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Report on
Detailed Site Investigation

Proposed School Development
Cnr Fox Valley Road & Comenarra Parkway
Wahroonga, NSW

Prepared for
Stanton Dahl Architects Pty Ltd

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Executive Summary

This report details the methodology and results of a detailed site investigation (DSI) associated with four stages of the proposed Wahroonga Adventist School and future residential development as part of the larger Wahroonga Estate Redevelopment, Precinct B project at the corner of Fox Valley Road and Comenarra Parkway, Wahroonga. The investigation was commissioned by Stanton Dahl Architects Pty Ltd (Stanton) on behalf of Seventh-day Adventist Greater Sydney Conference in accordance with Douglas Partners' proposal dated 23 April 2013 and discussion on 14 June 2013 regarding additional scope of works required to comply with the updated National Environment Protection Council *National Environment Protection (Assessment of Site Contamination) Measure, as amended* (NEPC, 2013) released on 17 May 2013. This report also provides a preliminary waste classification of soil for off-site disposal during construction.

For the purpose of this report, the 'site' comprises three main areas:

1. The proposed school site/development;
2. The future residential site/temporary PE courts site/development; and
3. The proposed playing field and PE courts.

A preliminary site investigation (desktop) report was prepared for the subject site along with two other contamination assessment-related reports prepared for the neighbouring hospital site and the larger Wahroonga Estate Redevelopment site. A review of the reports has been summarised in Section 3. Two major areas of environmental concern identified during the previous investigations included deep filling of up to 6.9 m in the neighbouring hospital site and the potential for asbestos findings in filling at the subject site. However, no analytical testing was conducted at the subject site during the previous studies to confirm the presence of asbestos contamination in filling.

The contaminants of concern in relation to past fill activities included: heavy metal, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH), monocyclic aromatic hydrocarbons (BTEX), organochlorine pesticides (OCP), organophosphate pesticides (OPP), total phenols, polychlorinated biphenyls (PCB), total phenols and asbestos in terms of soil contamination. Based on previous investigations, the potential for groundwater contamination appears to be low, a general suite of contaminants i.e. heavy metals, TRH/BETX, PAH, OCP, PCB and volatile organic compounds (VOC) was analysed to assess and confirm the overall quality of groundwater at the subject site.

Fieldwork comprised a combination of solid flight auger drilling and test pitting at a total of 28 test locations within the proposed development area. Three of the test bores were converted into temporary groundwater monitoring wells.

The results of the current analytical testing have been outlined below.

Soil Assessment
The concentrations of contaminants in the analysed soil samples were all within the adopted health based investigation and screening levels.

Asbestos was detected in a piece of suspected ACM fragment found in the filling at TP27 (0.3 - 0.4 m). The ACM fragment was a piece of beige compressed fibre cement containing chrysotile asbestos,

measuring at 55 x 40 x 3 mm and weighted 14.59 g. No other ACM was identified at the site and no asbestos was detected in the analysed soil samples at the laboratory reporting limit.

Building rubble material (brick, concrete, roof tile and ceramic tile) was noted in the filling at TP27 and asbestos is commonly associated with this type of material. Similar type and proportion of building rubble was observed in the filling located in the adjacent test pit (TP 28), both within the footprints of the former residential dwellings. Given that building rubble is generally associated with asbestos, it is possible that asbestos is present at other locations within the footprints and a management / remediation strategy should be implemented in this area.

Preliminary Ecological Risk Assessment

Concentrations of zinc, copper, chromium, nickel and lead, arsenic, DDT, naphthalene, BTEX, benzo(a)pyrene and TRH fractions were low or undetected in most soil samples, with exceedances of the adopted generic EILs and/or ESLs reported only for samples TB1/0.3-0.4, TB11/0.4-0.5, TB12/0-0.1, TB12/0.55-0.65, TB14/0.3-0.4 and TB25/0-0.3. These exceedances were generally only marginal and would require further assessment once the development layout is confirmed.

Preliminary Waste Classification

Results of preliminary waste classification testing indicate that concentrations of chemical contaminants (i.e. excluding asbestos) are within guideline values for General Solid Waste. This includes results for TCLP analysis on filling samples with elevated total concentrations of lead and benzo(a)pyrene. Asbestos was detected in the filling sample at Test Bore 27 noted to contain building rubble.

Given that asbestos has been identified in filling containing building rubble, it is considered that filling at the subject site identified as not containing building rubble materials has a preliminary waste classification of General Solid Waste (non-putrescible). Soils observed to contain building rubble, in particular filling within the footprint of former residential buildings or suspected asbestos-containing materials will require further assessment for final waste classification. Soils containing asbestos have a waste classification of Special Waste (Asbestos).

The natural clay and sandstone encountered beneath the filling are considered to be generally classifiable as VENM provided that the material is not cross-contaminated or mixed with other non-VENM material. This preliminary classification remains subject to confirmation upon removal of the filling overburden and remaining free of demolition and other waste materials.

Groundwater Assessment

Concentrations of contaminants in the analysed groundwater samples were found to be within the adopted GILs and health screening levels, or considered to be representative of regional background conditions.

Recommendations

This detailed site investigation for the proposed development did not uncover evidence of widespread or substantial soil contamination. It is considered that, based on the results of the investigation, the site is compatible with the proposed development subject to the following:

- Implementation of asbestos remediation within the footprints of the former dwellings and school buildings. This is likely to involve a process of tilling and “emu-picking” and subsequent disposal of ACM fragments followed by an inspection and sign-off by an occupational hygienist. The remediation process should be set out in an appropriate remediation action plan (RAP);

- Re-assessment of the ecological risks at and in the vicinity of the reported EIL and ESL exceedances, once the final development layout is confirmed. This is likely to involve additional soil sampling and testing in target areas; and
- Preparation of a Construction Environmental Management Plan (CEMP) incorporating an 'Unexpected Asbestos Finds Protocol', to ensure that any unsuspected finds of contamination, particularly asbestos, are dealt with appropriately.

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Report on Detailed Site Investigation
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1. Introduction

This report details the methodology and results of a detailed site investigation (DSI) associated with four stages of the proposed Wahroonga Adventist School development as part of the larger Wahroonga Estate Redevelopment, Precinct B project at the corner of Fox Valley Road and Comenarra Parkway, Wahroonga. The investigation was commissioned by Stanton Dahl Architects Pty Ltd (Stanton) on behalf of Seventh-day Adventist Greater Sydney Conference in accordance with Douglas Partners' proposal dated 23 April 2013 and discussion on 14 June 2013 regarding additional scope of works required to comply with the updated National Environment Protection Council *National Environment Protection (Assessment of Site Contamination) Measure, as amended* (NEPC, 2013) released on 17 May 2013. This supersedes the *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 (NEPC, 1999) and is currently endorsed by NSW Environment Protection Authority (EPA).

The proposed development involves the construction of a new Prep to Year 12 Co Ed School for the Wahroonga Adventist School. The existing school is used as a Prep – Year 6 school. The proposed school development involves the following four distinct elements:

- Stage 1: construction of the Middle School building, and part of the basement car park, fitted out to accommodate Prep to Year 6;
- Stage 2: construction of the Junior School building and part of the basement, to accommodate Prep to Year 12;
- Stage 3: construction of the playing field and PE courts on a separate lot north of main school site.; and
- Stage 4: removal of the temporary accommodation from site and construction of the Senior School building and completion of basement car park, to accommodate Prep to Year 12.

In addition, the proposed development will also involve use of part of the existing temporary car park (located in the future residential development zone) for temporary PE courts and access between the proposed school site and playing field.

For the purpose of this report, the 'site' comprises three main areas:

1. The proposed school site/development;
2. The future residential site/temporary PE courts site/development; and
3. The proposed playing field and PE courts.

Drawing 1, Appendix A, shows the location of the above proposed areas.

The aim of the DSI is to:

- Assess the potential for contamination at the site (via a review of previous assessments, as well as from current soil and groundwater sampling and testing);
- Provide data on the contamination status of the subsoils and groundwater present at the site; and
- Make recommendations for further investigations and/or remediation required to render the site suitable for the proposed development works.

In addition, this report provides a preliminary waste classification of soil for off-site disposal during basement construction.

It is understood that the redevelopment of the entire Wahroonga Estate Redevelopment project, including the existing school site, hospital site and existing houses/new school site, is approved under a Part 3A approval from the state government. This DSI is required to form part of DA submission for the new development works including the proposed school campus. It is understood that this assessment, at this stage, is not subject to an audit by an accredited contaminated land auditor.

2. Scope of Works

The scope of works undertaken for the detailed site investigation is described below:

- Review and summary of the previous reports applicable to the assessment of contamination at the site;
- Conduct a dial-before-you-dig (DBYD) search and underground service location prior to drilling, to locate detectable services as a precautionary measure;
- Drilling/test pitting of 28 locations across the site for soil sampling. The test pits or boreholes were extended to 0.5 m into natural soils, 4.0 m below ground level (bgl), or prior refusal, whichever was the lesser;
- Collection of at least one soil sample per test pit or bore hole, with samples collected from the fill and at indicators of potential contamination. Fill samples or suspected natural samples were screened for volatile compounds using a photo-ionisation detector (PID);
- Extension of three of the test bores to a depth of 6 m bgl and installation of groundwater monitoring wells at the three designated borehole locations;
- Development and sampling from the three wells using low flow techniques following stabilisation of field parameters;
- Despatch of 42 selected soil samples (plus 10% QA/QC samples) to a NATA accredited laboratory for quantitative analysis for the following potential contaminants:
    - The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, (42 soil samples);
    - Polycyclic aromatic hydrocarbons (PAH) (42 soil samples);
    - Total recoverable hydrocarbons (TRH) (an indicator of total petroleum hydrocarbons (TPH) (42 soil samples);

- Monocyclic aromatic hydrocarbons (BTEX – benzene, toluene, ethyl benzene, total xylene (42 soil samples);
- Organochlorine pesticides (OCP) (28 soil samples);
- Organophosphate pesticides (OPP) (28 soil samples);
- Total phenols (28 soil samples);
- Polychlorinated biphenyls (PCB) (28 soil samples); and
- Asbestos (42 soil / material samples)

It should be noted that detailed fieldwork methodologies and analytical methods and rationales are provided in Section 8.2 for soil sampling and asbestos assessment.

- Analysis of 17 samples (two representative boreholes from each of the proposed areas) to undertake preliminary ecological risk assessment for the following parameters:
  - Cation Exchange Capacity (CEC) (17 soil samples);
  - pH (17 soil samples);
  - Clay content (17 soil samples); and
  - Soil Texture (17 soil samples)
- Despatch a total of three groundwater samples to a NATA accredited laboratory for quantitative analysis for the following potential contaminants:
  - The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
  - TRH;
  - BTEX;
  - PAH (low level analysis);
  - OCP and PCB (trace level analysis);
  - Volatile organic compounds (VOC);
  - Hardness.
- Collection and analysis of the following samples for QA/QC purposes:
  - Intra-laboratory replicate soil sample for heavy metals and TRH/BTEX (four sample);
  - Inter-laboratory replicate soil sample for heavy metals and TRH/BTEX (four samples);
  - Intra-laboratory replicate groundwater samples for heavy metals and TRH/BTEX (one sample;
  - Four soil based trip spikes and blanks for TRH/BTEX; and
  - One water based trip spike and blank for TRH/BTEX.

Provision of a detailed site investigation report outlining the methodology, results and commenting on the suitability of the site for the proposed development, and any recommendations for additional works, if considered necessary.

3. Previous Investigations

The following reports were reviewed as part of the DSI:

- *Contamination Assessment, Sydney Adventist Hospital, 185 Fox Valley Road, Wahroonga NSW, Coffey Environments, 30 May 2008, Coffey ref: GEOTLCOV23462AA-AG* (Coffey 2008);
- *Report on Phase 1 Contamination Assessment, Proposed Redevelopment, Wahroonga Estate, Douglas Partners Pty Ltd (DP), November 2008, DP reference: 45569.01* (DP 2008); and
- *Report on Desktop Contamination Assessment Review, Proposed Wahroonga Adventist School, Fox Valley Road, Wahroonga, 23 April 2013, DP reference: 71015.00* (DP 2013).

3.1 Contamination Assessment (Coffey 2008)

The Coffey (2008) report was conducted within the hospital grounds, which is outside of the current site area. The Coffey (2008) report was thoroughly reviewed and included within the DP (2008) report. Much of the information included within the Coffey report is not relevant to this site and only limited information has been included within this report. The investigation included sub-surface sampling, and thus can give a general indication of sub-surface conditions that may be encountered in the area. Groundwater was not assessed as part of Coffey (2008).

The results of the review indicated that the Coffey (2008) site had been used for hospital uses from 1951 and potentially since 1903. Field investigations confirmed the presence of fill soils in the three study areas of Coffey (2008) ranging from between 0.2 m to 6.9 m in depth. No evidence of contamination was observed and samples tested for a suite of potential chemicals of concern did not exceed the site investigation levels for a commercial (hospital) land use.

On review of the laboratory testing schedule, it is noted that only selected samples were tested for all analytes, and only a generally targeted analytical approach was adopted. The results of the testing undertaken were compared to a commercial land use, whereas, for the current assessment, a more sensitive land use (school) is proposed and thus more stringent criteria would be applied. It is noted however, that if any concentrations of potential contaminants were reported in Coffey (2008), they were generally low or below laboratory detection limits.

A direct assessment of groundwater quality was not made during the Coffey study although, based on the soil laboratory results, the anticipated depth to groundwater and lack of nearby contamination sources the likelihood of contaminated groundwater affecting the then proposed development was considered to be low. A preliminary waste classification assessment of the soils found that fill soils generally satisfied the requirements for General Solid Waste and natural soils would classify as Virgin Excavated Natural Material (VENM) provided they were not mixed with fill soils or wastes.

3.2 Phase 1 Contamination Assessment (DP 2008)

The DP (2008) report was conducted for the whole Wahroonga Estate which consists of 62ha of land including the Sydney Adventist Hospital (SAH) hospital grounds and associated community facilities, and included the current site area. The report found that the Wahroonga Estate had, and continues to have, various residential, religious, open space (including bushland), educational, commercial and

health-based uses. The earliest known use was as a hospital (Sydney Sanatorium) which has had a presence since 1903. Other historic uses included orchards, market gardens and dairying.

Fill was observed at a number of locations across the Wahroonga Estate and the significant areas were recorded. The fill was found to be generally associated with providing a level platform for construction of buildings and car parks. The potential for contamination of selected fill areas on the Wahroonga Estate were investigated by Coffey (2008), and for the areas investigated, fill was not found to be contaminated, when assessed for a commercial land use. It was noted that, although contamination was not identified in this instance, contaminants such as asbestos can be present but not confirmed during such an investigation due to the generally sporadic nature of the distribution within fill.

Other potentially contaminated areas or previous contaminating uses for the Wahroonga Estate were identified such as termite treated buildings, registered dangerous goods in the hospital grounds, underground and above-ground fuel storage tanks, lead-based paints, asbestos, incinerator waste, market gardens/orchards and livestock pens. It was recommended that the contamination status of the above areas of environmental concern (AEC) be investigated with intrusive sampling.

Overall, the Wahroonga Estate was considered to have a low potential for contamination of the soil and groundwater based on the then current study and subject to investigation of the above AEC. It is understood that further investigation of the AEC has not been undertaken since the finalisation of this report.

The DP (2008) report did not indicate that the current site areas were within or contained AEC, although mention was made in DP (2008) of the discovery of a fibre-cement fragment that was potentially asbestos-cement and some fly-tipping along the bushland fringe, which is adjacent to the 'proposed playing fields site' area.

3.3 Desktop Contamination Assessment Review (DP 2013)

It should be noted that the desktop contamination assessment review conducted in April 2013 comprised the proposed school and playing field/PE courts. At the time of the assessment, Stanton (the client) had excluded the future residential/temporary PE courts as part of the desktop study.

The 'proposed school' site was occupied with residential housing, as shown from the aerial photographs from approximately 1943 to 2005. The residential houses which are present in the 2005 photographs have been replaced with two new school buildings, courts and an unsealed car park in the current aerial photo, thus it is assumed that those houses have been demolished.

Houses from this era which have been demolished would potentially have had asbestos-containing building materials contained within them. Thus, there is the potential for surficial contamination around the building footprint with asbestos-containing materials from demolition.

Buildings of this age could also contain lead-based paint finishes and other hazardous materials such as synthetic material fibres, PCB (within fluorescent light capacitors) and termite treatments (particularly timber-framed houses) using pesticides. Pesticides of this nature are persistent in the environment and, if used previously, could still be found within the building footprint (DP, 2008). If

present, this contamination is considered to have a limited, surficial impact, generally contained around the building curtilage. It is likely that due to recent construction of the two new demountable buildings within the new school site in this area that any surficial contamination, particularly from lead, OCP and PCB would have been removed off-site, however the potential for contamination from asbestos cannot be discounted.

The historical use of the 'proposed playing field' site has always remained as a vacant, grassed area as far as records can determine.

As fill was recorded at depths of up to 6.9 m bgl within the hospital site during previous investigations (Coffey, 2008) and observations during the current site inspection show the existence of and potential for fill, it is considered very likely that fill is present within the site area. Fill may have been sourced from the Wahroonga Estate or imported from off-site sources. The potential for contamination in fill soils arises from the use of fill from contaminated source sites. Fill can contain anthropogenic material such as ash, asbestos and metal wastes.

A fragment of potential asbestos-based sheeting was found during the site inspection on the ground surface within the 'proposed playing fields' site area. General building type rubble (crushed concrete and bricks) was also observed on the surface of the grass. A potential asbestos fragment was also observed in the previous DP investigation within the fill batter slope of the hospital car park (DP, 2008). Due to the sporadic distribution of asbestos within fill soils, and often random surface distribution, asbestos can be present but not necessarily able to be confirmed during investigation. Thus, the further presence of asbestos cannot be discounted.

In summary, the AEC associated with the site, as identified in DP (2013) are as follows:

- Potential for contamination from the use of imported fill material;
- Potential for contamination from the demolition of buildings; such as asbestos, lead paint and pesticides, particularly in former building footprints and building curtilage;
- Although unlikely, there is also a low potential for historical, unauthorised dumping of hospital wastes such as incinerator ash within the site area, as part of the fill; and
- Potential for contamination with pesticides and/or heavy metals from former, adjacent market garden use or dairying.

The contamination status of the above AEC was recommended to be confirmed with intrusive sampling and analysis.

4. Site Description

The proposed school site buildings and basement car park are located immediately north of Fox Valley Road, and is surrounded by an existing Church to the west, associated Sydney Adventist development to the east and unsealed temporary car park to the north. This area is currently occupied by demountable classroom buildings and temporary car parks, both asphaltic concrete sealed and unsealed gravel.

The future residential/temporary PE courts site is located between the proposed school and playing field sites, in the central portion of the temporary, bitumen car park. The site is situated adjacent to an existing, underground detention tank (the grassed rectangular patch) in the north-western portion of the car park, and will be utilised as temporary courts and access to the proposed playing fields area.

The proposed playing fields site is located in the far north-eastern corner of the Estate and is surrounded by nature reserve and Coups Creek to the north and east Fox Valley Road and residential lots to the south, and a temporary car park to the west. Ground surface levels within this area dip down to the north-east towards the bushland and Coups Creek.

These areas are shown on Drawing 1, Appendix A.

4.1 Proposed School

A sloping fill platform extends along the northern side of the school grounds and unsealed gravel car park. This batter face exposed filling, potentially indicating past cut and fill earthworks to form current site levels. The filling was observed to contain building rubble.

The grassed playing field, playground area and outdoor areas along the northern side of the existing demountable classroom buildings will also be constructed over with the new basement (see Photograph 5).
Based on the site inspection, it was observed that houses present in the 2005 aerial photograph have been demolished and demolition rubble had been removed from the site. There are currently car parks where the former houses were located (in the south-eastern portion of the site). The building footprints of the former houses would have been located within the unsealed gravel car park.

4.2 Future Residential/Temporary PE Courts

The future residential/temporary PE courts site is located between the proposed school and playing field sites and is part of an existing temporary bitumen car park to accommodate hospital staff and patients during peak period and as well as used for school drop-off and pick-up zones.

4.3 Proposed Playing Field

Part of the area appears to have been filled for construction of the car park. The northern perimeter of the paved car park shows evidence of potential filling.

A raised fill platform is observed along the eastern side of the paved car park and it extends along the crest of the hillside and the bushland below, within the site area for the proposed playing fields. Asbestos cement fragments were observed on the ground surface during the preliminary site investigation as well as general building such as concrete and brick fragments

A stockpile of woodchips and a stockpile of grassed-over mixed soil, rock and concrete were present on top of the raised fill platform area.

5. Geology, Hydrogeology and Soil Landscape

The geological mapping indicates that the Wahroonga Estate is underlain by Ashfield Shale on the higher ground levels adjacent to Fox Valley Road (proposed school site) and Hawkesbury Sandstone on the lower ground levels within the valley towards the north (proposed residential and playing fields sites). Ashfield Shale typically comprises black to dark grey shale and laminite. Hawkesbury Sandstone typically comprises medium to coarse grained quartz sandstone with very minor shale and laminite bands.

Ashfield Shale and Hawkesbury Sandstone typically weather to form clayey soils of medium to high plasticity and low permeability.

The Soil Conservation Service of NSW Acid Sulphate Soil Risk Map for Hornsby – Mona Vale indicates that there are no known occurrences of acid sulphate soils at the site. It is noted that acid sulphate soils typically occur in areas with surface levels less than about RL 5, whereas surface levels across the Wahroonga Estate range from approximately RL 150 to RL 170.

6. Review of Recent Aerial Photos

6.1 Proposed School

A review of the most recent aerial photos - June and August 2012 aerial images in Figures 1 and 2, indicate a number of residential houses were demolished in August 2012. The recent demolition activities were also evident in the current field findings where greater depth of fill and heterogeneous fill materials were observed within the footprint of former residential buildings.

The former residential buildings appear to have been built *circa* 1930s – 1960s. Houses from this era which have been demolished would potentially have had asbestos-containing building materials contained within them. Thus, there is the potential for surficial contamination around the building footprint with asbestos-containing materials from demolition. This was observed during the current field investigation where a fragment of suspected bonded asbestos-containing material was observed in the fill layer of a test pit located in the former building footprint. Subsequent analytical results confirmed the presence of asbestos. Details of the current findings are outlined in Section 13.

Figure 1: Area outlined in red shows former residential buildings situated in the proposed school campus. The aerial image was taken in June 2012 (Aerial image source: Nearmap)

Figure 2: Area outlined in red shows post-demolition of former residential houses. The aerial image was taken in August 2012. (Aerial image source: Nearmap)

6.2 Proposed Playing Field

As fill was recorded at depths of up to 6.9 m bgl within the hospital site during previous investigations (Coffey, 2008) and observations during the current site inspection show the existence of and potential for fill, it is considered very likely that fill is present within the site area.

A recent aerial image review indicates that cut and fill activities were undertaken *circa* September 2011 to level and establish the existing car park and possibly the existing detention tank and stormwater easement. This finding generally corresponds with DP's current field investigation where deep (greater than 4 m) and heterogeneous fill was observed within the boundary outlined in Figures 3 and 4.

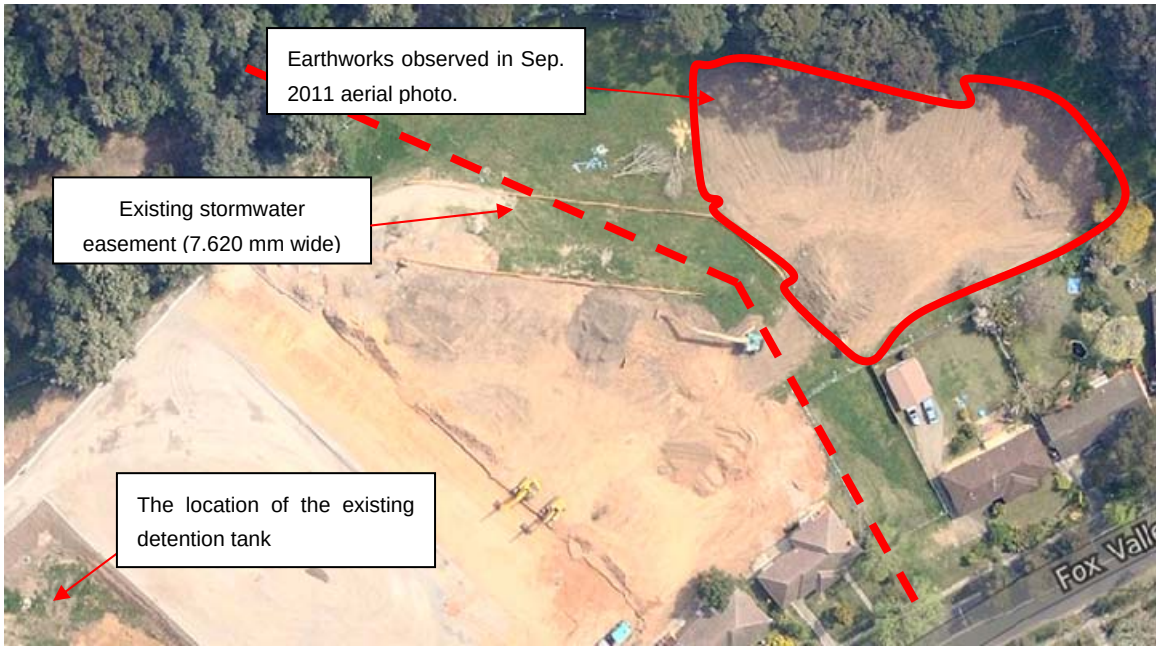


Figure 3: Area outlined in red marks the boundary of the former cut and fill activities observed in the September 2011 aerial photo. The red dashed line identifies the existing stormwater easement (7.620 mm wide) that runs from Fox Valley Road into Coups Creek (a tributary of Lane Cove River). (Aerial image source: Nearmap)

Figure 4: Area outlined in red marks the boundary of the anticipated boundary of deep and uncontrolled filling observed in the March 2012 aerial image. (Aerial image source: Nearmap)

7. Potential for Contamination

Based on the current and previous site uses, DP's review of documented information and site observations, a number of areas of potential sources of contamination (or AEC) have been identified. The potential sources contamination as well as the associated potential contaminants and risk ratings are summarised in Table 1.

Table 1: Potential sources of contamination

Potential AEC	Description of Potential Contaminating Activity	Potential Contaminants	Potential Risk Rating
Imported filling to form/level the site	Imported contaminated filling could have been used in site formation processes and used to level the site, particularly in the proposed playing field area.	Various (commonly TPH, PAH, heavy metals, pesticides, phenols and asbestos)	Low to moderate
Demolition of previous residential buildings	Potential for contamination from the demolition of buildings; such as asbestos, lead paint and pesticides, particularly in former building footprints and building curtilage.	Lead, asbestos, PCB and OCP.	Low to moderate
Former, adjacent market gardens or agricultural use	Potential for contamination with pesticides and/or heavy metals from former, adjacent market garden use or dairying.	OCP/OPP, some metals	Low
Neighbouring hospital site	Although unlikely, there is also a low potential for historical, unauthorised dumping of hospital wastes such as incinerator ash within the site area, as part of the fill.	TPH, PAH, VOC and phenols	Low

8. Fieldwork and Analysis

Prior to the commencement of drilling, all test locations were checked for underground services using an electronic scanner and a review of available plans. Drilling of bores for environmental sampling within the site commenced on the 19 June 2013 and was completed on 21 June 2013. Where possible, a differential GPS was used to determine the coordinates of each test bore. The test bore/pit coordinates are provided in the bore logs in Appendix B.

Fieldwork comprised the drilling of 14 test bores for environmental soil sampling within the area of the proposed school and future residential/temporary PE court development and the excavation of 14 test

pits within proposed playing field site (as shown in Drawing 1, Appendix A). Three of the test bores (BH 7-9) were converted into groundwater monitoring wells.

8.1 Sampling Locations

The site comprises three separate sections namely; playing field and PE courts (7,165 m^2), existing temporary car park (future residential/temporary PE courst) (3,975 m^2) and the proposed new school (7,383 m^2). Thus the total site area is 18,523 m^2 (approximately 1.8 ha). The minimum sampling points required for site characterisation of a site from 1.5 – 2.0 ha is between 25 and 30 locations respectively. Therefore the scope included a soil sampling programme from 28 test pits/bores, with the analysis of selected samples from all test pits or bores for asbestos and selected common contaminants of concern (refer Section 7), with groundwater sampling from three locations. Due to a small school area existing on the site, sampling within this area was restricted, and manual drilling by hand was conducted within the existing school. Based on the ratio of the proposed area, 11 sampling points were evenly distributed across the proposed school site, 6 sampling points were evenly distributed across the proposed future residential/temporary PE courts site and 11 sampling points distributed across the proposed playing field. The three groundwater wells were placed in a triangular formation in order to identify the direction of groundwater flow.

The soil sample locations were designed to provide for site coverage within accessible areas of the site. Restrictions on the final design of test bore locations included:

- The location of known underground services such as the existing stormwater easement;
- On-site structures, such as a school fence; and
- Vehicle and pedestrian traffic movements. Sample locations were designed to not significantly impact upon the operations of the car park and school drop-off and pickup zones.

8.1.1 Proposed School Area

Test Bores 12, 13 and 14 were located in the existing school area. Given access constraints, manual augering was applied to recover soil samples. Test Bores 6, 8 and 11 were drilled in the school drop-off/pickup zones. Test Pits 24 - 28 were excavated in the area where former residential buildings were situated.

8.1.2 Future Residential/Temporary PE Courts

Test Bores 1, 2, 3, 4, 5 and 10 were drilled in the central portion of the existing temporary car park.

8.1.3 Proposed Playing Field

Test Pits 15 - 23 and Test Bores 7 and 9 were excavated/drilled in the proposed playing field – former filled area.

In addition, Test Bores 7, 8 and 9 were also designated for the installation of groundwater monitoring wells for the following reasons:

- Groundwater sampling from Groundwater Bores 7 and 9 can provide relevant data of the groundwater quality flowing into the adjacent Coups Creek.
- Groundwater sampling from Groundwater Bore 8 can provide relevant data on the groundwater quality flowing into the current from neighbouring properties located to west.

Drawing 1, Appendix A shows the location of Groundwater Bores 7 - 9.

8.2 Soil Sampling Procedures

Soil sampling was undertaken using either a truck-mounted drilling rig with solid flight auger attachment, hand auger or an extended backhoe. Soil samples were collected at intervals based on field observations, including changes in strata and signs of contamination.

All soil sampling was performed according to standard operating procedures outlined in the DP *Field Procedures Manual* (internal manual). All sampling data was recorded on DP chain-of-custody sheets. The general soil sampling procedure comprised:

- collect soil samples directly from the auger attachment, bulk sample in the excavator bucket, or hand auger using disposable sampling equipment;
- transfer of samples into laboratory-prepared glass jars, and capping immediately with Teflon lined lids;
- label sample containers with individual and unique identification, including project number, sample location and sample depth;
- replicate samples of every sample were placed in sealed plastic bags for volatiles screening using a photo-ionisation detector (PID);
- collection of 10% replicate samples (5% inter-laboratory replicates and 5% intra-laboratory replicates) for QA/QC purposes; and
- placement of the sample jars into a cooled (with ice; topped up as required), insulated and sealed container for transport to the laboratory (Envirolab Services).

In characterising the extent of asbestos contamination at the site, the following process was adopted in general accordance with Schedule B2, NEPC (2013):

- A total of 14 test pits were excavated (using a 20 tonne extended backhoe). The test pits were excavated to a depth of at least 0.5 m below the natural soil interface or prior discontinuation due to limitation of backhoe reach (i.e. not greater than 4 m);
- Recovery of a minimum 10 L soil sample from each relevant stratum in each test pit;
- Individual samples (minimum of 10 L) were manually screened on-site through a 7 mm sieve and the material retained on the sieve examined for any bonded ACM and/or suspected material;
- Identified bonded ACM (and/or suspected ACM) was weighted for each sample;

- Recovery of a minimum 500 g sample from each relevant stratum in each test pit for asbestos fines (AF) and fibrous asbestos (FA) assessment ;
- A total of 14 test bores were drilled (using a truck mounted rig). The test bores were drilled to depths of at least 0.5 m below the natural soil interface. Given that limited quantity of soil samples were recovered from test bores, the soil samples were collected in a 50 g sealed plastic bag for asbestos testing. It should be noted soil samples recovered from test bores were not screened through a 7 mm sieve due to sampling limitation associated with solid flight auger. Test bores were used as a result of access constraint within the school site, the newly established bitumen car park and the installation of groundwater monitoring wells;
- Suspected ACM and bag samples was despatched to an NATA accredited laboratory for analysis of bonded asbestos, asbestos fines and fibrous asbestos; and
- Backfilling of the test pits in reverse order to minimise the potential for cross-contamination of strata.

The location of the test bores and test pits are provided on Drawing 1 Appendix A.

The sampling density for asbestos assessment was conducted in accordance with *Appendix A – Minimum Sampling Points Required for Site Characterisation Based on Detection of Circular Hot Spots Using Systematic GRID Sampling Pattern*, WA DoH 2009. For a site area of between 1.5 ha and 2.0 ha, the recommended number of sampling points is between 25 and 30.

A total of 14 test pits (approximately 50% of the recommended sampling density) was undertaken in accordance with Schedule B2, NEPC (2013) due to the following reasons.

- access constraints associated with the existing school fence;
- low potential for asbestos finding in the existing temporary car park; and
- required test bore method to install groundwater wells

DP considers that 50% of the recommended sampling density is sufficient at this stage to undertake as initial screening for asbestos at the site.

It should be noted that given that the proposed playground was covered was grass and that part of the proposed school area was covered was gravelly fill, a detailed walkover during initial assessment (Report 73244.00) was not conducted. The probability of identifying asbestos during the walkover is low due to potential buried asbestos under covered vegetation and gravelly fill material. However, the brief site walkover during the initial assessment indicated that potential bonded ACM was found on the ground surface within the proposed playing field along with general building rubble (crushed concrete and bricks) observed on the surface of the grass.

8.3 Well Installation and Groundwater Sampling Technique

Test Bores 7, 8 and 9 were converted into groundwater monitoring wells (piezometers). Well construction details are provided on the test bore/pit logs in Appendix B. The piezometers were constructed of 50 mm diameter acid washed class 18 PVC casing and machine slotted well screen intervals. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate the groundwater. The wells were completed with a gravel pack extending above the well

screen and then a bentonite plug. The wells were finished flush with the ground surface by means of a Gatic cover and concrete.

The water levels in piezometers were recorded prior to development and prior to sampling using an electronic interface probe which can detect the presence of separate phase liquid in the water column [such as light non-aqueous phase liquids (LNAPL) including petroleum hydrocarbons]. The depth to water in piezometer was measured prior to its development. The three wells were developed on 24 June 2013 using a battery-powered, submersible PVC pump. Groundwater sampling of the three selected wells was undertaken on 2 July 2013 using a low-flow geo-pump (peristaltic pump) and disposable tubing, following stabilisation of field parameters. Field parameters were obtained using a calibrated YSI Quatro Pro Plus multiparameter instrument, with probes placed inside a flow-through cell. The field parameters included temperature, dissolved oxygen (DO), electrical conductivity (EC), pH and oxidation reduction potential (redox).

The pumps and all non-disposable sampling equipment was decontaminated between samples via a "triple rinse" procedure i.e. a rinse of all particulates in tap water followed a decontamination using a 3% Decon 90 solution and a final rinse in deionised water.

Samples were collected in laboratory prepared bottles and vials. The groundwater samples collected for heavy metal testing were filtered in the field through a 45 µm membrane filter into nitric acid preserved bottles.

Collection of groundwater samples was carried out in accordance with the methodology prescribed in the DP *Field Procedures Manual*. Sample handling and transport was as set out below:-

- sample containers (supplied by the laboratory) were labelled with individual and unique identification, including project number and sample number;
- collection of an intra-laboratory replicate sample for QA/QC purposes;
- samples were placed in insulated coolers and maintained at a temperature of approximately 4°C until transported to the analytical laboratory, and
- chain-of-custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

Samples designated for analysis were dispatched to Envirolab Services, a NATA accredited laboratory.

8.4 Field Quality Assurance and Quality Control (QA/QC)

The field QC procedures for sampling as prescribed in Douglas Partners' *Field Procedures Manual* were followed during the assessment. Field sampling comprised intra- and inter-laboratory replicate sampling at a rate of approximately one replicate sample for every 10-20 samples. QA/QC also consisted of the use of trip spikes and trip blanks. The comparative QA/QC results are summarised in Appendix D.

8.5 Laboratory QA/QC

The analytical laboratories that were used are NATA accredited and are required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory reports in Appendix C and are evaluated in the QA/QC report in Appendix D.

9. Data Quality Objectives

The DSI has been devised broadly in accordance with the seven step data quality objective (DQO) process which is provided in *Guidelines for the NSW Site Auditor Scheme* (2nd Edition), 2006. The DQO process has also been adopted in Appendix B, Schedule B2 of NEPC (2013). The seven step DQO process is as follows:

1) State the Problem
2) Identify the Decision
3) Identify Inputs to the Decision
4) Define the Boundary of the Assessment
5) Develop a Decision Rule
6) Specify Acceptable Limits on Decision Errors
7) Optimise the Design for Obtaining Data.

The DQO process includes a number of data quality indicators (DQI) to confirm the quality of the data. The DQI include precision, accuracy, comparability, representativeness and completeness. The DQO and DQI are discussed in more detail in the QA/QC report in Appendix D. The DQI are undertaken to ensure that the data is reliable and that adequate sampling and analytical precision had been achieved. The DQI indicate (as discussed in Appendix D) that a satisfactory level of sampling and analytical precision was achieved to meet the objectives of the assessment.

10. Site Assessment Criteria

The proposed development involves school buildings in the south (approximately 0.7383 hectares), future residential/temporary PE courts development in the central portion of the existing car park (approximately 0.3975 hectares) and a sport/playing field in the north-east (0.7165 hectares). Under the current Masterplan, parts of the site are also proposed for access road and open space (lawns, courtyards and paving).

The analytical results from the laboratory testing have been assessed (as a Tier 1 assessment) against the investigation and screening levels in Schedule B1 of NEPC (2013). This guideline has been endorsed by the NSW EPA under the *Contaminated Land Management* (CLM) Act 1997. Schedule B1, NEPC (2013) provides investigation and screening levels for commonly encountered

contaminants which are applicable to generic land uses and include consideration of, where relevant, the soil type and the depth of contamination.

The investigation and screening levels are not intended to be used as clean up levels. They establish concentrations above which further appropriate investigation (e.g. Tier 2) should be undertaken.

The following sub-sections outline the relevant investigation and screening levels adopted for soils and groundwater as documented in NEPC (2013). All site specific and/or theoretical assumptions relevant to the selection of the investigation and screening levels have been outlined in each sub-section as required.

10.1 Soils

10.1.1 Health Investigation Levels

The health investigation levels (HILs) are scientifically based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst-case scenario for four generic land use scenarios. Given the proposed land uses under the Masterplan, the following HILs have been adopted:

- **Proposed School and Future Residential/Temporary PE Courts Development (HIL A)** – given that the design of future residential use has yet been confirmed, and the area will be temporarily used for PE courts for Stages 1 and 2, a more conservative land use category i.e. HIL A was adopted. HIL A represents residential with garden/accessible soil also includes childcare centres, preschools and primary schools. To be applied to the proposed school site and future residential/temporary PE Courts site; and
- **Proposed Sporting/Playing Field (HIL C)** – public open space such as parks, playgrounds, playing fields, secondary schools and footpaths (HIL C). To be applied to the proposed playing field site.

The adopted HILs, from Table 1A(1), Schedule B1 of NEPC (2013) are shown on the following Table 2. Only those analytes common to both Table 1A(1) and the list of analytes applied to samples from the site have been included.

Table 2: Health Investigation Levels (HILs) in mg/kg unless otherwise indicated

Analyte		HIL A	HIL C	Comments
Heavy Metals	Arsenic	100	300	
	Cadmium	20	90	
	Chromium (VI)	100	300	
	Copper	6,000	17,000	
	Lead	300	600	
	Mercury (inorganic)	40	80	
	Methyl Mercury	30	13	
	Nickel	400	1,200	
	Zinc	7,400	30,000	
PAH	Benzo(a)pyrene TEQ[1]	3	3	
	Total PAH	300	300	
Phenols	Phenol	3,000	40,000	
OCP	DDT +DDD +DDE	240	400	
	Aldrin + Dieldrin	6	10	
	Chlordane	50	70	
	Endosulfan	270	340	
	Endrin	10	20	
	Heptachlor	6	10	
	HCB	10	10	
	Methoxychlor	300	400	
OPP	Chlorpyrifos	160	250	
PCB	PCBs[2]	1	1	

Notes:
1 sum of carcinogenic PAH
2 non dioxin-like PCBs only

10.1.2 Health Screening Levels – Petroleum Hydrocarbons

Health Screening Levels (HSLs) are used to assess selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact with affected soils and groundwater. The HSLs were developed by the Co-operative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) and were derived through the consideration of health effects only, with particular emphasis on the vapour exposure pathway. Other considerations such as ecological risk, aesthetics, the presence of free phase product and explosive / fire risk are not addressed by the HSLs. As such the HSLs should be used similarly to the HILs, i.e. as a screening tool.

The HSLs have been developed for a range of petroleum hydrocarbons, and for different land uses, media, pathways, soil types and depths to contamination. HSLs have also been derived by CRC CARE for direct contact with petroleum hydrocarbons for the four land use scenarios and intrusive maintenance workers.

The approach in the development of HSLs has sought to set a combination of assumptions and parameters that correspond to the reasonable exposure that can be expected for the range of scenarios. If the subject site does not fall within the range of assumed conditions the HSLs may not be protective and a more detailed consideration of the site specific situation should be carried out.

In order to determine whether the HSLs tabulated in Schedule B1 of NEPC (2013) are applicable or whether a site specific determination is required CRC CARE provide an application checklist which should be completed prior to using the HSLs. The application checklist was completed for the site and a copy is included in Appendix C. The following parameters were considered in completing the checklist:

Petroleum Hydrocarbons (potential contaminants)

- Toluene
- Ethylbenzene
- Xylenes
- Naphthalene
- Benzene
- C_6-C_{10} (F1)
- >C_{10}-C_{16} (F2)
- >C_{16}-C_{34} (F3)
- >C_{34}-C_{40} (F4)

Land Uses (as proposed)

- HSL A – low density residential (proposed residential and school areas);
- HSL C – recreational open space (proposed playing fields); and
- Intrusive maintenance worker

Potential Pathways

- Soil vapour intrusion
- Direct contact

Media

- Soil

Soil Types

- Predominately clay

Depth to Contamination

- 0 to <1m for soil HSLs (depths to recorded soil impacts are variable with the shallowest depths recorded being within 1 m bgl. Therefore 0 to <1 m HSLs have been adopted as an initial conservative screen).

Workers Engaged in Subsurface Works

- For work in shallow trenches the HSLs for vapour intrusion and direct contact for HSL A, and HSL C and intrusive maintenance worker (CRC CARE technical reports) have been adopted.
- Work in deep trenches (e.g. sewers) has not been included in the development of HSLs. These works usually require health and safety procedures to be followed for protection in confined spaces including use of personal protection equipment.

Other Considerations

- The HSLs have been compared to individual values as an initial conservative screen rather than using a statistical approach.
- Multiple sources of contamination are not considered to be present.
- Combined pathways exposure has not been assessed. For each land use the lowest HSLs for soil vapour intrusion and/or direct contact have been adopted as an initial conservative screen.
- Cumulative cancer risk has not been assessed as the chemicals which have been recorded near to or above the HSLs are limited to TRH (non-carcinogenic) only;
- Site specific adjustments for vapour biodegradation, soils organic carbon content, air exchange rate, soil moisture content, differing lithology or depth of contamination have not been considered in this assessment. These parameters tend to reduce the conservatism of the HSL and can be considered at a later stage (e.g. once the development details are known) to potential increase the HSLs.

The checklist confirms that both vapour intrusion and direct contact risks need to be assessed. On the basis of the completed checklist, the generic HSLs are considered to be appropriate for the assessment of petroleum hydrocarbon contamination at the site.

The adopted soil HSLs for vapour intrusion, from Table 1A(3), Schedule B1 of NEPC (2013) and Table B3, Appendix B, CRC CARE Technical Report No. 10 (Intrusive Maintenance Worker) are shown on the following Table 3.

Table 3: Soil Health Screening Levels (HSLs) for Vapour Intrusion (mg/kg)

Analyte		HSL A	HSL C	Intrusive Maintenance Worker	Comments
TRH	$C_6 – C_{10}$ (less BTEX) [F1]	50	NL	NL	Clay Profile
	$>C_{10}-C_{16}$ (less Naphthalene) [F2]	280	NL	NL	Depth to Contamination <1m
BTEX	Benzene	0.7	NL	350	
	Toluene	480	NL	NL	
	Ethyl Benzene	NL	NL	NL	
	Xylene	110	NL	NL	
PAH	Naphthalene	5	NL	NL	

Notes:
NL -The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour which is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for a given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as not limiting 'NL'.

The adopted soil HSLs for direct contact, from Table B4, Appendix B, CRC CARE Technical Report No. 10 are shown on the following Table 4.

Table 4: Soil Health Screening Levels (HSLs) for Direct Contact (mg/kg)

Analyte		HSL A	HSL C	Intrusive Maintenance Worker	Comments
TRH	$C_6 – C_{10}$	4,400	5,100	82,000	
	$>C_{10}-C_{16}$	3,300	3,800	62,000	
	$>C_{16}-C_{34}$	4,500	5,300	85,000	
	$>C_{34}-C_{40}$	6,300	7,400	120,000	
BTEX	Benzene	100	120	430	
	Toluene	14,000	18,000	120,000	
	Ethyl Benzene	45,00	5,300	85,000	
	Xylene	12,000	15,000	130,000	
PAH	Naphthalene	1,400	1,900	29,000	

10.1.3 Ecological Investigation Levels

Ecological Investigation Levels (EILs) have been developed and discussed in NEPC (2013) for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physiochemical properties and land use scenarios and

generally apply to the top 2 m of soil, which essentially corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant using the following formula:

EIL = ABC + ACL, where

ABC = Ambient Background Concentration
ACL = Added Contaminant Limit

The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al. (1995) or Hamon et al. (2004).

ACLs are based on the soil characteristics of pH, CEC and clay content.

EILs (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants including As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EILs, and has been provided in the ASC NEPM Toolbox.
The adopted EILs, derived from Tables 1B(1) to 1B(4), Schedule B1 of NEPC (2013), and the *Interactive (Excel) Calculation Spreadsheet* are shown on the following Tables 5 to 7. The following site specific data and assumptions have been used to determine the EILs:

- a protection level of 80% (urban residential and public open space setting) has been adopted;
- the EILs will apply to the top 2 m of the soil profile;
- given the likely source of soil contaminants (i.e. historical site use/fill) the contamination is considered as “aged” (>2 years);
- given that the site is located in a highly developed area it is considered unlikely that a suitable location can be found to assess local background levels of the target contaminants in near surface soils. ABCs have been estimated in the *Interactive (Excel) Calculation Spreadsheet* using input parameters of “NSW” for state in which the site is located, and “high” for traffic volumes;
- Site specific pH, Cation Exchange Capacity (CEC) and Clay Content values have been used as input parameters in the *Interactive (Excel) Calculation Spreadsheet*; and
- For conservatism the lowest of the calculated EILs for each of the target analytes in which EILs are provided have been used as the site specific EIL, for each part of the site. Exceedances of this EIL value triggered an assessment against the calculated EIL for that specific sample (if analysed for pH, CEC and clay content) or a sample similar in composition and depth.

Table 5: Ecological Investigation Levels (EILs) in mg/kg – Future Residential/Temporary PE Courts Development

Analyte		EIL	Comments
Heavy Metals	Arsenic	100	Derivation of site-specific EIL is presented in Table 16
	Chromium (III)	630	
	Copper	65	
	Lead	1100	
	Nickel	10	
	Zinc	210	
OCP	DDT	180	

Table 6: Ecological Investigation Levels (EILs) in mg/kg – Proposed School Development

Analyte		EIL	Comments
Heavy Metals	Arsenic	100	Derivation of site-specific EIL is presented in Table 16
	Chromium (III)	470	
	Copper	45	
	Lead	1100	
	Nickel	6	
	Zinc	160	
OCP	DDT	180	

Table 7: Ecological Investigation Levels (EILs) in mg/kg – Proposed Playing/Sporting Field

Analyte		EIL	Comments
Heavy Metals	Arsenic	100	Derivation of site-specific EIL is presented in Table 16.
	Chromium (III)	630	
	Copper	65	
	Lead	1100	
	Nickel	9	
	Zinc	220	
OCP	DDT	180	

10.1.4 Ecological Screening Levels – Petroleum Hydrocarbons and PAH

Ecological Screening Levels (ESLs) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESLs apply to the top 2 m of the soil profile, which essentially corresponds to the root zone and habitation zone of many species.

ESLs have been derived in NEPC (2013) for the same four petroleum fractions as the HSLs (F1 to F4) as well as BTEX and Benzo(a)pyrene. The adopted ESLs, from Table 1B(6), Schedule B1 of NEPC (2013) are shown on the following Table 8. The following site specific data and assumptions have been used to determine the ESLs:

- the ESLs will apply to the top 2 m of the soil profile;
- The ESLs for urban residential and public open space apply; and
- the majority of soils encountered at the site comprised clay. A “fine” soil texture has been adopted unless otherwise stated in Table 8.

Table 8: Ecological Screening Levels (EILs) in mg/kg

Analyte		ESL	Comments
TRH	*C6 – C10 (less BTEX) [F1]*	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	1,300 / 300**	
	>C34-C40 [F4]	5,600 / 2800**	
BTEX	*Benzene*	65 / 50**	
	Toluene	105 / 85**	
	Ethyl Benzene	125 / 70**	
	Xylenes	45 / 105**	
PAH	*Benzo(a)pyrene*	0.7	

Notes:

** ESL applied to coarse textured soils, where encountered on the site

10.1.5 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSLs and ESLs, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSLs (F1 to F4). The adopted Management Limits, from Table 1B(7), Schedule B1 of NEPC (2013) are shown on the following Table 9. The following site specific data and assumptions have been used to determine the Management Limits:

- the Management Limits will apply to any depth within the soil profile;
- The Management Limits for residential, parkland and public open space apply; and

- the majority of soils encountered at the site comprised silt and clay. A “fine” soil texture has been adopted.

Table 9: Management Limits in mg/kg

Analyte		Management Limit	Comments
TRH	$C_6 – C_{10}$ (F1)	800	
	$>C_{10}$-C_{16} (F2)	1,000	
	$>C_{16}$-C_{34} (F3)	3,500	
	$>C_{34}$-C_{40} (F4)	10,000	

Note: Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2

10.1.6 Asbestos in Soil

Bonded asbestos containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and/or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

Health Screening Levels (HSLs) for asbestos in soil, which are based on likely exposure levels for different scenarios, have been adopted in NEPC (2013) from the Western Australian Department of Health (WA DoH) publication *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009* (WA DoH 2009). The HSLs have been developed for various land use scenarios including Residential A (gardens and accessible soil), Residential B (minimal opportunities for soil access), Recreational C (parks and public open space) and Commercial / Industrial D.

On the basis of the proposed land uses, and in accordance with Table 7, Schedule B1, NEPC (2013) the following HSLs have been adopted:

- 0.01% w/w of bonded ACM (Residential A) for proposed school and residential development;
- 0.02% w/w of bonded ACM (Recreational C) for proposed open space, roads and footpaths;
- 0.001% w/w friable asbestos (FA) and asbestos fines (AF), where quantifiable*; and
- No visible asbestos on the ground surface

Note: * NEPC (2013) recommends the use of AS4964-2004 for the detection of free fibres (including asbestos fibres) in a soil sample. NEPC (2013) also acknowledges the nominal detection limit of this method of 0.01%. As the Site has only a low potential for AF or FA based on its history and investigations to date (i.e. no asbestos manufacturing), this laboratory detection limit of 0.01% was adopted as the screening criteria for FA and AF.

NEPC (2013) defines the various asbestos types referred to above as follows:

Bonded ACM: Asbestos containing material which is in sound condition, bound in a matrix of cement or resin, and cannot pass a 7mm x 7mm sieve.

FA: Fibrous asbestos material including severely weathered cement sheet, insulation products and woven asbestos material. This material is typically unbonded or was previously bonded and is now significantly degraded and crumbling.

AF: Asbestos fines including free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7mm x 7mm sieve.

Note that in terms of asbestos assessment in the bores, the above ACM criteria does not apply, as the process outlined in Schedule B2 of NEPM (2013) was not followed.

10.2 Groundwater

10.2.1 Groundwater Investigation Levels

The Groundwater Investigation Levels (GILs) adopted in NEPC (2013) are based on:

- ANZECC & ARMCANZ (2000), *National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality*, Australian and New Zealand Conservation Council & Agriculture, and Resource Management Council of Australia and New Zealand; and
- NHMRC (2011), *National water quality management strategy, Australian drinking water guidelines*, National Health and Medical Research Council and National Resource Management Ministerial Council, Australia.

The potential receptors of impacted groundwater from the site include:

- Future occupiers of the site (e.g. could be students, teachers, parents, residents, workers and visitors);
- Workers conducting excavations, construction or maintenance works within the site or nearby the site (impacted groundwater);
- Residents, workers and recreational users of surrounding properties (vapours associated with groundwater impacts); and
- The fresh water ecosystems of Lane Cove River (most likely nearest surface water body recipient of groundwater flowing beneath the site).

On the basis of the identified potential human and ecological receptors, the adopted GILs are as follows:

- The health values from NHMRC (2011) for the assessment of human health risk;
- In order to assess whether the groundwater may impact on aquatic life within the freshwater aquatic ecosystems associated with Lane Cove River, the groundwater test results were assessed against the available Trigger Values in ANZECC & ARMCANZ (2000) for a freshwater system, at a general protection level of protection of 95% of species, which are extracted from the abovementioned guidelines; and
- For VOCs exceeding the laboratory PQL, where no Australian standard exists, the USEPA Regional Screening Levels for Chemical Contamination at Superfund Sites (updated November 2011) were used as screening criteria.

The adopted GIL for the analytes included in the assessment (where applicable), and the corresponding source documents, are shown in Table 10.

Table 10: Groundwater Investigation Levels (in µg/L unless otherwise stated)

Analyte		NEPC (2013) Fresh Waters [b]	NEPC (2013) Drinking Water [c]	Comments
MAH	Benzene	950	1	
	Toluene	180[a]	800	
	Ethyl Benzene	5.0[a]	300	
	Xylenes	625[a]	600	
PAH	Naphthalene	16	-	
	Benzo(a)pyrene	0.2[a]	0.01	
	Anthracene	0.04[a]	-	
Metals	Arsenic (V)	24	10	Trigger values have been adjusted for hardness where applicable to soft water.
	Arsenic (III)	13	10	
	Cadmium	0.2	2	
	Chromium (VI)	1	50	
	Copper	1.4	2000	
	Lead	3.4	10	
	Mercury (total)	0.06	1	
	Nickel	11	20	
	Zinc	8	-	
OCP	Chlordane	0.003	2	* Aldrin plus Dieldrin
	DDT	0.0004[a]	9	
	Endosulfan	0.03	20	
	Endrin	0.01	-	
	Heptachlor	0.01	-	
PCB	Aroclor 1242	0.6	-	
	Aroclor 1254	0..03	-	
VOC	Chloroform	370	-	
	1,3,5 – trimethylbenzene	12	-	
	1,2,4 – trimethylbenzene	12		

Notes:

a in cases where no high reliability trigger values are provided, the low reliability trigger values provided in ANZECC & ARMCANZ (2000) were used as screening levels

b Investigation levels apply to typically sightly-moderately disturbed systems

c Investigation levels are taken from the health levels in NHMRC (2011)

d Insufficient data for reliable trigger value. Interim working value based on the USEPA (2011) Regional Screening Levels for VOC.

The USEPA (2011) Regional Screening Levels for VOC have been included only where concentrations are detected above the laboratory reporting limits.

10.2.2 Health Screening Levels – Petroleum Hydrocarbons

Health Screening Levels (HSLs) are used to assess selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact with affected soils and groundwater.

The following parameters were considered in determining the HSLs for groundwater at the site:

Petroleum Hydrocarbons (potential contaminants)

- Toluene
- Ethylbenzene
- Xylenes
- Naphthalene
- Benzene
- C_6-C_{10} (F1)
- >C_{10}-C_{16} (F2)
- >C_{16}-C_{34} (F3)
- >C_{34}-C_{40} (F4)

Land Uses (as proposed)

- HSL A – proposed school and future residential/temporary PE courts development (applied to building footprints and curtilages as shown on the Masterplan);
- HSL C – recreational open space (applied to the remainder of the site); and
- Intrusive maintenance worker

Potential Pathways

- Vapour intrusion

Soil Types

- Clay - this is the media through which vapour from the groundwater to the surface will pass.

Depth to Contamination

- 2 m to <4 m for groundwater HSLs (depths to groundwater at the site have been variable, but generally in the range of 2 m to 4 m bgl with exception of GW8 (may not be a true representative of groundwater level but rather an indication of a perched groundwater table). Therefore 2 m to <4 m HSLs have been adopted as an initial conservative screen).

Workers Engaged in Subsurface Works

- For work in shallow trenches the HSLs for vapour intrusion for HSL A, HSL C and intrusive maintenance worker (CRC CARE technical reports) have been adopted.

- Work in deep trenches (e.g. sewers) has not been included in the development of HSLs. These works usually require health and safety procedures to be followed for protection in confined spaces including use of personal protection equipment.

Other Considerations

- The HSLs have been compared to individual values as an initial conservative screen rather than using a statistical approach.
- Multiple sources of contamination are not considered to be present. For this purpose, the groundwater is considered the potential source.
- Combined pathways exposure has not been assessed.
- Cumulative cancer risk has not been assessed as the chemicals which have been recorded near to or above the HSLs are limited to TRH (non-carcinogenic) only.
- Site specific adjustments for vapour biodegradation, soils organic carbon content, air exchange rate, soil moisture content, differing lithology or depth of contamination have not been considered in this assessment. These parameters tend to reduce the conservatism of the HSL and can be considered at a later stage (e.g. once the development details are known) to potential increase the HSLs.

The adopted groundwater HSLs for vapour intrusion, from Table 1A(4), Schedule B1 of NEPC (2013) and Table B2, Appendix B, CRC CARE Technical Report No. 10 (Intrusive Maintenance Worker) are shown on the following Table 11.

Table 11: Groundwater Health Screening Levels (HSLs) for Vapour Intrusion (µg/L)

Analyte		HSL A	HSL C	Intrusive Maintenance Worker	Comments
TRH	$C_6 – C_{10}$ (less BTEX) [F1]	NL	NL	NL	Clay Profile Depth to Contamination 2 m to <4 m
	$>C_{10}-C_{16}$ (less Naphthalene) [F2]	NL	NL	NL	
BTEX	Benzene	NL	NL	NL	
	Toluene	NL	NL	NL	
	Ethyl Benzene	NL	NL	NL	
	Xylene	NL	NL	NL	
PAH	Naphthalene	NL	NL	NL	

Note:
NL -The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour which is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for a given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as not limiting 'NL'.

11. Fieldwork Results

11.1 Soil Observations

11.1.1 Existing Temporary Car Park

Nine boreholes (including a groundwater monitoring well) were drilled through a surface layer of asphalt which was underlain by a layer of roadbase, observed to be not more than 0.4 m thick. Filling observed to underlay the roadbase was typically clay (possibly reworked clay); comprising mainly stiff clay with varying proportions of gravel, silt and sand. Observed filling depths were variable and ranged from 0.03 m at BH8, to 1 m bgl at BH10. Natural soils underlying filling were observed to comprise clay and weathered sandstone.

11.1.2 Existing school ground and associated playing field

Given access constraints (school fence), three boreholes were drilled using manual auger. Shallow filling was encountered at BH13 with an observed fill depth of 0.45 m. Natural soils underlying filling were observed to be shaly clay. Significant proportions of building rubble including rock, tile, brick, roof, wire and glass were observed in both BH12 and BH14 (within the footprint of former buildings). Given the limitation with using a hand auger, both boreholes were discontinued due to auger refusal in rubble. Significant amounts of rubble (with trace soil proportion) were observed under a hessian layer at BH12. The depth of filling at BH12 and BH14 remains unknown.

11.1.3 Existing gravelly, vacant open space (former residential houses)

Five test pits were excavated in the area where the former residential buildings had been situated. Shallow filling was encountered at Test Pits 24, 25 and 26, not more than 0.3 m thick. These test pits were excavated close to the southern boundary located adjacent to Fox Valley Road, where the former driveways and front gardens were located. A greater proportion of demolition waste i.e. brick, concrete, tile, ACM fragment, ceramic pipe and sandstone fragments was encountered in the filling. Observed filling depths were not more than 0.5 thick. Natural soils underlying filling consisted of shaly clay and weathered shale.

11.1.4 Existing grassed, vacant open space

Nine test pits and two boreholes (converted into two groundwater monitoring wells) were excavated/drilled in this area. Deeper filling ranging from 0.8 m to greater than 4 m was generally encountered in the eastern portion of the proposed playing field. Based on the September 2011 aerial photo presented in S. 6.1, it is presumed that the deep fill encountered in the eastern portion of the proposed playing field is sourced from the adjacent car park. The boundary of the former cut and fill activities is outlined in Figures 3 and 4. The fill observed at the proposed playing field appeared to consist of reworked clay material with some rubble inclusions encountered in BH 23. Poorly compacted fill was observed in BH23 where some sections of the soil profile collapsed during excavation.

Test bore/pit logs are provided in Appendix B and should be referenced for detailed soil descriptions.

11.2 Field Screening Results

Replicate soil samples collected from the bores in plastic bags were allowed to equilibrate under ambient temperatures before screening for total photo-ionisable compounds (TOPIC) using a calibrated PID. Readings from the PID are recorded on the test bore/pit logs, Appendix B. Most readings were less than 1 ppm indicating a low potential for volatile contaminants to be present in soil.

Asbestos screening results are summarised in the following table.

Table 12: Results of Asbestos Analysis

Sample ID	Sampling Date	Depths (m)	Fragment Condition	Total Weight of Fragment(s) (g)	ACM as %W/W [2]	ACM	ACM	Asbestos Fibres (g/kg)
Proposed Sporting/Playing Field								
DoH Assessment Criteria [1]					Parks, public open spaces, playing fields, etc. - 0.02%	-7mm to +2mm	-2mm (sub sample)	0.1
TP15	19/06/2013	0-0.2	-	-	-	-	-	-
TP15	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP15	19/06/2013	0.6-0.7	-	-	-	-	-	-
TP16	19/06/2013	0-0.2	-	-	-	-	-	-
TP16	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP16	19/06/2013	0.5-0.7	-	-	-	-	-	-
TP17	19/06/2013	0-0.2	-	-	-	-	-	-
TP17	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP17	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP18	19/06/2013	0-0.2	-	-	-	-	-	-
TP18	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP18	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP19	19/06/2013	0-0.3	-	-	-	-	-	-
TP19	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP19	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP20	19/06/2013	0-0.3	-	-	-	-	-	-
TP20	19/06/2013	0.3-0.4	-	-	-	-	-	-
TP20	19/06/2013	0.5-0.8	-	-	-	-	-	-
TP20	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP20	19/06/2013	1-1.2	-	-	-	-	-	-
TP21	19/06/2013	0-0.3	-	-	-	-	-	-

Sample ID	Sampling Date	Depths (m)	Fragment Condition	Total Weight of Fragment(s) (g)	ACM as %W/W [2]	ACM	ACM	Asbestos Fibres (g/kg)
TP21	19/06/2013	0.3-0.4	-	-	-	-	-	-
TP21	19/06/2013	0.5-0.8	-	-	-	-	-	-
TP21	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP22	19/06/2013	0-0.3	-	-	-	-	-	-
TP22	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP22	19/06/2013	1-1.2	-	-	-	-	-	-
TP23	19/06/2013	0-0.2	-	-	-	-	-	-
TP23	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP23	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP23	19/06/2013	1.3-1.5	-	-	-	-	-	-
TP23	19/06/2013	1.8-2.0	-	-	-	-	-	-
TP23	19/06/2013	2.8-3.0	-	-	-	-	-	-
TP23	19/06/2013	3.8-4.0	-	-	-	-	-	-
Proposed School Development								
DoH Assessment Criteria [1]					**Residential, minimal soil access - 0.01%**	-	-	**0.1**
TP24	19/06/2013	0.1-0.3	-	-	-	-	-	-
TP24	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP24	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP25	19/06/2013	0-0.3	-	-	-	-	-	-
TP25	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP25	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP26	19/06/2013	0.1-0.2	-	-	-	-	-	-
TP26	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP26	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP27	19/06/2013	0.3-0.5	Single fragment in fair condition; beige compressed fibre cement	14.59 g	0.015%	-	-	-

Sample ID	Sampling Date	Depths (m)	Fragment Condition	Total Weight of Fragment(s) (g)	ACM as %W/W [2]	ACM	ACM	Asbestos Fibres (g/kg)
TP27	19/06/2013	0.8-1.0	-	-	-	-	-	-
TP27	19/06/2013	1.0-1.1	-	-	-	-	-	-
TP28	19/06/2013	0.3-0.5	-	-	-	-	-	-
TP28	19/06/2013	0.5-0.8	-	-	-	-	-	-
TP28	19/06/2013	1.0-1.2	-	-	-	-	-	-

Notes

1: *Guidelines for the Assessment, Remediation and Management of Asbestos- Contaminated Sites in Western Australia published by the Western Australia Departments of Health in 2009* (WA DoH 2009a)

2: Calculations based on the assumptions that the % asbestos content (within asbestos materials) = 15% and soil density = 1.5 kg/L

Represents an exceedance of adopted guidelines

\- A non-detect of Asbestos ACM or fibres

11.3 Groundwater Field Measurements

Free groundwater was not observed in the test bores whilst drilling. Groundwater levels from the three monitoring wells were measured immediately prior to development and immediately prior to sampling. Table 13 shows the measured groundwater levels and the volume of water removed for well development. Water sampled from each of the wells appeared slightly silty.

Table 13: Groundwater Levels

Well	Ground Surface Level (m AHD)	Well development 24 June 2013			Well sampling 2 July 2013	
		Depth to Water (m bgl)	Water Level (m AHD)	Approximate Volume of Water Removed (L)	Depth to Water (m bgl)	Water Level (m AHD)
GW7	160.54	2.5	158.04	20 (to dry)	2.6	157.94
GW8	163.62	0.90	162.74	100	0.75	162.87
GW9	158.78	1.80	156.98	30 (to dry)	3.1	155.68

Groundwater levels indicate that the groundwater flow direction is approximately to the north-east, towards Coups Creek.

The groundwater sampling depths and stabilised field parameters, collected prior to groundwater sampling, are presented in Table 14.

Table 14: Stabilised Field Parameters

Well	Approximate Sample Depth (m)	pH	DO (ppm)	Redox (mV)	Temp (°C)	EC (µS/cm)
GW7	4.0	4.94	1.35	173.7	19.3	562.0
GW8	3.0	6.75	7.71	82.0	21.4	599.0
GW9	4.0	4.36	2.30	236.3	18.3	214.5

The pH values in Table 14 indicate slightly acidic conditions in GW7 and GW9. Redox values indicate generally reducing conditions in GW7.

12. Laboratory Testing

The results of laboratory analysis are summarised in the following tables:

- Table 15: Comparison of Soil Analysis Results against HILs and HSLs
- Table 16: Derivation of Site Specific Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs)
- Table 17: Comparison of Soil Analysis Results against EILs and ESLs
- Table 18: Comparison of Soil Analysis Results against Waste Guidelines
- Table 19: Summary of Results of Water Analysis

The full laboratory reports together with the chain of custody and sample receipt information are presented in Appendix C.

Table 15: Comparsion of soil analysis results against HILs and HSLs (All results in mg/kg unless otherwise stated)

Sample Identification			Heavy Metals								PAHs		Petroleum Hydrocarbons												Organochlorine Pesticides (OCP)											
Sample Location	Sample Depth Range (m)	Soil Type	Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Benzo(a)pyrene TEQ	Total PAHs	TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C6 - C9	TRH >C10 - C36 (Sum of total)	Naphthalene	Benzene	Toluene	Ethylbenzene	Total Xylene	DDT+DDE+DDD	Aldrin + Dieldrin	Chlordane	Endosulfan (total)	Endrin	Heptachlor	HCB	Methoxychlor	OPP	PCBs (total)	Phenols	Asbestos (fibres)
Proposed School and Residential Development																																			
1	0.3-0.4	Gravelly sand filling	<4	<0.4	15	43	22	<0.1	15	44	2	13	<25	<50	<25	<50	400	410	<25	530	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
2	0.9-1.0	Clay	7	<0.4	13	24	21	<0.1	2	9	<0.5	1.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
3	0.4-0.5	Clay	7	<0.4	14	32	17	<0.1	<1	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
4	0.4-0.5	Possibly reworked clay	9	<0.4	10	21	17	<0.1	1	13	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
5	0.4-0.5	Possibly reworked clay	10	<0.4	20	18	28	<0.1	3	23	<0.5	2.6	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
6	0.4-0.5	Clay	5	<0.4	14	20	21	<0.1	3	18	<0.5	3.6	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
6	0.9-1.0	Clay	7	<0.4	13	22	19	<0.1	4	17	<0.5	1.7	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
8	0.3-0.5	Clay	8	<0.4	11	23	18	<0.1	5	11	<0.5	1.9	<25	<50	<25	<50	190	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
10	0.8-1.0	Possibly reworked clay	9	<0.4	27	12	18	<0.1	3	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
11	0.4-0.5	Possibly reworked clay	9	<0.4	17	19	19	<0.1	1	7	1	4.3	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
11	1.3-1.5	Silty Clay	6	<0.4	8	23	19	<0.1	1	8	<0.5	1.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
12	0-0.1	Sand filling	<4	<0.4	2	83	8	<0.1	3	34	<0.5	0.36	<25	130	<25	130	2000	1200	<25	2500	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
12	0-0.1	with Silica Gel Cleanup	-	-	-	-	-	-	-	-	-	-	-	<50***	1000	460	-	1270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0.1-0.4	Sandy clay filling	7	<0.4	12	8	16	0.2	3	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0.55-0.65	clay filling	6	<0.4	9	14	14	<0.1	3	18	1	5.3	<25	<50	<25	<50	<100	<100	<25	150	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
13	0.3-0.45	Sandy clay filling	6	<0.4	14	17	41	<0.1	5	30	<0.5	1.8	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
13	0.45-0.55	Shaly clay	7	<0.4	16	16	19	0.1	4	11	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
14	0.3-0.4	Sandy clay filling	5	<0.4	19	14	38	0.6	10	39	1	4.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
14	0.5-0.9	Sandy clay filling	4	<0.4	12	30	64	0.1	4	110	<0.5	0.43	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
14	0.8	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
24	0.5-1.0	Shaly clay	<4	<0.4	10	18	22	0.3	4	21	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
25	0-0.3	silty/sandy clay filling	6	<0.4	12	17	40	<0.1	7	49	1	5.8	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
26	0.1-0.2	Silty clay filling	9	<0.4	16	16	25	<0.1	5	37	<0.5	1.7	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
27	0.3-0.5	Silty sand filling	7	<0.4	15	15	28	<0.1	6	40	<0.5	2.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
27	0.3-0.5	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**AD**
28	0.3-0.5	Silty clay filling	<4	<0.4	13	15	190	<0.1	5	110	<0.5	1.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
Site Assessment Criteria (Residential A - HIL A)																																			
HIL A or HSL A			100	20	100	6000	300	40	400	7400	3	300	50 [1]	280 [1]	-	-	-	-	-	-	5 [1]	0.7 [1]	480 [1]	NL	110 [1]	240	6	50	270	10	6	10	300	160 [3]	1	3000	0.01% W/W
Direct Contact (HSL-A)[2]			-	-	-	-	-	-	-	-	-	-	-	-	4400	3300	4500	6300	-	-	1400	100	14000	4500	12000	-	-	-	-	-	-	-	-	-	-	-
Management Limit			-	-	-	-	-	-	-	-	-	-	-	-	700**	1000	3500**	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Proposed Playing/Sporting Field																																			
7	0-0.1	Clay filling	14	<0.4	18	18	42	0.1	5	39	<0.5	0.36	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
7	0.4-0.5	Clay filling	9	<0.4	20	21	66	<0.1	5	77	<0.5	0.39	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
9	0-0.2	Silty clay filling	5	<0.4	10	7	17	0.1	2	14	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
9	0.3-0.5	Silty clay	5	<0.4	16	4	9	<0.1	1	3	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
15	0.2	Clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
15	0.3-0.5	Clay filling	6	<0.4	16	5	9	<0.1	2	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
16	0-0.2	Silty clay filling	6	<0.4	10	7	23	<0.1	2	13	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
16	0.3-0.5	Silty clay filling	5	<0.4	10	3	10	<0.1	<1	1	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
17	0-0.2	Silty clay filling	<4	<0.4	6	2	11	<0.1	<1	11	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
18	0-0.2	Silty clay filling	<4	<0.4	6	3	20	<0.1	1	6	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
18	0.3-0.5	Silty clay	4	<0.4	16	1	8	<0.1	<1	2	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
19	0-0.3	silty/sandy clay filling	5	<0.4	14	<1	7	<0.1	<1	1	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
19	0.3-0.5	Silty clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
20	0-0.3	Silty clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
20	0.3-0.4	Silty clay filling	<4	<0.4	7	2	7	<0.1	<1	3	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
20	0.5-0.8	Silty clay filling	<4	<0.4	10	1	6	<0.1	<1	2	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
21	0-0.3	Silty clay filling	6	<0.4	12	5	19	<0.1	2	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
21	0.3-0.4	Silty clay filling	5	<0.4	10	6	18	<0.1	2	8	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
22	0.8-1.0	Silty clay filling	6	<0.4	12	5	14	<0.1	<1	1	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
23	0-0.2	Clay filling	7	<0.4	17	17	35	<0.1	6	39	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
23	1.3-1.5	Clay filling	9	<0.4	17	17	31	<0.1	4	29	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
23	1.8-2	Clay filling	11	<0.4	22	15	28	<0.1	2	19	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
23	3.8-4	Clay filling	7	<0.4	16	11	30	<0.1	4	30	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
Site Assessment Criteria (Recreational C - HIL C)																																			
HIL C or HSL C			300	90	300	17000	600	80	1200	30000	3	300	NL	NL	-	-	-	-	-	-	NL	NL	NL	NL	NL	400	10	70	340	20	10	10	400	250 [3]	1	40000	0.01% W/W
Direct Contact (HSL-C)[2]			-	-	-	-	-	-	-	-	-	-	-	-	5100	3800	5300	7400	-	-	1900	120	18000	5300	15000	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit			-	-	-	-	-	-	-	-	-	-	-	-	700**	1000	3500**	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA/QC																																			
BD1A/190613			9	<0.4	12	17	20	<0.1	<1	2	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
BD2A/190613			9	<0.4	12	21	19	<0.1	<1	12	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
BD3A/190613			7	<0.4	14	21	20	<0.1	4	22	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
BD4A/190613			14	<0.4	16	17	29	<0.1	4	25	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
BD1/200613			5.5	<0.4	19	25	13	<0.05	38	37	-	-	<20	<50	<20	<50	<100	<100	<20	71	<0.5	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-	-	-	-	-	-	-	-
BD2/200613			6.1	<0.4	5.7	14	21	<0.05	<5	10	-	-	<20	<50	<20	<50	<100	<100	<20	<50	<0.5	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-	-	-	-	-	-	-	-
BD3/200613			5.4	<0.4	8.7	26	43	0.33	9.1	49	-	-	<20	<50	<20	<50	<100	<100	<20	<50	<0.5	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-	-	-	-	-	-	-	-
BD1/210612			8	<0.4	<5	20	20	<0.05	<5	9	-	-	<20	<50	<20	<50	<100	<100	<20	<50	<0.5	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-	-	-	-	-	-	-	-
TS1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103%	95%	90%	63-86%	-	-	-	-	-	-	-	-	-	-	-	-
TB1			-	-	-	-	-	-	-	-	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
TS2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98%	102%	100%	98%-99%	-	-	-	-	-	-	-	-	-	-	-	-
TB2			-	-	-	-	-	-	-	-	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
TS3			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101%	101%	102%	101-116%	-	-	-	-	-	-	-	-	-	-	-	-
TB3			-	-	-	-	-	-	-	-	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
TS4			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101%	101%	105%	104%	-	-	-	-	-	-	-	-	-	-	-	-
TB4			-	-	-	-	-	-	-	-	-	-	<25	<50	<25	<50	<100	<100	<25	<250	<0.1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-

Notes

BD1A/190613 is an intra-laboratory replicate of 3/0.4-0.5m
BD2A/190613 is an intra-laboratory replicate of 4/0.4-0.5m
BD3A/190613 is an intra-laboratory replicate of 6/0.4-0.5m
BD4A/190613 is an intra-laboratory replicate of 7/0-0.1m
BD1/200613 is an inter-laboratory replicate of 11/1.3-1.5
BD1/210613 is an inter-laboratory replicate of 12/0.1-0.4
BD2/200613 is an inter-laboratory replicate of 13/0.45-0.55
BD3/200613 is an inter-laboratory replicate of 14/0.3-0.4

HIL/HSL A	Residential with garden/accessible also includes primary schools
HIL/HSL C	Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths.
NL	Not Limiting
NAD	No asbestos detected at the laboratory reporting limit of 0.01 g/kg
AD	Asbestos Detected
BOLD	Exceedence of Site Assessment Criteria
*	Only lowest HSL for vapour intrusion shown (HSL may be raised depending on soil type and soil depth)
**	Only lowest management limit shown (management limit may be raised depending on soil type)
***	TRH C_{10}-C_{14}
1	Soil HSLs for vapour intrusion (mg/kg) for clay for 0 m to <1 m.
2	Soil HSLs for direct contact (mg/kg) extrated from CRC CARE NO. 10 Technical Report referenced in Section 10.1.2 of report
3	HIL for total OPP is not available; HIL for OPP is based on Chlorpyrifos only;

Table 16: Derivation of Site-Specific Ecological Investigation Levels (EIL) and Ecological Screening Levels (ESL) for Soil (All results in mg/kg unless otherwise stated)

Sample Identification			ESP/CEC (meq/100g)					pH (pH Units)	Clay Content (% w/w)	Soil Texture	EIL/ESL (Urban residential and open public spaces)																
											Heavy Metals							OCP	Hydrocarbon Contaminants [4]								
Sample Location	Sample Depth Range (m)	Soil Type	Exchangeable Ca	Exchangeable K	Exchangeable Mg	Exchangeable Na	Cation Exchnage Capacity				As [1]	Cr_III [3]	Cu [3]	Pb [2]	Ni [3]	Zn [3]	Benzo(a)pyrene [4]	DDT [1]	TRHC6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Naphthalene [1]	Benzene	Toluene	Ethylbenzene	Xylenes
Proposed Residential Development																											
2	0.3-0.4	Clay	3.9	0.2	1.3	<0.1	5.4	5.6	55	Light Medium Clay	100	710	130	1100	45	330	0.7	180	180	120	1300	5600	170	65	105	125	45
2	0.9-1.0	Clay	1.8	0.1	0.26	<0.1	2.2	5.2	38	Medium Clay	100	**630**	**65**	1100	**10**	**210**	0.7	180	180	120	1300	5600	170	65	105	125	45
10	0.3-0.5	Possibly reworked clay	15	0.5	1.2	0.45	17	6.2	62	Medium Clay	100	740	230	1100	240	590	0.7	180	180	120	1300	5600	170	65	105	125	45
10	0.8-1	Possibly reworked clay	2.6	<0.1	0.54	<0.1	3.3	5.3	70	Medium Clay	100	770	90	1100	15	240	0.7	180	180	120	1300	5600	170	65	105	125	45
10	1.3-1.5	Silty clay	2.9	0.1	0.59	<0.1	3.7	5.2	60	Medium Clay	100	730	95	1100	20	240	0.7	180	180	120	1300	5600	170	65	105	125	45
10	1.5-2	Silty clay	3.1	0.1	0.45	<0.1	3.8	5.7	50	Medium Clay	100	690	95	1100	20	290	0.7	180	180	120	1300	5600	170	65	105	125	45
Proposed School Development																											
13	0-0.1	Sand filling	25	1	2.7	<0.1	29	7.4	15	Sandy Loam	100	**470**	240	1100	350	1100	0.7	180	180	120	300 [5]	2800 [5]	170	50 [5]	85 [5]	70 [5]	105 [5]
13	0.3-0.45	Sandy clay filling	10	0.5	1.5	0.17	12	6.8	38	Sandy Loam	100	630	220	1100	190	590	0.7	180	180	120	1300	5600	170	65	105	125	45
13	0.45-0.55	Shaly clay	3.4	0.2	0.65	0.13	4.4	5.7	59	Light Medium Clay	100	730	110	1100	30	310	0.7	180	180	120	1300	5600	170	65	105	125	45
27	0.3-0.5	Silty sand filling	29	0.4	0.65	0.13	30	7.3	36	Sand Loam	100	620	240	1100	350	1100	0.7	180	180	120	300 5	2800 [5]	170	50 [5]	85 [5]	70 [5]	105 [5]
27	0.8-1	Shaly clay	0.4	<0.1	0.21	<0.1	<1.0	4.6	59	Light Medium Clay	100	730	**45**	1100	**6**	**160**	0.7	180	180	120	1300	5600	170	65	105	125	45
Proposed Playing/Sporting Field																											
16	0-0.2	Silty clay fililng	3.5	0.4	1.6	<0.1	5.6	6.0	25	Sandy Loam	100	550	130	1100	45	380	0.7	180	180	120	1300	5600	170	65	105	125	45
16	0.3-0.5	Silty clay filling	1.4	0.2	0.68	<0.1	2.2	5.6	33	Sandy Loam	100	600	65	1100	10	230	0.7	180	180	120	1300	5600	170	65	105	125	45
16	0.5-0.7	Silty clay	1.4	0.1	0.65	<0.1	2.2	5.7	21	Sandy Loam	100	520	65	1100	10	240	0.7	180	180	120	1300	5600	170	65	105	125	45
20	0-0.3	Silty clay filling	2.8	0.1	0.7	<0.1	3.7	5.7	17	Sandy Loam	100	490	95	1100	20	290	0.7	180	180	120	1300	5600	170	65	105	125	45
20	0.3-0.4	Silty clay filling	0.6	<0.1	0.24	<0.1	<1.0	5.7	15	Sandy Loam	100	**470**	**45**	1100	**6**	**190**	0.7	180	180	120	1300	5600	170	65	105	125	45
20	0.5-0.8	Silty clay filling	0.7	<0.1	1.2	<0.1	2.0	5.5	37	Light Clay	100	630	65	1100	9	220	0.7	180	180	120	1300	5600	170	65	105	125	45

Notes
1 Generic EIL for aged As, DDT, Napthalene; urban residential and public open space; Table 1B(5), Schedule B1, NEPC (2013)
2 Generic EIL for aged lead; urban residential and public open space; Table 1B(5), Schedule B1, NEPC (2013)
3 Site-specific EIL for Cr III, Cu, Ni and Zn; dervied from formula (ABC+ACL) specified in Schedule B1 of NEPC 2013 using the Interactive (Excel) Calculation Spreadsheet; ABC's based on selection of state (NSW) and traffic (High) Urban residential and open spaces.
4 Generic EIL for TRH fractions, BTEX and B(a)P; urban residential and public open space; Table 1B(5), Schedule B1, NEPC (2013) for 'fine' soil texture
5 Generic EIL for TRH fractions, BTEX and B(a)P; urban residential and public open space; Table 1B(5), Schedule B1, NEPC (2013) for 'coarse' soil texture
BOLD The lowest (or most conservative), calculated EIL has been selected in each of the proposed land use catergory for an initial round of screening. Any concentration of contaminant greater than the site-specific EIL would be selected for a second round of screening based on similar soil type and depth.

Table 17: Comparsion of soil analysis results against EILs and ESLs (All results in mg/kg unless otherwise stated)

Sample Identification			Heavy Metals								PAHs		Hydrocarbon Contaminants												Organochlorine Pesticides (OCP)								OPP	PCBs (total)	Phenols	Asbestos (fibres)
Sample Location	Sample Depth Range (m)	Soil Type	Arsenic	Cadmium	Chromium (III)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Benzo(a)pyrene TEQ	Total PAHs	TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C6 - C9	TRH +C10 - C36 (Sum of total)	Naphthalene	Benzene	Toluene	Ethylbenzene	Total Xylene	DDT	Aldrin + Dieldrin	Chlordane	Endosulfan (total)	Endrin	Heptachlor	HCB	Methoxychlor				
Proposed Residential Development																																				
1	0.3-0.4	Gravelly sand filling	<4	<0.4	15	43	22	<0.1	**15**	44	**2**	13	<25	<50	<25	<50	400	410	<25	530	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
2	0.9-1.0	Clay	7	<0.4	13	24	21	<0.1	2	9	<0.5	1.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
3	0.4-0.5	Clay	7	<0.4	14	32	17	<0.1	<1	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
4	0.4-0.5	Possibly reworked clay	9	<0.4	10	21	17	<0.1	1	13	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
5	0.4-0.5	Possibly reworked clay	10	<0.4	20	18	28	<0.1	3	23	<0.5	2.6	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
10	0.8-1.0	Possibly reworked clay	9	<0.4	27	12	18	<0.1	3	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
Ecological Assessment Criteria (Urban Residential and Public Open Space)																																				
EIL/ESL			100	-	630	65	1100	-	10	210	0.7	-	-	-	180	120	1300	5600	-	-	170	65	105	125	45	180	-	-	-	-	-	-	-	-	-	-	-
Proposed School Development																																				
6	0.4-0.5	Clay	5	<0.4	14	20	21	<0.1	3	18	<0.5	3.6	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
6	0.9-1.0	Clay	7	<0.4	13	22	19	<0.1	4	17	<0.5	1.7	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
8	0.3-0.5	Clay	8	<0.4	11	23	18	<0.1	5	11	<0.5	1.9	<25	<50	<25	<50	190	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
11	0.4-0.5	Possibly reworked clay	9	<0.4	17	19	19	<0.1	1	7	**1**	4.3	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
11	1.3-1.5	Silty Clay	6	<0.4	8	23	19	<0.1	1	8	<0.5	1.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
12	0-0.1	Sand filling	<4	<0.4	2	**83**	8	<0.1	3	34	<0.5	0.36	<25	**130**	<25	**130**	**2000**	**1200**	<25	**2500**	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
12	0.1-0.4	Sandy clay filling	7	<0.4	12	8	16	0.2	3	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0.55-0.65	clay filling	6	<0.4	9	14	14	<0.1	3	18	**1**	5.3	<25	<50	<25	<50	<100	<100	<25	150	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
13	0.3-0.45	Sandy clay filling	6	<0.4	14	17	41	<0.1	5	30	<0.5	1.8	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
13	0.45-0.55	Shaly clay	7	<0.4	16	16	19	0.1	4	11	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
14	0.3-0.4	Sandy clay fililng	5	<0.4	19	14	38	0.6	**10**	39	**1**	4.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
14	0.5-0.9	Sandy clay filling	4	<0.4	12	30	64	0.1	4	110	<0.5	0.43	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
14	0.8	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
24	0.5-1.0	Shaly clay	<4	<0.4	10	18	22	0.3	4	21	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
25	0-0.3	silty/sandy clay filling	6	<0.4	12	17	40	<0.1	7	49	**1**	5.8	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
26	0.1-0.2	Silty clay filling	9	<0.4	16	16	25	<0.1	5	37	<0.5	1.7	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
27	0.3-0.5	Silty sand filling	7	<0.4	15	15	28	<0.1	6	40	<0.5	2.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
27	0.3-0.5	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AD
28	0.3-0.5	Silty clay filling	<4	<0.4	13	15	190	<0.1	5	110	<0.5	1.5	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
Ecological Assessment Criteria (Urban Residential and Public Open Space)																																				
EIL/ESL			100	-	470	45	1100	-	6	160	0.7	-	-	-	180	120	1300	5600	-	-	170	65	105	125	45	180	-	-	-	-	-	-	-	-	-	-	-
Proposed Playing/Sporting Field																																				
7	0-0.1	Clay filling	14	<0.4	18	18	42	0.1	5	39	<0.5	0.36	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
7	0.4-0.5	Clay filling	9	<0.4	20	21	66	<0.1	5	77	<0.5	0.39	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
9	0-0.2	Silty clay filling	5	<0.4	10	7	17	0.1	2	14	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
9	0.3-0.5	Silty clay	5	<0.4	16	4	9	<0.1	1	3	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
15	0.2	Clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
15	0.3-0.5	Clay filling	6	<0.4	16	5	9	<0.1	2	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
16	0-0.2	Silty clay filling	6	<0.4	10	7	23	<0.1	2	13	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
16	0.3-0.5	Silty clay filling	5	<0.4	10	3	10	<0.1	<1	1	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
17	0-0.2	Silty clay filling	<4	<0.4	6	2	11	<0.1	<1	11	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
18	0-0.2	Silty clay filling	<4	<0.4	6	3	20	<0.1	1	6	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
18	0.3-0.5	Silty clay	4	<0.4	16	1	8	<0.1	<1	2	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
19	0-0.3	silty/sandy clay filling	5	<0.4	14	<1	7	<0.1	<1	1	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
19	0.3-0.5	Silty clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
20	0-0.3	Silty clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD
20	0.3-0.4	Silty clay filling	<4	<0.4	7	2	7	<0.1	<1	3	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
20	0.5-0.8	Silty clay filling	<4	<0.4	10	1	6	<0.1	<1	2	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	-
21	0-0.3	Silty clay filling	6	<0.4	12	5	19	<0.1	2	5	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
21	0.3-0.4	Silty clay filling	5	<0.4	10	6	18	<0.1	2	8	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
22	0.8-1.0	Silty clay filling	6	<0.4	12	5	14	<0.1	<1	1	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	-
23	0-0.2	Clay filling	7	<0.4	17	17	35	<0.1	6	39	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
23	1.3-1.5	Clay filling	9	<0.4	17	17	31	<0.1	4	29	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
23	1.8-2	Clay filling	11	<0.4	22	15	28	<0.1	2	19	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-	NAD
23	3.8-4	Clay filling	7	<0.4	16	11	30	<0.1	4	30	<0.5	<0.1	<25	<50	<25	<50	<100	<100	<25	<250	<1	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.7	<5	NAD
Ecological Assessment Criteria (Urban Residential and Public Open Space)																																				
EIL/ESL			100	-	630	65	1100	-	9	220	0.7	-	-	-	180	120	1300	5600	-	-	170	65	105	125	45	180	-	-	-	-	-	-	-	-	-	-	-

Notes

-	Not analysed/not available/not applicable
EIL/ESL	EIL/ESLs for urban residential and public open space
NL	Not Limiting
NAD	No Asbestos Detected
AD	Asbestos Detected
BOLD	Exceedence of EIL/ESL

Table 18: Comparsion of soil analysis results against waste guidelines (All results in mg/kg unless otherwise stated)

Sample Identification			Heavy Metals									PAHs										Organochlorine Pesticides (OCP)		Organophosphorus Pesticides (OPP)		PCBs (total)	Phenols	Asbestos (fibres)
Sample Location	Sample Depth Range (m)	Soil Type	Arsenic	Cadmium	Chromium (VI)	Copper	Lead	TCLP Lead (mg/L)	Mercury (inorganic)	Nickel	Zinc	Benzo(a)pyrene	TCLP B(a)p (mg/L)	Total PAHs	TCLP PAH (mg/L)	TRH C6 - C9	TRH +C10 - C36 (Sum of total)	Benzene	Toluene	Ethylbenzene	Total Xylene	Endosulfan (total)	Total OCP	Chlorpyrifos	Total OPP			
Proposed School and Residential Development																												
1	0.3-0.4	Gravelly sand filling	<4	<0.4	15	43	22	-	<0.1	15	44	2	<0.001	13	<0.001	<25	530	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
2	0.9-1.0	Clay	7	<0.4	13	24	21	-	<0.1	2	9	<0.5	-	1.5	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
3	0.4-0.5	Clay	7	<0.4	14	32	17	-	<0.1	<1	5	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
4	0.4-0.5	Possibly reworked clay	9	<0.4	10	21	17	-	<0.1	1	13	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
5	0.4-0.5	Possibly reworked clay	10	<0.4	20	18	28	-	<0.1	3	23	<0.5	-	2.6	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
6	0.4-0.5	Clay	5	<0.4	14	20	21	-	<0.1	3	18	<0.5	-	3.6	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
6	0.9-1.0	Clay	7	<0.4	13	22	19	-	<0.1	4	17	<0.5	-	1.7	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
8	0.3-0.5	Clay	8	<0.4	11	23	18	-	<0.1	5	11	<0.5	-	1.9	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
10	0.8-1.0	Possibly reworked clay	9	<0.4	27	12	18	-	<0.1	3	5	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
11	0.4-0.5	Possibly reworked clay	9	<0.4	17	19	19	-	<0.1	1	7	1	-	4.3	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
11	1.3-1.5	Silty Clay	6	<0.4	8	23	19	-	<0.1	1	8	<0.5	-	1.5	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
12	0-0.1	Sand filling	<4	<0.4	2	83	8	-	<0.1	3	34	<0.5	-	0.36	-	<25	2500	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
12	0.1-0.4	Sandy clay filling	7	<0.4	12	8	16	-	0.2	3	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0.55-0.65	clay filling	6	<0.4	9	14	14	-	<0.1	3	18	1	-	5.3	-	<25	150	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
13	0.3-0.45	Sandy clay filling	6	<0.4	14	17	41	-	<0.1	5	30	<0.5	-	1.8	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
13	0.45-0.55	Shaly clay	7	<0.4	16	16	19	-	0.1	4	11	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
14	0.3-0.4	Sandy clay filling	5	<0.4	19	14	38	-	0.6	10	39	1	-	4.5	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
14	0.5-0.9	Sandy clay filling	4	<0.4	12	30	64	-	0.1	4	110	<0.5	-	0.43	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
14	0.8	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	NAD
24	0.5-1.0	Shaly clay	<4	<0.4	10	18	22	-	0.3	4	21	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	-
25	0-0.3	silty/sandy clay filling	6	<0.4	12	17	40	-	<0.1	7	49	1	-	5.8	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
26	0.1-0.2	Silty clay filling	9	<0.4	16	16	25	-	<0.1	5	37	<0.5	-	1.7	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	-
27	0.3-0.5	Silty sand filling	7	<0.4	15	15	28	-	<0.1	6	40	<0.5	-	2.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
27	0.3-0.5	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	**AD**
28	0.3-0.5	Silty clay filling	<4	<0.4	13	15	190	1.5	<0.1	5	110	<0.5	-	1.5	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
Proposed Playing/Sporting Field																												
7	0-0.1	Clay filling	14	<0.4	18	18	42	-	0.1	5	39	<0.5	-	0.36	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
7	0.4-0.5	Clay filling	9	<0.4	20	21	66	-	<0.1	5	77	<0.5	-	0.39	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
9	0-0.2	Silty clay filling	5	<0.4	10	7	17	-	0.1	2	14	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
9	0.3-0.5	Silty clay	5	<0.4	16	4	9	-	<0.1	1	3	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
15	0.2	Clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	NAD
15	0.3-0.5	Clay filling	6	<0.4	16	5	9	-	<0.1	2	5	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	-
16	0-0.2	Silty clay filling	6	<0.4	10	7	23	-	<0.1	2	13	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	-
16	0.3-0.5	Silty clay filling	5	<0.4	10	3	10	-	<0.1	<1	1	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	-
17	0-0.2	Silty clay filling	<4	<0.4	6	2	11	-	<0.1	<1	11	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
18	0-0.2	Silty clay filling	<4	<0.4	6	3	20	-	<0.1	1	6	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	-
18	0.3-0.5	Silty clay	4	<0.4	16	1	8	-	<0.1	<1	2	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
19	0-0.3	silty/sandy clay filling	5	<0.4	14	<1	7	-	<0.1	<1	1	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
19	0.3-0.5	Silty clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	NAD
20	0-0.3	Silty clay filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	NAD
20	0.3-0.4	Silty clay filling	<4	<0.4	7	2	7	-	<0.1	<1	3	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
20	0.5-0.8	Silty clay filling	<4	<0.4	10	1	6	-	<0.1	<1	2	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	-
21	0-0.3	Silty clay filling	6	<0.4	12	5	19	-	<0.1	2	5	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	-
21	0.3-0.4	Silty clay filling	5	<0.4	10	6	18	-	<0.1	2	8	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
22	0.8-1.0	Silty clay filling	6	<0.4	12	5	14	-	<0.1	<1	1	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	-
23	0-0.2	Clay filling	7	<0.4	17	17	35	-	<0.1	6	39	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
23	1.3-1.5	Clay filling	9	<0.4	17	17	31	-	<0.1	4	29	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
23	1.8-2	Clay filling	11	<0.4	22	15	28	-	<0.1	2	19	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	-	-		-	-	-	NAD
23	3.8-4	Clay filling	7	<0.4	16	11	30	-	<0.1	4	30	<0.5	-	<0.1	-	<25	<250	<0.2	<0.5	<1	<3	<0.3	<0.1		<0.1	<0.7	<5	NAD
Maximum Values of Specific Contaminant Concentration for Classification without TCLP																												
General Solid Waste (CT1)			100	20	-	-	100	-	4	40	-	0.8	-	-	-	-	-	10	288	600	1000	60	-	4	-	-	288***	NAD
Maximum Values of Specific Contaminant Concentration and Leachable Concentration (withTCLP) when used together																												
General Solid Waste (SCC1 & TCLP1)			500	100	-	-	1500	5	50	1050	-	10	0.04	200	-	650	10000	18	518	1080	1800	108	<50*	108	250**	<50	518***	NAD

Notes

CT1	Contaminant threshold for General Solid Waste (GSW)
SCC1	The specific contaminant concentration (SCC) of any chemical contaminant in the waste (mg/kg) for GSW
TCLP1	The leachable concentration of any chemical contaminant using the Toxicity Characteristics Leaching Procedure (TCLP) (mg/L) for GSW
NL	Not Limiting
NAD	No Asbestos Detected
AD	Asbestos Detected
BOLD	Exceedence of General Solid Waste Criteria with TCLP (non-putrescible)
*	Value for scheduled chemicals
**	Value for moderately harmful pesticides
***	Phenol (non-halogenated)

Table 19: Summary of Results of Water Analysis (All results in µg/L unless otherwise stated)

Sample Location	Sample date	Heavy Metals (dissolved)								Polycylic Aromatic Hydrocarbons (PAH)				Total Recoverable Hydrocarbons (TRH)						Monocyclic Aromatic Hydrocarbons (MAH)					olatile Organic Compounds (VO				PCB			Organochlorine Pesticides							Hardness (mgCaCO3/L)
		Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a)pyrene	Anthracene	All other PAH	TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toulene	Ethylbenzene	o-xylene	m+p-xylene	Chloroform	1,3,5-trimethyl benzene	1,2,4-trimethyl benzene	All other VOCS	Arochlor 1242	Arochlor 1254	All other PCB	Heptachlor	Chlordane	DDT	Endrin	Endosulfan	All other OCP	
GW7	2-Jul-13	<1	<0.1	<1	**3**	<1	<0.05	9	**54**	0.2	<0.1	<0.1	ND	16	<50	19	<50	<100	<100	<1	<1	<1	1	2	3	1	2	ND	<0.01	<0.01	ND	<0.001	<0.002	<0.001	<0.001	<0.002	ND	41 (S)
GW8	2-Jul-13	<1	<0.1	<1	<1	<1	<0.05	10	**51**	0.2	<0.1	0.2	ND	16	<50	20	<50	<100	<100	<1	<1	<1	1	2	<1	2	2	ND	<0.01	<0.01	ND	<0.001	<0.002	<0.001	<0.001	<0.002	ND	30 (S)
GW9	2-Jul-13	<1	<0.1	<1	**3**	1	<0.05	3	**18**	0.3	<0.1	<0.1	ND	11	<50	12	<50	<100	<100	<1	<1	<1	1	<2	2	2	1	ND	<0.01	<0.01	ND	<0.001	<0.002	<0.001	<0.001	<0.002	ND	18 (S)
BD1A/020713	-	<1	<0.1	<1	<1	<1	<0.05	10	**50**	-	-	-	-	16	<50	20	<50	<100	<100	<1	<1	<1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trip Spike	-									-	-	-	-	-	-	-	-	-	-	92%	96%	106%	104%	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trip Blank	-									-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Groundwater Assessment Criteria																																						
GIL (Freshwater)		24 as As(III) 13 as As(V)	0.2 (S)	1 (S)	1.4 (S)	3.4 (S)	0.06 (S)	11 (S)	8 (S)	16	0.2	0.04	-	-	-	-	-	-	-	950	180	5	625		370	12 *	12 *	-	0.3	0.01	-	0.01	0.003	0.0004	0.01	0.03	-	-
GIL (Drinking Water)		10	2	50	2000	10	1	20	-	-	0.01	-	-	-	-	-	-	-	-	1	800	300	600		-	-	-	-	-	-	-	-	2	9	-	20	-	-
HSLs for vapour intrusion		-	-	-	-	-	-	-	-	-	-		-	NL	NL	-	-	-	-	NL	NL	NL	NL		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

BD1A/020713 is blind replicate of sample GW8

ND Not detected

NL Not Limiting - If the derived soil HSL exceeds the solubility limit a soil-vapour souce concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as Not Limiting, 'NL'.

\- not defined/ not analysed/ not applicable

Bold Exceeds GIL

S Soft water

* Insufficient data for reliable trigger value. Interim working value based on U.S. EPA Regional Screening Values.

13. Discussion

13.1 Contaminants in Soil

13.1.1 HSLs and HILs

The majority of concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc in soil were below laboratory detection limits, and detectable concentrations of these three metals were all relatively low. Concentrations of all eight heavy metals in soil were within the available HILs for all analysed soil samples.

The majority of concentrations of PAH in soil were below detection limits. Concentrations of detectable PAH (including benzo(a)pyrene) were generally low and all concentrations were within the available HILs.
Most concentrations of TRH, benzene, toluene, ethylbenzene, xylenes and naphthalene were below detection limits. Detectable concentrations of these contaminants are summarised as follows:

- Relatively low concentrations of TRH >C_{10} were detected in the filling samples from Test Bore 1, depth 0.3 – 0.4 m and Test Bore 8, depth 0.3 – 0.5 m. These TRH concentrations are within HSLs and management limits;

- TRH >C_{10}-C_{16} (130 mg/kg), TRH >C_{16}-C_{34} (2000 mg/kg) and TRH >C_{34}-C_{40} (1200 mg/kg) was detected in the filling at Test Bore 12, depth 0 - 0.1 m. Filling at this depth was noted to contain a high proportion of organic matter which may have attributed to the elevated concentrations of medium to long chain TRH. A silica gel clean-up was performed on sample 12/0-0.1 to exclude the presence of non-petroleum interferences which may result in a false interpretation of TRH contamination. A significant reduction (reduced by more than two folds) in the concentrations of medium to long chain TRH was noticed as a result of the cleanup, indicating that the organic matter observed in the filling did have significant contribution to the elevated levels of TRH >C_{10}-C_{36}. Review of the TRH chromatogram indicated that the TRH contamination may be attributed to a mixture of oils. The source of oil is somewhat ambiguous; however, given the heterogeneous nature of filling, it is considered that the mixture of oil is possibly attributed to the former fill activities or an accidental oil spill in the adjacent car park. TRH contamination was not noted in the underlying filling from a depth of 0.1 m to the fill depth of 0.65 m, indicating that the pocket of TRH contamination is confined in filling between depth of 0 and 0.1 m. Given that TRH contamination detected in TB12 does not constitute a hotspot, no remedial action is warranted.

OCP/OPP, PCB and phenols were not detected in any analysed sample.

Asbestos was detected in a piece of suspected ACM fragment found in the filling at TP27 (0.3 - 0.4 m). The ACM fragment was a piece of beige compressed fibre cement containing chrysotile asbestos, measuring at 55 x 40 x 3 mm and weighted 14.59 g. The quantity of asbestos in TP27/0.3-0.4 is estimated below as per *Section 4.10 of Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater* (NEPC, 2013):

% w/w asbestos in soil = 15% x 0.01459 (kg) / 10 (L) x 1.48 (kg/L)

% w/w asbestos in soil = 0.015%

No other ACM was identified at the site and no asbestos was detected in the analysed soil samples at the laboratory reporting limit.

Given that the proposed school development will include primary and secondary schools, the more conservative land use category i.e. residential A was adopted for the asbestos heath screening level rather than recreational C (secondary schools). The health screening level (HSL) for residential A (includes primary schools) for bonded ACM is 0.01%, and it is therefore considered that the concentration of asbestos in Test Pit 27 at depth of 0.3 - 0.4 m has exceeded the HSL for bonded ACM, indicating there is a potential health risk associated with the concentrations of asbestos in soil at this location.

Building rubble material (brick, concrete, roof tile and ceramic tile) was noted in the filling at this test pit and asbestos is commonly associated with this type of material. Similar type and proportion of building rubble was observed in the filling located in the adjacent test pit (TP 28), both within the footprints of the former residential dwellings. Given that the building rubble is generally associated with asbestos, it is possible that asbestos is present at other locations within the footprints and a management / remediation strategy should be implemented in this area.

13.2 EILs and ESLs

Concentrations of zinc, copper, chromium, nickel and lead, arsenic, DDT, naphthalene, BTEX, benzo(a)pyrene and TRH fractions were low or undetected in most soil samples, with exceedances of the adopted generic EILs and/or ESLs reported only for samples TB1/0.3-0.4, TB11/0.4-0.5, TB12/0-0.1, TB12/0.55-0.65, TB14/0.3-0.4 and TB25/0-0.3. These exceedances were generally only marginal and would require further assessment once the development layout is confirmed.

13.3 Preliminary Waste Classification Results

Soil analysis results shown in Table 18 have been compared to criteria sourced from NSW *Waste Classification Guidelines,* revised in December 2009. Results of preliminary waste classification testing indicate that concentrations of chemical contaminants (i.e. excluding asbestos) are within guideline values for General Solid Waste. This includes results for TCLP analysis on filling samples with elevated total concentrations of lead and benzo(a)pyrene. Asbestos was detected in the filling sample at Test Bore 27 noted to contain building rubble.

Given that asbestos has been identified in filling containing building rubble, it is considered that filling at the subject site identified as not containing building rubble materials has a preliminary waste classification of General Solid Waste (non-putrescible). Soils observed to contain building rubble, in particular filling within the footprint of former residential buildings or suspected asbestos-containing materials will require further assessment for final waste classification. Soils containing asbestos have a waste classification of Special Waste (Asbestos).

The natural clay and sandstone encountered beneath the filling are considered to be generally classifiable as VENM provided that the material is not cross-contaminated or mixed with other non-VENM material. This preliminary classification remains subject to confirmation upon removal of the filling overburden and remaining free of demolition and other waste materials.

13.4 Contaminants in Groundwater

Hardness results indicate that the groundwater at GW7, GW8 and GW9 is soft which corresponds well with the local geology of the site. Hardness of water is usually an indication of the presence of minerals i.e. calcium or magnesium. Soft water is an indication of low levels of calcium and magnesium present in groundwater as these minerals are not typically found in sedimentary rocks (sandstone and shale).

Table 19 provides adjusted GILs for hardness for heavy metals, where applicable.

Concentrations of arsenic, cadmium, chromium and mercury were below detection limits, and/or within the GILs for all groundwater samples.

Copper was detected in the samples from GW7 and GW9. The detected concentrations of copper (3 µg/L in both samples) was marginally above the detection limit and marginally above the GIL (1.4 µg/L). Based on DP's experience, detectable concentrations of copper in groundwater are common in the Sydney region and the concentration at GW7 and GW9 is considered to be representative of the background copper concentration rather than contamination. Given this, it is considered that the detectable concentrations of copper at GW7 and GW9 do not warrant further assessment.

Zinc was detected above the detection limits and GIL in all groundwater samples. However, based on DP's experience, detectable concentrations of zinc in groundwater are common in the Sydney region and the concentrations are considered to be representative of the background zinc concentration rather than contamination. Given this, it is considered that the detectable concentrations of zinc do not warrant further assessment.

Concentrations of naphthalene, anthracene, TRH C6-C10, xylene, chloroform, 1,3, 5-trimethyl benzene and 1,2,4-trimethyl benzene was recorded above the detection limit in some of the samples, most of which were marginally above the detection limit. The concentrations of these contaminants are well within the GILs and no HSLs are applicable in terms of vapour intrusion risk (i.e. not limiting). Concentrations of OCP and PCB were not detected.

Based on the data it is considered that further investigation and/or remediation of groundwater at the site is not warranted.

14. Conclusion and Recommendations

This detailed site investigation for the proposed development did not uncover evidence of widespread or substantial soil contamination. It is considered that, based on the results of the investigation, the site is compatible with the proposed development subject to the following:

- Implementation of asbestos remediation within the footprints of the former dwellings and school buildings. This is likely to involve a process of tilling and "emu-picking" and subsequent disposal of ACM fragments followed by an inspection and sign-off by an occupational hygienist. The remediation process should be set out in an appropriate remediation action plan (RAP);

- Re-assessment of the ecological risks at and in the vicinity of the reported EIL and ESL exceedances, once the final development layout is confirmed. This is likely to involve additional soil sampling and testing in target areas; and
- Preparation of a Construction Environmental Management Plan (CEMP) incorporating an 'Unexpected Asbestos Finds Protocol', to ensure that any unsuspected finds of contamination, particularly asbestos, are dealt with appropriately.

15. Limitations

Douglas Partners (DP) has prepared this report for the proposed school and future residential/temporary PE courts development, as part of the larger Wahroonga Estate Project at the corner of Fox Valley Road and Comenarra Parkway, Wahroonga in accordance with DP's revised proposal dated Douglas Partners' proposal dated 23 April 2013 and discussion on 14 June 2013 regarding additional scope of works. This report is provided for the exclusive use of Stanton Dahl Architects Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

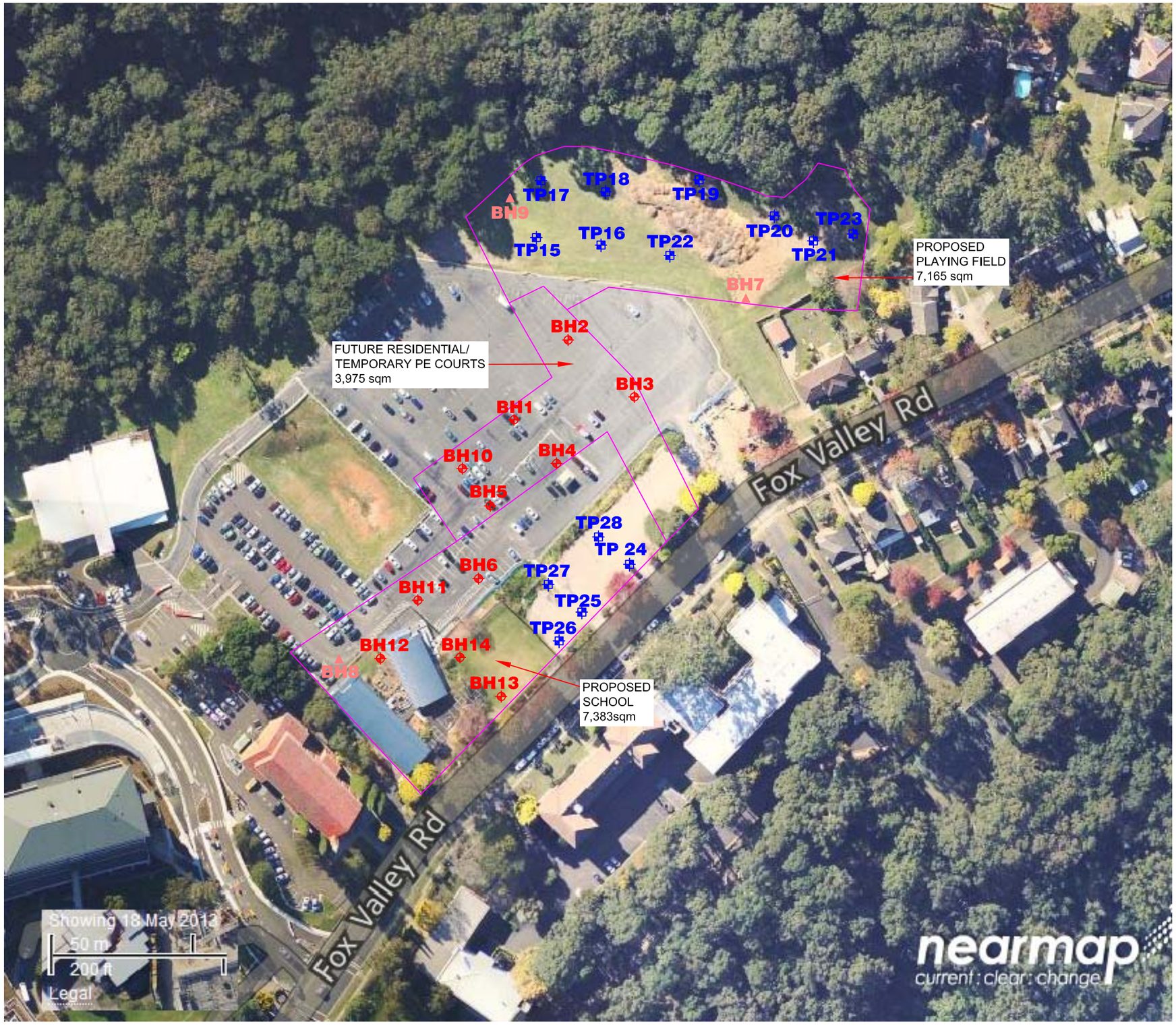
The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life.

This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the discussions section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

Drawing 1



LEGEND

- Test Pit Location
- Test Bore Location
- Groundwater Well Location

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Stanton Dahl Architects		TITLE: **Tests Locations**
OFFICE: Sydney	DRAWN BY: PSCH	**School Extensions, Wahroonga Adventist School**
SCALE: As shown	DATE: 8.7.2013	**Fox Valley Road, WAHROONGA**

N

PROJECT No:	73244.01
DRAWING No:	1
REVISION:	1

Appendix B

Test Pit/Bore Logs

Notes About this Report

Groundwater Field Sheets

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Soil Descriptions

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Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

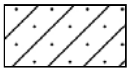
Soils


Topsoil

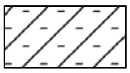

Peat


Clay

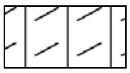

Silty clay

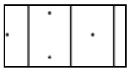

Sandy clay

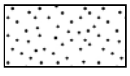

Gravelly clay

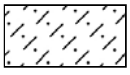

Shaly clay

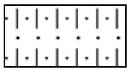

Silt


Clayey silt


Sandy silt

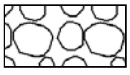

Sand

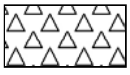

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

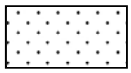

Talus

Sedimentary Rocks

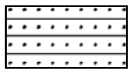

Boulder conglomerate

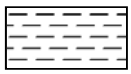

Conglomerate


Conglomeratic sandstone

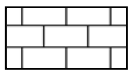

Sandstone


Siltstone


Laminite

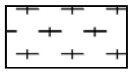

Mudstone, claystone, shale

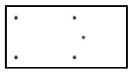

Coal


Limestone

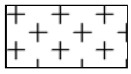
Metamorphic Rocks

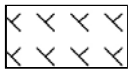

Slate, phyllite, schist

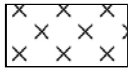

Gneiss

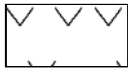

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 162.95
EASTING: 324113.6
NORTHING: 6265993.91
DIP/AZIMUTH: 90°/--

BORE No: BH 1
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
162	0.05	ASPHALT							
		FILLING - grey gravelly sand (roadbase)		A	0.3		PID<1		
	0.4	FILLING - red clay filling with a trace of gravel and silt (possibly reworked natural)		A	0.4		PID<1		
	0.6	CLAY - very stiff to hard red brown clay with a trace of silt, humid to damp		A	0.6 0.9 1.0		PID<1		
	1.1								
	1.15	SANDSTONE - low strength, light brown fine grained sandstone							
		Bore discontinued at 1.15m- Refusal on sandstone							

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 162.24
EASTING: 324132.12
NORTHING: 6266015.4
DIP/AZIMUTH: 90°/--

BORE No: BH 2
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
162	0.05	ASPHALT							
		FILLING - grey gravelly sand filling (roadbase)							
	0.25	CLAY - stiff, brown clay with a trace of silt, humid to damp			0.4				
				A	0.5		PID<1		
		- from 0.6m: becoming very stiff to hard							
					0.9				
	1			A	1.0		PID<1		1
161	1.1	SANDSTONE - very low strength, light brown, fine grained sandstone							
					1.3				
	1.4			A	1.4		PID<1		
		Bore discontinued at 1.4m - Target depth reached							
	2								2
160									
	3								3
159									
	4								4
158									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 163.69
EASTING: 324144.38
NORTHING: 6265996.71
DIP/AZIMUTH: 90°/--

BORE No: BH 3
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
163	0.05	ASPHALT							
		FILLING - grey gravelly sand (roadbase)							
	0.25	CLAY - very stiff brown clay with a trace of sand, humid							
				*A	0.4		PID<1		
					0.5				
		- from 0.7m: hard							
	1			A	0.9		PID<1		1
					1.0				
	1.4	SANDSTONE - very low strength, brown, fine grained sandstone							
				A	1.5		PID<1		
162	1.7	Bore discontinued at 1.7m- Refusal on sandstone			1.7				
	2								2
161									
	3								3
160									
	4								4
159									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD1A/ 190613 is a blind replicate of 3/ 0.4-0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 163.53
EASTING: 324124.84
NORTHING: 6265980.17
DIP/AZIMUTH: 90°/--

BORE No: BH 4
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
163	0.05	ASPHALT							
		FILLING - grey gravelly sand (roadbase)							
	0.25	FILLING - light brown clay filling with a trace of silt (possibly reworked natural)		*A	0.4		PID<1		
	0.5	CLAY - hard light brown mottled grey clay, humid			0.5				
	1			A	0.9		PID<1		1
					1.0				
	1.3	SANDSTONE - very low strength, light brown and grey, fine grained sandstone		A	1.4		PID<1		
162	1.5	Bore discontinued at 1.5m - Target depth reached			1.5				
	2								2
161									
	3								3
160									
	4								4
159									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD2A/ 190613 is a blind replicate of 0.4-0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 163.96
EASTING: 324099.84
NORTHING: 6265954.45
DIP/AZIMUTH: 90°/--

BORE No: BH 5
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
163	0.05	ASPHALT							
		FILLING - grey gravelly sand filling (roadbase)							
	0.25	FILLING - brown clay filling with a trace of gravel (probably reworked natural)							
				A	0.4		PID<1		
	0.5	CLAY - stiff, brown clay with a trace of silt, damp			0.5				
	1			A	0.9		PID<1		1
					1.0				
		- from 1.2m: becoming hard with trace sand							
				A	1.4		PID<1		
	1.5	Bore discontinued at 1.5m			1.5				
		- Target depth reached							
162	2								2
161	3								3
160	4								4
159									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 164.19
EASTING: 324100.8
NORTHING: 6265929.47
DIP/AZIMUTH: 90°/--

BORE No: BH 6
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
164	0.05	ASPHALT							
		FILLING - grey gravelly sand filling (roadbase)							
	0.25	CLAY - very stiff to hard, brown mottled grey clay with a trace of silt, humid			0.4				
				*A	0.5		PID<1		
	1								1
163				A	0.9		PID<1		
					1.0				
	1.3	SANDSTONE - very low strength, grey and brown fine grained sandstone							
				A	1.4		PID<1		
	1.5	Bore discontinued at 1.5m - Target depth reached			1.5				
	2								2
162									
	3								3
161									
	4								4
160									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD3A/ 190613 is a blind replicate of 0.4-0.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 160.54
EASTING: 324193.37
NORTHING: 6266036.34
DIP/AZIMUTH: 90°/--

BORE No: BH 7
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
160	0.0	FILLING - brown clay filling with a trace of sand, rock and fragments and tile -slight rotting organic odour at 0.5-0.8m		*A	0.0 0.1		PID<1		Flush gatic cover
				A	0.4 0.5		PID<1		Backfill
	0.8	CLAY - stiff to hard clay, humid to damp		A	0.9 1.0		PID<1		Bentonite
159	1			A	1.4 1.5		PID<1		Gravel
	2								
158	2.45	SANDSTONE - high strength, moderately weathered, fractured then slightly fractured, brown and grey fine grained sandstone							
	3								
157	4								Machine slotted PVC screen
156									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** HW to 1.5m

TYPE OF BORING: Solid flight auger to 1.5m; Rotary to 2.25m; Coring to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD4A/ 190613 is a blind replicate of 0-0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 160.54
EASTING: 324193.37
NORTHING: 6266036.34
DIP/AZIMUTH: 90°/--

BORE No: BH 7
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
155	6	SANDSTONE - high strength, moderately weathered, fractured then slightly fractured, brown and grey fine grained sandstone *(continued)*							Gravel; Machine slotted PVC screen; End cap
	6.0	Bore discontinued at 6.0m - Target depth reached							
154	7								
153	8								
152	9								
151									

RIG: DT-100 **DRILLER:** SS **LOGGED:** DW **CASING:** HW to 1.5m

TYPE OF BORING: Solid flight auger to 1.5m; Rotary to 2.25m; Coring to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD4A/ 190613 is a blind replicate of 0-0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 163.62
EASTING: 324052.67
NORTHING: 625900.94
DIP/AZIMUTH: 90°/--

BORE No: BH 8
PROJECT No: 73244.01
DATE: 21/6/2013
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
163	0.03	ROADBASE - dark brown silty sand filling (roadbase)							Flush gatic cover
		CLAY - grey mottled orange-red brown shaly clay		A	0.1		PID<1		
					0.2				Concrete/bitumen
				A	0.3		PID<1		
					0.5				
				A			PID<1		Gravel
	1 1.0	SHALE - very low strength, extremely weathered brown shale with ironstone gravel			1.0				1
				A	1.3		PID<1		
162					1.5				Bentonite
				A			PID<1		
	2 2.0	SHALE - low to medium strength, moderately weathered, brown grey shale			2.0				2
161									
	3								3 Machine slotted PVC creen
160									
	4								4
159									

RIG: Scout **DRILLER:** LC **LOGGED:** WFY **CASING:** HW to 2m

TYPE OF BORING: Solid flight auger to 2m; Coring to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 163.62
EASTING: 324052.67
NORTHING: 625900.94
DIP/AZIMUTH: 90°/--

BORE No: BH 8
PROJECT No: 73244.01
DATE: 21/6/2013
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
158	6	SHALE - low to medium strength, moderately weathered, brown grey shale *(continued)*							Gravel
	6.0	Bore discontinued at 6.0m - Target depth reached							End cap
157	7								7
156	8								8
155	9								9
154									

RIG: Scout **DRILLER:** LC **LOGGED:** WFY **CASING:** HW to 2m

TYPE OF BORING: Solid flight auger to 2m; Coring to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 158.78
EASTING: 324109.7
NORTHING: 6266063.97
DIP/AZIMUTH: 90°/--

BORE No: BH 9
PROJECT No: 73244.01
DATE: 21/6/2013
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		TOPSOIL - dark brown silty clay filling (topsoil) with rootlets and ironstone gravel		A	0.0		PID<1		Flush gatic cover
	0.2	SILTY CLAY - orange brown silty clay with some ironstone gravel			0.2				
					0.3				
				A			PID<1		
					0.6				
158					0.8				Gravel
				A			PID<1		
	1				1.0				1
	1.3	SILTSTONE - extremely low then very low strength, extremely then highly weathered, red orange-brown siltstone			1.3				
				A			PID<1		
					1.5				
157					1.8				Bentonite
				A			PID<1		
	2				2.0				2
	2.0	SILTSTONE - low strength, moderately weathered grey mottled red/orange-brown siltstone							
156									
	3								3
155									
	4								4 Machine slotted PVC screen
154									

RIG: Scout **DRILLER:** LC **LOGGED:** WFY **CASING:** HW to 2m

TYPE OF BORING: Solid flight auger to 2m; Coring to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 158.78
EASTING: 324109.7
NORTHING: 6266063.97
DIP/AZIMUTH: 90°/--

BORE No: BH 9
PROJECT No: 73244.01
DATE: 21/6/2013
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
153	6	SILTSTONE - low strength, moderately weathered grey mottled red/orange-brown siltstone *(continued)*							Gravel
	6.0	Bore discontinued at 6.0m - Target depth reached							End cap
152	7								
151	8								
150	9								
149									

RIG: Scout **DRILLER:** LC **LOGGED:** WFY **CASING:** HW to 2m

TYPE OF BORING: Solid flight auger to 2m; Coring to 6.0m

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 162.98
EASTING: 324091.46
NORTHING: 6265974.62
DIP/AZIMUTH: 90°/--

BORE No: BH 10
PROJECT No: 73244.01
DATE: 21/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
162	0.05	ASPHALT							
		FILLING - grey gravelly sand filling (roadbase)							
	0.3	FILLING - orange brown mottled yellow/brown clay filling with some fine sized gravel (possibly reworked natural)		A	0.3		PID<1		
					0.5				
				A	0.8		PID<1		
	1.0	SILTY CLAY - orange red brown silty clay			1.0				
					1.3				
				A			PID<1		
					1.5				
				A			PID<10		
161	2.0	Bore discontinued at 2.0m - (on orange red-brown siltstone)			2.0				
160									
159									

RIG: Scout **DRILLER:** LC **LOGGED:** WFY **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 165.09
EASTING: 324078.79
NORTHING: 6265923.1
DIP/AZIMUTH: 90°/--

BORE No: BH 11
PROJECT No: 73244.01
DATE: 21/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
165	0.0	ROADBASE							
	0.4	FILLING - red/orange-brown mottled grey clay filling with some fine sized gravel (possibly reworked natural)		A	0.4 0.5		PID<1		
	0.6	CLAY - grey mottled red orange brown clay		A	0.8		PID<1		
164	1 1.0	SILTY CLAY - grey mottled red-orange -brown silty clay		*A	1.0 1.3		PID<1		1
	1.5	SILTSTONE - very low strength, highly weathered grey siltstone		A	1.5 1.6		PID<1		
163	2 2.0	Bore discontinued at 2.0m			2.0				2
162	3								3
161	4								4

RIG: Scout **DRILLER:** LC **LOGGED:** WFY **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD1/ 210613 is a blind replicate of 1.3-1.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 160.24
EASTING: 324066.82
NORTHING: 6265906.97
DIP/AZIMUTH: 90°/--

BORE No: BH 12
PROJECT No: 73244.01
DATE: 20/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
160	0.1	FILLING - dark brown sand filling with some gravel, silt, woodchips, roots and organic matter		A	0.0		PID<1		
					0.1				
		FILLING - grey sandy clay filling, some rock fragments and lolly-pop stick		*A			PID<1		
					0.4				
	0.55	- at 0.55m: hessian layer		A	0.55		PID<1		
	0.65	FILLING - grey mottled orange brown clay filling with rubble (tile, brick, roof and slag)			0.65				
		Bore discontinued at 0.65m							
159	1								1
158	2								2
157	3								3
156	4								4

RIG: Hand auger **DRILLER:** DW/WFY **LOGGED:** DW/WFY **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS: *BD1/ 200613 is a blind replicate of 0.1-0.4m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 167.45
EASTING: 324107.62
NORTHING: 6265886.11
DIP/AZIMUTH: 90°/--

BORE No: BH 13
PROJECT No: 73244.01
DATE: 20/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
167	0.0	FILLING - dark brown sand filling with a trace of clay, gravel silt, rootlets		A	0.0		PID<1		
	0.1				0.1				
	0.25	FILLING - brown sandy clay filling with some shale fragments and trace of rootlets (possibly natural)		A	0.3		PID<1		
	0.45	SHALY CLAY - orange brown shaly clay, humid to damp		*A	0.45		PID<1		
	0.55	Bore discontinued at 0.55m- Refusal on shaly clay			0.55				
166	1								1
	2								2
165									
	3								3
164									
	4								4
163									

RIG: Hand auger **DRILLER:** DW/WFY **LOGGED:** DW/WFY **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed whilst drilling
REMARKS: *BD2/ 200613 is a blind replicate of 0.45-0.55m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 166.38
EASTING: 324095.24
NORTHING: 6265911.01
DIP/AZIMUTH: 90°/--

BORE No: BH 14
PROJECT No: 73244.01
DATE: 20/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
166	0.25	FILLING - grey sand filling with trace of gravel, silt and rootlets			0.1				
				A			PID<1		
		FILLING - brown sandy clay filling with some rock fragments and trace of slag, tin foil and rootlets		*A	0.3		PID<1		
					0.4				
		- from 0.5m: some brick, wire, glass and tile			0.5				
				A			PID<1		
					0.9				
	1.0	Bore discontinued at 1.0m- Refusal on rock fragments or rubble in filling							

RIG: Hand auger **DRILLER:** DW/WFY **LOGGED:** DW/WFY **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free groundwater observed whilst drilling
REMARKS: *BD3/ 200613 is a blind replicate of 0.3-0.4m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 160.69
EASTING: 324125.07
NORTHING: 6266052.64

PIT No: TP 15
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
160	0.0	TOPSOIL - dark brown silty clay filling (topsoil) with rootlets		E	0.0		PID<1		
	0.2	FILLING - red brown clay filling with some ironstone gravel			0.2				
				E	0.3		PID<1		
					0.5				
	0.6	SANDSTONE - orange red brown sandstone		E	0.6		PID<1		
	0.7	Pit discontinued at 0.7m - Refusal on sandstone			0.7				
159	1								1
158	2								2
157	3								3
156	4								4

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 160.46
EASTING: 324147.21
NORTHING: 6266052.08

PIT No: TP 16
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
160	0.0	TOPSOIL - dark brown silty clay filling (topsoil) with some rootlets and a trace of concrete fragments		E	0.0 0.02		PID<1		
	0.2	FILLING - orange/red brown mottled grey silty clay filling with ironstone gravel		E	0.3		PID<1		
	0.5	SILTY CLAY - light orange mottled grey silty clay with ironstone bands		E	0.5 0.7		PID<1		
159	1								1
158	1.2	Pit discontinued at 1.2m - Refusal on sandstone							
	2								2
157	3								3
156	4								4

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 156.59
EASTING: 324104.28
NORTHING: 6266077.1

PIT No: TP 17
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
156	0.2	TOPSOIL - dark brown silty clay filling (topsoil) with a trace of rubble (brick, concrete and gravel)		E	0.0		PID<1		
	0.3	SILTY CLAY - yellow orange-brown silty clay			0.2				
		SANDSTONE - very low strength, extremely weathered grey/ orange brown sandstone with ironstone bands		E	0.3		PID<1		
					0.5				
				E	0.8		PID<1		
155	1.0	Pit discontinued at 1.0m- Refusal on sandstone			1.0				
154									
153									
152									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 155.70
EASTING: 324126.79
NORTHING: 6266085.64

PIT No: TP 18
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
155	0.2	FILLING - (topsoil) dark brown silty clay filling		E	0.0		PID<1		
		SILTY CLAY - yellow/ orange brown silty clay with some ironstone gravel			0.2				
				E	0.3		PID<1		
					0.5				
				E	0.8		PID<1		
154	1.0	Pit discontinued at 1.0m- Refusal on sandstone			1.0				
153									
152									
151									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 155.80
EASTING: 324152.25
NORTHING: 6266086.25

PIT No: TP 19
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
155	0.0	TOPSOIL - dark brown silty /sandy clay filling (topsoil) with some concrete, brick fragments and rootlets		E	0.0		PID<1		
	0.3	FILLING - orange brown silty clay with some trace of roots, ironstone gravel and concrete fragments		E	0.3		PID<1		
					0.5				
				E	0.8		PID<1		
154	1.0	SANDSTONE - very low strength, highly weathered, grey orange -brown sandstone with ironstone bands			1.0				1
	1.1	Pit discontinued at 1.1m- Refusal on sandstone							2
153									3
152									4
151									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 154.57
EASTING: 324179.27
NORTHING: 6266082.12

PIT No: TP 20
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
154	0.0	TOPSOIL - dark brown silty clay filling(topsoil) with rootlets and trace of rubble (brick and concrete fragments)		E	0.0		PID<1		
	0.3	FILLING - light brown silty clay filling with some ironstone fragments		E	0.3		PID<1		
	0.4	FILLING - orange red/brown silty clay filling with some ironstone fragments		E	0.4 0.5		PID<1		
	0.8	SANDSTONE - very low strength, highly weathered, grey and orange brown sandstone with ironstone bands		E E	0.8 1.0		PID<1 PID<1		
153	1.2	Pit discontinued at 1.2m- Refusal on sandstone			1.2				
152									
151									
150									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 156.31
EASTING: 324225.17
NORTHING: 6266068.09

PIT No: TP 21
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
156	0.0	TOPSOIL - dark brown silty clay filling (topsoil) with rootlets		*E	0.0		PID<1		
	0.3	FILLING - light brown silty clay filling with rootlets		E	0.3		PID<1		
	0.4	FILLING - orange brown clay filling with tree roots			0.4				
				E	0.5		PID<1		
	0.8	SANDSTONE - very low strength, highly weathered orange brown sandstone with ironstone bands		E	0.8		PID<1		
155	1.0	Pit discontinued at 1.0m- Refusal on sandstone			1.0				
154	2								2
153	3								3
152	4								4

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD1/ 190613 is a blind replicate of 0.3m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 160.24
EASTING: 324174.26
NORTHING: 6266047.4

PIT No: TP 22
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
160	0.0	TOPSOIL - dark brown silty clay filling (topsoil) with rootlets		E	0.0		PID<1		
	0.3	FILLING - red brown mottled yellow-brown silty clay filling with some ironstone gravel			0.3				
				E	0.8		PID<1		
159	1.0	SANDSTONE -very low strength, highly weathered, grey orange brown sandstone		E	1.0		PID<1		
	1.2	Pit discontinued at 1.2m- Refusal on sandstone			1.2				
158	2								2
157	3								3
156	4								4

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 153.34
EASTING: 324202.51
NORTHING: 6266079.76

PIT No: TP 23
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
153	0.0	FILLING - red brown clay filling with some organic matter, wire, timber, brick and concrete		E	0.0		PID<1		
					0.2				
				E	0.3		PID<1		
					0.5				
				E	0.8		PID<1		
152	1				1.0				1
				E	1.3		PID<1		
					1.5				
				E	1.8		PID<1		
151	2				2.0				2
				E	2.8		PID<1		
	3				3.0				3
150				E	3.8		PID<1		
	4.0	Pit discontinued at 4.0m- Limit of backhoe reach			4.0				4
149									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 168.66
EASTING: 324154.75
NORTHING: 6265943.53

PIT No: TP 24
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
168	0.1	CONCRETE							
		TOPSOIL - brown silty clay filling (topsoil) with rootlets, gravel and shale fragments		E	0.1		PID<1		
	0.3	SHALY CLAY - brown shaly clay		E	0.3		PID<1		
					0.5				
	0.8	SHALE - very low strength, highly weathered brown shale		*E	0.8		PID<1		
167	1.0	Pit discontinued at 1.0m- Refusal on shale			1.0				
166									
165									
164									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD2/ 190613 is a blind replicate of 0.8-1.0m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 167.30
EASTING: 324139.93
NORTHING: 6265927.01

PIT No: TP 25
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
167	0.0	FILLING - dark brown silty/sandy clay filling with fine to medium sized gravel, concrete fragments and rootlets		E	0.0		PID<1		
	0.3	SHALY CLAY - orange brown shaly clay with some rootlets		E	0.3		PID<1		
					0.5				
	0.8	SHALE - very low strength, highly weathered brown shale		E	0.8		PID<1		
166	1.0	Pit discontinued at 1.0m- Refusal on shale			1.0				
165									
164									
163									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 167.21
EASTING: 324129.11
NORTHING: 6265911.61

PIT No: TP 26
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
167	0.1	ROADBASE - dark brown sandy clay filling (roadbase)			0.1				
	0.2	FILLING - brown silty clay filling with rootlets		*E	0.2				
		SHALY CLAY - orange brown shaly clay with some ironstone gravel		*E	0.3				
				E	0.5				
	0.8	SHALE - very low strength, highly weathered shale		E	0.8				
	1.0	Pit discontinued at 1.0m- Refusal on shale			1.0				

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD3/ 190613 is a blind replicate of 0.1-0.20m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 166.56
EASTING: 324130.86
NORTHING: 6265940.45

PIT No: TP 27
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
166	0.1	ROADBASE - dark brown silty sand filling (roadbase) with fine to medium sized gravel							
		FILLING - dark brown silty sand filling with some brick, concrete, roof tile, ceramic tile and pieces of ACM fragments		E	0.3		PID<1		
	0.5	SHALY CLAY -yellow brown mottled orange brown shaly clay with tree roots			0.5				
		-0.8m: grey mottled red/orange brown shaly clay		E	0.8		PID<1		
	1.0			E	1.0		PID<1		1
	1.1	SHALE - very low strength, highly weathered, grey brown shale			1.1				
		Pit discontinued at 1.1m- Refusal on shale							
165	2								2
164	3								3
163	4								4
162									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Stanton Dahl Architects
PROJECT: Proposed School Development
LOCATION: Fox Valley Way, Wahroonga

SURFACE LEVEL: 166.43
EASTING: 324146.14
NORTHING: 6265961.34

PIT No: TP 28
PROJECT No: 73244.01
DATE: 19/6/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
166	0.1	ROADBASE							
		FILLING - dark brown silty clay filling with brick, concrete, ceramic pipe, roof tile and sandstone fragments		E	0.3		PID<1		
	0.5	SHALY CLAY - yellow brow mottled orange brown shaly clay		E	0.5		PID<1		
	0.8	SHALE - very low strength, highly weathered brown grey shale		E	0.8				
	1				1.0		PID<1		1
	1.2	Pit discontinued at 1.2m- Refusal on shale			1.2				
165	2								2
164	3								3
163	4								4
162									

RIG: John Deere 315D backhoe

LOGGED: WFY/RL

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	⧗	Water level	V	Shear vane (kPa)

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Groundwater Field Sheet

Project and Bore Installation Details					
Bore / Standpipe ID:	GW7 (Grassed area near houses)				
Project Name:	Proposed Wahroonga Adventist School				
Project Number:	73294.01				
Site Location:	Fox Valley Way, Wahroonga				
Bore Easting:		Northing:			
Installation Date:					
GW Level (during drilling):	m bgl				
Well Depth:	m bgl				
Screened Interval:	m bgl				
Contaminants/Comments:					
Bore Development Details					
Date/Time:	24.06.13 1:15 pm				
Purged By:	A.G				
GW Level (pre-purge):	2.50 m bgl				
GW Level (post-purge):	5.40 m bgl				
PSH observed:	Yes / No (interface/visual). ? mm thick				
Observed Well Depth:	5.85 m bgl				
Estimated Bore Volume:	L				
Total Volume Purged:	20 L				
Equipment:					
Micropurge and Sampling Details					
Date/Time:	02.07.13 1:00 pm				
Sampled By:	A.G				
Weather Conditions:	Fine				
GW Level (pre-purge):	2.6 m bgl				
GW Level (post sample):	4.0 m bgl				
PSH observed:	Yes / No (interface/visual). ? mm thick				
Observed Well Depth:	5.85 m bgl				
Estimated Bore Volume:	L				
Total Volume Purged:	20 L				
Equipment:	ppm / SPC µS/cm				

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1°C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10 mV**
1:08	19.5	1.74	516.4/461.5	4.74	180.8
1:10	19.4	1.49	519.7/464.0	4.78	189.9
1:12	19.4	1.31	553.9/494.5	4.92	175.9
1:14	19.4	1.31	552.6/491.9	4.93	177.0
1:16	19.3	1.33	548.8/489.5	4.89	179.5
1:18	19.3	1.35	562.0/501.0	4.94	173.7
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS		

Sample Details

Sampling Depth (rationale):	4.0 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	Slightly silty
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	

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Groundwater Field Sheet

Project and Bore Installation Details					
Bore / Standpipe ID:	GW8 (Asphalt car park)				
Project Name:	Proposed Wahroonga Adventist School				
Project Number:	73244.01				
Site Location:	Fox Valley Way, Wahroonga				
Bore Easting:		Northing:			
Installation Date:					
GW Level (during drilling):	m bgl				
Well Depth:	m bgl				
Screened Interval:	m bgl				
Contaminants/Comments:					
Bore Development Details					
Date/Time:	24.06.13 11:15 am				
Purged By:	A.G				
GW Level (pre-purge):	0.90 m bgl				
GW Level (post-purge):	4.70 m bgl				
PSH observed:	Yes / No (interface/visual). ? mm thick				
Observed Well Depth:	6.05 m bgl				
Estimated Bore Volume:	L				
Total Volume Purged:	100 L				
Equipment:					
Micropurge and Sampling Details					
Date/Time:	02.07.13 10:30 am				
Sampled By:	A.G				
Weather Conditions:	Fine				
GW Level (pre-purge):	0.75 m bgl				
GW Level (post sample):	0.85 m bgl				
PSH observed:	Yes / No (interface/visual). ? mm thick				
Observed Well Depth:	6.05 m bgl				
Estimated Bore Volume:	L				
Total Volume Purged:	20 L				
Equipment:					

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10 mV**
10:48	21.1	8.78	973/902	8.10	70.8
10:50	21.4	8.28	912/850	7.82	79.0
10:52	21.4	8.20	895/837	7.35	81.9
10:54	21.4	7.92	851/789	7.05	83.3
10:56	21.4	7.76	762/703	6.90	82.9
10:58	21.4	7.70	701/644	6.84	82.0
11:00	21.4	7.72	628/580	6.78	81.8
11:02	21.4	7.71	599/552	6.75	82.0
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS		

Sample Details

Sampling Depth (rationale):	3.0 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	Slightly silty
Sample ID:	
QA/QC Samples:	B01/020713
Sampling Containers and filtration:	
Comments / Observations:	

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Groundwater Field Sheet

Project and Bore Installation Details					
Bore / Standpipe ID:	GW9 (Grassed slope)				
Project Name:	Proposed Wahroonga Adventist School				
Project Number:	73244.01				
Site Location:	Fox Valley Way, Wahroonga				
Bore Easting:	/ Northing: /				
Installation Date:					
GW Level (during drilling):	m bgl				
Well Depth:	m bgl				
Screened Interval:	m bgl				
Contaminants/Comments:					
Bore Development Details					
Date/Time:	24.06.13 12:15 pm				
Purged By:	A.G				
GW Level (pre-purge):	1.80 m bgl				
GW Level (post-purge):	5.90 m bgl				
PSH observed:	Yes / No (interface/visual). ? mm thick				
Observed Well Depth:	6.15 m bgl				
Estimated Bore Volume:	L				
Total Volume Purged:	30 L				
Equipment:					
Micropurge and Sampling Details					
Date/Time:	02.07.13 11:45 am				
Sampled By:	A.G				
Weather Conditions:	Fine				
GW Level (pre-purge):	3.1 m bgl				
GW Level (post sample):	4.0 m bgl				
PSH observed:	Yes / No (interface/visual). ? mm thick				
Observed Well Depth:	6.15 m bgl				
Estimated Bore Volume:	L				
Total Volume Purged:	20 L				
Equipment:					

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10 mV**
12:02	18.1	12.35	8.2/7.2	5.16	58.1
12:04	18.2	9.36	4.8/4.1	4.31	75.9
12:06	18.5	2.28	174.6/152.5	4.33	233.5
12:08	18.3	2.27	211.8/185.5	4.28	244.8
12:10	18.4	2.19	219.4/187.6	4.25	248.9
12:12	18.3	2.30	214.5/188.6	4.36	236.3
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS		

Sample Details

Sampling Depth (rationale):	4.0 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	Slightly silty
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	

Appendix C

Laboratory Reports and Chain of Custody Information

CRC CARE Application Checklist

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 92803

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wenfei

Sample log in details:

Your Reference:	**73244.01, Wahroonga**
No. of samples:	56 Soils
Date samples received / completed instructions received	24/06/2013, 25/06/'1324/06/2013

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

Report Details:

Date results requested by: / Issue Date:	2/07/13	/	2/07/13
Date of Preliminary Report:	Not issued		

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Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-1	92803-2	92803-3	92803-4	92803-5
Your Reference	----------	1	2	3	4	5
Depth	----------	0.3-0.4	0.9-1.0	0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	92	87	90	88

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-6	92803-7	92803-8	92803-9	92803-10
Your Reference	----------	6	6	7	7	8
Depth	----------	0.4-0.5	0.9-1.0	0-0.1	0.4-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	90	91	90	90	78

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-11	92803-12	92803-13	92803-14	92803-15
Your Reference	----------	9	9	10	11	11
Depth	----------	0-0.2	0.3-0.5	0.8-1.0	0.4-0.5	1.3-1.5
Date Sampled		21/06/2013	21/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	87	94	94	89	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-16	92803-17	92803-18	92803-19	92803-20
Your Reference	----------	12	12	13	13	14
Depth	----------	0-0.1	0.55-0.65	0.3-0.45	0.45-0.55	0.3-0.4
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	92	88	91	87

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-21	92803-22	92803-23	92803-24	92803-25
Your Reference	----------	14	15	16	16	17
Depth	----------	0.5-0.9	0.3-0.5	0-0.2	0.3-0.5	0-0.2
Date Sampled		20/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	88	75	90	94	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-26	92803-27	92803-28	92803-29	92803-30
Your Reference	----------	18	18	19	20	20
Depth	----------	0-0.2	0.3-0.5	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	90	90	91	92	90

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-31	92803-32	92803-33	92803-34	92803-35
Your Reference	----------	21	21	22	23	23
Depth	----------	0-0.3	0.3-0.4	0.8-1.0	0-0.2	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	87	90	92	93	92

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-36	92803-37	92803-38	92803-39	92803-40
Your Reference	----------	23	23	24	25	26
Depth	----------	1.8-2	3.8-4	0.5-1.0	0-0.3	0.1-0.2
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	85	93	94	92	92

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-41	92803-42	92803-43	92803-44	92803-45
Your Reference	----------	27	28	BD1A/190613	BD2A/190613	BD3A/190613
Depth	----------	0.3-0.5	0.3-0.5	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	92	93	90	92

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	92803-46	92803-47	92803-48	92803-49	92803-50
Your Reference	----------	BD4A/190613	TS1-170613	TB1-170613	TS2-170613	TB2-170613
Depth	----------	-	-	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	<25	[NA]	<25	[NA]	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	[NA]	<25	[NA]	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	[NA]	<25	[NA]	<25
Benzene	mg/kg	<0.2	103%	<0.2	98%	<0.2
Toluene	mg/kg	<0.5	95%	<0.5	102%	<0.5
Ethylbenzene	mg/kg	<1	90%	<1	100%	<1
m+p-xylene	mg/kg	<2	86%	<2	99%	<2
o-Xylene	mg/kg	<1	63%	<1	98%	<1
naphthalene	mg/kg	<1	[NA]	<1	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	90	94	96	101	99

vTRH(C6-C10)/BTEXN in Soil					
Our Reference:	UNITS	92803-51	92803-52	92803-53	92803-54
Your Reference	----------	TS3-240613	TB3-240613	TS4-240613	TB4-240613
Depth	----------	-	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	[NA]	<25	[NA]	<25
TRHC$_6$ - C$_{10}$	mg/kg	[NA]	<25	[NA]	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	[NA]	<25	[NA]	<25
Benzene	mg/kg	101%	<0.2	101%	<0.2
Toluene	mg/kg	101%	<0.5	101%	<0.5
Ethylbenzene	mg/kg	102%	<1	105%	<1
m+p-xylene	mg/kg	116%	<2	104%	<2
o-Xylene	mg/kg	101%	<1	104%	<1
naphthalene	mg/kg	[NA]	<1	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	102	97	99	96

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-1	92803-2	92803-3	92803-4	92803-5
Your Reference	----------	1	2	3	4	5
Depth	----------	0.3-0.4	0.9-1.0	0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	200	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	330	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	400	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	410	<100	<100	<100	<100
Surrogate o-Terphenyl	%	106	86	82	80	82

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-6	92803-7	92803-8	92803-9	92803-10
Your Reference	----------	6	6	7	7	8
Depth	----------	0.4-0.5	0.9-1.0	0-0.1	0.4-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	83	83	85	87	87

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-11	92803-12	92803-13	92803-14	92803-15
Your Reference	----------	9	9	10	11	11
Depth	----------	0-0.2	0.3-0.5	0.8-1.0	0.4-0.5	1.3-1.5
Date Sampled		21/06/2013	21/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	81	87	83	84	86

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-16	92803-17	92803-18	92803-19	92803-20
Your Reference	----------	12	12	13	13	14
Depth	----------	0-0.1	0.55-0.65	0.3-0.45	0.45-0.55	0.3-0.4
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	1,400	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	1,100	150	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	130	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	130	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	2,000	140	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	1,200	130	<100	<100	<100
Surrogate o-Terphenyl	%	#	84	81	79	80

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-21	92803-22	92803-23	92803-24	92803-25
Your Reference	----------	14	15	16	16	17
Depth	----------	0.5-0.9	0.3-0.5	0-0.2	0.3-0.5	0-0.2
Date Sampled		20/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	79	89	88	87	87

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-26	92803-27	92803-28	92803-29	92803-30
Your Reference	----------	18	18	19	20	20
Depth	----------	0-0.2	0.3-0.5	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	87	87	89	89	86

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-31	92803-32	92803-33	92803-34	92803-35
Your Reference	----------	21	21	22	23	23
Depth	----------	0-0.3	0.3-0.4	0.8-1.0	0-0.2	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	88	86	89	91	90

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-36	92803-37	92803-38	92803-39	92803-40
Your Reference	----------	23	23	24	25	26
Depth	----------	1.8-2	3.8-4	0.5-1.0	0-0.3	0.1-0.2
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	90	91	91	94	90

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-41	92803-42	92803-43	92803-44	92803-45
Your Reference	----------	27	28	BD1A/190613	BD2A/190613	BD3A/190613
Depth	----------	0.3-0.5	0.3-0.5	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	86	87	88	86	88

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	92803-46	92803-48	92803-50	92803-52	92803-54
Your Reference	----------	BD4A/190613	TB1-170613	TB2-170613	TB3-240613	TB4-240613
Depth	----------	-	-	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	94	93	88	89	92

PAHs in Soil						
Our Reference:	UNITS	92803-1	92803-2	92803-3	92803-4	92803-5
Your Reference	----------	1	2	3	4	5
Depth	----------	0.3-0.4	0.9-1.0	0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	1.1	0.4	<0.1	<0.1	0.2
Anthracene	mg/kg	0.3	0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	2.6	0.3	<0.1	<0.1	0.6
Pyrene	mg/kg	2.6	0.3	<0.1	<0.1	0.5
Benzo(a)anthracene	mg/kg	1.1	0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	1.0	0.1	<0.1	<0.1	0.2
Benzo(b+k)fluoranthene	mg/kg	1.7	<0.2	<0.2	<0.2	0.4
Benzo(a)pyrene	mg/kg	1.2	0.1	<0.05	<0.05	0.23
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.6	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	2	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	13	1.5	NIL (+)VE	NIL (+)VE	2.6
Surrogate p-Terphenyl-d14	%	103	101	102	101	103

PAHs in Soil						
Our Reference:	UNITS	92803-6	92803-7	92803-8	92803-9	92803-10
Your Reference	----------	6	6	7	7	8
Depth	----------	0.4-0.5	0.9-1.0	0-0.1	0.4-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	0.2	<0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.7	0.4	0.1	0.2	0.3
Pyrene	mg/kg	0.8	0.4	0.1	0.1	0.3
Benzo(a)anthracene	mg/kg	0.3	0.2	<0.1	<0.1	0.2
Chrysene	mg/kg	0.3	0.2	<0.1	<0.1	0.2
Benzo(b+k)fluoranthene	mg/kg	0.5	0.3	<0.2	<0.2	0.3
Benzo(a)pyrene	mg/kg	0.36	0.17	0.09	0.08	0.23
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	3.6	1.7	0.36	0.39	1.9
Surrogate p-Terphenyl-d14	%	103	103	103	95	104

PAHs in Soil						
Our Reference:	UNITS	92803-11	92803-12	92803-13	92803-14	92803-15
Your Reference	----------	9	9	10	11	11
Depth	----------	0-0.2	0.3-0.5	0.8-1.0	0.4-0.5	1.3-1.5
Date Sampled		21/06/2013	21/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.4	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.8	0.3
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.8	0.3
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.4	0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.4	0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.6	0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.39	0.15
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	1	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	4.3	1.5
Surrogate p-Terphenyl-d14	%	101	109	101	101	102

PAHs in Soil						
Our Reference:	UNITS	92803-16	92803-17	92803-18	92803-19	92803-20
Your Reference	----------	12	12	13	13	14
Depth	----------	0-0.1	0.55-0.65	0.3-0.45	0.45-0.55	0.3-0.4
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	0.4	0.2	<0.1	0.4
Anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	1	0.4	<0.1	0.9
Pyrene	mg/kg	0.2	1.0	0.4	<0.1	0.8
Benzo(a)anthracene	mg/kg	<0.1	0.5	0.1	<0.1	0.3
Chrysene	mg/kg	<0.1	0.4	0.2	<0.1	0.4
Benzo(b+k)fluoranthene	mg/kg	<0.2	0.8	0.3	<0.2	0.7
Benzo(a)pyrene	mg/kg	0.06	0.57	0.18	<0.05	0.46
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.2	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.2	<0.1	<0.1	0.2
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	1	<0.5	<0.5	1
Total +ve PAH's	mg/kg	0.36	5.3	1.8	NIL (+)VE	4.5
Surrogate p-Terphenyl-d14	%	110	107	103	101	103

PAHs in Soil						
Our Reference:	UNITS	92803-21	92803-22	92803-23	92803-24	92803-25
Your Reference	----------	14	15	16	16	17
Depth	----------	0.5-0.9	0.3-0.5	0-0.2	0.3-0.5	0-0.2
Date Sampled		20/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.08	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.43	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	101	105	107	104	102

PAHs in Soil						
Our Reference:	UNITS	92803-26	92803-27	92803-28	92803-29	92803-30
Your Reference	----------	18	18	19	20	20
Depth	----------	0-0.2	0.3-0.5	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	107	103	111	107	107

PAHs in Soil						
Our Reference:	UNITS	92803-31	92803-32	92803-33	92803-34	92803-35
Your Reference	----------	21	21	22	23	23
Depth	----------	0-0.3	0.3-0.4	0.8-1.0	0-0.2	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.06
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.28
Surrogate p-Terphenyl-d14	%	106	107	104	104	105

PAHs in Soil						
Our Reference:	UNITS	92803-36	92803-37	92803-38	92803-39	92803-40
Your Reference	----------	23	23	24	25	26
Depth	----------	1.8-2	3.8-4	0.5-1.0	0-0.3	0.1-0.2
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.9	0.3
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.9	0.3
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.4	0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.5	0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	1.0	0.3
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.69	0.20
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.6	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.4	0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	1	<0.5
Total +ve PAH's	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	5.8	1.7
Surrogate p-Terphenyl-d14	%	107	105	107	107	107

PAHs in Soil			
Our Reference:	UNITS	92803-41	92803-42
Your Reference	----------	27	28
Depth	----------	0.3-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Date extracted	-	26/06/2013	26/06/2013
Date analysed	-	28/06/2013	28/06/2013
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.4	0.3
Pyrene	mg/kg	0.4	0.3
Benzo(a)anthracene	mg/kg	0.2	0.1
Chrysene	mg/kg	0.2	0.1
Benzo(b+k)fluoranthene	mg/kg	0.3	0.3
Benzo(a)pyrene	mg/kg	0.19	0.17
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5
Total +ve PAH's	mg/kg	2.1	1.5
Surrogate p-Terphenyl-d14	%	102	103

Organochlorine Pesticides in soil						
Our Reference:	UNITS	92803-1	92803-3	92803-4	92803-5	92803-8
Your Reference	----------	1	3	4	5	7
Depth	----------	0.3-0.4	0.4-0.5	0.4-0.5	0.4-0.5	0-0.1
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	95	94	96	95

Organochlorine Pesticides in soil						
Our Reference:	UNITS	92803-10	92803-11	92803-14	92803-16	92803-17
Your Reference	----------	8	9	11	12	12
Depth	----------	0.3-0.5	0-0.2	0.4-0.5	0-0.1	0.55-0.65
Date Sampled		21/06/2013	21/06/2013	21/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	93	93	93	94

Organochlorine Pesticides in soil						
Our Reference:	UNITS	92803-18	92803-19	92803-20	92803-21	92803-22
Your Reference	----------	13	13	14	14	15
Depth	----------	0.3-0.45	0.45-0.55	0.3-0.4	0.5-0.9	0.3-0.5
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	90	93	91	91

Organochlorine Pesticides in soil						
Our Reference:	UNITS	92803-23	92803-25	92803-26	92803-28	92803-29
Your Reference	----------	16	17	18	19	20
Depth	----------	0-0.2	0-0.2	0-0.2	0-0.3	0.3-0.4
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	97	91	90	91

Organochlorine Pesticides in soil						
Our Reference:	UNITS	92803-31	92803-33	92803-34	92803-37	92803-39
Your Reference	----------	21	22	23	23	25
Depth	----------	0-0.3	0.8-1.0	0-0.2	3.8-4	0-0.3
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	92	90	89	90	94

Organochlorine Pesticides in soil				
Our Reference:	UNITS	92803-40	92803-41	92803-42
Your Reference	----------	26	27	28
Depth	----------	0.1-0.2	0.3-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	89

Organophosphorus Pesticides						
Our Reference:	UNITS	92803-1	92803-3	92803-4	92803-5	92803-8
Your Reference	----------	1	3	4	5	7
Depth	----------	0.3-0.4	0.4-0.5	0.4-0.5	0.4-0.5	0-0.1
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	95	94	96	95

Organophosphorus Pesticides						
Our Reference:	UNITS	92803-10	92803-11	92803-14	92803-16	92803-17
Your Reference	----------	8	9	11	12	12
Depth	----------	0.3-0.5	0-0.2	0.4-0.5	0-0.1	0.55-0.65
Date Sampled		21/06/2013	21/06/2013	21/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	93	97	93	94

Organophosphorus Pesticides						
Our Reference:	UNITS	92803-18	92803-19	92803-20	92803-21	92803-22
Your Reference	----------	13	13	14	14	15
Depth	----------	0.3-0.45	0.45-0.55	0.3-0.4	0.5-0.9	0.3-0.5
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	90	93	91	91

Organophosphorus Pesticides						
Our Reference:	UNITS	92803-23	92803-25	92803-26	92803-28	92803-29
Your Reference	----------	16	17	18	19	20
Depth	----------	0-0.2	0-0.2	0-0.2	0-0.3	0.3-0.4
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	97	91	90	91

Organophosphorus Pesticides						
Our Reference:	UNITS	92803-31	92803-33	92803-34	92803-37	92803-39
Your Reference	----------	21	22	23	23	25
Depth	----------	0-0.3	0.8-1.0	0-0.2	3.8-4	0-0.3
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	92	90	89	90	94

Organophosphorus Pesticides				
Our Reference:	UNITS	92803-40	92803-41	92803-42
Your Reference	----------	26	27	28
Depth	----------	0.1-0.2	0.3-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	87	89

PCBs in Soil						
Our Reference:	UNITS	92803-1	92803-3	92803-4	92803-5	92803-8
Your Reference	----------	1	3	4	5	7
Depth	----------	0.3-0.4	0.4-0.5	0.4-0.5	0.4-0.5	0-0.1
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	95	95	98	96	95

PCBs in Soil						
Our Reference:	UNITS	92803-10	92803-11	92803-14	92803-16	92803-17
Your Reference	----------	8	9	11	12	12
Depth	----------	0.3-0.5	0-0.2	0.4-0.5	0-0.1	0.55-0.65
Date Sampled		21/06/2013	21/06/2013	21/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	93	97	93	94

PCBs in Soil						
Our Reference:	UNITS	92803-18	92803-19	92803-20	92803-21	92803-22
Your Reference	----------	13	13	14	14	15
Depth	----------	0.3-0.45	0.45-0.55	0.3-0.4	0.5-0.9	0.3-0.5
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	90	93	91	91

PCBs in Soil						
Our Reference:	UNITS	92803-23	92803-25	92803-26	92803-28	92803-29
Your Reference	----------	16	17	18	19	20
Depth	----------	0-0.2	0-0.2	0-0.2	0-0.3	0.3-0.4
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	97	91	90	91

PCBs in Soil						
Our Reference:	UNITS	92803-31	92803-33	92803-34	92803-37	92803-39
Your Reference	----------	21	22	23	23	25
Depth	----------	0-0.3	0.8-1.0	0-0.2	3.8-4	0-0.3
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	92	90	89	90	94

PCBs in Soil				
Our Reference:	UNITS	92803-40	92803-41	92803-42
Your Reference	----------	26	27	28
Depth	----------	0.1-0.2	0.3-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	90	87	89

Total Phenolics in Soil						
Our Reference:	UNITS	92803-1	92803-3	92803-4	92803-5	92803-8
Your Reference	----------	1	3	4	5	7
Depth	----------	0.3-0.4	0.4-0.5	0.4-0.5	0.4-0.5	0-0.1
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	92803-10	92803-11	92803-14	92803-16	92803-17
Your Reference	----------	8	9	11	12	12
Depth	----------	0.3-0.5	0-0.2	0.4-0.5	0-0.1	0.55-0.65
Date Sampled		21/06/2013	21/06/2013	21/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	92803-18	92803-19	92803-20	92803-21	92803-22
Your Reference	----------	13	13	14	14	15
Depth	----------	0.3-0.45	0.45-0.55	0.3-0.4	0.5-0.9	0.3-0.5
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	92803-23	92803-25	92803-26	92803-28	92803-29
Your Reference	----------	16	17	18	19	20
Depth	----------	0-0.2	0-0.2	0-0.2	0-0.3	0.3-0.4
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	92803-31	92803-33	92803-34	92803-37	92803-39
Your Reference	----------	21	22	23	23	25
Depth	----------	0-0.3	0.8-1.0	0-0.2	3.8-4	0-0.3
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013	26/06/2013	26/06/2013
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil				
Our Reference:	UNITS	92803-40	92803-41	92803-42
Your Reference	----------	26	27	28
Depth	----------	0.1-0.2	0.3-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	26/06/2013	26/06/2013	26/06/2013
Date analysed	-	26/06/2013	26/06/2013	26/06/2013
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-1	92803-2	92803-3	92803-4	92803-5
Your Reference	----------	1	2	3	4	5
Depth	----------	0.3-0.4	0.9-1.0	0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	<4	7	7	9	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	13	14	10	20
Copper	mg/kg	43	24	32	21	18
Lead	mg/kg	22	21	17	17	28
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	15	2	<1	1	3
Zinc	mg/kg	44	9	5	13	23

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-6	92803-7	92803-8	92803-9	92803-10
Your Reference	----------	6	6	7	7	8
Depth	----------	0.4-0.5	0.9-1.0	0-0.1	0.4-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	5	7	14	9	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	13	18	20	11
Copper	mg/kg	20	22	18	21	23
Lead	mg/kg	21	19	42	66	18
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	4	5	5	5
Zinc	mg/kg	18	17	39	77	11

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-11	92803-12	92803-13	92803-14	92803-15
Your Reference	----------	9	9	10	11	11
Depth	----------	0-0.2	0.3-0.5	0.8-1.0	0.4-0.5	1.3-1.5
Date Sampled		21/06/2013	21/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	5	5	9	9	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	10	16	27	17	8
Copper	mg/kg	7	4	12	19	23
Lead	mg/kg	17	9	18	19	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	1	3	1	1
Zinc	mg/kg	14	3	5	7	8

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-16	92803-17	92803-18	92803-19	92803-20
Your Reference	----------	12	12	13	13	14
Depth	----------	0-0.1	0.55-0.65	0.3-0.45	0.45-0.55	0.3-0.4
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	<4	6	6	7	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	2	9	14	16	19
Copper	mg/kg	83	14	17	16	14
Lead	mg/kg	8	14	41	19	38
Mercury	mg/kg	<0.1	<0.1	<0.1	0.1	0.6
Nickel	mg/kg	3	3	5	4	10
Zinc	mg/kg	34	18	30	11	39

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-21	92803-22	92803-23	92803-24	92803-25
Your Reference	----------	14	15	16	16	17
Depth	----------	0.5-0.9	0.3-0.5	0-0.2	0.3-0.5	0-0.2
Date Sampled		20/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	4	6	6	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	16	10	10	6
Copper	mg/kg	30	5	7	3	2
Lead	mg/kg	64	9	23	10	11
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	2	2	<1	<1
Zinc	mg/kg	110	5	13	1	11

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-26	92803-27	92803-28	92803-29	92803-30
Your Reference	----------	18	18	19	20	20
Depth	----------	0-0.2	0.3-0.5	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	<4	4	5	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	6	16	14	7	10
Copper	mg/kg	3	1	<1	2	1
Lead	mg/kg	20	8	7	7	6
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	<1	<1	<1	<1
Zinc	mg/kg	6	2	1	3	2

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-31	92803-32	92803-33	92803-34	92803-35
Your Reference	----------	21	21	22	23	23
Depth	----------	0-0.3	0.3-0.4	0.8-1.0	0-0.2	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	6	5	6	7	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	10	12	17	17
Copper	mg/kg	5	6	5	17	17
Lead	mg/kg	19	18	14	35	31
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	<1	6	4
Zinc	mg/kg	5	8	1	39	29

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-36	92803-37	92803-38	92803-39	92803-40
Your Reference	----------	23	23	24	25	26
Depth	----------	1.8-2	3.8-4	0.5-1.0	0-0.3	0.1-0.2
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	11	7	<4	6	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	16	10	12	16
Copper	mg/kg	15	11	18	17	16
Lead	mg/kg	28	30	22	40	25
Mercury	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1
Nickel	mg/kg	2	4	4	7	5
Zinc	mg/kg	19	30	21	49	37

Acid Extractable metals in soil						
Our Reference:	UNITS	92803-41	92803-42	92803-43	92803-44	92803-45
Your Reference	----------	27	28	BD1A/190613	BD2A/190613	BD3A/190613
Depth	----------	0.3-0.5	0.3-0.5	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Date analysed	-	26/6/2013	26/6/2013	26/6/2013	26/6/2013	26/6/2013
Arsenic	mg/kg	7	<4	9	9	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	13	12	12	14
Copper	mg/kg	15	15	17	21	21
Lead	mg/kg	28	190	20	19	20
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	5	<1	<1	4
Zinc	mg/kg	40	110	2	12	22

Acid Extractable metals in soil		
Our Reference:	UNITS	92803-46
Your Reference	----------	BD4A/190613
Depth	----------	-
Date Sampled		19/06/2013
Type of sample		Soil
Date digested	-	26/6/2013
Date analysed	-	26/6/2013
Arsenic	mg/kg	14
Cadmium	mg/kg	<0.4
Chromium	mg/kg	16
Copper	mg/kg	17
Lead	mg/kg	29
Mercury	mg/kg	<0.1
Nickel	mg/kg	4
Zinc	mg/kg	25

Moisture						
Our Reference:	UNITS	92803-1	92803-2	92803-3	92803-4	92803-5
Your Reference	----------	1	2	3	4	5
Depth	----------	0.3-0.4	0.9-1.0	0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	11	15	14	16	24

Moisture						
Our Reference:	UNITS	92803-6	92803-7	92803-8	92803-9	92803-10
Your Reference	----------	6	6	7	7	8
Depth	----------	0.4-0.5	0.9-1.0	0-0.1	0.4-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	16	14	14	16	15

Moisture						
Our Reference:	UNITS	92803-11	92803-12	92803-13	92803-14	92803-15
Your Reference	----------	9	9	10	11	11
Depth	----------	0-0.2	0.3-0.5	0.8-1.0	0.4-0.5	1.3-1.5
Date Sampled		21/06/2013	21/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	15	14	24	18	15

Moisture						
Our Reference:	UNITS	92803-16	92803-17	92803-18	92803-19	92803-20
Your Reference	----------	12	12	13	13	14
Depth	----------	0-0.1	0.55-0.65	0.3-0.45	0.45-0.55	0.3-0.4
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	36	9.5	17	17	21

Moisture						
Our Reference:	UNITS	92803-21	92803-22	92803-23	92803-24	92803-25
Your Reference	----------	14	15	16	16	17
Depth	----------	0.5-0.9	0.3-0.5	0-0.2	0.3-0.5	0-0.2
Date Sampled		20/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	16	13	21	15	18

Moisture						
Our Reference:	UNITS	92803-26	92803-27	92803-28	92803-29	92803-30
Your Reference	----------	18	18	19	20	20
Depth	----------	0-0.2	0.3-0.5	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	17	17	16	16	16

Moisture						
Our Reference:	UNITS	92803-31	92803-32	92803-33	92803-34	92803-35
Your Reference	----------	21	21	22	23	23
Depth	----------	0-0.3	0.3-0.4	0.8-1.0	0-0.2	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	17	17	15	19	14

Moisture						
Our Reference:	UNITS	92803-36	92803-37	92803-38	92803-39	92803-40
Your Reference	----------	23	23	24	25	26
Depth	----------	1.8-2	3.8-4	0.5-1.0	0-0.3	0.1-0.2
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	19	17	9.5	8.6	14

Moisture						
Our Reference:	UNITS	92803-41	92803-42	92803-43	92803-44	92803-45
Your Reference	----------	27	28	BD1A/190613	BD2A/190613	BD3A/190613
Depth	----------	0.3-0.5	0.3-0.5	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	17	15	19	17	18

Moisture						
Our Reference:	UNITS	92803-46	92803-48	92803-50	92803-52	92803-54
Your Reference	----------	BD4A/190613	TB1-170613	TB2-170613	TB3-240613	TB4-240613
Depth	----------	-	-	-	-	-
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	26/06/13	26/06/13	26/06/13	26/06/13	26/06/13
Date analysed	-	27/06/13	27/06/13	27/06/13	27/06/13	27/06/13
Moisture	%	18	1.7	1.8	3.5	1.0

Asbestos ID - soils						
Our Reference:	UNITS	92803-1	92803-2	92803-3	92803-4	92803-5
Your Reference	----------	1	2	3	4	5
Depth	----------	0.3-0.4	0.9-1.0	0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Grey fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	92803-6	92803-7	92803-8	92803-9	92803-10
Your Reference	----------	6	6	7	7	8
Depth	----------	0.4-0.5	0.9-1.0	0-0.1	0.4-0.5	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Pink fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	92803-11	92803-12	92803-13	92803-14	92803-15
Your Reference	----------	9	9	10	11	11
Depth	----------	0-0.2	0.3-0.5	0.8-1.0	0.4-0.5	1.3-1.5
Date Sampled		21/06/2013	21/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Grey fine-grained soil & rocks	Light brown fine-grained soil & rocks	Reddish brown fine-grained soil & rocks	Reddish brown fine-grained soil & rocks	Light brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	92803-16	92803-17	92803-18	92803-19	92803-20
Your Reference	----------	12	12	13	13	14
Depth	----------	0-0.1	0.55-0.65	0.3-0.45	0.45-0.55	0.3-0.4
Date Sampled		20/06/2013	20/06/2013	20/06/2013	20/06/2013	20/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Dark brown soil & mulch	Light brown coarse-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils		
Our Reference:	UNITS	92803-21
Your Reference	----------	14
Depth	----------	0.5-0.9
Date Sampled		20/06/2013
Type of sample		Soil
Date analysed	-	27/06/2013
Sample mass tested	g	Approx 45g
Sample Description	-	Dark brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected

Asbestos ID - soils WA						
Our Reference:	UNITS	92803-25	92803-27	92803-28	92803-29	92803-34
Your Reference	----------	17	18	19	20	23
Depth	----------	0-0.2	0.3-0.5	0-0.3	0.3-0.4	0-0.2
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	566.89g	541.71g	655.95g	750.26g	583.51g
Sample Description	-	Grey fine-grained soil & rocks	Brown coarse-grained soil & rocks	Grey fine-grained soil & rocks	Light grey fine-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils WA						
Our Reference:	UNITS	92803-35	92803-36	92803-37	92803-39	92803-41
Your Reference	----------	23	23	23	25	27
Depth	----------	1.3-1.5	1.8-2	3.8-4	0-0.3	0.3-0.5
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	463.36g	534.13g	650.64g	664.93g	610.73g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Light brown fine-grained soil & rocks	Light brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils WA				
Our Reference:	UNITS	92803-42	92803-55	92803-56
Your Reference	----------	28	19	20
Depth	----------	0.3-0.5	0.3-0.5	0-0.3
Date Sampled		19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil
Date analysed	-	27/06/2013	27/06/2013	27/06/2013
Sample mass tested	g	882.89g	546.49g	715.76g
Sample Description	-	Light brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Grey fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Inorg-030	Total Phenolics - determined colorimetrically following disitillation, based upon APHA 22nd ED 5530 D.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-003	Asbestos ID - Minimum 500mL soil sample was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg as per AS4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-10	26/06/2013
Date analysed	-			27/06/2013	92803-1	27/06/2013 || 27/06/2013	LCS-10	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	92803-1	<25 || <25	LCS-10	93%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	92803-1	<25 || <25	LCS-10	93%
Benzene	mg/kg	0.2	Org-016	<0.2	92803-1	<0.2 || <0.2	LCS-10	101%
Toluene	mg/kg	0.5	Org-016	<0.5	92803-1	<0.5 || <0.5	LCS-10	96%
Ethylbenzene	mg/kg	1	Org-016	<1	92803-1	<1 || <1	LCS-10	102%
m+p-xylene	mg/kg	2	Org-016	<2	92803-1	<2 || <2	LCS-10	86%
o-Xylene	mg/kg	1	Org-016	<1	92803-1	<1 || <1	LCS-10	89%
naphthalene	mg/kg	1	Org-014	<1	92803-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	94	92803-1	92 || 94 || RPD: 2	LCS-10	93%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Date analysed	-			27/06/2013	92803-1	27/06/2013 || 27/06/2013	LCS-12	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	92803-1	<50 || <50	LCS-12	101%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	92803-1	200 || 230 || RPD: 14	LCS-12	111%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	92803-1	330 || 400 || RPD: 19	LCS-12	86%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	92803-1	<50 || <50	LCS-12	101%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	92803-1	400 || 460 || RPD: 14	LCS-12	111%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	92803-1	410 || 540 || RPD: 27	LCS-12	86%
Surrogate o-Terphenyl	%		Org-003	91	92803-1	106 || 111 || RPD: 5	LCS-12	122%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-10	26/06/2013
Date analysed	-			28/06/2013	92803-1	28/06/2013 || 28/06/2013	LCS-10	28/06/2013
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	<0.1 || <0.1	LCS-10	106%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	<0.1 || <0.1	LCS-10	110%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	1.1 || 1.4 || RPD: 24	LCS-10	104%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	0.3 || 0.4 || RPD: 29	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	2.6 || 2.9 || RPD: 11	LCS-10	103%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	2.6 || 2.8 || RPD: 7	LCS-10	100%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	1.1 || 1.2 || RPD: 9	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	1.0 || 1.1 || RPD: 10	LCS-10	98%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	92803-1	1.7 || 1.8 || RPD: 6	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	92803-1	1.2 || 1.3 || RPD: 8	LCS-10	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	0.6 || 0.6 || RPD: 0	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	0.1 || 0.2 || RPD: 67	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	92803-1	0.6 || 0.6 || RPD: 0	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	101	92803-1	103 || 105 || RPD: 2	LCS-10	103%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Date analysed	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
HCB	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	95%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	92%
Heptachlor	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	96%
delta-BHC	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	97%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	98%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	95%
Dieldrin	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	99%
Endrin	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	86%
pp-DDD	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	105%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	LCS-11	95%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	89	92803-1	95 || 98 || RPD: 3	LCS-11	85%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Date analysed	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Diazinon	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	LCS-11	99%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	LCS-11	97%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	92803-1	<0.1 || <0.1	LCS-11	96%
Surrogate TCMX	%		Org-008	89	92803-1	95 || 98 || RPD: 3	LCS-11	89%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Date analysed	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	92803-1	0.2 || 0.2 || RPD: 0	LCS-11	101%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	92803-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	89	92803-1	95 || 98 || RPD: 3	LCS-11	89%

QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-1	26/06/2013
Date analysed	-			26/06/2013	92803-1	26/06/2013 || 26/06/2013	LCS-1	26/06/2013
Total Phenolics (as Phenol)	mg/kg	5	Inorg-030	<5	92803-1	<5 || <5	LCS-1	98%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			26/06/2013	92803-1	26/6/2013 || 26/6/2013	LCS-1	26/06/2013
Date analysed	-			26/06/2013	92803-1	26/6/2013 || 26/6/2013	LCS-1	26/06/2013
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	92803-1	<4 || <4	LCS-1	98%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	92803-1	<0.4 || <0.4	LCS-1	99%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	92803-1	15 || 13 || RPD: 14	LCS-1	102%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	92803-1	43 || 47 || RPD: 9	LCS-1	100%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	92803-1	22 || 24 || RPD: 9	LCS-1	100%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	92803-1	<0.1 || <0.1	LCS-1	101%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	92803-1	15 || 11 || RPD: 31	LCS-1	102%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	92803-1	44 || 51 || RPD: 15	LCS-1	101%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL Asbestos ID - soils WA	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-11	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Date analysed	-	92803-11	27/06/2013 || 27/06/2013	LCS-11	27/06/2013
TRH C_6 - C_9	mg/kg	92803-11	<25 || <25	LCS-11	104%
TRH C_6 - C_{10}	mg/kg	92803-11	<25 || <25	LCS-11	104%
Benzene	mg/kg	92803-11	<0.2 || <0.2	LCS-11	100%
Toluene	mg/kg	92803-11	<0.5 || <0.5	LCS-11	97%
Ethylbenzene	mg/kg	92803-11	<1 || <1	LCS-11	104%
m+p-xylene	mg/kg	92803-11	<2 || <2	LCS-11	105%
o-Xylene	mg/kg	92803-11	<1 || <1	LCS-11	112%
naphthalene	mg/kg	92803-11	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	92803-11	87 || 84 || RPD: 4	LCS-11	96%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-11	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Date analysed	-	92803-11	27/06/2013 || 27/06/2013	LCS-11	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	92803-11	<50 || <50	LCS-11	93%
TRHC$_{15}$ - C$_{28}$	mg/kg	92803-11	<100 || <100	LCS-11	111%
TRHC$_{29}$ - C$_{36}$	mg/kg	92803-11	<100 || <100	LCS-11	86%
TRH>C$_{10}$-C$_{16}$	mg/kg	92803-11	<50 || <50	LCS-11	93%
TRH>C$_{16}$-C$_{34}$	mg/kg	92803-11	<100 || <100	LCS-11	111%
TRH>C$_{34}$-C$_{40}$	mg/kg	92803-11	<100 || <100	LCS-11	86%
Surrogate o-Terphenyl	%	92803-11	81 || 85 || RPD: 5	LCS-11	118%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-11	26/06/2013 || 26/06/2013	LCS-11	26/06/2013
Date analysed	-	92803-11	28/06/2013 || 28/06/2013	LCS-11	28/06/2013
Naphthalene	mg/kg	92803-11	<0.1 || <0.1	LCS-11	109%
Acenaphthylene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	92803-11	<0.1 || <0.1	LCS-11	108%
Phenanthrene	mg/kg	92803-11	<0.1 || <0.1	LCS-11	105%
Anthracene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	92803-11	<0.1 || <0.1	LCS-11	103%
Pyrene	mg/kg	92803-11	<0.1 || <0.1	LCS-11	111%
Benzo(a)anthracene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	92803-11	<0.1 || <0.1	LCS-11	99%
Benzo(b+k)fluoranthene	mg/kg	92803-11	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	92803-11	<0.05 || <0.05	LCS-11	119%
Indeno(1,2,3-c,d)pyrene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	92803-11	101 || 103 || RPD: 2	LCS-11	106%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-11	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Date analysed	-	92803-11	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
HCB	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	92803-11	<0.1 || <0.1	LCS-12	97%
gamma-BHC	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	92803-11	<0.1 || <0.1	LCS-12	92%
Heptachlor	mg/kg	92803-11	<0.1 || <0.1	LCS-12	86%
delta-BHC	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	92803-11	<0.1 || <0.1	LCS-12	99%
Heptachlor Epoxide	mg/kg	92803-11	<0.1 || <0.1	LCS-12	100%
gamma-Chlordane	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	92803-11	<0.1 || <0.1	LCS-12	97%
Dieldrin	mg/kg	92803-11	<0.1 || <0.1	LCS-12	101%
Endrin	mg/kg	92803-11	<0.1 || <0.1	LCS-12	84%
pp-DDD	mg/kg	92803-11	<0.1 || <0.1	LCS-12	96%
Endosulfan II	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	92803-11	<0.1 || <0.1	LCS-12	93%
Methoxychlor	mg/kg	92803-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	92803-11	93 || 93 || RPD: 0	LCS-12	84%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-21	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Date analysed	-	92803-21	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Diazinon	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	92803-21	<0.1 || <0.1	LCS-12	101%
Fenitrothion	mg/kg	92803-21	<0.1 || <0.1	LCS-12	98%
Bromophos-ethyl	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	92803-21	<0.1 || <0.1	LCS-12	99%
Surrogate TCMX	%	92803-21	91 || 93 || RPD: 2	LCS-12	90%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-21	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Date analysed	-	92803-21	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Arochlor 1016	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	92803-21	<0.1 || <0.1	LCS-12	100%
Arochlor 1260	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	92803-21	91 || 93 || RPD: 2	LCS-12	90%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-18	26/06/2013 || 26/06/2013	LCS-2	26/06/2013
Date analysed	-	92803-18	26/06/2013 || 26/06/2013	LCS-2	26/06/2013
Total Phenolics (as Phenol)	mg/kg	92803-18	<5 || <5	LCS-2	98%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	92803-11	26/6/2013 || 26/6/2013	LCS-2	26/06/2013
Date analysed	-	92803-11	26/6/2013 || 26/6/2013	LCS-2	26/06/2013
Arsenic	mg/kg	92803-11	5 || 5 || RPD: 0	LCS-2	98%
Cadmium	mg/kg	92803-11	<0.4 || <0.4	LCS-2	99%
Chromium	mg/kg	92803-11	10 || 14 || RPD: 33	LCS-2	102%
Copper	mg/kg	92803-11	7 || 5 || RPD: 33	LCS-2	99%
Lead	mg/kg	92803-11	17 || 18 || RPD: 6	LCS-2	99%
Mercury	mg/kg	92803-11	<0.1 || <0.1	LCS-2	111%
Nickel	mg/kg	92803-11	2 || 2 || RPD: 0	LCS-2	101%
Zinc	mg/kg	92803-11	14 || 12 || RPD: 15	LCS-2	101%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-21	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Date analysed	-	92803-21	27/06/2013 || 27/06/2013	LCS-12	28/06/2013
TRHC$_6$ - C$_9$	mg/kg	92803-21	<25 || <25	LCS-12	98%
TRHC$_6$ - C$_{10}$	mg/kg	92803-21	<25 || <25	LCS-12	98%
Benzene	mg/kg	92803-21	<0.2 || <0.2	LCS-12	100%
Toluene	mg/kg	92803-21	<0.5 || <0.5	LCS-12	97%
Ethylbenzene	mg/kg	92803-21	<1 || <1	LCS-12	102%
m+p-xylene	mg/kg	92803-21	<2 || <2	LCS-12	96%
o-Xylene	mg/kg	92803-21	<1 || <1	LCS-12	102%
naphthalene	mg/kg	92803-21	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	92803-21	88 || 91 || RPD: 3	LCS-12	98%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-21	26/06/2013 || 26/06/2013	LCS-10	26/06/2013
Date analysed	-	92803-21	27/06/2013 || 27/06/2013	LCS-10	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	92803-21	<50 || <50	LCS-10	88%
TRHC$_{15}$ - C$_{28}$	mg/kg	92803-21	<100 || <100	LCS-10	91%
TRHC$_{29}$ - C$_{36}$	mg/kg	92803-21	<100 || <100	LCS-10	83%
TRH>C$_{10}$-C$_{16}$	mg/kg	92803-21	<50 || <50	LCS-10	88%
TRH>C$_{16}$-C$_{34}$	mg/kg	92803-21	<100 || <100	LCS-10	91%
TRH>C$_{34}$-C$_{40}$	mg/kg	92803-21	<100 || <100	LCS-10	83%
Surrogate o-Terphenyl	%	92803-21	79 || 81 || RPD: 2	LCS-10	84%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-21	26/06/2013 || 26/06/2013	92803-2	26/06/2013
Date analysed	-	92803-21	28/06/2013 || 28/06/2013	92803-2	28/06/2013
Naphthalene	mg/kg	92803-21	<0.1 || <0.1	92803-2	106%
Acenaphthylene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	92803-21	<0.1 || <0.1	92803-2	111%
Phenanthrene	mg/kg	92803-21	<0.1 || <0.1	92803-2	107%
Anthracene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	92803-21	0.2 || <0.1	92803-2	107%
Pyrene	mg/kg	92803-21	0.2 || <0.1	92803-2	116%
Benzo(a)anthracene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	92803-21	<0.1 || <0.1	92803-2	99%
Benzo(b+k)fluoranthene	mg/kg	92803-21	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	92803-21	0.08 || <0.05	92803-2	118%
Indeno(1,2,3-c,d)pyrene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	92803-21	101 || 106 || RPD: 5	92803-2	106%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-21	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Date analysed	-	92803-21	26/06/2013 || 26/06/2013	92803-22	26/06/2013
HCB	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	92803-21	<0.1 || <0.1	92803-22	98%
gamma-BHC	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	92803-21	<0.1 || <0.1	92803-22	92%
Heptachlor	mg/kg	92803-21	<0.1 || <0.1	92803-22	87%
delta-BHC	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	92803-21	<0.1 || <0.1	92803-22	99%
Heptachlor Epoxide	mg/kg	92803-21	<0.1 || <0.1	92803-22	100%
gamma-Chlordane	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	92803-21	<0.1 || <0.1	92803-22	97%
Dieldrin	mg/kg	92803-21	<0.1 || <0.1	92803-22	101%
Endrin	mg/kg	92803-21	<0.1 || <0.1	92803-22	87%
pp-DDD	mg/kg	92803-21	<0.1 || <0.1	92803-22	105%
Endosulfan II	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	92803-21	<0.1 || <0.1	92803-22	93%
Methoxychlor	mg/kg	92803-21	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	92803-21	91 || 93 || RPD: 2	92803-22	87%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Date analysed	-	92803-31	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Diazinon	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	92803-31	<0.1 || <0.1	92803-22	105%
Fenitrothion	mg/kg	92803-31	<0.1 || <0.1	92803-22	101%
Bromophos-ethyl	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	92803-31	<0.1 || <0.1	92803-22	98%
Surrogate TCMX	%	92803-31	92 || 90 || RPD: 2	92803-22	93%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Date analysed	-	92803-31	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Arochlor 1016	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	92803-31	<0.1 || <0.1	92803-22	102%
Arochlor 1260	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	92803-31	92 || 90 || RPD: 2	92803-22	93%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-3	26/06/2013
Date analysed	-	92803-31	26/06/2013 || 26/06/2013	92803-3	26/06/2013
Total Phenolics (as Phenol)	mg/kg	92803-31	<5 || <5	92803-3	94%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	92803-21	26/6/2013 || 26/6/2013	LCS-3	26/06/2013
Date analysed	-	92803-21	26/6/2013 || 26/6/2013	LCS-3	26/06/2013
Arsenic	mg/kg	92803-21	4 || <4	LCS-3	99%
Cadmium	mg/kg	92803-21	<0.4 || <0.4	LCS-3	99%
Chromium	mg/kg	92803-21	12 || 12 || RPD: 0	LCS-3	103%
Copper	mg/kg	92803-21	30 || 27 || RPD: 11	LCS-3	101%
Lead	mg/kg	92803-21	64 || 68 || RPD: 6	LCS-3	100%
Mercury	mg/kg	92803-21	0.1 || 0.1 || RPD: 0	LCS-3	100%
Nickel	mg/kg	92803-21	4 || 6 || RPD: 40	LCS-3	102%
Zinc	mg/kg	92803-21	110 || 150 || RPD: 31	LCS-3	102%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-2	26/06/2013
Date analysed	-	92803-31	27/06/2013 || 27/06/2013	92803-2	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	92803-31	<25 || <25	92803-2	88%
TRHC$_6$ - C$_{10}$	mg/kg	92803-31	<25 || <25	92803-2	88%
Benzene	mg/kg	92803-31	<0.2 || <0.2	92803-2	93%
Toluene	mg/kg	92803-31	<0.5 || <0.5	92803-2	84%
Ethylbenzene	mg/kg	92803-31	<1 || <1	92803-2	91%
m+p-xylene	mg/kg	92803-31	<2 || <2	92803-2	84%
o-Xylene	mg/kg	92803-31	<1 || <1	92803-2	89%
naphthalene	mg/kg	92803-31	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	92803-31	87 || 96 || RPD: 10	92803-2	89%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-2	26/06/2013
Date analysed	-	92803-31	27/06/2013 || 27/06/2013	92803-2	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	92803-31	<50 || <50	92803-2	93%
TRHC$_{15}$ - C$_{28}$	mg/kg	92803-31	<100 || <100	92803-2	98%
TRHC$_{29}$ - C$_{36}$	mg/kg	92803-31	<100 || <100	92803-2	116%
TRH>C$_{10}$-C$_{16}$	mg/kg	92803-31	<50 || <50	92803-2	93%
TRH>C$_{16}$-C$_{34}$	mg/kg	92803-31	<100 || <100	92803-2	98%
TRH>C$_{34}$-C$_{40}$	mg/kg	92803-31	<100 || <100	92803-2	116%
Surrogate o-Terphenyl	%	92803-31	88 || 88 || RPD: 0	92803-2	111%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Date analysed	-	92803-31	28/06/2013 || 28/06/2013	92803-22	28/06/2013
Naphthalene	mg/kg	92803-31	<0.1 || <0.1	92803-22	107%
Acenaphthylene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	92803-31	<0.1 || <0.1	92803-22	107%
Phenanthrene	mg/kg	92803-31	<0.1 || <0.1	92803-22	102%
Anthracene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	92803-31	<0.1 || <0.1	92803-22	100%
Pyrene	mg/kg	92803-31	<0.1 || <0.1	92803-22	108%
Benzo(a)anthracene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	92803-31	<0.1 || <0.1	92803-22	97%
Benzo(b+k)fluoranthene	mg/kg	92803-31	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	92803-31	<0.05 || <0.05	92803-22	118%
Indeno(1,2,3-c,d)pyrene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	92803-31	106 || 105 || RPD: 1	92803-22	103%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-31	26/06/2013 || 26/06/2013	92803-42	26/06/2013
Date analysed	-	92803-31	26/06/2013 || 26/06/2013	92803-42	26/06/2013
HCB	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	92803-31	<0.1 || <0.1	92803-42	96%
gamma-BHC	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	92803-31	<0.1 || <0.1	92803-42	91%
Heptachlor	mg/kg	92803-31	<0.1 || <0.1	92803-42	83%
delta-BHC	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	92803-31	<0.1 || <0.1	92803-42	98%
Heptachlor Epoxide	mg/kg	92803-31	<0.1 || <0.1	92803-42	98%
gamma-Chlordane	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	92803-31	<0.1 || <0.1	92803-42	96%
Dieldrin	mg/kg	92803-31	<0.1 || <0.1	92803-42	99%
Endrin	mg/kg	92803-31	<0.1 || <0.1	92803-42	82%
pp-DDD	mg/kg	92803-31	<0.1 || <0.1	92803-42	95%
Endosulfan II	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	92803-31	<0.1 || <0.1	92803-42	92%
Methoxychlor	mg/kg	92803-31	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	92803-31	92 || 90 || RPD: 2	92803-42	86%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-41	26/06/2013 || 26/06/2013	92803-42	26/06/2013
Date analysed	-	92803-41	26/06/2013 || 26/06/2013	92803-42	26/06/2013
Diazinon	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	92803-41	<0.1 || <0.1	92803-42	99%
Fenitrothion	mg/kg	92803-41	<0.1 || <0.1	92803-42	96%
Bromophos-ethyl	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	92803-41	<0.1 || <0.1	92803-42	92%
Surrogate TCMX	%	92803-41	87 || 84 || RPD: 4	92803-42	89%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-41	26/06/2013 || 26/06/2013	92803-42	26/06/2013
Date analysed	-	92803-41	26/06/2013 || 26/06/2013	92803-42	26/06/2013
Arochlor 1016	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	92803-41	<0.1 || <0.1	92803-42	100%
Arochlor 1260	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	92803-41	87 || 84 || RPD: 4	92803-42	89%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	92803-33	26/06/2013
Date analysed	-	[NT]	[NT]	92803-33	27/06/2013
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	92803-33	92%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	92803-31	26/6/2013 || 26/6/2013	92803-2	26/06/2013
Date analysed	-	92803-31	26/6/2013 || 26/6/2013	92803-2	26/06/2013
Arsenic	mg/kg	92803-31	6 || 5 || RPD: 18	92803-2	93%
Cadmium	mg/kg	92803-31	<0.4 || <0.4	92803-2	85%
Chromium	mg/kg	92803-31	12 || 10 || RPD: 18	92803-2	100%
Copper	mg/kg	92803-31	5 || 5 || RPD: 0	92803-2	109%
Lead	mg/kg	92803-31	19 || 18 || RPD: 5	92803-2	84%
Mercury	mg/kg	92803-31	<0.1 || <0.1	92803-2	103%
Nickel	mg/kg	92803-31	2 || 2 || RPD: 0	92803-2	89%
Zinc	mg/kg	92803-31	5 || 7 || RPD: 33	92803-2	106%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-41	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Date analysed	-	92803-41	27/06/2013 || 27/06/2013	92803-22	27/06/2013
TRHC$_6$ - C$_9$	mg/kg	92803-41	<25 || <25	92803-22	84%
TRHC$_6$ - C$_{10}$	mg/kg	92803-41	<25 || <25	92803-22	84%
Benzene	mg/kg	92803-41	<0.2 || <0.2	92803-22	85%
Toluene	mg/kg	92803-41	<0.5 || <0.5	92803-22	81%
Ethylbenzene	mg/kg	92803-41	<1 || <1	92803-22	85%
m+p-xylene	mg/kg	92803-41	<2 || <2	92803-22	80%
o-Xylene	mg/kg	92803-41	<1 || <1	92803-22	84%
naphthalene	mg/kg	92803-41	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	92803-41	84 || 88 || RPD: 5	92803-22	92%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-41	26/06/2013 || 26/06/2013	92803-22	26/06/2013
Date analysed	-	92803-41	27/06/2013 || 27/06/2013	92803-22	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	92803-41	<50 || <50	92803-22	113%
TRHC$_{15}$ - C$_{28}$	mg/kg	92803-41	<100 || <100	92803-22	103%
TRHC$_{29}$ - C$_{36}$	mg/kg	92803-41	<100 || <100	92803-22	93%
TRH>C$_{10}$-C$_{16}$	mg/kg	92803-41	<50 || <50	92803-22	113%
TRH>C$_{16}$-C$_{34}$	mg/kg	92803-41	<100 || <100	92803-22	103%
TRH>C$_{34}$-C$_{40}$	mg/kg	92803-41	<100 || <100	92803-22	93%
Surrogate o-Terphenyl	%	92803-41	86 || 86 || RPD: 0	92803-22	122%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	92803-41	26/06/2013 || 26/06/2013	LCS-12	26/06/2013
Date analysed	-	92803-41	28/06/2013 || 28/06/2013	LCS-12	28/06/2013
Naphthalene	mg/kg	92803-41	<0.1 || <0.1	LCS-12	107%
Acenaphthylene	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	92803-41	<0.1 || <0.1	LCS-12	107%
Phenanthrene	mg/kg	92803-41	0.2 || 0.1 || RPD: 67	LCS-12	104%
Anthracene	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	92803-41	0.4 || 0.3 || RPD: 29	LCS-12	100%
Pyrene	mg/kg	92803-41	0.4 || 0.3 || RPD: 29	LCS-12	108%
Benzo(a)anthracene	mg/kg	92803-41	0.2 || 0.1 || RPD: 67	[NR]	[NR]
Chrysene	mg/kg	92803-41	0.2 || 0.1 || RPD: 67	LCS-12	98%
Benzo(b+k)fluoranthene	mg/kg	92803-41	0.3 || 0.2 || RPD: 40	[NR]	[NR]
Benzo(a)pyrene	mg/kg	92803-41	0.19 || 0.13 || RPD: 38	LCS-12	119%
Indeno(1,2,3-c,d)pyrene	mg/kg	92803-41	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	92803-41	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Benzo(g,h,i)perylene	mg/kg	92803-41	0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	92803-41	102 || 100 || RPD: 2	LCS-12	104%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	92803-41	26/06/2013 || 26/06/2013
Date analysed	-	92803-41	26/06/2013 || 26/06/2013
HCB	mg/kg	92803-41	<0.1 || <0.1
alpha-BHC	mg/kg	92803-41	<0.1 || <0.1
gamma-BHC	mg/kg	92803-41	<0.1 || <0.1
beta-BHC	mg/kg	92803-41	<0.1 || <0.1
Heptachlor	mg/kg	92803-41	<0.1 || <0.1
delta-BHC	mg/kg	92803-41	<0.1 || <0.1
Aldrin	mg/kg	92803-41	<0.1 || <0.1
Heptachlor Epoxide	mg/kg	92803-41	<0.1 || <0.1
gamma-Chlordane	mg/kg	92803-41	<0.1 || <0.1
alpha-chlordane	mg/kg	92803-41	<0.1 || <0.1
Endosulfan I	mg/kg	92803-41	<0.1 || <0.1
pp-DDE	mg/kg	92803-41	<0.1 || <0.1
Dieldrin	mg/kg	92803-41	<0.1 || <0.1
Endrin	mg/kg	92803-41	<0.1 || <0.1
pp-DDD	mg/kg	92803-41	<0.1 || <0.1
Endosulfan II	mg/kg	92803-41	<0.1 || <0.1
pp-DDT	mg/kg	92803-41	<0.1 || <0.1
Endrin Aldehyde	mg/kg	92803-41	<0.1 || <0.1
Endosulfan Sulphate	mg/kg	92803-41	<0.1 || <0.1
Methoxychlor	mg/kg	92803-41	<0.1 || <0.1
Surrogate TCMX	%	92803-41	87 || 84 || RPD: 4

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	92803-41	26/6/2013 || 26/6/2013	92803-22	26/06/2013
Date analysed	-	92803-41	26/6/2013 || 26/6/2013	92803-22	26/06/2013
Arsenic	mg/kg	92803-41	7 || 6 || RPD: 15	92803-22	91%
Cadmium	mg/kg	92803-41	<0.4 || <0.4	92803-22	91%
Chromium	mg/kg	92803-41	15 || 15 || RPD: 0	92803-22	97%
Copper	mg/kg	92803-41	15 || 19 || RPD: 24	92803-22	103%
Lead	mg/kg	92803-41	28 || 28 || RPD: 0	92803-22	94%
Mercury	mg/kg	92803-41	<0.1 || <0.1	92803-22	104%
Nickel	mg/kg	92803-41	6 || 6 || RPD: 0	92803-22	93%
Zinc	mg/kg	92803-41	40 || 45 || RPD: 12	92803-22	91%
QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	92803-42	26/06/2013
Date analysed	-	[NT]	[NT]	92803-42	28/06/2013
TRHC$_6$ - C$_9$	mg/kg	[NT]	[NT]	92803-42	92%
TRHC$_6$ - C$_{10}$	mg/kg	[NT]	[NT]	92803-42	92%
Benzene	mg/kg	[NT]	[NT]	92803-42	93%
Toluene	mg/kg	[NT]	[NT]	92803-42	90%
Ethylbenzene	mg/kg	[NT]	[NT]	92803-42	95%
m+p-xylene	mg/kg	[NT]	[NT]	92803-42	89%
o-Xylene	mg/kg	[NT]	[NT]	92803-42	95%
naphthalene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	[NT]	[NT]	92803-42	92%
QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	92803-42	26/06/2013
Date analysed	-	[NT]	[NT]	92803-42	27/06/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	[NT]	[NT]	92803-42	102%
TRHC$_{15}$ - C$_{28}$	mg/kg	[NT]	[NT]	92803-42	108%
TRHC$_{29}$ - C$_{36}$	mg/kg	[NT]	[NT]	92803-42	88%
TRH>C$_{10}$-C$_{16}$	mg/kg	[NT]	[NT]	92803-42	102%
TRH>C$_{16}$-C$_{34}$	mg/kg	[NT]	[NT]	92803-42	108%
TRH>C$_{34}$-C$_{40}$	mg/kg	[NT]	[NT]	92803-42	88%
Surrogate o-Terphenyl	%	[NT]	[NT]	92803-42	117%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	92803-42	26/06/2013
Date analysed	-	[NT]	[NT]	92803-42	28/06/2013
Naphthalene	mg/kg	[NT]	[NT]	92803-42	104%
Acenaphthylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	[NT]	[NT]	92803-42	106%
Phenanthrene	mg/kg	[NT]	[NT]	92803-42	103%
Anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	[NT]	[NT]	92803-42	103%
Pyrene	mg/kg	[NT]	[NT]	92803-42	110%
Benzo(a)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	[NT]	[NT]	92803-42	99%
Benzo(b+k)fluoranthene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	[NT]	[NT]	92803-42	125%
Indeno(1,2,3-c,d)pyrene	mg/kg	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	[NT]	[NT]	92803-42	105%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	92803-42	26/06/2013
Date analysed	-	[NT]	[NT]	92803-42	26/06/2013
Arsenic	mg/kg	[NT]	[NT]	92803-42	87%
Cadmium	mg/kg	[NT]	[NT]	92803-42	88%
Chromium	mg/kg	[NT]	[NT]	92803-42	93%
Copper	mg/kg	[NT]	[NT]	92803-42	98%
Lead	mg/kg	[NT]	[NT]	92803-42	#
Mercury	mg/kg	[NT]	[NT]	92803-42	99%
Nickel	mg/kg	[NT]	[NT]	92803-42	87%
Zinc	mg/kg	[NT]	[NT]	92803-42	##

Report Comments:

This report is consistent with the analytical procedures and reporting recommendations in the Western Australian Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

METALS_S:# Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

METALS_S:## Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos ID was analysed by Approved Identifier:	Alex Tam
Asbestos ID was authorised by Approved Signatory:	Lulu Guo

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01 ..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*						Notes
1	0.3-0.4	(1)	19/06/13	S	P/G	X												* Asbestos (WA Method)
1	0.4-0.6		19/06/13															~~Combo 8a~~
1	0.9-1		19/06/13															
1	1.4-1.5		19/06/13															
2	0.4-0.5		19/06/13			[redacted]	[redacted]											
2	0.9-1.0	2	19/06/13				X											
2	1.3-1.4		19/06/13															
3	0.4-0.5	3	19/06/13			X	[redacted]											
3	0.9-1.0		19/06/13															
3	1.5-1.7		19/06/13															
4	0.4-0.5	4	19/06/13			X												
4	0.9-1.0		19/06/13															

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No 92803
Date Received: 24/6/13
Time Received: 15:40
Received by: PT
Temp: Cool/Ambient
Cooling: Ice/Ice Pack
Security: Intact/Broken/None

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: WFY Signed: Date & Time: 24.06.13 / 3 pm. Received By: PT Date & Time: 24/6/13 15:40

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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*						Notes
4	1.4-1.5		19/06/13	S	P/G													* Asbestos (WA Method)
5	0.4-0.5	5				X												
5	0.9-1.0																	
5	1.4-1.5																	
6	0.4-0.5	6					X											
6	0.9-1.0	7					X											
6	1.4-1.5																	
7	0-0.1	8				X												
7	0.4-0.5	9					X											
7	0.9-1.0																	
7	1.4-1.5		↓															
8	0.1-0.2		21/06/13															

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: 24/6/13 Date & Time: 15:40 24/6/13

92803

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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01 ..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*						Notes
8	0.3-0.5	10	21/06/13	S	P/G	X												* Asbestos (WA Method)
8	0.5-1																	
8	1.3-1.5																	
8	1.5-2	11																
9	0-0.2	11				X												
9	0.3-0.5	12					X											
9	0.8-1																	
9	1.3-1.5																	
9	1.8-2																	
10	0.3-0.5																	
10	0.8-1	13					X											
10	1.3-1.5																	

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13

92803 15:40

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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
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Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

				Sample Type		Analytes												
Sample ID	Sample Depth	Lab ID	Sampling Date	S - soil W – water	Container type	Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*						Notes
10	1.5-2		21/06/13	S	P/G													* Asbestos (WA Method)
11	0.4-0.5	14				X												
11	0.8-1																	
11	1.3-1.5	15					X											
11	1.6-2		↓			~~X~~												
12	0-0.1	16	20/06/13			X												
12	0.1-0.4																	
12	0.55-0.65	17				X												
13	0-0.1																	
13	0.3-0.45	18				X												
13	0.45-0.55	19				X												
14	0-0.1		↓															

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13 15:40

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Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type (S - soil, W – water)	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*							Notes
14	0.3-0.4	20	20/06/13	S	P/G	X													* Asbestos (WA Method)
14	0.5-0.9	21	↓			X	⊗												
15	0-0.2		19/06/13																
15	0.3-0.5	22						X											
15	0.6-0.7																		
16	0-0.2	23						X											
16	0.3-0.5	24							X										
16	0.5-0.7																		
16	1-1.2																		
17	0-0.2	25						X				X							
17	0.3-0.5																		
17	0.8-1		↓																

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13 15:40

92863

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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type (S - soil, W – water)	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*							Notes
18	0-0.2	26	19/06/13	S	P/G			X											* Asbestos (WA Method)
18	0.3-0.5	27							X			X							
18	0.8-1																		
19	0-0.3	28						X				X							
19	0.3-0.5	55										X							
19	0.8-1																		
20	0-0.3	56										X							
20	0.3-0.4	29						X				X							
20	0.5-0.8	30							X										
20	0.8-1																		
21	0-0.3	31						X											
21	0.3-0.4	32	↓						X										

Lab Report No. .....
Phone: (02) 9809 0666
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13 15:40

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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

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Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*							Notes
21	0.5-0.8		19/06/13	S	P/G														* Asbestos (WA Method)
21	0.8-1																		
22	0-0.3																		
22	0.8-1	33				●		X											
22	1-1.2																		
23	0-0.2	34				●		X				X							
23	0.3-0.5								●			●							
23	0.8-1						●												
23	1.3-1.5	35							X			X							
23	1.8-2	36				●			X			X							
23	2.8-3	37					●		●			●							
23	3.8-4	37	↓			●		X				X							

Lab Report No. .....
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Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13 15:40

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Form COC Rev0/November 2006

Douglas Partners
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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

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12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*							Notes
24	0.1-0.3		19/6/13	S	P/G														* Asbestos (WA Method)
24	0.3-0.5																		
24	0.8-1	38					⊗		X										
25	0-0.3	39				⊗		X				X							
25	0.3-0.5																		
25	0.8-1																		
26	0.1-0.2	40				⊗		X											
26	0.3-0.5																		
26	0.8-1																		
27	0.3-0.5	41				⊗		X				X							
27	0.8-1						⊗		●										
27	1-1.1																		

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13 15:40

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Form COC Rev0/November 2006

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01 ..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
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Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*	Notes
28	0.3-0.5	42	19/06/13	S	P/G	~~X~~		X				X	* Asbestos (WA Method)
28	0.5-0.8		↓										
28	1-1.2												
BD1A/190613		43								X	X		
BD2A/190613		44								X	X		
BD3A/190613		45								X	X		
BD4A/190613		46								X	X		
TS1-170613		47									BTEX		
TB1-170613		48									X		
TS2-170613		49									BTEX		
TB2-170613		50									X		
TB-24/6		~~51~~											
TB-24/6		~~52~~											

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 24/6/13

51) TS3-240613 BTEX
52) TB3-240613 X
53) TS4-240613 BTEX
54) TB4-240613 X

15540

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 92877

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wenfei

Sample log in details:

Your Reference:	**73244.01, Wahroonga**
No. of samples:	19 Soils, 2 Materials
Date samples received / completed instructions received	25/06/13 / 25/06/13

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

Report Details:

Date results requested by: / Issue Date:	3/07/13 / 3/07/13
Date of Preliminary Report:	Not issued

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

Acid Extractable metals in soil						
Our Reference:	UNITS	92877-1	92877-2	92877-3	92877-4	92877-5
Your Reference	----------	2	2	10	10	10
Depth	----------	0.3-0.4	0.9-1.0	0.3-0.5	0.8-1	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	28/6/2013	28/6/2013	28/6/2013	28/6/2013	28/6/2013
Date analysed	-	28/6/2013	28/6/2013	28/6/2013	28/6/2013	28/6/2013
Iron	mg/kg	22,000	35,000	40,000	47,000	46,000

Acid Extractable metals in soil						
Our Reference:	UNITS	92877-6	92877-7	92877-8	92877-9	92877-10
Your Reference	----------	10	13	13	13	16
Depth	----------	1.5-2	0-0.1	0.3-0.45	0.45-0.55	0-0.2
Date Sampled		21/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	28/6/2013	28/6/2013	28/6/2013	28/6/2013	28/6/2013
Date analysed	-	28/6/2013	28/6/2013	28/6/2013	28/6/2013	28/6/2013
Iron	mg/kg	39,000	11,000	35,000	44,000	27,000

Acid Extractable metals in soil						
Our Reference:	UNITS	92877-11	92877-12	92877-13	92877-14	92877-15
Your Reference	----------	16	16	20	20	20
Depth	----------	0.3-0.5	0.5-0.7	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	28/6/2013	28/6/2013	28/6/2013	28/6/2013	28/6/2013
Date analysed	-	28/6/2013	28/6/2013	28/6/2013	28/6/2013	28/6/2013
Iron	mg/kg	15,000	14,000	14,000	9,600	16,000

Acid Extractable metals in soil			
Our Reference:	UNITS	92877-16	92877-17
Your Reference	----------	27	27
Depth	----------	0.3-0.5	0.8-1
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Date digested	-	28/6/2013	28/6/2013
Date analysed	-	28/6/2013	28/6/2013
Iron	mg/kg	27,000	27,000

Moisture						
Our Reference:	UNITS	92877-1	92877-2	92877-3	92877-4	92877-5
Your Reference	----------	2	2	10	10	10
Depth	----------	0.3-0.4	0.9-1.0	0.3-0.5	0.8-1	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Moisture	%	19	9.3	22	20	17

Moisture						
Our Reference:	UNITS	92877-6	92877-7	92877-8	92877-9	92877-10
Your Reference	----------	10	13	13	13	16
Depth	----------	1.5-2	0-0.1	0.3-0.45	0.45-0.55	0-0.2
Date Sampled		21/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Moisture	%	16	22	16	18	17

Moisture						
Our Reference:	UNITS	92877-11	92877-12	92877-13	92877-14	92877-15
Your Reference	----------	16	16	20	20	20
Depth	----------	0.3-0.5	0.5-0.7	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/06/2013	27/06/2013	27/06/2013	27/06/2013	27/06/2013
Date analysed	-	28/06/2013	28/06/2013	28/06/2013	28/06/2013	28/06/2013
Moisture	%	15	13	20	17	15

Moisture			
Our Reference:	UNITS	92877-16	92877-17
Your Reference	----------	27	27
Depth	----------	0.3-0.5	0.8-1
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Date prepared	-	27/06/2013	27/06/2013
Date analysed	-	28/06/2013	28/06/2013
Moisture	%	17	18

ESP/CEC						
Our Reference:	UNITS	92877-1	92877-2	92877-3	92877-4	92877-5
Your Reference	----------	2	2	10	10	10
Depth	----------	0.3-0.4	0.9-1.0	0.3-0.5	0.8-1	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Exchangeable Ca	meq/100g	3.9	1.8	15	2.6	2.9
Exchangeable K	meq/100g	0.2	0.1	0.5	<0.1	0.1
Exchangeable Mg	meq/100g	1.3	0.26	1.2	0.54	0.59
Exchangeable Na	meq/100g	<0.1	<0.1	0.45	<0.1	<0.1
Cation Exchange Capacity	meq/100g	5.4	2.2	17	3.3	3.7

ESP/CEC						
Our Reference:	UNITS	92877-6	92877-7	92877-8	92877-9	92877-10
Your Reference	----------	10	13	13	13	16
Depth	----------	1.5-2	0-0.1	0.3-0.45	0.45-0.55	0-0.2
Date Sampled		21/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Exchangeable Ca	meq/100g	3.1	25	10	3.4	3.5
Exchangeable K	meq/100g	0.1	1	0.5	0.2	0.4
Exchangeable Mg	meq/100g	0.45	2.7	1.5	0.65	1.6
Exchangeable Na	meq/100g	<0.1	<0.1	0.17	0.13	<0.1
Cation Exchange Capacity	meq/100g	3.8	29	12	4.4	5.6

ESP/CEC						
Our Reference:	UNITS	92877-11	92877-12	92877-13	92877-14	92877-15
Your Reference	----------	16	16	20	20	20
Depth	----------	0.3-0.5	0.5-0.7	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Exchangeable Ca	meq/100g	1.4	1.4	2.8	0.6	0.7
Exchangeable K	meq/100g	0.2	0.1	0.1	<0.1	<0.1
Exchangeable Mg	meq/100g	0.68	0.65	0.70	0.24	1.2
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	2.2	2.2	3.7	<1.0	2.0

ESP/CEC			
Our Reference:	UNITS	92877-16	92877-17
Your Reference	----------	27	27
Depth	----------	0.3-0.5	0.8-1
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Exchangeable Ca	meq/100g	29	0.4
Exchangeable K	meq/100g	0.4	<0.1
Exchangeable Mg	meq/100g	0.65	0.21
Exchangeable Na	meq/100g	0.13	<0.1
Cation Exchange Capacity	meq/100g	30	<1.0

Miscellaneous Inorg - soil						
Our Reference:	UNITS	92877-1	92877-2	92877-3	92877-4	92877-5
Your Reference	----------	2	2	10	10	10
Depth	----------	0.3-0.4	0.9-1.0	0.3-0.5	0.8-1	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2013	03/07/2013	03/07/2013	03/07/2013	03/07/2013
Date analysed	-	03/07/2013	03/07/2013	03/07/2013	03/07/2013	03/07/2013
pH 1:5 soil:water	pH Units	5.6	5.2	6.2	5.3	5.2
Clay in soils <2um	% (w/w)	55	38	62	70	60

Miscellaneous Inorg - soil						
Our Reference:	UNITS	92877-6	92877-7	92877-8	92877-9	92877-10
Your Reference	----------	10	13	13	13	16
Depth	----------	1.5-2	0-0.1	0.3-0.45	0.45-0.55	0-0.2
Date Sampled		21/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2013	03/07/2013	03/07/2013	03/07/2013	03/07/2013
Date analysed	-	03/07/2013	03/07/2013	03/07/2013	03/07/2013	03/07/2013
pH 1:5 soil:water	pH Units	5.7	7.4	6.8	5.7	6.0
Clay in soils <2um	% (w/w)	50	15	38	59	25

Miscellaneous Inorg - soil						
Our Reference:	UNITS	92877-11	92877-12	92877-13	92877-14	92877-15
Your Reference	----------	16	16	20	20	20
Depth	----------	0.3-0.5	0.5-0.7	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2013	03/07/2013	03/07/2013	03/07/2013	03/07/2013
Date analysed	-	03/07/2013	03/07/2013	03/07/2013	03/07/2013	03/07/2013
pH 1:5 soil:water	pH Units	5.6	5.7	5.7	5.7	5.5
Clay in soils <2um	% (w/w)	33	21	17	15	37

Miscellaneous Inorg - soil			
Our Reference:	UNITS	92877-16	92877-17
Your Reference	----------	27	27
Depth	----------	0.3-0.5	0.8-1
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Date prepared	-	03/07/2013	03/07/2013
Date analysed	-	03/07/2013	03/07/2013
pH 1:5 soil:water	pH Units	7.3	4.6
Clay in soils <2um	% (w/w)	36	59

Texture and Salinity						
Our Reference:	UNITS	92877-1	92877-2	92877-3	92877-4	92877-5
Your Reference	----------	2	2	10	10	10
Depth	----------	0.3-0.4	0.9-1.0	0.3-0.5	0.8-1	1.3-1.5
Date Sampled		19/06/2013	19/06/2013	21/06/2013	21/06/2013	21/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Electrical Conductivity 1:5 soil:water	µS/cm	35	50	79	42	49
Texture Value		8.0	7.0	7.0	7.0	7.0
TEXTURE	-	Light Medium Clay	Medium Clay	Medium Clay	Medium Clay	Medium Clay
ECe	dS/m	0	0	1.0	0	0
Class	-	NON SALINE	NON SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity						
Our Reference:	UNITS	92877-6	92877-7	92877-8	92877-9	92877-10
Your Reference	----------	10	13	13	13	16
Depth	----------	1.5-2	0-0.1	0.3-0.45	0.45-0.55	0-0.2
Date Sampled		21/06/2013	20/06/2013	20/06/2013	20/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Electrical Conductivity 1:5 soil:water	µS/cm	150	230	58	55	16
Texture Value		7.0	14	14	8.0	14
TEXTURE	-	Medium Clay	Sandy Loam	Sandy Loam	Light Medium Clay	Sandy Loam
ECe	dS/m	1.0	3.0	1.0	0	0
Class	-	NON SALINE	SLIGHTLY SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity						
Our Reference:	UNITS	92877-11	92877-12	92877-13	92877-14	92877-15
Your Reference	----------	16	16	20	20	20
Depth	----------	0.3-0.5	0.5-0.7	0-0.3	0.3-0.4	0.5-0.8
Date Sampled		19/06/2013	19/06/2013	19/06/2013	19/06/2013	19/06/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Electrical Conductivity 1:5 soil:water	µS/cm	14	12	21	8	19
Texture Value		14	14	14	14	8.5
TEXTURE	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Light Clay
ECe	dS/m	0	0	0	0	0
Class	-	NON SALINE	NON SALINE	NON SALINE	NON SALINE	NON SALINE

Texture and Salinity			
Our Reference:	UNITS	92877-16	92877-17
Your Reference	----------	27	27
Depth	----------	0.3-0.5	0.8-1
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Electrical Conductivity 1:5 soil:water	µS/cm	180	31
Texture Value		8.0	8.0
TEXTURE	-	Light Medium Clay	Light Medium Clay
ECe	dS/m	1.0	0
Class	-	NON SALINE	NON SALINE

Asbestos ID - soils WA			
Our Reference:	UNITS	92877-19	92877-20
Your Reference	----------	15	21
Depth	----------	0.2	0.3-0.4
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Date analysed	-	1/07/2013	1/07/2013
Sample mass tested	g	529.07g	674.50g
Sample Description	-	Light brown fine-grained soil & rocks	Light brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected

Asbestos ID - materials			
Our Reference:	UNITS	92877-18	92877-21
Your Reference	----------	27	14
Depth	----------	0.3-0.5	0.8
Date Sampled		19/06/2013	20/06/2013
Type of sample		Material	Material
Date analysed	-	1/07/2013	1/07/2013
Mass / Dimension of Sample	-	55x40x3mm	32x19x5mm
Sample Description	-	Beige compressed fibre cement material	Grey compressed pebbly cement material
Asbestos ID in materials	-	Chrysotile asbestos detected	No asbestos detected

Method ID	Methodology Summary
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soil based on Rayment and Lyons 2011.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+.
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2um reported.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA 22nd ED 2510 and Rayment & Lyons.
ASB-003	Asbestos ID - Minimum 500mL soil sample was analysed as recommended by "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg as per AS4964-2004.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			27/06/2013	92877-1	28/6/2013 || 28/6/2013	LCS-1	27/06/2013
Date analysed	-			27/06/2013	92877-1	28/6/2013 || 28/6/2013	LCS-1	28/06/2013
Iron	mg/kg	1	Metals-020 ICP-AES	<1	92877-1	22000 || 21000 || RPD: 5	LCS-1	103%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL ESP/CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	92877-1	3.9 || 4.4 || RPD: 12	LCS-1	113%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	92877-1	0.2 || 0.2 || RPD: 0	LCS-1	102%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	92877-1	1.3 || 1.2 || RPD: 8	LCS-1	110%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	92877-1	<0.1 || <0.1	LCS-1	106%
Cation Exchange Capacity	meq/100g	1	Metals-009	<1.0	92877-1	5.4 || 5.8 || RPD: 7	[NR]	[NR]

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			27/06/2013	92877-1	03/07/2013 || 03/07/2013	LCS-1	26/06/2013
Date analysed	-			27/06/2013	92877-1	03/07/2013 || 03/07/2013	LCS-1	26/06/2013
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	92877-1	5.6 || 5.4 || RPD: 4	LCS-1	102%
Clay in soils <2um	% (w/w)		AS1289.3.6.3	[NT]	92877-1	55 || [N/T]	[NR]	[NR]

QUALITY CONTROL Texture and Salinity	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	92877-1	35 || 44 || RPD: 23	LCS-1	103%
Texture Value			Inorg-002	[NT]	92877-1	8.0 || 8.0 || RPD: 0	[NR]	[NR]
Class	-			[NT]	92877-1	NON SALINE || NON SALINE	[NR]	[NR]

QUALITY CONTROL Asbestos ID - soils WA	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL Asbestos ID - materials	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	92877-11	28/6/2013 || 28/6/2013	92877-2	27/06/2013
Date analysed	-	92877-11	28/6/2013 || 28/6/2013	92877-2	28/06/2013
Iron	mg/kg	92877-11	15000 || 21000 || RPD: 33	92877-2	#

QUALITY CONTROL ESP/CEC	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Exchangeable Ca	meq/100 g	92877-11	1.4 || 1.3 || RPD: 7
Exchangeable K	meq/100 g	92877-11	0.2 || 0.2 || RPD: 0
Exchangeable Mg	meq/100 g	92877-11	0.68 || 0.66 || RPD: 3
Exchangeable Na	meq/100 g	92877-11	<0.1 || <0.1
Cation Exchange Capacity	meq/100 g	92877-11	2.2 || 2.2 || RPD: 0

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date prepared	-	92877-11	03/07/2013 || 03/07/2013
Date analysed	-	92877-11	03/07/2013 || 03/07/2013
pH 1:5 soil:water	pH Units	92877-11	5.6 || 5.4 || RPD: 4

QUALITY CONTROL Texture and Salinity	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Electrical Conductivity 1:5 soil:water	µS/cm	92877-11	14 || 17 || RPD: 19

Report Comments:

METALS_S: # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australian Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009.

Asbestos ID was analysed by Approved Identifier: Alex Tam
Asbestos ID was authorised by Approved Signatory: Lulu Guo

INS: Insufficient sample for this test
NA: Test not required
<: Less than

PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than

NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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Project Name: Wahroonga – Proposed School Development.....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes: CEC	pH	Clay Content	Texture Classifica	Iron		Other	Notes
												Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200 Job No: 92877 Date Received: 25/6/13 Time Received: 15:00 Received by: PT Temp: Cool/Ambient Cooling: Ice/Icepack Security: Intact/Broken/None	Samples analysed for asbestos (WA method)
2	0.4-0.5	1	19/06/13	S	P	X	X	X	X	X		25)	+ 15/0-0.2 + 23/2.8-3
2	0.9-1.0	2	19/06/13	S	P	X	X	X	X	X			+ 17/0-0.2 37) + 23/3.8-4
10	0.3-0.5	3	21/06/13	S	P	X	X	X	X	X			+ 18/0-3-0.5 39) + 25/0-0.3
10	0.8-1	4	21/06/13	S	P	X	X	X	X	X		27)	+ 19/0-0.3 41) + 27/0.3-0.5
10	1.3-1.5	5	21/06/13	S	P	X	X	X	X	X		28	+ 19/0.3-0.5 42) + 28/0.3-0.5
10	1.5-2	6	21/06/13	S	P	X	X	X	X	X			+ 20/0-0.3
13	0-0.1	7	20/06/13	S	P	X	X	X	X	X		29	+ 20/0.3-0.4
13	0.3-0.45	8	20/06/13	S	P	X	X	X	X	X		32	+ 21/0.3-0.4
13	0.45-0.55	9	20/06/13	S	P	X	X	X	X	X		34	+ 23/0-0.2
16	0-0.2	10	19/06/13	S	P	X	X	X	X	X		35	+ 23/1.3-1.5
16	0.3-0.5	11	19/06/13	S	P	X	X	X	X	X		36	+ 23/1.8-2
16	0.5-0.7	12	19/06/13	S	P	X	X	X	X	X			

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114 Phone: (02) 9809 0666 Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 25/6/13 15:00

Form COC Rev0/November 2006

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Geotechnics · Environment · Groundwater

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Project Name: Wahroonga – Proposed School Development.....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

	Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes: CEC	pH	Clay Content	Texture Classification	Iron	Asbestos	Other: Asbestos (WA Method)	Notes
X	20	0-0.3	13	19/06/13	S	P	X	X	X	X	X			
X	20	0.3-0.4	14	19/06/13	S	P	X	X	X	X	X			
X	20	0.5-0.8	15	19/06/13	S	P	X	X	X	X	X			
X	27	0.3-0.5	16	19/06/13	S	P	X	X	X	X	X			
X	27	0.8-1	17	19/06/13	S	P	X	X	X	X	X			
X	27	0.3-0.5	18	19/06/13	M	P						X		
X	15	0.2	19	19/06/13	S	P							X	
X	21	0.3-0.4	20	19/06/13	S	P							X	
	14	0.8	21	20/06/13	M							X		
	~~28~~	~~0.3-0.5~~	22		S									

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095
Relinquished by: Signed: Date & Time: Received By: PT Date & Time: 25/6/13 15:00

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 93534

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wen Fei Yuan

Sample log in details:

Your Reference:	**73244.01, Wahroonga**		
No. of samples:	1 Soil		
Date samples received / completed instructions received	09/07/13	/	09/07/13

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

Report Details:

Date results requested by: / Issue Date:	11/07/13	/	11/07/13
Date of Preliminary Report:	Not issued		

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

Acid Extractable metals in soil		
Our Reference:	UNITS	93534-1
Your Reference	----------	12/0.1-0.4
Type of sample	----------	Soil
Date digested	-	10/7/2013
Date analysed	-	11/7/2013
Arsenic	mg/kg	7
Cadmium	mg/kg	<0.4
Chromium	mg/kg	12
Copper	mg/kg	8
Lead	mg/kg	16
Mercury	mg/kg	0.2
Nickel	mg/kg	3
Zinc	mg/kg	18

Moisture		
Our Reference:	UNITS	93534-1
Your Reference	----------	12/0.1-0.4
Type of sample	----------	Soil
Date prepared	-	10/07/13
Date analysed	-	11/07/13
Moisture	%	18

Method ID	Methodology Summary
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

Client Reference: 73244.01, Wahroonga

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			10/07/2013	[NT]	[NT]	LCS-1	10/07/2013
Date analysed	-			10/07/2013	[NT]	[NT]	LCS-1	10/07/2013
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-1	100%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-1	97%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	102%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	104%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	98%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-1	88%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	101%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	10%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	93534-1	10/07/2013
Date analysed	-	[NT]	[NT]	93534-1	10/07/2013
Arsenic	mg/kg	[NT]	[NT]	93534-1	80%
Cadmium	mg/kg	[NT]	[NT]	93534-1	79%
Chromium	mg/kg	[NT]	[NT]	93534-1	88%
Copper	mg/kg	[NT]	[NT]	93534-1	82%
Lead	mg/kg	[NT]	[NT]	93534-1	76%
Mercury	mg/kg	[NT]	[NT]	93534-1	85%
Nickel	mg/kg	[NT]	[NT]	93534-1	79%
Zinc	mg/kg	[NT]	[NT]	93534-1	77%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Wen-Fei Yuan

From: Wen-Fei Yuan
Sent: Monday, 8 July 2013 5:43 PM
To: Nancy Zhang <NZhang@envirolab.com.au> (NZhang@envirolab.com.au)
Subject: RE: Results for registration '92803 - 73244.01, Wahroonga'

Hi Nancy,

In addition to my previous e-mail. Please conduct analytical testing on sample 12/0.1-0.4 for heavy metals on 2 days turnaround time.

Regards
Wen-Fei Yuan | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0642 | F: 02 9809 4095 | M: 0448 280 782 | E: WenFei.Yuan@douglaspartners.com.au

-----Original Message-----
From: Wen-Fei Yuan
Sent: Monday, 8 July 2013 3:47 PM
To: 'Nancy Zhang'
Subject: RE: Results for registration '92803 - 73244.01, Wahroonga'

Hi Nancy,

Please perform silica gel cleanup for sample 12/0-0.1 and a copy of the chromatogram (after the cleanup) with possible indication of source of TRHC10-C36.

Regards
Wen-Fei Yuan | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0642 | F: 02 9809 4095 | M: 0448 280 782 | E: WenFei.Yuan@douglaspartners.com.au

-----Original Message-----
From: Nancy Zhang [mailto:NZhang@envirolab.com.au]
Sent: Tuesday, 2 July 2013 5:02 PM
To: Wen-Fei Yuan; Rob Dobinson
Subject: Results for registration '92803 - 73244.01, Wahroonga'

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC
an excel file containing the results

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

Job No: 93534
Date Received: 9/07
Time Received: 10:00
Received by: GB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None
6.7°C

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
Jacinta Hurst on jhurst@envirolabservices.com.au or Rhian Morgan on rmorgan@envirolabservices.com.au or David Springer on dspringer@envirolabservices.com.au
or
Tania Notaras on tnotaras@envirolabservices.com.au

Regards

Envirolab Services
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
www.envirolabservices.com.au

Regards,

Nancy Zhang | Organics Section Supervisor | Envirolab Services Pty Ltd

Great Chemistry.Great Service

12 Ashley Street Chatswood NSW 2067
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nzhang@envirolab.com.au | www.envirolab.com.au

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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 92803-A

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wenfei

Sample log in details:

Your Reference:	**73244.01, Wahroonga**
No. of samples:	Additional testing on 2 soils
Date samples received / completed instructions received	24/06/2013, 25/06/1305/07/13

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

Report Details:

Date results requested by: / Issue Date:	12/07/13	/	10/07/13
Date of Preliminary Report:	Not issued		

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

PAHs in TCLP (USEPA 1311)		
Our Reference:	UNITS	92803-A-1
Your Reference	----------	1
Depth	----------	0.3-0.4
Date Sampled		19/06/2013
Type of sample		Soil
Date extracted	-	09/07/2013
Date analysed	-	10/07/2013
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	120

Metals in TCLP USEPA1311			
Our Reference:	UNITS	92803-A-1	92803-A-42
Your Reference	----------	1	28
Depth	----------	0.3-0.4	0.3-0.5
Date Sampled		19/06/2013	19/06/2013
Type of sample		Soil	Soil
Date extracted	-	09/07/2013	09/07/2013
Date analysed	-	09/07/2013	09/07/2013
pH of soil for fluid# determ.	pH units	10.6	9.5
pH of soil for fluid # determ. (acid)	pH units	1.7	1.6
Extraction fluid used	-	1	1
pH of final Leachate	pH units	6.8	5.3
Lead in TCLP	mg/L	[NA]	1.5

Method ID	Methodology Summary
Org-012 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439 and USEPA 1311.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/07/2013	[NT]	[NT]	LCS-W1	09/07/2013
Date analysed	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
Naphthalene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	102%
Acenaphthylene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	96%
Phenanthrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	88%
Anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	88%
Pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	96%
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	88%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	Org-012 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	102%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	114	[NT]	[NT]	LCS-W1	108%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/07/2013	[NT]	[NT]	LCS-W1	09/07/2013
Date analysed	-			09/07/2013	[NT]	[NT]	LCS-W1	09/07/2013
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-W1	104%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Simon Song

From: Nancy Zhang
Sent: Friday, 5 July 2013 1:57 PM
To: Simon Song
Cc: Aileen Hie
Subject: FW: Results for registration '92877 - 73244.01, Wahroonga'

Regards,

Nancy Zhang | Organics Section Supervisor | Envirolab Services Pty Ltd

Great Chemistry.Great Service

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 F 612 9910 6201
mailto:nzhang@envirolab.com.au | http://www.envirolab.com.au

92803 A
~~92877A~~
Std T/A
Due 12/7

-----Original Message-----
From: Wen-Fei Yuan [mailto:WenFei.Yuan@douglaspartners.com.au]
Sent: Friday, 5 July 2013 1:51 PM
To: Nancy Zhang
Subject: RE: Results for registration '92877 - 73244.01, Wahroonga'

Hi Nancy,

Please conduct TCLP testing on the following samples:

- PAH: 1/0.3-0.4 -1
- Lead: 28/0.3-0.5 -42

Regards
Wen-Fei Yuan | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0642 | F: 02 9809 4095 | M: 0448 280 782 | E: WenFei.Yuan@douglaspartners.com.au

-----Original Message-----
From: Nancy Zhang [mailto:NZhang@envirolab.com.au]
Sent: Wednesday, 3 July 2013 5:13 PM
To: Wen-Fei Yuan; Rob Dobinson
Subject: Results for registration '92877 - 73244.01, Wahroonga'

Please refer to attached for:
a copy of the Certificate of Analysis

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 93397

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wen-fei Yuan

Sample log in details:

Your Reference:	**73244.01, Wahroonga - Proposed School Develop**
No. of samples:	6 waters
Date samples received / completed instructions received	04/07/13 / 04/07/13

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

Report Details:

Date results requested by: / Issue Date:	12/07/13 / 12/07/13
Date of Preliminary Report:	Not issued

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference:	UNITS	93397-1	93397-2	93397-3	93397-4	93397-5
Your Reference	----------	GW7	GW8	GW9	BD1A/020713	Trip Spike
Date Sampled	----------	02/07/2013	02/07/2013	02/07/2013	02/07/2013	02/07/2013
Type of sample		water	water	water	water	water
Date extracted	-	05/07/2013	05/07/2013	05/07/2013	05/07/2013	05/07/2013
Date analysed	-	06/07/2013	06/07/2013	06/07/2013	06/07/2013	06/07/2013
$TRHC_6$ - C_9	µg/L	<10	<10	<10	<10	[NA]
$TRHC_6$ - C_{10}	µg/L	19	20	12	20	[NA]
$TRHC_6$ - C_{10} less BTEX (F1)	µg/L	16	16	11	16	[NA]
MTBE	µg/L	<1	<1	<1	<1	[NA]
Benzene	µg/L	<1	<1	<1	<1	92%
Toluene	µg/L	<1	<1	<1	<1	96%
Ethylbenzene	µg/L	<1	<1	<1	<1	106%
m+p-xylene	µg/L	2	2	<2	2	100%
o-xylene	µg/L	1	1	1	1	104%
Naphthalene	µg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	99	99	99	99	98
Surrogate toluene-d8	%	95	96	96	96	96
Surrogate 4-BFB	%	96	97	98	97	98

vTRH(C6-C10)/BTEXN in Water		
Our Reference:	UNITS	93397-6
Your Reference	----------	Trip Blank
Date Sampled	----------	02/07/2013
Type of sample		water
Date extracted	-	05/07/2013
Date analysed	-	06/07/2013
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	99
Surrogate toluene-d8	%	96
Surrogate 4-BFB	%	96

svTRH (C10-C40) in Water					
Our Reference:	UNITS	93397-1	93397-2	93397-3	93397-4
Your Reference	----------	GW7	GW8	GW9	BD1A/020713
Date Sampled	----------	02/07/2013	02/07/2013	02/07/2013	02/07/2013
Type of sample		water	water	water	water
Date extracted	-	09/07/2013	09/07/2013	09/07/2013	09/07/2013
Date analysed	-	10/07/2013	10/07/2013	10/07/2013	10/07/2013
TRHC$_{10}$ - C$_{14}$	µg/L	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	µg/L	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	µg/L	<100	<100	<100	<100
TRH>C$_{10}$ - C$_{16}$	µg/L	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH>C$_{16}$ - C$_{34}$	µg/L	<100	<100	<100	<100
TRH>C$_{34}$ - C$_{40}$	µg/L	<100	<100	<100	<100
Surrogate o-Terphenyl	%	98	100	99	90

PAHs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-1 GW7 02/07/2013 water	93397-2 GW8 02/07/2013 water	93397-3 GW9 02/07/2013 water
Date extracted	-	09/07/2013	09/07/2013	09/07/2013
Date analysed	-	10/07/2013	10/07/2013	10/07/2013
Naphthalene	µg/L	0.2	0.2	0.3
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	0.2	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	0.17	0.35	0.32
Surrogate p-Terphenyl-d14	%	90	87	97

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-1 GW7 02/07/2013 water	93397-2 GW8 02/07/2013 water	93397-3 GW9 02/07/2013 water	93397-4 BD1A/020713 02/07/2013 water
Date prepared	-	08/07/2013	08/07/2013	08/07/2013	08/07/2013
Date analysed	-	08/07/2013	08/07/2013	08/07/2013	08/07/2013
Arsenic-Dissolved	µg/L	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Copper-Dissolved	µg/L	3	<1	3	<1
Lead-Dissolved	µg/L	<1	<1	1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	9	10	3	10
Zinc-Dissolved	µg/L	54	51	18	50

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/07/2013	[NT]	[NT]	LCS-W1	05/07/2013
Date analysed	-			06/07/2013	[NT]	[NT]	LCS-W1	06/07/2013
TRHC$_{6}$ - C$_{9}$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	107%
TRHC$_{6}$ - C$_{10}$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	107%
MTBE	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	101%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	102%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	111%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	111%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	110%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NR]	[NR]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	98	[NT]	[NT]	LCS-W1	98%
Surrogate toluene-d8	%		Org-016	95	[NT]	[NT]	LCS-W1	95%
Surrogate 4-BFB	%		Org-016	95	[NT]	[NT]	LCS-W1	99%

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/07/2013	[NT]	[NT]	LCS-W1	09/07/2013
Date analysed	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
TRHC$_{10}$ - C$_{14}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	89%
TRHC$_{15}$ - C$_{28}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	101%
TRHC$_{29}$ - C$_{36}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	93%
TRH>C$_{10}$ - C$_{16}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	89%
TRH>C$_{16}$ - C$_{34}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	101%
TRH>C$_{34}$ - C$_{40}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	93%
Surrogate o-Terphenyl	%		Org-003	95	[NT]	[NT]	LCS-W1	99%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/07/2013	[NT]	[NT]	LCS-W1	09/07/2013
Date analysed	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
Naphthalene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	102%
Acenaphthylene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	96%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Phenanthrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	88%
Anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	88%
Pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	96%
Benzo(a)anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	88%
Benzo(b+k)fluoranthene	µg/L	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-W1	102%
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	114	[NT]	[NT]	LCS-W1	108%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			08/07/2013	93397-1	08/07/2013 || 08/07/2013	LCS-W3	08/07/2013
Date analysed	-			08/07/2013	93397-1	08/07/2013 || 08/07/2013	LCS-W3	08/07/2013
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	93397-1	<1 || <1	LCS-W3	98%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	93397-1	<0.1 || <0.1	LCS-W3	93%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	93397-1	<1 || <1	LCS-W3	94%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	93397-1	3 || 3 || RPD: 0	LCS-W3	90%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	93397-1	<1 || <1	LCS-W3	102%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	93397-1	<0.05 || <0.05	LCS-W3	100%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	93397-1	9 || 9 || RPD: 0	LCS-W3	92%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	93397-1	54 || 53 || RPD: 2	LCS-W3	96%

QUALITY CONTROL HM in water - dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	93397-2	08/07/2013
Date analysed	-	[NT]	[NT]	93397-2	08/07/2013
Arsenic-Dissolved	µg/L	[NT]	[NT]	93397-2	96%
Cadmium-Dissolved	µg/L	[NT]	[NT]	93397-2	96%
Chromium-Dissolved	µg/L	[NT]	[NT]	93397-2	90%
Copper-Dissolved	µg/L	[NT]	[NT]	93397-2	100%
Lead-Dissolved	µg/L	[NT]	[NT]	93397-2	90%
Mercury-Dissolved	µg/L	[NT]	[NT]	93397-2	80%
Nickel-Dissolved	µg/L	[NT]	[NT]	93397-2	80%
Zinc-Dissolved	µg/L	[NT]	[NT]	93397-2	88%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Douglas Partners
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CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: AG ....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

	Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W – water	Container type	Analytes: Combo 3L*	HM8	TRH/BTEX											Notes
1)	GW7	–		02/07/13	W	P/G	✓	✓	✓											* HM8, TRH, BTEX, MTBE, PAH – low level)
2)	GW8			02/07/13	W	P/G	✓	✓	✓											
3)	GW9			02/07/13	W	P/G	✓	✓	✓											
4)	BD1/020713							✓	✓											
5)	Trip Spike			02/07/13	W	P/G			BTEX											
6)	Trip Blank			02/07/13	W	P/G			✓											

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

Job No: 93397
Date Received: 4/7/13
Time Received: 18:30
Received by: pT
Temp: Cool/Ambient
Cooling: Ice/Ice Pack
Security: Intact/Broken/None

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Lab Report No. 93397			Phone: (02) 9809 0666
Send Results to: Douglas Partners	Address: 96 Hermitage Road, West Ryde 2114		Fax: (02) 9809 4095
Relinquished by: WFY	Signed:	Date & Time: 04/07/13 @ 10AM	Received By:	Date & Time:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

PRELIMINARY CERTIFICATE OF ANALYSIS

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wen-fei Yuan

Sample log in details:

Envirolab Reference:	93397-A
Your Reference:	73244.01, Wahroonga - Proposed School Develop
No. of samples:	Additional testing on 3 waters
Date samples received:	04/07/13
Date completed instructions received:	09/07/13

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details:

Date results requested by:	17/07/13
Date of Preliminary Report:	11/07/13

NATA accreditation number 2901. This document shall not be reproduced except in full.
Tests not covered by NATA are denoted with *.

INS:	Insufficient sample for this test	NT:	Not tested
NR:	Not requested	PQL:	Practical Quantitation limit
<:	Less than	>:	Greater than

LCS: Laboratory Control Sample

Contact Details:
Please direct any queries to Tania Notaras, Jacinta Hurst or David Springer
ph: 02 9910 6200 fax: 02 9910 6201
email: tnotaras@envirolabservices.com.au

Tania Notaras Jacinta Hurst

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Date extracted	-	10/07/2013	10/07/2013	10/07/2013
Date analysed	-	10/07/2013	10/07/2013	10/07/2013
Dichlorodifluoromethane	µg/L	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1
Chloroform	µg/L	3	<1	2
2,2-dichloropropane	µg/L	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1
Benzene	µg/L	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
Bromoform	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	2	<2
Styrene	µg/L	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1
o-xylene	µg/L	1	1	1
1,2,3-trichloropropane	µg/L	<1	<1	<1

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Jacinta Hurst

Client Reference: 73244.01, Wahroonga - Proposed School Develop **Envirolab Reference:** 93397-A

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Isopropylbenzene	µg/L	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	1	2	2
Tert-butyl benzene	µg/L	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	2	2	1
1,3-dichlorobenzene	µg/L	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	99	100	100
Surrogate toluene-d8	%	101	101	102
Surrogate 4-BFB	%	100	102	101

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OCP in water - trace level Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Date extracted	-			
Date analysed	-			
HCB	µg/L			
Heptachlor	µg/L			
Heptachlor Epoxide	µg/L			
Aldrin	µg/L			
gamma-BHC (Lindane)	µg/L			
alpha-BHC	µg/L			
beta-BHC	µg/L			
delta-BHC	µg/L			
trans-Chlordane	µg/L			
cis-Chlordane	µg/L			
Oxychlordane	µg/L			
Dieldrin	µg/L			
p,p-DDE	µg/L			
p,p-DDD	µg/L			
p,p-DDT	µg/L			
Endrin	µg/L			
Endrin Aldehyde	µg/L			
Endrin Ketone	µg/L			
alpha-Endosulfan	µg/L			
beta-Endosulfan	µg/L			
Endosulfan Sulfate	µg/L			
Methoxychlor	µg/L			
Surrogate OC Recovery	%			

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Client Reference: 73244.01, Wahroonga - Proposed School Develop **Envirolab Reference:** 93397-A

PCB in water - trace level				
Our Reference:	UNITS	93397-A-1	93397-A-2	93397-A-3
Your Reference	----------	GW7	GW8	GW9
Date Sampled	----------	02/07/2013	02/07/2013	02/07/2013
Type of sample		water	water	water
Date extracted	-			
Date analysed	-			
Aroclor 1016	µg/L			
Aroclor 1221	µg/L			
Aroclor 1232	µg/L			
Aroclor 1242	µg/L			
Aroclor 1248	µg/L			
Aroclor 1254	µg/L			
Aroclor 1260	µg/L			
Total PCB's (as above)	µg/L			

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Cations in water Dissolved				
Our Reference:	UNITS	93397-A-1	93397-A-2	93397-A-3
Your Reference	----------	GW7	GW8	GW9
Date Sampled	----------	02/07/2013	02/07/2013	02/07/2013
Type of sample		water	water	water
Date digested	-	10/07/2013	10/07/2013	10/07/2013
Date analysed	-	10/07/2013	10/07/2013	10/07/2013
Calcium - Dissolved	mg/L	3.2	3.0	2.0
Magnesium - Dissolved	mg/L	8.1	5.5	3.3
Hardness	mgCaCO3 /L	41	30	18

Tania Notaras

Jacinta Hurst

Method ID	Methodology Summary
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Ext-020	Analysis subcontracted to Australian Government - National Measurement Institute. NATA Accreditation No: 198
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

Tania Notaras Jacinta Hurst

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery
Date extracted	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
Date analysed	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
Dichlorodifluoromethane	µg/L	10	Org-013		[NT]	[NT]	LCS-W1	[NT]
Chloromethane	µg/L	10	Org-013		[NT]	[NT]	LCS-W1	[NT]
Vinyl Chloride	µg/L	10	Org-013		[NT]	[NT]	LCS-W1	[NT]
Bromomethane	µg/L	10	Org-013		[NT]	[NT]	LCS-W1	[NT]
Chloroethane	µg/L	10	Org-013		[NT]	[NT]	LCS-W1	[NT]
Trichlorofluoromethane	µg/L	10	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,1-Dichloroethene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,1-dichloroethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	106%
Cis-1,2-dichloroethene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Bromochloromethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Chloroform	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	106%
2,2-dichloropropane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2-dichloroethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	108%
1,1,1-trichloroethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	105%
1,1-dichloropropene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Cyclohexane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Carbon tetrachloride	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Dibromomethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2-dichloropropane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Trichloroethene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	120%
Bromodichloromethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	106%
trans-1,3-dichloropropene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,1,2-trichloroethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Toluene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,3-dichloropropane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Dibromochloromethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	107%
1,2-dibromoethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Tetrachloroethene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	103%
1,1,1,2-tetrachloroethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Chlorobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Ethylbenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Bromoform	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
m+p-xylene	µg/L	2	Org-013		[NT]	[NT]	LCS-W1	[NT]
Styrene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]

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Client Reference: 73244.01, Wahroonga - Proposed School Develop Envirolab Reference: 93397-A

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery
o-xylene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2,3-trichloropropane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Isopropylbenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Bromobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
n-propyl benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
2-chlorotoluene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
4-chlorotoluene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Tert-butyl benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,3-dichlorobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Sec-butyl benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,4-dichlorobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
4-isopropyl toluene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2-dichlorobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
n-butyl benzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Hexachlorobutadiene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-013		[NT]	[NT]	LCS-W1	[NT]
Surrogate Dibromofluoromethane	%		Org-013	103	[NT]	[NT]	LCS-W1	98%
Surrogate toluene-d8	%		Org-013	100	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-013	99	[NT]	[NT]	LCS-W1	100%

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QUALITY CONTROL OCP in water - trace level	UNITS	PQL	METHOD	Blank
Date extracted	-			
Date analysed	-			
HCB	µg/L	0.001	Ext-020	
Heptachlor	µg/L	0.001	Ext-020	
Heptachlor Epoxide	µg/L	0.001	Ext-020	
Aldrin	µg/L	0.001	Ext-020	
gamma-BHC (Lindane)	µg/L	0.001	Ext-020	
alpha-BHC	µg/L	0.001	Ext-020	
beta-BHC	µg/L	0.001	Ext-020	
delta-BHC	µg/L	0.001	Ext-020	
trans-Chlordane	µg/L	0.001	Ext-020	
cis-Chlordane	µg/L	0.001	Ext-020	
Oxychlordane	µg/L	0.001	Ext-020	
Dieldrin	µg/L	0.001	Ext-020	
p,p-DDE	µg/L	0.001	Ext-020	
p,p-DDD	µg/L	0.001	Ext-020	
p,p-DDT	µg/L	0.001	Ext-020	
Endrin	µg/L	0.001	Ext-020	
Endrin Aldehyde	µg/L	0.001	Ext-020	
Endrin Ketone	µg/L	0.001	Ext-020	
alpha-Endosulfan	µg/L	0.001	Ext-020	
beta-Endosulfan	µg/L	0.001	Ext-020	
Endosulfan Sulfate	µg/L	0.001	Ext-020	
Methoxychlor	µg/L	0.001	Ext-020	
Surrogate OC Recovery	%		Ext-020	

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Client Reference: 73244.01, Wahroonga - Proposed School Develop **Envirolab Reference:** 93397-A

QUALITY CONTROL PCB in water - trace level	UNITS	PQL	METHOD	Blank
Date extracted	-			
Date analysed	-			
Aroclor 1016	µg/L	0.01	Ext-020	
Aroclor 1221	µg/L	0.01	Ext-020	
Aroclor 1232	µg/L	0.01	Ext-020	
Aroclor 1242	µg/L	0.01	Ext-020	
Aroclor 1248	µg/L	0.01	Ext-020	
Aroclor 1254	µg/L	0.01	Ext-020	
Aroclor 1260	µg/L	0.01	Ext-020	
Total PCB's (as above)	µg/L	0.010	Ext-020	

QUALITY CONTROL Cations in water Dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery
Date digested	-				93397-A-1	10/07/2013 || 10/07/2013	LCS-W1	10/07/2013
Date analysed	-				93397-A-1	10/07/2013 || 10/07/2013	LCS-W1	10/07/2013
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES		93397-A-1	3.2 || 3.1 || RPD: 3	LCS-W1	91%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES		93397-A-1	8.1 || 7.8 || RPD: 4	LCS-W1	88%
Hardness	mgCaCO3/L	3			93397-A-1	41 || 40 || RPD: 2	[NR]	[NR]

QUALITY CONTROL Cations in water Dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery
Date digested	-	[NT]	[NT]	93397-A-2	10/07/2013
Date analysed	-	[NT]	[NT]	93397-A-2	10/07/2013
Calcium - Dissolved	mg/L	[NT]	[NT]	93397-A-2	96%
Magnesium - Dissolved	mg/L	[NT]	[NT]	93397-A-2	104%
Hardness	mgCaCO3/L	[NT]	[NT]	[NR]	[NR]

Tania Notaras

Jacinta Hurst

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CERTIFICATE OF ANALYSIS 93397-A

Client:
Douglas Partners
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Wen-fei Yuan

Sample log in details:

Your Reference:	**73244.01, Wahroonga - Proposed School Develop**
No. of samples:	Additional testing on 3 waters
Date samples received / completed instructions received	04/07/13 / 09/07/13

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

Report Details:

Date results requested by: / Issue Date:	17/07/13 / 19/07/13
Date of Preliminary Report:	11/07/2013

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Date extracted	-	10/07/2013	10/07/2013	10/07/2013
Date analysed	-	10/07/2013	10/07/2013	10/07/2013
Dichlorodifluoromethane	µg/L	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1
Chloroform	µg/L	3	<1	2
2,2-dichloropropane	µg/L	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1
Benzene	µg/L	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
Bromoform	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	2	<2
Styrene	µg/L	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1
o-xylene	µg/L	1	1	1
1,2,3-trichloropropane	µg/L	<1	<1	<1

VOCs in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Isopropylbenzene	µg/L	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	1	2	2
Tert-butyl benzene	µg/L	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	2	2	1
1,3-dichlorobenzene	µg/L	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	99	100	100
Surrogate toluene-d8	%	101	101	102
Surrogate 4-BFB	%	100	102	101

OCP in water - trace level Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Date extracted	-	15/07/2013	15/07/2013	15/07/2013
Date analysed	-	15/07/2013	15/07/2013	15/07/2013
HCB	µg/L	<0.001	<0.001	<0.001
Heptachlor	µg/L	<0.001	<0.001	<0.001
Heptachlor Epoxide	µg/L	<0.001	<0.001	<0.001
Aldrin	µg/L	<0.001	<0.001	<0.001
gamma-BHC (Lindane)	µg/L	<0.001	<0.001	<0.001
alpha-BHC	µg/L	<0.001	<0.001	<0.001
beta-BHC	µg/L	<0.001	<0.001	<0.001
delta-BHC	µg/L	<0.001	<0.001	<0.001
trans-Chlordane	µg/L	<0.001	<0.001	<0.001
cis-Chlordane	µg/L	<0.001	<0.001	<0.001
Oxychlordane	µg/L	<0.001	<0.001	<0.001
Dieldrin	µg/L	<0.001	<0.001	<0.001
p,p-DDE	µg/L	<0.001	<0.001	<0.001
p,p-DDD	µg/L	<0.001	<0.001	<0.001
p,p-DDT	µg/L	<0.001	<0.001	<0.001
Endrin	µg/L	<0.001	<0.001	<0.001
Endrin Aldehyde	µg/L	<0.001	<0.001	<0.001
Endrin Ketone	µg/L	<0.001	<0.001	<0.001
alpha-Endosulfan	µg/L	<0.001	<0.001	<0.001
beta-Endosulfan	µg/L	<0.001	<0.001	<0.001
Endosulfan Sulfate	µg/L	<0.001	<0.001	<0.001
Methoxychlor	µg/L	<0.001	<0.001	<0.001
Surrogate OC Recovery	%	75	95	81

PCB in water - trace level Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	93397-A-1 GW7 02/07/2013 water	93397-A-2 GW8 02/07/2013 water	93397-A-3 GW9 02/07/2013 water
Date extracted	-	15/07/2013	15/07/2013	15/07/2013
Date analysed	-	15/07/2013	15/07/2013	15/07/2013
Aroclor 1016	µg/L	<0.01	<0.01	<0.01
Aroclor 1221	µg/L	<0.01	<0.01	<0.01
Aroclor 1232	µg/L	<0.01	<0.01	<0.01
Aroclor 1242	µg/L	<0.01	<0.01	<0.01
Aroclor 1248	µg/L	<0.01	<0.01	<0.01
Aroclor 1254	µg/L	<0.01	<0.01	<0.01
Aroclor 1260	µg/L	<0.01	<0.01	<0.01
Total PCB's (as above)	µg/L	<0.01	<0.01	<0.01

Cations in water Dissolved				
Our Reference:	UNITS	93397-A-1	93397-A-2	93397-A-3
Your Reference	----------	GW7	GW8	GW9
Date Sampled	----------	02/07/2013	02/07/2013	02/07/2013
Type of sample		water	water	water
Date digested	-	10/07/2013	10/07/2013	10/07/2013
Date analysed	-	10/07/2013	10/07/2013	10/07/2013
Calcium - Dissolved	mg/L	3.2	3.0	2.0
Magnesium - Dissolved	mg/L	8.1	5.5	3.3
Hardness	mgCaCO3/L	41	30	18

Method ID	Methodology Summary
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Ext-020	Analysis subcontracted to Australian Government - National Measurement Institute. NATA Accreditation No: 198
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
Date analysed	-			10/07/2013	[NT]	[NT]	LCS-W1	10/07/2013
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	108%
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	105%
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	120%
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	106%
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	107%
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	103%
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Ethylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
m+p-xylene	µg/L	2	Org-013	<2	[NT]	[NT]	[NR]	[NR]
Styrene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
o-xylene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VOCs in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-013	103	[NT]	[NT]	LCS-W1	98%
Surrogate toluene-d8	%		Org-013	100	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-013	99	[NT]	[NT]	LCS-W1	100%

QUALITY CONTROL OCP in water - trace level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			15/07/2013	[NT]	[NT]	LCS-W1	15/07/2013
Date analysed	-			15/07/2013	[NT]	[NT]	LCS-W1	15/07/2013
HCB	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Heptachlor	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	88%
Heptachlor Epoxide	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	88%
gamma-BHC (Lindane)	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	78%
alpha-BHC	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
delta-BHC	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
trans-Chlordane	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
cis-Chlordane	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Oxychlordane	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Dieldrin	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	90%
p,p-DDE	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
p,p-DDD	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
p,p-DDT	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	96%
Endrin	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	LCS-W1	126%
Endrin Aldehyde	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Endrin Ketone	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
alpha-Endosulfan	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
beta-Endosulfan	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulfate	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Methoxychlor	µg/L	0.001	Ext-020	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate OC Recovery	%		Ext-020	[NT]	[NT]	[NT]	LCS-W1	74%

QUALITY CONTROL PCB in water - trace level	UNITS	PQL	METHOD	Blank
Date extracted	-			15/07/2013
Date analysed	-			15/07/2013
Aroclor 1016	µg/L	0.01	Ext-020	<0.01
Aroclor 1221	µg/L	0.01	Ext-020	<0.01
Aroclor 1232	µg/L	0.01	Ext-020	<0.01
Aroclor 1242	µg/L	0.01	Ext-020	<0.01
Aroclor 1248	µg/L	0.01	Ext-020	<0.01
Aroclor 1254	µg/L	0.01	Ext-020	<0.01
Aroclor 1260	µg/L	0.01	Ext-020	<0.01
Total PCB's (as above)	µg/L	0.010	Ext-020	[NT]

QUALITY CONTROL Cations in water Dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			10/07/2013	93397-A-1	10/07/2013 || 10/07/2013	LCS-W1	10/07/2013
Date analysed	-			10/07/2013	93397-A-1	10/07/2013 || 10/07/2013	LCS-W1	10/07/2013
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	93397-A-1	3.2 || 3.1 || RPD: 3	LCS-W1	91%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	93397-A-1	8.1 || 7.8 || RPD: 4	LCS-W1	88%
Hardness	mgCaCO3/L	3		[NT]	93397-A-1	41 || 40 || RPD: 2	[NR]	[NR]

QUALITY CONTROL Cations in water Dissolved	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	93397-A-2	10/07/2013
Date analysed	-	[NT]	[NT]	93397-A-2	10/07/2013
Calcium - Dissolved	mg/L	[NT]	[NT]	93397-A-2	96%
Magnesium - Dissolved	mg/L	[NT]	[NT]	93397-A-2	104%
Hardness	mgCaCO3/L	[NT]	[NT]	[NR]	[NR]

Report Comments:

OC/PCB's in water analysed by NMI. Report No.RN0981532.

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

Aileen Hie

From: Wen-Fei Yuan [WenFei.Yuan@douglaspartners.com.au]
Sent: Tuesday, 9 July 2013 10:00 AM
To: Aileen Hie
Subject: FW: Sample Receipt for '93397 - 73244.01, Wahroonga - Proposed School Develop'
Attachments: SR_93397.PDF; 93397-COC.pdf

Hi Aileen,

In addition to the attached COC. Please add OCP/PCB (trace level), VOC and hardness for all three samples outlined in the attached COC on two days tat.

93397 A
48hrs TA
he 11/7

Regards
Wen-Fei Yuan | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0642 | F: 02 9809 4095 | M: 0448 280 782 | E: WenFei.Yuan@douglaspartners.com.au

-----Original Message-----
From: Aileen Hie [mailto:AHie@envirolab.com.au]
Sent: Friday, 5 July 2013 3:21 PM
To: Wen-Fei Yuan
Subject: Sample Receipt for '93397 - 73244.01, Wahroonga - Proposed School Develop'

Please refer to attached for a copy of your COC and our Sample Receipt Advice (SRA).
Results will be available by 6.30pm on the date indicated.
PLEASE NOTE COMBO PRICES WILL ONLY APPLY IF COMBOS ARE SELECTED ON COC.
The current pricing schedule came into effect on 1/1/13.

Enquiries should be made directly to:
Aileen Hie on ahie@envirolabservices.com.au or Jacinta Hurst on jhurst@envirolabservices.com.au or Geoff Weir on gweir@envirolabservices.com.au (Tuesday to Friday)

Regards

Envirolab Services
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
www.envirolabservices.com.au

Regards,

Aileen Hie | Sample Receipt Supervisor | Envirolab Services Pty Ltd

Great Chemistry.Great Service

12 Ashley Street Chatswood NSW 2067
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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Douglas Partners (Syd)
96 Hermitage Road
West Ryde
NSW 2114

Attention: **Wen Fei Yuan**

Report **383843-S**
Client Reference WAHROONGA PROPOSED SCHOOL DEVELPOMENT 73244.01
Received Date Jun 25, 2013

Client Sample ID			BD1/210613	BD1/200613	BD2/200613	BD3/200613
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S13-Jn18182	S13-Jn18183	S13-Jn18184	S13-Jn18185
Date Sampled			Jun 21, 2013	Jun 20, 2013	Jun 20, 2013	Jun 20, 2013
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	71	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	71	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	114	113	110	108
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Heavy Metals						
Arsenic	2	mg/kg	8.0	5.5	6.1	5.4
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	< 5	19	5.7	8.7
Copper	5	mg/kg	20	25	14	26
Lead	5	mg/kg	20	13	21	43
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	0.33
Nickel	5	mg/kg	< 5	38	< 5	9.1
Zinc	5	mg/kg	9.0	37	10	49
% Moisture	0.1	%	15	22	18	20

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jul 01, 2013	14 Day
- Method: E004 Petroleum Hydrocarbons (TPH)			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jul 01, 2013	14 Day
- Method: LM-LTM-ORG2010			
BTEX	Sydney	Jul 01, 2013	14 Day
- Method: E029/E016 BTEX			
Metals M8	Sydney	Jun 28, 2013	28 Day
- Method: E022 Acid Extractable metals in Soils & E026 Mercury			
% Moisture	Sydney	Jun 27, 2013	28 Day
- Method: E005 Moisture Content			

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Site # 1254 & 14271

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Douglas Partners (Syd)	**Order No.:**		**Received:**	Jun 25, 2013 4:45 PM
Address:	96 Hermitage Road	**Report #:**	383843	**Due:**	Jul 3, 2013
	West Ryde	**Phone:**	02 9809 0666	**Priority:**	5 Day
	NSW 2114	**Fax:**		**Contact Name:**	Wen Fei Yuan

Client Job No.: WAHROONGA PROPOSED SCHOOL DEVELPOMENT 73244.01

Eurofins | mgt Client Manager: Jean Heng

Sample Detail					% Moisture	Metals M8	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted								
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217					X	X	X	X
Brisbane Laboratory - NATA Site # 20794								
External Laboratory								
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
BD1/210613	Jun 21, 2013		Soil	S13-Jn18182	X	X	X	X
BD1/200613	Jun 20, 2013		Soil	S13-Jn18183	X	X	X	X
BD2/200613	Jun 20, 2013		Soil	S13-Jn18184	X	X	X	X
BD3/200613	Jun 20, 2013		Soil	S13-Jn18185	X	X	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

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

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environment Protection Authority
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX E029/E016 BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions LM-LTM-ORG2010							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH C6-C10 less BTEX (F1)	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Metals M8 E022 Acid Extractable metals in Soils & E026 Mercury							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.05			0.05	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	%	109			70-130	Pass	
TRH C10-C14	%	87			70-130	Pass	
LCS - % Recovery							
BTEX E029/E016 BTEX							
Benzene	%	110			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	110			70-130	Pass	
m&p-Xylenes	%	110			70-130	Pass	
o-Xylene	%	109			70-130	Pass	
Xylenes - Total	%	109			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions LM-LTM-ORG2010							
Naphthalene	%	95			70-130	Pass	
TRH C6-C10	%	109			70-130	Pass	
TRH >C10-C16	%	92			70-130	Pass	
LCS - % Recovery							
Metals M8 E022 Acid Extractable metals in Soils & E026 Mercury							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Arsenic			%	112			70-130	Pass	
Cadmium			%	104			70-130	Pass	
Chromium			%	106			70-130	Pass	
Copper			%	80			70-130	Pass	
Lead			%	100			70-130	Pass	
Mercury			%	112			70-130	Pass	
Nickel			%	100			70-130	Pass	
Zinc			%	99			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S13-Jn18782	NCP	%	113			70-130	Pass	
TRH C10-C14	S13-Jn18782	NCP	%	79			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S13-Jn18782	NCP	%	114			70-130	Pass	
Toluene	S13-Jn18782	NCP	%	114			70-130	Pass	
Ethylbenzene	S13-Jn18782	NCP	%	115			70-130	Pass	
m&p-Xylenes	S13-Jn18782	NCP	%	114			70-130	Pass	
o-Xylene	S13-Jn18782	NCP	%	114			70-130	Pass	
Xylenes - Total	S13-Jn18782	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S13-Jn18782	NCP	%	90			70-130	Pass	
TRH C6-C10	S13-Jn18782	NCP	%	113			70-130	Pass	
TRH >C10-C16	S13-Jn18782	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Metals M8				Result 1					
Arsenic	S13-Jn18182	CP	%	82			70-130	Pass	
Cadmium	S13-Jn18182	CP	%	104			70-130	Pass	
Chromium	S13-Jn18182	CP	%	102			70-130	Pass	
Copper	S13-Jn18182	CP	%	93			70-130	Pass	
Lead	S13-Jn18182	CP	%	109			70-130	Pass	
Mercury	S13-Jn18182	CP	%	116			70-130	Pass	
Nickel	S13-Jn18182	CP	%	101			70-130	Pass	
Zinc	S13-Jn18182	CP	%	110			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S13-Jn18782	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S13-Jn18782	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S13-Jn18782	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S13-Jn18782	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S13-Jn18782	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S13-Jn18782	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S13-Jn18782	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S13-Jn18782	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S13-Jn18782	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S13-Jn18782	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S13-Jn18782	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S13-Jn18782	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	S13-Jn18782	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S13-Jn18782	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S13-Jn18782	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S13-Jn18782	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Metals M8				Result 1	Result 2	RPD			
Arsenic	S13-Jn18182	CP	mg/kg	8.0	4.2	62	30%	Fail	Q15
Cadmium	S13-Jn18182	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S13-Jn18182	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	S13-Jn18182	CP	mg/kg	20	20	1.0	30%	Pass	
Lead	S13-Jn18182	CP	mg/kg	20	20	1.0	30%	Pass	
Mercury	S13-Jn18182	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Nickel	S13-Jn18182	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S13-Jn18182	CP	mg/kg	9.0	12	28	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q15	The RPD reported passes Eurofins | mgt's Acceptance Criteria as stipulated in SOP 05. Refer to Glossary Page of this report for further details

Authorised By

Jean Heng	Client Services
James Norford	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)

Dr. Bob Symons
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Douglas Partners
Geotechnics · Environment · Groundwater

Please forward to LabMark.

CHAIN OF CUSTODY

Project Name: Wahroonga – Proposed School Development .....
Project No: 73244.01..... Sampler: WFY/DW/RL.....
Project Mgr: LR .....Mob. Phone 0448 280 782.....
Email: wenfei.yuan@douglaspartners.com.au .....
Date Required: STD..... Lab Quote No. .....

To: Mgt LabMark

*323243

Sample ID	Sample Depth	Lab ID	Sampling Date	Sample Type: S - soil W – water	Container type	Analytes: Comobo 8a	Comobo 3a	Combo 8	Combo 3	HM	TRH/BTEX	Asbestos*						Notes
BD1/210613				S	P/G					X	X							* Asbestos (WA Method)
BD1/200613										X	X							
BD2/200613										X	X							92803
BD3/200613										X	X							

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114 Phone: (02) 9809 0666 Fax: (02) 9809 4095
Relinquished by: WFY Signed: Date & Time: 24.06.13 / 3pm Received By: PT Date & Time: 24/6/13 15:40

RECEIVED
25 JUN 2013
BY: Sean O. 4.45

Relinquished: Sapphire ES

HSL APPLICATION CHECKLIST

INTRODUCTION

This checklist is designed to allow assessors to conceptualise potential issues with contaminated land, and how to apply the HSLs. The checklist is designed to trigger responses from the assessor in determining whether the HSLs are applicable or whether consideration should be given to a more site-specific determination of risk. It highlights the key limitations and considerations that are common to contamination assessments and risk assessment.

The checklist summarises the key items from this Application Document.
It is recommended that the Application Document be read in conjunction with the use of this Checklist.

Summary of Steps

Step 1	**Identification of key limitations to the application of health screening levels**
Step 2	**Identification of key receptors and scenarios**
Step 3	**Identification of relevant soil type**
Step 4	**Identification of impacted media and depths**
Step 5	**Identification of source concentrations to be compared with health screening levels**
Step 6	**Selecting appropriate HSL and consideration of combining vapour intrusion and direct contact exposure**
Step 7	**Applying adjustments to the HSLs based on vapour biodegradation, soil organic carbon content, air exchange rate, and soil moisture content Consideration given to soil saturation and water solubility limits**
Step 8	**Adjustments for cancer risk assessment - modification of acceptable cancer risk level, assessment of cumulative cancer risk**

Step 1 – Limitations to HSLs

Assessing contamination in soil and groundwater should only be carried out by a qualified professional.

Are guidelines relevant for site? Check the following limitations:

Have chemicals other than petroleum hydrocarbons been identified at the site?	Y	May consider site-specific risk asessment (refer to Section 5.2 of the Application Document)
Is the groundwater to be used for irrigation purposes?	N	May consider site-specific risk asessment (refer to Section 2.4.5 of the Application Document)
Is the site conservation land?	N	May be required to also assess ecological values (refer to Section 2.4.6 of the Application Document)
Is the depth to groundwater impact less than 2m bgs ?	N	May consider site-specific risk asessment for direct contact May consider soil vapour sampling for vapour intrusion (refer to Section 2.4.2 of the Application Document)
Has significant odour been observed at the site?	N	May be required to also assess odour for sensitive land uses (refer to Section 5.4 of the Application Document)
Is the identified chemical a result of a solvent spill rather than petroleum spill/leak?	N	HSLs may be used where saturation point is not considered (refer to Section 5.3 of the Application Document)
Is the identified contamination an atypical petroleum mixture?	N	May consider site-specific risk asessment to consider cumulative effects between chemicals (refer to Section 3.6 of the Application Document)
Is the soil source thickness significantly different than 2 m?	Y	For small source thicknesses, HSLs may be overly conservative if source fully depletes. For larger thicknesses HSLs may not adequately characterise risk, however lateral extent of contamination should also be considered. A site-specific HRA may be considered. (refer to Section 2.4.7 of the Application Document)
Does the building have a crawl space rather than slab-on-ground construction?	Y	HSLs may be used as likely to be conservative. However, for situations where habitants may be exposed in crawl space area such as spaces under dwellings which incorporate garages/workshop then consideration may be given to ambient air sampling. (refer to Section 2.3.4 of the Application Document)
Does the building have or is likely to have a habitable basement?	N	May consider site-specific risk asessment (refer to Section 2.3.3 of the Application Document)

Note that the HSLs may be used for assessing health risk. In addition to this assessment, legislation requirements still need to be fulfilled which may include other considerations and assessments. Such considerations may include:

- Assessment of environmental values and ecological impacts
- Consideration of sustainability issues
- Risks for extraction and use of groundwater
- Soil source ongoing source to groundwater contamination
- Local planning requirements, such as sensitive uses under commercial zones, or future land use zones
- Social impacts and consultation with stakeholders

Step 2 – Identify receptors and scenarios to be considered

Check the receptors and scenarios to be assessed. Note that receptors and scenarios may require consideration of future land use planning and local regulations pertaining to site redevelopment.

	X	Residential use (refer to Sections 2.1.1 and 2.3.1 of the Application Document)
HSL-A	X	Low-Density Residential – assumes access to soils with no management controls on site. Assessment may consider surface soils with direct contact, intrusive maintenance worker protection, and consider using surface soil HSL for all soils down to 3 m depth to protect uncontrolled excavation of contamination.
HSL-B		High-Density Residential – assumes limited access to surface soils with management controls on site. Assessment may consider surface soils/dust with limited direct contact. Intrusive maintenance workers may be protected under suitable site management plan.
HSL-A	X	Medium-Density Residential with grassed open space – assumes access to soils with management controls on site. Assessment may consider surface soils with direct contact and subsurface soils through vapour intrusion. Intrusive maintenance workers may be protected under suitable site management plan.
HSL-B		Medium-Density Residential with permanent paving open space – assumes limited access to soils with management controls on site. Assessment may consider surface soils/dust with limited direct contact. Intrusive maintenance workers may be protected under suitable site management plan.
HSL-A (for VI) *HSL-A or HSL-B (for DC)*		Low- or Medium-Density Residential with single basement garage – for vapour intrusion, low-density residential (HSL-A) may apply due to low air exchange rate for basement garage. HSL depth is displaced by depth of basement. For soil direct contact HSLs, select from above medium density scenarios based on access to soils. Intrusive maintenance workers may be protected under suitable site management plan (refer to Section 2.3.3 of the Application Document).
HSL-D (for VI) *HSL-B (for DC outside footprint)*		Medium- or High-Density Residential with communal basement car park – assumes no access to soils with management controls on site. HSL depth is displaced by depth of basement. Intrusive maintenance workers may be protected under suitable site management plan. Note that areas outside of the basement footprint may be required to be assessed as a building without basement and with limited direct contact with soil. Also, limited exposure time for basement users and therefore HSL for Commercial Worker may be used for vapour intrusion (refer to Section 2.3.3 of the Application Document).
HSL-C	X	Recreational / Public Open Space (refer to Section 2.1.2 of the Application Document)
	X	Parks, ovals, pedestrian areas
		National parks, conservation areas – may be required to also assess ecological values (refer to Section 2.4.6 of the Application Document)
HSL-D		Commercial / Industrial Workers (refer to Section 2.1.3 of the Application Document) – considers only healthy adults under normal working conditions. Does not consider sensitive commercial uses such as schools, day care centres and medical practices.
		Commercial sensitive users – may consider using residential HSLs or a site-specific HRA (refer to Section 2.4.1 of the Application Document)
		Agricultural land – may consider a site specific HRA (refer to Section 2.4.5 of the Application Document)
	X	Shallow intrusive workers down to 1 m deep. May require assessment of direct contact for soils surface to <2 m (refer to Sections 2.1.4 and 2.4.3 of the Application document)
	X	Deep intrusive workers down to >1 m deep, such as sewer. Should be managed with appropriate procedures and work practices for confined spaces (refer to Section 2.4.4 of the Application Document)

Is a site management plan (that includes specific occupational hazard management for works on the site) to be implemented on the site (controlled site)? → May not need to consider health risks to intrusive workers

Step 3 – Identify soil type relevant to site (soils above impacts in soil and/or groundwater)

Note the following before selecting soil type for use in assessment:

1. The prime parameter that influences the value of the HSL is the air filled porosity and volatility of the specific chemical. The higher the air filled porosity the greater the potential for volatile chemicals to migrate vertically through the soil profile.
2. The selection of a generic soil type requires knowledge of the soil profile across the site.
3. The selection of generic soil types should take into account the predominant characteristics of the soil profile and depth of contamination. The generic soil types assume a uniform profile, which at many, if not all, sites will not be the case. Where the overlying profile is predominantly fine materials (clays) (i.e. > 50% for soil column), these may be considered as the generic soil type. If the profile has a significant proportion of loose/coarse materials (including backfill) (i.e. > 50%), these materials may be considered as the generic soil type.
4. Air filled porosity is affected by moisture content. The wetter the soil, the lower the air filled porosity. Generic soil types have assumed a typical moisture content for the profile typical of average soil conditions occurring at depth. Moisture content will vary greatly by location and season. Moisture content will also vary between sub-categories of soil, e.g. between sand and clayey sand. HSLs may be adjusted based on moisture content. This is done in Step 7.
5. The selection of appropriate soil type is discussed in Section 3.2 of the Application Document.

Is there one dominant soil type on the site (> 50% of soil column)?
Or can a geological setting be conservatively identified (i.e. allowing greater vapour transport)? →

- [ ] Y - Proceed
- [X] N - Consideration may be given to assuming the more conservative soil type, or may be given to a site-specific HRA (refer to Section 4.6 of the Application Document)

Has excavated area(s) been backfilled with more porous materials ? →

- [ ] Y - Consideration should be given to adopting a more porous soil type (refer to Section 3.2 of the Application Document)
- [X] N - Proceed

Does the site lithology contain rock formations
or soil with large cracks that can form preferential pathways? →

- [X] Y - The derived HSLs do not include lithogies with rock formations. Consideration may be given to using soil-vapour sampling or carrying out a site-specific HRA (refer to Section 4.6 of the Application Document)
- [ ] N - Proceed

Identify HSL soil type relevant to site and assessment (above impacts)

The soil profile properties have been based on a predominant soil texture grouping developed by the US Department of Agriculture. The 12 texture classes have been grouped into 3 groups: sand, silt and clay. The groupings of the classes are based on mean particle size and saturation porosities. Refer to Section 3.2 for further discussion on the soil properties.

HSL soil type selected:

- [ ] **Sand** – Properties selected to be representative of a coarse textured undisturbed soil profile. Consists of texture classes sand, sandy clay.
- [ ] **Silt** – Properties selected to be representative of a coarse textured undisturbed soil profile. Consists of texture classes silt, silty clay.
- [X] **Clay** – Properties selected to be representative of a fine textured undisturbed soil profile. Consists of texture classes clay.
- [X] **Other** – Including soil with large cracks (preferential pathways) and fractured rock (basalt, sandstone, siltstone, limestone) - refer to Section 4.6 of the Application Document. Soil vapour measurement is preferred to soil or groundwater. Due to fractures and preferential vapour pathways in rock, consideration should be given to overlying weathered soil, or to using HSLs for surface soil in sand.

For soil assessment (texture classification) undertaken in accord with AS 1726 the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit less than 50%, and fine with liquid limit greater than 50% respectively.

Where there is uncertainty, laboratory analysis should be carried out. This may include parameters for detailed particle analysis and exact soil texture sub-class, and saturation porosity.

Step 4 – Impact media

Are there impacts to media other than soil and groundwater? (e.g surface water, biota, odours etc)
Note: aesthetic issues (odours/staining/ecological impacts etc.) to be addressed separately

→ [X] As well as human health assessment, consideration of other issues such as ecological, aesthetics, etc. may be required.

Soils

Are there soil impacts remaining on the site?

→ [X] Y - Proceed
[ ] N - Go to groundwater section

Depth to soil impacts. Note if considering basements, depths need to be displaced e.g. a 3 m deep basement means surface to <1 m represents 3 m to <4 m.
(refer to Section 2.3.3 of the Application Document)

- [X] surface to <1 m
- [ ] 1 m to <2 m
- [ ] 2 m to <4 m
- [ ] 4 m and deeper

[X] Displacement due to basement
Distance of displacement (m) _____

Is the site of interest an uncontrolled site where excavation activities such as construction may result in subsurface soil contaminantion brought to surface in the future?

→ [X] Consideration may be given to use of HSLs for direct contact and surface HSLs for vapour intrusion, for deeper soils. A site management plan may be used to address uncontrolled excavation at a site.
(refer to Sections 2.3.1, 3.4.1, and 4.7 of the Application Document)

Groundwater

Are there groundwater impacts beneath the site?

→ [ ] Y - Proceed
[X] N - Go to soil vapour section

Is the depth to groundwater less than 2 m?

→ [ ] Y - The HSL values may not adequately address this scenario. A site-specific HRA may be considered.
Soil vapour sampling may be used to assess vapour intrusion.
(refer to Section 2.3.3 of the Application Document)

Depth to groundwater impacts. Note if considering basements, depths should be displaced e.g. a 3 m deep basement means surface to 2 m represents 5 m (refer to Sections 2.3.3 of the Application Document). With basements, groundwater HSLs may not adequately characterise risks where the groundwater level is within 2 m of basement foundation.

- [ ] 2 m to <4 m
- [ ] 4 m to <8 m
- [ ] 8 m and deeper

[ ] Displacement due to basement
Distance of displacement (m) _____

Step 4 – Impact media (cont.)

Soil vapour

Has soil vapour sampling been used to characterise vapour intrusion at the site? →

- [ ] Y - Proceed
- [X] N - Proceed to Step 5

Depth to soil impacts. Note if considering basements, depths need to be displaced e.g. a 3 m deep basement means surface to <1 m represents 3 m to <4 m.
(Refer to Section 2.3.3 of the Application Document.)

- [ ] surface to <1 m
- [ ] 1 m to <2 m
- [ ] 2 m to <4 m
- [ ] 4 m to <8 m
- [ ] 8 m and deeper

- [ ] Displacement due to basement
  Distance of displacement (m) _____

In using soil vapour sampling, please note the following:
1) It is recommended that soil vapour samples be taken as laterally close to a vapour source as possible (within or above).
2) Any sample taken within 1 m of the open air is subject to high levels of uncertainty due to atmospherical and meteorological effects. This includes the base and wall of excavation pits.
3) For sites subject to redevelopment with residential or commercial buildings, the soil vapour profiles are subject to change due to presence of concrete slabs. Caution is required on the use of soil vapour samples that are not within a soil source and in locations where buildings currently do not exist (refer to Section 1.6 of the Application Document).

Step 5 – Selection of relevant source concentrations

Soil concentrations

1. Is the investigation site likely to be subdivided into smaller lots? →
   - [X] Y - Statistical analysis using entire data set may not be applicable. Consideration may be given to using the maximums or using a sub-set for statistical analysis (refer to Section 3.4.1 of the Application Document)
   - [ ] N - Statistical analysis using entire data set may be applicable

2. Is the site public open space / recreational land where users are unlikely to be in the same location for extended period? →
   - [ ] Y - Statistical analysis using entire data set may not be applicable. Consideration may be given to using the maximums or using a sub-set for statistical analysis (refer to Section 3.4.1 of the Application Document)
   - [X] N - Statistical analysis using entire data set may be applicable

If statistical analysis is appropriate consideration should be given to the following methodology (refer to Section 3.4.1 of the Application Document):

1. Samples should be sub-divided into appropriate depth ranges as defined by HSLs (i.e. surface to <1 m, 1 m to <2 m, 2 m to <4 m, 4 m+). Note if considering basement, the appropriate displacement distance should be accounted for.
2. For each depth range, the statistical mean (e.g. 95% UCL arithmetic mean) soil concentration should be calculated for each chemical. One approach is described in the NSW EPA *Contaminated sites: Sampling design guidelines* (1995). The coefficient of variance test described in the document may be used to determine if the distribution is normal or lognormal. Consideration of other statistical methods may be adopted if justified (e.g. distribution does not fit a normal or lognormal distribution).
3. For samples with no detection, it is recommended to use half the detection limit during statistical analysis.
4. If the standard deviation is very large (due to outliers or low number of samples) the statistical mean may be higher than the maximum concentrations. In this case it is recommended to use the maximum.
5. It is recommended to keep note of maximum concentrations as well as statistical mean concentrations. Maximum concentrations may be required to address potential acute exposure issues.

Groundwater concentrations

Has floating product been identified in any well? →
- [ ] Y - Refer to point (a)

(a) If PSH is identified, dissolved phase is likely to contain chemicals at solubility limits. Proceed with HSL comparison, noting that if there is at least one chemical for which HSLs in groundwater is limiting (i.e. not all chemical HSLs are NL) then presence of PSH may be a potential vapour risk to site users (refer to Section 3.4.2 of the Application Document). Also note that the presence of PSH may trigger other legislative requirements for remediation/monitoring.

Is the area of interest represented by a single groundwater location or multiple ? →
- [ ] Single - small area of interest such as residential dwelling may be represented by the maximum groundwater concentration if the dwelling location is unknown, otherwise if the building footprint is known, the groundwater well nearest to the point of interest may be used.
- [ ] Multiple - where exposure may occur over larger areas such as recreational parkland, consideration may be given to averaging the concentrations across the area of interest.

In deciding which set of monitoring data is most useful for analysis consideration may also be given to:
- Historical results to determine trends in groundwater concentrations (i.e. the likelihood that concentrations may increase)
- Upgradient wells and background concentrations
- Groundwater flow direction

(Refer to Section 3.4.2 of the Application Document.)

Step 5 – Selection of relevant source concentrations (cont)

Soil vapour concentrations

Is the area of interest represented by a single or multiple vapour location? →

- Single - small area of interest such as residential dwelling may be represented by the maximum soil vapour concentration if the dwelling location is unknown, otherwise if the building footprint is known, the groundwater well nearest to the point of interest may be used.
- Multiple - where exposure may occur over larger areas such as recreational parkland, consideration may be given to averaging the concentrations across the area of interest.

Are soil vapour samples measured in shallow soil less than 1 m from the surface where there is no existing slab or concrete paving? →

- Y - Measurements are subject to influence from weather and atmospheric conditions and may not be considered reliable.

Are soil vapour samples measured in areas where there is no existing slab or concrete paving, and the site is planned to be redeveloped where a building will exist (residential/commercial/ industrial use)? →

- Y - Soil vapour samples not measured within a soil or groundwater source, may not be representative of the soil vapour in the future when a building is located on site. The placement of an impermeable barrier such as a concrete slab can cause build-up of soil vapour within the soil and sub-slab, above levels measured where there is no slab present. Note soil vapour measurements from within soil and groundwater sources are not subject to vapour build-up as the soil vapour is likely to be at its maximum concentration when located within the source.

Soil vapour measurements may be taken at multiple depths, including within the source zone, above the source zone, and directly under a building foundation. Each of the measurement depths should be considered individually.

Refer to Sections 3.4.3 and 1.6 of the Application Document.

Step 6 – HSL determination and combined vapour intrusion and direct contact

HSL determination

HSLs and satuaration/solubility limits are presented in the Appendix B HSL tables. Select the appropriate HSLs for vapour intrusion from tables for:
1) Each selected receptor listed in Step 2
2) Dominant soil texture classification listed in Step 3
3) Source depth listed in Step 4

HSLs may be compared to soil/groundwater/soil vapour source concentrations determined in Step 5.
Note for TPH C6 to C10, BTEX should be subtracted from analytical result prior to comparing with HSL

1. Is the HSL value Not Limiting 'NL'? →
   - ☐ Y - Indicates that vapour reaches saturation point and cannot increase to a point which would result in an unacceptable health risk
   - ☐ N - Continue with Question 2 for groundwater, or proceed to Question 3

2. Is groundwater HSL not 'NL' and PSH identified in water? →
   - ☐ Y - May indicate potential vapour risk (refer to Section 3.4.2 of Application Document)
   - ☐ N - Proceed to Question 3

3. Are comparisons being made against soil HSLs? →
   - ☐ Y - Proceed to Question 4
   - ☐ N - Proceed to Question 5

4. Does direct contact need to be considered as well as vapour intrusion? →
   - ☐ HSL-A Low-Density Residential - surface soils, and possibly subsurface soils if determined to be relevant (refer to Section 4.7 of Application Document). Proceed to 'Combined pathways exposure'
   - ☐ HSL-B High-Density Residential – surface soils. Proceed to 'Combined pathways exposure'
   - ☐ HSL-C Open Space Recreational – surface soils.Proceed to 'Combined pathways exposure'
   - ☐ HSL-D Commercial / Industrial – surface soils. Proceed to 'Combined pathways exposure'
   - ☐ Intrusive Maintenance Worker – down to 2 m. Proceed to 'Combined pathways exposure'
   - ☐ N - Proceed to Question 5

5. Do cross-scenario exposure need to be considered? (eg. adjacent residential and open space) →
   - ☐ Y - Proceed to 'Combined pathways exposure'
   - ☐ N - Proceed to Step 7

Combined pathways exposure

Refer to Section 3.3 of the Application Document.
Combined exposures may occur on the same property where indoor vapour intrusion occurs concurrently with outdoor direct contact.
Combined exposure may also occur on adjacent properties, e.g. vapour intrusion on residential property and direct contact on adjacent open space (park).
For the given scenarios/chemicals, list the HSLs.

Where a vapour intrusion HSL is Not Limiting (NL) the chemical / scenario does not need to be considered in the combined pathway exposure.

The combined exposure is assessed as follows:

Multiple exposure pathways: $$\textbf{Cumulative Fraction} = \frac{C_{\text{Under Building}}}{HSL_{\text{Vapour Intrusion}}} + \frac{C_{\text{Outside Building}}}{HSL_{\text{Direct Contact}}}$$ where vapour intrusion can refer to soil, groundwater or soil vapour source

Multiple exposure scenarios: $$\textbf{Cumulative Fraction} = \frac{C_{\text{Land use 1}}}{HSL_{\text{Land use 1}}} + \frac{C_{\text{Land use 2}}}{HSL_{\text{Land use 2}}}$$ where the HSLs may refer to HSLs for vapour intrusion or direct contact

If a given C/HSL fraction is less than 0.1, the contribution of risk may be considered insignificant and the cumulative exposure need not be assessed for this scenario.
Where a cumulative fraction is less than 1 risk is normally acceptable. Where the value exceeds 1 a site-specific assessment should be undertaken, or proceed to Step 7.

Step 7 – HSLs and adjustments (vapour intrusion)

HSL adjustments (vapour intrusion only)

For each adjustment, careful consideration and justification is required.

1. Vapour biodegradation (refer to Section 4.2 of Application Document)
Prior to applying attenuation factor for vapour degradation it is recommended to read the source documentation (Davis et al. 2009).
The minimum requirements for allowing attenuation factors for vapour degradation are as follows:

1. Is there evidence of oxygen penetration? → (refer to Section 4.2.1 of Application Document)
   - ☐ Y - Requires measurement of oxygen in soil gas with at least 5% at 1 m depth
   - ☐ N - Attenuation factor may not be applicable

2. Is the source depth 2 m or deeper? → (refer to Section 4.2.2 of Application Document)
   - ☐ Y - Continue to Question 3
   - ☐ N - Attenuation factor may not be applicable

3. Does the slab have one side less than 15m length? → (refer to Section 4.2.3 of Application Document)
   - ☐ Y - Degradation factor may apply. Less than 4 m depth, a factor of 10 may apply. 4 m and deeper, a factor of 100 may apply.
   - ☐ N - Attenuation factor may not be applicable

2. Soil organic carbon content (refer to Section 4.3 of Application Document)
May be used to adjust soil HSLs only. Soil HSLs were based on fraction organic carbon content of 0.003.
HSL may be adjusted if background levels of organic carbon content at the same depth as source is different from baseline. Background sample must not be contaminated with hydrocarbons. If surface soil, background sample in open space may not be appropriate to use if comparing for soil under slab.

Adjustment is linear, i.e. doubling the organic carbon will double the HSL. Applies only to soil HSL for vapour intrusion.

3. Air exchange rate (refer to Section 4.4 of Application Document)
HSLs are based on air exchange rate (AER) of 0.6 h^{-1} for residential and 0.83 h^{-1} for commercial.
Careful justification may be required prior to changing AER. Consideration should be given to weather conditions, practice of leaving doors/windows open, or closed in climate controlled building. New buildings tend to be more air tight to comply with energy saving regulations.

For soil and groundwater, adjustment is linear with respect to AER.
For soil vapour, adjustment is variable depending on soil type and depth.
Refer to the charts in Appendix D to determine the adjustment factor.

4. Moisture content (refer to Section 4.5 of Application Document)
HSLs may be adjusted if moisture content in soil is significantly different from baseline HSLs. The baseline moisture contents used were (dry wt) for sand 8%, silt 22% and clay 20%.
Moisture content should be representative of long-term moisture content and not short-term result from recent rain event. Also note that for a development with future building where no building currently exists, moisture contents on site may not be representative for the future state of the site.
HSL scaling factors for different land use/chemicals/soils are presented in Appendix C of the Application Document and may be applied as described in Section 4.5.

Step 7 – HSLs and adjustments (vapour intrusion) (cont.)

Saturation/solubility limits (soil and groundwater HSLs only)

Apply the adjustments to the HSLs for vapour intrusion by multiplying by the determined factors.

After applying the adjustments to the HSLs, is the revised HSL greater than the solubility / saturation limit? →
- ☐ Y - Indicates that the predicted source concentration to produce an unacceptable vapour risk is higher than the saturation point. The revised HSL is not limiting to vapour (NL). Note this does not apply to soils with direct contact.
- ☐ N - Revised HSL may be compared with measured source concentrations.

Multi-Pathway Exposure

1. Is inclusion of direct contact with soils required? →
   - ☐ Y - Repeat Step 6 with Adjusted Vapour Intrusion HSLs and Direct Contact HSLs
   - ☐ N - Proceed to Question 2

2. Is cross-scenario exposure required to be assessed?
   - ☐ Y - Repeat Step 6 with Adjusted Vapour Intrusion HSLs and Direct Contact HSLs
   - ☐ N - Proceed to 'Screening assessment'

Screening assessment

Is the adjusted HSL less than source concentration? →
- ☐ Y - Indicates potential health risk
- ☐ N - Considered within acceptable health risks. If cancer endpoint (benzene) may also need to assess cancer risk level and cumulative cancer risk in Step 8

Is the maximum soil, groundwater or soil-vapour concentration greater than the HSL by more than one or two orders of magnitude? →
- ☐ Y - Indicates potential acute risk around hotspot
- ☐ N - Considered within acceptable health risks

If the screening assessment indicates the potential for unacceptable health risk, consideration may be given to further investigations such as further contaminantion deliniation, site-specific health risk assessment or site management. Before deciding the appropriate form of action considerations should include:
- The magnitude of HSL exceedence
- The nature of the source
- The time frame required for managing health risks
- Other statutory requirements

Step 8 – Cancer risk assessment

Acceptable cancer risk

(Refer to Section 5.1 of Application Document)

HSLs for benzene have been based on 1 x 10^{-5} cancer risk. In some jurisdictions it may be required to assess carcinogenic risks based on 1 x 10^{-6} cancer risk.

1) The HSLs are linearly related to acceptable risk. HSLs based on a cancer risk of 1 x 10^{-6} may be calculated by dividing the HSLs in Appendix B by a factor of 10.
2) If the HSL is NL (vapour only HSL), it is possible that it may become limiting if the HSL is within a factor of 10 of the soil saturation concentration (or solubility limit for groundwater).
3) If soil or groundwater source concentration is less than an order of magnitude of the saturation concentration / solubility limit (in Appendix B), then even dividing the non-limiting HSL by 10 would result in an acceptable risk. Hence there is no need to proceed further.
4) If soil or groundwater source concentration is within an order of magnitude of the saturation concentration / solubility limit it is recommended to calculate the revised HSL from the non-limiting HSL. This process is outlined as follows:

Calculating revised HSL for 10^{-6} cancer risk from non-limiting HSL.

1) The non-limiting HSLs are presented in Friebel & Nadebaum 2011 (Part 1).
2) The derived HSLs are presented in Appendix F.
3) Find the pages that correspond to the source type (soil, groundwater, soil vapour) for the given scenario (residential / commercial / recreational / intrusive maintenance). Note indicator chemicals and TPH have been separated.
4) For the corresponding soil category, depth and chemical, the Vapour Intrusion HSL and saturation/solubility concentration is presented in the columns on the right.
5) If this HSL is divided by 10 and the result is greater than Csat (for soil) or saturation limit (for groundwater), then the revised HSL is still NL. Otherwise the result is the revised Vapour HSL.

Cumulative cancer risk

(Refer to Section 3.6.1 of Application Document)

HSLs for benzene have been based on 1 x 10^{-5} cancer risk. In most jurisdictions it is required to assess total carcinogenic risks based on 1 x 10^{-5} cancer risk.

If HSLs are not NL for benzene and another carcinogenic chemical is identified, such as PAHs, follow the proedure outlined in Section 3.6.1.

The cumulative fraction may also be applied to more than two chemicals.

Note that multiple sources should be considered. For example, a resident may be exposed through direct contact with PAHs in surface soil, but also benzene vapours from soil and groundwater. For vapour risk (benzene), the risk contribution should consider the greatest risk for the receptor from all vapour sources. Because multiple sources do not have an additive effect, the source with the greatest risk needs to be identified (refer to Section 3.5 for discussion on multiple vapour sources). This means that for all sources/depths the source concentration should be divided by their respective HSLs to calculate the benzene contribution to cumulative risk. The highest fraction determines which source poses the greatest risk to receptors.

The same may be carried out for carcinogenic PAHs. The sum of the highest benzene fraction and the highest PAH fraction results in the highest possible cumulative fraction.

Appendix D

QA/QC Report

QA/QC PROCEDURES AND RESULTS

Q1. Data Quality Objectives

The detailed site investigation has been devised broadly in accordance with the seven step data quality objective (DQO) process which is provided in the *Guidelines for the NSW Site Auditor Scheme* (2nd Edition), 2006. The DQO process has also been adopted in Appendix B, Schedule 2 of National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013. The DQO process is outlined as follows:

(1) State the Problem

The "problem" to be addressed is to characterize the nature and extent of contamination, if any, at the site, and to make recommendations for further investigations and/or remediation to render the site suitable for the proposed redevelopment works.

(2) Identify the Decision

Environmental data, including soil and groundwater characteristics, is required as part of the contamination assessment process to enable an assessment of the contamination status of the site, and the requirement for further assessment and/or remediation. The following specific decisions are required to be made:

- Do the existing fill materials and natural soils pose a potential risk to human health of potential future users of the site, including construction workers, site workers, and visitors?
- Do the existing fill materials and natural soils pose a potential risk to ecological receptors, either current receptors or potential future receptors?
- Does the existing groundwater beneath the site pose a potential risk to human health (on-site or off-site) or ecological receptors, either current receptors or potential future receptors?
- Is the data sufficient to make a decision regarding the abovementioned risks, or are additional investigations required?
- Is the data sufficient to enable preparation of a Remediation Action Plan (RAP) and/or Environmental Management Plan (EMP) should the data suggest these are required?

(3) Identify Inputs to the Decision

Inputs into the decision are as follows:

- Available site information regarding previous and current activities undertaken on the site and the surrounding area (presented in previous reports, in particular, the initial Contamination Assessment);
- Results of previous investigations undertaken;
- Screening results;

- The local geology, topography and hydrology
- Soil data collected from the site, included analytical results for the contaminants of concern;
- Groundwater data collected from the site, including analytical results and the contaminants of concern;
- Relevant Site Assessment Criteria (SAC) and Groundwater Investigation Levels (GIL); and
- Field and laboratory QA/QC data to assess the suitability of the environmental data for the assessment.

(4) Define the Boundary of the Assessment

The 'proposed school' site buildings and basement car park are located immediately north of Fox Valley Road, and is surrounded by an existing Church to the west, associated Sydney Adventist development to the east and unsealed temporary car park to the north. This area is currently occupied by demountable classroom buildings and temporary car parks, both asphaltic concrete sealed and unsealed gravel.

The future residential/temporary PE courts site is located between the proposed school and playing field sites, in the central portion of the temporary, bitumen car park. The future residential site is situated adjacent to an existing, underground detection tank (the grassed rectangular patch) in the north-western portion of the car park.

The 'proposed playing fields' site is located in the far north-eastern corner of the Estate and are surrounded by nature reserve and Coups Creek to the north and east Fox Valley Road and, residential lots to the south and a temporary car park to the west. Ground surface levels within this area dip down to the north-east towards the bushland and Coups Creek.

The site boundaries are shown on Drawing 1, Appendix A.

(5) Develop a Decision Rule

The information obtained during the assessment will be used to characterise the site in terms of contamination issues and risk to human health and/or the environment. The decision rule in characterising the site will be as follows:

- Laboratory test results for systematic soil samples were assessed individually against the SAC;
- The SAC and GIL were the NSW Environment Protection Authority (EPA) endorsed criteria. Where such criteria are not available, other recognised national or international standards were used;
- A contaminant concentration in soil/filling material was considered to be significant if:
  - The concentration of the contaminant is more than 2.5 times the investigation or screening level. Any location more than 2.5 times the SAC was classified as a 'hotspot', requiring further assessment/ management;

- The groundwater was considered not significantly impacted by a particular contaminant if there is no notable or significant increase in analyte concentrations in the groundwater between well locations and/or there are no analyte concentrations in the groundwater samples significantly exceeding the adopted GIL; and
- Further investigation, remediation and/or management were recommended if the site is found to be contaminated or containing contamination "hot spots".

Laboratory test results were only accepted and considered useable for the assessment under the following conditions:

- All laboratories used are accredited by NATA for the analyses undertaken. DP used Envirolab Services as the primary laboratory and Eurofins mgt as the secondary laboratory;
- All practical quantitation limits (PQL) set by the laboratories fall below the SAC and GIL adopted, or indicate across the board lack of detection (i.e. it is noted that some of the water assessment criteria are difficult to achieve at PQL);
- The differences between the reported concentrations of analytes in the intra-laboratory and inter-laboratory replicate samples and the corresponding original samples are within adopted acceptance limits; and
- The quality assurance / quality control (QA/QC) protocols and results reported by the laboratories comply with the requirements of NEPM, 1999 amended 2013.

(6) Specify Acceptable Limits on Decision Errors

Limits on decision errors for the proposed assessment will be as follows:

- Systematic soil sample numbers comply (where possible) with those recommended in the NSW EPA *Sampling Design Guidelines* (1995), which have risk probabilities already incorporated.
- The analyte selection was based on the available site history, past site activities, site features and the findings of the initial contamination assessment. The potential for contaminants other than those proposed to be analysed is considered to be low;
- The SAC and GIL were adopted from established and NSW EPA endorsed guidelines. Where not available, recognised national and international guidelines were used. The SAC and GIL have risk probabilities already incorporated; and
- The acceptance limits for laboratory QA/QC parameters are based on the laboratory reported acceptance limits and those stated in NEPM, 1999 amended 2013.

(7) Optimise the Design for Obtaining Data

Sampling locations were located to provide site coverage where accessible to a drilling rig. Procedures for the collection of environmental samples, were developed prior to undertaking the assessment phase of works.

To optimise the selection of samples for chemical analysis, all samples collected were screened using a calibrated photo-ionisation detector (PID). The interpretation of PID values allowed for better

assessment of the investigation samples to determine the analytical programme and the need, if any, for further investigation. Further, DP employed NATA accredited analytical laboratories to conduct sample analysis.

Q2. FIELD QUALITY ASSURANCE AND QUALITY CONTROL

The field QC procedures for sampling as prescribed in Douglas Partners *Field Procedures Manual* were followed at all times during the assessment.

Q2.1 Sampling Team

Soil sampling was by Wen-Fei Yuan, Richard Lamont and David Walker, DP Environmental Scientist/Engineer. Groundwater sampling was undertaken by Alan Gainey, a DP Engineer.

Q2.2 Sample Collection and Weather Conditions

Sample collection procedures and dispatch are reported in Section 8. Soil and groundwater sampling was undertaken under mainly fine weather conditions.

Q2.3 Logs

Logs for each soil sampling location were recorded in the field. The individual samples were recorded on the field logs along with the sample identity, location, depth, initials of sampler, duplicate locations, duplicate type, site observations. Logs are presented in Appendix B.

Field records of groundwater sampling and development were maintained including records of micro-purging and field parameters presented in Appendix B.

Q2.4 Chain of Custody

Chain of custody information was recorded on the Chain of Custody (COC) sheets and accompanied samples to the analytical laboratory. Signed copies of COCs are presented in Appendix C, following the laboratory reports.

Q2.5 Q2.5 Sample Splitting Techniques

Replicate samples were collected in the field as a measure of accuracy, precision and repeatability of the results. Field replicate samples for soil were collected from the same location and an identical depth to the primary sample. Equal portions of the primary sample were placed into the sampling jars and sealed. The sample was not homogenised in a bowl to prevent the loss of volatiles from the soil. Replicate samples were labelled with a DP identification number, recorded on DP bore logs, so as to conceal their relationship to their primary sample from the analysing laboratory.

Groundwater replicate samples were collected by decanting equal portions of groundwater into separately and uniquely labelled groundwater bottles. Sample bottles were filled directly from the pump outlet to minimise disturbance.

Q2.6 Replicate Frequency

Field sampling comprised inter-laboratory and intra-laboratory replicate sampling, at a rate of at least one replicate sample for every ten original samples for intra-laboratory and inter-laboratory analysis, with a minimum of one replicate sample per sampling day.

Q2.7 Trip Spikes

According to *the NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (2000,)* preservation methods as the field samples, then analysed for volatile contaminants (BTEX in this case), for the purposes of assessing any potential losses in volatile organics incurred prior to reaching the laboratory.

Discussions with the laboratory indicated that trip spikes are generally prepared as aqueous solutions. The laboratory prepared soil trip spikes which were preserved in the standard manner and taken into the field unopened. The volatile organic recovery rates are shown in the table below. At this stage, the laboratory has no standard acceptance limits in recovery rates as results from in-house laboratory controls often vary.

A trip spike was taken into the field on every soil sample day and every groundwater sampling day and dispatched with the batch sampling run. Results (Table Q1) indicate that the percentage loss for BTEX during the trip was minimal and therefore appropriate preservation techniques were employed.

Table Q1: Trip Spike Results (% Recovery)

Sampling ID	Benzene	Toluene	Ethylbenzene	m + p Xylene	o-Xylene
Soil Spikes					
TS1	103	95	90	86	63
TS2	98	102	100	99	98
TS3	101	101	102	116	101
TS4	101	101	105	104	104
Water Spikes					
Trip Spike	92	96	106	100	104

Q2.8 Trip Blanks

Laboratory prepared soil trip blanks and water trip blanks were taken out to the field unopened, subjected to the same preservation methods as the field samples, then analysed for the purposes of determining the transfer of contaminants into the blank sample incurred prior to reaching the laboratory. The result of the laboratory analysis for the trip blanks is shown in Table Q2.

Table Q2: Trip Blank Results

Sampling Date	Benzene	Toluene	Ethylbenzene	m+p Xylene	o- Xylene
Soil Blanks (mg/kg)					
TB1	<0.2	<0.5	<1	<2	<1
TB2	<0.2	<0.5	<1	<2	<1
TB3	<0.2	<0.5	<1	<2	<1
TB4	<0.2	<0.5	<1	<2	<1
Water Blanks (µg/L)					
Trip Blank	<1	<1	<1	<2	<1

Levels of analytes were all below detection limits and indicate transfer of BTEX contaminants into the blank has not occurred.

Q2.9 Relative Percentage Difference

A measure of the consistency of results for field samples is derived by the calculation of relative percentage differences (RPDs) for duplicate samples. A RPD of 30% is generally considered typically acceptable for inorganic analytes by NSW EPA, although in general a wider RPD range (50%) may be acceptable for organic analytes. RPDs have only been considered where a concentration is greater than 5 times the practical quantitation limit (PQL). High RPDs are shown in **bold** on the relevant tables below.

Q2.9.1 Intra-Laboratory Analysis

Intra-laboratory replicates were conducted as an internal check of the reproducibility within the primary laboratory (Envirolab Pty Ltd) and as a measure of consistency of sampling techniques. Replicate samples were collected at a rate of approximately one replicate sample for every ten original samples collected and also analysed at a rate of 10% of primary samples analysed. Generally at least one replicate sample was recovered and analysed for each day of sampling.

The comparative results of analysis between original and replicate samples are summarised in the Tables Q3 and Q4.

Table Q3: RPD results for Intra-laboratory soil samples

	3/0.4-0.5	BD1A/190613	RPD	4/0.4-0.5	BD2A/190613	RPD	6/0.4-0.5	BD3A/190613	RPD	7/0-0.1	BD4A/190613	RPD
Arsenic	7	9	25	9	9	0	5	7	**33**	14	14	0
Cadmium	<0.4	<0.4	0	<0.4	<0.4	0	<0.4	<0.4	0	<0.4	<0.4	0
Chromium (VI)	14	12	15	10	12	18	14	14	0	18	16	12
Copper	32	17	**61**	21	21	0	20	21	5	18	17	6
Lead	17	20	16	17	19	11	21	20	5	42	29	**37**
Mercury	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	0.1	<0.1	0
Nickel	<1	<1	0	1	<1	0	3	4	1	5	4	22
Zinc	5	2	**86**	13	12	**8**	18	22	20	39	25	**44**
TRH C6-C10 less BTEX	<25	<25	0	<25	<25	0	<25	<25	0	<25	<25	0
TRH >C10-C16 less Naphthalene	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
TRH C6-C10	<25	<25	0	<25	<25	0	<25	<25	0	<25	<25	0
TRH >C10-C16	<50	<50	0	<50	<50	0	<50	<50	0	<50	<50	0
TRH >C16-C34	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
TRH >C34-C40	<100	<100	0	<100	<100	0	<100	<100	0	<100	<100	0
TRH C6-C9	<25	<25	0	<25	<25	0	<25	<25	0	<25	<25	0
TRH +C10-C36	<250	<250	0	<250	<250	0	<250	<250	0	<250	<250	0
Naphthalene	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Benzene	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0
Toluene	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0	<0.5	<0.5	0
Ethylbenzene	<1	<1	0	<1	<1	0	<1	<1	0	<1	<1	0
Total Xylene	<3	<3	0	<3	<3	0	<3	<3	0	<3	<3	0

Table Q4: RPD results for Intra-laboratory Groundwater Sample

	GW8	BD1A/020713	RPD
Arsenic	<1	<1	0
Cadmium	<0.1	<0.1	0
Chromium (III+VI)	<1	<1	0
Copper	<1	<1	0
Lead	<1	<1	0
Mercury	<0.05	<0.05	0
Nickel	10	10	0
Zinc	51	50	2
TRH C6-C10 less BTEX	16	16	0
TRH >C10-C16 less Naphthalene	<50	<50	0
TRH C6-C10	20	20	0
TRH >C10-C16	<50	<50	0
TRH >C16-C34	<100	<100	0
TRH >C34-C40	<100	<100	0
TRH C6-C9	<10	<10	0
TRH +C10-C36	<250	<250	0
Benzene	<1	<1	0
Toluene	<1	<1	0
Ethylbenzene	<1	<1	0
Total Xylene	3	3	0

The greater majority of calculated RPD values were within the acceptable range of 30% for inorganic analytes and 50% for organic analytes with the exception of those in bold. However, this is not considered to be significant due to:

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred, particularly for groundwater;
- A number of replicate pairs being collected from fill soils which by its nature is heterogeneous;
- Replicates, rather than homogenised duplicates were used to avoid volatile loss, hence greater variability can be expected;
- Most of the recorded concentrations being at/ close to the practical quantitation limit;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQI's

Therefore the overall intra-laboratory comparisons indicate that the sampling technique was consistent and repeatable and therefore the results are useable and representative of the conditions encountered.

Q2.9.2 Inter-Laboratory Analysis

Inter-laboratory duplicates were conducted as a check of the reproducibility of results between the primary laboratory (Envirolab Pty Ltd) and a secondary laboratory (Eurofins mgt) and as a measure of consistency of sampling techniques. Inter-laboratory replicates were collected at a rate at least one replicate sample for every 10 original samples collected and also analysed at a rate of 10% of primary samples analysed.

The comparative results of analysis between original and inter-laboratory replicates are summarised in Table Q5. Note that where the laboratory PQL are different and both samples are below PQL (or one sample is below PQL and other has a recorded detection below the other lab PQL) the difference and RPD has been given as zero (0).

Table Q5: Inter-laboratory Results – Soils

	11/1.3-1.5	BD1/200613	RPD	13/0.45-0.55	BD2/200613	RPD	14/0.3-0.4	BD3/200613	RPD	12/0.1-0.4	BD1/210613	RPD
Arsenic	6	8	29	7	6.1	14	5	5.4	8	7	8	13
Cadmium	<0.4	<0.4	0	<0.4	<0.4	0	<0.4	<0.4	0	<0.4	<0.4	0
Chromium (III+VI)	8	<5	**46**	16	5.7	**95**	19	8.7	**74**	12	<5	**82**
Copper	23	20	14	16	14	13	14	26	**60**	8	20	**86**
Lead	19	20	5	19	21	10	38	43	12	16	20	22
Mercury	<0.1	<0.05	**67**	0.1	<0.05	**67**	0.6	0.33	**58**	0.2	<0.05	**120**
Nickel	1	<5	**133**	4	<5	22	10	9.1	9	3	<5	**50**
Zinc	8	9	12	11	10	10	39	49	23	18	9	**67**
TRH C6-C10 less BTEX	<25	<20	22	<25	<20	22	<25	<20	22	-	-	-
TRH >C10-C16 less Naphthalene	<50	<50	0	<50	<50	0	<50	<50	0	-	-	-
TRH C6-C10	<25	<20	22	<25	<20	22	<25	<20	22	-	-	-
TRH >C10-C16	<50	<50	0	<50	<50	0	<50	<50	0	-	-	-
TRH >C16-C34	<100	<100	0	<100	<100	0	<100	<100	0	-	-	-
TRH >C34-C40	<100	<100	0	<100	<100	0	<100	<100	0	-	-	-
TRH C6-C9	<25	<20	22	<25	<20	22	<25	<20	22	-	-	-
TRH +C10-C36	<250	70	**113**	<250	<50	**133**	<250	<50	**133**	-	-	-
Benzene	<1	<0.5	**67**	<1	<0.5	**67**	<1	<0.5	**67**	-	-	-
Toluene	<0.2	<0.1	**67**	<0.2	<0.1	**67**	<0.2	<0.1	**67**	-	-	-
Ethylbenzene	<0.5	<0.1	**133**	<0.5	<0.1	**133**	<0.5	<0.1	**133**	-	-	-
Total Xylene	<1	<0.3	**108**	<1	<0.3	**108**	<1	<0.3	**108**	-	-	-

The greater majority of calculated RPD values were within the acceptable range of 30% for inorganic analytes and 50% for organic analysts with the exception of those in bold. However, this is not considered to be of concern due to:

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred;
- A number of replicate pairs being collected from fill soils which by its nature is heterogeneous;
- Replicates, rather than homogenised duplicates were used to avoid volatile loss, hence greater variability can be expected;
- Most of the recorded concentrations being at/ close to the practical quantitation limit;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQI's

Therefore the overall inter-laboratory comparisons indicate that the sampling technique was consistent and repeatable and therefore the results are useable and representative of the conditions encountered.

Q3. LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

Envirolab Services was used as the primary laboratory. Eurofins mgt was used as the secondary laboratory.

Q3.1 Surrogate Spike

This sample is prepared by adding a known amount of surrogate, which behaves similarly to the analyte, prior to analysis to each sample. The recovery result indicates the proportion of the known concentration of the surrogate that is detected during analysis. These results are within acceptance limits as specified in Envirolab Services, indicating that the extraction technique was effective.

The laboratory acceptance criteria for surrogate samples is generally 60-140% for organics; and 10-140% for SVOC and speciated phenols.

Q3.2 Reference and Daily Check Sample Results – Laboratory Control Sample (LCS)

This sample comprises spiking either a standard reference material or a control matrix (such as a blank of sand or water) with a known concentration of specific analytes. The LCS is then analysed and results compared against each other to determine how the laboratory has performed with regard to sample preparation and analytical procedure. LCSs are analysed at a frequency of 1 in 20, with a minimum of one analysed per batch.

The laboratory acceptance criteria for LCS samples is generally 70-130% for inorganic/ metals; and 60-140% for organics; and 10-140% for SVOC and speciated phenols.

Q3.3 Laboratory Duplicate Results

These are additional portions of a sample which are analysed in exactly the same manner as all other samples. The laboratory acceptance criteria for duplicate samples is: in cases where the level is <5xPQL – any RPD is acceptable; and in cases where the level is >5xPQL – 0-50% RPD is acceptable.

Q3.4 Laboratory Blank Results

The laboratory blank, sometimes referred to as the method blank or reagent blank is the sample prepared and analysed at the beginning of every analytical run, following calibration of the analytical apparatus. This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, it can be determined by processing solvents and reagents in exactly the same manner as for samples. Laboratory blanks are analysed at a frequency of 1 in 20, with a minimum of one per batch.

Q3.5 Matrix Spike

This is a sample duplicate prepared by adding a known amount of analyte prior to analysis, and then treated exactly the same as all other samples. The recovery result indicates the proportion of the known concentration of the analyte that is detected during analysis. The laboratory acceptance criteria for matrix spike samples is generally 70-130% for inorganic/metals; and 60-140% for organics; and 10-140% for SVOC and speciated phenols.

Q3.6 Results of Laboratory QC

The laboratory QC for surrogate spikes, LCS, laboratory duplicate results, method blanks and matrix spikes were generally within the acceptance standards. There were, however a few comments made in some of the laboratory reports which are summarised in Table Q6 below.

Table Q6: Laboratory QA Comments

Report No.	Laboratory	Laboratory Comment
92803-A	Envirolab	No Comments
93534	Envirolab	No Comments
92803-B	Envirolab	No Comments
93397	Envirolab	No Comments
93397-A	Envirolab	OC/PCB's in water analysed by NMI. Report No. RN0981532
92803	Envirolab	This report is consistent with the analytical procedures and reporting recommendations in the Western Australian Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia – May 2009. Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-samples is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container. METALS_S: # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS. METALS_S: ## Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.
92877	Envirolab	METALS_S: # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS. This report is consistent with the analytical procedures and reporting recommendations in the Western Australian Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia – May 2009.
383843-S	Eurofins mgt	No Comments

The majority of the laboratory quality control samples were within the laboratory acceptance criteria, with the exception of those identified in Table Q6. The QC failures, where they occurred, are not considered to have significantly impacted the quality of the results overall as the number of failures were minor compared to the overall QC data. It is considered that an acceptable level of laboratory precision and consistency was achieved and that surrogate spikes, LCS, laboratory duplicate results, method blanks and matrix spike results were of an acceptable level overall. On the basis of this assessment, the laboratory data sets are considered to be reliable and useable for this assessment.

Q4. QA/QC DATA EVALUATION

The following Table Q7 provides a list of the data quality indicators adopted for the detailed site investigation and the methods adopted in ensuring that the data quality indicators were met. Reference should be made to all previous sections and referenced Appendices for specific details.

Table Q7 : QA/QC Data Evaluation

Data Quality Indicator	Method(s) of Achievement
Data Precision and Accuracy	Use of trained, qualified and inducted field staff; Adequate field QA/QC samples prepared and/or recovered, including field replicates, trip spike and trip blank; Use of analytical laboratories experienced in the analyses undertaken, with appropriate NATA certification; Appropriate and validated laboratory test methods used; Adequate laboratory performance based on overall results of the blank samples, matrix spike samples, control samples, duplicates and surrogate spike samples; Acceptable RPD overall for replicate comparison; Acceptable concentrations (less than PQL) in trip blank samples; Acceptable recoveries in trip spike samples.
Data Representativeness	Sampling location numbers comply with the NSW EPA sampling design guidelines; Representative coverage of potential contaminant sources, based on site history, site activities and site features; Representative coverage of potential contaminants, Adequate replicate sample numbers prepared and analysed, complying with NEPM; Batch and daily trip spike, trip blank and rinsate samples analysed; and Adequate laboratory internal quality control and quality assurance methods overall, complying with the NEPM.
Documentation Completeness	Preparation of borehole logs, groundwater sampling records, sample location plan and chain of custody records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; and NATA registered laboratory results certificates provided by all laboratories used.

Data Quality Indicator	Method(s) of Achievement
Data Completeness	Sample location numbers comply with EPA guidelines; Analysis for all potential contaminants of concern; and Field replicate sample, trip spike, and trip blank numbers and complying with NEPM.
Data Comparability	Using appropriate techniques for sample recovery; Experienced samplers used throughout; Using appropriate sample storage and transportation methods; Using the same sampling, storage and transportation methods for each day of sampling; Use of NATA registered laboratories; Test methods consistent for each sample; Acceptable RPD between original samples and field replicates; and Adequate laboratory internal quality control and quality assurance results, generally complying with the NEPM and laboratory internal standards.

Based on the above, it is considered that the quality assurance and quality control data quality indicators have been generally complied with. Overall, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.