Urban Growth NSW
Environmental and Geotechnical Site Investigation

Sewage Treatment Plant
Former Defence Ingleburn Site
Campbelltown Rd, Edmondson Park, NSW

13 December 2013
43008-56443 (Rev A)

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List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

ACM	Asbestos Containing Material
AHD	Australian Height Datum
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
COC	Chain of Custody
COPC	Contaminant of potential concern
CSM	Conceptual site model
BTEX	Benzene, toluene, ethylbenzene and xylenes
B(a)P	Benzo(a)pyrene
DEC	NSW Department of Environment and Conservation
DECCW	NSW Department of Environment, Climate Change and Water
DO	Dissolved oxygen
DQI	Data quality indicator
DQOs	Data Quality Objectives
DWE	NSW Department of Water and Energy
Eh	Redox Potential
EPA	NSW Environment Protection Authority
ESA	Environmental Site Assessment
ha	Hectare
HIL	Health based investigation level
IDS	Ingleburn Defence Site
JBS&G	JBS&G (NSW & WA) Pty Ltd (formerly JBS Environmental Pty Ltd)
LOR	Limit of Reporting
NEPM	National Environment Protection Measure
OEH	Office of Environment and Heritage
OCP	Organochlorine Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RPD	Relative Percentage Difference

SAQP	Sampling, Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SMF	Synthetic Mineral Fibres
STP	Sewage Treatment Plant
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compound

Executive Summary

JBS&G (NSW and WA) Pty Ltd (JBS&G) was engaged by Urban Growth NSW (UGNSW) to undertake a detailed environmental site contamination assessment of the site required prior to remediation of the Sewage Treatment Plant (STP) and two associated oxidation pond areas. The site is accessed from Campbelltown Road at Edmondson Park, NSW.

The site comprises the STP Compound and two oxidation ponds, which cover an area of approximately 1.5 to 2 hectares (ha). Within the STP Compound are several buildings, primary treatment ponds, pipes, tanks, two large trickle filters and associated infrastructure. It is understood the site is a redundant STP for the former Ingleburn Army Camp.

Previous investigations have been completed within the site and adjacent to the site. The investigation identified elevate nutrients within soils and groundwater at the site, biological constituents in soils down gradient of the STP area and asbestos containing materials (ACM) along the STP boundary. Additionally, TPH and biologicals were reported in sewer sludge. The TPH concentrations were attributed to organic matter in the sediment. The elevated nutrients may be attributed to natural features of the soils present at the site. The biologicals were not compared with guidelines during the previous assessment. A detailed site characterisation assessment was required to determine if the site is suitable for the proposed open space use.

The objectives of the detailed site assessment were to:

- obtain sufficient data to characterise current site conditions in relation to proposed use of the site as open space; and
- assess the suitability of the site for the proposed use or make recommendations to enable such conclusions.

The scope of works completed for this assessment comprised:

- a review of available site history and background information, and a detailed inspection of the site and surrounds to identify the presence of potential areas of environmental concern;
- development and documentation of a conceptual site model (CSM) based on the available information;
- development and documentation of the data quality objectives (DQOs) for the detailed investigation as a sampling, analytical and quality plan (SAQP);
- implementation of a site investigation program including soil and groundwater sampling as per the SAQP, as well as geotechnical site investigations;
- Laboratory analysis of representative surface and subsurface fill material, natural soils and sediment samples was completed for a broad range of identified COPC including heavy metals, polycyclic aromatic hydrocarbons (PAHs), organochlorine compounds (OCPs), total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes (BTEX), polychlorinated biphenyls (PCBs), asbestos, major cations and anions, nutrients and biological parameters.
- comparison of collected data against *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPC 2013*[1]*)*, health based investigation levels (HILs) for public open space landuse (HIL-C) and ecological based criteria (EILS/ESLs) ;

[1] *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* (NEPC 2013).

- preparation of an environmental site assessment report in general accordance with relevant NSW Environmental Protection Agency (EPA) Guidelines; and
- assessment of whether the site is suitable from a site contamination perspective, for the proposed land use or, where the site was identified as not suitable, provision of recommendations for future remediation/management, including potential containment, actions required to make the site suitable.

Based on the findings of this investigation and subject to the limitations in **Section 13**, the following conclusions are made with respect to the site:

- Fill material comprising a mix of silty clay /silty sand, gravels was identified at the site to depths of between 0.2 m bgs to 1.9 m bgs. Where encountered, natural soils underlying the fill material comprised either residual clay soil and/or weathered shale and shale bedrock
- One sediment sample in the west oxidation pond has been identified as having a concentration of lead that exceeded the NEPC (2013) health based investigation levels (HIL) and adopted ecological investigation levels (EIL) for urban residential and public open space landuse(s).
- A total of 4 samples from within the oxidation ponds, were analysed for E.Coli, faecal coliforms, salmonella, helminth ova and enteric viruses, with 3 having E.coli above the NSW EPA *Use and Disposal of Biosolids products*, 1997 guidelines.
- Concentrations of COPCs were below the relevant criteria in all other samples collected from the STP, eastern oxidation pond and western oxidation pond.
- Suspected asbestos containing materials (ACM) were visually identified within soil at one location within the fill material within the bank of the eastern oxidation pond during the investigation works. Subsequent selected laboratory analysis did identify a matted material containing asbestos fibres in fill material in the surface soil sample within the east oxidation pond.
- One location within the western oxidation pond contained lead 250% the adopted site criteria. All other soil samples collected were below the adopted criteria for lead.
- Concentrations of COPCs were below the relevant criteria in samples collected from the trickle filters.
- Groundwater and surface water heavy metal and organic contaminant concentrations are considered not to represent an unacceptable risk to sensitive receptors at, or down-gradient of the site as the metal concentrations are likely to be the result of background concentrations associated with the shale bedrock rather than contamination at the site.
- Elevated concentrations of ammonia above the ANZECC 2004 guidelines in groundwater have been identified at one of the four groundwater sampling locations and surface water from the west oxidation pond. The ammonia concentration in groundwater is present in the sample collected at the up-gradient extent of the site in the STP area and the concentration at the down-gradient extent of the site is less than the adopted assessment criterion. The source of the ammonia in groundwater and surface water is considered to comprise the decomposition of organic material and is potentially a regional issues. The concentrations of ammonia in the current assessment is lower than the previous concentrations in the previous assessment (ERM 2010).
- Elevated concentrations of ammonia were reported within one groundwater monitoring well (MW04), located within the STP area and one surface water sample collected from the western oxidation pond. The latter may have been associated with decomposing algae.

- Concentrations of TPH were reported to be consistent with the previous investigation.
- Concentrations of ammonia were lower in the current investigation that the previous investigation.
- Biological concentrations are lower than in the current investigation across the site than the previous investigation.
- Based on the current assessment findings, it is considered the site can be made suitable for the proposed use subject to implementation of an appropriate site management strategy to address site contamination issues including the heavy metal, asbestos and E.coli impacts.

Should encapsulation of material be required, the cleared areas east of the STP is considered a suitable area as the area was previously remediated and a SAS issued (AECOM 2011). Following demolition and any remediation works, the STP site could also be utilised. The area of the eastern oxidation pond may be suitable, dependent on whether or not this pond will be retained as a surface water feature for the regional park. Discussion of the containment cell aspects will be provided in separate advice.

It is recommended that a management strategy and/or Remedial Action Plan (RAP) be developed in accordance with the relevant regulatory requirements to address the identified contamination issues to render the site suitable for the proposed open space use

1 Introduction and Background

1.1 Background

JBS&G (NSW & WA) Pty Ltd (JBS&G) has been engaged by Urban Growth NSW (UGNSW) to provide environmental site investigation services required prior to remediation of the Sewage Treatment Plant (STP) and two associated oxidation pond areas, accessed from Campbelltown Road at Edmondson Park, NSW. The site location is shown on **Figure 1**.

Based on information provided by UGNSW, the site comprises the STP Compound and two oxidation ponds, which cover an area of approximately 1.5 to 2 hectares (ha). Within the STP Compound are several buildings, primary treatment ponds, pipes, tanks, two large trickle filters and associated infrastructure. The site layout is shown on **Figure 2**.

It is understood the site is a redundant STP for the former Ingleburn Army Camp. When acquired by UrbanGrowth NSW in 2011, the STP was servicing the Ingleburn North Primary School, the Bardia Barracks heritage precinct and a number of residential tenancies. The STP was shut down in late 2011. The Department of Defence (Defence) had undertaken a number of investigations of the site, but had not initiated any remedial plans. Other areas of the former Ingleburn Defence Site (IDS) have undergone investigation and remediation, and are subject to a Site Audit Statement (SAS) regarding their suitability for mixed land uses. The STP and oxidation ponds were excluded from the remediation program and the SAS. The site boundaries on **Figures 1 and 2** are based on figures provided in the Site Audit Report (SAR)[2] indicating the area as being excluded.

The investigation area boundaries have been assumed as described below:

- The STP Compound is bound by the Compound's security fence;
- The boundary of the oxidation ponds is assumed to be an area immediately surrounding the top of each pond's bank in the order of 10 to 20 m wide, including a small pumping structure at the eastern end of the western oxidation pond, noting some investigation may be required to the edge of the clearing in which each pond is located;
- The access road to the STP Compound and oxidation ponds is not included within the site area; and
- The approximately 0.5 ha of vacant cleared land east of the STP compound is not included within the site, although this area will undergo some preliminary investigation for geotechnical purposes.

The majority of the site is zoned E1 under the Liverpool City Council's Local Environment Plan (LEP 2008[3]) for the future Edmondson Regional Park, and once remediated, is to be transferred to the Office of Environment and Heritage (National Parks) (OEH). A section of the site (understood to comprise the western-most oxidation pond and clearing) is zoned RE1 (LEP 2008) and is to become local open space area managed by Liverpool City Council.

A hazardous Building Material Survey (HBMS) and geotechnical investigation are required to be undertaken concurrently with the environmental site assessment (ESA).

The investigation will be conducted in general accordance with relevant NSW Environmental Protection Authority (EPA) guidelines (**Section 7**).

[2] *Site Audit Report – Defence Ingleburn Site*, prepared for Department of Defence by AECOM Australia Pty Ltd, 25 July 2011 (AECOM 2011).
[3] Liverpool City Council Local Environment Plan, 2008, (LEP 2008)

1.2 Objectives

The objectives of the detailed site assessment were to:

- obtain sufficient data to characterise current site conditions in relation to proposed use of the site as recreational open space;
- obtain environmental (and geotechnical) data to assess areas for possible on-site containment of potentially impacted materials.
- assess the suitability of the site for the proposed use or make recommendations to enable such conclusions.

1.3 Scope of Works

The scope of works completed for this assessment comprised:

- a review of previous environmental site investigation results to identify potential areas of environmental and chemical concern;
- development and documentation of a conceptual site model (CSM) based on the available information;
- development and documentation of the DQOs for the detailed investigation as a sampling, analytical and quality plan (SAQP) in accordance with relevant EPA guidelines;
- implementation of a site investigation program including soil and groundwater sampling as per the SAQP, as well as geotechnical site investigations;
- soil sampling at 37 locations across the site, including the STP and oxidation ponds;
- installation of four groundwater monitoring wells;
- groundwater sampling from four groundwater monitoring wells;
- collection of two surface water samples within the oxidation ponds;
- analysis of selected soil and groundwater samples for various COPCs;
- comparison of collected data against relevant endorsed criteria in relation to assessment, from a contamination perspective, of land use suitability;
- preparation of an environmental site assessment report in general accordance with relevant EPA Guidelines; and
- assessment of whether the site is suitable from a site contamination perspective, for the proposed land use or, where the site was identified as not suitable, provision of recommendations for future remediation/management actions, including potential containment, required to make the site suitable.

2 Background Information

2.1 Site Identification and Condition

The location of the site is shown in **Figure 1**, and current layout is shown in **Figure 2**. The site details are summarised in **Table 2.1**.

Table 2.1 Summary Site Details

Lot/DP	Part of Lot 3 in Deposited Plan (DP) 831152
Address	Off Campbelltown Road, Edmondson Park, NSW
Local Government Authority	Liverpool Council
Site Zoning	E1 for the future Edmondson Regional Park, except western oxidation pond zoned RE1 Public Open Space
Current Use	Former STP and associated oxidation ponds
Proposed Use	Edmondson Regional Park under OEH management, except western oxidation pond to be Public Open Space under Liverpool Council management.
Site Area	Approximately 1.5 to 2 ha
MGA Coordinates (Zone 56) of approximate centre of STP Compound	E: 302796 N: 6239208

2.2 Site Description

The site comprised the STP Compound and the eastern and western oxidation ponds to the northeast and north of the STP Compound respectively. The clearings immediately east of the STP Compound and south of the western oxidation pond do not form part of the site, as these areas were included in the AECOM (2011) Site Audit. However, for the purpose of identifying potential future on-site containment areas, these two clearings were included in the area for geotechnical investigation.

Figures showing the STP and oxidation pond infrastructure are provided in **Appendix A**.

STP Compound

The STP Compound (STP) comprises a square area, approximately 1.2 ha, within a wire-mesh security fence. An unsealed access road is located outside the eastern STP boundary, between the STP and the clearing east of the STP. According to ERM (2010[4]), this cleared area east of the STP is a former sewage sludge disposal (SSD) area that has since been remediated and included in the AECOM (2011) SAS.

The STP area slopes to the north and northeast, other than flat areas presumably excavated level for placement of STP infrastructure, which includes several buildings, primary treatment ponds, pipes, tanks, two large circular trickle filters and associated infrastructure. ERM 2010 provides a description of the STP infrastructure and process, while ERM (2011[5]) provides further detail on the infrastructure. The following is noted:

- Grit chambers are comprised primarily of concrete, with a depth of approximately 0.6 m to 1 m;
- Two primary settling tanks are concrete funnel-shaped structures with a depth of approximately 8 to 10 m;
- Sludge digesters are circular with approximate depths of 6 to 8 m, and an interim chamber with a depth greater than 6 m;

[4] *Phase II Environmental Site Assessment, Sewage Treatment Plant, Campbelltown Road, Ingleburn, Final*, prepared for Department of Defence by Environmental Resources Management Australia, 13 October 2010 (ERM 2010).

[5] *Ingleburn Sewage Treatment Plant, Preliminary Remedial Strategy*, prepared for Department of Defence by Environmental Resource Management Australia Pty Ltd, 4 March 2011 (ERM 2011).

- The pump house within the valve house has an estimated depth of between 6 and 8 m;
- Drying beds comprised 0.5 m thick coarse filter sand with some perforated terracotta underlying for drainage, surrounded by concrete walls;
- Trickle filters are two large circular concrete structure approximately 2 to 3 m high, filled with cobble-sized stone grading to coarse sand substrate. Two metal irrigation booms are understood to have possibly contained mercury bearings, however these are also reported to have possibly been removed;
- Tertiary treatment tanks store effluent after the trickle filters, prior to discharge to the oxidation ponds, however ERM (2011) reports the tanks have not been used for any specific treatment since operated by Sydney Water. The tanks comprise concrete and are approximately 4 m deep.

Surfaces are largely unsealed and vegetated (grass and minor trees) other than where there are concrete paths between structures and immediately surrounding the base of most structures.

Structures at the site are understood to comprise hazardous building materials including asbestos containing material (ACM).

Oxidation Ponds

The oxidation ponds are located approximately 150 m north and northeast of the STP, and were used to store treated water. The majority of the water is reported to have been used by a nearby golf course for irrigation, with any overflow discharging to a small creek to the northeast (ERM 2010).

The western (primary) and eastern (secondary) oxidation ponds are separated by a narrow cleared area. At the eastern end of the western oxidation pond is a small pumping station, with an underground concrete pipe connecting the two ponds. ERM (2010) reported fill material was observed in the southern and eastern boundary of the secondary (eastern) pond, although the fill was assessed separately by ERM in a report not provided to JBS&G.

2.3 Surrounding Landuse

Current landuse of adjacent properties or properties across adjacent roads is summarised as follows:

- North – a mixture of bushland north of the STP and eastern oxidation pond, and semi-rural residential land north of the western oxidation pond. A small creek is located north of the STP, which flows in an easterly direction towards the eastern oxidation ponds;
- East – bushland, with the exception of a clearing to the east of the STP Compound;
- South – bushland between the site and Campbelltown Road; and
- West – bushland.

2.4 Topography and Drainage

The STP generally follows regional topography, sloping generally towards the north and northeast. ERM (2010) report the elevation at the southwest corner of the STP is 47.5 m AHD. The area immediately surround the oxidation ponds is relatively level. Land north of the oxidation ponds slopes gently to the southeast towards the ponds.

A small creek is located north of the STP, and appears to flow easterly towards the oxidation ponds, and from there to the east into bushland. ERM report the creek flows intermittently after periods of heavy rain. The creek is referred to as Maxwells Creek by ERM (2011). ERM (2010) also report the oxidation ponds can dry out in dry conditions.

Rainfall will generally follow the local topography towards the creek and oxidation ponds, where rainfall is too great for infiltration into unsealed ground surfaces.

2.5 Geology and Hydrogeology

ERM (2010) report the site is located over Bringelly Shale, part of the Wianamatta Group being the uppermost unit of the Sydney Basin. The Bringelly Shale is reported to comprise shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

The site-specific geology is summarised below, based on ERM (2010):

- A layer of fill or topsoil covers the STP area, overlying natural clay and weathered shale and shale bedrock, with bedrock at depths between 1.3 and 4 m below ground surface (bgs);
- Within a former sludge drying bed in the east of the STP, a thin layer of silty sewage sludge (0.05 m bgs) underlain by coarse grained sand to 0.3 m bgs and very coarse gravel to 0.5 m bgs was encountered over natural clays at 0.5 m bgs;
- Within the oxidation ponds there was an upper layer of dark brown silty 'sludge' over silty clay, clayey silt or clayey sand, with stiff natural clay between 0.4 m and 0.8 m bgs.

Strong organic/sulphurous odours (not hydrocarbon) were observed in shale or weathered shale at depths from 5 m to 8 m bgs in three locations in the north and northwest of the STP. ERM did not consider these associated with hydrocarbons, but rather hydrogen sulphide production.

ERM report regional groundwater occurs within the shales with principle flow through fissures and joints within the bedrock, although with low potential for movement. Groundwater is reported to be somewhat saline and typically hard.

During drilling, ERM reported water encountered at two of five borehole locations in the STP area between 4 m bgs at the northern STP boundary and 5.3 m bgs near the northwest STP boundary, in shale or weathered shale. The boreholes were drilled to between 8 m and 12 m bgs. Final water levels following installation of monitoring wells at the five locations ranged from 2.2 m to 5.8 m bgs, with predicted groundwater contours indicating groundwater flow to the east. The groundwater was under reducing and low dissolved oxygen (DO) conditions, except at the southeast corner, with organic/sulphurous odours noted in groundwater at two locations, consistent with similar odours in shales at depths where water ingress is expected.

3 Site History

A detailed site history is provided in ERM (2010). Based on historical aerial photographs, the STP was present in 1947, with land surrounding the STP cleared and containing only scattered trees. No changes were reported in subsequent aerial photographs up to 1994.

An historical title search was completed for the site. The search indicated that the site has been owned by the Commonwealth of Australia since 1943.

Information from UGNSW, who acquired the site in 2011, indicates the STP was servicing the Ingleburn North Primary School, the Bardia Barracks heritage precinct and a number of residential tenancies, prior to it being shut down in late 2011. The STP was operated by Sydney Water on behalf of Defence (ERM 2011).

ERM reported the STP could have potentially been impacted by a wide range of liquid wastes and sewage sludge, including from possible sub-surface burial of general waste materials from the former Defence facility. It is reported the STP is likely to have had mercury seals on the main bearings of the trickle filters, although GPNSW have verbally indicated such seals would have been replaced some time ago if present.

As previously noted, treated dried sewage sludge from the STP had been disposed in the cleared area east of the STP, known as the SSD. This area has been remediated and validated and was the subject of a SAS (AECOM 2011).

4 Previous Investigations

A brief summary of the previous investigations is provided below.

4.1 ERM (2010) STP Assessment

The assessment of the STP area included the drilling of five boreholes to a maximum of 12 m bgs for installation of monitoring wells, and excavation of 19 test pits to a maximum of 1.5 m bgs for soil sampling. The locations were placed on a general grid pattern across the STP, noting that a number of test pit and two borehole locations appeared to be outside the fence surround the STP.

The assessment of oxidation pond areas included installation of four test pits around the perimeter of each pond with the exception of one apparently placed towards the centre of the western pond. These were excavated to a maximum of 2.2 m bgs for sediment sampling.

A total of 54 primary soil and sediment samples from the STP area, and 16 primary samples from the two oxidation ponds, were analysed for a range of contaminants of potential concern (COPC) including metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs) and asbestos, as well as nutrients including ammonia, nitrate and total phosphate. A number of samples were analysed for pathogens including E coli bacteria, faecal coliforms, salmonella bacteria, enteric viruses and helminth ova.

Relevant findings are summarised as follows:

- Minor ACM on the ground surface was observed on the boundary and outside the southeast STP boundary (at STPTP20). No asbestos fibres were reported in soil samples;
- Limited soil contamination was identified within the STP area, with only TPH (C_{10}-C_{36}) reported at 7400 mg/kg at STP TP14 (0.1m) in the sludge drying beds exceeding adopted site assessment criterion of 1000 mg/kg (EPA 1994[6]). This sample was analysed without silica-gel clean-up to remove potential hydrocarbons associated with organic materials, as opposed to hydrocarbon-based sources. The maximum TPH ($_{C10-C36}$) following repeat analysis with silica-gel clean-up was reported as 1470 mg/kg, in excess of the previously adopted criterion. Sample at depth reported TPH and PAH below the reporting limits or assessment criteria;
- Volatile TPH, BTEX, pesticides and PCBs were below laboratory limits of reporting (LOR) in all samples analysed, and metals were reported below LOR or adopted assessment criteria being NEPC (1999) health investigation levels for parks and recreational open space areas (HIL-E);
- Salmonella and faecal coliforms were detected in the sewage sludge drying beds at STP TP14, faecal coliforms were detected in surface soils (0.1 m) in STP BH03, TP16 and TP17, and taenia ova were detected in near-surface samples at STP TP12 (0.25m) and TP17 (0.5m). It is noted that STP TP16 and TP17 are respectively located at and towards the upslope STP boundary and may be considered as potential background locations with regards to STP operations. No assessment criteria were adopted for the assessment of these results;
- Elevated PID readings and organic/sulphurous odours in weathered and unweathered shale at depths below 5 m bgs in three borehole locations (STP BH01,

[6] *Contaminated Sites: Guidelines for Assessing Service Station Sites*, NSW Environment Protection Authority, 1994 (EPA 1994)

BH02 and BH05) in the STP area were considered representative of hydrogen sulphide production and not hydrocarbons. Similarly, elevated PID readings at locations in the oxidation ponds were considered associated with organic odours in silt or silty clay sediments/soils;

- Slightly elevated nutrient (ammonia, phosphorous and nitrate) concentrations were reported in the oxidation pond sediments, and Salmonella was detected in sediments at PBBH09 in the western (primary) oxidation pond in the vicinity of the treated water discharge point from the STP area;
- Elevated inorganics including ammonia were detected in groundwater at STPBH03 east (downgradient) of the trickle filters was considered related to the STP operation. Dissolved TPH up to 160 ug/L was reported in two monitoring wells STP BH02 and BH04, located upgradient of STP infrastructure. Elevated metals in up- and down-gradient groundwater were considered likely to be background concentrations within the shale aquifer;
- Mounding of groundwater was observed at STP BH02 that may be indicative of potential leakage of STP infrastructure, otherwise groundwater flow was assessed to be easterly.

Previous sampling locations are shown on **Figures 3a and 3b**.

Reference is made to an *Assessment of Fill Material within the Oxidation Pond Wall* by ERM (9 September 2010), however JBS&G have not been provided a copy. No summary of previous investigations was provided.

4.2 ERM (2011) STP Preliminary Remedial Strategy

ERM prepared a preliminary remedial strategy for the STP and oxidation ponds on the basis the site would be 'redeveloped' for National Park use.

The report referred to a number of previous investigations and remediation validation reports, including:

- Validation Report for the Sewage Sludge Disposal Area Located East of the Sewage Treatment Plant, Ingleburn Defence Site, URS 2004 (and earlier 2002 investigation works);
- Ingleburn Defence Site, LCC Open Space Areas, Stage II Environmental Investigations, SKM, 2009; and
- Stage II Environmental Investigation Ingleburn Defence Site, Data Gap Assessment Report, SKM 2009.

At the time this report was prepared, JBS&G had been provided the URS 2004 validation report but no other reports listed above.

Relevant information relating to ERM (2011) summary of previous investigations is as follows:

- The treated dried sludge disposed in the SSD east of the STP contained elevated metals, predominantly mercury, exceeding 'residential land use guidelines', noting this area was remediated and validated and included in the AECOM (2011) SAS. URS (2004) indicated the SSD area was validated to guidelines consistent with residential use with accessible soil, although there were reportedly exceedances of EILs in the northern and western boundaries of the SSD area, and further assessment of these areas was recommended during subsequent investigations. Review of URS (2004) results indicates exceedances of previously adopted EILs included one location for arsenic (27 mg/kg), one location for nickel (107 mg/kg), one location for copper (173 mg/kg), zinc (340 mg/kg) and mercury (8.7 mg/kg), and three other locations for mercury (1.1 to 2.1 mg/kg);
- URS (2004) reported no enteric viruses, faecal coliforms, E. coli or Salmonella reported, and two detections of Helminth ova (Taenia species) to 0.32 units, being less than the adopted EPA (1997[7]) criterion of <1 plaque forming unit (PFU) per 4 g, in validation soil results for the SSD area east of the STP;
- Investigation of sediment samples by SKM in 2008 indicated elevated mercury concentrations in the oxidation ponds, although no concentrations were reported in ERM 2011), while further data gap investigation indicated mercury in sediments was found to have low leachability and would be classified as General Solid Waste if sediments were removed;
- It was considered a risk assessment would be required to assess potential risks from bacteria in soil reported by ERM (2010), as no threshold criteria were available for these analytes, although no further justification for this was included;
- Previous reported (ERM 2010) ACM fragments on the boundary and at TP20 outside the southeast boundary had been removed by a licensed contractor as part of the IDS site remediation;
- The mounding at BH02 previously reported as potentially associated with STP infrastructure leakage was expanded upon, with ERM noting that results of groundwater analysis indicated that "if this is indeed occurring, the water is unlikely to be significantly impacted with any of the contaminants of concern";
- Inspection in November 2010 and discussion with Sydney Water staff confirmed the western settlement tank had leaked and created a zone of saturated soil and ponding to the west of the western digester, in the southwest of the STP. It is noted this would appear unrelated to the abovementioned groundwater mounding north of the western trickle filter at BH02 in the northwest of the STP. Saturated soils were reported from surface in test pit STPTP13 southwest of the western digester, but not in STPTP17 immediately northwest of the western digester; and
- A HMBS in 2009 identified asbestos, lead based paints, PCB capacitors in light fittings and or synthetic mineral fibres (SMF) within the site shed and valve house.

Uncertainties associated with contamination and remediation were considered, and included:

- One isolated contamination (TPH at TP14) had been identified, but there were a number of analytes without threshold criteria (namely, nutrients and bacteria) and the potential risk of such has not been assessed. ERM reported a risk assessment may or may not identify these as contaminants requiring removal;
- The extent of contamination beneath STP infrastructure is unclear;

[7] *Use and Disposal of Biosolids Products* "Stabilisation Grade A Product", NSW EPA (1997).

- Sediment in the oxidation ponds has not presently been characterised at a frequency compliant with EPA guidance, as such variations in sediments have not been assessed; and
- Quantitative risk assessment may facilitate an approach for the infilling of some buried infrastructure without removal.

The remedial strategy comprised a number of steps from risk assessment, environmental and safety management, STP decommissioning, site demolition including conversion of oxidation ponds to detention basins, characterising soil contamination and remediation, stockpile management, validation, waste disposal, backfilling, to reporting. No further information relating to potential contamination was discussed.

5 Conceptual Site Model

The information presented herein, together with the figures included, provides a conceptual site model (CSM) for the site based on the current understanding of the site and the specific project objectives.

5.1 Potential Areas of Environmental Concern

Based on the site history review, review of previous investigations and JBS&G's understanding of site conditions, and in consideration of the specific project objectives, potential areas/aspects of environmental concern (AEC) and associated contaminants of potential concern (COPC) have been identified and are presented in **Table 5.1**.

Table 5.1 Areas of Environmental Concern and associated Contaminants of Potential Concern

Area/Aspect of Environmental Concern (AEC)	Location	Contaminants of Potential Concern (COPCs)
Fill and Natural Soils	STP and Oxidation Ponds	Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) PAHs TPH and BTEX OCPs/PCBs Asbestos (Fill only) Biological contaminants (inc. *E. coli*, *salmonella* sp, faecal coliforms, enteric viruses and helminth ova)
Trickle Filter Materials	STP	Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) TPH and BTEX Biological contaminants (inc. *E. coli*, *salmonella* sp, faecal coliforms, , enteric viruses and helminth ova) Nutrients (nitrogen, phosphorous)
Sediments	Oxidation Ponds	Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) TPH and BTEX Biological contaminants (inc. *E. coli*, *salmonella* sp, faecal coliforms, , enteric viruses and helminth ova)
Surface Water	Oxidation Ponds, 4x Settling Ponds in STP	Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) SVOCs suite* Water Quality Parameters (pH, EC, redox, TDS/TSS, major cations/anions) (* SVOCs to capture broad suite of potential semi-volatile organic contaminants)
Groundwater	STP and Oxidation Ponds	Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) Nutrients TPH

5.2 Potentially Contaminated Media

Potentially contaminated media targeted for this investigation:

- Fill material;
- Natural soils;
- Surface water;
- Sediments; and
- Groundwater.

Some potential for filling has been reported at the site, including possible burial of waste as well as dumping and placement of STP by-products (e.g. sludge) as part of the treatment process. Further, there is the potential for cut and fill at the site to create level areas for STP infrastructure. Fill material is considered a potentially contaminated medium.

Natural clay soils and weathered shale soils underlie fill materials. Although some contaminants (e.g. mercury) have been assessed as having low leachability, others (e.g. TPH) have the potential to have migrated vertically, although previous investigation suggests vertical migration has not occurred. As the site is largely unsealed allowing rainfall infiltration, and given the depth of some STP infrastructure, there is the potential for natural soils to be impacted.

Given the potential for downward migration of contaminants through fill and natural soils, and the depth below ground level of some STP infrastructure, there is the potential for groundwater to be impacted.

As the STP discharges treated water to, or surface water runoff may migrate to, surface water bodies, i.e. the oxidation ponds, there is the potential for surface water and sediments to be impacted.

5.3 Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants identified at the site are present in solid (e.g. impacted soil or fill, asbestos) and liquid (e.g. dissolved in water) forms.

Rainfall infiltration at the site is expected to occur in unsealed areas investigated. There is therefore the potential for contaminants in fill to leach into underling natural soils.

As a result of the reported depth of some STP infrastructure, there is the potential for migration of contaminants to impact and migrate via groundwater. Given reported discharge of water from oxidation ponds during high rainfall periods there is the potential for contaminants to migrate via surface waters.

Odours have been reported at the site, as a function of natural processes rather than hydrocarbon releases, and it is considered there is limited potential for generation of vapours or ground gases associated with volatile contaminants given the unlikely presence and lack of detection of volatile contaminants at the site. However, soil and groundwater has odours which may pose aesthetic issues.

5.4 Potential Exposure Pathways

Potential exposure pathways include:

- Dermal;
- Ingestion; and
- Inhalation.

Due to the presence of exposed impacted soil/fill on ground surfaces in areas of the site, dermal exposure is considered a potential exposure pathway.

The potential for ingestion of soil through eating soil is considered relatively low due to the proposed open space use, however, as the site may be accessed for reasonable periods of time by those who may be inclined to ingest soil, and dust may be generated which could also be ingested, ingestion must be considered a potential exposure pathway. Groundwater is not likely to be used at the site given the poor quality resource and that it is unlikely to utilise groundwater for irrigation, as such ingestion of groundwater is considered unlikely during future use of the site. Should surface water remain in the oxidation ponds, there is the potential for ingestion of surface water.

As there is the possibility for generation of dust in unsealed areas where potentially impacted soil/fill are present, inhalation is also considered a potential exposure pathway. Additionally, should odours be present and migrate to surface, there is the potential for inhalation of odorous compounds.

6 Sampling and Analysis Plan

6.1 Data Quality Objectives

Data quality objectives (DQOs) were developed for the investigation, as discussed in the following sections.

6.1.1 State the Problem

Previous investigation data indicates potential risks from contamination, and additional environmental data needs to be collected to assess the risks, and to enable appropriate recommendations to be made for management actions.

Additionally, to assist future management of materials from the site and other areas within the Edmondson Park redevelopment by UGNSW, an assessment of suitable areas for encapsulation is required by geotechnical investigation. While not strictly related to the suitability of the site with regards to assessment of contamination, this aspect is included in the DQO as a project planning aspect.

6.1.2 Identify the Decision

Based on the decision making process for assessing urban redevelopment site detailed in DEC (2006), modified to meet the specific project objectives, the following decisions must be made:

- Are there any unacceptable risks to likely future onsite receptors for the proposed land use scenarios?
- Are there any issues relating to local area background soil concentrations that exceed the appropriate soil criteria?
- Are there any impacts of chemical mixtures?
- Are there any aesthetic concerns in soils present at the site?
- Has the potential migration of contaminants from the Site been appropriately addressed?
- Is a management strategy required?
- Have suitable areas been identified for potential on-site encapsulation of materials?

6.1.3 Identify Inputs to the Decision

Inputs to the decisions are:

- The results of previous investigations relevant to the areas of investigation, including background historical information, site observations, laboratory results and report findings;
- New environmental data as collected by sampling and analysis and site observations made during this investigation;
- Assessment criteria to be achieved on the site as based on the intended landuse and previous investigations, and project objectives, as defined by assessment criteria nominated in **Section 7**;
- Confirmation that data generated by sampling and analysis are of an acceptable quality to allow reliable comparison to assessment criteria as undertaken by assessment of quality assurance / quality control (QA/QC) as per the data quality indicators (DQIs) established in **Section 6.1.6**; and
- Geotechnical data from investigations in conjunction with the ESA.

6.1.4 Define the Study Boundaries

The study boundaries are limited to those portions of the nominated site areas as described in **Section 1.2** and shown on **Figure 2**. Some additional areas east of the STP and south of the western (primary) oxidation pond are included for investigation of suitable encapsulation areas.

The vertical extent of the investigation was approximately 0.2 to 0.3 m beneath the base of fill for most locations, other than where installation of groundwater monitoring wells or geotechnical investigation requires deeper investigation, and deeper fill in the trickle filters area.

Due to the project objectives, seasonality was not be assessed as part of this investigation. Data was therefore be representative of the timing and duration of the current investigation. It is noted that historical data from previous investigations dating from 2010 was considered as part of the assessment.

6.1.5 Develop a Decision Rule

Laboratory analytical data was assessed against EPA endorsed criteria as identified in **Section 7**.

The decision rules adopted to answer the decisions identified in **Section 6.1.2** are summarised in **Table 6.1**.

Table 6.1 Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Are there any unacceptable risks to onsite future receptors from soil or groundwater?	The nature and extent of soil impacts was assessed, and soil analytical data was compared against EPA endorsed criteria. Statistical analyses of the data in accordance with relevant guidance documents was undertaken, if appropriate, to facilitate the decisions. The following statistical criteria was adopted with respect to soils: Either: the reported concentrations are all below the site criteria; Or: the average site concentration for each analyte must be below the adopted site criterion; no single analyte concentration exceeds 250% of the adopted site criterion; and the standard deviation of the results must be less than 50% of the site criteria. And: the 95% upper confidence limit (UCL)[8] of the average concentration for each analyte must be below the adopted site criterion. If the statistical criteria stated above are satisfied, and an assessment of risk indicates no unacceptable risks, the decision is No. Otherwise, the decision is Yes.
2. Are there any issues relating to the local area background soil concentrations that exceed appropriate soil criteria?	If the 95% UCL of surface soils exceeded published background concentrations (NEPC 1999), the decision is Yes. Otherwise the decision is No.
3. Are there any chemical mixtures?	Are there more than one group of contaminants present which increase the risk of harm? If there is, the decision is Yes. Otherwise, the decision is No.
4. Are there any aesthetics issues in fill soils at the site?	If there are any unacceptable odours the answer to the decision is Yes. Otherwise, the answer to the decision is No.
5. Is there a potential risk of migration of contaminants from the Site?	Groundwater and surface water analytical data collected were compared to the adopted assessment criteria with respect to human health and/or ecological receptors as per guidance provided in ANZECC/ARMCANZ 2000 and NEPC 2013. Based on conclusions of this assessment, if there is the potential unacceptable risk from contaminant migration, the answer to the decision is Yes. Otherwise, the answer to the decision is No.
6. Is a management strategy required?	Was the answer to any of the above decisions Yes? If not, then the answer is No.

[8] *Sampling Design Guidelines.* (NSW EPA,1995)

Decision Required to be Made	Decision Rule
	If yes, then the answer is Yes and management may be required.
7. Have suitable areas been identified for potential on-site encapsulation of materials?	Based on consideration of geotechnical information and data collected, are areas investigated considered able to be utilised for on-site encapsulation of materials? If so, the answer is Yes. Otherwise the answer is No, and further actions and consideration may be required.

Statistical analyses of the data was undertaken, if required, in accordance with relevant guidance documents. The following statistical criteria were adopted:

- The upper 95% confidence limit on the average concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material types) must be below the adopted criterion;
- No single analyte concentration shall exceed 250% of the adopted criterion; and
- The standard deviation of the results must be less than 50% of the criterion.

6.1.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013), appropriate indicators of data quality (DQIs used to assess QA/QC) and standard JBS&G's procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data was assessed against pre-determined Data Quality Indicators (DQIs) for completeness, comparability, representativeness, precision and accuracy. The acceptable limit on decision error is 95% compliance with DQIs.

The pre-determined Data Quality Indicators (DQIs) established for the project are discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCC parameters), and are shown in **Table 6.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.

- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.

If any of the DQIs are not met, further assessment was necessary to determine whether the non-conformance significantly affected the usefulness of the data. Corrective actions may include requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of the data.

Table 6.2 Summary of Quality Assurance / Quality Control Program

Data Quality Objective	Frequency	Data Quality Indicator
Precision		
Blind duplicates (intra laboratory)	1 / 20 samples	<50% RPD[1]
Blind duplicates (inter laboratory)	1 / 20 samples	<50% RPD[1]
Accuracy		
Surrogate spikes	All organic samples	70-130%
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes		-
Samples extracted and analysed within holding times.	-	organics (14 days), inorganics (6 months)
Trip spike (for volatiles)	1 per sampling event when sampling for volatile or semi-volatile COPC	70-130% recovery
Storage blank	1 per sampling event	<LOR
Rinsate	1 per sampling date where reusable sampling equipment used	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All samples
Standard analytical methods used for all analyses	All Samples	All samples
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples
Limits of reporting appropriate and consistent	All Samples	All samples
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples
Appropriate documentation	All Samples	All samples
Satisfactory frequency and result for QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid

1. Relative per cent difference

6.1.7 Optimise the Design for Obtaining Data

The STP area has previously been assessed on a grid-basis, including some off-site locations and installation of five groundwater monitoring wells. Limited impacts were identified in soils, with minor TPH impact in the drying beds, and ACM at the boundaries which has reportedly since been removed. Some biological responses were noted in soils, although this was also the case at upslope locations of the STP, and no assessment against criteria. No investigation of surface water, sediments of filter trickle bed material was completed. The oxidation pond sediments have been assessed at the perimeter of both and towards the centre of one, identifying some nutrient and biological responses. Groundwater contained elevated ammonia, as well as metals considered to represent background levels. Some mounding of groundwater north of the western trickle filter may represent leakage from STP infrastructure.

The cleared areas east of the STP and south of the western (primary) oxidation pond, have previously been subject to assessment, remediation, validation and site auditor review.

No geotechnical investigation is understood to have been completed.

The number of sample locations is generally based on the minimum number of samples required for hotspot characterisation shown in Table A of the Contaminated Sites: Sampling Design Guidelines (EPA 1995). Previous sampling in the STP Compound has been generally grid-based, with some sample locations may be skewed towards identified AECs. Additional data is proposed to be collected also on an approximate grid, staggered from the previous locations, as well as targeting data gaps or areas where previous impacts or potential issues were identified. Using this combined systematic/targeted approach to soil sampling, the number of sampling locations and the analytical component of the works can be streamlined. Selected locations will be also utilised for geotechnical investigations. The soil sampling strategy initially proposed for each distinct portion of the site is shown in **Table 6.3** below.

Table 6.3 Soil Investigation Locations

Portion	Area (m^2)	Accessible Area (m^2)	Proposed No. Sampling Locations	No. Sampling Locations Required
STP Compound	5700	4100	13	13
Oxidation Pond West	13000	8900 (included clearing to south)	20 soil 1 sediment	10 soil (perimeter of pond, excludes clearing to south, geotechnical not required) 4 sediment
Oxidation Pond East	9400	5100	13 soil 1 sediment	8 soil (perimeter of pond) 4 sediment
Area East of STP			-	7

JBS&G notes that at the time of preparing the proposal for these works, previous investigation and AECOM (2011) SAR was not available, and the following assumptions were made:

- The cleared areas south of the western (primary) oxidation pond, between the two oxidation ponds, and south of the eastern oxidation pond, were included in the STP site;
- Previous groundwater monitoring wells had not been installed; and
- The cleared area east of the STP was not included in the STP site (although it was identified as a potential containment area).

On review of AECOM (2011) it was evident the clearing south of the western oxidation pond, the majority of the cleared area between the two ponds, and the clearing area south of the eastern oxidation pond had already been subject to validation and site audit. It is considered therefore that only soils in the area immediately surrounding the pond perimeters and adjacent the small pumping station required investigation in the oxidation pond area. This is in addition to surface water, sediment and groundwater investigation.

Further, the area east of the STP was identified as a potential future containment area, even though it is outside the STP site boundaries and has already been subject to the AECOM (2011) site audit. As such, some preliminary investigation was undertaken in this area.

As such the overall number of investigation locations has been adjusted from that proposed, as indicated above in **Table 6.3**, and below in **Table 6.4**. It is noted that where

soil sampling locations was reduced around the oxidation ponds, additional sediment sampling is proposed based on consideration of previous sediment assessment by ERM (2010). Analytical requirements were adjusted accordingly.

The sampling locations for investigations are shown on **Figures 4a and 4b**.

6.2 Investigation Methodology

6.2.1 Soil Sampling Approach

Shallow test pits were considered the most appropriate sampling approach for assessing fill material as they enable a better characterisation of the typically heterogeneous composition of fill. However, the presence of potentially deep STP infrastructure and additional geotechnical requirements, indicate that the excavation of test pits was not appropriate at all locations and the use of boreholes and auger holes was required at selected locations.

Soil samples were collected via boreholes, testpits or hand auger locations. Boreholes were drilled using a 4WD or track mounted drilling rig which was capable of push tube sampling, solid flight augering and geotechnical sampling. Testpits were excavated by an excavator with a 4 m reach. Soil samples were collected from the ground surface (0-0.1 m) and subsurface (to 0.3 m into natural materials, a maximum depth of 3 m or prior refusal).

Samples were collected from the trickle filter material using an excavator. One test pit was excavated within each trickle filter, with samples collected from material throughout the filter. It should be noted that the samples collected from the filters were mainly large gravels, with no fines encountered, which made analysis difficult, requiring crushing of gravels.

Collected samples were immediately transferred to laboratory supplied sample jars and plastic resealable 'ziplock' bags, depending on the analytes required. Where soil samples are collected for volatile petroleum hydrocarbons, care was taken to minimise the potential for loss of volatile contaminants during sampling. From push-tube locations sampling from the sample tube immediately after withdrawing the sample core was considered appropriate to minimise volatile loss. At auger locations, samples were transferred immediately to sample containers.

The sample jars were then be transferred to a chilled ice box for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form was completed and forwarded with the samples to the testing laboratory. Based upon field observations and the PID screening results, samples were analysed in accordance with the laboratory schedule in **Table 6.3** below.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination (e.g. ACM) were noted. It is noted that the presence of ACM is less likely to be observed from boreholes than from test pits.

Soil samples were screened on site during works using a photo-ionisation detector (PID) containing a standard ionisation lamp with electron voltage (eV) range associated with the ionisation potentials of typical volatile organic compounds (VOCs). The PID used was appropriate calibrated, and was also used to assist in collection of samples for petroleum hydrocarbon analysis.

Samples obtained for PID screening were placed in a sealed plastic bag for a period of approximately 5 minutes to equilibrate, prior to a PID being attached to the bag. Readings were then monitored for a period of approximately 1 minute or until values stabilise and

the stabilised/highest reading recorded. PID screening results were recorded on the borehole logs included in the DSI report.

Where possible samples were collected directly from the centre of the excavator bucket, directly from disposable push tube sleeves, to mitigate potential cross-contamination and avoid the need for decontamination. Prior to the commencement of soil sampling activities, non-disposable sampling equipment, including augers, sampling trowel, etc were cleaned with a high pressure water/detergent spray, rinsed with water and then air dried. The equipment was then inspected to ensure that no soil, oil, debris or other contaminants are apparent on the equipment prior to the commencement of works.

Field soil duplicate and triplicate samples were obtained using the above sampling methods. The collected samples were then divided laterally into three samples with minimal disturbance to reduce the potential for loss of volatiles and placed in three clean glass jars or sample bags as appropriate. Each sample was labelled with a primary, duplicate or triplicate sample identification before being placed in the same chilled esky for laboratory transport.

6.2.2 Groundwater Investigation

Three new monitoring wells were installed in the STP area. Additionally, a monitoring well was installed in the oxidation ponds area and a monitoring well was placed west of the settling tanks and sludge digesters in the south of the STP to provide an overall picture of groundwater conditions across the site.

Groundwater was expected to occur at variable depths depending on the presence of alluvials near water courses and depth to the interface between residual clay and shale bedrock. Based on local topography in the STP area, shallow groundwater was anticipated to be less than 12 m depth and flowing with topography in a north to north-easterly direction.

The wells were installed to a maximum depth of 8.8 m below ground surface (bgs) or 2 m below the encountered groundwater depth, whichever was shallower. The wells were constructed from 50 mm uPVC screen and casing, combined with a lockable cap exposed standpipe. A surveyor was subcontracted to provide a relative height survey of the monitoring well locations to allow interpretation of groundwater flow directions at the site. The survey information is included in **Appendix F**.

Given the depth of the monitoring wells, groundwater sampling was completed using a low flow Micropurge pump system with small diameter, single use tubing. Monitoring wells were purged at the highest possible flow-rate while ensuring that minimal fluctuations in depth to water occur. A flow cell was employed to monitor water quality parameters of: Electrical conductivity (EC); Redox potential (Eh); pH; Dissolved oxygen (DO); and Temperature during purging and sampling.

All samples for dissolved metal analysis were field filtered. All groundwater samples were placed into laboratory supplied bottles/vials with appropriate preservatives (where required). Each of the sample bottles were labelled with the project ID, date, sampler's initials and unique monitoring well ID (or QC sample name), using permanent ink marker on labels affixed to the sides of the bottles by the laboratory. In addition, the sample ID (i.e., the monitoring well ID) were replicated on the lid of the bottles/vials in the event that the labels became detached from the bottles during transport.

Bottles were placed directly into a pre-chilled ice chest, for transport to the testing laboratories under chain of custody conditions. COC documentation were completed for

samples relinquished to the laboratory and included: sample ID; number of bottles/vials; media type (i.e., water); project ID; name; date of sampling and relinquishment.

At the completion of sampling at each location, single use sampling equipment were disposed of and re-useable equipment including the pump head, flow cell and interface probe decontaminated as follows:

- Pressure spray with Decon 90 detergent and potable water mix;
- Pressure spray rinse with potable water; and
- Air drying.

The completed activities were documented on groundwater monitoring and calibration/decontamination record forms included in **Appendix C**. Rinsate samples were obtained during the field decontamination procedures at a frequency of one per sampling event. The rinsate samples were obtained by rinsing the interface probe and flow cell with laboratory grade demineralised water following the decontamination procedure. The water samples were then appropriately preserved and stored with the site water samples prior to transport to the laboratory for chemical analysis.

6.2.3 Surface Water Sampling

One surface water sample was collected from each of the oxidation ponds to benchmark the water quality and enable assessment for future management requirements.

Additionally, water samples were collected from each of the four settling tanks in the STP Compound.

6.2.4 Sediment sampling

Four sediment samples were collected from sediment at the base of the each oxidation pond. Sediment samples were collected from the shore using a grab sampler on an extendable pole.

6.2.5 Laboratory Analysis

JBS&G contracted project laboratories which are NATA accredited for the required analyses. In addition, the laboratories were required to meet JBS&G's internal Quality Assurance requirements.

The laboratory analysis program is outlined in **Table 6.4**.

Toxicity characteristic leaching procedure (TCLP) were undertaken for metals and PAHs on one sample, based on total concentrations reported, to aid in waste classification as required for potential site management.

Selected samples were analysed for a range of general soil parameters, pH, cation exchange capacity (CEC), iron and % clay content, to enable assessment of ecological impacts according to NEPC (2013). It is noted that identification of a 'background' location at the site was not possible so natural clay soils underlying the site were utilised to obtain site-specific ambient background concentrations.

Bulk soil samples (500 mL) for asbestos analysis were collected where analysis for asbestos was proposed or where visible asbestos containing material (ACM) was observed or has previously been reported at surface or in fill.

From experience and discussion with Sydney Water relating to other STP sites, silica gel clean-up on TPH analyses was crucial to enable assessment of what can be considerable proportion of TPH reported as non-anthropogenic hydrocarbons at STP sites, which enables consideration of appropriate management options for 'true' TPH impacts.

The analytical schedule is presented in **Table 6.4** below. Laboratory methods and reporting limits for the COPCs and presented in **Tables 7.1 and 7.2**.

Table 6.4 Sampling and Analytical Program

Sample Type	Target Area	# Sampling Locations	Analyses (ex QA/QC)
Soil	STP Compound	15 (TP08 to TP16, TP30 to TP35)	Heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) – 16 samples PAH – 7 samples TPH/BTEX – 4 samples TPH silica gel clean-up – 3 samples TPH aromatic/aliphatic – 1 sample OCPs/PCBs – 4 samples Asbestos – 5 samples TCLP (metals/PAHs) – 1 sample Biological contaminants (inc. *E. coli*, *salmonella* sp, faecal coliforms) – 5 sample (incl background location) Fe, organic matter, CEC, pH – 2 samples Nutrients – 4 samples
Soil	2x Trickle filters	2 (TP17 and TP18)	Heavy metals – 6 samples TPH/BTEX – 6 samples TPH aliphatic/aromatic split – 6 samples TPH silica gel clean-up – 6 samples Biological contaminants (inc. *E. coli*, *salmonella* sp, faecal coliforms, , enteric viruses and helminth ova – 6 samples Nutrients – 6 samples
	Oxidation Pond West	9 (TP20 to TP27 & TP29)	Heavy metals – 23 samples PAH – 20 samples TPH/BTEX – 13 samples TPH Aromatic/Aliphatic – 1 sample TPH silica gel clean-up – 3 samples OCPs/PCBs – 10 samples Asbestos – 7 samples Biological contaminants – 4 samples EC – 4 samples Fe, organic matter, CEC, pH – 4 samples
	Oxidation Pond East	8 (TP01 to TP07 & TP19)	
Sediment	East & West Oxidation Ponds	8 (OPWS_01 to 04 & OPES_01 to 04)	Heavy metals – 8 samples TPH aliphatic/aromatic split – 8 samples TPH silica gel clean-up – 8 samples Biological contaminants (inc. *E. coli*, *salmonella* sp, faecal coliforms, , enteric viruses and helminth ova) – 4 samples (2 each)
Surface Water	East & West Oxidation Ponds	2 (OPW_01 and OPE_01)	Heavy metals – 2 samples sVOCs – 2 samples WQ parameters (pH, EC, redox, TDS/TSS, major cations/anions) – 2 samples
Surface Water	4x Settling Ponds STP	4 (SP01 to SP04)	Heavy metals – 4 samples TPH – 4 samples WQ parameters (pH, EC, redox, TDS/TSS, major cations/anions) – 4 samples
Groundwater	Newly installed monitoring wells	4 (MW01 to MW04	Heavy metals – 4 samples Nutrients (Phosphorous, Nitrate, Ammonia) – 4 samples TPH aliphatic/aromatic split – 4 samples TPH silica gel clean-up – 4 samples

In addition to the above analyses, for QA/QC purposes field duplicates and triplicates will be analysed at a rate of 1/20 primary samples. Rinsate samples were obtained from all reusable sampling equipment per day of sampling, and trip spike and storage blank samples accompanied the samples for each batch of samples submitted to the laboratory. QA/QC requirements are discussed further in **Section 6.1.6**.

6.3 Geotechnical Investigation

The purpose of the geotechnical investigation was to develop sufficient geotechnical information on subsurface soil, bedrock and groundwater conditions to support evaluation of cell containment options for areas to be dedicated to OEH as part of the Edmondson Regional Park. The geotechnical investigation did not include the western oxidation pond, given that land is to be dedicated to Council and as such is unlikely to be used for containment.

A total of four bore holes were drilled and 20 test pits excavated across the site concurrently with the environmental assessment works. Four holes were drilled to a maximum depth of 8 m with remaining holes excavated to a maximum depth of 4.3 m. Given the subsurface conditions at the site, the geotechnical conditions were unlikely to vary significantly over distances smaller than 50 m. On this basis the boreholes were spaced at approximately 40 to 50 m centres resulting in an average borehole spacing of 1 per 800 m^2.

The geotechnical investigation of the eastern oxidation pond did not include drilling or test pitting within the ponds due to difficult access. Test pits (TP01 to TP09 and TP19 were excavated around the pond which was assumed to have similar subsurface conditions to the pond itself.

A total of seven locations were drilled/excavated in the cleared area east of the STP compound. Although this area has already been remediated and included in the AECOM (2011) site audit and does not form part of the STP 'site', the area has been identified as having potential for future containment.

Standard penetration tests (SPT) or tube sampling was undertaken at a regular interval (e.g. every 1.5 m penetration), to a maximum of 4.3 m depth. All geotechnical holes were logged by a geotechnical engineer/engineering geologist.

Two Index Shrink Swell (Iss) tests and two Atterberg Limits tests will be undertaken by a geotechnical laboratory.

The geotechnical report is included in **Appendix E** of the report.

7 Assessment Criteria

7.1 Regulatory and Technical Guidelines

The investigation was undertaken with consideration to aspects of the following guidelines and technical documents, as relevant:

- *Contaminated Sites: Guidelines for Assessing Service Station Sites,* NSW EPA, 1994 (EPA 1994);
- *Contaminated Sites: Sampling Design Guidelines,* NSW EPA, 1995 (EPA 1995)
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*, NSW EPA, 1997 (EPA 1997);
- *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Edition,* NSW Department of Environment and Conservation, 2006 (DEC 2006);
- *National Environment Protection (Assessment of Site Contamination) Measure,* National Environment Protection Council, 1999 (NEPC 1999), where consideration of background concentrations is required;
- *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*, National Environment Protection Council, 2013 (NEPC 2013);
- *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, May 2009, Western Australia Department of Health (WA DOH 2009); and
- *Waste Classification Guidelines*, NSW Department of Environment, Climate Change and Water, December 2009 (DECCW 2009).

7.2 Soil Criteria

Based on the proposed recreational open space land use, concentrations of contaminants in soil were compared against NEPC (2013) health-based investigation and screening levels (HILs and HSLs), and ecological investigation and screening levels (EILs and ESLs) as below:

- HILs:
    - HIL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate;
- HSLs:
    - HSL C - recreational / open space (broadly equivalent to the HIL A, HIL B and HIL C land use scenarios); and
- EILs and ESLs:
    - Urban residential/public open space.

Where required, results will be statistically assessed in accordance with the method summarised in **Table 6.1**.

Where appropriate, after consideration of relevant ESLs and HSLs for TPH fractions, NEPC (2013) Management Limits for TPH fractions were utilised.

The results of asbestos observations and analysis were assessed in general accordance with NEPC (2013) and WA DOH (2009) guidance, although asbestos quantification was not undertaken as sufficient bonded ACM was not observed to warrant quantification.

Table 7.1 Soil Criteria (all units in mg/kg)

	Limit of Reporting	Laboratory Method	Health Investigation/ Screening Levels			
			Residential – Access HIL-A	Residential – Minimal Access HIL-B	Recreational/ Open Space HIL-C	Commercial industrial HIL-D
METALS						
Arsenic	4.0	ICP-AES (USEPA 200.7)	100	500	300	3000
Cadmium	0.4	ICP-AES (USEPA 200.7)	20	150	90	900
Chromium	1.0	ICP-AES (USEPA 200.7)	100	500	300	3600
Copper	1.0	ICP-AES (USEPA 200.7)	6000	30 000	17 000	240000
Nickel	1.0	ICP-AES (USEPA 200.7)	400	1200	1200	6000
Lead	1.0	ICP-AES (USEPA 200.7)	300	1200	600	1500
Zinc	1.0	ICP-AES (USEPA 200.7)	7400	60 000	30 000	400000
Mercury (inorganic)	0.1	Cold Vapour ASS (USEPA 7471A)	40	120	80	730
POLYCYCLIC AROMATIC HYDROCARBONS						
Carcinogenic PAHs (as B(a)P TPE)[3]	0.028	GCMS (USEPA8270)	3	4	3	40
Total PAHs[4]	0.4	GCMS (USEPA8270)	300	400	300	4000
BTEX						
Benzene	1.0	Purge Trap-GCMS (USEPA8260)	0.5	0.5	NL	3
Toluene	1.0	Purge Trap-GCMS (USEPA8260)	160	160	NL	NL
Ethylbenzene	1.0	Purge Trap-GCMS (USEPA8260)	55	55	NL	NL
Total Xylenes	3.0	Purge Trap-GCMS (USEPA8260)	40	40	NL	230
TOTAL RECOVERABLE HYDROCARBONS						
F1 C_6-C_{10}	10	TPH Purge Trap-GCMS (USEPA8260)	45	45	NL	260
F2 >C_{10}-C_{16}	50	TPH Purge Trap-GCMS (USEPA8260)	110	110	NL	NL
F3 >C_{16}-C_{34}	100	Purge Trap-GCFID (USEPA8000)	-	-	-	-
F4 >C_{34}-C_{40}	100	Purge Trap-GCFID (USEPA8000)	-	-	-	-
ORGANOCHLORINE PESTICIDES						
DDT + DDD + DDE	0.3	GCECD (USEPA8140,8080)	240	600	400	3600
Aldrin + Dieldrin	0.2	GCECD (USEPA8140,8080)	6	10	10	45
Chlordane	0.1	GCECD (USEPA8140,8080)	50	90	70	530
Endosulfan	0.3	GCECD (USEPA8140,8080)	270	400	340	2000
Endrin	0.1	GCECD (USEPA8140,8080)	10	20	20	100
Heptachlor	0.1	GCECD (USEPA8140,8080)	6	10	10	50
HCB	0.1	GCECD (USEPA8140,8080)	10	15	10	80
Methoxychlor	0.1	GCECD (USEPA8140,8080)	300	500	400	2500
PCBs						
Total PCBs	0.7	GCECD (USEPA8140,8080)	1	1	1	7
VOLATILE ORGANIC COMPOUNDS						
PCE	1.0	Purge Trap-GCMS (USEPA8260)	2	2	40	8
TCE	1.0	Purge Trap-GCMS (USEPA8260)	0.02	0.02	0.4	0.08
Cis 1,2 DCE	1.0	Purge Trap-GCMS (USEPA8260)	0.08	0.08	2	0.3
VC	1.0	Purge Trap-GCMS (USEPA8260)	0.03	0.03	0.5	0.1
OTHER						
Bonded ACM	-	Field Quantification	0.01%	0.04%	0.02%	0.05%
Asbestos	Presence	PLM / Dispersion Staining	No asbestos capable of being detected via visual identification and sample analysis by a NATA accredited laboratory, and no Free Asbestos (FA) and Asbestos Fines (AF) above 0.001%			

Notes:

1. Guideline values presented are for Chromium (VI) in absence of total Chromium values. Where total Chromium results are elevated, samples will be analysed for Chromium (VI).
2. Guideline values are for inorganic mercury. Where elevated mercury concentrations are encountered and/or site information suggests the potential presence of elemental mercury and/or methyl mercury, consideration of applicability would be needed.
3. Carcinogenic PAHs calculated as per Benzo(a)pyrene Toxicity Equivalent Factor requirements presented in NEPC (2013)
4. Total PAHs calculated as per requirements presented in NEPC (2013).
5. Soil Health Screening Levels for Vapour Intrusion: Sand Soils. Values presented are those for 0 to <1 m bgs as the most conservative level. Reference should be made to results tables for further detail of levels at greater depths. NL: Non-limiting.
6. Values for F1 C6-C9 are obtained by subtracting BTEX (Sum) from laboratory result for C6-C9 TRH. Naphthalene is not subtracted as there is separate limits for Naphthalene.
7. No EPA endorsed criteria, The LOR is proposed as a screening level in the absence of endorsed site specific criteria.

Biological data will be compared against the NSW EPA *Use and Disposal of Biosolid Products*, 1997. The results were assessed against the criteria in **Table 7.2** below:

Table 7.2 Biosolid Based Soil Criteria

Parameter	Standard
Enteric Viruses	<1 PFU per 4 g total dry solids
Helminth ova	<1 per 4 g total dry solids
E.Coli	<100 MPN per g (dry weight)
Facel Coliforms	<1,000 MPN per g (dry weight)
Salmonella	Not detected/50 g of final product

Table 7.3 Ecological Based Soil Criteria (all units in mg/kg)

	Limit of Reporting	Laboratory Method	EILs/ESLs[1]
			Urban Residential and public open space
Metals			
Arsenic	4.0	ICP-AES (USEPA 200.7)	100
Cadmium	0.4	ICP-AES (USEPA 200.7)	-
Chromium	1.0	ICP-AES (USEPA 200.7)	410
Chromium (VI)	1.0	Alkali leach colorimetric (APHA3500-Cr/USEAP3060A)	-
Copper	1.0	ICP-AES (USEPA 200.7)	220
Nickel	1.0	ICP-AES (USEPA 200.7)	320
Lead	1.0	ICP-AES (USEPA 200.7)	1100
Zinc	1.0	ICP-AES (USEPA 200.7)	520
Mercury (inorganic)	0.1	Cold Vapour ASS (USEPA 7471A)	-
PAHs[2]			
Benzo(a)pyrene	0.5	GCMS (USEPA8270)	0.7
Naphthalene	0.1	GCMS (USEPA8270)	170
BTEX[2]			
Benzene	1.0	Purge Trap-GCMS (USEPA8260)	50
Toluene	1.0	Purge Trap-GCMS (USEPA8260)	85
Ethylbenzene	1.0	Purge Trap-GCMS (USEPA8260)	70
Total Xylenes	3.0	Purge Trap-GCMS (USEPA8260)	105
TPH[2, 3, 4]			
F1 C_6-C_{10}	10	TPH Purge Trap-GCMS (USEPA8260)	180
F2 >C_{10}-C_{16}	50	TPH Purge Trap-GCMS (USEPA8260)	120
F3 >C_{16}-C_{34}	100	Purge Trap-GCFID (USEPA8000)	300
F4 >C_{34}-C_{40}	100	Purge Trap-GCFID (USEPA8000)	2800
OCPs			
DDT	0.1	GCECD (USEPA8140,8080)	180

1. EILs presented for metals other than arsenic are equivalent to the most conservative NEPC (2013) Added Contaminant Level (ACL), including assumed soil pH of 6 for Copper and Zinc. Site-specific EILs can be derived according to NEPC (2013) based on site data for pH, CEC, % Clay and Iron. Generic NEPC (2013) EILs are provided for Arsenic, Naphthalene and DDT. Value for Chromium (III) adopted for evaluation of total Chromium in the absence of known Chromium (VI) source.
2. ESLs for TPH fractions, BTEX and BAP are for coarse soil textures per NEPC (2013).
3. Values for F1 C6-C9 are obtained by subtracting BTEX (Sum) from laboratory result for C6-C9 TRH.
4. Naphthalene (EIL) should not be subtracted from values for F2 >C10-C16 as there is no separate ESL for naphthalene (per NEPC 2013 Errata 29 July 2013).

7.3 Groundwater Assessment Criteria

Assessment of groundwater conditions was required to confirm previous groundwater data from the STP site, and to include an assessment of groundwater in the vicinity of the oxidation ponds. The adopted criteria from guidelines as noted below are based upon those adopted during previous assessment of the site (ERM 2010):

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality. ANZECC/ARMCANZ (2000), based on 95% species protection in freshwater environments (based on fresh water receiving waters, rather than saline groundwater);
- Australian Drinking Water Guidelines (NHMRC/NRMMC 2004) where appropriate, although use of groundwater for drinking water is unlikely as previously noted; and
- Laboratory reporting limits or other Australian or International screening levels where no criteria are available from the above guidelines, where appropriate.

Table 7.4Groundwater Assessment Criteria (units in µg/L unless noted)

	Limit of Reporting	Laboratory Method	Drinking Water Criteria[1]	Freshwater Ecosystem Criteria[2]
METALS				
Arsenic	1.0	ICP-AES (USEPA 200.8, 6020A)	10	-
Cadmium	0.1	ICP-AES (USEPA 200.8, 6020A)	2	0.2[4]
Chromium	1.0	ICP-AES (USEPA 200.8, 6020A)	50	1.4
Copper	1.0	ICP-AES (USEPA 200.8, 6020A)	2000	1.3
Lead	1.0	ICP-AES (USEPA 200.8, 6020A)	10	3.4
Mercury	0.1	ICP-AES (USEPA 200.8, 6020A)	1	0.6[4]
Nickel	1.0	ICP-AES (USEPA 200.8, 6020A)	20	11
Zinc	1.0	ICP-AES (USEPA 200.8, 6020A)	3000	8
BTEX				
Benzene	1.0	P&T GC/MS (USEPA 8020A)	1	950
Toluene	1.0	P&T GC/MS (USEPA 8020A)	800	-
Ethylbenzene	1.0	P&T GC/MS (USEPA 8020A)	300	-
o-Xylene	1.0	P&T GC/MS (USEPA 8020A)	600[8]	350[5]
m-Xylene	1.0	P&T GC/MS (USEPA 8020A)		-
p-Xylene	1.0	P&T GC/MS (USEPA 8020A)		-
PETROLEUM HYDROCARBONS				
C6 – C9 Fraction	10	P&T GC/MS (USEPA 8020A)	-	10[9]
C10 – C36 Fraction	250	GC/FID (USEPA 8000)	-	250[9]
POLYCYCLIC AROMATIC HYDROCARBONS				
Naphthalene	0.1	GCMS (USEPA8270)	-	16[4,10]
Anthracene	0.1	GCMS (USEPA8270)	-	-
Phenanthrene	0.1	GCMS (USEPA8270)	-	-
Fluoranthene	0.1	GCMS (USEPA8270)	-	-
Benzo(a)pyrene	0.1	GCMS (USEPA8270)	0.1[7]	-
SEMI VOLATILE ORGANIC COMPOUNDS				
Analine	2.0	P&T GC/MS (USEPA 8020B)	-	250

	Limit of Reporting	Laboratory Method	Drinking Water Criteria[1]	Freshwater Ecosystem Criteria[2]
Hexachlorobudiene	4.0	P&T GC/MS (USEPA 8020B)	0.7	-
Hexachloroethane	2.0	P&T GC/MS (USEPA 8020B)	-	360
Nitrobenzene	2.0	P&T GC/MS (USEPA 8020B)	-	550
Pentachlornitrobenzene	2.0	P&T GC/MS (USEPA 8020B)	30	-
Di(2-ethylbexy)phthalate	20	P&T GC/MS (USEPA 8020B)	10	-
Dibutyl phthalate	2	P&T GC/MS (USEPA 8020B)	-	26
Diethyl phthalate	2	P&T GC/MS (USEPA 8020B)	-	1000
Dimethylphthalate	2	P&T GC/MS (USEPA 8020B)	-	3700
ORGANOPHOSPHOROUS PESTICIDES				
Azinphos methyl	0.5	GCMS (USEPA8270)	30	0.02
Chlorpyrifos	0.5	GCMS (USEPA8270)	10	0.01
Diazinon	0.5	GCMS (USEPA8270)	4	0.01
Dimethoate	0.5	GCMS (USEPA8270)	7	0.15
Fenitrotion	2	GCMS (USEPA8270)	7	0.2
Malathion	0.5	GCMS (USEPA8270)	70	0.05
Parathion	2	GCMS (USEPA8270)	20	0.004
ORGANOCHLORINE PESTICIDES				
DDT	2	GCMS (USEPA8270)	9	0.01
Endrin	0.5	GCMS (USEPA8270)	-	0.02
g-BHC (Lindane)	0.5	GCMS (USEPA8270)	10	0.2
Heptachlor	0.5	GCMS (USEPA8270)	-	0.09
Aldrin & Dieldrin	0.1	GCMS (USEPA8270)	0.3	-
Chlordane	1	GCMS (USEPA8270)	2	0.08
Heptachlor Epoxide	0.1	GCMS (USEPA8270)	0.3	-
Pentachlorophenol	10	GCMS (USEPA8270)	10	10
Toxaphene	10	GCMS (USEPA8270)	-	0.2
OTHER				
Ammonia (at pH 6)	100	Colorimetric (EPA 350.1)	-	900[12]
NOx (based on Nitrate as N)	100	Colorimetric (EPA 353.2)	50 000	700[13]

Notes

1. Australian Drinking Water Guidelines (NHMRC/NRMMC 2004)
2. 95% Protection Trigger Values for Fresh Water (ANZECC/ARMCANZ 2000)
3. Guidelines for Managing Risks in Recreational Waters – 10 times Drinking Water Values as a screening level (NHMRC 2008)
4. 95% Protection Level used, as recommended by ANZECC/ARMCANZ 2000
5. Low Reliability Trigger Value (ANZECC/ARMCANZ 2000)
6. Indicative Interim Working Level (ANZECC/ARMCANZ 2000)
7. Laboratory limit of reporting is greater than the available criterion, hence the laboratory LOR is adopted as the screening level.
8. Total Xylenes
9. Laboratory LOR is adopted as the criterion as a screening level in the absence of EPA endorsed assessment value.
10. Moderate Reliability Trigger value in marine waters.
11. In absence of NSW EPA endorsed values, USEPA RSLs for Tap Water adopted as screening level for assessment purposes.
12. Ammonia value for pH 7.2 as presented in ANZECC (2000) adopted based on average pH reported by the laboratory for groundwater samples.
13. Nitrate value based on 95% trigger value in freshwater.

8 Quality Assurance / Quality Control

8.1 QA/QC Results

The results of the QA/QC program are presented in **Table 8.1** and discussed in **Section 8.2** and **Section 8.3**. Detailed QA/QC results are included with the laboratory reports in **Appendix D**.

Table 8.1 Summary of QA/QC Results

Data Quality Objective	Frequency	Results	DQO met?
Precision			
Soil Blind duplicates (intra laboratory)	3/53 metals; 3/23 TPH and BTEX; 3/29 PAH; 2/14 OCP and PCB; and 1/12 asbestos.	0 – 183%	Partial
Soil Blind duplicates (inter laboratory)	3/53 metals; 3/23 TPH and BTEX; 3/29 PAH; 2/14 OCP and PCB; and 2/12 asbestos.	0 - 167%	Partial
Water Blind duplicates (intra laboratory)	1/10 metals and BTEX; 1/6 TPH; 1/4 TPH aromatic/aliphatic/silica gel clean up; & BTEX; 0/6 SVOCs; and 0/4 for nutrients	0%	Yes
Water Blind duplicates (inter laboratory)	1/10 metals and BTEX; 1/6 TPH; 1/4 TPH aromatic /aliphatic/silica gel clean up; 0/6 SVOCs; and 0/4 for nutrients.	0%	Yes
Laboratory duplicates	1/batch	0 – 95 %	Partial
Storage blank	1 per sampling event	<LOR	Yes
Rinsate blank	1 per sampling event where reusable sampling equipment used	<LOR	Yes
Accuracy			
Surrogate spikes	All organic analytes	38- 130%	Partial
Laboratory Control Samples	1 per lab batch	60-134%	Partial
Matrix spikes	1 per lab batch	69-130%	Partial
Representativeness			
Sampling appropriate for media and analytes	All media /analytes	Sampling conducted in accordance with JBS&G procedures	Yes
Trip Spike	1 per sampling event when sampling for volatile or semi-volatile COPC	88-99%	Yes
Laboratory blanks	1 per lab batch	<LOR	Yes
Samples extracted and analysed within holding times.	All samples	Soil: 14 days for organics, 6 months for metals, asbestos Water: sTPH/PAH 7 days, SVOC/vTPH – 14 days, 6 months for metals	Yes
Comparability			
Standard operating procedures for sample collection & handling	All samples	JBS&G field scientist completed all sampling works using standard operating procedures.	Yes
Standard analytical methods used for all analyses	All samples	Analytical methods as commercially available and as adopted for assessment phase	Yes

		activities employed for validation assessment as documented in **Appendix D.**	
Consistent field conditions, sampling staff and laboratory analysis	All samples	All sampling and visual inspections were completed by experienced JBS&G field scientist. The primary and secondary laboratories remained the same throughout the investigation.	Yes
Limits of reporting appropriate and consistent	All samples	Limits of reporting were consistent and appropriate	Yes
Completeness			
Sample description and COCs completed and appropriate	All samples	All bore / sample log and COCs were completed appropriately	Yes
Appropriate documentation	All samples	Appropriate field documentation included in the Appendices	Yes
Satisfactory frequency and result for QC samples	All samples	The QC results are considered adequate for the purposes of the investigation	Yes
Data from critical samples is considered valid	All samples	All	Yes
Sensitivity			
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	All samples	Appropriate laboratory analysis methods and detection limits were considered to have been achieved during the field and laboratory phases of this investigation.	Yes

8.2 Soils QA/QC Discussion

8.2.1 Precision

Blind and Split Duplicates

Field blind duplicates had relative percentage differences (RPDs) generally within the acceptable range of less than 50% with the following exceptions:

- Cadmium and copper in primary sample TP02 0.1-0.2 and duplicate sample QS001, with RPDs of 67% and 52%, respectively;
- Copper, mercury, nickel and zinc in primary sample TP07 3.4-3.5 and duplicate sample QS002, RPDs of 57%, 183%, 56% and 72%, respectively; and
- Nickel in primary sample TP29 0.1-0.2 and duplicate sample QS004, RPD of 94%.

Field split duplicates had RPDs generally within the acceptable range of less than 50% with the following exception:

- Arsenic, cadmium, chromium, mercury and nickel in primary sample TP02 0.1-0.2 and triplicate sample QS001A, with RPDs of 67%, 67%, 58%, 67% and 58%, respectively; and
- Mercury in primary sample TP07 3.4-3.5 and triplicate sample QS002A, RPD of 167%.

The elevated RPDs noted are due to contaminant concentrations being close to the laboratory limit of reporting (LOR) where a relatively minor discrepancy can be represented as a large RPD value.

Laboratory Duplicates

Laboratory duplicate analyses had RPDs generally within the acceptable range of less than 50%, with the following exceptions:

- Phosphorous in sample N003512 for batch 398440, with a RPD of 95%.

8.2.2 Accuracy

Surrogate Spikes

Surrogate spikes were detected slightly within the target range of 70-130%.

Matrix Spikes

Matrix spikes were detected within the target range of 70-130% with the exception of lead in sample N009122 for batch 399026, (recovery of 69%), which was within the NATA accredited acceptance range of 60-140%.

Laboratory Control Samples

Laboratory Control Samples (LCS) were detected slightly outside the target range for:

- TPH $_{C29-C36}$ in LCS-4 (999986-1) with recovery concentration of 134%; and
- TPH $_{C29-C36}$ in LCS-4 (100279-1) with recovery concentration of 134%.

All LCS recoveries were within the Envirolab Services NATA accredited acceptance range of 60-140%.

8.2.3 Representativeness

Sampling appropriate for media and analytes

The sampling methods were considered appropriate for soil media and the analytes targeted.

Trip spikes

Two trip spikes for BTEX compounds were included with two batch of soil samples submitted for analysis. The recoveries of the trip spike samples were all within the nominated acceptance criteria.

Storage blanks

Two storage blanks were provided with each batch of samples. All levels of analytes in the trip blanks were below detection limits.

Laboratory blanks

At least one laboratory blank was analysed for each analyte with each batch of samples. All levels of analytes in laboratory blanks were below detection limits.

Rinsate Samples

Two rinsate samples were included when reusable sampling equipment was used. All levels of analytes in the rinsate samples were below detection limits.

Holding times

All analyses have been undertaken within holding times.

8.2.4 Comparability

Common and consistent JBS&G Field Personnel have been used to collect samples throughout the project. Field works have been undertaken in accordance with JBS&G field

operating procedures. All required field forms and sampling logs have been appropriately completed by sampling personnel. Well installation logs and field notes are provided as **Appendix B** and **C**.

8.2.5 Completeness

Documentation

All documentation was completed to the required standard. Borehole logs are provided as **Appendix C**. Chain of custody forms are provided with laboratory documentation included as **Appendix E**.

Frequency for QC Samples

The frequency of QC samples is considered to be sufficient and meets the project DQI's.

8.2.6 Soil QA/QC Conclusions

The results of the field and laboratory QA/QC program indicates that the data obtained from this investigation generally met the predetermined Data Quality Indicators (DQIs) or, where the DQIs were exceeded, did not indicate systematic sampling or analytical errors. As such the data is considered to be of adequate quality to be relied on for the purposes of assessing the environmental condition at the site.

8.3 Groundwater QA/QC Discussion

8.3.1 Precision

Blind and Split Duplicates

Field blind duplicates and triplicates had relative percentage differences (RPDs) within the acceptable range of less than 50%.

Laboratory Duplicates

Laboratory duplicate analyses had RPDs generally within the acceptable range of less than 50%.

8.3.2 Accuracy

Surrogate Spikes

Surrogate spikes were detected slightly outside the target range (70-130%) for:

- Phenol-d6 in samples N006473 to N006478 and N006489 with a reported recoveries ranging between 38 and 40%;

The surrogate spike recovery outside of the target range are not considered to affect the analytical dataset as concentrations of volatile compounds (VOCs and BTEX) were below the limit of reporting in all samples analysed during this investigation.

Matrix Spikes

Matrix spikes were detected within the target range of 70-130%.

Laboratory Control Samples

Laboratory Control Samples (LCS) were detected within the target range of 70-130% and all LCS recoveries were within the NATA accredited acceptance range of 60-140%.

8.3.3 Representativeness

Sampling appropriate for media and analytes

The sampling methods were considered appropriate for groundwater media and the analytes targeted.

Trip spike

A trip spike for BTEX compounds was included with the batch of groundwater samples submitted for analysis. The recoveries of the trip spike sample were all within the nominated acceptance criteria.

Storage blank

A storage blank was provided with the batch of samples. All levels of analytes in the storage blank were below detection limits.

Laboratory blanks

At least one laboratory blank was analysed for each analyte with each batch of samples. All levels of analytes in laboratory blanks were below detection limits.

Rinsate Samples

A rinsate sample was included with the batch of water samples. All levels of analytes in the rinsate samples were below detection limits.

Holding times

All analyses have been undertaken within holding times.

8.3.4 Comparability

Common and consistent JBS&G Field Personnel have been used to collect samples throughout the project. Field works have been undertaken in accordance with JBS&G field operating procedures. All required field forms and sampling logs have been appropriately completed by sampling personnel. Borehole logs and field notes are provided as **Appendix B** and **C**.

8.3.5 Completeness

Documentation

All documentation was completed to the required standard. Groundwater monitoring notes are provided as **Appendix B**. Chain of custody forms are provided with laboratory documentation included as **Appendix D**.

Frequency for QC Samples

The frequency of QC samples is considered to be sufficient and meets the project DQI's.

8.3.6 Groundwater QA/QC Conclusions

The results of the field and laboratory QA/QC program indicates that the data obtained from this investigation generally met the predetermined Data Quality Indicators (DQIs) or, where the DQIs were exceeded, did not indicate systematic sampling or analytical errors. As such the data is considered to be of adequate quality to be relied on for the purposes of assessing the environmental condition at the site.

9 Soil Results

9.1 Field Observations

9.1.1 Observations

A total of 30 test pits were excavated, 4 boreholes drilled and 3 surface soil samples collected for soil investigation purposes as shown in **Figure 4a** and **4b**. Test pit and borehole logs and associated monitoring well installation records are presented in **Appendix B**.

STP Area

Fill material was encountered from the ground surface at all sampling locations and generally comprised topsoil of silty clay and silty sand. The fill material extended to depths of between 0.3 m (TP12 and TP23) and 1.3 m bgs in the majority of locations.

The three surface samples (TP33 to TP35) were collected from fill material.

Material in the trickle filter comprised angular gravels and building rubble. No fines were observed within or at the base of the gravels. The thickness of material in TP17 and TP18 was observed to be between 1.9 to 2.1 m.

Oxidation Ponds

Fill material was encountered from the ground surface at all sampling locations and generally comprised topsoil of silty clay and silty sand. The fill material extended to depths of between 0.3 m (TP12 and TP13) and 1.0 m bgs in the majority of locations.

TP23 were terminated in fill material at 0.2 m bgs due to the presence of a possible service.

Suspected asbestos containing materials (ACM) was noted in spoil during site investigation activities at location TP19 at a depth of 0.4-0.5 m bgs at the western end of the east oxidation pond.

Natural soil was encountered underlying the fill material at 28 of the 34 soil sampling locations. Residual clay soils and weathered shale were encountered at depths of 0.2 m to 6.7 m bgs at TP01 TP16, TP19 to TP22 and TP24 to TP32 inclusive. Boreholes TP12, TP13, TP16, TP24 and TP30 to TP32 were terminated in shale bedrock material.

Groundwater seepage was observed during drilling at depths of 3.4 m bgs (TP04, eastern end of east oxidation pond) with moist soils encountered in the majority of test pits. Standing water levels measured at monitoring wells installed at MW01 to MW04 inclusive are summarised in **Section 10** below.

Field PID screening of samples as recorded on the borehole logs reported concentrations of less than 4 ppm in all instances. Ammonia odours were noted in test pits TP04 and TP05 (east oxidation pond) at depths of 1.2 m bgs and 0.8 to 1.1 m bgs, respectively. No other observations of odorous soil conditions were identified during soil sampling activities, including deeper boreholes into shale.

9.2 Soil Analytical Results

The soil sampling locations are shown on **Figure 4a and 4b** and summarised laboratory results are presented in **Tables 2** to **7**. Detailed laboratory reports and chain of custody documentation is provided in **Appendix D**. Laboratory results are discussed in the following sections in relation to the proposed land use as shown in **Figure 5**.

9.2.1 Sewerage Treatment Plant

9.2.1.1 Heavy Metals

A total of 25 samples (18 fill material and 7 natural soil) were analysed for a range of heavy metals with the results summarised in **Table 2**.

Concentrations of all individual heavy metals for all material types were less than the adopted health based assessment criterion.

Evaluation of the data within the depth range from 0 – 3 m bgs did not identify any individual heavy metals above the adopted ecological investigation levels.

9.2.1.2 PAHs

A total of 8 samples (7 fill material and 1 natural soil) were analysed for a range of PAHs and the sum of carcinogenic PAHs as B(a)P TEQ in addition to total PAHs was calculated as presented in **Table 3**.

All reported concentrations were less than the adopted assessment criterion for total PAHs of 300 mg/kg. Calculated B(a)P TPE concentrations for individual samples were less than the adopted assessment criterion of 3 mg/kg.

Concentration of naphthalene in each of the samples within the interval from 0 to 3.0 m bgs were below the adopted ecological assessment criterion of 170 mg/kg.

Concentrations of B(a)P in one fill material sample (concentration of 0.8 mg/kg in TP12 0.1-0.2 m bgs) within the interval from 0 to 3.0 m bgs exceeded the adopted ecological assessment criterion of 0.7 mg/kg, as shown in **Figure 5.**

9.2.1.3 TPH and BTEX

A total of 10 samples (9 fill material and 1 natural soil) were analysed for TPH and BTEX as summarised in **Table 4**.

Concentration of each of the samples within the interval from 0 to 3.0 m bgs were below the adopted ecological assessment criteria.

Results for one fill sample (TP09 0.1-0.2 m) analysed for aliphatic and aromatic TPHs was below laboratory detection limits.

9.2.1.4 PCBs

A total of 4 fill samples were analysed for a range of PCB compounds and the results are summarised in **Table 5**. All concentrations were reported to be less than the LOR and below than the respective adopted health and ecological assessment criteria.

9.2.1.5 OCPs

A total of 4 fill samples were analysed for a range of OCP compounds and the results are summarised in **Table 6**. All concentrations were reported to be less than the LOR and below than the respective adopted health and ecological assessment criteria.

9.2.1.6 Asbestos

A total of 4 fill samples were screened for the presence of asbestos fibres in soil with the results summarised in **Table 7**. Asbestos fibres were not identified in the fill samples.

9.2.1.7 Nutrients

A total of one sample was analysed for ammonia in natural soils with a result of 0.1 mg/kg.

A total of 7 samples (5 from fill and 2 natural) were analysed for phosphorous, sulphur, nitrogen, chloride, sulphate and alkalinity and the results are summarised in **Table 7**. The

ranges for fill and natural samples is presented in **Table 9.1** below. In general, sulfur and nitrogen concentrations are comparable between fill and natural soils, phosphorous is elevated in fill compared to natural soils and chloride, sulphate and alkalinity have higher results in natural soils compared to the fill materials.

Table 9.1 Comparison of Nutrient Concentrations in Fill and Natural Soils (mg/kg)

Analyte	Fill Concentration (range)	Natural Soil Concentration (range)
Phosphorous	1600 – 4000	27 – 400
Sulfur	200 – 1100	310 – 1200
Total Nitrogen	110 – 1000	580 – 1300
Chloride	<10	67 – 320
Sulphate	<10	18 – 81
Alkalinity	<50	<50 - 1000

9.2.1.8 Soil Properties

A total of 2 samples (1 from fill and 1 natural) were analysed for iron, CEC, EC, pH and organic matter and the results are summarised in **Table 7**.

Table 9.2 Comparison of Soil Properties in Fill and Natural Soils (mg/kg)

Analyte	Fill Concentration (range)	Natural Soil Concentration (range)
Iron	9000	28,000
CEC	20	31
EC	27	210
pH	7.4	5.9
Organic Matter	3.1%	4.8%

9.2.1.9 Biological

A total of 11 samples (9 from fill and 2 natural) were analysed for E.Coli, faecal coliforms, salmonella, helminth ova and enteric viruses and the results are summarised in **Table 7**. Each of the results for the nine samples were below laboratory LOR.

9.2.2 Oxidation Ponds

9.2.2.1 Heavy Metals

A total of 26 samples (20 fill material and 6 natural soil) were analysed for a range of heavy metals. A total of 8 sediment samples (4 from each oxidation pond) were also analysed for a range of heavy metals. The results are summarised in **Table 2**.

Concentrations of all individual heavy metals for all material types were less than the adopted health based assessment criterion with the exception of lead in a sediment sample for the western oxidation pond (labelled as OPWS_01 with a concentration of 2,900 mg/kg compared to the criterion of 600 mg/kg).

Evaluation of the data within the depth range from 0 – 3 m bgs identified individual heavy metals in the following sediment samples exceeded the adopted ecological investigation levels as shown in **Figure 5**:

- OPWS_01 for lead and zinc; and
- OPWS_03 for copper.

9.2.2.2 PAHs

A total of 20 samples (17 fill material and 3 natural soil) were analysed for a range of PAHs and the sum of carcinogenic PAHs as B(a)P TPE in addition to total PAHs was calculated as presented in **Table 3**. No sediment samples were analysed for PAHs.

All reported concentrations were less than the adopted assessment criterion for total PAHs of 300 mg/kg. Calculated B(a)P TPE concentrations for individual samples were less than the adopted assessment criterion of 3 mg/kg.

Concentration of naphthalene in each of the samples within the interval from 0 to 3.0 m bgs were below the adopted ecological assessment criterion of 170 mg/kg.

9.2.2.3 TPH and BTEX

A total of 13 samples (10 fill material and 3 natural soil) were analysed for TPH and BTEX. Seven samples from test pits were also analysed for aliphatic and aromatic TPH. A total of 8 sediment samples (4 from each oxidation pond) were also analysed for aliphatic and aromatic TPH. The results are summarised in **Table 4**.

Concentration of each of the samples within the interval from 0 to 3.0 m bgs were below the adopted ecological assessment criteria. Results for each of the samples analysed for aliphatic and aromatic TPHs were below laboratory detection limits.

9.2.2.4 PCBs

A total of 10 fill samples were analysed for a range of PCB compounds and the results are summarised in **Table 5**. All concentrations were reported to be less than the LOR and below than the respective adopted health and ecological assessment criteria. No sediment samples were analysed for PCBs.

9.2.2.5 OCPs

A total of 10 fill samples were analysed for a range of OCP compounds and the results are summarised in **Table 6**. All concentrations were reported to be less than the LOR and below than the respective adopted health and ecological assessment criteria. No sediment samples were analysed for OCPs.

9.2.2.6 Asbestos

A total of 7 (6 fill materials and 1 natural soils) were screened for the presence of asbestos fibres in soil with the results summarised in **Table 7**. Asbestos fibres as chrysotile asbestos in a matted material was detected in sample TP14 0.4-0.5 m bgs in fill located at the western end of the eastern oxidation pond.

9.2.2.7 Nutrients

A total of one natural soil sample (labelled as TP04 1.2-1.3 bgs) was analysed for ammonia, phosphorous, sulphur, nitrogen, chloride, sulphate and alkalinity and the results are summarised in **Table 7**. The results were in the range or slightly lower than the natural soil results in the sewerage treatment plant samples.

9.2.2.8 Soil Properties

A total of 4 samples (2 from fill material and 2 natural soils) were analysed for iron, CEC, EC, pH and organic matter and the results are summarised in **Table 7**. In general, iron, CEC, pH and organic matter are comparable between fill and natural soil with CEC and EC generally lower in the natural samples. The results are comparable with STP results with the exception of iron and EC which are lower in the STP fill material compared to fill material in the oxidation ponds.

Table 9.3 Comparison of Soil Properties in Fill and Natural Soils (mg/kg)

Analyte	Fill Concentration (range)	Natural Soil Concentration (range)
Iron	17,000 – 18,000	17,000 – 34,000
CEC	30 - 33	17 – 25
EC	230 – 720	53 – 120
pH	7.3 – 8.7	8.1 – 8.5
Organic Matter	3.2 – 4%	2.9 – 4%

9.2.2.9 Biological

A total of 4 samples from within the oxidation ponds, (1 from fill material and 3 natural soils), were analysed for E.Coli, faecal coliforms, salmonella, helminth ova and enteric viruses and the results are summarised in **Table 7**. Each of the results for the four samples were below laboratory LOR with the exception of three samples from the oxidation ponds, as below, reported in Most Probable Number per gram (MPN/g):

- E.Coli (10 MPN/g) in OPES_01;
- E.Coli (580 MPN/g) and faecal coliforms (730 MPN/g) in OPWS_01; and
- E.Coli (51 MPN/g) and faecal coliforms (52 MPN/g) in OPES_03.

10 Groundwater and Surface Water Results

Groundwater gauging and groundwater and surface water quality parameter results are summarised in **Tables 8** and **9**. Groundwater and surface water laboratory results are summarised in **Tables 10** to **16** and laboratory reports and chain of custody documentation are included in **Appendix D**. The locations of groundwater monitoring well and surface water sample locations are shown on **Figures, 4a, 4b, 6a and 6b**.

10.1 Field Observations

10.1.1 Groundwater

Groundwater levels ranged between 3.218 and 8.521 m bgs with groundwater elevations ranging between 38.569 m AHD (MW03) and 43.026 m AHD (MW04). The groundwater flow direction is anticipated to the north east. The previous assessment (ERM 2010) does not provide a flow direction for the site, however, the previous assessment indicated mounding present within the STP area. This is consistent with the current assessment.

No phase separated hydrocarbons (PSH), hydrocarbon sheen or odour was noted in any of the four wells. A sulfate odour was noted on groundwater from MW03. Electrical conductivity ranged between 2,100 µs/cm and 15,322 µs/cm, and total dissolved solids ranged between 1,365 and 9,959 mg/L. Based on these levels, groundwater is classified as brackish to saline. Redox potential was recorded between -312 and 18 mV indicating predominantly anaerobic/reducing conditions, and pH between 6.81 and 7.86 indicating slightly acidic to neutral conditions. Low dissolved oxygen was recorded in each well (0.04 mg/L to 1.18 mg/L) indicative of reducing conditions, consistent with redox results.

10.1.2 Surface Water

No phase separated hydrocarbons (PSH), hydrocarbon sheen or odours were noted on any of the surface water sample locations within the STP or oxidation ponds.

Within the STP area the electrical conductivity ranged between 277 µs/cm and 376 µs/cm, and total dissolved solids ranged between 180 and 244 mg/L. Redox potential was recorded between -88 and -52 mV indicating reducing conditions, and pH between 7.55 and 7.94 indicating neutral conditions. Moderate to high dissolved oxygen was recorded in each on the surface water locations (ranging between 4.31 mg/L and 7.01 mg/L).

Within the oxidation ponds the electrical conductivity ranged between 490 µs/cm and 542 µs/cm, and total dissolved solids ranged between 319 and 352 mg/L. Redox potential was recorded between -24 and -2 mV indicating reducing conditions, and pH between 7.45 and 7.49 indicating neutral conditions. Moderate to high dissolved oxygen was recorded in each on the surface water locations (ranging between 8.55 mg/L and 5.77 mg/L).

Based on these levels, groundwater is classified as fresh.

10.2 Water Analytical Results

10.2.1 Groundwater

10.2.1.1 Heavy Metals

Each of the four groundwater samples were analysed for a range of heavy metals and results are summarised in **Table 10**.

Concentrations of all individual heavy metals were less than the adopted assessment criteria with the exception of arsenic (11 µg/L compared to criteria of 10 µg/L), nickel (35

μg/L compared to criteria of 11 and 20 μg/L respectively) and zinc (18 μg/L compared to 8 μg/L for ANZECC 2000) in MW04 in the STP area.

10.2.1.2 TPH and BTEX

Each of the four groundwater samples were analysed for a TPH, BTEX, aromatic and aliphatic TPH and TPH silica gel clean up and results are summarised in **Table 11**.

Concentrations of each result was below the laboratory LOR and adopted assessment criteria.

10.2.1.3 Nutrients

Each of the four groundwater samples were analysed for ammonia, nitrate and phosphorous and the results are summarised in **Table 15**. Concentrations of ammonia ranged between <10 and 990 mg/L with monitoring well MW04 above the adopted assessment criteria of 900 mg/L.

Concentrations of nitrate ranged between 40 and 90 mg/L and were below the adopted assessment criteria. Phosphorous ranged between <10 and 50 mg/L however there is no criteria available for this analyte.

10.2.2 Surface Water (STP)

10.2.2.1 Heavy Metals

Each of the four surface water samples were analysed for a range of heavy metals and results are summarised in **Table 10**.

Concentrations of all individual heavy metals were less than the adopted assessment criteria with the exception of cadmium in 3 of the 4 STP samples (at the assessment criterion of 0.2 μg/L), and zinc in all the four samples (ranging between 10 μg/L and 47 μg/L compared to 8 μg/L ANZECC 2000 criterion).

10.2.2.2 TPH and BTEX

Each of the four surface water samples were analysed for TPH and BTEX and results are summarised in **Table 11**. Concentrations of BTEX were below the laboratory LOR and adopted assessment criteria. Concentrations of TPH were detected in any of the STP samples

10.2.2.3 PAHs and Phenols

Each of the four surface water samples were analysed for a PAHs and phenols and results are summarised in **Table 12**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.2.4 OPPs

Each of the four surface water samples were analysed for OPPs and results are summarised in **Table 13**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.2.5 OCPs

Each of the four surface water samples were analysed for OCPs and results are summarised in **Table 14**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.2.6 SVOCs

Each of the four surface water samples were analysed for a range of SVOCs and results are summarised in **Table 16**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.3 Surface Water (Oxidation Ponds)

10.2.3.1 Heavy Metals

The two surface water samples were analysed for a range of heavy metals and results are summarised in **Table 10**.

Concentrations of all individual heavy metals were less than the adopted assessment criteria with the exception of copper in the western oxidation pond (2 μg/L compared to criteria of 1.4 μg/L) and zinc in western oxidation pond samples (ranging between 10 μg/L and 47 μg/L compared to 8 μg/L ANZECC 2000 criterion).

10.2.3.2 TPH and BTEX

The two surface water samples were analysed for TPH and BTEX and results are summarised in **Table 11**. Concentrations of BTEX were below the laboratory LOR and adopted assessment criteria. Concentrations of TPH were detected in each of the oxidation pond samples with concentrations of 300 and 900 μg/L for TPH $_{C10-C40}$.

10.2.3.3 PAHs and Phenols

The two surface water samples were analysed for a PAHs and phenols and results are summarised in **Table 12**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.3.4 OPPs

The two surface water samples were analysed for OPPs and results are summarised in **Table 13**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.3.5 OCPs

The two surface water samples were analysed for OCPs and results are summarised in **Table 14**. Concentrations for each sample were below the laboratory LOR and adopted assessment criteria.

10.2.4 Major Cations, Anions and Nutrients

Each of the six surface water samples were analysed for a range of major cations, anions and nutrients with results summarised in **Table 15**. Concentration ranges were as follows:

Table 9.3 Major Cations and Anions Results – Surface Water Samples

Analyte	Oxidation Ponds (mg/L)	STP (mg/L)
Calcium	9.7 – 15	30-36
Magnesium	8.5-9.9	1.5-2.4
Potassium	44-56	3.1-4.6
Sodium	44-56	26-36
Bicarbonate Alkalinity	97-110	91-120
Chloride	47-51	26-38
Carbonate Alkalinity	<5	<5
Sulphate	<2 – 11	3-4

Concentrations of ammonia and nitrate were below the adopted criteria in each of the six surface water samples with the exception of:

- Ammonia with a concentration of 3,800 ug/L compared to the criteria of 900 ug/L in the west oxidation pond (OPW_01), with this likely attributed to decomposition of algae from observed algal blooms in the water.

10.2.4.1 Water Quality Parameters

Each of the six surface water samples were analysed for a range of water quality parameters with results summarised in **Table 15**. The following were reported:

- pH concentrations ranging between 7.45 and 7.94 and consistent in the oxidation pond and STP samples;
- Electrical conductivity ranging between 277 and 542 ms/cm and generally comparable in the oxidation pond and STP samples;
- Suspended solids ranging between 352 ug/L and 180 ug/L with the oxidation ponds reporting the highest levels; and
- Redox ranging between -88 and -2 mV and generally comparable between the oxidation pond and STP samples.

EC, TDS and pH results were generally consistent with field measurements.

11 Site Characterisation

Based on the decisions required to be made to assess the Site, as discussed in **Section 6**, the outcomes of the assessment works as they relate to Site characterisation are discussed below.

11.1 Are there any unacceptable risks to likely future onsite receptors for the proposed land use scenarios?

Asbestos fibres within matted material was reported at one location within the east oxidation pond. Given the detection of ACM in one sample and the presence of construction and demolition waste in isolated locations (i.e. the trickle filters), and previously reported observations in the STP area (ERM 2010), it is considered likely that bonded asbestos fragments are present in isolated areas within fill material that will be identified during future site development activities. As such, management of ACM will require to be addressed during development of the site management plan details.

Lead was detected above the adopted health investigation criteria and ESLs at one location in sediment in the west oxidation pond. Additional, zinc and copper were reported above the ESLs in one sediment location each in west oxidation pond. With respect to the STP, one results for B(a)P was reported slightly above the ESLs. However, it should be noted that for benzo(a)pyrene, application of NEPC (2013) Ecological Screening levels (ESLs) is considered inappropriate for the site, given its low reliability. Plants have a limited ability to take up PAHs through the roots, especially for higher molecular weight PAHs (such as benzo (a) pyrene). Higher molecular weight PAHs are considered persistent and are strongly absorbed to the soil, which limits availability of PAHs to the plants (NEPC 2013.

Management/remediation of the lead impact in sediments from western oxidation pond is requirement as part of the development works. Management of the B(a)P, zinc and copper may be required if the material is likely to stay or be placed at near surface following development works.

E.coli and f.coli in western oxidation pond requires management given exceedance of EPA bioloids criterion (E.Coli) and comparatively elevated levels against other biological results.

Assessment of groundwater at monitoring wells spaced across the site identified minor elevated concentrations of ammonia, arsenic, nickel and zinc in one groundwater well as shown in **Figure 6**. Concentrations of metals are likely to be background concentrations associated with the shale bedrock rather than contamination at the site. Ammonia is most likely associated with decomposition of organic material and is not considered to pose an unacceptable risk to future onsite receptors, particularly given the depth to groundwater and the poor resource potential.

The previous assessment (ERM2012) indicated the presence of TPH concentrations within the sewer sludge drying beds. The results were subject to a silica gel clean-up which indicated that the high concentrations of TPH were likely attributed to high organic matter content.

11.2 Are there any issues relating to local area background soil concentrations that exceed the appropriate soil criteria?

Where present, the natural soils were observed to comprise either residual clay soils or shale and sandstone bedrock. Analysis of selected samples of clay soils identified metals in natural soil results were generally within Australian background soil contaminant ranges reported in NEPC (1999).

On this basis there are considered to not to be any outstanding issues relating to natural background soil conditions.

11.3 Are there any impacts of chemical mixtures?

There were no potential chemical mixtures identified during the investigation that may increase the risk of harm at the site or require special management.

11.4 Are there any aesthetic concerns in soils present at the site?

Inspection of test pit and bore holes spoil generated during excavations and installation of the monitoring wells was completed for the presence of fibrous cement fragments that may contain asbestos or other indications of potentially contaminated materials. The inspections identified the presence of ACM within the soil profile at one location (TP19) in the east oxidation pond. Asbestos fibres were identified in matted material in one sample at TP19 (0.4-0.5 m) as shown in **Figure 5**. Given the detection of ACM in one sample and the presence of construction and demolition waste in isolated locations (i.e. the trickle filters), it is considered likely that bonded asbestos fragments are present in isolated areas within fill material that will be identified during future site development activities. As such, management of ACM will require to be addressed during development of the site management plan details.

The odours reported in groundwater are unlikely to impact users of the land given depth and unlikely future use.

Ammonia odours were reported in two test pits within the western oxidation pond area. These are potentially an aesthetic concern should this material be excavated and brought to the surface.

11.5 Has the potential migration of contaminants from the Site been appropriately addressed?

Groundwater at the site has been identified as flowing across the site in a generally west to east direction. Standing groundwater levels of approximately 38.57 m to 43.03 m AHD were recorded at the site, equivalent to 3.22 m to 5.21 m bgs. Natural clays and bedrock generally occur below the water table which is not impacted with heavy metals, PAHs and/or heavy fraction hydrocarbons.

Assessment of groundwater at monitoring wells spaced across the site identified minor elevated concentrations of arsenic, nickel and zinc in one groundwater well (MW04) as shown in **Figure 6**. Reported concentrations for the above compounds were not identified within the most down-gradient well MW01 on site.

Based on a qualitative evaluation, it is considered that the existing saturated soils are not a significant contaminant migration source to groundwater as:

- Assessment of soils at the site has only identified localised contamination and current groundwater conditions has not identified the presence of significant contamination concentrations as would be representative of broad scale contaminant loading and leaching; and
- the currently saturated soils are natural clays and bedrock with concentration below the adopted criteria.

Concentrations of ammonia in groundwater in one of the four monitoring well locations (at an inferred upgradient location in the STP area), and one anomalous surface water sample from the west oxidation pond, were reported above the adopted assessment criteria. The ammonia concentrations in groundwater are considered likely a result of anaerobic

decomposition of organic matter in the deep soil/weathered shale profile. No elevated ammonia was detected in surface water samples from the STP settling ponds, which suggests no apparent link to ammonia in groundwater (in shale) at depths of X m beneath the STP. The source of the anomalous ammonia result at the eastern end of the western oxidation pond is unknown (with the possible exception of ammonia liberation through decomposition of algal growths). No ammonia was reported in MW01 immediately east of the western oxidation pond (adjacent the surface water sample location).

11.6 Is a management strategy required?

Based on the results of the investigation and subject to the limitations presented in **Section 13**, it is considered that a site management strategy is required to address identified contamination issues associated with, biological (E.coli), lead in the western oxidation pond and asbestos in fill material underlying the site. Successful implementation of an appropriate site management strategy would result in the site being considered suitable for the proposed recreational open space use.

11.7 Have suitable areas been identified for potential on-site encapsulation of materials?

This site assessment has identified isolated areas of contamination at the site that require management and/or remediation. The geotechnical investigation included in **Appendix E**, outlines the management requirements for cut and fill activities at the site. Should encapsulation of material be required, the cleared areas east of the STP is considered a suitable area as the area was previously remediated and a SAS issued (AECOM 2011). Following demolition and any remediation works, the STP site could also be utilised. The area of the eastern oxidation pond may be suitable, although consideration of using the current pond excavation and expanding it for additional containment space will be required by UGNSW, dependent on whether the eastern oxidation pond will be retained as a surface water feature for the regional park. Discussion of the containment cell aspects will be provided in separate advice.

12 Conclusions and Recommendations

12.1 Conclusions

Based on the findings of this investigation and subject to the limitations in **Section 13**, the following conclusions are made with respect to the site:

- Fill material comprising a mix of silty clay /silty sand, gravels was identified at the site to depths of between 0.2 m bgs to 1.9 m bgs. Where encountered, natural soils underlying the fill material comprised either residual clay soil and/or weathered shale and shale bedrock
- One sediment sample in the west oxidation pond has been identified as having a concentration of lead that exceeded the NEPC (2013) health based investigation levels (HIL) and adopted ecological investigation levels (EIL) for urban residential and public open space landuse(s).
- A total of 4 samples from within the oxidation ponds, (1 from fill material and 3 natural soils), were analysed for E.Coli, faecal coliforms, salmonella, helminth ova and enteric viruses, with 3 having E.coli above the relevant adopted criteria.
- Concentrations of COPCs were below the relevant criteria in all other samples collected from the STP, eastern oxidation pond and western oxidation pond.
- Suspected asbestos containing materials (ACM) were visually identified within soil at one location within the fill material within the bank of the eastern oxidation pond during the investigation works. Subsequent selected laboratory analysis did identify a matted material containing asbestos fibres in fill material in the surface soil sample within the east oxidation pond.
- One location within the western oxidation pond contained lead 250% the adopted site criteria. All other soil samples collected were below the adopted criteria for lead.
- Concentrations of COPCs were below the relevant criteria in samples collected from the trickle filters.
- Groundwater and surface water heavy metal and organic contaminant concentrations are considered not to represent an unacceptable risk to sensitive receptors at, or down-gradient of the site as the metal concentrations are likely to be the result of background concentrations associated with the shale bedrock rather than contamination at the site.
- Elevated concentrations of ammonia above the ANZECC 2004 guidelines in groundwater have been identified at one of the four groundwater sampling locations and surface water from the west oxidation pond. The ammonia concentration in groundwater is present in the sample collected at the up-gradient extent of the site in the STP area and the concentration at the down-gradient extent of the site is less than the adopted assessment criterion. The source of the ammonia in groundwater and surface water is considered to comprise the decomposition of organic material and is potentially a regional issues. The concentrations of ammonia in the current assessment is lower than the previous concentrations in the previous assessment (ERM 2010).
- Elevated concentrations of ammonia were reported within one groundwater monitoring well (MW04), located within the STP area and one sediment water sample collected from the western oxidation pond.

- Concentrations of TPH were reported to be consistent with the previous investigation.
- Concentrations of ammonia were lower in the current investigation that the previous investigation.

- Based on the current assessment findings, it is considered the site can be made suitable for the proposed use subject to implementation of an appropriate site management strategy to address site contamination issues including the heavy metal, asbestos and E.coli impacts.

Should encapsulation of material be required, the cleared areas east of the STP is considered a suitable area as the area was previously remediated and a SAS issued (AECOM 2011). Following demolition and any remediation works, the STP site could also be utilised.

12.2 Recommendations

It is recommended that a management strategy and/or Remedial Action Plan (RAP) be developed in accordance with the relevant regulatory requirements to address the identified contamination issues to render the site suitable for the proposed open space use.

13 Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

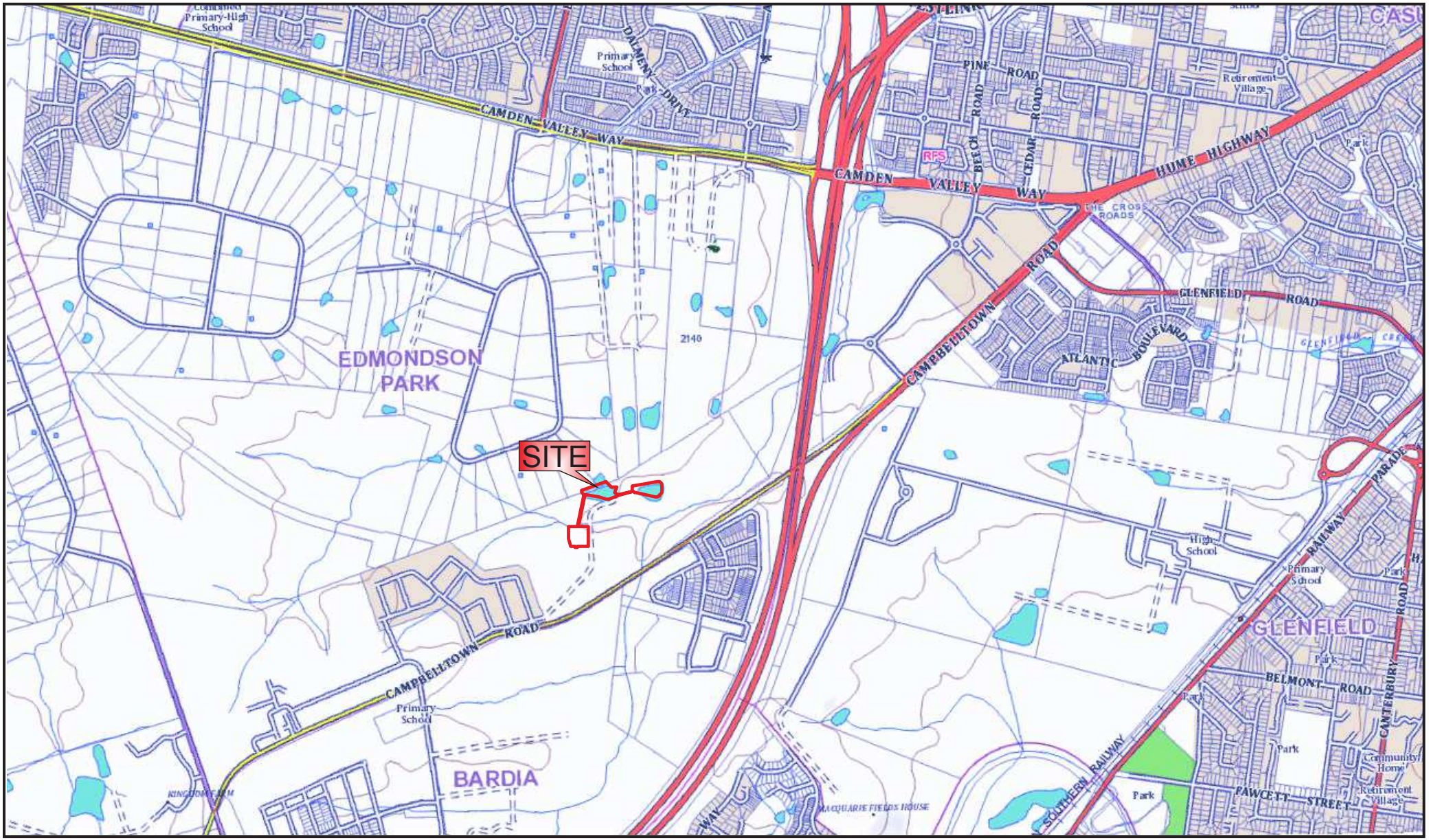
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Limited sampling and laboratory analyses were undertaken as part of the investigations, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the sites, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Source: Base Image - © SIX Maps www.maps.six.nsw.gov.au

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Scale: 1:20,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	03-12-2013

Legend:

- Approximate Site Boundary

JBS&G

Figure 1: Site Location

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_01

Source: Base Image - © www.nearmap.com.au

0 50 100 200 m

Scale: 1:5,000

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Access Path

JBS&G

Figure 2: Site Layout

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_02

Source: Base Image - © www.nearmap.com.au

0 5 10 20 m

Scale: 1:750

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Groundwater Monitoring Well Location
- Test Pit Location

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Figure 3a: Previous Sample Locations Sewerage Treatment Plant

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_03a

Source: Base Image - © www.nearmap.com.au

0 12.5 25 50 m

Scale: 1:1,250

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Access Path
- Groundwater Monitoring Well Location
- Test Pit Location

JBS&G

Figure 3b: Prevoius Sample Locations Oxidation Ponds

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_03b

Source: Base Image - © www.nearmap.com.au

0 5 10 20 m

Scale: 1:750

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Monitoring Well Location
- Oxidation Pond Soil Sample Location
- Oxidation Pond Surface Water Sample Location
- Surface Soil Sample Location
- Surface Water Sample Location
- Test Pit Location

JBS&G

Figure 4a: Sample Locations Sewerage Treatment Plant

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_04a

Source: Base Image - © www.nearmap.com.au

0 12.5 25 50 m

Scale: 1:1,250

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Monitoring Well Location
- Oxidation Pond Soil Sample Location
- Oxidation Pond Surface Water Sample Location
- Surface Soil Sample Location
- Test Pit Location

JBS&G

Figure 4b: Sample Locations Oxidation Ponds

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_04b

Source: Base Image - © www.nearmap.com.au

0 12.5 25 50 m

Scale: 1:1,250

Datum: GDA 1994 MGA Zone 56 - AHD

A4			
A	Original Issue - R02	SE	10-12-2013
Rev	Description	Drn.	Date:

Legend:

- Approximate Site Boundary
- Monitoring Well Location
- Oxidation Pond Soil Sample Location
- Surface Soil Sample Location
- Test Pit Location

JBS&G

Figure 5: Soil Exceedances

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_05

Source: Base Image - © www.nearmap.com.au

0 15 30 60 m

Scale: 1:1,750

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Inferred Groundwater Flow Direction
- Monitoring Well Location

JBS&G

Figure 6a: Groundwater Exceedances and Elevations

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_06a

OPW-01	Concentration
Analyte	(µg/L)
Ammonia	3800
Copper	2
Zinc	10

SP04	Concentration
Analyte	(µg/L)
Cadmium	0.2
Zinc	47

SP03	Concentration
Analyte	(µg/L)
Cadmium	0.2
Zinc	44

SP02	Concentration
Analyte	(µg/L)
Zinc	39

SP01	Concentration
Analyte	(µg/L)
Cadmium	0.2
Zinc	47

Source: Base Image - © www.nearmap.com.au

0 15 30 60 m

Scale: 1:1,750

Datum: GDA 1994 MGA Zone 56 - AHD

Rev	Description	Drn.	Date:
A4			
A	Original Issue - R02	SE	10-12-2013

Legend:

- Approximate Site Boundary
- Oxidation Pond Surface Water Sample Location
- Surface Water Sample Location

JBS&G

Figure 6b: Surface Water Exceedances

Client: UrbanGrowth NSW

Project: Remediation and Validation Edmondson Park - ESA

Job No: 43008 File Name: 43008_06b

Tables

Table 1- Soil and Groundwater Sample Register
Job No. 43008
Urban Growth Edmondson Park

Soil Sample ID /Depth (m)	Sampling Date	Depth (m)	ACM Fragments in Soil	8 Metals	TPH	TPH Aromatic /Aliphatic	TPH Silica Gel Cleanup	BTEX	PAHs	OCP	PCB	Asbestos	SV0C	Nutrients (Phosphorous/Nitrate/Ammonia)	EC/Fe/pH/CEC	Organic Matter	E.Coli	Faecal Coliforms	Salmonella	Enteric Viruses	Helminth Ova	WQ Parameters
Soil Samples																			Biological			
TP01	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	-	-	-			-	-	-	-	-	-
TP01	30-Oct-13	0.6-0.7	No	X	-	-	-	-	X	-	-	-	-	-	X	X	-	-	-	-	-	-
TP01	30-Oct-13	1.9-2.0	No	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	-
TP02	30-Oct-13	0.1-0.3	No	X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP03	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP04	30-Oct-13	0.1-0.2	No	X	X	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
TP04	30-Oct-13	1.2-1.3	No	X	X	-	-	X	X	-	-	-	-	X	-	-	-	-	-	-	-	-
TP04	30-Oct-13	3.6-3.7	No	-	X	-	-	X	X	-	-	-	-	-	-	-	X	X	X	X	X	-
TP05	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-
TP06	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-
TP07	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
TP07	30-Oct-13	3.4-3.5	No	X	X	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	X	-	X	X	X	-	-	-	-	-	-
TP08	30-Oct-13	1.5-1.6	No	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-
TP08	30-Oct-13	2.5	No	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
TP09	30-Oct-13	0.1-0.2	No	X	X	X	X	X	X	X	X	-	-	-	-	-	X	X	X	X	X	-
TP10	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-
TP11	30-Oct-13	0.1-0.2	No	X	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-
TP11	30-Oct-13	1.9-2.0	No	X	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP12	31-Oct-13	0.1-0.2	No	X	X	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP12	31-Oct-13	0.7-0.8	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP14	31-Oct-13	0.1-0.2	Yes	X	X	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP14	31-Oct-13	1.4-1.5	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP15	31-Oct-13	0.1-0.2	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP15	31-Oct-13	0.4-0.5	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP16	31-Oct-13	0.1-0.2	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP16	31-Oct-13	0.9-1.0	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP16	31-Oct-13	2.7-2.8	No	-	-	-	-	-	-	-	-	X	-	-	-	-	X	X	X	X	X	-
TP17	31-Oct-13	0.4-0.5	No	X	X	X	X	X	X	-	-	-	-	X	-	-	X	X	X	X	X	-
TP17	31-Oct-13	0.9-1.0	No	X	X	X	X	X	-	-	-	-	-	X	-	-	X	X	X	X	X	-
TP17	31-Oct-13	1.8-1.9	No	X	X	X	X	X	-	-	-	-	-	X	-	-	X	X	X	X	X	-
TP18	31-Oct-13	0.4-0.5	No	X	X	X	X	X	X	-	-	-	-	X	-	-	X	X	X	X	X	-
TP18	31-Oct-13	1.0-1.1	No	X	X	X	X	X	-	-	-	-	-	X	-	-	X	X	X	X	X	-
TP18	31-Oct-13	1.8-1.9	No	X	X	X	X	X	-	-	-	-	-	X	-	-	X	X	X	X	X	-
TP19	31-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
TP19	31-Oct-13	0.4-0.5	No	X	X	X	X	X	X	-	-	X	-	-	-	-	-	-	-	-	-	-
TP19	31-Oct-13	1.9-2.0	No	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	-
TP20	31-Oct-13	0.4-0.5	No	X	X	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
TP21	31-Oct-13	0.1-0.2	No	X	X	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
TP21	31-Oct-13	0.4-0.5	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP22	31-Oct-13	0.1-0.2	No	X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP22	31-Oct-13	0.9-1.0	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP23	1-Nov-13	0.1-0.2	No	X	X	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
TP24	1-Nov-13	0.1-0.2	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP25	31-Oct-13	0.4-0.5	No	X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP26	31-Oct-13	0.5-0.6	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP26	31-Oct-13	0.9-1.0	No	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
TP27	1-Nov-13	0.4-0.5	No	X	X	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
TP29	1-Nov-13	0.1-0.2	No	X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
TP29	1-Nov-13	2.9-3.0	No	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-
TP30	31-Oct-13	0.1-0.2	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP31	31-Oct-13	0.1-0.2	No	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
TP32	1-Nov-13	0.4-0.5	No	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP32	1-Nov-13	7.9-8.0	No	-	-	-	-	-	-	-	-	-	-	X	-	-	X	X	X	X	X	-
TP33	1-Nov-13	0.1-0.2	No	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
TP34	1-Nov-13	0.1-0.2	No	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-

Table 1- Soil and Groundwater Sample Register
Job No. 43008
Urban Growth Edmondson Park

Soil Sample ID /Depth (m)	Sampling Date	Depth (m)	ACM Fragments in Soil	8 Metals	TPH	TPH Aromatic /Aliphatic	TPH Silica Gel Cleanup	BTEX	PAHs	OCP	PCB	Asbestos	SVOC	Nutrients (Phosphorous/Nitrate/Ammonia)	EC/Fe/pH/CEC	Organic Matter	E.Coli	Faecal Coliforms	Salmonella	Enteric Viruses	Helminth Ova	WQ Parameters
Soil Samples																			Biological			
TP35	1-Nov-13	0.1-0.2	No	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
OPWS_01	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
OPWS_02	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OPWS_03	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
OPWS_04	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OPES_01	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
OPES_02	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OPES_03	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	X	-
OPES_04	1-Nov-13	-	No	X	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Primary Total				**53**	**23**	**16**	**20**	**23**	**29**	**14**	**14**	**12**	**0**	**11**	**6**	**6**	**20**	**20**	**20**	**20**	**20**	**0**
QA/QC Sample ID	**Sampling Date**	**Comments**		**8 Metals**	**TPH**	**TPH Aromatic /Aliphatic**	**TPH Silica Gel Cleanup**	**BTEX**	**PAHs**	**OCP**	**PCB**	**Asbestos**	**SVOC**	**Nutrients**	**EC/Fe/pH/CEC**	**Organic Matter**	**E.Coli**	**Faecal Coliforms**	**Salmonella**	**Enteric Viruses**	**Helminth Ova**	**WQ Parameters**
QS001	30-Oct-13	Duplicate of TP002 0.1-0.2		X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
QS001A	30-Oct-13	Trilicate of TP002 0.1-0.2		X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
QS002	30-Oct-13	Duplicate of TP07: 3.4-3.5		X	X	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
QS002A	30-Oct-13	Triplicate of TP07: 3.4-3.5		X	X	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
QS004	1-Nov-13	Duplicate of TP20 0.1-0.2		X	X	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
QS004A	1-Nov-13	Triplicate of TP20 0.1-0.2		X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-
QA/QC Total				**6**	**6**	**0**	**0**	**6**	**6**	**4**	**4**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Groundwater and Surface Water Samples																						
MW01	11-Nov-13		-	X	-	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-
MW02	11-Nov-13		-	X	-	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-
MW03	11-Nov-13		-	X	-	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-
MW04	11-Nov-13		-	X	-	X	X	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-
SP01	11-Nov-13	Sewerage Treatment Plant		X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X
SP02	11-Nov-13	Sewerage Treatment Plant		X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X
SP03	11-Nov-13	Sewerage Treatment Plant	-	X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X
SP04	11-Nov-13	Sewerage Treatment Plant		X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X
OPW_01	11-Nov-13	Oxidation Pond - West		X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X
OPE_01	11-Nov-13	Oxidation Pond - East		X	X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	X
Primary Total				**10**	**6**	**4**	**4**	**10**	**0**	**0**	**0**	**0**	**6**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**
QA/QC Sample ID	**Sampling Date**	**Comments**		**8 Metals**	**TPH**	**TPH Aromatic /Aliphatic**	**TPH Silica Gel Cleanup**	**BTEX**	**PAHs**	**OCP**	**PCB**	**Asbestos**	**SVOC**	**Nutrients**	**EC/Fe/pH/CEC**	**Organic Matter**	**E.Coli**	**Faecal Coliforms**	**Salmonella**	**Enteric Viruses**	**Helminth Ova**	**WQ Parameters**
Dup1	11-Nov-13	Duplicate of MW02		X	X	X	X	X	-	-	-	-	-	-			-	-	-	-	-	-
Triplicate1	11-Nov-13	Triplicate of MW02		X	X	X	X	X	-	-	-	-	-	-			-	-	-	-	-	-
QA/QC Total				**2**	**2**	**2**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Rinsate, Trip Spike and Storage Blanks																						
Rinsate1	31-Oct-13	Rinsate		X	X	-	-	X	X	X	-	-	-	-			-	-	-	-	-	-
Trip S	29-Oct-13	Trip Spike		-	X	-	-	X	-	-	-	-	-	-			-	-	-	-	-	-
Trip B	29-Oct-13	Storage blank		-	X	-	-	X	-	-	-	-	-	-			-	-	-	-	-	-
Rinsate2	1-Nov-13	Rinsate		X	X	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Trip S	29-Oct-13	Trip Spike		-	X	-	-	X	-	-	-	-	-	-			-	-	-	-	-	-
Trip B	29-Oct-13	Storage blank		-	X	-	-	X	-	-	-	-	-	-			-	-	-	-	-	-
Trip B	11-Nov-13	Storage blank		-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rinsate 1	11-Nov-13	Rinsate		X	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
QA/QC Total				**3**	**7**	**1**	**0**	**7**	**2**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Biological = E.Coli, Salmonella, Faecal coliforms, Enteric viruses and helminth ova
Nutrients = phosphorous, nitrate, ammonia
WQ Parameters -= pH, EC, Redox, TDS/TSS, Major Cations/Anions

Table 2: Soil Analytical Results - Metals, Metalloids, and Non-Metallic Inorganics
Project Number: 43008
Project Name: Edmondson Park

				Metals							
				Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				2	0.4	5	5	5	0.05	5	5
NEPC 2013 Soil HIL C				**300**	**90**	**300**	**17000**	**600**	**80**	**1200**	**30000**
NEPC 2013 Soil EILs/ESLs				**100**		**410**	**220**	**1100**		**320**	**520**
Field ID	**Depth (m)**	**Date**	**SampleCode**								
OPES_01		11/11/2013	Oxidation Pond East - Fill	12	0.5	20	36	28	0.21	7	28
OPES_02		11/11/2013	Oxidation Pond East - Fill	6.7	<0.4	11	29	9.9	0.07	5.8	24
OPES_03		11/11/2013	Oxidation Pond East - Fill	4.6	<0.4	9.3	34	9.8	0.19	5.9	67
OPES_04		11/11/2013	Oxidation Pond East - Fill	7.3	<0.4	14	44	21	0.25	9.7	68
OPWS_01		11/11/2013	Oxidation Pond West - Fill	12	2.7	21	200	**2900**	2.6	23	**660**
OPWS_02		11/11/2013	Oxidation Pond West - Fill	6.3	1.6	14	130	18	2	10	270
OPWS_03		11/11/2013	Oxidation Pond West - Fill	12	1.7	73	**750**	69	8.7	22	500
OPWS_04		11/11/2013	Oxidation Pond West - Fill	5.8	0.8	19	210	21	2.7	10	180
TP01	0.1-0.2	30/10/2013	Fill	5.8	<0.4	12	15	12	0.05	6.6	24
TP01	0.6-0.7	30/10/2013	Fill	6.5	<0.4	9.4	22	13	0.12	6	26
TP02	0.1-0.2	30/10/2013	Fill	10	0.4	20	17	15	0.1	9.1	21
TP03	0.1-0.2	30/10/2013	Fill	9.3	0.4	15	16	18	<0.05	16	22
TP04	0.1-0.2	30/10/2013	Fill	13	0.7	29	11	34	0.06	5.1	21
TP04	1.2-1.3	30/10/2013	Natural	5	<0.4	9.8	15	14	3.9	7.1	10
TP05	0.1-0.2	30/10/2013	Fill	3	<0.4	9	13	9	<0.05	6.2	41
TP06	0.1-0.2	30/10/2013	Fill	5.9	0.5	12	29	15	0.07	7.2	52
TP07	0.1-0.2	30/10/2013	Fill	7.6	<0.4	16	48	17	0.5	7.4	23
TP07	3.4-3.5	30/10/2013	Natural	8.4	0.7	13	29	25	1.1	18	61
TP08	0.1-0.2	30/10/2013	Fill	<2	0.5	16	93	29	<0.05	<5	94
TP09	0.1-0.2	30/10/2013	Fill	11	0.9	27	92	87	0.45	11	170
TP10	0.1-0.2	30/10/2013	Fill	11	0.8	22	31	39	0.58	14	85
TP11	0.1-0.2	30/10/2013	Fill	11	0.5	17	44	62	1.7	12	200
TP11	1.9-2	30/10/2013	Natural	<2	<0.4	<5	13	5.7	<0.05	<5	14
TP12	0.1-0.2	31/10/2013	Fill	13	<0.4	15	43	55	0.43	9.5	310
TP12	0.7-0.8	31/10/2013	Fill	14	<0.4	12	18	10	<0.05	<5	17
TP14	0.1-0.2	31/10/2013	Fill	11	0.6	25	23	25	0.72	11	41
TP14	1.4-1.5	31/10/2013	Natural	4.6	<0.4	<5	14	5.1	<0.05	<5	14

Table 2: Soil Analytical Results - Metals, Metalloids, and Non-Metallic Inorganics
Project Number: 43008
Project Name: Edmondson Park

				Metals							
				Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				2	0.4	5	5	5	0.05	5	5
NEPC 2013 Soil HIL C				**300**	**90**	**300**	**17000**	**600**	**80**	**1200**	**30000**
NEPC 2013 Soil EILs/ESLs				**100**		**410**	**220**	**1100**		**320**	**520**
Field ID	**Depth (m)**	**Date**	**SampleCode**								
TP15	0.1-0.2	31/10/2013	Fill	15	0.5	21	18	41	0.13	10	43
TP15	0.4-0.5	31/10/2013	Fill	10	<0.4	15	19	14	<0.05	<5	20
TP16	0.1-0.2	31/10/2013	Fill	12	1.8	46	110	96	5.4	11	240
TP16	0.9-1	31/10/2013	Natural	6.1	<0.4	13	20	14	0.07	<5	39
TP17	0.4-0.5	1/11/2013	Fill	<2	<0.4	6.3	91	<5	<0.05	33	54
TP17	0.9-1	31/10/2013	Fill	<2	<0.4	21	49	10	0.29	50	83
TP17	1.8-1.9	31/10/2013	Fill	<2	<0.4	14	43	8.7	0.26	37	55
TP18	0.4-0.5	1/11/2013	Fill	2.1	<0.4	20	90	<5	<0.05	60	78
TP18	1-1.1	31/10/2013	Fill	<2	<0.4	12	32	<5	0.07	39	19
TP18	1.8-1.9	31/10/2013	Fill	2.1	<0.4	<5	18	<5	0.18	7	43
TP19	0.1-0.2	31/10/2013	Fill	10	<0.4	11	31	16	0.13	15	68
TP19	0.4-0.5	31/10/2013	Fill	7.4	<0.4	14	31	100	0.18	13	130
TP20	0.4-0.5	31/10/2013	Fill	6.7	<0.4	16	28	20	0.82	7.3	89
TP21	0.1-0.2	31/10/2013	Fill	6.1	<0.4	11	28	15	0.74	<5	50
TP21	0.4-0.5	31/10/2013	Fill	5.7	<0.4	12	17	17	0.41	<5	42
TP22	0.1-0.2	31/10/2013	Fill	4.6	<0.4	9.4	10	8.7	<0.05	<5	8.9
TP22	0.9-1	31/10/2013	Natural	5.5	<0.4	9.3	15	12	<0.05	<5	15
TP23	0.1-0.2	1/11/2013	Fill	33	1.2	36	46	59	0.91	17	190
TP24	0.1-0.2	1/11/2013	Fill	5.2	0.4	27	44	19	0.56	20	68
TP25	0.4-0.5	31/10/2013	Fill	5.6	<0.4	15	16	56	0.4	<5	59
TP26	0.5-0.6	31/10/2013	Fill	5.5	<0.4	12	<5	14	0.12	<5	6.1
TP27	0.4-0.5	1/11/2013	Fill	3.6	<0.4	11	13	6.3	<0.05	<5	9.8
TP29	0.1-0.2	29/10/2013	Fill	3.8	<0.4	8.5	15	14	<0.05	<5	32
TP30	0.1-0.2	31/10/2013	Fill	7.4	0.8	23	39	51	1.7	9.7	190
TP31	0.1-0.2	31/10/2013	Fill	13	0.7	31	17	26	0.12	17	51
TP32	0.4-0.5	1/11/2013	Fill	6.4	<0.4	8.6	15	9.1	0.08	<5	19

Bold Above the HILs and ESLs
Bold Above the ESLs

Table 3: Soil Analytical Results - PAHs
Project Number: 43008
Project Name: Edmondson Park

				Polycyclic Aromatic Hydrocarbons																					
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (US)	Benzo(a)pyrene TEQ (lower bound)*	Benzo(a)pyrene TEQ (medium bound)*	Benzo(a)pyrene TEQ (upper bound)*	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)	PAHs (Sum of Total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	
NEPC 2013 ESL Urban Residential and Public Open Space, Fine Soil								0.7														170				
NEPC 2013 Soil HIL C																					3				300	300
NEPC 2013 Soil HSL C for Vapour Intrusion - Clay 0 to <1m																						NL				
NEPC 2013 Soil HSL C for Vapour Intrusion - Clay 1 to <2m																						NL				
Field ID	**Depth (m)**	**Date**	**SampleCode**																							
TP01	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP01	0.6-0.7	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP02	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP03	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP04	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP04	1.2-1.3	30/10/2013	Natural	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP04	3.6-3.7	30/10/2013	Natural	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP05	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP06	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP07	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP07	3.4-3.5	30/10/2013	Natural	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP08	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	3.75
TP09	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	0.605	<0.5	1	1.2	3.6	3.60
TP10	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP11	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP12	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	0.7	0.8	1.3	-	-	-	0.7	0.7	0.7	0.6	<0.5	2.2	<0.5	<0.5	1.298	<0.5	1.1	2.1	9.6	9.60
TP12	0.7-0.8	31/10/2013	Natural	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP14	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP19	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP19	0.4-0.5	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP20	0.4-0.5	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP21	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP22	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP23	0.1-0.2	1/11/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP25	0.4-0.5	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP27	0.4-0.5	1/11/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP29	0.1-0.2	29/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5
TP31	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.605	<0.5	<0.5	<0.5	<0.5	<7.5

Table 4: Soil Analytical Results - TPH and BTEX
Project Number: 43008
Project Name: Edmondson Park

				BTEX								TPHs				TPHs (NEPC 1999)								TRHs (NEPC 2013)							TPHs Silica Clean up							Benzenes
				Benzene	BTEX (Sum of Total)	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene (Total)	Xylene (Sum of Total)	C10-C15 Aliphatic	C10-C15 Aromatic	>C35 Aliphatic	>C35 Aromatic	>C16-C35 Aromatic	>C16-C35 Aliphatic	>C10-C36 (Sum of Total)	C10-C14 Fraction	C6-C9 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Total)	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	>C10 - C16 less Naphthalene (F2)	>C10-C40 (Sum of Total)	C6-C10 Fraction	C6 - C10 less BTEX (F1)	>C10-C16 after Silica Cleanup	>C16-C34 after Silica Cleanup	>C34-C40 after Silica Cleanup	C10-C14 after Silica Cleanup (TPH)	C15-C28 after Silica Cleanup (TPH)	C29-C36 after Silica Cleanup (TPH)	Hexachlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1		0.1	0.1	0.2	0.1	0.3		500	50	1000	200	50	1000		20	20	50	50	50	50	100	100	50		20	20	50	100	100	50	100	100	0.05
NEPC 2013 ESL Urban Residential and Public Open Space, Course Soil				50		70	85			105														120	300	2800			180									
NEPC 2013 Soil HIL C																																						10
NEPC 2013 Soil HSL C for Vapour Intrusion - Clay 0 to <1m				NL		NL	NL			NL																	NL			NL							
NEPC 2013 Soil HSL C for Vapour Intrusion - Clay 1 to <2m				NL		NL	NL			NL																	NL			NL							
Field ID	Depth (m)	Date	SampleCode																																			
OPES_01		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPES_02		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPES_03		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPES_04		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPWS_01		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPWS_02		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPWS_03		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
OPWS_04		11/11/2013	Fill	-	-	-	-	-	-	-	-	<500	<50	<1000	<200	<50	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<100	<50	<100	<100	-
TP02	0.1-0.2	30/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	121	<20	-	<50	86	86	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP04	0.1-0.2	30/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	-	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP04	1.2-1.3	30/10/2013	Natural	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	-
TP04	3.6-3.7	30/10/2013	Natural	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	-
TP07	3.4-3.5	30/10/2013	Natural	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	-
TP09	0.1-0.2	30/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	-	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	<0.05
TP11	1.9-2	30/10/2013	Natural	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	-
TP12	0.1-0.2	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	<0.05
TP14	0.1-0.2	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	<0.05
TP17	0.4-0.5	1/11/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP17	0.9-1	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP17	1.8-1.9	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP18	0.4-0.5	1/11/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP18	1-1.1	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP18	1.8-1.9	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP19	0.4-0.5	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	<500	<50	<1000	<200	<50	<1000	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP20	0.4-0.5	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	<0.05
TP21	0.1-0.2	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP22	0.1-0.2	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP23	0.1-0.2	1/11/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP25	0.4-0.5	31/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP27	0.4-0.5	1/11/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	<50	<100	<100	<50	<100	<100	-
TP29	0.1-0.2	29/10/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05
TP29	0.1-0.2	1/11/2013	Fill	<0.1	0.3	<0.1	<0.1	<0.2	<0.1	<0.3	<0.3	-	-	-	-	-	-	60	<20	<20	<50	<50	<50	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-	<0.05

Table 5: Soil Analytical Results - PCBs
Project Number: 43008
Project Name: Edmondson Park

				Polychlorinated Biphenyls						
				Aroclor 1016	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.5	0.5	0.5	0.5	0.5	0.5	0.5
NEPC 2013 Soil HIL C										1
Field ID	**Depth (m)**	**Date**	**SampleCode**							
TP02	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP03	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP04	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP06	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP09	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP11	0.1-0.2	30/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP12	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP14	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP20	0.4-0.5	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP21	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP22	0.1-0.2	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP23	0.1-0.2	1/11/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP25	0.4-0.5	31/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP29	0.1-0.2	29/10/2013	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table 6: Soil Analytical Results - OCPs
Project Number: 43008
Project Name: Edmondson Park

	Organochlorine Pesticides																						
	Aldrin	Aldrin + Dieldrin (Sum of Total)	alpha-BHC	beta-BHC	delta-BHC	Chlordane	DDD	DDE	DDT	DDT+DDE+DDD (Sum of Total)	Dieldrin	Endosulfan alpha	Endosulfan beta	Endosulfan Sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Lindane	Methoxychlor	Toxaphene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.05		0.05	0.05	0.05	0.1	0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	1
NEPC 2013 Soil HIL C		10				70				400		340			20			10			400	30
NEPC 2013 ESL Urban Residential and Public Open Space, Course Soil									180													

Field ID	Depth (m)	Date	SampleCode																					
TP02	0.1-0.2	30/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP03	0.1-0.2	30/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP04	0.1-0.2	30/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP06	0.1-0.2	30/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP09	0.1-0.2	30/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP11	0.1-0.2	30/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP12	0.1-0.2	31/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP14	0.1-0.2	31/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP20	0.4-0.5	31/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP21	0.1-0.2	31/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP22	0.1-0.2	31/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP23	0.1-0.2	1/11/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP25	0.4-0.5	31/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1
TP29	0.1-0.2	29/10/2013	Fill	<0.05	0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1

Table 7: Soil Analytical Results - Major Cations and Anions, Nitrates and Ionic Balance
Project Number: 43008
Project Name: Edmondson Park

	Nutrients								Major Cations		Major Anions					Biological						Asbestos
	Ammonia (as N)	Phosphorus	Sulfur	Nitrate	Nitrite	Nitrate & Nitrite (as N)	Total Kjeldahl Nitrogen (as N)	Total Nitrogen (as N)	Iron	Cation Exchange Capacity	Chloride	Sulphate	Electrical Conductivity 1:5 soil:water	pH 1:5 soil:water	Total Alkalinity as CaCO3	E.Coli	Faecal Coliforms	Salmonella	Enteric Viruses	Helminth Ova	Organic Matter	Asbestos
	mg/kg	mg/kg	mg/kg			mg/kg	mg/kg	mg/kg	mg/kg	meq/100g	mg/kg	mg/kg	µS/cm	ph Units	mg/kg	MPN/g	MPN/g	in 25g	in 60g	in 20g	% w/w	g/kg
EQL	0.1	10.00	50			0.1	10	10		0.05	10	10	10	0.1	50						0.01	0.10
NEPC 2013 ESL Urban Residential and Public Open Space, Fine Soil																						
NEPC 2013 Soil HIL C																						0.1
NEPC 2013 Soil HSL C for Vapour Intrusion - Clay 0 to <1m																						
NEPC 2013 Soil HSL C for Vapour Intrusion - Clay 1 to <2m																						

Field ID	Depth (m)	Date	SampleCode																				
OPES_01		11/11/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	10	ND	<3	<2*	-	-
OPES_03		11/11/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	52	ND	<3	<2*	-	-
OPWS_01		11/11/2013	Oxidation Pond West - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	580	730	ND	<3	<2*	-	-
OPWS_03		11/11/2013	Oxidation Pond West - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	ND	<3	<2*	-	-
TP01	0.6-0.7	30/10/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	17000	30	-	-	230	7.3	-	-	-	-	-	-	4.0	-
TP01	1.9-2	30/10/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	18000	33	-	-	720	8.7	-	<2	<2	ND	<3	<1	3.2	-
TP02	0.1-0.2	30/10/2013	Oxidation Pond East - Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP03	0.1-0.2	30/10/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP04	1.2-1.3	30/10/2013	Oxidation Pond East - Natural	0.1	130	100	<0.1	<0.1	0.1	880	880	-	-	13	<10	-	-	77	-	-	-	-	-	-	-
TP04	3.6-3.7	30/10/2013	Oxidation Pond East - Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	ND	<3	<1	-	-
TP05	0.1-0.2	30/10/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP08	0.1-0.2	30/10/2013	STP - Fill	-	-	-	-	-	-	-	-	9000	20	-	-	27	7.4	-	-	-	-	-	-	3.1	Nil
TP08	1.5-1.6	30/10/2013	STP - Natural	-	-	-	-	-	-	-	-	28000	31	-	-	210	5.9	-	-	-	-	-	-	4.8	-
TP08	2.4-2.5	30/10/2013	STP - Natural	0.1	27	310	<0.1	<0.1	<0.1	580	580	-	-	320	81	-	-	<50	-	-	-	-	-	-	-
TP09	0.1-0.2	30/10/2013	STP - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	<2	ND	<3	<1	-	-
TP10	0.1-0.2	30/10/2013	STP - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP12	0.1-0.2	31/10/2013	STP - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP14	0.1-0.2	31/10/2013	STP - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP16	2.7-2.8	1/11/2013	STP - Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-		<2	<2	ND	<3	<1	-	-
TP17	0.4-0.5	1/11/2013	STP - Fill	-	1600	1100	0.20	<0.1	0.2	110	110	-	-	<10	<10	-	-	<50	<1	<1	ND	<3	-	-	-
TP17	0.9-1	31/10/2013	STP - Fill	-	3300	340	0.50	<0.1	0.5	1000	1000	-	-	<10	<10	-	-	<50	<2	<2	ND	<3	<1	-	-
TP17	1.8-1.9	31/10/2013	STP - Fill	-	4000	-	0.30	<0.1	0.3	800	800	-	-	<10	<10	-	-	<50	<2	<1	ND	<3	<1	-	-
TP18	0.4-0.5	1/11/2013	STP - Fill	-	2400	480	1.90	<0.1	2	270	270	-	-	<10	<10	-	-	<50	<1	<1	ND	<3	-	-	-
TP18	1-1.1	31/10/2013	STP - Fill	-	2700	200	0.30	<0.1	0.3	310	-	-	-	<10	<10	-	-	<50	<2	<2	ND	<3	<1	-	-
TP18	1.8-1.9	31/10/2013	STP - Fill	-	3400	530	0.30	<0.1	0.4	500	500	-	-	<10	<10	-	-	<50	<2	<2	ND	<3	<1	-	-
TP19	0.4-0.5	31/10/2013	Oxidation Pond East - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Chrysolite in
TP19	1.9-2	31/10/2013	Oxidation Pond East - Natural	-	-	-	-	-	-	-	-	34000	25	-	-	53	8.1	-	<2	<2	ND	<3	<1	2.9	-
TP22	0.1-0.2	31/10/2013	Oxidation Pond West - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP25	0.4-0.5	31/10/2013	Oxidation Pond West - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP26	0.9-1.0	31/10/2013	Oxidation Pond West - Natural				-	-				-							<2	<2	ND	<3	<1	-	-
TP29	0.1-0.2	29/10/2013	Oxidation Pond West - Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil
TP29	2.9-3	1/11/2013	Oxidation Pond West - Natural	-	-	-	-	-	-	-	-	17000	17	-	-	120	8.5	-	-	-	-	-	-	4.20	-

Table 8 - Groundwater Gauging Results
Job No: 43008
Urban Growth Edmondson Park

Well ID	Date Measured	TD (m)	Top of Well Casing Elevation (mAHD)	Depth to Water* (m)	Depth to PSH* (m)	PSH Thickness (m)	Product Gravity	Hydraulic Equivalent (m)	Corrected Depth to Water (m)	Corrected Water Elevation (mAHD)	Comments
MW01	11/11/2013	6.045	44.700	3.218	-	-	-	-	3.218	41.482	
MW02	11/11/2013	8.276	46.700	4.512	-	-	-	-	4.512	42.188	
MW03	11/11/2013	8.521	47.090	8.521	-	-	-	-	8.521	38.569	
MW04	11/11/2013	5.204	48.230	5.204	-	-	-	-	5.204	43.026	

Notes:
* below top of well casing
ID = identification
mAHD = metres above Australia Height Datum
m = metres
PSH = phase separated hydrocarbons
DRY = well dry at time of gauging

Field Equipment Used:
Solinst Inferface Probe
Pre purge gauging data only

Table 9 - Groundwater and Surface Water Quality Parameters
Job No: 43008
Urban Growth Edmondson Park

Well ID	Date Measured	Dissolved Oxygen	Electrical Conductivity	TDS*	Redox Potential	pH	Temperature	Comments
		(mg/L)	(uS/cm)	(mg/L)	(mV)		(oC)	
Groundwater Monitoring								
MW01	11/11/2013	0.27	2100	1365	-83	7.86	16.8	No sheen or odour
MW02	11/11/2013	0.04	14830	9640	18	6.81	16.3	No sheen or odour
MW03	11/11/2013	0.09	15322	9959	-312	6.88	16.1	Sulfate odour
MW04	11/11/2013	1.18	14690	9549	-79	7.11	18.0	No sheen or odour
STP Surface Water								
SP01	11/11/2013	4.31	374	243	-88	7.94	17.4	
SP02	11/11/2013	6.16	277	180	-52	7.57	18.8	
SP03	11/11/2013	7.01	283	184	-47	7.57	19.2	
SP04	11/11/2013	4.01	376	244	-66	7.55	17.4	
OPW Surface Water								
OPW_01	11/11/2013	8.55	490	319	-24	7.49	19.3	
OPE_01	11/11/2013	5.77	542	352	-2	7.45	18.8	

Notes:
ID = identification
mg/L = milligrams per litre
L = litres
uS/cm = microsiemen per centimetre
mV = millivolts
^{o}C = degrees Celsius

Note that readings are post purge only.
* Approximate value determined using the following equation: TDS (mg/L) = EC x 0.65

Table 7: Metals, Metalloids and Non-Metalic Inorganics
Project Number: 43008
Project Name: Edmondson Park

	Arsenic (Total) (Filtered)	Cadmium (Filtered)	Chromium (Total) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Inorganic) (Filtered)	Nickel (Filtered)	Zinc (Filtered)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	1	0.1	1	1	1	0.1	1	5
ANZECC & ARMCANZ 2000 FW 95%		0.2		1.4	3.4	0.6	11	8
NEPC 2013 GIL - Drinking Water	10	2		2000	10	1	20	
NEPC 2013 GIL - Fresh Waters		0.2		1.4	3.4	0.06	11	8
NHMRS & NRMMC 2011 - ADWG Aesthetic				1000				3000
NHMRS & NRMMC 2011 - ADWG Health	10	2		2000	10	1	20	

Field_ID	Date	Sample Code							
MW01	11/11/2013	S13-No06469	<1	<0.1	<1	<1	<1	<0.1	<1	<5
MW02	11/11/2013	S13-No06470	<1	<0.1	<1	<1	<1	<0.1	<1	<5
MW03	11/11/2013	S13-No06471	1	<0.1	<1	<1	<1	<0.1	<1	<5
MW04	11/11/2013	S13-No06472	**11**	<0.1	<1	<1	<1	<0.1	**35**	**18**
OPE_01	11/11/2013	S13-No06478	<1	<0.1	<1	<1	<1	<0.1	<1	<5
OPW_01	11/11/2013	S13-No06477	4	<0.1	<1	**2**	<1	<0.1	4	**10**
SP01	11/11/2013	S13-No06473	<1	**0.2**	<1	<1	<1	<0.1	<1	**47**
SP02	11/11/2013	S13-No06474	<1	<0.1	<1	1	<1	<0.1	<1	**39**
SP03	11/11/2013	S13-No06475	<1	**0.2**	<1	1	<1	<0.1	<1	**44**
SP04	11/11/2013	S13-No06476	<1	**0.2**	<1	<1	<1	<0.1	<1	**47**

Table 11 - Groundwater Analytical Results - TPH and BTEX
Project Number: 43008
Project Name: Edmondson Park

	BTEX								TPHs				TPHs (NEPC 1999)								TRHs (NEPC 2013)							TPHs Silica Clean up					
	Benzene	BTEX (Sum of Total)	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene (Total)	Xylene (Sum of Total)	C10-C15 Aliphatic	C10-C15 Aromatic	>C35 Aliphatic	>C35 Aromatic	>C16-C35 Aromatic	>C16-C35 Aliphatic	>C10-C36 (Sum of Total)	C10-C14 Fraction	C6-C9 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Total)	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	>C10 - C16 less Naphthalene (F2)	>C10-C40 (Sum of Total)	C6-C10 Fraction	C6 - C10 less BTEX (F1)	>C10-C16 after Silica Cleanup	>C16-C34 after Silica Cleanup	>C34-C40 after Silica Cleanup	C10-C14 after Silica Cleanup (TPH)	C15-C28 after Silica Cleanup (TPH)	C29-C36 after Silica Cleanup (TPH)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
EQL	1		1	1	2	1	3		500	50	1000	200	400	4000		50	20	100	100	100	50	100	100	50		20	20	50	100	0.1	50	0.1	0.1
ANZECC & ARMCANZ 2000 FW 95%	**950**					**350**																											
NEPC 2013 GIL - Drinking Water	**1**		**300**	**800**			**600**																										
Field_ID	**Date**	**Sample Code**																															
MW01	11/11/2013	S13-No06469	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
MW02	11/11/2013	S13-No06470	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
MW02	11/11/2013	S13-No06487	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<4000	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	<50	<100	<0.1	<50	<0.1	<0.1
MW03	11/11/2013	S13-No06471	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
MW04	11/11/2013	S13-No06472	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
OPE_01	11/11/2013	S13-No06478	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	600	<50	<20	400	200	600	<50	600	300	<50	900	<20	<20	-	-	-	-	-	-
OPW_01	11/11/2013	S13-No06477	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	300	<50	<20	200	100	300	<50	300	<100	<50	300	<20	<20	-	-	-	-	-	-
SP01	11/11/2013	S13-No06473	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-
SP02	11/11/2013	S13-No06474	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-
SP03	11/11/2013	S13-No06475	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-
SP04	11/11/2013	S13-No06476	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-

Table 12: Groundwater Analytical Results - PAHs and Phenols
Project Number: 43008
Project Name: Edmondson Park

	Polycyclic Aromatic Hydrocarbons																			
	2-Methylnaphthalene	3-Methylcholanthrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/l	µg/L	µg/L	µg/L	µg/L
EQL	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1
ANZECC & ARMCANZ 2000 FW 95%																	16			
NEPC 2013 GIL - Drinking Water							0.01													
Field_ID	Date	Sample Code																		
OPE_01	11/11/2013	S13-No06478	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
OPW_01	11/11/2013	S13-No06477	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP01	11/11/2013	S13-No06473	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP02	11/11/2013	S13-No06474	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP03	11/11/2013	S13-No06475	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP04	11/11/2013	S13-No06476	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-

Table 13: Groundwater Analytical Results - OPPs
Project Number: 43008
Project Name: Edmondson Park

	Organophosphorus Pesticides																	
	Azinphos methyl	Chlorpyrifos	Dementon-S-methyl	Demeton	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethoprophos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Mevinphos	Monocrotophos	Parathion	Parathion methyl	Profenofos
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	2	2	2
ANZECC & ARMCANZ 2000 FW 95%	**0.02**	**0.01**			**0.01**		**0.15**			**0.2**			**0.05**			**0.004**		
NEPC 2013 GIL - Drinking Water	**30**	**10**			**4**	**5**	**7**	**4**	**1**	**7**		**7**	**70**	**6**		**20**	**0.7**	**0.3**
Field_ID	**Date**	**Sample Code**																
OPE_01	11/11/2013	S13-No06478	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
OPW_01	11/11/2013	S13-No06477	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP01	11/11/2013	S13-No06473	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP02	11/11/2013	S13-No06474	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP03	11/11/2013	S13-No06475	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP04	11/11/2013	S13-No06476	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2

Table 14: Groundwater Analytical Results - OCPs
Project Number: 43008
Project Name: Edmondson Park

	Organochlorine Pesticides																							
	Aldrin	Aldrin + Dieldrin (Sum of Total)	alpha-BHC	beta-BHC	delta-BHC	Chlordane	DDD	DDE	DDT	DDT+DDE+DDD (Sum of Total)	Dieldrin	Endosulfan alpha	Endosulfan beta	Endosulfan Sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Lindane	Methoxychlor	Pentachlorophenol	Toxaphene
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.1		0.1	0.1	0.1	1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	10	10
ANZECC & ARMCANZ 2000 FW 95%						**0.08**			**0.01**						**0.02**			**0.09**		**0.2**		**10**	**0.2**
NEPC 2013 GIL - Drinking Water		**0.3**				**2**			**9**										**0.3**	**10**		**10**	
Field_ID	**Date**	**Sample Code**																						
OPE_01	11/11/2013	S13-No06478	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
OPW_01	11/11/2013	S13-No06477	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP01	11/11/2013	S13-No06473	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP02	11/11/2013	S13-No06474	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP03	11/11/2013	S13-No06475	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP04	11/11/2013	S13-No06476	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-

Table 15: Groundwater Analytical Results - Major Cations and Anions, Ionic Balance and Ammonia
Project Number: 43008
Project Name: Edmondson Park

		Major Cations				Major Anions				Ammonia	Ionic Balance				Redox	Non-Metallic Inorganics	
		Calcium	Magnesium	Potassium - Dissolved	Sodium	Bicarbonate Alkalinity as CaCO3	Chloride	Carbonate Alkalinity as CaCO3	Sulphate	Ammonia (as N)	EC_Lab	pH_Lab	Total Dissolved Solids	Suspended Solids	Redox Potential mV*	Nitrate (as Nitrate)	Phosphorus
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µS/cm	ph Units	mg/L	µg/L	MV	µg/L	µg/L
EQL		0.5	0.5	0.5	0.5	5	1	5	2	10	1	0.1	5	5000	1	10	10
ANZECC & ARMCANZ 2000 FW 95%										900						700	
NEPC 2013 GIL - Drinking Water																50000	
Field_ID	**Date**	**Sample Code**															
MW01	11/11/2013	S13-No06469	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	40	<10
MW02	11/11/2013	S13-No06470	-	-	-	-	-	-	-	-	390	-	-	-	-	-	40	10
MW03	11/11/2013	S13-No06471	-	-	-	-	-	-	-	-	590	-	-	-	-	-	40	50
MW04	11/11/2013	S13-No06472	-	-	-	-	-	-	-	-	990	-	-	-	-	-	90	30
OPE_01	11/11/2013	S13-No06478	9.7	8.5	8.2	44	97	47	<5	<2	<10	370	6.8	240	230000	113	<10	-
OPW_01	11/11/2013	S13-No06477	15	9.9	5.6	56	110	51	<5	11	3800	480	7.1	350	90000	140	<10	-
SP01	11/11/2013	S13-No06473	36	2.4	4.6	36	110	37	<5	4	30	400	7.2	220	46000	78	60	-
SP02	11/11/2013	S13-No06474	31	1.6	3.2	27	91	26	<5	3	<10	290	7.3	160	<5000	154	<10	-
SP03	11/11/2013	S13-No06475	30	1.5	3.1	26	94	26	<5	3	<10	290	7.5	150	<5000	162	10	-
SP04	11/11/2013	S13-No06476	36	2.4	4.4	36	120	38	<5	4	30	400	7.2	230	<5000	164	50	-

Table 16: Groundwater Analytical Results - Miscellaneous
Project Number: 43008
Project Name: Edmondson Park

		Miscellaneous SVOCs																										Phthalates					
		2-Chloronaphthalene	2-Naphthylamine	2-Nitroaniline	4-Aminobiphenyl	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	Acetophenone	Aniline	Bis(2-chloroethoxy)methane	Carbazole	Dibenzofuran	Diphenylamine	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Nitrobenzene	N-Nitrosodibutylamine	N-Nitrosodipropylamine	N-Nitrosopiperidine	Pentachlorobenzene	pentachloronitrobenzene	Phorate	Prothiofos	Stirophos	Trichloronate	Di(2-ethylhexy) phthalate	Dibutyl phthalate	Diethyl phthalate	Dimethyl phthalate	di-n-octylphthalate	Butyl benzyl phthalate
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		2	2	4	2	2	2	2	2	2	2	2	2	0.1	2	4	2	2	2	2	2	2	2	2	2	2	2	20	2	2	2	2	2
ANZECC & ARMCANZ 2000 FW 95%									250								360	550											26	1000	3700		
NEPC 2013 GIL - Drinking Water															0.7								30					10					
Field_ID	**Date**	**Sample Code**																															
OPE_01	11/11/2013	S13-No06478	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
OPW_01	11/11/2013	S13-No06477	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP01	11/11/2013	S13-No06473	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP02	11/11/2013	S13-No06474	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP03	11/11/2013	S13-No06475	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP04	11/11/2013	S13-No06476	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2

Table 17: Relative Percent Differences - Soils
Project No: 43008
Project Name: Edmondson Park

			SDG	31/10/2013	31/10/2013		31/10/2013	Interlab_D		31/10/2013	31/10/2013		31/10/2013	Interlab_D		11/01/2013	11/01/2013		11/01/2013	11/01/2013	
			Field_ID	TP02	QS001	RPD	TP02	QS001A	RPD	TP07	QS002	RPD	TP07	QS002A	RPD	TP29	QS004	RPD	TP29	QS004A	RPD
			Date	30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		1/11/2013	1/11/2013		1/11/2013	1/11/2013	
Chem_Gro	ChemName	Units	EQL																		
BTEX	Benzene	mg/kg	0.1 (Primary): 0.2 (Interlab)	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0	<0.1	<0.2	0
	Ethylbenzene	mg/kg	0.1 (Primary): 1 (Interlab)	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1	0
	Toluene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.1	0	<0.1	<0.5	0
	Xylene (m & p)	mg/kg	0.2 (Primary): 2 (Interlab)	<0.2	<0.2	0	<0.2	<2.0	0	<0.2	<0.2	0	<0.2	<2.0	0	<0.2	<0.2	0	<0.2	<2.0	0
	Xylene (o)	mg/kg	0.1 (Primary): 1 (Interlab)	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1	0
	Xylene (Total)	mg/kg	0.3	<0.3	<0.3	0	<0.3			<0.3	<0.3	0	<0.3			<0.3	<0.3	0	<0.3		
Chlorinated	Hexachlorobenzene	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0							<0.05	<0.05	0	<0.05	<0.05	0
Metals & Me	Arsenic (Total)	mg/kg	2 (Primary): 4 (Interlab)	10.0	15.0	40	10.0	5.0	**67**	8.4	13.0	43	8.4	12.0	35	6.0	3.8	45	6.0	6	0
	Cadmium	mg/kg	0.4	0.4	<0.4	**67**	0.4	<0.4	**67**	0.7	1.2	53	0.7	<0.4	55	<0.4	<0.4	0	<0.4	<0.4	0
	Chromium (Total)	mg/kg	5 (Primary): 1 (Interlab)	20.0	20.0	0	20.0	11.0	**58**	13.0	17.0	27	13.0	15.0	14	8.4	8.5	1	8.4	10	17
	Copper	mg/kg	5 (Primary): 1 (Interlab)	17.0	10.0	**52**	17.0	18.0	6	29.0	52.0	**57**	29.0	28.0	4	16.0	15.0	6	16.0	18	12
	Lead	mg/kg	5 (Primary): 1 (Interlab)	15.0	14.0	7	15.0	14.0	7	25.0	37.0	39	25.0	26.0	4	10.0	14.0	33	10.0	14	33
	Mercury (Inorganic)	mg/kg	0.05 (Primary): 0.1 (Interlab)	0.1	0.07	35	0.1	0.2	**67**	1.1	<0.05	**183**	1.1	<0.1	**167**	<0.05	<0.05	0	<0.05	<0.1	0
	Nickel	mg/kg	5 (Primary): 1 (Interlab)	9.1	6.2	38	9.1	5.0	**58**	18.0	32.0	**56**	18.0	16.0	12	<5.0	<5.0	0	<5.0	7	**94**
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	21.0	15.0	33	21.0	25.0	17	61.0	130.0	**72**	61.0	65.0	6	34.0	32.0	6	34.0	42	21
Organochlo	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	alpha-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	beta-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	delta-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Chlordane	mg/kg	0.1	<0.1	<0.1	0	<0.1			-	-	-	-	-	-	<0.1	<0.1	0	<0.1	<0.1	0
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	DDT	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan alpha	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan beta	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan Sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05			-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor Epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Lindane	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.1	0	-	-	-	-	-	-	<0.2	<0.2	0	<0.2	<0.2	0
	Toxaphene	mg/kg	1	<1.0	<1.0	0	<1.0									<1.0	<1.0	0	<1.0	<1.0	0
Polychlorina	Aroclor 1016	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1232	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1242	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1248	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1254	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1260	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	PCBs (Total)	mg/kg	0.5	<0.5	<0.5	0	<0.5									<0.5	<0.5	0	<0.5	<0.5	0
Polycyclic A	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene	mg/kg	0.5 (Primary): 0.05 (Interlab)	<0.5	<0.5	0	<0.5	<0.05	0	<0.5	<0.5	0	<0.5	<0.05	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(b,j)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	<0.5	0
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyren	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	PAHs (Total)	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5	<0.5	0

Table 17: Relative Percent Differences - Soils
Project No: 43008
Project Name: Edmondson Park

SDG				31/10/2013	31/10/2013		31/10/2013	Interlab_D		31/10/2013	31/10/2013		31/10/2013	Interlab_D		11/01/2013	11/01/2013		11/01/2013	11/01/2013	
Field_ID				TP02	QS001	RPD	TP02	QS001A	RPD	TP07	QS002	RPD	TP07	QS002A	RPD	TP29	QS004	RPD	TP29	QS004A	RPD
Date				30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		1/11/2013	1/11/2013		1/11/2013	1/11/2013	
Chem_Gro	ChemName	Units	EQL																		
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
TPHs (NEP	C10-C14 Fraction	mg/kg	20 (Primary): 50 (Interlab)	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	0	<20.0	<20.0	0
	C6-C9 Fraction	mg/kg	20 (Primary): 25 (Interlab)							<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<20.0	0
	C15-C28 Fraction	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C29-C36 Fraction	mg/kg	50 (Primary): 100 (Interlab)	86.0	<50.0	**53**	86.0	<100.0	0	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C10-C36 Fraction (Tota	mg/kg	50	86.0	<50.0	NA	86.0	-	NA	<50.0	<50.0	0	<50.0			<50.0	<50.0	0	<50.0	<50.0	0
TRHs (NEP	>C10-C16 Fraction	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	>C16-C34 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0
	>C34-C40 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0
	>C10 - C16 less Naphth	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C6-C10 Fraction	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<20.0	0
	C6 - C10 less BTEX (F	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<20.0	0

*RPDs have only been considered where a concentration is greater than 4 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (4-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 18: Relative Percent Differences - Water, Rinsates, Trip Spike and Storage Blanks
Project No: 43008
Project Name: Edmondson Park

SDG				11/11/2013	Intralab_D		11/11/2013	Interlab_D		31/10/2013	1/11/2013	11/11/2013	29/10/2013	30/10/2013	29/10/2013	29/10/2013	11/11/2013
Field_ID				MW02	Dup1	RPD	MW02	Triplicate1	RPD	Rinsate	Rinsate 2	Rinsate 1	Trip S	TS	Trip B	TB	Trip B
Date				11/11/2013	11/11/2013		11/11/2013	11/11/2013		31/10/2013	1/11/2013	11/11/2013	30/10/2013	30/10/2013	30/10/2013	29/10/2013	11/11/2013
Chem_Gro	ChemName	Units	EQL														
BTEX	Benzene	mg/kg	0.1 (Primary): 0.2 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	-	99%	88%	<0.1	<0.1	<1
	Ethylbenzene	mg/kg	0.1 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	-	98%	88%	<0.1	<0.1	<1
	Toluene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	-	99%	88%	<0.1	<0.1	<1
	Xylene (m & p)	mg/kg	0.2 (Primary): 2 (Interlab)	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	-	99%	88%	<0.2	<0.2	<2.0
	Xylene (o)	mg/kg	0.1 (Primary): 1 (Interlab)	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	-	99%	88%	<0.1	<0.1	<1.0
	Xylene (Total)	mg/kg	0.3	<3	<3	0	<3	<3	0	<3	<3	-	-	-	<0.3	<0.3	<3
Metals & Me	Arsenic (Total)	mg/kg	2 (Primary): 4 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Cadmium	mg/kg	0.4	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	<0.1	-	-	-	-	-
	Chromium (Total)	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Copper	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Lead	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Mercury (Inorganic)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	<0.01	-	-	-	-	-
	Nickel	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	<5	-	-	-	-	-
SVOCs				-	-	-	-	-	-	<100	-	-	-	-	-	-	-
OCP (total)				-	-	-	-	-	-	<2	<2	-	-	-	-	-	-
PCB (total)				-	-	-	-	-	-	<40	<40	-	-	-	-	-	-
													-	-	-	-	-
Polycyclic A	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(a)pyrene	mg/kg	0.5 (Primary): 0.05 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(b,j)fluoranthene	mg/kg	0.5	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(k)fluoranthene	mg/kg	0.5	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	PAHs (Total)	mg/kg	0.5	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
TPHs (NEP	C10-C14 Fraction	mg/kg	20 (Primary): 50 (Interlab)	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	-	-	-	-	-	-
	C6-C9 Fraction	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<100	0	<20.0	<20.0	-	-	88%	<20	<20	<1
	C15-C28 Fraction	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	-	-	-	-	-	<1
	C29-C36 Fraction	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	-	-	-	-	-	<1
	C10-C36 Fraction (Tota	mg/kg	50	<50.0	<50.0	NA	<50.0	NA	NA	<50.0	<50.0	-	-	-	-	-	<2.0
												-	-	-	-	-	<1.0
TRHs (NEP	>C10-C16 Fraction	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	-	-	-	-	-	<3
	>C16-C34 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	-	-	-	-	-	-
	>C34-C40 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	-	-	-	-	-	-
	>C10 - C16 less Naphtl	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	-	-	-	-	-	-
	C6-C10 Fraction	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<10	0	<20.0	<20.0	-	-	-	-	-	-
	C6 - C10 less BTEX (F	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<10	0	<20.0	<20.0	-	-	-	-	-	-

*RPDs have only been considered where a concentration is greater than 4 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (4-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 11 - Groundwater Analytical Results - TPH and BTEX
Project Number: 43008
Project Name: Edmondson Park

	BTEX								TPHs				TPHs (NEPC 1999)								TRHs (NEPC 2013)							TPHs Silica Clean up					
	Benzene	BTEX (Sum of Total)	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene (Total)	Xylene (Sum of Total)	C10-C15 Aliphatic	C10-C15 Aromatic	>C35 Aliphatic	>C35 Aromatic	>C16-C35 Aromatic	>C16-C35 Aliphatic	>C10-C36 (Sum of Total)	C10-C14 Fraction	C6-C9 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Total)	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	>C10 - C16 less Naphthalene (F2)	>C10-C40 (Sum of Total)	C6-C10 Fraction	C6 - C10 less BTEX (F1)	>C10-C16 after Silica Cleanup	>C16-C34 after Silica Cleanup	>C34-C40 after Silica Cleanup	C10-C14 after Silica Cleanup (TPH)	C15-C28 after Silica Cleanup (TPH)	C29-C36 after Silica Cleanup (TPH)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
EQL	1		1	1	2	1	3		500	50	1000	200	400	4000		50	20	100	100	100	50	100	100	50		20	20	50	100	0.1	50	0.1	0.1
ANZECC & ARMCANZ 2000 FW 95%	**950**					**350**																											
NEPC 2013 GIL - Drinking Water	**1**		**300**	**800**			**600**																										
Field_ID	**Date**	**Sample Code**																															
MW01	11/11/2013	S13-No06469	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
MW02	11/11/2013	S13-No06470	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
MW02	11/11/2013	S13-No06487	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<4000	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	<50	<100	<0.1	<50	<0.1	<0.1
MW03	11/11/2013	S13-No06471	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
MW04	11/11/2013	S13-No06472	<1	3	<1	<1	<2	<1	<3	<3	<500	<50	<200	<1000	<400	<5000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<100	<0.1	<50	<0.1	<0.1
OPE_01	11/11/2013	S13-No06478	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	600	<50	<20	400	200	600	<50	600	300	<50	900	<20	<20	-	-	-	-	-	-
OPW_01	11/11/2013	S13-No06477	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	300	<50	<20	200	100	300	<50	300	<100	<50	300	<20	<20	-	-	-	-	-	-
SP01	11/11/2013	S13-No06473	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-
SP02	11/11/2013	S13-No06474	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-
SP03	11/11/2013	S13-No06475	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-
SP04	11/11/2013	S13-No06476	<1	3	<1	<1	<2	<1	<3	<3	-	-	-	-	-	-	<250	<50	<20	<100	<100	<100	<50	<100	<100	<50	<250	<20	<20	-	-	-	-	-	-

Table 12: Groundwater Analytical Results - PAHs and Phenols
Project Number: 43008
Project Name: Edmondson Park

	Polycyclic Aromatic Hydrocarbons																			
	2-Methylnaphthalene	3-Methylcholanthrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Carcinogenic PAHs as B(a)P TPE	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/l	µg/L	µg/L	µg/L	µg/L
EQL	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1
ANZECC & ARMCANZ 2000 FW 95%																	16			
NEPC 2013 GIL - Drinking Water							0.01													
Field_ID	Date	Sample Code																		
OPE_01	11/11/2013	S13-No06478	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
OPW_01	11/11/2013	S13-No06477	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP01	11/11/2013	S13-No06473	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP02	11/11/2013	S13-No06474	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP03	11/11/2013	S13-No06475	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-
SP04	11/11/2013	S13-No06476	<2	<2	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	1.11	<1	<1	<1	-

Table 13: Groundwater Analytical Results - OPPs
Project Number: 43008
Project Name: Edmondson Park

	Organophosphorus Pesticides																	
	Azinphos methyl	Chlorpyrifos	Dementon-S-methyl	Demeton	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethoprophos	Fenitrothion	Fensulfothion	Fenthion	Malathion	Mevinphos	Monocrotophos	Parathion	Parathion methyl	Profenofos
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20	2	2	2
ANZECC & ARMCANZ 2000 FW 95%	**0.02**	**0.01**			**0.01**		**0.15**			**0.2**			**0.05**			**0.004**		
NEPC 2013 GIL - Drinking Water	**30**	**10**			**4**	**5**	**7**	**4**	**1**	**7**		**7**	**70**	**6**		**20**	**0.7**	**0.3**
Field_ID	**Date**	**Sample Code**																
OPE_01	11/11/2013	S13-No06478	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
OPW_01	11/11/2013	S13-No06477	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP01	11/11/2013	S13-No06473	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP02	11/11/2013	S13-No06474	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP03	11/11/2013	S13-No06475	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2
SP04	11/11/2013	S13-No06476	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2

Table 14: Groundwater Analytical Results - OCPs
Project Number: 43008
Project Name: Edmondson Park

	Organochlorine Pesticides																							
	Aldrin	Aldrin + Dieldrin (Sum of Total)	alpha-BHC	beta-BHC	delta-BHC	Chlordane	DDD	DDE	DDT	DDT+DDE+DDD (Sum of Total)	Dieldrin	Endosulfan alpha	Endosulfan beta	Endosulfan Sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Lindane	Methoxychlor	Pentachlorophenol	Toxaphene
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.1		0.1	0.1	0.1	1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	10	10
ANZECC & ARMCANZ 2000 FW 95%						**0.08**			**0.01**						**0.02**			**0.09**		**0.2**		**10**	**0.2**
NEPC 2013 GIL - Drinking Water		**0.3**				**2**			**9**										**0.3**	**10**		**10**	
Field_ID	**Date**	**Sample Code**																						
OPE_01	11/11/2013	S13-No06478	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
OPW_01	11/11/2013	S13-No06477	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP01	11/11/2013	S13-No06473	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP02	11/11/2013	S13-No06474	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP03	11/11/2013	S13-No06475	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-
SP04	11/11/2013	S13-No06476	<2	2	-	-	<2	-	<2	<2	<4	4	<2	-	-	<2	<2	<2	<2	<2	<2	<2	<1	<10	-

Table 15: Groundwater Analytical Results - Major Cations and Anions, Ionic Balance and Ammonia
Project Number: 43008
Project Name: Edmondson Park

		Major Cations				Major Anions				Ammonia	Ionic Balance				Redox	Non-Metallic Inorganics	
		Calcium	Magnesium	Potassium - Dissolved	Sodium	Bicarbonate Alkalinity as CaCO3	Chloride	Carbonate Alkalinity as CaCO3	Sulphate	Ammonia (as N)	EC_Lab	pH_Lab	Total Dissolved Solids	Suspended Solids	Redox Potential mV*	Nitrate (as Nitrate)	Phosphorus
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µS/cm	ph Units	mg/L	µg/L	MV	µg/L	µg/L
EQL		0.5	0.5	0.5	0.5	5	1	5	2	10	1	0.1	5	5000	1	10	10
ANZECC & ARMCANZ 2000 FW 95%										900						700	
NEPC 2013 GIL - Drinking Water																50000	
Field_ID	**Date**	**Sample Code**															
MW01	11/11/2013	S13-No06469	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	40	<10
MW02	11/11/2013	S13-No06470	-	-	-	-	-	-	-	-	390	-	-	-	-	-	40	10
MW03	11/11/2013	S13-No06471	-	-	-	-	-	-	-	-	590	-	-	-	-	-	40	50
MW04	11/11/2013	S13-No06472	-	-	-	-	-	-	-	-	990	-	-	-	-	-	90	30
OPE_01	11/11/2013	S13-No06478	9.7	8.5	8.2	44	97	47	<5	<2	<10	370	6.8	240	230000	113	<10	-
OPW_01	11/11/2013	S13-No06477	15	9.9	5.6	56	110	51	<5	11	3800	480	7.1	350	90000	140	<10	-
SP01	11/11/2013	S13-No06473	36	2.4	4.6	36	110	37	<5	4	30	400	7.2	220	46000	78	60	-
SP02	11/11/2013	S13-No06474	31	1.6	3.2	27	91	26	<5	3	<10	290	7.3	160	<5000	154	<10	-
SP03	11/11/2013	S13-No06475	30	1.5	3.1	26	94	26	<5	3	<10	290	7.5	150	<5000	162	10	-
SP04	11/11/2013	S13-No06476	36	2.4	4.4	36	120	38	<5	4	30	400	7.2	230	<5000	164	50	-

Table 16: Groundwater Analytical Results - Miscellaneous
Project Number: 43008
Project Name: Edmondson Park

		Miscellaneous SVOCs																										Phthalates					
		2-Chloronaphthalene	2-Naphthylamine	2-Nitroaniline	4-Aminobiphenyl	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	Acetophenone	Aniline	Bis(2-chloroethoxy)methane	Carbazole	Dibenzofuran	Diphenylamine	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Nitrobenzene	N-Nitrosodibutylamine	N-Nitrosodipropylamine	N-Nitrosopiperidine	Pentachlorobenzene	pentachloronitrobenzene	Phorate	Prothiofos	Stirophos	Trichloronate	Di(2-ethylhexy) phthalate	Dibutyl phthalate	Diethyl phthalate	Dimethyl phthalate	di-n-octylphthalate	Butyl benzyl phthalate
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		2	2	4	2	2	2	2	2	2	2	2	2	0.1	2	4	2	2	2	2	2	2	2	2	2	2	2	20	2	2	2	2	2
ANZECC & ARMCANZ 2000 FW 95%									250								360	550											26	1000	3700		
NEPC 2013 GIL - Drinking Water															0.7								30					10					
Field_ID	**Date**	**Sample Code**																															
OPE_01	11/11/2013	S13-No06478	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
OPW_01	11/11/2013	S13-No06477	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP01	11/11/2013	S13-No06473	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP02	11/11/2013	S13-No06474	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP03	11/11/2013	S13-No06475	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2
SP04	11/11/2013	S13-No06476	<2	<2	<4	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2	<2	<2	<2

Table 17: Relative Percent Differences - Soils
Project No: 43008
Project Name: Edmondson Park

			SDG	31/10/2013	31/10/2013		31/10/2013	Interlab_D		31/10/2013	31/10/2013		31/10/2013	Interlab_D		11/01/2013	11/01/2013		11/01/2013	11/01/2013	
			Field_ID	TP02	QS001	RPD	TP02	QS001A	RPD	TP07	QS002	RPD	TP07	QS002A	RPD	TP29	QS004	RPD	TP29	QS004A	RPD
			Date	30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		1/11/2013	1/11/2013		1/11/2013	1/11/2013	
Chem_Gro	ChemName	Units	EQL																		
BTEX	Benzene	mg/kg	0.1 (Primary): 0.2 (Interlab)	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0	<0.1	<0.2	0
	Ethylbenzene	mg/kg	0.1 (Primary): 1 (Interlab)	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1	0
	Toluene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.1	0	<0.1	<0.5	0
	Xylene (m & p)	mg/kg	0.2 (Primary): 2 (Interlab)	<0.2	<0.2	0	<0.2	<2.0	0	<0.2	<0.2	0	<0.2	<2.0	0	<0.2	<0.2	0	<0.2	<2.0	0
	Xylene (o)	mg/kg	0.1 (Primary): 1 (Interlab)	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1	0
	Xylene (Total)	mg/kg	0.3	<0.3	<0.3	0	<0.3			<0.3	<0.3	0	<0.3			<0.3	<0.3	0	<0.3		
Chlorinated	Hexachlorobenzene	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0							<0.05	<0.05	0	<0.05	<0.05	0
Metals & Me	Arsenic (Total)	mg/kg	2 (Primary): 4 (Interlab)	10.0	15.0	40	10.0	5.0	**67**	8.4	13.0	43	8.4	12.0	35	6.0	3.8	45	6.0	6	0
	Cadmium	mg/kg	0.4	0.4	<0.4	**67**	0.4	<0.4	**67**	0.7	1.2	53	0.7	<0.4	55	<0.4	<0.4	0	<0.4	<0.4	0
	Chromium (Total)	mg/kg	5 (Primary): 1 (Interlab)	20.0	20.0	0	20.0	11.0	**58**	13.0	17.0	27	13.0	15.0	14	8.4	8.5	1	8.4	10	17
	Copper	mg/kg	5 (Primary): 1 (Interlab)	17.0	10.0	**52**	17.0	18.0	6	29.0	52.0	**57**	29.0	28.0	4	16.0	15.0	6	16.0	18	12
	Lead	mg/kg	5 (Primary): 1 (Interlab)	15.0	14.0	7	15.0	14.0	7	25.0	37.0	39	25.0	26.0	4	10.0	14.0	33	10.0	14	33
	Mercury (Inorganic)	mg/kg	0.05 (Primary): 0.1 (Interlab)	0.1	0.07	35	0.1	0.2	**67**	1.1	<0.05	**183**	1.1	<0.1	**167**	<0.05	<0.05	0	<0.05	<0.1	0
	Nickel	mg/kg	5 (Primary): 1 (Interlab)	9.1	6.2	38	9.1	5.0	**58**	18.0	32.0	**56**	18.0	16.0	12	<5.0	<5.0	0	<5.0	7	**94**
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	21.0	15.0	33	21.0	25.0	17	61.0	130.0	**72**	61.0	65.0	6	34.0	32.0	6	34.0	42	21
Organochlo	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	alpha-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	beta-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	delta-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Chlordane	mg/kg	0.1	<0.1	<0.1	0	<0.1			-	-	-	-	-	-	<0.1	<0.1	0	<0.1	<0.1	0
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	DDT	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan alpha	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan beta	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan Sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05			-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor Epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Lindane	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	-	-	-	-	-	-	<0.05	<0.05	0	<0.05	<0.05	0
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.1	0	-	-	-	-	-	-	<0.2	<0.2	0	<0.2	<0.2	0
	Toxaphene	mg/kg	1	<1.0	<1.0	0	<1.0									<1.0	<1.0	0	<1.0	<1.0	0
Polychlorina	Aroclor 1016	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1232	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1242	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1248	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1254	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	Aroclor 1260	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0							<0.5	<0.5	0	<0.5	<0.5	0
	PCBs (Total)	mg/kg	0.5	<0.5	<0.5	0	<0.5									<0.5	<0.5	0	<0.5	<0.5	0
Polycyclic A	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene	mg/kg	0.5 (Primary): 0.05 (Interlab)	<0.5	<0.5	0	<0.5	<0.05	0	<0.5	<0.5	0	<0.5	<0.05	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(b,j)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	-	-	<0.5	<0.5	0	<0.5	<0.5	0
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyren	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	PAHs (Total)	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5	<0.5	0

Table 17: Relative Percent Differences - Soils
Project No: 43008
Project Name: Edmondson Park

SDG				31/10/2013	31/10/2013		31/10/2013	Interlab_D		31/10/2013	31/10/2013		31/10/2013	Interlab_D		11/01/2013	11/01/2013		11/01/2013	11/01/2013	
Field_ID				TP02	QS001	RPD	TP02	QS001A	RPD	TP07	QS002	RPD	TP07	QS002A	RPD	TP29	QS004	RPD	TP29	QS004A	RPD
Date				30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		30/10/2013	30/10/2013		1/11/2013	1/11/2013		1/11/2013	1/11/2013	
Chem_Gro	ChemName	Units	EQL																		
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
TPHs (NEP	C10-C14 Fraction	mg/kg	20 (Primary): 50 (Interlab)	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	0	<20.0	<20.0	0
	C6-C9 Fraction	mg/kg	20 (Primary): 25 (Interlab)							<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<20.0	0
	C15-C28 Fraction	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C29-C36 Fraction	mg/kg	50 (Primary): 100 (Interlab)	86.0	<50.0	**53**	86.0	<100.0	0	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C10-C36 Fraction (Tota	mg/kg	50	86.0	<50.0	NA	86.0	-	NA	<50.0	<50.0	0	<50.0			<50.0	<50.0	0	<50.0	<50.0	0
TRHs (NEP	>C10-C16 Fraction	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	>C16-C34 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0
	>C34-C40 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0
	>C10 - C16 less Naphth	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C6-C10 Fraction	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<20.0	0
	C6 - C10 less BTEX (F	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<20.0	0

*RPDs have only been considered where a concentration is greater than 4 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (4-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 18: Relative Percent Differences - Water, Rinsates, Trip Spike and Storage Blanks
Project No: 43008
Project Name: Edmondson Park

SDG				11/11/2013	Intralab_D		11/11/2013	Interlab_D		31/10/2013	1/11/2013	11/11/2013	29/10/2013	30/10/2013	29/10/2013	29/10/2013	11/11/2013
Field_ID				MW02	Dup1	RPD	MW02	Triplicate1	RPD	Rinsate	Rinsate 2	Rinsate 1	Trip S	TS	Trip B	TB	Trip B
Date				11/11/2013	11/11/2013		11/11/2013	11/11/2013		31/10/2013	1/11/2013	11/11/2013	30/10/2013	30/10/2013	30/10/2013	29/10/2013	11/11/2013
Chem_Gro	ChemName	Units	EQL														
BTEX	Benzene	mg/kg	0.1 (Primary): 0.2 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	-	99%	88%	<0.1	<0.1	<1
	Ethylbenzene	mg/kg	0.1 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	-	98%	88%	<0.1	<0.1	<1
	Toluene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<1	<1	0	<1	<1	0	<1	<1	-	99%	88%	<0.1	<0.1	<1
	Xylene (m & p)	mg/kg	0.2 (Primary): 2 (Interlab)	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	-	99%	88%	<0.2	<0.2	<2.0
	Xylene (o)	mg/kg	0.1 (Primary): 1 (Interlab)	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	-	99%	88%	<0.1	<0.1	<1.0
	Xylene (Total)	mg/kg	0.3	<3	<3	0	<3	<3	0	<3	<3	-	-	-	<0.3	<0.3	<3
Metals & Me	Arsenic (Total)	mg/kg	2 (Primary): 4 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Cadmium	mg/kg	0.4	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	<0.1	-	-	-	-	-
	Chromium (Total)	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Copper	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Lead	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Mercury (Inorganic)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	<0.01	-	-	-	-	-
	Nickel	mg/kg	5 (Primary): 1 (Interlab)	<1	<1	0	<1	<1	0	<1	<5	<1	-	-	-	-	-
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	<5	<5	0	<5	<5	0	<5	<5	<5	-	-	-	-	-
SVOCs				-	-	-	-	-	-	<100	-	-	-	-	-	-	-
OCP (total)				-	-	-	-	-	-	<2	<2	-	-	-	-	-	-
PCB (total)				-	-	-	-	-	-	<40	<40	-	-	-	-	-	-
													-	-	-	-	-
Polycyclic A	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(a)pyrene	mg/kg	0.5 (Primary): 0.05 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(b,j)fluoranthene	mg/kg	0.5	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Benzo(k)fluoranthene	mg/kg	0.5	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	PAHs (Total)	mg/kg	0.5	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-
TPHs (NEP	C10-C14 Fraction	mg/kg	20 (Primary): 50 (Interlab)	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	-	-	-	-	-	-
	C6-C9 Fraction	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<100	0	<20.0	<20.0	-	-	88%	<20	<20	<1
	C15-C28 Fraction	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	-	-	-	-	-	<1
	C29-C36 Fraction	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	-	-	-	-	-	<1
	C10-C36 Fraction (Tota	mg/kg	50	<50.0	<50.0	NA	<50.0	NA	NA	<50.0	<50.0	-	-	-	-	-	<2.0
												-	-	-	-	-	<1.0
TRHs (NEP	>C10-C16 Fraction	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	-	-	-	-	-	<3
	>C16-C34 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	-	-	-	-	-	-
	>C34-C40 Fraction	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	-	-	-	-	-	-
	>C10 - C16 less Naphtl	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	-	-	-	-	-	-
	C6-C10 Fraction	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<10	0	<20.0	<20.0	-	-	-	-	-	-
	C6 - C10 less BTEX (F	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<10	0	<20.0	<20.0	-	-	-	-	-	-

*RPDs have only been considered where a concentration is greater than 4 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (4-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix A – STP and Oxidation Pond Infrastructure Figures

Figure 3a

STP Infrastructure

Client:	Department of Defence	
Project:	STP Remediation Strategy	
Drawing No:	0113181s_STP_Remediation_G004_R0.mxd	
Date:	20/12/2010	Drawing size: A4
Drawn by:	NS	Reviewed by: SC
Projection:	GDA 1994 MGA Zone 56	
Scale:	Refer to Scale Bar	

N

0 7 14 21m

Environmental Resources Management Australia Pty Ltd

Brisbane, Canberra, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

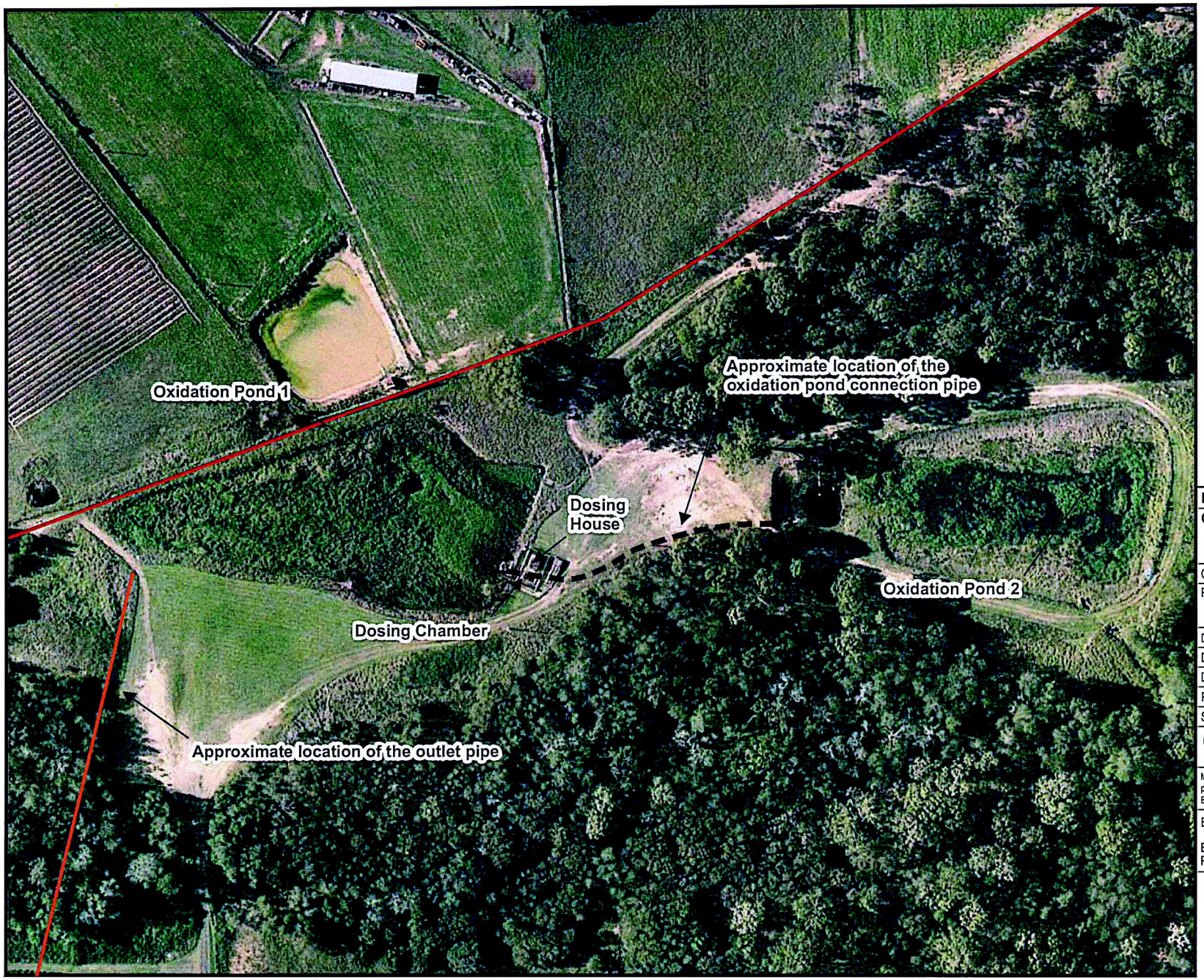

Figure 3b

Oxidation Pond Infrastructure

Client:	Department of Defence	
Project:	STP Remediation Strategy	
Drawing No: 0113181s_STP_Remediation_G005_R0.mxd		
Date:	20/12/2010	Drawing size: A4
Drawn by:	NS	Reviewed by: SC
Projection:	GDA 1994 MGA Zone 56	
Scale:	Refer to Scale Bar	

N

0 10 20 30m

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Appendix B – Test pit, Bore and Monitoring Well Installation Logs

Test Pit No: TP01

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.4

Eastings (MGA): 303032
Northings (MGA): 6239382
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL silty clay, dark brown, poorly graded, dry, high plasticity, heterogeneous, dense, inclusions of medium gravels	TP01 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
			TP01 0.6 - 0.7	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** dark brown, soft, heterogeneous with minor rocks grading to homogeneous, low plasticity, slightly moist, minor rocks				
			TP01 1.4 - 1.5	0.0	D	No ACM. odours or staining encountered
		as above, brown with minor orange/red, moist, low plasticity, minor plant roots, firm				
2.0			TP01 1.9 - 2.0	0.0	D	No ACM. odours or staining encountered
		as above, (reddish brown with minor grey), becomming more moist with depth, homogeneous, dense				
3.0						
		End of Hole @ 3.4m - Backfilled with cuttings and compacted				
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP02

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.5

Eastings (MGA): 303057
Northings (MGA): 6239371
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**FILL** silty clay, dark brown, poorly graded, stiff, poorly graded, minor gravels, dense	TP02 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered QS001 & QS001A samples taken
			TP02 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
		as above but slightly softer, less rocks				
1.0		**CLAY** brown with minor red banding, very minor focks, slight organic material, low plasticity, slightly moist	TP02 0.9 - 1.0	0.0	D	No ACM. odours or staining encountered
		as above, grading to slight reddish brown with grey bands, moist, very soft, organic material present, roots present, low plasticity	TP02 1.4 - 1.5	0.0	D	No ACM. odours or staining encountered
2.0						
3.0		as above, (reddish brown with minor grey), weathered shale (hard), soft clay, low plasticity, very moist,				
		End of Hole @ 3.5m	TP02 3.4 - 3.5	0.0	D	No ACM, odours of staining encountered
4.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Ellen Luu *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP03

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 4.4

Eastings (MGA): 303095
Northings (MGA): 6239362
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL silty clay, reddish brown, gravel and rocks present, stiff, dense, dry, heterogeneous, coarse grained, minor grass present	TP03 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		as above, minor rocks and gravels, clay grading to slight reddish brown to grey, very dry	TP03 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** brown to slight grey, stiff, dry, heterogeneous, medium plasticity				
		as above,reddish grey to brown, moderately soft, homogeneous, low plasticity, moist				
2.0			TP03 1.9 - 2.0	0.0	D	No ACM. odours or staining encountered
3.0						
4.0		grey weathered shale, reddish brown clay, heterogeneous, low pasticity, very moist	TP03 4.3 - 4.4	0.0	D	No ACM. odours or staining encountered
		End of Hole @ 4.4m				
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP04

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.7

Eastings (MGA): 303117
Northings (MGA): 6239376
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL silty clay, brown, stiff, poorly graded, dry, moderate plasticity, heterogeneous, medium to coarse grained, inclusions of minor gravels	TP04 0.1 - 0.2	2.1	D	No ACM. odours or staining encountered
		clay, grey to brown, minor gravels, dry, slightly stiff, low plasticity, medium coarse grained, heterogeneous, concrete noted	TP04 0.6 - 0.7	2.0	D	No ACM. odours or staining encountered
1.0		organic clay, dark brown to black, minor roots, very soft, ammonia odour noted, very moist, organic odour/material present	TP04 1.2 - 1.3	3.4	D	No ACM observed. Odours present
		CLAY brown to red, minor roots, soft, low plasticity, moist				
		as above clay grading to dark red/brown				
2.0						
		clay reddish brown, minor manganese nodules, moderate plasticity, slightly moist				
3.0			TP04 3.6 - 3.7	0.0	D	Water seepage observed. Sample collected for bacteria
		End of Hole @ 3.7m				No ACM, odours or staining encounted
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP05

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 4.0

Eastings (MGA): 303124
Northings (MGA): 6239408
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL clay, stiff, minor gravels and silt, organic material, tree roots, dry, medium coarse grained,	TP05 0.1 - 0.2	0.1	D	No ACM. odours or staining encountered
		as above, concrete (loose) clay grading to oxidised red colour, heterogeneous, soft, low plasticity				
		silty clay, brown, organic material, low plasticity, soft, homogeneous	TP05 0.6 - 0.7	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** clay, dark brown, ammonia odour, low plasticity, organic material, soft, moist				
		clay grading towards brown, moderate plasticity, soft to stiff, heterogeneous, organic material, moist	TP05 1.1 - 1.2	0.0	D	No ACM observed. Odours present
2.0						
3.0		as above, grading to orange clay, moderate plasticity, homogeneous, moist				
		clay, orange, moderate plasticity, weathered shale, moist, manganese nodules observed	TP05 3.9 - 4.0	0.0	D	No ACM, odours or staining encounted
4.0		End of Hole @ 4.0m				
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP06

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.5

Eastings (MGA): 303106
Northings (MGA): 6239427
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL clayey gravel, dark brown, minor rocks and silt, low plasticity, dry, stiff, heterogeneous, medium coarsed grained, organic material present	TP06 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		as above however more clay then gravel, grading to reddish brown, low plasticity	TP06 0.4 - 0.5	0.1	D	No ACM. odours or staining encountered
1.0		as above with mixed natural clay, reddish brown, slightly oxidised, dry, stiff, low plasticity, heterogeneous				
		CLAY clay, reddish brown with slight grey banding, dry, moderate plasticity, stiff, dry, homogeneous, oxidation	TP06 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
2.0		clay, grey to minor red, slightly moist, moderate plasticity, firm, homogeneous,				
		End of Hole @ 2.5m	TP06 2.4 - 2.5	0.1	D	No ACM, odours or staining encountered
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP07

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.5

Eastings (MGA): 303068
Northings (MGA): 6239423
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL clay, brown to reddish brown, very stiff, low plasticity, coarse to medium grained, minor silt, heterogeneous, dry, poorly graded, minor gravels and organic material	TP07 0.1 - 0.2	0.2	D	No ACM. odours or staining encountered
			TP07 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
1.0		clay, dark brown, soft to firm, low plasticity, coarse to medium grained, minor silt, poorly graded, organic material, dry				
		CLAY grey with minor red oxidation, stiff, low plasticity, coarse to medium grained, dry, homogeneous,	TP07 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
2.0		clay, reddish brown, firm, dry, low plasticity, homogeneous, coarse to medium grained				
		clay, red with minor grey, moist, moderate plasticity				Oxidised/red banding @ 2.7m
3.0						No ACM, odours or staining encountered
			TP07 3.4 - 3.5	0.0	D	QS002 & QS002A samples taken
		End of Hole @ 3.5m				
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP08

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.5

Eastings (MGA): 302831
Northings (MGA): 6239180
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL topsoil, silty sand, dark brown, fine grained, minor gravels, organic material ,homogeneous, dry, soft, loose,	TP08 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		clay, reddish brown, dry, stiff, minor gravels, heterogeneous, medium density, metal pole found at 0.4m	TP08 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
		CLAY red, dry, stiff, firm, moderate plasticity				
1.0		clay, grey with minor red, dry, firm, moderate plasticity, well graded, medium dense				
			TP08 1.5 - 1.6	0.0	D	No ACM, odours or staining encountered
		weathered shale (grey), clay (grey), dry, hard, low plasticity, well graded,				
2.0						
			TP08 2.4 - 2.5	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 2.5m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP09

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 1.3

Eastings (MGA): 302826
Northings (MGA): 6239192
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL topsoil, silty sand, dark brown, fine grained, minor gravels, homogeneous, dry, soft, loose,	TP09 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		clay, reddish brown, low plasticity, slightly moist, minor organic material, homogeneous	TP09 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** greyish red, low plasticity, slightly moist, oxidised, weathered shale present, heterogeneous	TP09 1.2 - 1.3	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 1.3m				
2.0						
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP10

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.4

Eastings (MGA): 302814
Northings (MGA): 6239196
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, graves (blue metal) present, organic material, loose, soft, dry, heterogeneous,	TP10 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		topsoil, dark brown, mixed with clay (red/brown), coal present, low plasticity, slightly moist, topsoil - loose, dry, minor gravel, soft	TP10 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** red grading to slight grey, low plasticity, firm, dry				
		as above but grey, moist, loose, firm				
2.0		weathered shale, ironstone, clay (red), moderate plasticity, hard, dry, dense				
			TP10 2.3 - 2.4	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 2.4m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Ellen Luu *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP11

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.1

Eastings (MGA): 302804
Northings (MGA): 6239210
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, graves (blue metal) present, organic material, loose, soft, slightly moist, heterogeneous,	TP11 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		clay, reddish brown, minor gravel, moderate plasticity, slightly moist, stiff, grading to reddish brown/grey, dense, organic material present	TP11 0.6 - 0.7	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** red grading to slight grey, moderate plasticity, stiff, moist				
		as above but dry, loose				
			TP11 1.9 - 2.0	0.0	D	No ACM, odours or staining encountered
2.0		as above, grey with minor red, weathered shale and ironstone inclusions, hard, dry, moderate plasticity				
		End of Hole @ 2.1m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP12

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 1.4

Eastings (MGA): 302768
Northings (MGA): 6239192
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, minor gravels present, organic material, loose, soft, dry, heterogeneous,	TP12 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		CLAY clay, reddish grey, minor gravel and ironstone, moderate plasticity, dry, stiff, poorly graded	TP12 0.7 - 0.8	0.0	D	No ACM. odours or staining encountered QS003 & QS003A samples taken
1.0			TP12 1.1 - 1.2	0.0	D	No ACM, odours or staining encountered
		ironstone, rediish grey, minor weathered shale, very hard, loose, homogeneous, well graded				
		End of Hole @ 1.4m				
2.0						
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP13

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.3

Eastings (MGA): 302777
Northings (MGA): 6239244
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, minor gravels present, loose, dry, heterogeneous,	TP13 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		clay, reddish grey, minor gravel and ironstone, low plasticity, dry, stiff,	TP13 0.5 - 0.6	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** grey with minor red, stiff, slightly moist, homogeneous, low plasticity	TP13 1.0 - 1.1	0.0	D	No ACM, odours or staining encountered
		as above but firm				
		as above, reddish grey, ironstone, stiff, loose, heterogeneous				
2.0			TP13 2.1 - 2.2	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 2.3m -Refusal on bedrock (ironstone)				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP14

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.7

Eastings (MGA): 302799
Northings (MGA): 6239242
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, minor gravels present, loose, moist, heterogeneous, organic material	TP14 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		clay, reddish brown, minor gravel, low plasticity, minor topsoil mixed, dense	TP14 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** grey with minor red, firm, slightly moist, homogeneous, low plasticity	TP14 0.9 - 1.0	0.0	D	No ACM, odours or staining encountered
		as above but grading from red to grey	TP14 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
2.0		as above, reddish grey, ironstone and weathered shale, hard, loose, heterogeneous	TP14 2.5 - 2.7	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 2.7m -Refusal				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Ellen Luu *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP15

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 1.5

Eastings (MGA): 302818
Northings (MGA): 6239250
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, minor gravels present, loose, moist, heterogeneous, organic material	TP15 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		clay, reddish brown, minor gravel, low plasticity, dense, dry, organic material	TP15 0.4 - 0.5	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** reddish brown grey, firm, homogeneous, low plasticity				
		as above but grey with minor red, soft to firm, slightly moist,	TP15 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 1.5m				
2.0						
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Ellen Luu *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP16

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.7

Eastings (MGA): 302827
Northings (MGA): 6239221
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL top soil, silty sand, dark brown, loose, moist, heterogeneous, organic material	TP16 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
1.0		**CLAY** clay, reddish brown, minor gravel, low plasticity, stiff, topsoil mixed in,	TP16 0.9 - 1.0	0.0	D	No ACM. odours or staining encountered
		as above, reddish grey, dry, homogeneous	TP16 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
		as above but grey				
2.0		as above but hard, Ironstone (red) and clay (grey) inclusions				
		SHALE weathered shale, grey with red bands, hard, dry	TP16 2.7 - 2.8	0.0	D	No ACM, odours or staining encountered
3.0		End of Hole @ 2.7m - Refusal on weathered shale				
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP17

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.1

Eastings (MGA): 302802
Northings (MGA): 6239238
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**FILL** Angular gravels, loose, basaltic conglomerate, (20mm-120mm)				
1.0		as above but slight change in gradation, wetter material, smaller gravel size, poorly sorted, no evidence of sand at base	TP17 0.9 - 1.0	0.0	D	No ACM, odours or staining encountered
			TP17 1.8 - 1.9	0.0	D	No ACM, odours or staining encountered
2.0		End of Hole @ 1.9m Side of filter pack 2.1m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Michelle Delandro *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP18

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 1.9

Eastings (MGA): 302779
Northings (MGA): 6239218
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**FILL** angular gravel, loose, grey, basaltic conglomerate, (20mm - 120mm),				
1.0		as above but larger concrete sections, inclusions of builders rubble (brick/tile/clay piping). No evidence of gradation at this location	TP18 1.0 - 1.1	0.0	D	No ACM. odours or staining encountered
			TP18 1.8 - 1.9	0.0	D	No ACM, odours or staining encountered
2.0		End of Hole @ 1.9m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Ellen Luu *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

JBS&G	**Test Pit No: TP19**	**Project No:** 43008 **Client:** Urban Growth, NSW **Project Name:** Environmental and Geotechnical Investigation **Site Address:** Campbeltown Rd, Edmondson Park

Date: 31/10/13
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 6.7

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3): -

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**Fill (FL)** Silty clay, dark brown, metal fragments, organic material, low plasticity, soft, moist, medium grained.	TP19 0.1-0.2	0.0	D	No odours, staining or ACM observed.
		Fill (FL) Clayey silt, dark brown, minor gravel, low plasticity, moist, organic material, medium grained.	TP19 0.4-0.5	0.1	D	No odours or staining observed. ACM fragment observed.
1.0		**Clay (CL)** Silty, redish brown, low plasticity, moist.	TP19 0.9-1.0 TP19 1.0-1.3	0.0 0.2	D D	No odours, staining or ACM observed. No odours, staining or ACM observed.
2.0		as above, redish grey, wet, minor gravels and silt, heterogeneous, fine grained.	TP19 1.9-2.0	0.0	D	No odours, staining or ACM observed.
3.0		as above, fine-medium grained. Weathered shale encountered at 4.7 mbgs.				
4.0			TP19 3.9-4.0	0.0	D	No odours, staining or ACM observed.
5.0						
6.0						
7.0		End of hole @ 6.7 mbgs. Target Depth.				

Method TP	*Sample Type* D	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* E.Luu *Project Manager:* T.Harding

Test Pit No: TP20

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 23/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.5

Eastings (MGA): 302904
Northings (MGA): 6239419
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL topsoil, silty sand, dark brown, loose, fine to medium grained, soft, dry, organic material	TP20 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
			TP20 0.4 - 0.5	0.0	D	No ACM, odours or staining encountered
		as above, grading to clay with minor silt, brown to red, low plasticity, moist, heterogeneous				
1.0			TP20 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
		CLAY reddish orange, low plasticity, slight moisture, homogeneous				
2.0			TP20 2.4 - 2.5	0.0	D	No ACM, odours or staining encountered
3.0		as above but reddish grey, wet, minor gravels and silt, homogeneous, fine grained				
			TP20 3.4 - 3.5	0.0	D	No ACM odours or staining encountered
		End of Hole @ 3.5m				
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP21

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.5

Eastings (MGA): 302944
Northings (MGA): 6239402
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL topsoil, silty sand, dark brown, loose, fine to medium grained, soft, dry, organic material, rocks	TP21 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
			TP21 0.4 - 0.5	0.0	D	No ACM, odours or staining encountered
1.0		**CLAY** minor silt, orange to brown, low plasticity, medium grained, soft, slightly moist, well graded	TP21 1.4 - 1.5	0.0	D	No ACM, odours or staining encountered
2.0		as above but grading to reddish grey	TP21 2.9 - 3.0	0.0	D	No ACM, odours or staining encountered
3.0			TP21 3.4 - 3.5	0.0	D	No ACM odours or staining encountered
		End of Hole @ 3.5m				
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Ellen Luu *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP22

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.8

Eastings (MGA): 0
Northings (MGA): 0
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL silty clay, brown, dry, organics (roots and grass), dense,	TP22 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		CLAY red brown, moist, slight organics at surface, moderate plasticity,				
1.0			TP22 0.9 - 1.0	0.0	D	No ACM, odours or staining encountered
		grey mottled clay, red rootlets, moderate plasticity, firm				
			TP22 1.7 - 1.8	0.0	D	No ACM, odours or staining encountered
2.0						
		clay, reddish brown with grey mottling, moist with depth, manganese nodules,	TP22 2.7 - 2.8	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 2.8m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Michelle Delandro *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

JBS&G	**Test Pit No: TP23**	**Project No:** 43008 **Client:** Urban Growth, NSW **Project Name:** Environmental and Geotechnical Investigation **Site Address:** Campbeltown Rd, Edmondson Park

Date: 03/11/13
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 0.2

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3): -

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**Fill (FL)** silty clay, dark brown, low plasticity, fine-medium grained, moist with organic material.	TP 0.1-0.2	0.0	D	No odours, staining or ACM observed.
		Fill (FL) Encountered a concrete footpath, and bricks. Possibly on a service line underneath.				
		End of hole @ 0.2mbgs -Test pit abandoned due to possible servicesat beneath this location.				
1.0						
2.0						
3.0						
4.0						

Method TP	*Sample Type* D	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* E.Luu *Project Manager:* T.Harding

JBS&G	**Test Pit No: TP24**	**Project No:** 43008 **Client:** Urban Growth, NSW **Project Name:** Environmental and Geotechnical Investigation **Site Address:** Campbeltown Rd, Edmondson Park

Date: 01/11/13
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.7

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3): -

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**Fill (FL)** silty clayey sand, dark brown, low plasticity, medium grained, moist, soft with organic material.	TP24 0.1-0.2	0.0	D	No odours, staining or ACM observed.
		Fill (FL) clayey silt, dark brown, low plasticity, medium grained, moist, soft with organic material.	TP24 0.4-0.5	0.0	D	No odours, staining or ACM observed.
1.0		**Clay (CL)** clay, red/grey, low plasticity, medium grained, moist, very soft with minor silt.	TP24 1.4-1.5	0.0	D	No odours, staining or ACM observed.
2.0		**Clay (CL)** As above with minor weathered loose shale.	TP24 2.4-2.4	0.0	D	No odours, staining or ACM observed.
		Sandstone (SS) Weathered sandstone.				
3.0		End of hole @ 2.7 mbgs.				
4.0						

Method TP	*Sample Type* D	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* E.Luu *Project Manager:* T.Harding

Test Pit No: TP25

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 3.4

Eastings (MGA): 302876
Northings (MGA): 6239361
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL silty clay, dark brown, dry, organics (roots and grass), moist, soft, high plasticity	TP25 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
			TP25 0.4 - 0.5	0.0	D	No ACM, odours or staining encountered
1.0		**silty CLAY** red/orange with manganese/iron nodules moderate plasticity, moist	TP25 1.1 - 1.2	0.0	D	No ACM, odours or staining encountered
2.0		as above but with grey mottling and no nodules				
3.0		silty clay, with manganese nodules, trace angular fine gravels, wet, red brown	TP25 3.3 - 3.4	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 3.4m				
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* Ellen Luu
		BGS - Below Ground Surface	*Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP26

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 30/10/2013
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.7

Eastings (MGA): 302845
Northings (MGA): 6239367
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3):

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		Grass				
		FILL silty clay, brown	TP26 0.1 - 0.2	0.0	D	No ACM. odours or staining encountered
		as above, organics inclusions, high plasticity,	TP26 0.5 - 0.6	0.0	D	No ACM, odours or staining encountered
		CLAY grey to orange mottles, organic rootlets, soft, moderate plasticity	TP26 0.9 - 1.0	0.0	D	No ACM, odours or staining encountered
1.0						
2.0		as above, red/orange mottling, moist	TP26 2.6 - 2.7	0.0	D	No ACM, odours or staining encountered
		End of Hole @ 2.7m				
3.0						
4.0						
5.0						

Method	*Sample Type*	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum* *BGS - Below Ground Surface*	*Logged By:* Michelle Delandro *Project Manager:* Tom Harding

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Test Pit No: TP27

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental and Geotechnical Investigation
Site Address: Campbeltown Rd, Edmondson Park

Date: 01/11/13
Contractor: Terratest
Excavation Plant: Excavator
Method: TP
Total Hole Depth (mbgs): 2.5

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation - Surface (m): 0
Pit Dimension (m^3): -

SUBSURFACE PROFILE			SAMPLE			
Depth	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments
0.0		**Fill (FL)** silty sandy clay, dark brown, low plasticity, fine-medium grained, moist, soft with organic material.	TP27 0.1-0.2	0.0	D	No odours, staining or ACM observed.
		Fill (FL) clay, dark brown, low plasticity, fine-medium grained, with minor silt.	TP27 0.4-0.5	0.0	D	No odours, staining or ACM observed.
		As above, soft, moist, brown/grey.	TP27 0.9-1.0	0.0	D	No odours, staining or ACM observed.
1.0		**Clay (CL)** Clay, red/grey, low plasticity, moist, soft, homogeneous.				
2.0		As above with gravelly shale.	TP27 2.4-2.4	0.0	D	No odours, staining or ACM observed.
		End of hole @ 2.5 mbgs				
3.0						
4.0						

Method TP	*Sample Type* D	*Reference Level*	*Log Details*
TP - Test Pit	*D - Disturbed sample*	*AHD - Australian Height Datum*	*Logged By:* E.Luu
		BGS - Below Ground Surface	*Project Manager:* T.Harding

Well No: TP29/MW01

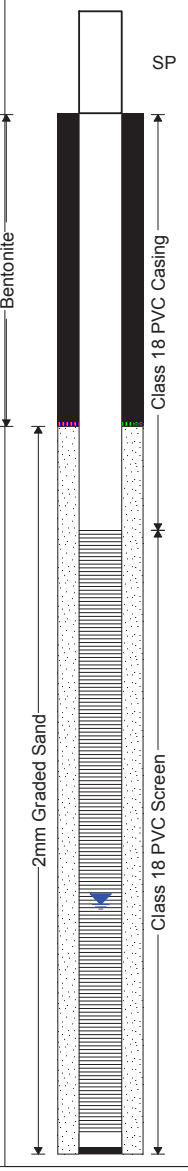
Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental and Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 01/11/2013
Contractor: Terratest
Drill Rig: Geoprobe
Method: SPT
Total Hole Depth (mbgs): 4.0

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation: Surface (m) 0 **TOC (m):** -
Bore Diameter (mm): 50

Water Level Initial (mbgs): 3.8
Water Level Static (mbgs): -
Casing Type/Surface Finish: SP
Screen Diameter (mm): 50 **Screen Length (m):** 3
Casing Diameter (mm): 50 **Casing Length (m):** 2

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Well Construction
-1.0							
0.0		Ground Surface **Fill (FL)** clayey silty sand, dark brown, fine-medium grained, soft, dry, loose, heterogeneous with organic material, and small rocks.	TP29 0.1-0.2	0.0	U	No ACM, odours or staining encountered	
		Fill (FL) As above, wet.	TP29 0.4-0.5	0.0	U	No ACM, odours or staining encountered	
		Fill (FL) clay, brown-yellow/grey, low plasticity, well graded, moist, firm, homogeneous.					
1.0		**Clay (CL)** clay, brown-yellow/grey, low plasticity, well graded, moist, soft, homogeneous, with organic material and minor gravel.	TP29 1.0-1.5	0.0	U	No ACM, odours or staining encountered	
2.0			TP29 1.9-2.0	0.0	U	No ACM, odours or staining encountered	
		As above.	TP29 2.4-2.5	0.0	U	No ACM, odours or staining encountered	
3.0		As above with minor gravel.	TP29 2.9-3.0	0.0	U	No ACM, odours or staining encountered	
4.0		As above, yellow/brown, heterogeneous with weathered shale.					
5.0							



Method	*Sample Type* U	*Reference Level*	*Casing Type/Surface Finish*	*Log Details*
HA - Hand Auger	*U - Undisturbed tube sample*	*AHD - Australian Height Datum*	*PVC 18 - Class 18 PVC*	*Logged By:* E.Luu
SFA - Solid Flight Auger	*D - Disturbed sample*	*BGS - Below Ground Surface*	*MT - Monument*	*Project Manager:* T.Harding
HFA - Hollow Flight Auger	*CS - Core sample*	*TOC - Top of Casing*	*RB - Roadbox*	

Well No: TP30/MW02

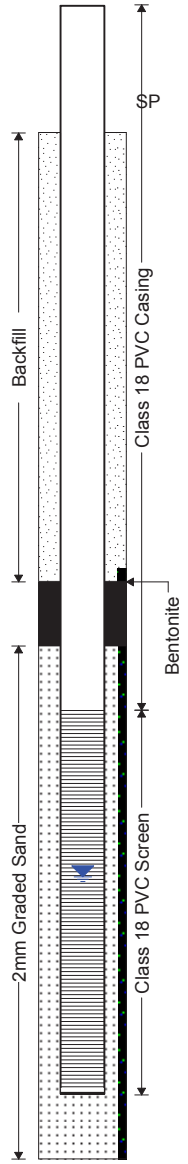
Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Drill Rig:
Method:
Total Hole Depth (mbgs): 8.0

Eastings (MGA): 0
Northings (MGA): 0
Reference Level:
Elevation: Surface (m) 0 **TOC (m):**
Bore Diameter (mm):

Water Level Initial (mbgs):
Water Level Static (mbgs):
Casing Type/Surface Finish: Stand pipe
Screen Diameter (mm): **Screen Length (m):** 3
Casing Diameter (mm): **Casing Length (m):** 5.5

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Well Construction
-1.0							
0.0		Ground Surface **FILL** silty clay, dark brown, organics (roots and rootlets), high plasticity,	TP30 0.1 - 0.2	0.0	D	No ACM, odours or staining encountered	
		as above, red brown mottle, trace inclusions of gravels, rootlets					
1.0		**CLAY** high plasticity, red with grey mottling, rootlets to approximately 1.5m	TP30 0.9 - 1.0	0.0	SPJ	No ACM, odours or staining encountered	
			TP30 1.5 - 1.6	0.0	G	No ACM, odours or staining encountered	
2.0							
		SHALE highly weathered, grey, down grading weathering through profile					
3.0		as above. Becomming harder at 4.6m and darker with depth Moisture at 5.2m					
4.0						Decision made to install well at 7.5m due to collapsing well walls	
5.0							
6.0							
7.0							
8.0		End of Hole @ 8.0m End of Well @ 7.5m					
9.0							



Method	*Sample Type*	*Reference Level*	*Casing Type/Surface Finish*	*Log Details*
HA - Hand Auger	*U - Undisturbed tube sample*	*AHD - Australian Height Datum*	*PVC 18 - Class 18 PVC*	*Logged By: Ellen Luu*
SFA - Solid Flight Auger	*D - Disturbed sample*	*BGS - Below Ground Surface*	*MT - Monument*	*Project Manager: Tom Harding*
HFA - Hollow Flight Auger	*CS - Core sample*	*TOC - Top of Casing*	*RB - Roadbox*	
PT - Push Tube			*SP - Stickup/Standpipe*	
AH - Air Hammer				

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Well No: TP31/MW03

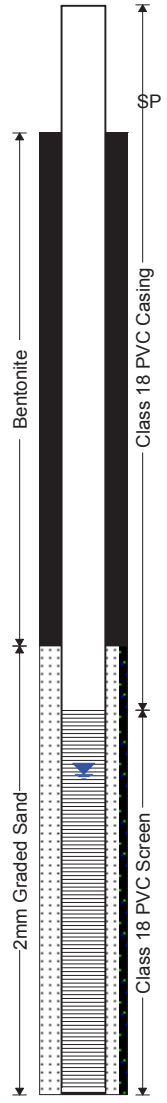
Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental & Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 31/10/2013
Contractor: Terratest
Drill Rig:
Method:
Total Hole Depth (mbgs): 7.5

Eastings (MGA): 0
Northings (MGA): 0
Reference Level:
Elevation: Surface (m) 0 **TOC (m):**
Bore Diameter (mm):

Water Level Initial (mbgs):
Water Level Static (mbgs):
Casing Type/Surface Finish: Stand pipe
Screen Diameter (mm): **Screen Length (m):** 3
Casing Diameter (mm): **Casing Length (m):** 5.5

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Well Construction
-1.0		Ground Surface					
0.0		**FILL** topsoil, silty sand, dark brown, dry, loose, medium to fine grained, very soft, low plasticity, inclusions of minor gravels, organics	TP31 0.1 - 0.2	0.0	D	No ACM, odours or staining encountered	
1.0		**CLAY** low plasticity, orange to brown, minor silt, fine to medium grained, minor topsoil material, firm, poorly graded,	TP31 0.9 - 1.0	0.0	D	No ACM, odours or staining encountered	
		as above, clay becomming harder at depth, dry					
		clay, reddish brown, soft, homogeneous, moderate plasticity, dry	TP31 1.4 - 1.5	0.1	D	No ACM, odours or staining encountered	
2.0		as above with minor weathered sandstone, dry and hard					
3.0		**SANDSTONE** weatherd, hard, dry, grey (bedrock)					
4.0		**SHALE** slight to moderate weathered, dark grey, hard					
5.0		as above but slight moisture noted in shale, bailing up					
		as above but very wet					
6.0							
7.0		End of Well @ 7.5m					
8.0							
9.0							



Method	*Sample Type*	*Reference Level*	*Casing Type/Surface Finish*	*Log Details*
HA - Hand Auger	*U - Undisturbed tube sample*	*AHD - Australian Height Datum*	*PVC 18 - Class 18 PVC*	*Logged By:* Michelle Delandro
SFA - Solid Flight Auger	*D - Disturbed sample*	*BGS - Below Ground Surface*	*MT - Monument*	*Project Manager:* Tom Harding
HFA - Hollow Flight Auger	*CS - Core sample*	*TOC - Top of Casing*	*RB - Roadbox*	
PT - Push Tube			*SP - Stickup/Standpipe*	
AH - Air Hammer				

NOTE: This bore log is for environmental assessment purposes only and is not intended to provide geotechnical information

Well No: TP32/MW04

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental and Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 01/11/2013
Contractor: Terratest
Drill Rig: Geoprobe
Method: SPT
Total Hole Depth (mbgs): 8.8

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation: Surface (m) 0 **TOC (m):** 0
Bore Diameter (mm): 50

Water Level Initial (mbgs):
Water Level Static (mbgs):
Casing Type/Surface Finish:
Screen Diameter (mm): **Screen Length (m):**
Casing Diameter (mm): **Casing Length (m):**

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Well Construction
		Ground Surface					
0.0		**Fill (FL)** Clayey sand, dark brown, low plasticity, moist, heterogeneous with organic material and minor silt.	TP32 0.1-0.2	0.0	U	No odours, staining or ACM observed.	
		As above, red/brown, damp, stiff.	TP32 0.4-0.5	0.0	U	No odours, staining or ACM observed.	
1.0		**Clay (CL)** clay, red/brown, low-moderate plasticity, stiff, damp with minor gravel.	TP32 0.9-1.0	0.0	U	No odours, staining or ACM observed.	
		Clay (CL) Clay, red/brown, low plasticity, hard, heterogeneous with ironstone.	TP32 1.4-1.5	0.0	U	No odours, staining or ACM observed.	
2.0		**Shale (SH)** Ironstone, weathered shale and siltstone, red/grey, very hard, interbedded.	TP32 2.4-2.5	0.0	U	No odours, staining or ACM observed. Refusal at 2.5 mbgs, changed to SFA.	
3.0			TP32 3.4-3.5	0.0	D	No odours, staining or ACM observed.	
4.0		**Shale (SH)** Weathered shale, grey, dry, loose	TP32 4.4-4.5	0.0	D	No odours, staining or ACM observed.	

Bentonite
2mm Graded Sand
Class 18 PVC Casing
Class 18 PVC Screen

Method	Sample Type	Reference Level	Casing Type/Surface Finish	Log Details
HA - Hand Auger	*U - Undisturbed tube sample*	*AHD - Australian Height Datum*	*PVC 18 - Class 18 PVC*	*Logged By:* E.Luu
SFA - Solid Flight Auger	*D - Disturbed sample*	*BGS - Below Ground Surface*	*MT - Monument*	*Project Manager:* T.Harding
HFA - Hollow Flight Auger	*CS - Core sample*	*TOC - Top of Casing*	*RB - Roadbox*	

Well No: TP32/MW04

Project No: 43008
Client: Urban Growth, NSW
Project Name: Environmental and Geotechnical Investigation
Site Address: Campbelltown Road, Edmondson Park

Date: 01/11/2013
Contractor: Terratest
Drill Rig: Geoprobe
Method: SPT
Total Hole Depth (mbgs): 8.8

Eastings (MGA): -
Northings (MGA): -
Reference Level: AHD
Elevation: Surface (m) 0 **TOC (m):** 0
Bore Diameter (mm): 50

Water Level Initial (mbgs):
Water Level Static (mbgs):
Casing Type/Surface Finish:
Screen Diameter (mm): **Screen Length (m):**
Casing Diameter (mm): **Casing Length (m):**

SUBSURFACE PROFILE			SAMPLE				
Depth (m)	Graphic Log	Lithologic Description	Sample ID	PID (ppm)	Sample Type	Comments	Well Construction
5.0			TP32 5.4-5.5	0.0	D	No odours, staining or ACM observed.	2mm Graded Sand; Class 18 PVC Screen
6.0		As above.	TP32 6.4-6.5	0.0	D	No odours, staining or ACM observed.	
7.0			TP32 6.9-7.0			No odours, staining or ACM observed.	
8.0			TP32 7.9-8.0	0.0	D	No odours, staining or ACM observed.	
9.0							
10.0		End of hole @ 10.0mbgs	TP32 9.9-10.0	0.0	D	No odours, staining or ACM observed.	

Method	Sample Type	Reference Level	Casing Type/Surface Finish	Log Details
HA - Hand Auger	*U - Undisturbed tube sample*	*AHD - Australian Height Datum*	*PVC 18 - Class 18 PVC*	*Logged By:* E.Luu
SFA - Solid Flight Auger	*D - Disturbed sample*	*BGS - Below Ground Surface*	*MT - Monument*	*Project Manager:* T.Harding
HFA - Hollow Flight Auger	*CS - Core sample*	*TOC - Top of Casing*	*RB - Roadbox*	

Appendix C – Field Record Forms

Groundwater Gauging Data

JBS&G

PROJECT NAME: Ed Punk	PROJECT NO: 43008
FIELDWORK DATES: 11/11/13	SAMPLERS: EL & MD
TYPE OF INVESTIGATION (GME/ESA etc): GME	PROJECT MANAGER: TH

WELL ID	DATE	TOTAL DEPTH (m)	DEPTH TO WATER (m)	DEPTH TO LNAPLs (m)	DEPTH TO DNAPLs (m)	CALCULATED WELL VOLUME	COMMENTS
MW01	11/11/13	6.045	3.218	—	—		
MW02	11/11/13	8.276	4.512	—	—		
MW03	11/11/13	2.542	8.521	—	—		
MW04	11/11/13	9.554	5.204	—	—		

Groundwater Sampling Form

FIELD RECORD SHEETS

JBS&G

Project name: Ed PK	Location: Ed PK	Well ID: MW01
Person sampling: SL & MP.	Sample method: P-pump	Date: 11/11/13 Weather:
Pre-purging groundwater depth (m): 3.281	Post-sampling groundwater depth (m): 3.698	Total well depth (m): 6.045
Well diameter (mm): 50mm Well volume (L):	Pump on time: 1pm Pump off time:	Cycles per minute:

Field Measurements

Time	Purge Rate (mL/min)	Volume purged (L)	DO (mg/L)	DO (% saturation)	EC (us/cm)	pH (units)	Redox (mV)	Temp (oC)	TDS ppm
Field Stabilisation Criteria (1):			+/- 10%		+/- 3%	+/- 0.5	+/- 10 mV		+/- 3%
13:08		1	1.28		2100	7.98	-62	16.9	
13:14		2	0.80		2101	7.93	-69	16.6	
13:22		3	0.51		2105	7.87	-76	16.6	
13:28		4	0.45		2112	7.88	-79	16.7	
13:32		5	0.31		2100	7.86	-82	16.9	
13:39		6	0.27		2100	7.86	-83	16.8	

3.352
3.402
3.452
3.488
3.517
3.546

Comments (Odour, colour, turbidity, sheen etc)

yellow brown, High turbidity, no sheen

Were Metals Field Filtered? Yes

Were QA/QC Samples Collected? NO

(1) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.

Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

Groundwater Sampling Form

FIELD RECORD SHEETS

JBS&G

Project name: OK Ed PK EL & MO	Location: Ed PK	Well ID: MW91
Person sampling:	Sample method: Peri Pump	Date: 11/9/13 Weather: wet
Pre-purging groundwater depth (m): 3.218	Post-sampling groundwater depth (m):	Total well depth (m):
Well diameter (mm): 50mm Well volume (L):	Pump on time: 8:30 Pump off time:	Cycles per minute:

Field Measurements

Time	Purge Rate (mL/min)	Volume purged (L)	DO (mg/L)	DO (% saturation)	EC (uS/cm)	pH (units)	Redox (mV)	Temp (oC)	TDS ppm
Field Stabilisation Criteria [1]:			+/- 10%		+/- 3%	+/- 0.5	+/- 10 mV		+/- 3%
4.812 8:36		1	1.54		14.82	6.68	6.4	16.9	
4.771 8:44		2	0.38		14.80	6.78	39	15.9	
4.764 8:47		3	0.19		14.77	6.79	20	16.2	
4.764 8:51		4	1.31		14.76	6.83	28	16.2	
4.814 8:54	8.34	5	0.2		14.79	6.80	22	16.5	
5.03 8:58		6	0.61		14.83	6.81	18	16.3	

Comments (Odour, colour, turbidity, sheen etc)

Were Metals Field Filtered? _____

Were QA/QC Samples Collected? _____

[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.

Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

IMSO Forms010 - Groundwater Sampling

Groundwater Sampling Form

FIELD RECORD SHEETS

JBS&G

Project name: ~~Ambo~~ Ed Pk	Location: Ed Pk	Well ID: MW03	
Person sampling: EL & MAP	Sample method: P-Pump	Date:	
Pre-purging groundwater depth (m): 2.582 2.542	Post-sampling groundwater depth (m): 3.285	Weather: Total well depth (m): 8.521	
Well diameter (mm): Well volume (L):	Pump on time: 9:52 Pump off time:	Cycles per minute:	

Field Measurements

Time	Purge Rate (mL/min)	Volume purged (L)	DO (mg/L)	DO (% saturation)	EC (us/cm)	pH (units)	Redox (mV)	Temp (oC)	TDS ppm
Field Stabilisation Criteria [1]:			+/- 10%		+/- 3%	+/- 0.5	+/- 10 mV		+/- 3%
9:53		1	1.33		14040	6.36	-236	16.1	
10:04		2	6.43 1.16		14044 1520	6.70	-291.5 -292	16.1	
10:11		3	1.23 0.49		1525	6.58	-274	16.1	
10:19		4	2.15 0.28		13711 1510	0.58	-296 -294	16.1	
10:31		5	0.17 2.57		15220	6.57	-306.9	16.1	
10:32		6	2.65, 0.09		13961		-299.3	16.1	
					15322	6.55	-2992	16.1	
							-312		

2.932
2.986
3.143
3.190
3.186
3.195

Comments (Odour, colour, turbidity, sheen etc)

Turb, sulfide odour.

Were Metals Field Filtered? _____

Were QA/QC Samples Collected? _____

[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.

Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

Groundwater Sampling Form

FIELD RECORD SHEETS

JBS&G

Project name: Gd Plc	Location: Gd Plc	Well ID: MW04
Person sampling: EL & MD	Sample method: Pump	Date: 11/11/13 Weather: wet
Pre-purging groundwater depth (m): 5.20-4	Post-sampling groundwater depth (m): 7.020	Total well depth (m):
Well diameter (mm): Well volume (L):	Pump on time: 12:00pm Pump off time:	Cycles per minute:

Field Measurements

Time	Purge Rate (mL/min)	Volume purged (L)	DO (mg/L)	DO (% saturation)	EC (us/cm)	pH (units)	Redox (mV)	Temp (oC)	TDS ppm
Field Stabilisation Criteria [1]:			+/- 10%		+/- 3%	+/- 0.5	+/- 10 mV		+/- 3%
1124		1L	1.55 →		15280	7.21	-102	18.1	
1131		2L	1.02		14930	7.21	-101	18.0	
1135		3L	0.93		14900	7.20	-100	17.8	
1140		4L	0.90		14900	7.19	-99	17.8	
1144		5L	0.95		14820	7.17	-94	18.0	
1151		6L	1.07		14730	7.13	-85	18.0	
1156		7L	1.18		14690	7.11	-79	18.0	

5.581
5.804
5.954
6.050
6.230
6.440
6.570

Comments (Odour, colour, turbidity, sheen etc)

brown-grey, mod turb, no odour/sheen

Were Metals Field Filtered? YS

Were QA/QC Samples Collected? NO.

[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.

Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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Daily Field Report

Page __ of __

Date:	~~7-11-13~~ 11/11/13	**Completed by**	EL & MP.
Arrival Time		**Weather**	
Depart Time		**Subcontractor(s)**	
Site Address			

Purpose of Visit

Notes

(include sketch or attach site map/plan)

STP ares
Parameters for ~~[illegible]~~ Reads

DO 12:13pm.

SP01 – ~~O_2~~ = 4.31 ppm ~~[illegible]~~
cond. = 374 μS/cm
pH = 7.94
Redox = −88 mV
Temp = 17.4°C

SP04 – DO = 4.01 ppm 12:15pm
cond = 376 μS/cm
pH = 7.55
Redox = −66 mV
Temp = 17.4°C

SP02 – DO = 6.16 ppm 12:17pm
Cond = 277 μS/cm
pH ~~Redox~~ = 7.51
Redox −82 mV
Temp = 18.8°C

SP03 – DO = 7.01 ppm 12:18pm
cond = 283 μS/cm
pH 7.56
redox −49 mV
Temp 19.2°C

OPW
Do 8.55 ppm
Cond 490 μS
pH 7.49 14:07
Redox −24 mV
Temp 19.3°C

Associated Completed Forms

(eg, bore logs, PID/XRF calibration forms)

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Field Equipment Calibration and Decontamination

JBS&G

PROJECT NAME: Urban Growth Edmondson Park	**PROJECT NO:** 43008
FIELD DATES: 30/10/13	**FIELD STAFF:** MP & EL

CALIBRATION SUMMARY
EQUIPMENT:
CALIBRATION STANDARD: 100ppm isobutylene

DATE	TIME	READING (ppm_v)	COMMENTS
30/10/13	1001	Pre 100.3 Post. 100	Ok
31/10/13	0832	Pre 100.4 Post 100.6ppm	
01/10/13	0735	Pre 101.2 Post 100.2ppm	

DECONTAMINATION SUMMARY

EQUIPMENT: _____

1. Was the equipment decontaminated appropriately prior to sampling at each location?	Y	N	NA
2. Was excess soil removed by scraping, brushing or wiping with disposable towels?	Y	N	NA
3. Was the equipment contaminated with grease, tar or similar material? If so, was the equipment steam cleaned or rinsed with pesticide-grade acetone:hexane?	Y Y	N N	NA
4. Was phosphate-free detergent used to wash the equipment?	Y	N	NA
5. Was the equipment rinsed with clean water?	Y	N	NA
6. Was the equipment then rinsed with deionised water?	Y	N	NA
7. Were all sample containers cleaned and acid or solvent washed prior to sample collection?	Y	N	NA

WERE ANY ADDITIONAL DECONTAMINATION MEASURES REQUIRED? PROVIDE DETAILS.

_____