluoranthene                                      | 205-99-2 205-82-3 | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Benzo(k)fluoranthene  | 207-08-9          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Benzo(a)pyrene  | 50-32-8           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Indeno(1.2.3.cd)pyrene                                      | 193-39-5          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Dibenz(a.h)anthracene                                       | 53-70-3           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Benzo(g.h.i)perylene  | 191-24-2          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Sum of polycyclic aromatic hydrocarbons                   | ----              | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Benzo(a)pyrene TEQ (zero)                                 | ----              | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Benzo(a)pyrene TEQ (half LOR)                             | ----              | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Benzo(a)pyrene TEQ (LOR)                                  | ----              | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP080/071: Total Petroleum Hydrocarbons</b>              |                   |      |       |                  |        |        |        |        |      |
| C6 - C9 Fraction  | ----              | 10   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| C10 - C14 Fraction  | ----              | 50   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| C15 - C28 Fraction  | ----              | 100  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| C29 - C36 Fraction  | ----              | 100  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ C10 - C36 Fraction (sum)                                  | ----              | 50   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)                                     |                   |      |       | Client sample ID | F3asb  | ----   | ----   | ----   | ---- |
|--|-------------------|------|-------|------------------|--------|--------|--------|--------|------|
| Client sampling date / time  |                   |      |       | [29-Mar-2016]    | ----   | ----   | ----   | ----   |      |
| Compound   | CAS Number        | LOR  | Unit  | ES1607001-022    | -----  | -----  | -----  | -----  |      |
|  |                   |      |       | Result           | Result | Result | Result | Result |      |
| <b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b> |                   |      |       |                  |        |        |        |        |      |
| C6 - C10 Fraction  | C6_C10            | 10   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ C6 - C10 Fraction minus BTEX (F1)                                    | C6_C10-BTEX       | 10   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| >C10 - C16 Fraction  | ----              | 50   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| >C16 - C34 Fraction  | ----              | 100  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| >C34 - C40 Fraction  | ----              | 100  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ >C10 - C40 Fraction (sum)  | ----              | 50   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ >C10 - C16 Fraction minus Naphthalene (F2)                           | ----              | 50   | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP080: BTEXN</b>  |                   |      |       |                  |        |        |        |        |      |
| Benzene  | 71-43-2           | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Toluene  | 108-88-3          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Ethylbenzene   | 100-41-4          | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| meta- & para-Xylene  | 108-38-3 106-42-3 | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ortho-Xylene   | 95-47-6           | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Sum of BTEX  | ----              | 0.2  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| ^ Total Xylenes  | 1330-20-7         | 0.5  | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| Naphthalene  | 91-20-3           | 1    | mg/kg | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP066S: PCB Surrogate</b>   |                   |      |       |                  |        |        |        |        |      |
| Decachlorobiphenyl   | 2051-24-3         | 0.1  | %     | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP068S: Organochlorine Pesticide Surrogate</b>                      |                   |      |       |                  |        |        |        |        |      |
| Dibromo-DDE  | 21655-73-2        | 0.05 | %     | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP068T: Organophosphorus Pesticide Surrogate</b>                    |                   |      |       |                  |        |        |        |        |      |
| DEF  | 78-48-8           | 0.05 | %     | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP075(SIM)S: Phenolic Compound Surrogates</b>                       |                   |      |       |                  |        |        |        |        |      |
| Phenol-d6  | 13127-88-3        | 0.5  | %     | ----             | ----   | ----   | ----   | ----   |      |
| 2-Chlorophenol-D4  | 93951-73-6        | 0.5  | %     | ----             | ----   | ----   | ----   | ----   |      |
| 2,4,6-Tribromophenol   | 118-79-6          | 0.5  | %     | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP075(SIM)T: PAH Surrogates</b>                                     |                   |      |       |                  |        |        |        |        |      |
| 2-Fluorobiphenyl   | 321-60-8          | 0.5  | %     | ----             | ----   | ----   | ----   | ----   |      |
| Anthracene-d10   | 1719-06-8         | 0.5  | %     | ----             | ----   | ----   | ----   | ----   |      |
| 4-Terphenyl-d14  | 1718-51-0         | 0.5  | %     | ----             | ----   | ----   | ----   | ----   |      |
| <b>EP080S: TPH(V)/BTEX Surrogates</b>                                  |                   |      |       |                  |        |        |        |        |      |
| 1,2-Dichloroethane-D4  | 17060-07-0        | 0.2  | %     | ----             | ----   | ----   | ----   | ----   |      |





### Analytical Results

| Sub-Matrix: <b>SOLID</b><br>(Matrix: <b>SOLID</b> )                     |            |      |      | Client sample ID | F2asb  | ----   | ----   | ----   | ---- |
|---|------------|------|------|------------------|--------|--------|--------|--------|------|
| Client sampling date / time   |            |      |      | [29-Mar-2016]    | ----   | ----   | ----   | ----   |      |
| Compound  | CAS Number | LOR  | Unit | ES1607001-021    | -----  | -----  | -----  | -----  |      |
|   |            |      |      | Result           | Result | Result | Result | Result |      |
| <b>EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples</b> |            |      |      |                  |        |        |        |        |      |
| Asbestos Detected   | 1332-21-4  | 0.1  | g/kg | No               | ----   | ----   | ----   | ----   |      |
| Asbestos Type   | 1332-21-4  | -    | --   | -                | ----   | ----   | ----   | ----   |      |
| Sample weight (dry)   | ----       | 0.01 | g    | 20.0             | ----   | ----   | ----   | ----   |      |
| APPROVED IDENTIFIER:  | ----       | -    | --   | G.MORGAN         | ----   | ----   | ----   | ----   |      |

### 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   | F1asb - [29-Mar-2016]                          | Mid brown clay soil with one piece of bonded asbestos cement sheeting approx 45 x 30 x 5 mm. |
| EA200: Description   | F3asb - [29-Mar-2016]                          | Mid brown clay soil with grey rocks.   |

Sub-Matrix: **SOLID**

| Method: Compound  | Client sample ID - Client sampling date / time | Analytical Results  |
|---|--|---|
| <b>EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples</b> |  |   |
| EA200: Description  | F2asb - [29-Mar-2016]                          | Several pieces of vinyl tile approximately 50 x 35 x 2mm. |



## 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  |

## **APPENDIX D**

**Search of the NSW EPA Contaminated Land Management Record**

**Search of the Protection of the Environment operations Public Register (POEO) of Licensed and Delicensed Premises:**

| Organisation Name                               | Premise Address                    | Suburb        | Local Govt Area | Fee-Based Activity  |
|---|------------------------------------|---------------|-----------------|---|
| VIP DRUM RECONDITIONERS PTY. LTD.               | 30-32 POWERS ROAD                  | SEVEN HILLS   | BLACKTOWN       | Container reconditioning                                      |
| HARDMAN AUSTRALIA PTY LIMITED                   | 11 BODEN ROAD                      | SEVEN HILLS   | BLACKTOWN       | Chemical production waste generation                          |
| HENKEL AUSTRALIA PTY LTD                        | 7 STANTON ROAD                     | SEVEN HILLS   | BLACKTOWN       | Paints/polishes/adhesives production                          |
| FULTON HOGAN INDUSTRIES PTY LTD                 | OLD WALLGROVE ROAD                 | EASTERN CREEK | BLACKTOWN       | Crushing, grinding or separating                              |
| DEXION (AUSTRALIA) PTY LTD                      | 23 TATTERSALL ROAD                 | KINGS PARK    | BLACKTOWN       | Metal waste generation  |
| A J BUSH & SONS (MANUFACTURES) PTY LTD          | WINDSOR ROAD                       | RIVERSTONE    | BLACKTOWN       | Rendering or fat extraction                                   |
| CHASSIS BRAKES INTERNATIONAL CASTINGS PTY LTD   | 18-24 ABBOTT ROAD                  | SEVEN HILLS   | BLACKTOWN       | Metal waste generation  |
| VALSPAR PAINT (AUSTRALIA) PTY LIMITED           | 4 STEEL STREET                     | BLACKTOWN     | BLACKTOWN       | Chemical production waste generation                          |
| HOLCIM (AUSTRALIA) PTY LTD                      | LOT1 WOODSTOCK AVE                 | ROOTY HILL    | BLACKTOWN       | Concrete works  |
| SYDNEY WATER CORPORATION                        | QUAKERS ROAD (NEAR MELROSE AVENUE) | QUAKERS HILL  | BLACKTOWN       | Sewage treatment processing by large plants                   |
| CSR BUILDING PRODUCTS LIMITED                   | 75 TOWNSON ROAD                    | SCHOFIELDS    | BLACKTOWN       | Mining for minerals   |
| Auscol Pty Ltd                                  | 148 RIVERSTONE PDE                 | RIVERSTONE    | BLACKTOWN       | Non-thermal treatment of hazardous and other waste            |
| THE VALSPAR (AUSTRALIA) CORPORATION PTY LIMITED | 203 POWER STREET                   | GLENDEENING   | BLACKTOWN       | Chemical production waste generation                          |
| KNIGHTS SYNDICATE PTY LTD                       | 105 SCHOFIELDS ROAD                | ROUSE HILL    | BLACKTOWN       | Waste storage - other types of waste                          |
| SITA AUSTRALIA PTY LTD                          | 29 POWERS ROAD                     | SEVEN HILLS   | BLACKTOWN       | Non-thermal treatment of general waste                        |
| SITA AUSTRALIA PTY LTD                          | 29 POWERS ROAD                     | SEVEN HILLS   | BLACKTOWN       | Waste storage - waste tyres                                   |
|   | NORTH STREET                       | SCHOFIELDS    | BLACKTOWN       | Non-thermal treatment of general waste                        |
| AUSTRAL MASONRY (NSW) PTY LTD                   | CLUNIES ROSS STREET                | PROSPECT      | BLACKTOWN       | Concrete works  |
| RED LEA CHICKENS PTY LTD                        | 421-427 FLUSHCOMBE ROAD            | BLACKTOWN     | BLACKTOWN       | Slaughtering or processing animals                            |
| HANSON CONSTRUCTION MATERIALS PTY LTD           | Off Wallgrove Road                 | EASTERN CREEK | BLACKTOWN       | Waste storage - other types of waste                          |
| WASTE ASSETS MANAGEMENT CORPORATION             | WALLGROVE ROAD                     | EASTERN CREEK | BLACKTOWN       | Non-thermal treatment of general waste                        |
| BLACKTOWN CITY COUNCIL                          | SCHOFIELDS ROAD                    | ROUSE HILL    | BLACKTOWN       | Land-based extractive activity                                |
| AXALTA COATING SYSTEMS AUSTRALIA PTY LTD        | 13 MELBOURNE ROAD                  | RIVERSTONE    | BLACKTOWN       | Chemical production waste generation                          |
| TRANSPACIFIC INDUSTRIES PTY. LTD.               | 6-8 RAYBEN STREET                  | GLENDEENING   | BLACKTOWN       | Non-thermal treatment of hazardous and other waste            |
| ONESTEEL NSW PTY LIMITED                        | 22 KELLOGG ROAD                    | ROOTY HILL    | BLACKTOWN       | Chemical storage waste generation                             |
| TOLL NORTH PTY LTD                              | 616 GREAT WESTERN HIGHWAY          | ARNDELL PARK  | BLACKTOWN       | General chemicals storage                                     |
| PASCOE'S PTY LTD                                | 14 GARLING ROAD                    | KINGS PARK    | BLACKTOWN       | Chemical production waste generation                          |
| COMCHROME (AUST) PTY LTD                        | 36 TATTERSALL ROAD                 | KINGS PARK    | BLACKTOWN       | Metal waste generation  |
| BITUPAVE LTD                                    | 25 POWERS ROAD                     | SEVEN HILLS   | BLACKTOWN       | Waste storage - other types of waste                          |
| OSI INTERNATIONAL FOODS (AUSTRALIA) PTY LIMITED | 11 BESSEMER ST                     | BLACKTOWN     | BLACKTOWN       | General animal products production                            |
| EDL LFG (NSW) PTY LTD                           | WALLGROVE ROAD                     | EASTERN CREEK | BLACKTOWN       | Generation of electrical power from gas                       |
| BOSTIK AUSTRALIA PTY LTD                        | 21 Tattersall Road                 | KINGS PARK    | BLACKTOWN       | Chemical production waste generation                          |
| DULUXGROUP (AUSTRALIA) PTY LTD                  | 9 Coventry Place                   | MOUNT DRUITT  | BLACKTOWN       | Pesticides and related products production                    |
| SELL & PARKER PTY LTD                           | 45 TATTERSALL ROAD                 | BLACKTOWN     | BLACKTOWN       | Scrap metal processing  |
|   | 132 BURFITT ROAD                   | RIVERSTONE    | BLACKTOWN       | Composting  |
| SAFT BATTERIES PTY LIMITED                      | UNIT 18, 167 PROSPECT HIGHWAY      | SEVEN HILLS   | BLACKTOWN       | Chemical production waste generation                          |
| SYDNEYWIDE PIPE CLEANING PTY LTD                | 40 Edward Street                   | RIVERSTONE    | BLACKTOWN       | Non-thermal treatment of hazardous and other waste            |
| NCI HOLDINGS PTY LTD                            | 194 Power Street                   | GLENDEENING   | BLACKTOWN       | Metal waste generation  |
| ONESTEEL COIL COATERS PTY LTD                   | 3A Contaplas Street                | ARNDELL PARK  | BLACKTOWN       | Metal waste generation  |
| LMS ENERGY PTY LTD                              | Ferrers Road                       | EASTERN CREEK | BLACKTOWN       | Generation of electrical power otherwise than from coal, dies |
| AUSTRALIAN ECO OILS PTY LIMITED                 | 55 Princes Street                  | RIVERSTONE    | BLACKTOWN       | Non-thermal treatment of hazardous and other waste            |
| EDL LFG (NSW) PTY LTD                           | GRANGE AVENUE (WEST)               | MARSDEN PARK  | BLACKTOWN       | Generation of electrical power from gas                       |

| <b>Organisation Name</b>               | <b>Premise Address</b> | <b>Suburb</b> | <b>Local Govt</b> | <b>Fee-Based Activity</b>                          |
|--|------------------------|---------------|-------------------|--|
| ELGAS LTD                              | 22 Holbeche Road       | ARNDELL PARK  | BLACKTOWN         | Petroleum products storage                         |
| Dial-A-Dump (EC) Pty Ltd               | Honeycomb Drive        | EASTERN CREEK | BLACKTOWN         | Composting   |
| STATE WASTE SERVICES (NSW) PTY LIMITED | 9 Kenoma Place         | ARNDELL PARK  | BLACKTOWN         | Non-thermal treatment of hazardous and other waste |
| Dial-A-Dump (EC) Pty Ltd               | Honeycomb Drive        | EASTERN CREEK | BLACKTOWN         | Waste disposal by application to land              |





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Matched 7 notices relating to 2 sites.

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| Suburb      | Address            | Site Name                                       | Notices related to this site |
|-------------|--------------------|---|------------------------------|
| KINGS PARK  | 21 Tattersall ROAD | <a href="#">Dow Corning</a>                     | 1 current and 4 former       |
| SEVEN HILLS | 27 Powers ROAD     | <a href="#">Australian Waste Oil Refineries</a> | 2 current                    |