Gunyama Park Aquatic and Recreation Centre
City of Sydney
15-Jun-2016
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Remedial Action Plan

Gunyama Park Aquatic and Recreation Centre - Zetland, NSW

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Client: City of Sydney

ABN: 22 636 550 790

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

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1.0 Introduction

1.1 Background

AECOM Australia Pty Ltd (AECOM) was commissioned by the City of Sydney (Council) to prepare this Remedial Action Plan (RAP) in relation to the future construction of the Green Square Aquatic Centre at 130-138 Joynton Avenue, Zetland, NSW (hereafter referred to as 'the Site', refer to **Figure 1**, **Appendix A**). The Site is owned by the City of Sydney and two other land owners, and forms part of a much larger transformation project of the Green Square Precinct.

The current layout of the Site and the features of the proposed Green Square Aquatic Centre which includes the adjoining Gunyama Park open space are presented on **Figures 2** and **3** respectively, **Appendix A**. Presently, the Site is being utilised as a parking area and site offices and was historically occupied for light industrial purposes (including vehicle assembly, parking and maintenance works).

In 2002 and 2008 AECOM completed two environmental site investigations at the Site which involved soil and groundwater sampling and analysis (refer to **Section 1.4** for the investigation findings). The site investigation sampling locations are provided on **Figure 2**, **Appendix A**. Metal and Polycyclic Aromatic Hydrocarbon (PAH) impact was identified in both fill material and groundwater across the Site, although predominantly in the portion of the Site where it is intended to construct the Aquatic Centre facility and not Gunyama Park. The fill material has been identified to be significantly deeper in the western portion of the Site. The Site requires remediation and management, as described in this document, in order to render the Site suitable for future recreational purposes.

AECOM conducted Additional Investigations (including soil and groundwater sampling) across the Site in November 2015. This included assessing the Lincoln Development site which is in the north east corner of the Site. The findings and conclusions from these works are provided in **Appendix D**. Geotechnical testing of the Site soils was also conducted during these works and is reported separately (AECOM, 2016).

Council plans to commission a NSW EPA Accredited Site Auditor to review and endorse the site investigations (which have been completed) and this RAP. This RAP will form part of the Development Application to be submitted in May 2016.

1.2 Proposed Development

It is understood that the proposed aquatic centre development will include the following elements (refer to **Figure 3**, **Appendix A**):

- Excavation and construction works for four (4) swimming pools and pool balance tanks in the western part of the Site to depths ranging between the approximate Relative Levels [RL] of 17.3 and 18.3 m Australian Height Data [AHD]) or a maximum of 1.2 m below the current ground level (approximately RL 18.5 m AHD);
- The Aquatic Centre building will include a general platform level of RL 19.7 m AHD, which will result in raising the current ground level by approximately 1.2 m;
- Realignment of the Green Square stormwater main within the easement located directly to the east of the Aquatic Centre building. These works will occur prior to the remediation works discussed herein and will be managed via a separate RAP being prepared by others;
- Construction of a sports field (Gunyama Park) and landscaped setback areas across the eastern part of the Site. Gunyama Park will include a small amenities building, pathways, trees, growing media, a synthetic playing surface (artificial turf) and some public furniture (refer to **Appendix B**). The final details are subject to further design and development; and
- Construction of a new road (Zetland Avenue) adjacent to the northern Site boundary (offsite).

Based on the above development works, the proposed land uses will comprise:

- Aquatic Centre area – sports recreation area with limited access to the Site soils; and
- Gunyama Park area – sports recreation area with shallow and deeper (trees) planting areas. The surface type to be adopted will likely comprise synthetic grass for the sports field area and a mixture of grassed and paved areas.

No new roadway areas are proposed within the Site as part of the proposed development works. The new Zetland Avenue will be located offsite to the north of the Site.

AECOM has reviewed the following Council development plans (refer to **Appendix B**) as part of the preparation of this RAP. The key features of the proposed development and general site layout is provided on **Figure 3**, **Appendix A**:

- Drawing 'ARC-A-011' (dated 2 July 2015) titled 'Introductory Documents Site Plan'; and
- ABA Grimshaw plan 'Site Sections - Cut and Fill', Revision B dated 28 September 2015.

Based on the above plans, it is assumed that the Aquatic Centre development will include the following features:

- A 50 m swimming pool (approximate excavation depth of 0.4 m and an area of 1,161 m^2);
- A 25 m swimming pool (approximate excavation depth of 1.2 m and an area of 307 m^2);
- A leisure water area (no excavation required and an area of 522 m^2);
- A smaller hydrotherapy pool (approximate excavation depth of 0.8 m, and area of 272 m^2);
- A small crèche, toilets, changing facilities and staff offices within the Aquatic Centre building;
- 10 m setback for the Aquatic Centre building from Joynton Avenue;
- 1.0 m setback for the Aquatic Centre building from southern and northern boundary and the new Green Square stormwater main;
- The Gunyama Park finished surface level will match the design levels for the proposed Zetland Avenue to the north (ranging between RL 19.4 m AHD (western end of the Park) and RL 19.5 m AHD (eastern end);
- The surface levels in the south east corner of Gunyama Park (currently a Council depot) will be RL 18.5 m AHD following demolition of the workshop. The final design finished surface level for this south east corner will be RL 19.6 m AHD;
- There will be a surface depression (overland surface water flow path) in the area where the new Green Square stormwater drain is proposed (east of the Aquatic Centre building). The ground level adjacent to the eastern wall of the Aquatic Centre building will step down to the Gunyama Park area; and
- The synthetic sports field will be covered with 300 mm crushed rock (drainage layer) and at least 150 mm of 'clean' topsoil - to provide a physical barrier to impacted fill material below. The drainage layer will be underlain by an impermeable liner which will mitigate surface water infiltration to the underlying fill materials and groundwater.
- New drainage features for the development will include the following features constructed with connections to the new Green Square stormwater drain:
    - Sealed surface of the Aquatic Building concrete platform slab;
    - Drainage layer beneath the synthetic sports field (crushed rock underlain by impermeable liner);
    - Surface runoff from Gunyama Park and the synthetic sports field to pits with connection to the new stormwater drain; and
    - A new stormwater drainage network will be installed across the Site.

1.3 Objectives

The objectives of this RAP are to:

- Summarise the findings of the three stages of environment site investigations conducted at the Site (refer to **Section 1.4**);
- Present a plan of the anticipated remediation that will allow the planned development of the Site to proceed in a manner that protects human health and the environment, and to make the Site suitable for the proposed Aquatic Centre facility (recreation mixed use) and Gunyama Park (recreational open space); and
- Where possible, retain all excavated material onsite as part of the proposed development.

This RAP has been developed with reference to the following guideline documents:

- *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (NSW DEC, 2006): provided the soil assessment criteria and were used to apply the NSW EPA decision processes for assessing redevelopment of urban Sites;
- *Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DECC, 2007): followed throughout the site investigations and during preparation of this RAP;
- *Australian and New Zealand Environment Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000): considered for the assessment of groundwater conditions;
- *Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA, 1997): followed for preparation of this RAP;
- *Sampling Design Guidelines (NSW EPA, 1995):* considered during design of the validation sampling plan and determination of the Data Quality Objectives (DQOs);
- *Waste Classification Guidelines* (NSW EPA, 2014): used for characterising soil for disposal to an appropriately licensed landfill facility;
- National Environmental Protection (Assessment of Site Contamination) Amendment Measure (National Environmental Protection Council [NEPC], May 2013 as amended): was considered throughout preparation of this RAP;
- *Managing Land Contamination, Planning Guidelines, SEPP 55-Remediation of Land* (NSW Department of Planning, 1998): considered for the preparation of this RAP; and
- *City of Sydney Contaminated Land Development Control Plan 2004:* City of Sydney Council (28 June 2004).

The scope of remediation works and methodology presented herein is based on AECOM's current understanding of the nature and extent of contamination present at the Site and the provided Council development plans.

1.4 Previous Reports

AECOM[1] has previously prepared the following reports for the Site:

- HLA-Envirosciences Pty Ltd (2002). *Site Investigation, 132-138 and 140 Joynton Avenue and 94-104 Epsom Road, Zetland, NSW (ref: J1873/1)*;
- ENSR (30 May 2008). *Phase 2 Environmental Site Assessment, 132-138 Joynton Avenue and 140-144 Epsom Road, Zetland, NSW*;
- ENSR (9 June 2009). *Strategic Site Remediation Report, 132-138 and 140-144 Joynton Avenue, Zetland, NSW*;
- Material Reuse Options Study – Green Square Aquatic Centre, 132-138 Joynton Avenue, Zetland, NSW (AECOM, 30 April 2014);
- WSP Environment & Energy (WSP, 2011a). *Phase 1 Contamination Assessment, 106-116 Epsom Road, Zetland NSW*. Prepared for Lincon Development Pty Ltd. May 2011;
- WSP (WSP, 2011b). Limited Phase 2 Contamination and Geotechnical Assessment, 106-116 Epsom Road, Zetland NSW. Prepared for Lincon Development Pty Ltd. October 2011;
- Douglas Partners (DP, 2009). Phase 1 Contamination Assessment (summarised in WSP reports); and
- Douglas Partners (DP, 1995). Preliminary Contamination Assessment (summarised in WSP reports).

The historic soil and groundwater analytical results are provided as **Table T1** to **T3**, **Appendix C**.

As noted on **Figure 2**, **Appendix A** the above site investigations also included soil and groundwater sampling of the area adjacent to the northern Site boundary. As these boreholes are located offsite, beneath the future proposed Zetland Avenue, the relevant data has not been considered further in this report.

The Additional Investigation discussed in **Section 1.1** (including assessment of the Lincoln Development site) is provided in **Appendix D**.

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[1] AECOM was previously known as HLA-Envirosciences Pty Ltd and ENSR Australia Pty Limited.

The following geotechnical reports have also recently been prepared for the Site:

- AECOM, 2016. *Green Square Aquatic Centre - Material Re-use*. 19 February; and
- Douglas Partners (April 2016). *Report on Geotechnical Investigation, Gunyama Park Aquatic and Recreation Centre, Joynton Avenue, Zetland*.

1.5 Construction Environmental Documents

During construction the following Management Plans and Work Procedures will be prepared for the proposed development works at the Site:

Table 1 Construction Environmental Documentation

Project Plan	To be prepared by	To be approved by:
Remedial Action Plan (RAP) (this document)	AECOM	CoS/Site Auditor
Construction Environmental Management Plan	AECOM	CoS
Occupational Health and Safety Plan (OHSP)	Principal Contractor	CoS
Remediation Environmental Management Plan (REMP) including: - *Traffic and Pedestrian Management Plan;* - *Noise and Vibration Management Plan;* - *Waste Management Plan;* - *Stormwater and Erosion Management Plan;* - *Air Management Plan; and* - *Flora and Fauna Assessment.*	Principal Contractor	CoS
Asbestos Management Plan	AECOM	CoS/Site Auditor
Acid Sulfate Management Plan	AECOM	CoS/Site Auditor
Material Tracking Plan	AECOM	CoS/Site Auditor
Quality Management Plan	Principal Contractor	CoS
Site Management Plan	AECOM	CoS/Site Auditor

2.0 Site Description

2.1 Site Identification

The Site identification details are presented in the following table:

Table 2 Site Identification Details

Item	Description	
Site Owner	City of Sydney	
Site Address	132-138 Joynton Avenue	Part of Lot 2 DP 850686
	140 Joynton Avenue	Lot 100 DP 1200645
	Part of 94-104 Epsom Road	Part of Lot 101 DP 1200645 (Council depot site)
	106-116 Epsom Road	Part of Lot 1 DP 830870 (Lincoln Development site, north east corner of the Site)
	130 Joynton Avenue	Small section of Lot 1 DP 850686 (Ausgrid site)
Site Survey	Refer to **Appendix B**	
County and Parish	County of Cumberland, Parish of Alexandria	
Local Government Authority	City of Sydney	
Current Zoning	SP2 Community Facility	
Proposed Land Use	Recreation mixed use (Aquatic Centre) and public open space (Gunyama Park)	
Geographical Coordinates (Australian Map Grid)	N 6246516, E 334305	
Site Elevation (m AHD)	Approximately 20 m AHD	
Site Area	2.87 hectares (ha)	
Site Location	**Figure 1**	
Site Layout and Former BH Locations	**Figure 2**	

2.2 Surrounding Land Uses

The Site is currently surrounded by the following land uses:

- North: Zetland Ausgrid Depot, followed by high density residential apartments and open space.
- East: Car dealerships and service centres, followed by Link Road and Southern Cross Drive.
- South: Car dealership and service centre, a Meriton residential construction site, City of Sydney Depot and a warehouse are located along the southern boundary of the Site followed by Epsom Road.
- East: Joynton Avenue followed by Green Square Community Hall, high density residential apartments and future development site for a childcare centre and park.

2.3 Topography and Drainage

The Site is located in an area which is relatively flat and elevated approximately 20 m AHD. The surrounding land in the vicinity of the Site displays a gentle slope (down) to the west towards Alexandra Canal (located approximately 1.4 km to the south west of the Site. There are no natural drainage features at the Site and any stormwater generated at the Site is expected to drain in a westerly direction into the Council stormwater drainage system present along Joynton Avenue.

A Sydney Water stormwater main easement is located in the middle of the Site (refer **Figure 3**, **Appendix A**). Review of Dial Before You Dig plans obtained during the Phase 2 Environmental Site Assessment (ESA, ENSR, 2008) found no stormwater connection conduits at the Site. This information indicated that it was unlikely that stormwater is connected to the stormwater easement and, as previously stated, it is expected to drain surface water generated at the Site to Joynton Avenue. Based on depth to groundwater data obtained during the Phase 2 ESA (ENSR, 2008), which included a groundwater assessment, groundwater flow at the Site did not appear to be influenced by the presence of the stormwater main.

2.4 Geology

The regional geology is composed of Quaternary medium to fine grained “marine” sand with podsols (Sydney 1: 100 000 Geological Series Sheet 9130 1st Edition 1983).

The Site is located in the northern portion of the Botany Basin. The Botany Basin is considered a superimposed structural basin within the larger Cumberland Basin (DMR, 1980). The geology of the Site and surrounding area is characterised by Quaternary aged interbedded marine sands, peaty sands, peat and mud (Botany Sands), underlain by the Triassic Hawkesbury Sandstone. The Botany Sands are expected to be greater than 10 metres thick in the site area and thicken to up to 80 metres in the central portion of the Botany Basin, south of the Site.

Reference to the Sydney 1:100,000 Soil Landscape Series Sheet 9130 indicates that the Site is located in an area mapped as being “disturbed terrain”. Disturbance is defined as removal or burial of soil, or landfill with soil, rock, building and waste materials. The area is originally low lying swampland (Waterloo Swamp), which was historically filled to raise surface levels.

The Botany Bay 1.25 000 scale acid sulfate map of the area indicates that no known occurrence of acid sulfate soils is identified for the Site.

2.5 Hydrogeology

Groundwater within the Site is present within the Botany Sands aquifer and sometimes within shallow fill, depending on the depth of fill and local groundwater levels (ENSR, 2008 and AECOM, 2015, refer to **Appendix D**). Groundwater levels within the unconfined Botany Sands aquifer are variable but typically shallow (within five metres of ground surface) when not influenced by localised pumping. The water table depth and direction of flow in the region is influenced by local factors such as distance from recharge and discharge areas, local development and pumping.

Recharge to the Botany Sands aquifer is via direct rainfall, locally enhanced by rainfall runoff and via a series of ponds in Moore Park and Centennial Park (located approximately 1 km to the north east of the Site). Locally groundwater flows from the Botany Sands and discharges to Alexandra Canal and Botany Bay. Natural groundwater fluctuations can cause the water table to rise by up to 0.5 metres following high rainfall events and can also be influenced by tidal fluctuations and seasonal variations. In 2014, groundwater levels were relatively high across eastern Sydney within the Botany Sands aquifer particularly when compared to levels during the recent drought.

Groundwater quality within the unconfined Botany Sands aquifer is of variable quality but is typically of low salinity and moderately acidic. The shallow water table is susceptible to contamination because of its location in an urban and industrial environment with no confining layer. Variations in the native groundwater quality are attributed to a number of factors including the presence of peaty sediments, industrial development, leakage from sewer systems and landfills.

The Site and surrounds is within the Botany Groundwater Management Zone 2, which bans domestic use of groundwater due to contamination (http://www.water.nsw.gov.au/water-management/water-quality/groundwater/Botany-Sand-Beds-aquifer).

During the Phase 2 ESA (ENSR, 2008), the Standing Water Level (SWL) within the five monitoring wells located across the Site was measured to range between 15.05 m AHD and 18.42 m AHD and the average elevation of groundwater level was 16.27 m AHD. Based on the measured SWLs and Site survey plan, groundwater at the Site is estimated to flow to the west.

The Douglas Partners (2016) investigation reported that groundwater levels at the Site ranged between RL 13.6 m AHD and RL 17.3 m AHD. Based on the available data the report concluded that a site groundwater level of RL 16 m AHD could be assumed. It was recommended that a design groundwater level of at least 2 m above the average site groundwater level (i.e. RL 18 m AHD) be adopted to allow for occasional increases in water levels.

Groundwater levels recorded during AECOM (2015) (refer to **Appendix D**) were observed to have lowered across the Site since the previous investigations. On the Lincon Development site, groundwater levels have lowered by 1 m and by over 1.5 m near Joynton Avenue. This is likely due to temporary dewatering works currently occurring to the west to northwest of the Site on the Green Square Town Centre construction site (on the opposite side of Joynton Avenue) and possibly related to the current Mirvac basement excavation/construction works to the south of the Site. The inferred groundwater flow is towards the dewatering area to the west.

2.6 History

2.6.1 Summary of Site History

The site history was detailed in HLA (2002) and in the Additional Investigation (Appendix D) for the Lincon Development site. **Table 3** below summarises the historical land uses undertaken at the Site.

Table 3 Summary of the Site

Date	Owner	Land Use	Potential Contaminating Activities
All of the Site (prior to division into the Lots)			
1884 to 1907	William Charles Cooper – Gentleman	Natural wetland that was drained and filled for development of a racecourse	Uncontrolled filling
1907 to 1910	James Joynton Smith – Licensed Victualler	Natural wetland that was drained and filled for development of a racecourse	Uncontrolled filling
1910 to 1939	Victoria Park Racing and Recreational Grounds Company Pty Limited	Racetrack, stables and paddocks	Use of ash on the racetrack Use of herbicides and pesticides Burial of waste
1939 to 1945	Victoria Park Racecourse Occupied by the Australian Army	Ordinance unit and military camp for WWII. No infrastructure was visible on the Site in the 1943 aerial photograph.	Unexploded ordnance (UXO)
1946 to 1949/52	The Right Honourable William The First Viscount of Nuffield	Racetrack, stables and Paddocks.	Potential use of herbicides and pesticides Potential burial of waste
Lot 2 DP850686 (northwest part of the Site)			
1954 to 1964	James N Kirby Holdings Pty Limited	Post-war manufacturer of consumer goods such as refrigerators, televisions, washing machines, radios and other household appliances. The factory building occupied most of the lot in the 1961 aerial photograph.	Potential use of solvents (including chlorofluorocarbons), heavy metals and petroleum hydrocarbons.
1964 to 1995	The Sydney County Council	Works depot for the council. The factory building was demolished after hailstorm damage in 1999.	Potential use and storage of fuels, solvents and oils.
1995 to 1997	Sydney Electricity		

Date	Owner	Land Use	Potential Contaminating Activities
1997 to Present	South Sydney City Council/City of Sydney Council	The concrete hardstand was not removed.	
Lot 100 DP1200645 (southwest part of the Site)			
1952 to 1953	The Director of Transport and Highways	Road works depot	Use and storage of fuels, solvents and oils
1955 to 1955	The Commissioner for Motor Transport		
1980 to 1988	One Hundred and Forty Joynton Avenue Rosebery Pty Limited	Printing and/or newspaper/magazine distribution/warehouse	Potential use and storage of fuels, solvents and oils if used as a transport depot
1988 to 1988	Consolidated Magazines Pty Ltd		
1988 to 1989	Leda Holdings Pty Limited (Leda)	Leda is an investment and development company.	
1989 to present	The Council of the City of South Sydney/ City of Sydney Council *Between 1988 and the present part of the site is leased to Sydney County Council of Substation No 6067.*	Council works depot comprising two buildings and an UST located to the southeast of the building. The buildings were demolished in the early 2000s and the area unused.	Use and storage of fuels, solvents and oils
Lot 101 DP 1200645 (southeast part of the Site)			
1951 to 1954	Nuffield (Australia) Pty Limited (Nuffield) (car manufacturers)	Nuffield was a large industrial facility producing motor vehicles (British Motor Company) operating offsite to the north. The 1951 aerial photograph depicts parts of the Nuffield facility to the north (offsite) but the southeast portion of the Site remains undeveloped by the Nuffield operations (no buildings constructed).	Degreasing operations (eg: acid baths and solvents, acids etc); painting (paint pits, electro-coating and spray painting); assembly line procedures (eg: hydraulic oils and lubricants); and bulk storage of materials (fuels, paints, solvents, oils etc) off-site to the north.
1949 to 1952	Nuffield (Australia) Pty Limited (car manufacturers)		
1952 to 1980	The Olympic Tyre & Rubber Co Ltd	Olympic Tyre and Rubber factory	Bulk storage of materials (fuels, paints, solvents, oils etc).
1980 to 1987	Ninety Four Epsom Road Pty Limited	Unknown	Unknown
1987 to 1988	Joynton Avenue No 2 Pty Ltd Consolidated Magazines Pty Limited	Printing or warehouse/transport depot.	Potential use and storage of fuels, solvents and oils if used as a transport depot

Date	Owner	Land Use	Potential Contaminating Activities
1988 to 1998	Leda Holdings Pty Limited (Leda) *During this time between 1988-1998 parts of the site were leased to John Fairfax & Sons Limited and Marbig Rexel Pty Ltd (Marbig) of warehouses 1 & 1 at 94 Epsom Road, Rosebery.*	Leda is an investment and development company. Marbig are stationary and artist supplies. John Fairfax & Sons Limited is a newspaper publisher.	Potential use and storage of fuels, solvents and oils if used as a transport depot
1998 to Present	The Council of the City of South Sydney/ City of Sydney Council	Council works depot	Use and storage of fuels, solvents and oils
Part of Lot 1 DP 830670 (north east part of the Site – Lincon site)			
1951 to 1954	Nuffield (Australia) Pty Limited (car manufacturers)	The Lincon site appeared vacant and undeveloped in historical photographs but with disturbed ground and potential lower lying than surrounding land. Olympic Tyre and Rubber factory was located on the same property to the south. Nuffield was a large industrial facility producing motor vehicles (British Motor Company) to the north of the Site. The 1951 aerial photograph depicts parts of the Nuffield Facility but the Lincon site remains undeveloped.	Potential use of herbicides and pesticides Potential burial of waste
1954 to 1968	The Olympic Tyre & Rubber Co Ltd	The Lincon site appeared vacant and undeveloped in historical photographs but with disturbed ground and potential lower lying than surrounding land. Olympic Tyre and Rubber factory was located on the same property to the south.	Potential use of herbicides and pesticides. Potential up-gradient off-site sources from the British Motor Corporation plant. Potential receiving pit for solid and liquid wastes.
1968 to 1970	D.C.L (holdings) Australia Pty Ltd	Uncontrolled landfilling on the Lincon site as visible in aerial photograph in the 1970 aerial photograph.	Uncontrolled fill containing demolition and tyre waste
1970 to 1994		The Lincon site was recreation space for employees	Significant activities unlikely
1994 to 2010	Lincon Development Pty Ltd	Unused	Potential use of herbicides and pesticides
2010 to date		Construction of a bitumen surfaced car park for short term storage of cars	Refuelling of construction equipment, importation of fill for levelling

2.6.2 Summary of History of Land Surrounding the Site

Table 4 below summarises the historical land uses undertaken in the region surrounding the site.

Table 4 Summary of the land use history surrounding the Site

Direction from the Site	Summary
North	The Waterloo Swamp historically extended to the north of the Site. Along with the Site the land to the north was reclaimed and developed into the Victoria Park Racecourse. During WWII the site was used as an ordinance unit and military camp. In the 1950s the remainder of the James N. Kirby manufacturing site continued to the north of the Site followed by The British Motor Corporation (BMC) plant. The BMC plant operated from 1961 to 1975 and occupied 26 hectares. The BMC site was then used as a Naval store until the factories were demolished in 1999. From the 1990s to the present date the site on the northern boundary of the site was used as an electrical depot by Sydney Electricity (now Ausgrid). Factory buildings rooves appeared to be constructed of fibre cement sheeting. It is understood that a former Defence Navy Supply Centre was located to the north of the site on Joynton Avenue and was the subject of soil and groundwater contamination assessment and remediation works. Contaminants are understood to have included chlorinated solvents in groundwater and the presence of ash and landfill wastes.
West	The Waterloo dam continued to the east of the Site and was filled along with the portion of the dam and surrounding dam within the Site in the early 1900s. The Royal South Sydney Hospital was located directly to the west of the site from the 1940s. The Ingot Mills Pty Ltd factory (textile manufacturing) was located to the northeast of the Site on the opposite side of Joynton Avenue in the 1950s.
South	The Joseph Lucas Ltd site was located on the corner of Joynton and Epsom Roads in the 1950s and manufactured car parts. The Olympic Tyre and Rubber Company was located south of the Site, which later was occupied by D.C.L (Holdings) Australia Pty Ltd for warehousing or engineering maintenance and then Lincon Development Pty Ltd. The South Sydney Council Depot was also located to the south of the Site from
East	The Waterloo Swamp continued to the east and was filled along with the site in the early 1900s and developed into the Victoria Park Racecourse. Manufacturing sites were visible in the aerial photographs from the 1950s.

2.7 Areas and Contaminants of Concern

The areas and contaminants of concern based on the historical information and former and current surrounding land uses are summarised in Table 5 below.

Table 5 Areas and Contaminants of Concern

Area	Activity	Contaminants
All of the Site	Uncontrolled spoil disposal (potentially liquid and solid) in the 1900s	Metals, PAHs, TRH, BTEX, asbestos, OCPs, OPPs, PCBs and industrial solvents (Semi Volatile Organic Compounds [SVOCs] and Volatile Organic Compounds VOCs)
Northeast portion of the Site	Uncontrolled spoil disposal (potentially liquid and solid) in the 1900s and between 1950s and 1970.	
All of the Site	Racecourse construction and operation, the use of ash on the racecourse surface	Metals, PAHs, OCPs and OPPs

Area	Activity	Contaminants
Northwest portion of the Site	Industrial manufacturing of refrigerators and appliances	Metals, TRH, BTEX, cyanide, industrial solvents (SVOCs and VOCs) and perfluorinated compounds (PFCs)
All of the Site	Unknown fuel storage and dispensing	Lead, TRH, BTEX and PAHs
Southeast portion of the Site	Known fuel storage and dispensing	Lead, TRH, BTEX and PAHs
All of the Site	Ordnance storage or use during WWII	There is no Unexploded Ordnance (UXO) reported on the Department of Defence website: www.defence.gov.au/uxo/where_is_uxo
Up-gradient off-site sources	Industrial manufacturing, electrical substations, car servicing centres/mechanics and filled land.	Metals, TRH, BTEX, PAHs, cyanide, industrial solvents (SVOCs and VOCs), PCBs and PFCs

3.0 Validation Criteria

3.1 Soil Validation Criteria

The soil validation criteria for the Site have been adopted from the following NSW EPA endorsed guidance documents:

- NSW DEC, 2006. *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*;
- National Environment Protection Council (NEPC), 1999. *National Environment Protection (Assessment of Site Contamination) Measure (NEPM), as amended* 2013 - Soil Health investigation Levels (HILs) (for metals, PAHs, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organochlorine pesticides (OCPs) and asbestos) and Health Screening Levels (HSLs) (for asbestos);
- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report No.10 - *CRC CARE Health Screening Levels for petroleum hydrocarbons in soil and groundwater.* September 2011. (Friebel, E.and Nadebaum, P., 2011); and
- WA Department of Health (DoH), 2008. *Draft Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia.*

Given the proposed range of land uses for the Site, a range of criteria sourced from the guidance documents listed above are required to be applied. Soil validation criteria to be applied are based on the applicable human health and ecological investigation levels published in NEPC (2013). Specifically, validation criteria will be derived for each contaminant as relevant based on:

- Health Investigation and Screening Levels for Recreational C for the Gunyama Park public open space and Commercial/Industrial D exposure for the Aquatic Centre facility - Tables 1A(1) and 1A(3)(NEPC [2013]), refer to **Table T1** in **Appendix B**;
- Environmental Screening Levels for the Gunyama Park public open space - Table 1B(6), NEPC (2013);
- Management Limits for Total Petroleum Hydrocarbons (TPH) fractions in Soil for the Gunyama Park public open space - Table 1B(7) NEPC (2013); and
- The definition of asbestos contaminated soil as provided in Safe Work Australia (SWA) 2011/NSW WorkCover 2011.

3.2 Imported Materials

In accordance with current NSW EPA policy, only material that does not represent an environmental or health risk at the receiving site may be considered for resource recovery. Imported materials will only be accepted to the Site if they meet the definition of:

- Virgin Excavated Natural Material (VENM) as defined in the *Protection of the Environment Operations Act* (1997) Schedule 1; or
- Excavated Natural Material (ENM) as defined in DECC (2012); or
- any other suitable material which has been appropriately validated and meets the soil validation criteria.

All material imported to the Site will be required to be accompanied by appropriate documentation that has been verified by the appointed Validation Consultant.

3.3 Waste Classification

Materials which do not meet the soil validation criteria and/or are deemed not suitable for reuse at the Site (refer to **Section 3.1**) will be assessed for off-site disposal in accordance with the NSW EPA (2014) *Waste Classification Guidelines*.

3.4 Groundwater Assessment Criteria

3.4.1 Human Health - Health Screening Levels (HSLs)

Friebel, E. and Nadebaum, P. (2011) have been referred to for the assessment of petroleum hydrocarbon contamination, which are applicable for assessing vapour intrusion risks from contaminated groundwater. The HSLs are based on five specific land uses/receptors, three soil types and three depth ranges for groundwater.

Table 6 Health Screening Level Summary

HSL	Land Use	Depth to Groundwater	Soil Types (all land uses)
C	Public open space including parklands and ovals	2 m to <4 m 4 m to <8m 8 m +	Silt (silt, silty clay and silty clay loam)
D	Commercial/Industrial Land		
Shallow Trench Worker	Utility / intrusive maintenance workers involved in shallow trenches to a maximum depth of 1m)		Clay (clay, clay loam and silt loam)

It is noted that groundwater is not beneficially reused in the area and recreational use is not considered applicable.

3.4.2 Ecological

The ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* provide 'trigger' values for chemicals within the water, which represent the best current estimates of the concentration of chemicals that should have no significant adverse effects on the aquatic ecosystem.

ANZECC (2000) indicates that an exceedance of a trigger values does not necessarily imply that there is an inherent risk, rather that further assessment and monitoring may be required prior to implementing appropriate management actions. AECOM notes that according to ANZECC (2000), low reliability trigger values are interim levels only because "*low reliability trigger values were derived, in the absence of a data set of sufficient quantity, using larger assessment factors to account for greater uncertainty*", and, *"low reliability values should not be used as default guidelines".*

Whilst ANZECC (2000) provide an interim, low reliability trigger level of 7 µg/L for crude oil in water, there is no trigger level for TPH. AECOM notes that current laboratory limits of reporting (LOR) cannot quantify TPH to this concentration. As a consequence, no ecological assessment criteria for TPH have been adopted.

3.4.3 Adopted Groundwater Assessment Criteria

The following criteria will be adopted as the groundwater assessment criteria in the event groundwater monitoring is required:

Table 7 Groundwater Assessment Criteria

Receptor	Guideline	Level Adopted	CoPC
Human Health	Friebel, E. and Nadebaum, P. (2011)	Vapour Intrusion: HSL D (commercial/industrial), 2 m to >4m, sand	TRH, BTEXN
	CRC Care (2011)	Shallow Trench Worker: 2m to <4m, sand	Benzene
Ecological	ANZECC (2000)	Marine, 95% level of species protection where applicable, including moderate and low reliability trigger values	Metals, VOCs (including BTEX), SVOCs
		Marine water – medium to low reliability	Metals, VOCs (including BTEX), SVOCs

The following rationale was applied in the selection of these groundwater assessment criteria:

- Commercial/industrial standards (HSL D) have been adopted for human health as they considered vapour intrusion risks which would be relevant to the Green Square Aquatic Centre and Gunyama Park; and
- Sand was selected as the soil type and shallowest presented groundwater depth (<2-4m) as a conservative measure to be protective of deeper groundwater. For the purpose of this assessment the Friebel and Nadebaum, (2011) extension model was not applied for groundwater less than <2m deep as it is unlikely that the value (for vapour intrusion) would be less than the drinking water guideline.

Based on review of available information and in accordance with Table 5 of Schedule B1 of the NEPM (2013 *as amended*), the groundwater environmental values to be adopted include the ANZECC (2000) trigger values for marine aquatic ecosystems. Environmental values including raw drinking water source, agricultural use - stock watering, agricultural use – irrigation, marine water aquatic ecosystem and recreational use are not considered appropriate given the predominantly commercial and industrial nature of the Site and surroundings areas.

4.0 Summary of Site Investigation Data

A summary of the HLA (2002), ENSR (2008) and recent Additional Investigations (AECOM, 2015 [refer to **Appendix D**]) is provided in the following sections.

4.1 Subsurface Conditions

The previous site investigations (refer to **Section 1.4**) reported that deeper fill material are present predominantly in the south western part of the Site. Both the *Phase 2 Environmental Site Assessment* (ENSR, 2008) and the *Geotechnical Investigation* (Douglas Partners, 2016) conclude that the fill material is significantly deeper along the western Site boundary. The depth of the fill material in this western area extends to a maximum depth of approximately 3.3 m below ground level (bgl, BH19). The deeper fill material encountered in this area were as follows:

- BH19 - 3.3 m bgl;
- BH106 - 3.0 m bgl; and
- BH107 - 3.0 m bgl.

The recent Additional Investigation (refer to **Appendix D**) also provided the following lithological summary:

- **Western Area**: The lithology encountered in the boreholes consisted of the following in the western portion of the Site (west of BH212):
  - Road base gravels underlying pavements followed by fill consisting of sand, gravel and clay with a relatively high proportions of slag, ash and metals. The depth of fill was deepest towards Joynton Avenue at approximately 3 m bgl and shallower to the east at 0.2 to less than 1 m bgl. The fill was commonly logged as black in colouration. No obvious odours were observed during sampling of the fill material.
  - Organic high plasticity black clays with hydrogen sulphide odours underlay the fill in the western portion and then sandy clay further to the east. The fill and clays were underlain by poorly graded fine to medium sand.
- **Eastern Area**: The lithology encountered in the boreholes consisted of the following in the eastern portion of the Site (Lincon Development site):
  - Road base gravels underlying pavements followed by fill consisting of sand, gravel and clay with demolition type waste (brick and concrete) to 1 - 2 m bgl. The demolition type fill was underlain fill similar to the fill in the western part of the Site, but with lower proportions of slag, ash and metals. No obvious odours were observed during sampling of the fill.
  - The fill was underlain by poorly graded fine to medium sand and no clays were encountered to the depth of the boreholes.
- Fill extends across the Site that appears to have been placed prior to 1910 and contains waste with slag, ash and metal. The material filled the former Waterloo swamp and dam that was located within and surrounding the Site. The fill was deepest in the west near Joynton Avenue and shallowest in the south east of the Site. The Lincon Development site was filled with a mound of material between the mid-1950s and 1961 that sits above the pre 1910 fill. The 1960s fill consists of soil mixed with demolition and tyre waste. A conceptual cross section illustrating the stratigraphy at the Site is provided as **Figure B4**, **Appendix D**.

4.2 Summary of Identified Contamination

4.2.1 Fill/Soil

The soil analytical results for the Site are detailed in **Table T1**, **Appendix C** and compared to the soil validation criteria detailed in **Section 9.2.1**. **Table T2**, **Appendix C** also presents the soil analytical data and compares them to the NSW EPA (2014) *Waste Classification Guidelines*.

The previous site investigations included soil samples that were collected and analysed from within the western portion of the Aquatic Centre building footprint. The relevant borehole locations are HA01, HA2, BH01/MW01, BH02, BH14 and BH19 (HLA, 2002) and BH106, BH107 and BH108 (ENSR, 2008) (refer to **Figure 2**, **Appendix A**).

The results from these sample locations (i.e. within the proposed western portion of the Aquatic Centre building footprint) reported some benzo(a)pyrene concentrations which exceed the *National Environment (Assessment of Site Contamination) Amendment Measure* (NEPM, 1999 as amended 2013) Health Investigation Level (HIL) 'C' for recreational land use (HIL C). One sample (BH106_2-2.2) also exceeded the HIL C with a Total PAH concentration of 1,431 mg/kg and benzo(a)pyrene (141.2 mg/kg) exceeded the HIL D. The reported TRH C_{10}-C_{36} concentrations (6,930 mg/kg) at this location were less than the adopted criteria. During the soil sampling works at this location/depth (2.2 m bgl) 'chemical odours' were identified to be present in the fill material until the underlying natural marine sediments (sandy clay) were encountered at a depth of 3.0 m bgl. The analytical results and field observations from neighbouring sampling locations adjacent to this impacted area (i.e. BH107, BH202, BH209 and BH210) indicated that the elevated PAH soil impacts in the BH106 area are localised to this area and present between a depth of 2 to 3 m bgl.

Given that the excavated material is proposed to be reused within the Gunyama Park open space area, it is noted that HIL C criteria is based on direct dermal (i.e. absorption of contaminants through the skin), inhalation of dust and vapours, and incidental ingestion of soil and dust particles. Design specifications indicate that a minimum of 450mm crushed rock/'clean' topsoil cap (underlain by an impermeable liner) and a synthetic pitch (artificial turf) will be constructed over Gunyama Park and this will provide a three layer physical barrier between such exposure pathways and the underlying fill material (thereby mitigating dermal, inhalation and ingestion risks). The impermeable liner will also mitigate surface water infiltration to and contact with the underlying fill materials and groundwater. Therefore, it is considered that the limited exceedances of the HIL C do not preclude the soils from being suitable for reuse as long as appropriate long term management actions are implemented to maintain the integrity of the tri-layer cap.

Analysed soil samples obtained from the boreholes located in the Gunyama Park (i.e. BH07-BH09, BH15-BH18 and BH26) also reported some lead and benzo(a)pyrene concentrations which exceeded the relevant HIL C criteria. However, these materials are also considered to be suitable as the capping layer will mitigate physical contact with the soils as discussed above.

Asbestos was analysed from samples collected from the shallow fill samples at sampling locations BH01, BH02, BH13, BH108 and HA01. Asbestos fibres were not detected at these locations (refer to **Table T1**, **Appendix C**).

Based on the findings of the desktop review (refer to **Appendix D**), field observations and the analytical data (including the previous investigations and recent Additional Investigation) it appears that there has been two generations of filling at the Site:

- **Fill Generation** 1 - prior to 1910 and contains waste with slag, ash and metal. The material filled the former Waterloo swamp and dam that was located within and surrounding the Site. The fill was deepest in the west near Joynton Avenue and shallowest in the south east of the Site. The highest concentrations of carcinogenic PAHs and lead were in the western part of the Site and highest towards Joynton Avenue. The depth of fill adjacent to Joynton Avenue is generally 3-3.5 m depth; and
- **Fill Generation 2** – From the mid-1950s, the Lincon Development site was filled with a mound of material that sits above the Generation 1 fill. The Generation 2 Fill consists of soil mixed with demolition and tyre waste. A conceptual cross section illustrating the stratigraphy at the Site is provided as **Figure D4** (**Appendix D**).
- The Chemicals of Potential Concern (COPC) at the Site are considered to be lead, TPH, BTEX, PAHs and asbestos. The higher reported concentrations are present in the Generation 1 fill located in the western part of the Site (including the BH106 area).
- The fill is impacted with lead, PAHs and asbestos with less significant but detectable concentrations of TRH. Exceedances of the adopted HILs for carcinogenic PAHs and lead occurred in some areas of the Site. The highest concentrations of carcinogenic PAHs and lead were in the western part of the Site towards Joynton Avenue. The lead and PAH concentrations were significantly lower in the Generation 2 Fill present on the Lincon Development site and validates the concept that different generations of filling have occurred at the Site. This distribution has implications of how material can be excavated and separated for potential reuse at the Site.
- Suspension Peroxide Oxidation Combined Acidity & Sulfur (SPOCAS) testing conducted during the Additional Investigations indicates that Potential Acid Sulfate Soils (PASS) exists in the western portion of the Site below the depth of the fill. An Acid Sulfate Management Plan will therefore be required for the development works, including appropriate treatment and reuse of the material onsite.

No exceedances of the adopted soil criteria were reported in the underlying natural soils.

4.2.2 Groundwater

The groundwater analytical results for the Site are detailed in **Table T3**, **Appendix C** and compared to the groundwater validation criteria outlined in **Section 9.2.4**. Four wells were installed within the footprint of the proposed Aquatic Centre (MW01, MW106, MW107 and WRL1S) and two wells in the Gunyama Park area (MW03 and MW04).

The groundwater results indicate that with respect to:

- **Human health (2008 and 2015 sampling events)** - all reported concentrations of the Chemicals of Potential Concern (COPC) concentrations at the Site were reported to be less than the adopted HSLs. Low level Volatile Halogenated Compounds (VHC) concentrations (97 ug/L trichloroethene and 31 ug/L cis-1,2-dichlorothene) were reported at MW203 which was installed to further assess VHC concentrations which were previously reported at MW03 (HLA, 2008 - 7 ug/L trichloroethene and 8 ug/L cis-1,2-dichlorothene). A concentration of 45ug/L cis-1,2-dichlorothene was also reported at well WRL1S (HLA, 2008). Trichloroethene and cis-1,2-dichlorothene was not reported in the three groundwater wells located down gradient of MW203 (i.e.MW200 to MW202); and
- **Ecological protection (2008 sampling event)**:
  - copper and zinc concentrations slightly exceed the ANZECC (2000) marine criteria (95% level of protection). These concentrations are considered to be naturally occurring and representative of background concentrations in the region (i.e. Zetland);
  - PAH concentrations (benzo[a]pyrene, fluoranthene and phenanthrene) exceeded the adopted ANZECC (2000) marine water medium to low reliability criteria at MW01, MW106 and MW107. As these wells are located within the footprint of the proposed Aquatic Centre building, the results are likely to be representative of groundwater quality within the deeper fill materials in the western portion of the Site;
  - lead concentrations in groundwater were all less than the adopted ANZECC (2000) marine criteria (95% level of protection); and
  - the groundwater results at monitoring well location WRL1S (located down hydraulic gradient of the TPH and PAH impacted soils in the BH106 area, refer to **Figure 3**) indicated that TPH and PAH concentrations in groundwater were less than the laboratory's limit of reporting (LOR).
- **Ecological protection (2015 sampling event)**:
  - copper and zinc concentrations were all less than the ANZECC (2000) marine criteria (95% level of protection);
  - lead concentrations in groundwater were all less than the adopted ANZECC (2000) marine criteria (95% level of protection) with the exception of MW201. Based on these localised impacts, lead is not considered to be a CoPC in groundwater at the Site;
  - the groundwater results at monitoring well locations MW201 and MW202 (located down hydraulic gradient of the TPH and PAH impacted soils in the western part of the Site) indicated that dissolved PAH concentrations are elevated above the ANZECC (2000) marine criteria (med-low reliability). It appears that elevated concentrations of PAH are leaching from the fill material in the western part of the Site. TPH groundwater concentrations did not exceed the adopted criteria; and
  - while groundwater could not be sampled on the Lincon Development site during this stage of work (due to the lowering of the groundwater table due to local dewatering works), it is considered that based on the reported soil contaminant concentrations on this part of the Site (in particular the relatively low reported metals and PAH concentrations in the fill material), that adverse impacts to groundwater in this part of the Site, are not likely. Therefore, further investigation or management of soil or groundwater is this part of the Site is not considered to be warranted.

4.3 Underground Storage Tanks

The historic reports listed in **Section 1.4** did not identify the presence of Underground Storage Tanks (USTs) on the Site. The HLA report (2002) noted that:

- an UST was removed from the BH05 area which is located offsite to the north of the Site; and
- two USTs (diesel and petrol) were previously located directly to the east of sampling location BH16/MW04 (refer to **Figure 2**). No significant petroleum impacts in groundwater were reported during the sampling of MW04 in 2008 (located directly downgradient of the former UST area).

Further inspection of the Site during the Additional Investigations did not identify the presence of USTs or associated filling points, etc and so they are not likely to be present on the Site.

4.4 Conceptual Site Model

The purpose of a Conceptual Site Model (CSM) is to assess risks potentially present at the Site by identifying and describing contaminant sources, transport mechanisms, exposure pathways and sensitive receptors associated with the Site. The CSM is based on AECOM's review of the previous reports and results from the Additional Investigation (refer to Appendix D). The CSM developed for the Site is summarised in **Table 8** below.

Table 8 Conceptual Site Model

Consideration	Details
Site Setting	The Site is located in a commercial/industrial area. Future land-use to change to recreational and open space with an Aquatic Centre containing buildings and pools and parkland areas. Proposed development specifications including the infrastructure layout as outlined in **Section 1.2**, will result in significant access restrictions to any residual contamination remaining beneath the Site.
Contaminants and Areas of Concern	The main contaminants of concern in soil are metals (mainly lead, nickel and zinc), PAHs, TRH and asbestos in soil and PAHs and low concentrations of metals and VHCs in groundwater. The source of contamination is related predominantly to historical uncontrolled placement of impacted fill across the Site, rather than historical operations. The low level VHC impacts in the groundwater are potentially related to the former Defence Navy Supply Centre historically located to the north of the Site and which was subject to soil and groundwater site investigation and remediation works (HLA, 2002).
Sources of contamination	The following contamination activities are known or suspected to have occurred: - Deposition of uncontrolled contaminated fill, including ash, slag and demolition waste from unconfirmed sources. - Historical industrial use which may have included fuel storage and use of chemicals such as solvents, oils and degreasers. - Off-site sources of groundwater contamination from surrounding industrial and filled sites (including the discussed Defence site to the north).
Groundwater Depth and Flow Direction	Groundwater conditions on the Site are summarised below: - Shallow groundwater was encountered between depths of 3.2 and 4.3 m AHD and within sand and have dropped since 2011 by 1 to 1.5 m which is likely due to local dewatering occurring to the west-northwest of the Site. - The flow direction was inferred to be towards the west.
Extent of Groundwater Impacts	- No sheens LNAPL or DNAPL were encountered in the wells monitored. - All concentrations of TRH and BTEXN were less than the human health based GAC. - No significant petroleum impacts in groundwater at MW04 (2008) located directly downgradient of two USTs. - All concentrations of CoPC were less than the ecological based GAC with the exception of PAHs in MW202 and MW201 in the western portion of the Site. - Cis-1,2-dichloroethene and trichloroethene were detected at low concentrations in MW203 in the western are of the Site and formerly in MW03 in 2008 in the central area of the Site but are not expected to pose a significant risk to future users of the parkland.

Consideration	Details
Extent of soil impacts	- Concentrations of lead and carcinogenic PAHs in fill exceeded the HIL for open space across the Site with the highest concentrations in the western portion of the Site. Lead and carcinogenic PAHs exceeded the HIL for commercial land use in two boreholes the western portion of the Site. - Asbestos was detected in three samples from boreholes in the west, centre and east parts of the Site. - Concentrations of BTEXN and TRH were below the adopted HSLs. - Concentrations of nickel, lead, copper, benzo(a)pyrene and TRH C16-C34 exceeded the ecological based criteria (EILs and ESLs). - Potential acid sulfate soils (PASS) are present in organic clays and sandy clay in the western portion of the Site.
Potential Transport Mechanisms and Exposure Pathways for Contaminants	- Direct dermal contact or ingestion of contaminants in soil during construction or post development. - Dispersion of dust in the wind from unsealed surfaces during construction - Uptake of contaminants by plants and ecological receptors in soil post development. - Off-site groundwater migration. - Vapour intrusion into future occupied structures from VHCs in groundwater.
Potential Receptors of Contamination	The potential human receptors of contamination include: - Construction workers, contractors and visitors on the Site during redevelopment works. - Future receptors are recreational users of Gunyama Park and the Aquatic Centre as well as commercial workers in the Aquatic Centre and intrusive maintenance workers. Potential environmental receptor of impacts are: - Off-site groundwater which flows towards the Alexandra Canal. - Future Gunyama Park.
Identified Complete Future Pathways	- Direct dermal contact or ingestion of contaminants in soil: complete pathways exist for future site users due to the contamination of lead and carcinogenic PAHs exceeding the HIL if an appropriate barrier is not in place. The placement of appropriate barriers between the source and receptor will appropriately mitigate this pathway. Barrier controls include a capping layer and implementation of a long term site management plan to ensure maintenance and longevity of control measure. Physical disturbance of asbestos (plant and vehicles running over material) and dispersion of asbestos fibres via wind: ACM fibres have been detected in fill. A complete pathway may exist where impacted soils are not capped and protected by a long term management plan or where appropriate Asbestos Management Plan is not implemented during construction works. Workers could also be exposed during construction and redevelopment if appropriate controls are not implemented. - Groundwater migration to ecological receptors: there is potential for groundwater to migrate off-site and to impact surrounding groundwater quality. Therefore this pathway is considered complete. It is noted that down-gradient groundwater quality is already affected by similar sources of contamination and the Site would be further contributing to poor groundwater quality. Due to the distance between the Site and the nearest surface water body being over 1.2 km and the concrete lined nature of Alexandra Canal (considered a degraded ecosystem), the pathway between the Site source and the nearest surface water body is incomplete. - Vapour migration from groundwater to future built structures: low VHC concentrations within groundwater may be present beneath the future Aquatic Centre. It is considered that based on the relatively low VHC concentrations at MW203 and the distance (approximately 60m to the indoor area of the Aquatic Centre) that potential VHC concentrations in groundwater will be lower and, in addition to retention of the existing concrete slab, will add another level/barrier to restrict vapour intrusion risks to occupants of the Aquatic Centre building. A pathway between the source and future occupants therefore is unlikely based on the current data set. Refer to **Section 5.0** and the proposed groundwater validation works in **Section 9.4**.

5.0 Assessment of Remediation Requirements

Based on the current soil and groundwater data set (2008-2015) and in conjunction with the elements of the proposed development, it is AECOM's opinion that:

PAH impacted fill materials adjacent to the western Site boundary do not warrant remediation - the future risk of significantly contaminated groundwater migrating offsite is considered low and would not warrant remediation for the following reasons:

- The impacts would not present an unacceptable risk to future site occupants or intrusive maintenance workers (following completion of the proposed development works);
- The proposed development works across the western part of the Site include the laying of a new concrete slab for the construction of the Aquatic Centre building. Therefore, infiltration of surface water through the identified PAH impacted fill material and therefore the associated leaching of PAHs to the groundwater, will be negligible;
- The proposed upgrade of Joynton Avenue will involve raising the level of the road by approximately 400mm. The related compaction and road sealing works in this area will serve to improve the local groundwater quality (adjacent to the down gradient Site boundary) by mitigating surface water infiltration through the fill material in this offsite area;
- The proposed renewal of the Green Square stormwater main running through the middle of the Site (and located up gradient of the western PAH impacted fill materials) will mitigate leaks from the original stormwater main in this area and reduce the infiltration of stormwater through the PAH impacted fill material (and the potential associated leaching of PAHs to the groundwater);
- As discussed in **Section 2.2**, the nearest sensitive receptor is Alexandria Canal which is located approximately 1.4 km to the south west of the Site. However, the pathway between impacted groundwater sourced from the Site and this Canal is considered incomplete, mostly due to the concrete lining of the canal which prevents groundwater from discharging into it and the significant distance between the two. In addition the PAH concentrations detected in groundwater in the western part of the Site (MW201 and MW202) only marginally exceed the adopted groundwater criteria and it is reasonable to expect that concentrations would further attenuate with distance from the Site;
- There is no identified beneficial reuse of the groundwater in the vicinity of the Site and it is likely that the elevated dissolved PAHs in groundwater is a regional issue due to the historic widespread use of anthropogenic fill materials in the Green Square/Alexandria area;
- The depth of fill on the western site boundary typically ranges between 2.5 and 3.5 m bgl whilst the general depth to groundwater in this area is 2 m bgl, meaning that groundwater only interacts with the lower 1.5 m of the fill layer. Consequently, in the context of the whole Site, the volume of PAH impacted fill material which has the potential to leach PAHs to the groundwater is relatively small;
- The acidity of the groundwater in the western part of the Site is relatively neutral (ranging between pH 6.5 and 6.9, MW201 and MW202) and is not considered to be sufficiently acidic to mobilise PAHs at significant concentrations; and
- The low level of risk that the identified PAH impact poses coupled with the practicalities of excavating the large volume of western fill material to a depth of approximately 3.5 m bgl (including the associated dewatering and shoring works which would be required) renders remediation in this location an unsustainable approach with respect to the balance between resource consumption (associated with dewatering of the groundwater, excavation, spoil management and off-site disposal) and the prospective small incremental benefit to improving groundwater quality migrating from the Site. Such excavation works to a depth of 3.5 m bgl would therefore be inconsistent with the principles of Ecologically Sustainable Development as required by Section 9 of the *CLM Act* (1997) and the *Waste Avoidance and Resource Recovery Act* (2001).

VHC impacted groundwater in the MW03/MW203 area (northern central part of the Site) – low level VHC concentrations in groundwater (trichloroethene and cis-1,2-dichlorothene) were reported at MW203 (2015) and previously reported at MW03 and WRL1S (HLA, 2008) does not warrant remediation for the following reasons:

- The impact will be covered as discussed in **Section 1.2**, the area of dissolved VHC impact is beneath Gunyama Park, which will be mostly covered with a synthetic sports field. This sports field will comprise three four distinct layers
    - an impermeable liner placed immediately over the existing fill material;
    - a 300 mm crushed rock drainage layer;
    - a 150 mm layer of validated topsoil; and
    - artificial turf layer.

The proposed design specifications also include retaining where possible, the existing concrete slab (refer to the Council development plans in **Appendix B**) with the exception of the Aquatic Building footprint (due to the number of piles and services to be installed in this area). Therefore, there will be limited potential for significant vapour migration from isolated locations from the underlying groundwater to occupants/users of the sportsfield and park areas. It is also considered that as the proposed land use is open space/playing field and therefore any limited vapour which migrates to the surface would be diluted within the outdoor air and would be negligible. It is also noted that:

- in addition, the level of Gunyama Park (comprising sportsfield and open space areas) will be raised approximately 1.0 m above the level of the existing concrete slab. Therefore, the vertical movement of any soil vapour from the Site's groundwater would be further attenuated due to natural biodegradation processes;
- the existing concrete slab (approximately RL 18.2 m AHD) will likely be demolished and removed from the proposed Aquatic Centre building footprint (as discussed above). This area will be filled with suitable material compacted to the underside of the soffit of the new platform slab. Therefore, whilst VHC concentrations within groundwater which may be present beneath the Aquatic Centre are unknown directly downgradient of MW203, it is considered that based on the VHC concentrations at MW203 and the distance (approximately 60m to the indoor area of the Aquatic Centre) that potential VHC concentrations in groundwater will be lower and, will be further attenuated with the material used and compacted to raise the levels in this area for construction of the new platform slab, will add another level/barrier to restrict vapour intrusion risks to occupants of the Aquatic Centre building;

  Notwithstanding the above assessment, it is recommended that:

    - the groundwater wells in the western part of the Site (i.e. representative of groundwater which may be present beneath the proposed Aquatic Centre) be sampled and analysed for low level VHCs to confirm previous findings and understand temporal influence. These groundwater validation works are discussed further in **Section 9.4**; and
    - a soil gas survey be conducted beneath future occupied areas within the footprint of the Aquatic Centre building. These works are discussed in **Section 9.3.3**.

PAH impacted fill materials in the BH106 area (on the southern boundary) – due to the PAH impacted fill material in this area (i.e. highest PAH soil and groundwater concentrations reported at the Site), additional validation works are recommended to assess:

- the vertical and lateral extent of the PAH impacted fill material (refer to **Section 9.3.2** for further details on these validation works); and
- whether remediation of the fill material in this area is required or if the material can be left in place.

6.0 Regulatory Framework

6.1 Council

Remedial works at the Site shall be carried out in accordance with the requirements of the *Contaminated Land Management Act* 1997, the State Environmental Planning Policy 55 (SEPP 55), City of Sydney *Contaminated Land Development Control Plan* 2004 (DCP 2004) and the Protection of the Environment Operations Act, 1997.

SEPP 55 specifies when remediation work will require Development Consent from the planning authority (Category 1 remediation work). Any remediation works that do not require Development Consent are Category 2.

A Development Application will be required for the proposed development works.

Based on review of Clause 9 of SEPP 55 and the DCP 2004, the proposed remediation works are considered to be Category 2, as summarised below:

Table 9 Review of SEPP 55 Requirements

Category 1 Remediation Work	Site Evaluation
SEPP 55	
Designated Development	No
Land declared to be critical habitat	No
Likely to have significant effect on a critical habitat or a threatened species, population or ecological community	No
Development for which another State environmental policy or regional environmental plan requires development consent	No
Carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:	
Coastal protection	No
Conservation or heritage conservation	No
Habitat area, habitat protection area, habitat or wildlife corridor	No
Environment protection	No
Escarpment, escarpment protection or escarpment preservation	No
Floodway	No
Littoral rainforest	No
Nature reserve	No
Scenic area, or scenic protection	No
Wetland	No
Carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated	No
DCP 2004 (where different to above)	
Remediation works involving on-Site treatment of groundwater	No
Remediation works involving on-Site treatment of contaminated soil	No
Remediation work that does not comply with the management provisions of Section 5 of the DCP 2004	No [1]

Notes:

[1] Review of DCP 2004, indicates that:

- Council requires 30 days notice prior to the commencement of Category 2 remediation works;
- Council requires a copy of ESA report(s) and the RAP at least 14 days prior to the commencement of Category 2 remediation works;
- Contact details for the Principal Contractor and/or party responsible for ensuring compliance of remediation work with all relevant regulatory requirements; and
- After completion of the remediation program, Council must be notified within 30 days.

AECOM assumes that the above notification(s) will be provided by the Remediation Contractor.

6.2 CLM Act (1997)

The *CLM Act* (1997) is the primary Act under which contaminated land is regulated by the NSW EPA. Relevant legislation relating to the *CLM Act* (1997) includes the *Contaminated Land Management Regulation* (2008), which commenced on 1 September 2008.

This section addresses the following aspects of the *Act*:

- Determination and suitability of a contaminated site for a proposed use including the generation of remediation criteria;
- Existing orders and regulatory instruments applicable to the Site; and
- Voluntary remediation proposals and agreements.

The *Guidelines for the NSW Site Auditor's Scheme (The Auditor Guidelines)* (DEC, 2006a) were prepared by the Department of Environment and Conservation (DEC, now known as the NSW EPA) under the *CLM Act* (1997). *The Auditor Guidelines* (DEC, 2006a) describe a decision process for assessing urban redevelopment sites that should be followed by contaminated land consultants. *The Auditor Guidelines* (DEC, 2006a) prescribe soil investigation levels (SILs), which are the concentrations of particular contaminants above which further investigation and evaluation (such as through completion of a quantitative risk assessment) are required.

The *CLM Act* (1997) sets out requirements for site audits. It is understood that a Site Audit Statement will be prepared by a NSW EPA Accredited Site Auditor for the Site. The SAS will confirm whether the Site has been remediated to a standard suitable for the proposed development land uses.

6.3 WorkCover

6.3.1 Asbestos

The buildings and structures on the Site are not known to contain asbestos containing material (ACM).

If asbestos impacted fill material is encountered during the excavation works, WorkCover requires at least 7 days notification prior to any excavation works associated with bonded and friable asbestos.

6.3.2 Underground Storage Tanks

Underground storage tanks (USTs) have not been identified on the Site during the previous site investigations. If any USTs are encountered during the excavation works, based on review of the DECC (2009) *Guidelines for the Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008*, removal of the UST should be undertaken in accordance with:

- Australian Standard AS4976-2008, *The Removal and Disposal of Underground Petroleum Storage Tanks*; and
- Australian Standard AS1940-2004, *The Storage and Handling of Flammable and Combustible Liquids*.

WorkCover must be notified of any UST removal works within 7 days using the prescribed approval form.

7.0 Remediation

7.1 Objective

As discussed in **Section 1.3**, the remediation objective is to manage the bulk excavation and fill/soil disposal reuse works so that the Site is suitable for both the proposed Aquatic Centre facility (recreation mixed use) and Gunyama Park (recreational open space) and that, where possible, all excavated material is retained onsite as part of the development works.

7.2 Preferred Remediation Strategy

The remedial works will be strategically undertaken concurrently with the redevelopment works. The overarching remedial strategy for the Site will be to reuse all geotechnically suitable materials excavated from the western portion of the Site during the construction of the Aquatic Centre and formation of Gunyama Park that are demonstrated to be aesthetically appropriate and chemically stable/immobile where contaminants have been identified above the validation criteria.

As discussed in **Section 5.0** and subject to the soil validation works detailed in **Section 9.3.2**, if remediation of the 'BH106 PAH impacted fill materials' is required this material will be excavated and stockpiled for validation sampling to assess whether it is suitable for placement above groundwater within the footprint of the Aquatic Centre building. If required, this approach will effectively:

- raise the fill material above the typical depth to groundwater to mitigate interaction and potential leaching of PAHs to the Site's groundwater; and
- mitigate surface water infiltration through the fill material and potential leaching of PAHs to the Site's groundwater.

Construction of the new Sydney Water stormwater main through the middle of the Site will be completed prior to the remediation works detailed herein and is being managed in accordance with a separate RAP prepared by others. Once the stormwater main has been installed and the required levels achieved (including the capping requirements detailed in **Section 7.3.4**), there would be no direct contact with the underlying fill materials and access to the stormwater mains would be via man holes only.

In addition, the excavated materials from the western portion of the Site that are surplus to filling of the Aquatic Centre, will be validated as suitable will be placed in Gunyama Park and covered by a capping layer (refer to **Section 7.3.4**). The capping layer will include surface and sub-surface drains which will serve to reduce infiltration of surface water into the underlying fill materials.

A Site Management Plan (SMP) will be developed to manage residual fill contamination (including PAHs, lead, TRH and asbestos) and the integrity and longevity of the capping layer at Gunyama Park (refer to **Section 9.7**).

The preferred strategy to achieve the remediation objectives is as follows:

- Site establishment and preparatory works;
- The existing concrete slabs will be retained where possible as part of the development works with the exception of the Aquatic Building footprint. Where sections of the slab are removed (i.e. the Aquatic Building area), a suitably qualified Validation Consultant will inspect the removed slabs for asbestos and the underlying soils to assess for potentially contaminated soils (based on visual and olfactory observations and field screening of soil samples using a photoionisation detector [PID]);
- Potential temporary stockpiling of the BH106 PAH impacted fill materials (if required by the outcomes of soil validation works detailed in **Section 9.3.2**). These works would be supervised by a suitably qualified Validation Consultant to ensure different fill material types are appropriately separated and stockpiled in the designated stockpiling area (based on the available information and observations of the excavation works). At the designated stockpile area:
    - the materials would be aesthetically classified as suitable or not, materials determined suitable will undergo leachate testing to confirm immobility of the CoPC (lead and BaP); and
    - the materials classified as aesthetically unsuitable and/or the CoPC (lead and BaP) are confirmed to be mobile will be further characterised by conducting waste classification testing prior to offsite disposal;

- Pending the outcomes of the discussed BH106 area validation works, placement of the BH106 PAH impacted fill materials above groundwater level and beneath the footprint of the Aquatic Centre building;
- Backfilling and compaction of the BH106 area with suitable, validated material (likely gained from the eastern part of the Site) to the required levels;
- Piling works as required for the Aquatic Centre building (including the swimming pools and pool balance tanks);
- Shallow excavation works (i.e. less than 1 m bgl) as required for the swimming pools and pool balance tanks in the western part of the Site;
- Fill material which is geotechnically unsuitable for reuse at the Site will be classified appropriately (refer to **Section 8.6**) and disposed offsite to a NSW EPA licensed landfill facility;
- Excavation and separation of any other potentially contaminated fill materials (based on visual and olfactory observations and if they appear to be similar to the BH106 PAH impacted fill materials) considered to be Unexpected Find Material for separate stockpiling and validation testing to confirm if it is suitable for reuse within Gunyama Park or will require offsite disposal (refer to **Section 9.3.2**);
- Construction of the proposed Aquatic Centre building concrete platform (RL 19.7 m AHD) across most of the western portion of the Site to appropriately cap and contain the underlying fill materials;
- Importation of suitable/validated imported fill to the Site to achieve the Gunyama Park and related open space final levels (if required) and as required for the capping material (refer to **Section 7.3.4**). This is likely to include crushed rock and topsoil which will be required as base material for the proposed synthetic sportsfield;
- Installation of the impermeable liner on top of the existing fill material in the sportsfield area and placement/compaction of the overlying crushed rock, topsoil and synthetic pitch (artificial turf) to the required final finished levels. The installation of the capping materials will be regularly inspected and documented by the Validation Consultant and this information included in the Validation Report. The site inspections will confirm that the capping extends across all proposed public open space areas;
- Once the required levels (minus the capping layer) have been achieved in the Gunyama Park and related open space areas, a detailed survey and site inspection will be conducted to confirm that the marker material meets the requirements of **Section 7.3.3**; and
- A final survey of the final finished level will be conducted to confirm that the marker and capping requirements in the Gunyama Park area (as detailed in **Section 7.3.3** and **7.3.4**) are achieved.

The above approach is considered to be appropriate for the following reasons:

- The proposed approach of reusing the material excavated from the swimming pool excavation areas beneath the Gunyama Park will require placement of this material above the level of groundwater (i.e. within the shallow, unsaturated soils) thereby minimising the opportunity for contaminants to leach to the Site's groundwater. The fill material in the Gunyama Park will also be capped with the proposed impermeable liner (beneath the crushed rock drainage layer) which will also mitigate surface water flows through the future sports field to the underlying fill material and groundwater;
- There will be no complete exposure pathway to the underlying fill materials for future occupants of the Gunyama Park open space area due to the proposed capping works;
- If required, placement of the BH106 PAH impacted fill materials above the depth of groundwater within the footprint of the Aquatic Centre building and where the material will be suitably capped and surface water infiltration into the material will be mitigated. This is considered to be a suitable management approach given the isolation of the impact so that direct human and water contact is mitigated;
- The excavation and reuse, if required, of the material from the BH106 PAH impacted fill material excavations beneath the Aquatic Centre area is consistent with regulatory policy requirements including:
    - source removal and clean-up to the extent practicable as contemplated by the NSW DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*;
    - The principles of Ecologically Sustainable Development as required by Section 9 of the *CLM Act* (1997); and

- The principles of the *Waste Avoidance and Resource Recovery Act* (2001).

7.3 Remediation Methodology

7.3.1 Aquatic Centre - Swimming Pool Excavations

As discussed in **Section 7.2**, if required, BH106 PAH impacted fill materials will be progressively excavated and separated from other material types in this area for additional validation testing (refer to **Section 9.3.1**). These works will be supervised by an appropriately qualified Validation Consultant to appropriately separate the materials and confirm that the excavated materials are similar to those encountered during the previous investigations.

Materials of different types will be stockpiled separately and appropriately in a prepared stockpile area (refer to **Section 8.2.2**) for potential validation works by the Validation Consultant (if required).

7.3.2 Management of Unexpected Finds

Excavated material which is deemed to be Unexpected Finds Material will be stockpiled separately and sampled in accordance with the requirements of **Section 9.3**. Based on the results of these validation works, the material will be either reused within the Gunyama Park below the capping material (refer to **Section 7.3.3** and **7.3.4** below) or tested for offsite disposal (refer to **Section 8.6**).

The following unexpected events have been identified as having the potential to occur during the excavation works:

- Variation of contaminant characteristics or identification of unanticipated contaminants and materials. This may include the following materials:
  - Soil that appears to be contaminated based on visual and olfactory (odour) observations;
  - Soil that contains significant VOC concentrations (i.e. greater than 50 ppm as measured during the field screening of bagged soils samples using a PID);
  - Asbestos containing materials (i.e. either bonded or friable asbestos);
  - Groundwater that appears to be contaminated based on visual and olfactory (odour) observations (including potential hydrocarbon sheens on the water surface);
  - Drums or underground storage tanks with unknown contents (i.e. either contained or potentially leaked into the surrounding soils).

In the event that additional trade waste lines or other in-ground features are identified and are considered to represent potential contamination sources (e.g. tanks, drums, unusual wastes etc), the following protocol will be adopted:

- All excavation works will cease, the Validation Consultant will be contacted and the area of concern will be appropriately barricaded;
- If required, appropriate sampling and analysis will be undertaken by the Validation Consultant;
- The requirement for any additional remediation works will be assessed by the Validation Consultant and undertaken following liaison with the Site Auditor; and
- The above works will be documented in the Validation Report.

Occupational Health & Safety (OH&S) and environmental protection requirements may need to be reviewed, depending on the type of unexpected finds encountered.

7.3.3 Marker Material Installation

As discussed in **Section 1.2**, the proposed Gunyama Park will be capped as follows:

- **beneath the synthetic sports field** – the capping material will be underlain by a marker material (an impermeable liner) to indicate that excavation to greater depths in the future will involve excavation of potentially contaminated fill material; and
- **beneath other open space areas** – the capping material will be underlain by a marker material. Consistent with the Green Square Town Centre project, the marker material shall consist of a bright coloured HDPE geotextile fabric constructed to a density greater than 300 grams per square metre (or equivalent).

Disturbance of the underlying fill material in the above open space areas will be managed as per the requirements of the Site Management Plan yet to be prepared for the Site (refer to **Section 9.7**).

Regular inspections will be undertaken by the Validation Consultant to verify the appropriate installation of the marker material beneath the proposed Gunyama Park at the appropriate depth below the Final Finished Levels including the minimum 450mm of crushed rock and/or validated suitable imported fill (as defined in **Section 9.2.2**, as appropriate). Photographic records will be maintained from the inspection(s) for inclusion in the Validation Report in addition to provision by the Principal Contractor of a survey showing the level(s) and lateral extent of the marker material.

7.3.4 Capping Material Installation

Inspection will be undertaken to verify the installation of the capping profile during placement of the suitable imported fill (as defined in **Section 9.2.2**) over the marker material. The following capping works will be undertaken:

- Gunyama Park beneath the synthetic sports field - a minimum of 300 mm crushed rock (drainage layer) and at least 150 mm of validated suitable clean fill;
- Gunyama Park beneath other open space areas (including the stormwater main easement) - a minimum of 500 mm of validated suitable clean fill. The capping material will be underlain by a marker material;
- Gunyama Park shallow landscaping and mass planting - minimum 500 mm capping depth;
- Underground service corridors – minimum 850 mm capping depth. The services will be placed within imported fill and above the marker layer. If services are installed at greater depths, the depth of the imported fill and marker layer will be extended appropriately; and
- Planted tree areas – minimum 1.5m depth capping depth.

The above capping material requirements are broadly in line with that being undertaken within the Green Square Town Centre infrastructure corridors.

Capping would not be required in areas of the Site where the material is natural and uncontaminated or if there is a minimum of 2 m of validated clean material.

In capping areas directly adjacent to the Site boundary, such works will be completed with use of a temporary retention wall until such time as the future offsite development works are completed (i.e. Joynton Avenue and new Zetland Avenue works). These works will involve raising offsite areas with suitable material by up to 400mm. As such, some low profile batter slopes may be formed around the edge of the Site. The validation consultant will inspect these works and confirm that a suitable batter treatment is provided.

The thickness of the capping material may be increased locally to provide suitable batter slopes for areas such as the step down from the Aquatic Centre to the west (to Joynton Avenue) and to the east (to Gunyama Park).

Photographic records will be retained from the inspection(s) for inclusion in the Validation Report in addition to provision by the Principal Contractor of a survey showing the final finished level(s) and lateral extent of the capping. The Validation Consultant will inspect the imported fill as it is brought to the Site.

7.3.5 Trees to be Retained

The established trees along the western site boundary will be retained as part of the development works. The current ground level around these trees is in the order of RL 18.4 m AHD and the proposed development works will retain these levels to reduce adverse impacts to the trees and shallow root systems.

The upgrade of Joynton Avenue (to mitigate local flooding issues) includes raising the level of the road by approximately 500m (to RL 18.3 m AHD) which will broadly match the current ground level around the trees. Therefore the marker material to be installed around the trees can be conducted with minimal disruption to the shallow root system and without significantly raising soil levels against the tree trunks. Where possible, the existing fill material overlying the tree roots will be carefully removed by hand, the marker material installed and covered with a 200mm layer of mulch. The SMP to be prepared for the Site (refer to **Section 9.7**) will include provision to ensure that the mulch around western established trees is maintained to appropriately cover the marker material and to provide a suitable physical barrier to the underlying fill material.

8.0 Construction Management Procedures

This section identifies the broad environmental construction management measures that will be required to be implemented, specifically in relation to contamination on the Site, during the proposed development works (involving the pool excavations and Gunyama Park landscaping works). These measures are proposed to be incorporated into a *REMP* to be prepared by the Principal Contractor (refer to **Section 1.5**).

8.1 Material Tracking Plan

All materials handled during the construction works will be tracked in accordance with the Material Tracking Plan (MTP) in order to allow verification of the correct movement and handling. The system will track materials from cradle-to-grave, and will provide detailed information on the location and quantity of all material movements both on and off-Site, so that the material being handled can be identified and accounted for. The tracking system shall include accurate tracking of stockpiles throughout the entire material handling stage and will included confirmation of stockpile locations and volumes. This is to reduce the risk of cross-contamination between stockpiles/spoil movement.

As part of this process, accurate records shall be kept to ensure that backfilling of excavations (where required) and potential reuse of material only occurs following the appropriate testing of the subject materials. Plans will be made with respect to the extent of each excavation. A register of all analytical results for stockpiles and excavations will be maintained throughout the soil testing works.

Standard forms shall be prepared as part of the MTP. The forms and their function shall include, but not be limited to:

- **Off-Site Transport/Disposal Form:** providing a record of materials removed from the Site and including the material type, quantity, origin, shipping destination, time/date removed from the Site, time/date placed at the offsite location and an approval by the nominated environmental consultant that the material meets the disposal requirements;
- **Imported Fill Form:** providing a record of materials imported to the Site including the date, material type, quantity, point of origin, intended use and the suitability of the material for use as backfill at the Site;
- **Material Excavation Form:** providing a record of excavated materials for each piling area or excavation on the Site including the date, material type, excavated quantity, origin and intended destination;
- **Material Stockpiling Form:** provides a record of all materials placed in stockpiles. The form will include the date, material type, stockpiled quantity, origin and intended end use; and
- **Material Placement Form:** this form provides a record of any materials backfilled on the Site and includes the date, material type, quantity backfilled and origin.

Each form shall be completed on a daily basis by the Remediation Contractor’s representative and collated into a cumulative log for each process on a weekly basis. Roles and responsibilities for materials tracking will be specified in the MTP.

8.2 Erosion and Sedimentation Control

This section outlines the broad environmental construction management measures that will be required for erosion and sediment control during the proposed works. Further detail will be provided in the *REMP* to be prepared by the Remediation Contractor.

To prevent erosion of surfaces and sedimentation of surface water during the construction works, appropriate measures should be implemented to manage:

- Excavations;
- Material stockpiling;
- Surface water flows; and
- Dust and odour generation.

These four aspects are addressed in the following sections, and supplement the *REMP* to be prepared for the construction works.

8.2.1 Management of Excavations

To minimise the amount of erosion and sedimentation during the proposed excavation works, as far as practicable, works should minimise the area of exposed, unsealed surfaces or extent of trenches at any one time, through sequencing of works and progressive excavation and restoration. Surface waters will need to be appropriately controlled during the excavation works.

When excavations are planned, diversion channels/drains should be constructed to divert clean water away from future open excavation areas (e.g. piling locations), exposed surfaces (e.g. stockpile areas) and areas of disturbed soils (e.g. unsealed roadways). Similarly, erosion and sediment control measures should be installed around and downslope of planned excavation areas and around stormwater drains, pits and outflows prior to the start of excavation to prevent silt laden water from migrating off-site.

To anticipate and plan for potential erosion and sedimentation incidents, erosive works should be deferred or re-scheduled after periods of heavy rainfall and during high wind periods.

Restoration of previously exposed surfaces, excavations and stockpiles may involve permanent solutions including asphalting/concreting or revegetating the area, or temporary measures such as seeding and/or covering. Restoration of a disturbed area is to be undertaken as soon as practicable. Trenches and excavations are to be covered as soon as feasibly possible through backfilling and sealing, to reduce the potential exposure of stormwater to sediment and/or contaminants.

Based on the groundwater levels at the Site discussed in **Section 2.5**, excavations below the depth of groundwater are unlikely to be required. Lead concentrations in the fill material is not considered to be a COPC based on the reported lead groundwater concentrations at the Site. Consequently, dewatering of excavated materials (if required) will need to be managed within the excavation areas prior to movement of the material to the designated stockpile area (once the material has been appropriately dewatered).

Management of groundwater seepage into excavations and dewatering are discussed in the following sections.

8.2.2 Stockpiling of Materials

8.2.2.1 Stockpile Locations

Materials generated by the piling or excavation works will be stockpiled within a designated stockpile area. If the excavated material is considered to be significantly different to that encountered during the previous site investigations (i.e. Unexpected Finds Material), the stockpiled soil will then be tested for either potential reuse on the Site or to classify the material prior to being transported directly offsite to a licensed landfill facility. The soil testing works related to these works are detailed in **Section 9.3.2**. The volume of stockpiles formed from the discussed piling and excavation works will be confirmed as part of the MTP.

8.2.2.2 Stockpile Area Preparation

In the event that contaminated spoil material is temporarily stored on-site prior to being transported off-site, the following management measures will be implemented (further detail will be provided in the *REMP* to be prepared by the Remediation Contractor):

- A designated temporary spoil stockpile containment area is to be established on the Site on a concrete/asphalt surface or other relatively impervious layer such as or HDPE plastic where no hardstand is available;
- Potentially contaminated and/or odorous stockpiles should be covered with plastic covers/tarps to mitigate risks associated with wind and water erosion;
- In addition to the sediment source controls, sediment filters (e.g. geotextile ‘sausages’, gravel / sandbags or similar) are to be installed around the Site’s active stockpiling areas. Sediment filters are to be installed at on-site stormwater inlets, grates and entry points of preferential drainage lines (if any) to reduce potential sedimentation;
- Signs will be erected at the entrance to the stockpile area and at locations around the stockpile specifying individual stockpile numbers and the type of materials stored; and
- Buffer zones will be established around each stockpile area to enable access to the stockpiles and minimise impacts of the stockpile area on the surrounding facilities. The location of the truck access to the stockpiles and stockpile area is not to impede the function of the diversion drains, bunding and erosion and sedimentation control measures outlined previously.

8.2.2.3 Stockpile Construction and Maintenance

The drainage, sediment and erosion control measures installed within stockpiling areas at the commencement of the construction works will be maintained, repaired and replaced where necessary for the duration of the stockpiling activities (in accordance with the *REMP)*.

Stockpiles of excavated material are to be kept onsite for the shortest time period possible. All stockpiles are to be maintained in a tidy and safe condition with stable batter slopes (if required).

As discussed, while it is considered unlikely that stockpiles would be held onsite for the longer term, if required, such stockpiles should be covered with high density polyethylene (HDPE) plastic or stabilised with spray grass seeding to reduce dust generation and erosion.

Measures will be taken to reduce the generation of dust from stockpiles through the use of wetting and covers (refer to **Section 8.7**). Run-off will be managed by the use of surface bunding, silt fences and drainage diversions collected and prevented from moving onto other areas of the Site, off-site and/or into stormwater drains or waterways.

If stockpiling of odorous material is required, the stockpiles will be managed as follows:

- The material will be stockpiled separately to all other materials and clearly identified with signage;
- If required, odour suppressant sprays or foams will be sprayed onto stockpile surfaces to mitigate odours during construction of the stockpile;
- The stockpile will be securely covered with a HDPE liner and surface water controls will be constructed around the perimeter (as required for all stockpiled materials); and
- Daily monitoring of the stockpile will be undertaken and will include qualitative assessment of odour around the perimeter of the stockpile.

Where necessary to prevent dust, odour, and/or sediment generation, all long-term soil spoil stockpiles (i.e. 3 months or more) are to be covered or stabilised with spray grass seeding or other suitable measures to reduce dust generation and erosion.

8.3 Water Management

Works are not to pollute waters, in accordance with the requirements of section 120 of the *Protection of Environment Operations Act* (*POEO Act*, 1997).

8.3.1 Surface Water Management

During construction works, stormwater entering the Site is to be minimised wherever possible by directing surface stormwater away from the Site. This can be accomplished using bunds, diversion drains and stormwater control measures constructed to divert clean water away and in particular around exposed areas, disturbed soils (e.g. piling works) and stockpiling areas.

Sediment control devices are to be installed around all stormwater drains, gutters and pits, and in depressions downstream of the Site, prior to the start of works, to prevent sediment-laden water from entering the stormwater system. Stormwater inlet / grate openings within the vicinity of works that have the potential to receive contaminated waters are to be blocked through the use of barriers surrounding the inlet.

Areas where on-site stormwater could come into contact with spoil / waste material, contaminated material, excavated areas (trench locations, prior to backfilling), open stockpiles, this stormwater is to be contained through the use of bunds (or similar), to allow stormwater collection, categorisation, appropriate water quality treatment and reuse, or, off-site disposal. No untreated sediment-laden surface water collected in these areas is to enter the stormwater system or is to be sprayed on other areas of the Site/vegetation without prior testing and treatment (if required).

If a wheel wash is installed, dirty water is to be pumped out and treated (e.g. with flocculent in a sealed skip bin) and reused onsite (if suitable) or disposed offsite at a licensed facility.

Before any on-site collected water is discharged to stormwater drains, sewers or other outlets, approval, permits and/or licences from relevant authorities will need to be secured. Water that fails to meet the criteria of the applicable permits and/or licences is to be pumped into waste storage containers for off-site disposal. The approximate amounts of stormwater either released or containerised for off-site disposal will be recorded, along with the results of laboratory testing, on a Stormwater Monitoring and Disposal Record Form. These disposal documents are to be retained by the Principal Contractor and reported, as required, with monthly waste generation reports prepared in accordance with the requirements of the *REMP*.

In addition, any chemical and fuel spills that occur will be cleaned up to prevent contamination of run-off (a more detailed description of spill management will be detailed in the *REMP*).

Stormwater control devices are to be inspected daily. Inspections of control devices during rain / storm events is to be undertaken at a higher frequency (to be determined based on the magnitude of the event), and on completion of the storm event to monitor the effectiveness of mitigation techniques. If warranted, the inspections should involve cleaning and/or replacement of devices if deemed that they are compromised.

8.3.2 Dewatering Management

No untreated groundwater generated during excavation works, or sediment-laden surface water collected in stockpile runoff, is to enter nearby water bodies or the stormwater system, or is to be sprayed on other areas of the Site/vegetation.

If required, any groundwater generated and pumped out during excavation works must either be classified before disposal at an appropriately licensed liquid waste facility, or tested for contamination, treated if required and discharged from the Site if it meets ANZECC (2000) marine water guidelines or in accordance with the relevant conditions of a Site Environmental Protection Licence (EPL). If seepage water is identified during excavation works, it is to be assessed for heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, mercury and zinc), TPH, BTEX, PAHs and VHCs.

In the unlikely event that dewatering works are required during the construction works at the Site, an application to the Department of Water will be made for a dewatering license.

8.4 Management of Asbestos Containing Materials

Based on the results of the site investigations the identification of ACM during the excavation works is considered possible within fill material in localised parts of the Site (i.e. detections at sampling locations BH204, BH212 and BH214). As such, an *Asbestos Management Plan* will be prepared prior to commencement of the construction works and will be implemented if ACM is encountered during the excavation works.

Identified ACM which requires removal under an *Asbestos Management Plan* will be collected and disposed of by a licensed Asbestos Removal Contractor (ARC) in accordance with the requirements of the following:

- *NSW Work Health and Safety Act* (2011);
- *NSW Work Health and Safety Regulation* (2011);
- *Code of Practice: How to Safely Remove Asbestos,* Safe Work Australia (2011); and
- *Code of Practice: How to manage and control asbestos in the workplace,* Safe Work Australia (2011).

The ACM removal works, where required by the *Asbestos Management Plan*, would be undertaken as follows:

- The Principal Contractor would establish appropriate barriers and signage around the area where ACM has been identified;
- The ACM will be suitably removed from the Site by an Asbestos Removal Contractor (ARC);
- Airborne asbestos fibre monitoring will be undertaken around the working area during the works to confirm that the ACM is being removed in an appropriately controlled manner (refer to **Section 8.9**);
- Validation soil samples will be collected at 10 m lineal intervals along the walls and base of any identified ACM impacted excavation areas and analysed for asbestos. Should the soils beneath the ACM be impacted with asbestos fibres, the impacted soils will be excavated for appropriate off-site disposal; and
- An ARC will conduct a visual inspection of the affected area to confirm that it is free of all visible ACM fragments. A clearance certificate will be prepared to document these works.

If ACM is encountered and removed during the excavation works, for the purposes of appropriately protecting the construction worker, residual soils must not contain asbestos (bonded or otherwise) as determined by the following:

- A visual inspection of the remediated area to confirm the removal of all visible ACM fragments; and
- No detection of asbestos in samples collected from the residual soils and submitted for analysis.

The additional works (including over-excavation if required) for management of ACM identified in residual soils for the protection of construction workers will be determined by the *Asbestos Management Plan*.

Asbestos air monitoring to be conducted during the remediation works is discussed in **Section 8.9**.

8.5 Classification for On-Site Reuse

As discussed in **Section 8.2.2.1**, stockpiled Unexpected Finds Material from the excavation works will be assessed for its suitability for reuse on-site, where required, by collection of representative samples and chemical analysis for the relevant CoPC (refer to **Section 4.2.1**). The analytical results will be assessed against the soil validation criteria as detailed in **Section 9.2.1**.

8.6 Waste Classification for Off-Site Disposal

Materials deemed not suitable for reuse at the Site or which require excavation to accommodate the redevelopment works will be assessed for off-site disposal in accordance with the NSW EPA (2014) *Waste Classification Guidelines - Part 1: Classifying Waste.*

Stockpile sampling would be undertaken at a frequency of one sample analysed per 100 m^3 on the basis that the sampled materials are inspected by a qualified environmental scientist and are observed to be relatively homogenous. If the material is considered to be heterogeneous comprising different fill types, then a greater sampling density will be required.

Waste classification samples will be analysed for the following suite of analytes:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, mercury and zinc);
- TPH and BTEX;
- PAHs;
- Asbestos; and
- Toxicity characteristic leaching procedure (TCLP) testing for heavy metals and PAHs, as required based on the primary results.

Based on the analytical data presented in **Section 4.0**, it is considered unlikely that onsite treatment works will be required as part of the offsite disposal works (i.e. the materials are likely to be classified as either General or Restricted Solid Waste which do not require treatment/stabilisation).

8.6.1 Off-Site Transportation of Materials

Classified waste is to be taken to an appropriate waste disposal facility licensed to receive such waste. Approval may need to be obtained from the respective landfill facility prior to transport. An application for such an approval would require an assessment of the DECCW Guidelines and an estimate of the likely volume of waste to be disposed.

The following material handling requirements will be implemented for trucks transporting materials off-Site:

- A licensed transporter is to be used to transport material to an appropriately licensed NSW EPA waste facility;
- All truck loads are to be filled to the correct level, no over-filling;
- Trucks carrying waste materials will be covered prior to exiting the Site and will remain covered until authorised to unload at the destination (NSW EPA licensed waste facility);

- Trucks will be fitted with seals to ensure that the movement of potentially saturated materials is undertaken appropriately. The integrity of the seals will be inspected and tested prior to commencement of each day's haulage works;
- Excess dust or load material is to be removed from vehicles prior to departure from Site, and as such may require the use of an onsite wheel wash or spray wash or similar. In the event that materials are tracked offsite, it is to be immediately cleaned up in a way that prevents contamination of land, the stormwater or waterways;
- Trucks will not wait in the streets surrounding the Site or within the Site area; and
- Trucks will exit the Site through predetermined exit points and will follow a predetermined transport route to the destination (landfill) via an approved route in accordance with the Principal Contractor *Traffic Management Plan* (yet to be prepared).

8.7 Acid Sulfate Management Plan

As discussed in **Section 4.2.1**, an Acid Sulfate Management Plan (ASMP) will need to be prepared to appropriately manage the treatment and onsite reuse of PASS affected soils for pile risings and if excavations are to be conducted below the depth of groundwater. The ASMP will be prepared in accordance with the NSW Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998 *Acid Sulfate Soils Assessment Guidelines*. NSW Acid Sulfate Soil Management Advisory Committee prior to commencement of the construction works.

8.8 Air Quality Management

This section outlines a number of measures that are to be implemented on Site to reduce potential dust and odour issues that may be associated with the works, from a contamination perspective. These measures are to be adopted in accordance an *Air Management Plan* and *Stormwater and Erosion Management Plan* to be prepared as part of the *REMP* (refer to **Section 1.5**).

8.8.1 Odours

Based on the findings of the previous investigations, it is considered unlikely that significantly odorous materials would be generated during the construction works. If remediation of the BH106 PAH impacted fill material is required, this material is likely to be odorous and will need to be managed carefully to ensure environmental control measures listed below are implemented.

An odour management system will be developed as part of the *REMP* to incorporate the use of various management options as deemed appropriate.

If required, the management of odours during the excavation and stockpiling works will include the following options:

- Investigation as to the source of odours including odour monitoring;
- Minimisation of the quantity or surface area of exposed odorous materials;
- Implementation of odour management response procedures (required to be specified in the *REMP*);
- Implementation of progressive contingency measures (required to be specified in the *REMP*);
- Covering of exposed odorous materials progressively or at the completion of each work period;
- Minimising exposed/excavation areas;
- Apply odour suppressant sprays or foams to excavation surfaces; and
- Undertake activities during favourable weather conditions.

Selection of the appropriate management and mitigation measures, including those summarised above, will be based on consideration of:

- The quantity of odorous materials that require remediation;
- The duration of the required remediation works and associated management of odorous materials;
- The proximity of the proposed remediation works to sensitive receptors;

- The prevailing and forecast weather conditions; and/or
- Other activities being undertaken at the Site in parallel with the remediation work.

8.8.2 Dust

To prevent unacceptable levels of dust being generated during the construction works, a number of appropriate measures should be implemented. These measures may include the following:

- Use of a water cart or water sprays to suppress dust in open areas and along unsealed internal roadways;
- Watering and installation of temporary sheeting to cover localised exposed areas and stockpiles;
- Hosing down spoil as it is excavated during excavation activities;
- Covering stockpiles of potential contaminated soil which will remain on the Site for more than 48 hours (where practical);
- Alteration of the works program to minimise the extent of disturbed open areas;
- Consolidation of material stockpiles, where appropriate;
- Use of chemical dust-suppressants provided the chemicals do not pose a contamination or OHS hazard;
- Use of alternative coverings such as hydromulch to stabilise the surface of open disturbed areas and long-term stockpiles;
- Use of additional dust suppression features on items of dust generating plant and equipment;
- Installation and use of a wheel wash at the Site exit to remove material from Site vehicles;
- Securely covering all loads entering or exiting the Site; and
- Use of alternate work practices such as modified equipment to minimise dust generation.

8.9 Asbestos Air Monitoring

Asbestos fibre air monitoring will be carried out during excavation of fill materials at the Site in accordance with the *Guidance Note on The Membrane Filter Method For Estimating Airborne Asbestos Fibres 2nd Edition* [NOHSC:3003(2005)].

The air monitoring will be carried out by a Licenced Asbestos Assessor to NATA Standards and in accordance with the Safework Australia *Code of Practice How to Remove Asbestos Safely*. If friable asbestos is discovered during the works, an independent licensed asbestos assessor will be required [independent of the Principal Contractor/Licenced Class A (friable) or Class B (non-friable) asbestos removalist].

The asbestos assessor will select the number and location of asbestos monitoring locations based on the daily site works and conditions. Typically the monitoring locations will be around the active excavation area (fill material), stockpile areas and site sheds/amenities on each day of remediation work.

Air monitoring samples are only to be analysed at a NATA accredited laboratory accredited to ISO17025 for asbestos counting.

The airborne asbestos monitoring results will be communicated to the site workers daily during pre-start/toolbox meetings at the commencement of the next work shift and a copy posted in the site office.

The following asbestos fibre control limits and actions applicable to the work will include:

Table 10 Asbestos Air Monitoring Action Levels

Level	Control Limit	Action
Acceptable limit	<0.01 fibre/mL	Equal to background and detectable limits. Level to achieve for air clearances.
Alert level	>0.01 fibres/mL	Review control measures, investigate the cause and implement controls to eliminate or minimise exposure.

Level	Control Limit	Action
Action level	>0.02 fibres/mL	Review control measures investigate the cause and implement controls to eliminate or minimise exposure. The licensed asbestos removalist (Remediation Contractor) must notify the regulator (WorkCover NSW) by phone followed by email, fax or written statement that work has ceased and the results of the air monitoring. Work may only recommence following receipt of air clearance monitoring results of <0.01 fibres/mL).

The air monitoring will continue until the final excavation surface has been inspected as clear of visible asbestos. Following the receipt of the final air clearance monitoring results of <0.01 fibres/mL, the asbestos work exclusion area may be entered without the need for asbestos exposure prevention PPE.

8.10 Noise and Vibration Management

The following measures are recommended to minimise potential noise and vibration impacts from excavation and compaction works on the Site, and are to be applied in conjunction with any conditions of development approval gained for the works:

- Unless contrary to the conditions of development approval, all reasonable and feasible measures are to be used to meet the construction noise management levels outlined in The City of Sydney *Code of Practise for Construction Hours/Noise within the Central Business District* (1992) and the NSW EPA *Industrial Noise Policy* (1999);
- Efficient silencers and low noise mufflers should be used on all plant and machinery where possible;
- Regularly maintain plant and machinery to minimise noise emissions;
- Face exhausts of plant and machinery away from receivers, where possible;
- Vibration monitoring may need to be undertaken during vibration generating activities (e.g. jackhammering, ground compaction) to determine compliance with NSW EPA guidelines at the nearest receivers; and
- The potential cumulative impacts of the proposed works in conjunction with other planned construction works in the area (i.e. on the Green Square Town Centre site) should be considered and appropriate mitigation measures adopted if required.

8.11 Site Access

The primary access route to the Site will be via Joynton Avenue (to be confirmed as part of the application process). The main gate will control access to and around the Site during the development works.

Entry to any designated excavation works areas will be controlled through the use of a sign-on/sign-off log system at the main gate. Only authorised personnel will be allowed into the excavation works area.

Personnel will gain access to excavation areas only after they have:

- Attended and completed a Site safety induction briefing (applicable to all Site workers and visitors);
- Are wearing all applicable personal protective equipment (PPE) as detailed in the OHSP (refer to **Section 1.5**); and
- Been inducted into the OHSP.

All construction vehicles and delivery vehicles will enter the Site through the nominated entry point.

8.12 Work Health and Safety Signage

Work Health and Safety (WHS) signage will be installed at the Site entrance detailing the location of the Site offices, construction/excavation works, first aid facilities and parking. Traffic restrictions will be installed to limit access further into the Site and ensure the safety of Site visitors.

Signage at the main gate will include after-hours contact details. Additional signage will be erected along Exclusion Zone boundaries to restrict access to these areas to authorised personnel only.

9.0 Validation Plan

This section provides a description of the validation methodology to be adopted by the Validation Consultant during the remediation works.

The information presented herein is of a summary nature only. If required, specific details could be documented in a *Sampling, Analysis and Quality Plan* (SAQP).

9.1 Project Team

The Project Team must include a suitably qualified Validation Consultant with experience working on contaminated sites and trained in the requirements of this RAP. Decisions related to validation will be made in accordance with relevant guidelines endorsed by the NSW EPA.

9.2 Validation Criteria

9.2.1 Soil Validation Criteria

The soil validation criteria for the Site have been adopted from the following NSW EPA endorsed guidance documents:

- NSW DEC, 2006. *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*;
- National Environment Protection Council (NEPC), 1999. *National Environment Protection (Assessment of Site Contamination) Measure (NEPM), as amended* 2013 - Soil Health investigation Levels (HILs) (for metals, PAHs, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organochlorine pesticides (OCPs) and asbestos) and Health Screening Levels (HSLs) (for asbestos);
- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report No.10 - *CRC CARE Health Screening Levels for petroleum hydrocarbons in soil and groundwater.* September 2011. (Friebel, E.and Nadebaum, P., 2011);
- WA Department of Health (DoH), 2008. *Draft Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia*; and
- ASSMAC Acid Sulfate Soils Assessment Guidelines (ASSMAC, 1998).

Given the proposed range of land uses for the Site, a range of criteria sourced from the guidance documents listed above are required to be applied. Soil validation criteria to be applied are based on the applicable human health and ecological investigation levels published in NEPC (2013). Specifically, validation criteria will be derived for each contaminant as relevant based on:

- Health Investigation and Screening Levels for Recreational C for the Gunyama Park public open space and Commercial/Industrial D exposure for the Aquatic Centre facility - Tables 1A(1) and 1A(3)(NEPC [2013]), refer to **Table T1** in **Appendix B**;
- Environmental Screening Levels for the Gunyama Park public open space - Table 1B(6), NEPC (2013);
- Management Limits for Total Petroleum Hydrocarbons (TPH) fractions in Soil for the Gunyama Park public open space - Table 1B(7) NEPC (2013); and
- The definition of asbestos contaminated soil as provided in Safe Work Australia (SWA) 2011/NSW WorkCover 2011.

9.2.2 Imported Materials

In accordance with current NSW EPA policy, only material that does not represent an environmental or health risk at the receiving site may be considered for resource recovery. Imported materials will only be accepted to the Site if they meet the definition of:

- Virgin Excavated Natural Material (VENM) as defined in the *Protection of the Environment Operations Act* (1997) Schedule 1; or
- Excavated Natural Material (ENM) as per as per Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 The excavated natural material exemption order 2014 defined in DECC (2012); or

- any other suitable material which has been appropriately validated and meets the soil validation criteria (refer to **Section 9.2.1**).

In addition to meeting the above criteria, reported CoPC concentrations should be confirmed to be representative of background concentrations expected for the material type being imported.

All material imported to the Site will be required to be accompanied by appropriate documentation that has been verified by the appointed Validation Consultant.

9.2.3 Waste Classification

Materials which do not meet the soil validation criteria and/or are deemed not suitable for reuse at the Site (refer to **Section 3.1**) will be assessed for off-site disposal in accordance with the NSW EPA (2014) *Waste Classification Guidelines*.

9.2.4 Groundwater Assessment Criteria

Human Health - Health Screening Levels (HSLs)

Friebel, E. and Nadebaum, P. (2011) have been referred to for the assessment of petroleum hydrocarbon contamination, which are applicable for assessing vapour intrusion risks from contaminated groundwater. The HSLs are based on five specific land uses/receptors, three soil types and three depth ranges for groundwater.

Table 11 Health Screening Level Summary

HSL	Land Use	Depth to Groundwater	Soil Types (all land uses)
C	Public open space including parklands and ovals	2 m to <4 m 4 m to <8m 8 m +	Silt (silt, silty clay and silty clay loam)
D	Commercial/Industrial Land		
Shallow Trench Worker	Utility / intrusive maintenance workers involved in shallow trenches to a maximum depth of 1m)		Clay (clay, clay loam and silt loam)

It is noted that groundwater is not beneficially used on the Site (currently and no plans in the future) or in the region and recreational use is not considered applicable.

Ecological

The ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* provide ‘trigger’ values for chemicals within the water, which represent the best current estimates of the concentration of chemicals that should have no significant adverse effects on the aquatic ecosystem.

ANZECC (2000) indicates that an exceedance of a trigger values does not necessarily imply that there is an inherent risk, rather that further assessment and monitoring may be required prior to implementing appropriate management actions. AECOM notes that according to ANZECC (2000), low reliability trigger values are interim levels only because “*low reliability trigger values were derived, in the absence of a data set of sufficient quantity, using larger assessment factors to account for greater uncertainty*”, and, *“low reliability values should not be used as default guidelines”.*

Whilst ANZECC (2000) provide an interim, low reliability trigger level of 7 µg/L for crude oil in water, there is no trigger level for TPH. AECOM notes that current laboratory limits of reporting (LOR) cannot quantify TPH to this concentration. As a consequence, no ecological assessment criteria for TPH have been adopted.

Adopted Groundwater Validation Criteria

The following criteria will be adopted as the groundwater validation criteria in the event groundwater monitoring is required:

Table 12 Groundwater Assessment Criteria

Receptor	Guideline	Level Adopted	CoPC
Human Health	Friebel, E. and Nadebaum, P. (2011)	Vapour Intrusion: HSL D (commercial/industrial), 2 m to >4m, sand	TRH, BTEXN
	CRC Care (2011)	Shallow Trench Worker: 2m to <4m, sand	Benzene
Ecological	ANZECC (2000)	Marine, 95%[1] level of species protection where applicable, including moderate and low reliability trigger values	Metals, VOCs (including BTEX), SVOCs
		Marine water – medium to low reliability	Metals, VOCs (including BTEX), SVOCs

The following rationale was applied in the selection of these groundwater validation criteria:

- Commercial/industrial standards (HSL D) have been adopted for human health as they considered vapour intrusion risks which would be relevant to the Green Square Aquatic Centre and Gunyama Park; and
- Sand was selected as the soil type and shallowest presented groundwater depth (<2-4m) as a conservative measure to be protective of deeper groundwater. For the purpose of this assessment the Friebel and Nadebaum, (2011) extension model was not applied for groundwater less than <2m deep as it is unlikely that the value (for vapour intrusion) would be less than the drinking water guideline.

Based on review of available information and in accordance with Table 5 of Schedule B1 of the NEPM (2013 *as amended*), the groundwater environmental values to be adopted include the ANZECC (2000) trigger values for marine aquatic ecosystems. Environmental values including raw drinking water source, agricultural use - stock watering, agricultural use – irrigation, marine water aquatic ecosystem and recreational use are not considered appropriate given the predominantly commercial and industrial nature of the Site and surroundings areas.

9.3 Soil Validation Plan

9.3.1 Aquatic Centre Excavation Material - Reuse in Gunyama Park

If findings of the soil validation works detailed in **Section 9.3.2**, indicate that the BH106 PAH impacted fill materials require remediation, the material will be excavated and stockpiled separately under the full-time supervision of the Validation Consultant. As per **Section 7.2**, if this material is excavated, it is preferred that it be placed above groundwater and capped beneath the Aquatic Centre building. However, if required (i.e. due to the cut and fill balance at the Site), this material, or other similar materials encountered during the excavation works, will be validated to confirm their suitability for placement in the Gunyama Park area by:

- Assessing the aesthetically suitability of the material. Materials which are highly odorous will be landfarmed to reduce odours and placed beneath the Aquatic Centre building; and
- Representative validation samples will be collected and analysed to assess the leachability of lead and benzo(a)pyrene concentrations under a neutral leaching conditions (using the Australian Standard Leaching Procedure [ASLP]). This testing will confirm that potentially lead and benzo(a)pyrene impacted materials are suitability immobile. The lead and benzo(a)pyrene ASLP results in the materials is required to be less than the adopted ANZECC (2000) trigger values for marine aquatic ecosystems to enable onsite reuse. Samples will be analysed at 1 sample per 100 m^3.

Sulphate concentrations in soil should also be assessed by the project's geotechnical engineer in order to be appropriately protective of building slabs, footings or piles.

9.3.2 Southern Boundary Soil Validation Works

As discussed in **Section 5.0**, soil validation works are required in the BH106 area to confirm the extent of the PAH impacted fill material in this area and to assess the requirement for remediation. The scope of work will include the following:

- Soil sampling at three (3) boreholes located approximately 10m from the BH106 sampling location (i.e. three (3) boreholes located to the west, north and east of BH106. The sampling works will be conducted by a suitably qualified environmental scientist.

- Soil sampling at four (4) boreholes located along the southern boundary of the Site in the area of the demolished building and former location of two underground USTs (diesel and petrol) previously reported to be in this area (adjacent to sampling location BH16/MW04 [HLA, 2002]). The sampling works will be conducted by a suitably qualified environmental scientist.
- A survey of potential UST areas (including the BH16/MW04 area discussed above and other identified historic workshop areas) will be conducted using Ground Penetrating Radar prior to the drilling works described above. If this stage of work identifies any USTs, they will be removed appropriately and the area validated as per **Section 9.3.5**.
- Undisturbed soil samples will be collected at a depth of 0.1m and every 0.5m thereafter within fill materials and at 1.0m intervals within the natural marine sediments. Soil sampling will be undertaken within natural materials to an approximate maximum depth of 5.0 m below ground level.
- Soil samples will be collected using sample dedicated nitrile gloves in laboratory supplied glass jars with zero headspace.
- A sub-sample of soil will be collected for each sample in a zip lock plastic bag and the headspace screened for Volatile Organic Compounds (VOCs) using a Photo Ionisation Detector (PID).
- Inter and intra laboratory duplicates will be analysed at a rate of 1 per 20 primary samples.
- Trip and rinsate blanks will be collected at a rate of one per batch of soil samples.
- All samples will be immediately placed in an insulated container with crushed ice.
- Samples will be transported under chain of custody protocols to a NATA accredited laboratory.
- Samples selected for analysis will be based on field observations and PID field screening results. The selected samples will be analysed for PAHs, VHCs and OCPs.
- Preparation of a letter report assessing:
    - the extent of PAH impacted fill materials and if similar PAH concentrations are present as was reported in soil sample BH106_2.0-2.2);
    - petroleum impacts related to the historic USTs located in the BH16/MW04 area; and
    - the need for remediation in the investigated areas along the southern boundary.

  The letter report will be provided to the Site Auditor for endorsement.

In addition to the above works, MW106 will be sampled and analysed during this stage of work and the results discussed in the letter report (refer to **Section 9.4** for further details).

9.3.3 Aquatic Centre - Soil Gas Assessment

As discussed in **Section 5.0**, to assess potential soil gas risks from VHCs within the footprint of the Aquatic Centre building, the following soil gas assessment works are proposed:

- All sampling works will be conducted in accordance with AECOM's Field Quality Manual 3.01 Soil Vapour Bore Installation - Sub Slab;
- It is proposed that 6 soil gas pins be installed within the footprint of the Aquatic Centre building and in future occupied areas (excluding the proposed outdoor pool excavation areas). Two locations will be located at the southern end of the Building footprint and 4 in the northern area (including the proposed crèche location);
- Soil gas pins will be installed to assess the soil gas beneath the existing concrete slab. It is noted that as the existing concrete slab in the Aquatic Building area is proposed to be removed to allow the piling works, this assessment will likely provide a conservative assessment of soil gas concentrations as part of the future development works as the area will be raised 1.2m with compacted suitable material which has been appropriately validated;
- The installation will involve drilling a 16mm hole through the concrete and inserting the gas pin. The gas pin (brass or stainless steel) will be surrounded by silicon tubing to seal the pin against the concrete. Although these pins will serve for this project as temporary soil gas measurements devices, their installation is designed for permanent use, therefore repeat soil gas sampling is also possible;

- To confirm the gas pin has been installed correctly, helium integrity testing will be performed to ensure ambient air is not being drawn into the sub slab;
- Once integrity testing has confirmed installation has been undertaken suitably, the soil gas sample will be sampled using evacuated canisters. The canisters will sample over 1 hour with a flow rate of approximately 16 mL/min;
- Permanent gases (oxygen, methane and carbon dioxide) and VOCs will also be measured with portable instruments before and after the gas analysis;
- Once sampling is complete, the evacuated canister will be sent under chain of custody for analysis using a modified US EPA TO-15 Method for a range of chlorinated compounds, including trichloroethene and cis-1,2-dichlorothene;
- The canister results will be compared to relevant guidelines as follows:
  - NEPM Interim soil gas health investigation levels for volatile organic chlorinated compounds; and
  - US EPA Region 3, 6 and 9 Screening Levels.
- Should concentrations be elevated above screening criteria, further assessment may be warranted. This may involve further estimation of dilution of the COPC through the suitable materials used to raise levels in this area into the future occupied areas based on the anticipated design of the Aquatic Centre building and new platform slab.

The above works will be detailed in a report to be provided to the Site Auditor for endorsement.

9.3.4 Unexpected Finds Material

The validation of Unexpected Finds Material will be conducted to assess whether it can be reused onsite as follows:

- All Unexpected Finds Material proposed to be reused as fill materials below the cap and down to a depth of 2 m below the Final Finished Level in the Gunyama Park area shall be sampled at a frequency of one sample per 70 m^3 (consistent with the Green Square Town Centre project);
- Samples shall be analysed for the CoPC listed in **Section 4.2.1** (i.e. lead, TPH, BTEX, PAHs and asbestos) in combination with consideration of the source location and material inspection. A detailed and systematic inspection will be completed of the material to assess the potential presence of visible ACM prior to final placement. This will comprise supervision of excavation of the Unexpected Finds Material and inspection during stockpiling of the material. The material will be visually assessed and field screened using a photoionisation detector;
- The validation samples will also be tested to assess the leachability of lead and benzo(a)pyrene concentrations under a neutral leaching conditions (using the ASLP). This testing will confirm that potentially lead and benzo(a)pyrene impacted materials are suitability immobile. The lead and benzo(a)pyrene ASLP results in the materials is required to be less than the adopted ANZECC (2000) trigger values for marine aquatic ecosystems to enable onsite reuse; and
- Fill materials shall be inspected for consistency by the Field Scientist. Material which is found to be aesthetically dissimilar to the fill materials exposed in general at the Site shall be assessed as per the protocols for unexpected finds. Malodorous materials shall be analysed for TPH and VOCs (in addition to the CoPCs discussed above).

The following rules will apply to the soil testing data when assessing against the soil validation criteria (refer to **Section 3.1**) by statistical analysis:

- No single analyte concentration shall exceed 250% of the soil validation criteria for each CoPC; and
- The standard deviation of the results must be less than 50% of the allowable maximum specified for each CoPC.

If the above validation testing of the Unexpected Finds Material indicates that the material is suitable for reuse beneath the Gunyama Park cap, the material will also be inspected as it is placed in this area to ensure it is similar to the materials that were tested and analysed during the above validation sampling.

9.3.5 Underground Storage Tanks

If any USTs and related infrastructure are encountered during the excavation works, soil characterisation / validation sampling of the resulting excavation will be completed in accordance with NSW EPA (2014) *Technical Note: Investigation of Service Station Sites*, as follows:

9.3.5.1 Validation of Excavations

The validation of UST excavations will be undertaken as follows:

- **Tank Pit Excavation - Walls**: a minimum of two samples will be collected and analysed per tank, with a sample taken from each tank wall. Samples will be selected for analysis based on results of both field observations and field screening results (refer **Section 9.3.5.3**). Samples will also be distributed across soil types (i.e. multiple wall samples may be collected and analysed);
- **Tank Pit Excavation - Floor**: at least one sample will be collected and analysed from beneath each removed UST and / or every 10 m^2 thereafter;
- **Fuel Dispensing Pumps - Base**: one sample will be collected and analysed beneath each dispensing pump backfill and one per natural soil (if considered required);
- **Fuel Feed Lines to Dispensing Pumps** - one sample will be collected and analysed per 5 m of trenching from excavated fuel lines; and
- **Remote Fill Points** - one sample will be collected and analysed per fill point.

Samples will be collected by the following method:

- Directly from the bulk samples within excavator bucket using a trowel and gloved hand; and
- Hand auger safely in accessible areas.

9.3.5.2 Stockpile Characterisation Sampling

Soil removed during UST excavation works will be sampled at a minimum rate of one sample per 25 m^3, or one sample per stockpile for stockpiles smaller than 25 m^3. Samples will be collected directly from the stockpiles using a trowel and gloved hand.

9.3.5.3 Field Screening

Each soil sample will be split in the field to provide a sub sample for screening for Volatile Organic Compound (VOCs) using a Photo-Ionisation Detector (PID). The result of the PID screening will be used to help identify which samples to send for laboratory assessment, along with other field observations. Field screening of soil samples by organic vapour analysers will follow the headspace method to minimise the loss of volatiles (as per Section 7.4.3 in Schedule B2 of the NEPM (2013 *as amended*).

The PID will be supplier calibrated prior to delivery and additionally calibrated using fresh air and gas standard (isobutylene or similar) in the field at the beginning of each sampling day. Calibrations certificates from the supplier and daily field calibrations will be maintained on the project file.

9.3.6 Imported Fill

Any material imported to the Site will be required to meet the environmental and geotechnical requirements specified for the particular end use.

It is expected that materials imported to the Site for the capping works or for use as growing media will meet the validation criteria detailed in **Section 9.2.2**.

The frequency of soil sampling will be dependent on the source of the fill material. If the material is brought onto the Site from a quarry, and the material is homogeneous, soil testing will consist of:

- a certificate warranting that the material is VENM or demonstrating the physical and chemical quality of the fill, including supporting test data; and
- visual confirmation that the material is free from contamination as it is imported to the Site.

If the imported material (including landscaping materials such as mulch) cannot be certified as VENM or clean quarry material by the supplier, the following works will be undertaken by the Validation Consultant:

- Site inspection of the source site and the reporting of these findings in the relevant reports; and

- One sample per 70m^3 will be collected and analysed or a minimum of 10 samples per source (consistent with the Green Square Town Centre project). This sampling density may be decreased depending on the quantity of material to be imported from a given source and the initial laboratory analytical results. Any change in sampling density will be determined in consultation with the NSW EPA Accredited Site Auditor; and
- Visual confirmation that the material is free from contamination as it is imported to the Site.

Samples will be collected and analysed from the source location and the suitability of the material assessed by the Validation Consultant, prior to import of the material to the Site.

All soil samples will be analysed for the following suite of potential contaminants:

- Metals (As, Cd, Cr, Cu, Ni, Pb, Zn and Hg);
- PAHs and phenols;
- TPH/BTEX;
- OPPs and OCPs;
- PCBs; and
- Asbestos.

The analytical results will also be assessed to ensure they are representative of background concentrations – that is, metals concentrations are very low and organics non-detect.

The above testing regime will also be undertaken for recycled concrete, crushed rock (non-quarry), topsoil or any other imported product prior to importation to the Site.

9.4 Groundwater Validation

As discussed in **Section 5.0**, to further assess the VHC concentrations in groundwater in the western part of the Site, a groundwater sampling round will be conducted for wells MW01, MW03, MW200 to 203 and WRL15 (i.e. those wells located down gradient from MW03 inclusive).

The groundwater testing will be conducted prior to any development works (likely timing will be mid-2016) and preferably once the dewatering works in the local area have ceased, and the Site's groundwater level has returned to stabilised levels.

The groundwater testing will include low level VHC analysis to enable a detection limit of 0.3 ug/L for vinyl chloride and comparison of the results to the US EPA Region 9 screening criteria.

MW106 will also be sampled and analysed for PAHs during this GME in conjunction with the BH106 validation works (as detailed in **Section 9.3.2**).

The Validation Consultant will prepare a Groundwater Monitoring Event (GME) report assessing the groundwater results, any implications for changes to the remediation scope (refer to **Section 5.0**) and recommendations for further investigations. If VHC concentrations in groundwater exceed the US EPA Region 9 screening criteria, a quantitative assessment will be undertaken to assess the risk to volatiles to receptors within the Aquatic Centre. The GME report and risk assessment (if required) will be provided to the Site Auditor for endorsement.

9.4.1 Groundwater Sampling Methodology

The groundwater sampling will be conducted in accordance with written standard operating procedures, copies of which will be maintained in a register. This will ensure that representative groundwater samples are collected and the sampling methodology remains consistent if additional sampling rounds are required.

A summary of the groundwater monitoring methodology is provided in **Table 13** following.

Table 13 Groundwater Sampling Methodology

Activity/Item	Details
Monitoring Parameters	Monitoring should include the following: - Groundwater depth (converted to m Australian Height Datum); and - Field parameters (including temperature, electrical conductivity, pH, dissolved oxygen and redox potential). Laboratory Analysis for low level VHCs, SVOCs and PFCs.
Well Gauging	Monitoring wells should be gauged using a calibrated water level probe. The probe should be decontaminated between each measurement. Water levels should be gauged from the surveyed point on the casing. Details of the gauging dates and depths recorded are to be provided as part of the GME report.
Well Surveying	If new wells are required, a licensed surveyor will be engaged to survey the location and elevation of the well to Australian Height Datum (m AHD).
Well Purging and Sampling Process	All groundwater monitoring wells should be purged using low flow (such as Micropurge) pumping prior to sampling, using new disposable low-density polyethylene (LDPE) bladders, in conjunction with flow cells as necessary and dedicated LDPE tubing. The LDPE tubing will be disposed of appropriately after each sampling event. Measurement of field water parameters should be conducted continuously and purging continued until groundwater field quality parameters have stabilised. An appropriately experienced environmental scientist will carry out these activities.
Decontamination Procedure	Monitoring and sampling equipment should be decontaminated according to the following procedure: - Wash with Decon 90 or similar decontaminant / water solution and rinse. - Triple wash with laboratory supplied clean deionised water.
Sample Method and Preservation	Following stabilisation of field parameters, samples should be placed into laboratory-supplied bottles containing appropriate preservatives for the selected analytical testing. Samples should be immediately chilled and stored at a temperature of 4°C or less prior to transit to the laboratory.
Disposal of Purged Groundwater	If required, purged groundwater should be disposed of to a licensed waste receiving facility. Purged groundwater may be placed in drums for characterisation and disposed in accordance with the DECCW (2014) *Waste Classification Guidelines* or any subsequent revision. If required, a licensed contractor should be engaged to dispose of the water to an appropriately licensed facility.
Analytical Laboratories	Both a primary laboratory and secondary (QC) laboratory should be used. Both laboratories should be accredited by NATA for the analyses undertaken.
Quality Assurance / Quality Control (QA/QC)	QA/QC samples collected for quality control purposes during each round of groundwater sampling will be consistent with the requirements of **Section 9.5.2**. Discussion of the laboratory and field quality assurance/quality control and analytical data validation should be included in the GME report.
Sample Nomenclature	Sample nomenclature will be consistent with the previous sampling events.

9.5 Quality Assurance / Quality Control

The Validation Consultant should adopt the Data Quality Objectives (DQO) process, which have been developed based on the iterative DQO process developed by the USEPA (2000) *Guidance for the Data Quality Objectives Process - EPA QA/G-4* and adopted by NSW DEC (2006).

The guidelines incorporate field quality control and laboratory analysis, methods and information on laboratory quality control data and will be used to validate the field and analytical data for the validation works. Assessment of the achievement of the DQOs must be undertaken through reference to the Data Quality Indicators (DQIs) of completeness, comparability, representativeness, precision and accuracy.

Components of the field and laboratory programs (including quality assurance) are briefly presented in the following sections.

9.5.1 Sampling Methodology

Field procedures will be undertaken with reference to:

- National Environmental Protection (Assessment of Site Contamination) Amendment Measure (NEPC, 1999 as amended) *Schedule B2, Guideline on Site Characterisation*; and
- ANZECC (2000) - Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council (ANZECC/NHMRC), "*Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*", January 1992.

The general soil sampling strategy would be as follows:

- All soil samples will be collected into laboratory prepared and supplied glass jars with Teflon lined lids. The sampling locations will be accurately recorded (by survey wherever possible). Sample depths (where appropriate) will be recorded by tape measure. To assist surveying, labelled sample location markers (e.g. survey pegs or similar) will be used;
- Screening of the vapour headspace of soil samples for volatile organic compounds (VOCs) will be undertaken in the field using a PID. Observations for odours, staining and other unusual conditions will also be made. Sample collection will be biased towards detecting contamination;
- All samples will be collected using decontaminated equipment and a new pair of nitrile gloves;
- Samples for analysis for organic compounds will be placed on ice; and
- All samples will be forwarded to an analytical laboratory for analysis under chain-of-custody protocols.

9.5.2 Field and Laboratory QC/QC

Collection of field quality control samples will include:

- Blind duplicate soil samples (intra-laboratory) will be analysed at a rate of 1 per 20 primary samples;
- Split duplicate samples (inter-laboratory) will be analysed at a rate of 1 per 20 primary samples; and
- Where required, rinsate or equipment blank samples will be collected and analysed at a rate of 1 sample per day of sampling activities.

Additionally, the PID will be calibrated prior to the start of field activities and daily during field activities. Calibration records will be provided in the Validation Report.

Laboratory QA/QC procedures will comprise the following at a minimum:

- Laboratory Duplicate Samples: at least one per batch (where the batch exceeds five samples);
- Matrix Spiked Samples: at a rate of approximately 5% of all analyses. At least one per batch will be reported;
- Laboratory Blanks: at least one per batch and one per analyte;
- Laboratory Control Samples: analysed at a rate of at least one per process batch, and typically at a rate of 5% of analyses; and
- Surrogates: at least one per sample.

9.5.3 Laboratory Analyses

All laboratory analyses will be conducted by laboratories using methods accredited by the National Association of Testing Authorities, that adhere to the international standard methods referred in the ANZECC (1996) guidelines and Schedule B(3) of the NEPC (2013).

9.5.4 Decision Rules

To evaluate the sample analysis data, the following decision rules will be applied:

- Sampling locations are to be recorded by survey;
- Comparison of the sample analysis results to the soil validation criteria;
- Qualitative assessment of potential risk associated with any 'elevated' result(s);

- If required, assessment of data through checking that each individual sample concentration does not exceed the soil validation criteria by more than 250%;
- Calculation of the Upper Confidence Limit (UCL) on the average concentrations (of the relevant contaminant(s)) at a confidence level of 95 % (95 % $UCL_{average}$). This would include excavation and stockpile samples;
- If required, calculation of the standard deviation of the data. The standard deviation should be less than 50% of the validation criteria;
- Assessment of the sampling results for any soil/waste to be disposed off-site in accordance with NSW EPA (2014) *Waste Classification Guidelines*; and
- Assessment of the reliability of both the field and laboratory programs by reference to DQIs.

Where data indicates that unacceptable concentrations of chemical contaminants remain, the excavation and stockpiling process will be required at the relevant location(s).

9.6 Validation Reporting

A Validation Report will be prepared by the Validation Consultant on completion of remediation works. The report will contain an overview of the remediation activities conducted and details of the following:

- Volumes of excavated material and location of excavations/stockpiles;
- Field observation of the piling and excavation works, and observations of any Unexpected Finds Material;
- Tracking of materials disposed off-site or reused on other parts of the Site;
- Validation field methods;
- Plan of validation sampling locations;
- Site photographs;
- Analytical results of validation and characterisation soil samples and related QA/QC results;
- Confirmation that the proposed Aquatic Centre building concrete platform (RL 19.7 m AHD) has been constructed across most of the western portion of the Site to appropriately cap and contain the underlying fill materials;
- Confirmation that the proposed capping extends across all proposed public open space areas; and
- A conclusion regarding the completeness of remediation and the suitability of the Site for the proposed land uses.

Supporting factual evidence will be included in the report. This will include a Stockpile Register for the project, landfill disposal certificates, VENM certificates (if required), NATA ‘stamped’ laboratory analysis certificates, interpretative summary tables and an overview of the works carried out during the remediation process. The report will include an assessment of all results and evaluation of the suitability of the Site for the proposed land use.

The Validation report will be prepared in accordance with the relevant NSW EPA endorsed guideline documents.

9.7 Site Management Plan (SMP)

Part of the Site validation process will include the preparation of a SMP by the Validation Consultant in accordance with Section 3.4.6 of NSW DEC (2006) and endorsement of the SMP by the Site Auditor. The SMP will include the following:

- roles and responsibilities for implementing the SMP on an ongoing basis at the Site (including site inductions;
- the surveyed location of capped areas (confirmation via as-built construction plans);
- a summary of the CoPC and the areas of potential concern if the cap is proposed to be penetrated/excavated;

- requirement to maintain the integrity of the capping layer (refer to **Section 7.3.4**);
- management measures for potential future intrusive works within the proposed public open space areas (Gunyama Park);
- requirement to maintain a 200mm thickness of landscaping mulch above the marker material and around the trees roots to be retained on the western site boundary (refer to **Section 7.3.5**); and
- requirement for the SMP to be included in the Site's Environmental Management System.

10.0 Conclusion

This RAP has generally been prepared to meet the requirements of the DUAP and NSW EPA (1998) *Managing Land Contamination - Planning Guidelines SEPP 55 - Remediation of Land* and relevant NSW EPA endorsed guidelines including the NSW EPA (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*.

It is concluded that upon successful implementation of the preferred remediation strategy described by this RAP and in conjunction with the proposed development works, the Site will have been made suitable for the proposed Aquatic Centre facility (recreation mixed use) and Gunyama Park (recreational open space) and will ultimately result in improved groundwater quality migrating from the Site.

11.0 References

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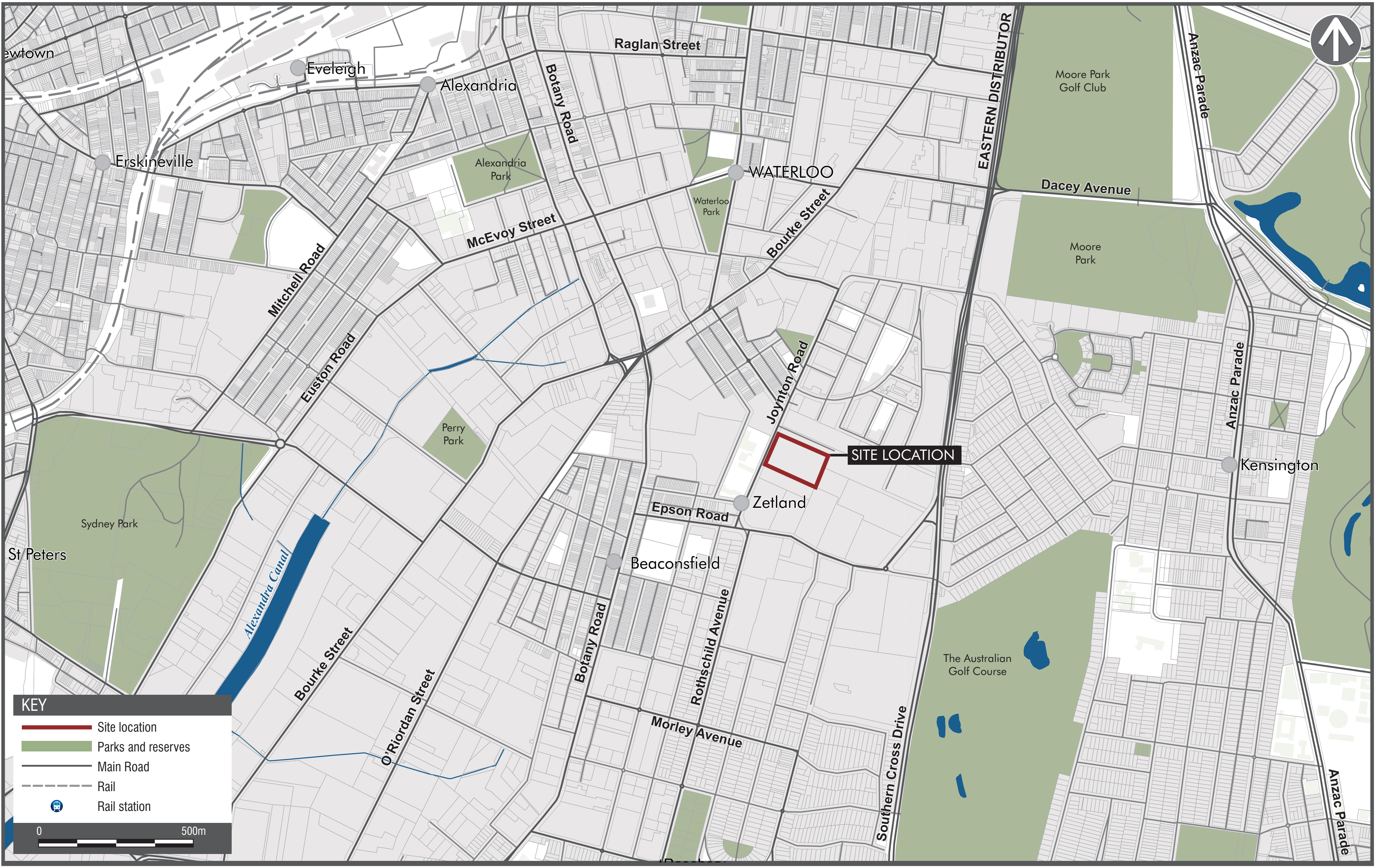
Appendix A

Site Figures



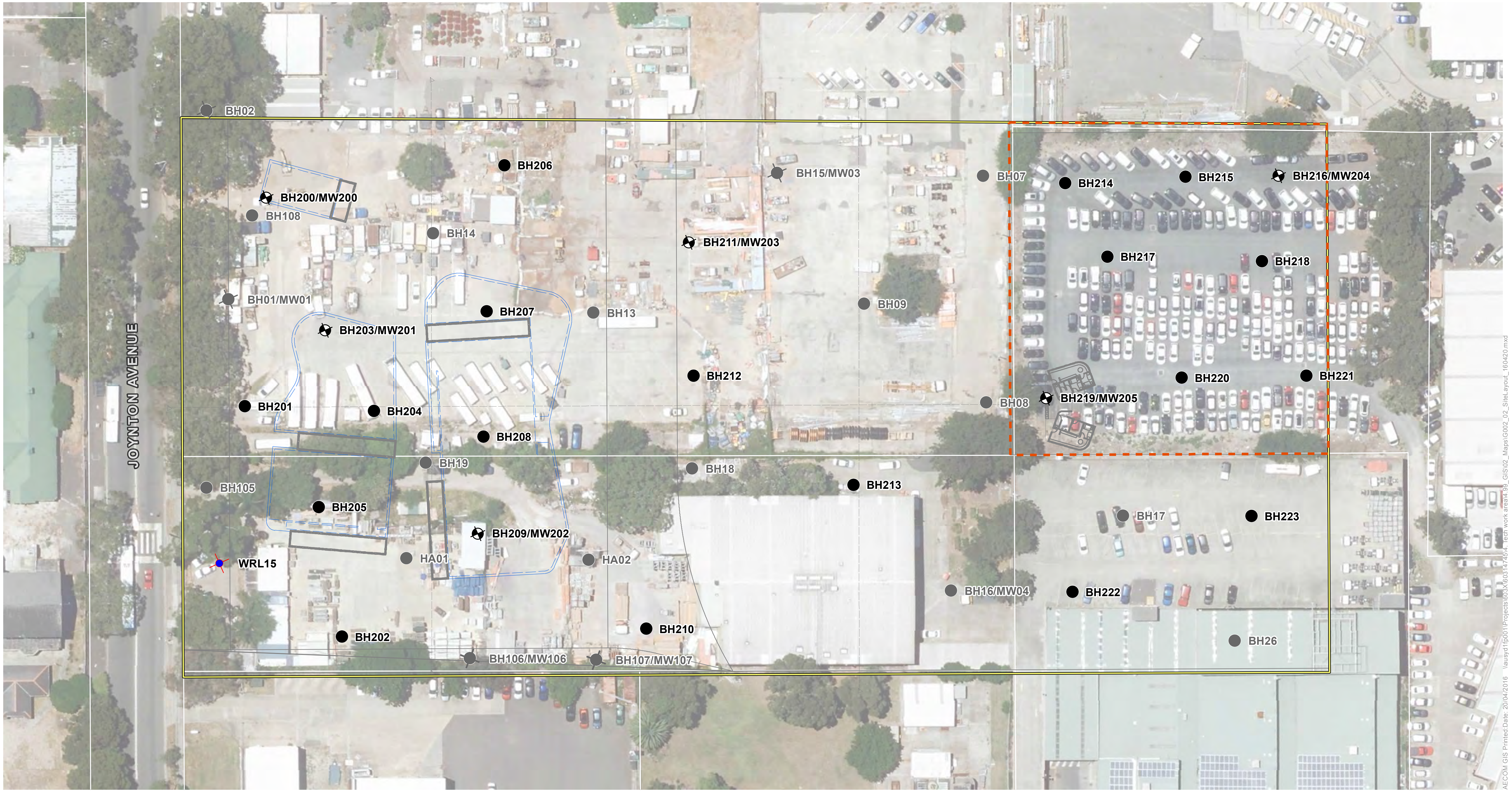
G:\Projects\603 Projects\60314745 Green Square Aquatic Centre\FIGURES\RAP\603147454 F1 Site Location 21 05 2014 TO

AECOM

SITE LOCATION

Green Square Aquatic Centre
Remedial Action Plan
132-138 Joyton Avenue, Zetland, New South Wales

FIGURE F1



KEY

▭ Site boundary

▭ Lincon development site

● AECOM (2015) borehole

⊕ AECOM (2015) monitoring well

✛ Water Research Laboratory (2007) monitoring well

— Swimming pool excavation areas

✱ ENSR (2008) borehole

✛ ENSR (2008) monitoring well

● HLA (2002) borehole

0 10 20 m

SCALE
1:800

SIZE
A3

SHEET
1 of 1

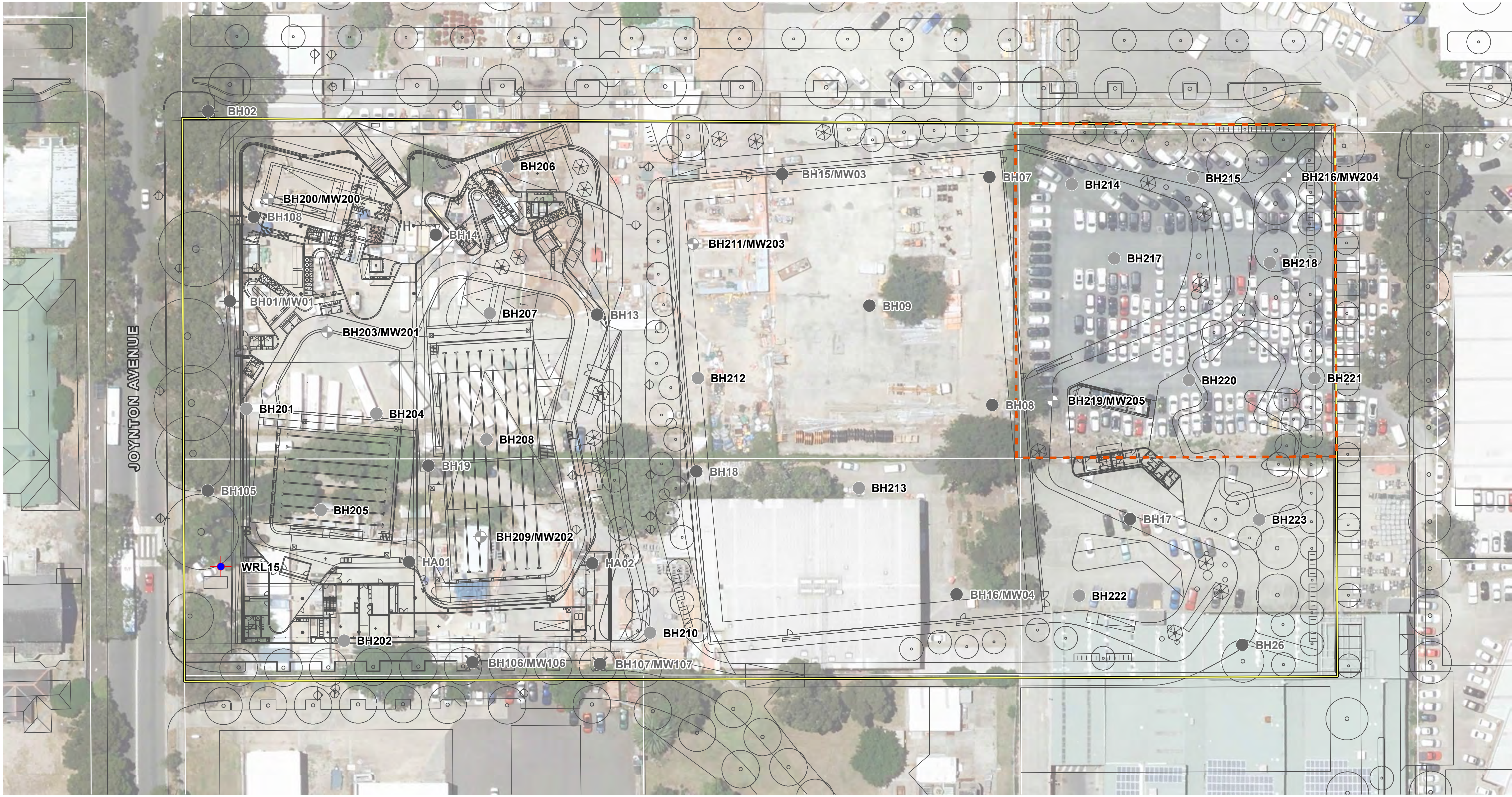
COORDINATE SYSTEM
GDA 1994 MGA Zone 56

TITLE
FIGURE 2 - Site layout and sampling locations

PROJECT
GREEN SQUARE AQUATIC CENTRE

CLIENT
CITY OF SYDNEY

DRAWN	DATE	MAP #	REV	Project
SC	20/04/2016	G002	02	60314745
CHECK	DATE			



KEY

▭	Site boundary
▭	Lincon development site
●	AECOM (2015) borehole
⊕	AECOM (2015) monitoring well
⊕	Water Research Laboratory (2007) monitoring well
●	ENSR (2008) borehole
⊕	ENSR (2008) monitoring well
●	HLA (2002) borehole

0 10 20 m

SCALE
1:800

SIZE
A3

SHEET
1 of 1

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

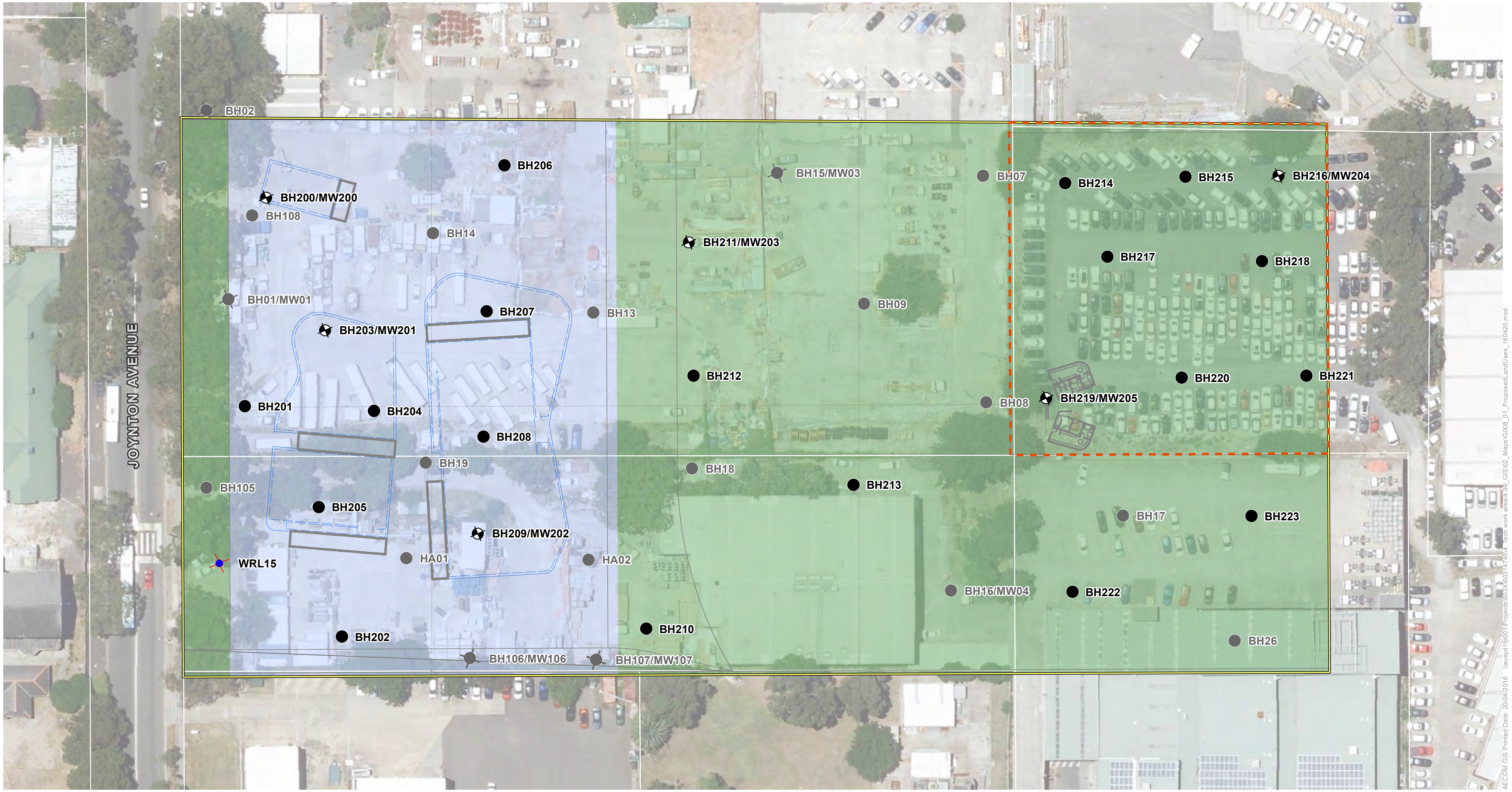
TITLE
FIGURE 3 - Proposed development features

PROJECT
GREEN SQUARE AQUATIC CENTRE

CLIENT
CITY OF SYDNEY

DRAWN	DATE	MAP #	REV	Project
SC	20/04/2016	G007	01	60314745
CHECK	DATE			

AECOM GIS Printed:Date: 20/04/2016 \\ausyd1fp001\Projects\603X\60314745\4. Tech work area\4.99_GIS\02_Maps\G007_01_ProposedDevelopment_160420.mxd



AECOM GIS Printed:Date: 20/04/2016 \\ausyd1fp001\Projects\603X\60314745\4. Tech work area\4.99_GIS\02_Maps\G008_01_ProposedLandUses_160420.mxd

KEY

▭	Site boundary
▭	Lincon development site
●	AECOM (2015) borehole
⊕	AECOM (2015) monitoring well
✛	Water Research Laboratory (2007) monitoring well
—	Swimming pool excavation areas
✕	ENSR (2008) borehole
✛	ENSR (2008) monitoring well
●	HLA (2002) borehole
🟦	Commercial/recreation mixed use
🟩	Recreational open space

0 10 20 m

Disclaimer Spatial data used under licence from Land and Property Management Authority, NSW © 2015.

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SCALE
1:800

SIZE
A3

SHEET
1 of 1

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

TITLE
FIGURE 4 - Proposed land uses

PROJECT
GREEN SQUARE AQUATIC CENTRE

CLIENT
CITY OF SYDNEY

DRAWN	DATE	MAP #	REV	Project
SC	20/04/2016	G008	01	60314745
CHECK	DATE			

Appendix B

Council Development Plans

GUNYAMA PARK AQUATIC AND RECREATION CENTRE

LANDSCAPE WORKS

132 - 140 Joynton Avenue, Zetland NSW 2017

ISSUED: 13.05.16 FOR DEVELOPMENT APPLICATION REV: -

Drawing Number	Drawing Title	Scale	Issue
ARC-T-DA-001	DRAWING LIST & SITE CONTEXT PLAN	1:750@A1	Development Application
ARC-T-DA-002	LANDSCAPE LEGEND & MATERIALS	NTS	Development Application
ARC-T-DA-003	TREE PROTECTION & REMOVAL PLAN	1:350@A1	Development Application
ARC-T-DA-004	GENERAL ARRANGEMENT PLAN	1:350@A1	Development Application
ARC-T-DA-005	FURNITURE & FIXTURES PLAN	1:350@A1	Development Application
ARC-T-DA-006	GRADING PLAN	1:350@A1	Development Application
ARC-T-DA-007	PLANTING STRATEGY	1:350@A1	Development Application
ARC-T-DA-008	LONG SECTIONS & ELEVATION	As showAs shown	Development Application
ARC-T-DA-009	SECTIONS	1:50@A1	Development Application
ARC-T-DA-010	DETAILED PLAYGROUND PLAN	1:100@A1	Development Application
ARC-T-DA-011	DETAILED PLAYGROUND	1:50@A1	Development Application
ARC-T-DA-012	DETAILED PLAYGROUND	NTS	Development Application

01 SITE CONTEXT
Plan
scale 1:750@A1

0 10 20m 30m 40m

DRAWING NOTES
DEVELOPMENT OUTSIDE OF SITE BOUNDARY IS SHOWN FOR INFORMATION ONLY

A1

INTELLECTUAL PROPERTY

NOTES

DO NOT SCALE OFF DRAWINGS

LEGEND

▬ ▬ Site Boundary

REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
-	13.05.16	DEVELOPMENT APPLICATION

HEAD CONSULTANT TEAM

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre
132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Drawing List & Site Context Plan

DRAWN: AL
CHECKED: SA
SCALE: 1:750
FIRST ISSUE: 13/05/16

N

DRAWING NO: ARC-T-DA-001
REV: A

LANDSCAPE TYPES SCHEDULE

PV01
Location: Circuit Path

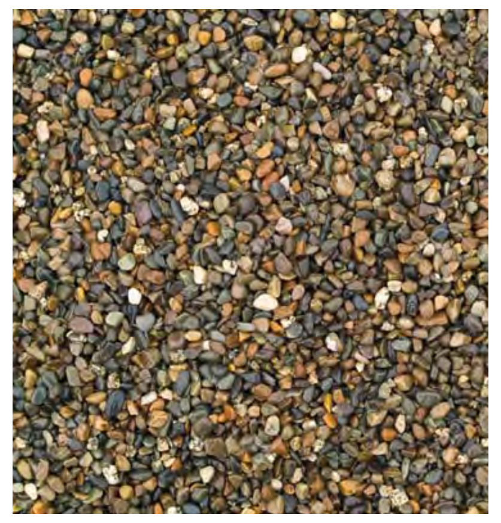
Concrete - Trafficable
Special Class Mix A in situ concrete. - Type 1

PV02
Location: Secondary path network

Concrete - Trafficable
Special Class Mix A in situ concrete. - Type 2

PV03
Location: Playground

Soft fall sand
(To meet AS4422)

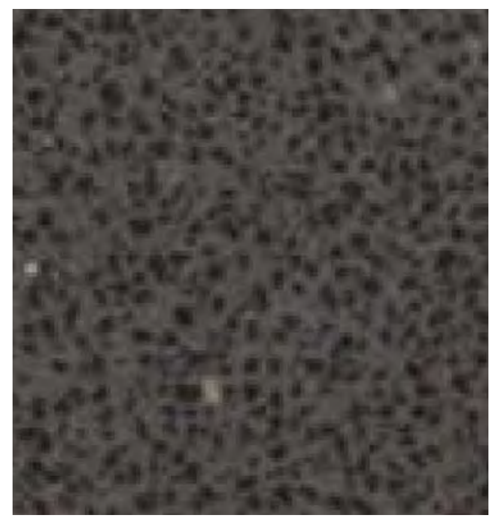


PV04
Location: Playground

Softfall pea gravel
(To meet AS4422 & AS 4685:2014)

PV05
Location: Playground

Soft fall mulch
(To meet AS4422 & AS 4685:2014)



PV06
Location: Streetscape

Adbri 600 x400mm Sydney City Charcoal - EDR1093
(Type 1) (orientated perpendicular to kerb)

PV07
Location: Playground

Softfall - Rubaroc
Colour: 'Slate'

PV08
Location: Streetscape Parking

Trihex Concrete Paving
Colour: Charcoal

TD01
Location: Circuit path & turf interface

Timber Decking, 30x40mm
Kiln Dried Black Butt, Class 1

SL01
Location: Turf

Natural Instant Turf
Buffalo 'Sapphire'

SL02
Location: Sports field

Synthetic Turf,
Specified by City of Sydney

SL03
Location: Garden Bed Berms

Organic Mulch
'Eucy mulch or approved equivalent

SL04
Location: Garden Bed

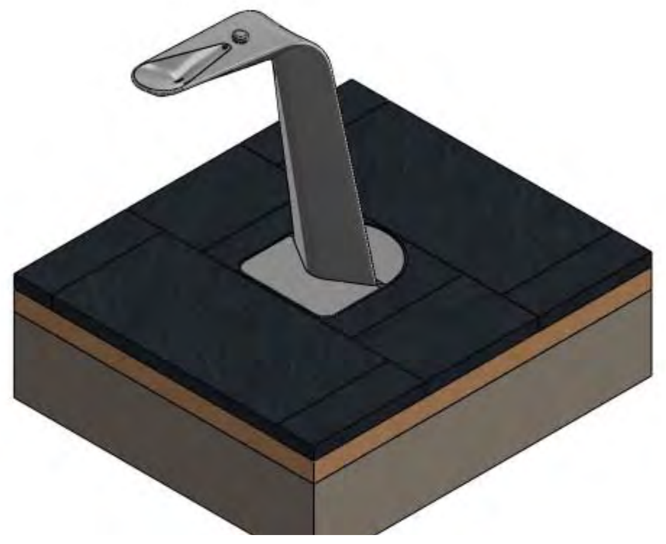
Sandstone Mulch, size 20-40mm

Stepping Stones
Location: Garden Bed, Playground

Sandstone rock, size 300-600mm

FURNITURE & FIXTURES SCHEDULE

PROPRIETARY FURNITURE

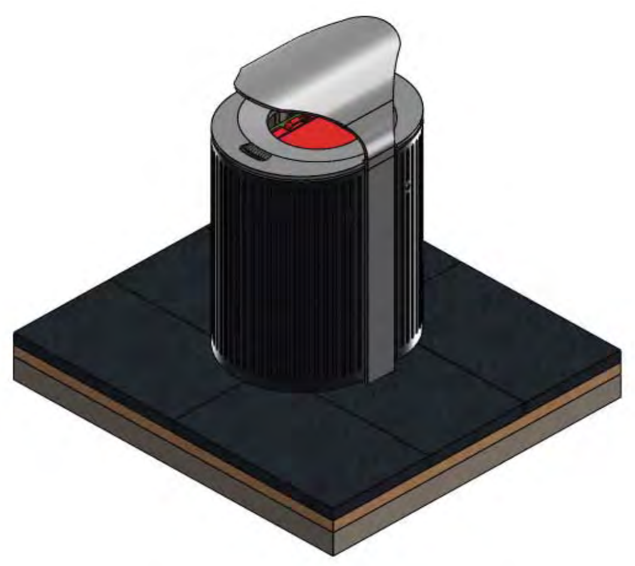


FN01
Location: Refer Furniture & Fixtures Plan

Ambulant Access Bubbler for CoS Standard Standard, with dog bowl

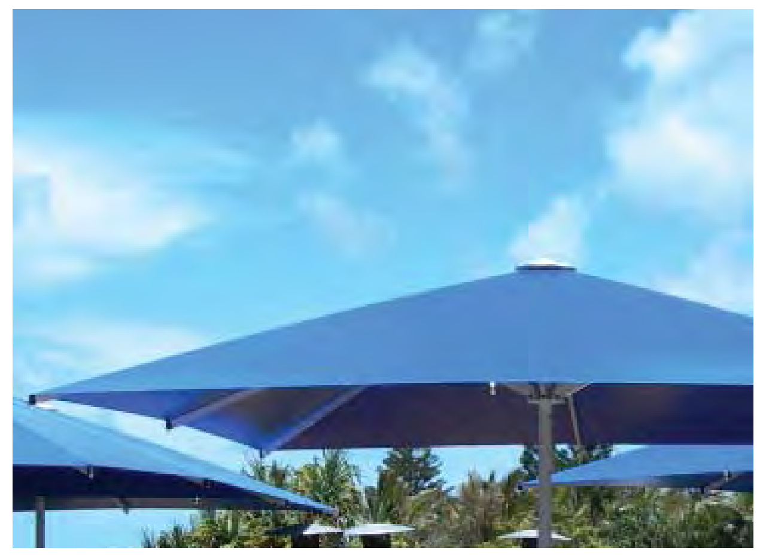
FN02
Location: Refer Furniture & Fixtures Plan

Bicycle Hoop
SS LEDA Bike Rail



FN03
Location: Refer Furniture & Fixtures Plan

CoS Standard Recycle Bin & Refuse



FN04
Location: Refer Furniture & Fixtures Plan

Shade Umbrella
UltraShade Heavy Duty Commercial Grade Square Umbrella with waterproof 100% acrylic canvas.

FX04
Location: Refer Furniture & Fixtures Plan

BBQ's brushed stainless steel, Christie Parksafe

FX05
Location: Refer Furniture & Fixtures Plan

Tree Grate, Stainless steel top with galv. frame

FN05
Location: Playground, refer Furniture & Fixtures Plan

Multiple layering of draped camo netting

Barrier Net Post
Location: Sportsfield
Proprietary Post & net
25m W x 7m H

CUSTOM FURNITURE

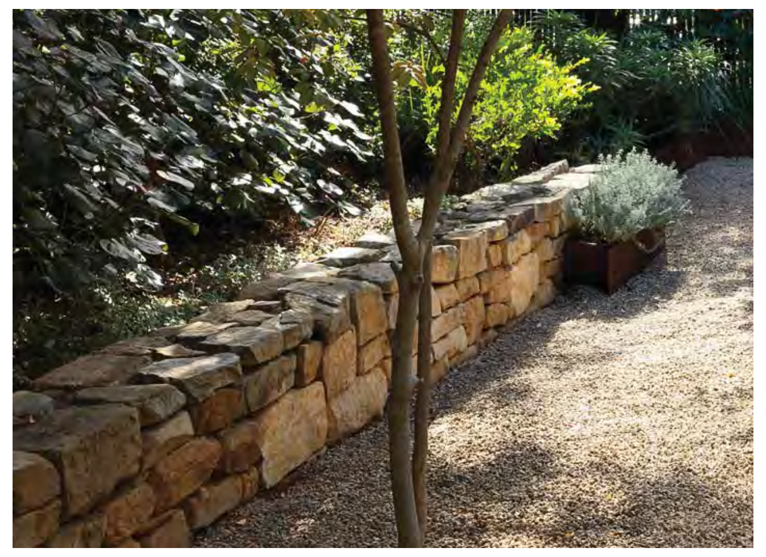
Seat Type 1
Location: Circuit Path
CoS Standard seat with timber seat & backrest
- customised length
- Bronze finish (Green Square Material Palette)
- with locations for wheelchair access

Seat Type 2
Location: Playground
Circular / Deck seat, 3000m D

Picnic Table
Location: BBQ Areas
Brushed stainless steel round table & bench with allowance for wheelchair

Seat Type 3
Location: Circuit Path
CoS Standard picnic seat (only) with timber.
- customised length
- Bonze finish (Green Square Material Palette)

Seat Type 4
Location: Refer Furniture & Fixtures Plan
Concrete Plinth, refer Architectural documentaiton



Seat Type 5
Location: Playground, Refer Furniture & Fixtures Plan
Sandstone Drystone wall. 400mm H

INTELLECTUAL PROPERTY

NOTES

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-	13.05.16	DEVELOPMENT APPLICATION

HEAD CONSULTANT TEAM

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

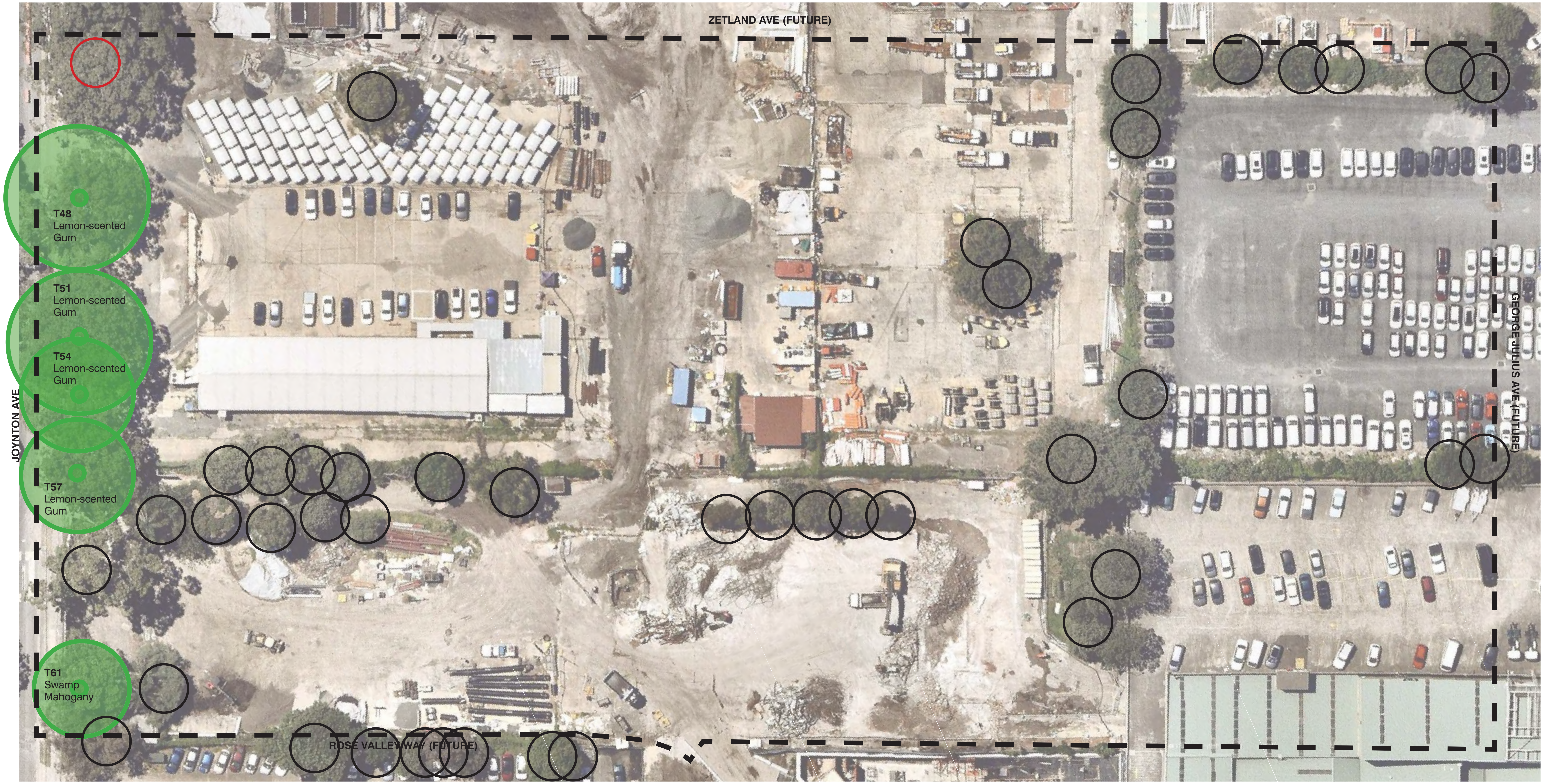
132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Landscape Legend & Materials

DRAWN: AL
CHECKED: SA
SCALE: NTS
FIRST ISSUE: 13/05/16

DRAWING NO	REV
ARC-T-DA-002	A



SCALE 1:350@A1

0 5 10 15 20m

DRAWING NOTES
REFER TO TREE ASSESSMENT REPORT & TREE PROTECTION PLAN BY ARBORIST.
REFER TO DEMOLITION PLAN (CIVIL ENGINEERING) FOR ALL HARDSCAPE ELEMENTS

NOTES

DO NOT SCALE OFF DRAWINGS

LEGEND

- ▬ ▬ Site Boundary
- 🟢 Existing Trees to be retained & protected
  Tree protection fencing to be installed prior to the commencement of works. Refer Tree Assesment Report & Tree Protection Plan by Arborist.
- ○ Existing Trees to be removed
- ⭕ Existing Trees to be removed (By others during roadworks)

REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
-	13.05.16	DEVELOPMENT APPLICATION

HEAD CONSULTANT TEAM

ABA
GRIMSHAW

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

T.C.L

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Tree Protection & Removal Plan

DRAWN: AL
CHECKED: SA
SCALE: 1:350
FIRST ISSUE: 13/05/16

DRAWING NO: ARC-T-DA-003
REV: A

NOTES

DO NOT SCALE OFF DRAWINGS

LEGEND

▬ ▬	Site Boundary
	Existing Trees to be protected
	Proposed Street trees
	Proposed tree & tall shrub planting
🟩	Proposed lower shrubs & groundcover
🟩	Green Roof
①	Aquatic & Recreation Centre
②	Entry
③	Café
④	Circuit Path
⑤	Overland Flow & Trunk drain (below)
⑥	Bike Parking
⑦	Rain Garden
⑧	Artwork
⑨	Mounded garden beds
⑩	Amenities Buildings, with canopy over
⑪	Exercise Station
⑫	Sports Field
⑬	Terrace & Seating Edge
⑭	BBQ Facilities
⑮	Lawn
⑯	Play Space
⑰	Skate Bowl
⑱	GPT locations in paving
⑲	Park Entry plaza
⑳	Skateable Moment
㉑	Landscape Setback
PV01	Concrete Type 1
PV02	Concrete Type 2
PV03	Softfall Pea Gravel
PV04	Softfall Sand
PV05	Softfall Mulch
PV06	Concrete Pavers
PV07	Rubaroc
PV08	Trihex Concrete Paving
TD01	Timber Decking
SL01	Natural Instant Turf
SL02	Synthetic Turf
SL03	Organic Mulch
SL04	Sandstone Mulch

REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
-	13.05.16	DEVELOPMENT APPLICATION

HEAD CONSULTANT TEAM

ABA GRIMSHAW

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

T.C.L

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

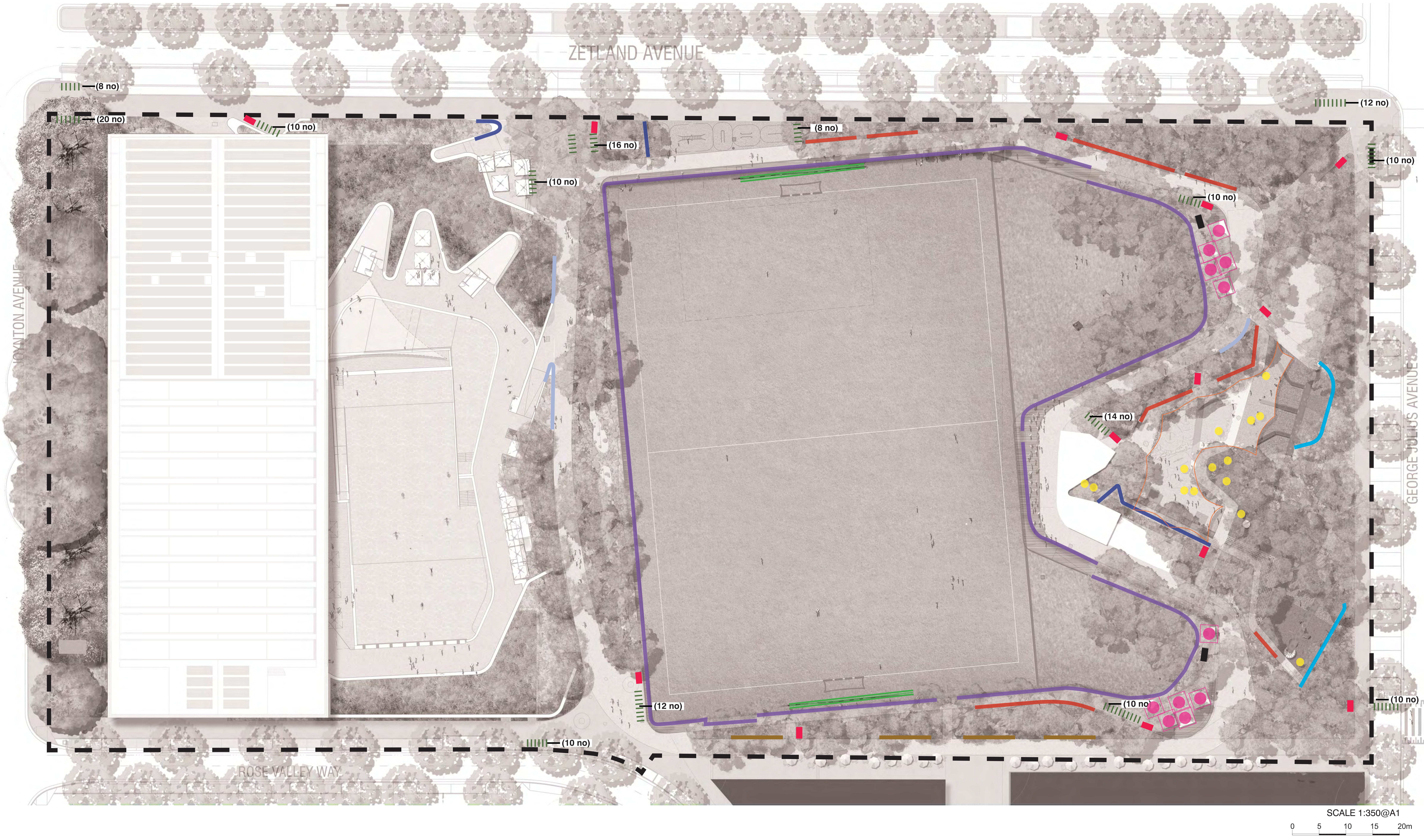
General Arrangment Plan

N

DRAWN: AL
CHECKED: SA
SCALE: 1:350 @A1
FIRST ISSUE: 13/05/16
DRAWING NO
REV

ARC-T-DA-004

DRAWING NOTES
REFER ARCHITECTURE PLANS FOR FULL DETAILS ON AQUATIC & RECREATION CENTRE
REFER LANDSCAPE LEGEND & MATERIALS (ARC-T-DA-002)



NOTES

DO NOT SCALE OFF DRAWINGS

LEGEND

▬ ▬	Site Boundary
	FN01- Drinking Fountain. Refer Furniture & Fixtures Schedule
🟩	FN02 - Bicycle Hoop Refer Furniture & Fixtures Schedule
🟥	FN03 - Recycle Bin & Refuse Refer Furniture & Fixtures Schedule
☐	FN04 - Shade Umbrellas Refer Furniture & Fixtures Schedule
☐	FN05 - Shade Netting Refer Furniture & Fixtures Schedule
■	FX04 - BBQ Refer Furniture & Fixtures Schedule
▬	Seat Type 1 - Timber with backrest Refer Furniture & Fixtures Schedule
●	Seat Type 2 - Circular Seat Refer Furniture & Fixtures Schedule
▬	Seat Type 3 - Timber seat Refer Furniture & Fixtures Schedule
▬	Seat Type 4 - Concrete Plinth Refer Furniture & Fixtures Schedule
▬	Seat Type 5 - Drystone Plinth Refer Furniture & Fixtures Schedule
●	Picnic Table - Round table & chair Refer Furniture & Fixtures Schedule
▬	Timber Terrace Seating Edge
▬	Skateable Moment
▬	Field Netting

REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
-	13.05.16	DEVELOPMENT APPLICATION

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385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Furniture & FixturesPlan

N

DRAWN: AL
CHECKED: SA
SCALE: 1:350 @A1
FIRST ISSUE: 13/05/16
DRAWING NO
REV

ARC-T-DA-005

DRAWING NOTES
REFER LIGHTING ENGINEER DOCUMENTATION FOR LIGHTING STRATEGY
REFER LANDSCAPE LEGEND & MATERIALS (ARC-T-DA-002)

SCALE 1:350@A1

0 5 10 15 20m

INTELLECTUAL PROPERTY

NOTES

DO NOT SCALE OFF DRAWINGS

LEGEND

▬ ▬	Site Boundary
+RLXX.XX	Proposed level
+EXXX.XX	Existing level
+HPXX.XX	High point
400	Wall / edge height
– – – – –	100mm contours
←	Fall

REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
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ABA
GRIMSHAW

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T.C.L

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385 Drummond Street
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t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

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Zetland NSW 2017
Australia

TITLE

Grading Plan

N

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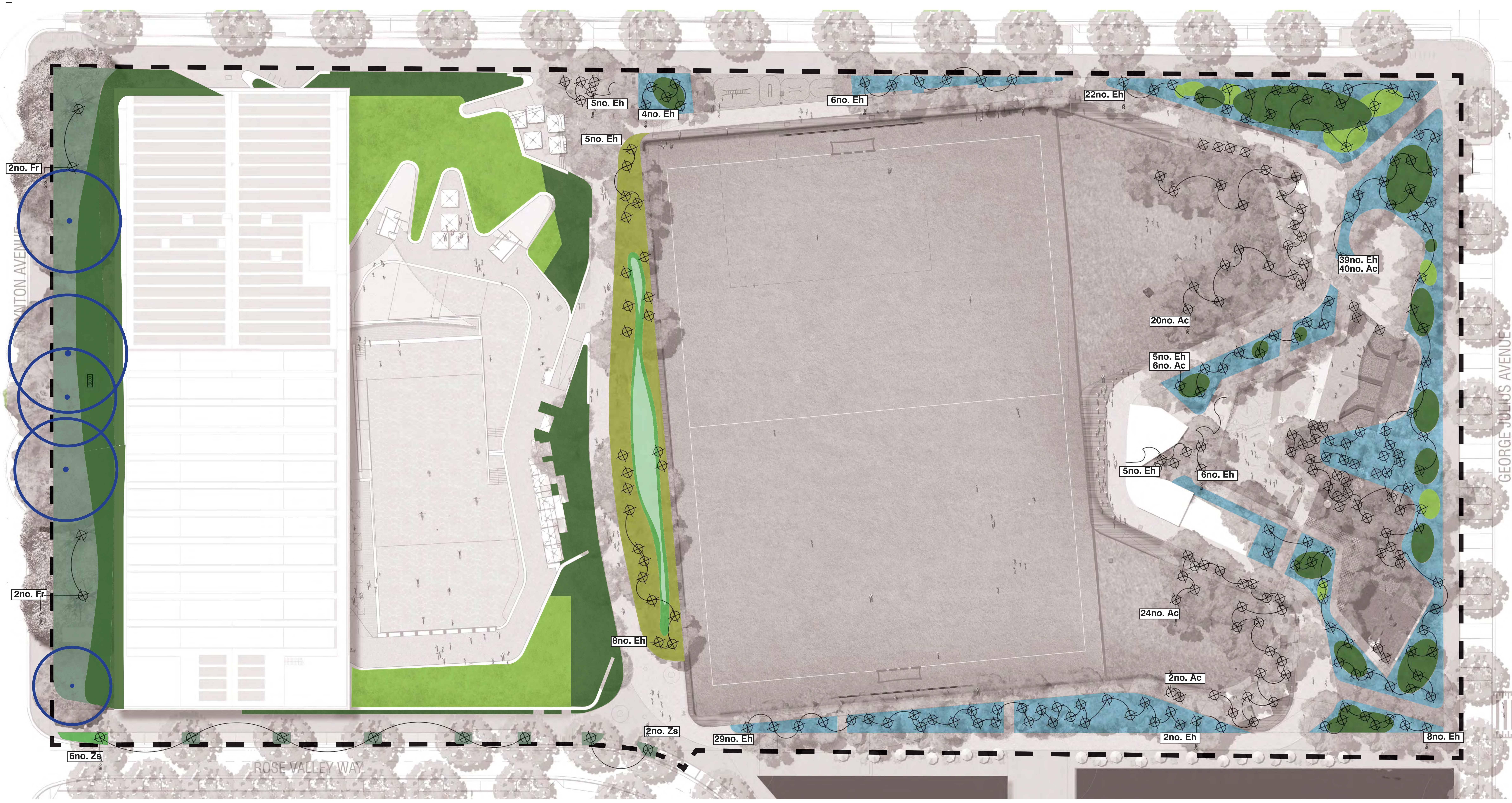
CHECKED: SA
SCALE: 1:350 @A1
FIRST ISSUE: 13/05/16
DRAWING NO
REV

ARC-T-DA-006



INTELLECTUAL PROPERTY

NOTES

DO NOT SCALE OFF DRAWINGS

LEGEND

▬ ▬ Site Boundary

○ Existing Trees to be protected

⊗ Proposed Trees

PLANTING SCHEDULE

	Species	Common Name	Qty	Size
Fr	Ficus rubiginosa	Port Jackson fig	4	700L
Zs	Zelkova serrata	Japanese Zelkova (TBC by CoS)	8	700L
Ac	Angophora costata	Smooth-barked Apple	92	700L
Eh	Eucalyptus haemastoma	Broad-leaved Scribbly Gum	144	700L

PLANT MIX A - SHRUBS

	Species	Common Name	Cts	Size (Pots/mm)
🟩	*Acacia suaveolens*	Sweet Wattle	1000	200
	Actinotus helianthi	Flannel Flower	500	200
	Banksia aemula	Wallum banksia	1000	200
	Banksia ericifolia (s)	Old Man Bansia	1000	200
	Bauera rubioides (s)	Dog rose	500	200
	Boronia pinnata	Variable Bossiaea	500	200
	Callistemon citrinus (s)	Crimson Bottlebrush	1000	200
	Correa alba	White Correa	500	200
	Correa reflexa	Native Fuchsia	500	200
	Cryptandra amara	Pretty pearlflower	500	200
	Darwinia fascicularis	Sydney Wattle	1000	200
	Epacris longiflora	The Fuchsia Heath	500	200
	Eriostemon australasius	Pink Wax Flower	500	200
	Eriostemon buxifolius	Box-leaf waxflower	500	200
	Goodenia ovata	hop goodenia	500	200
	Grevillea speciosa	Red Spider Flower	800	200
	Grevillea mucronulata	Green Spider Flower	500	200
	Hakea dactyloides	Finger Hakea	800	200
	Hakea teretifolia (s)	Dagger Hakea	800	200
	Hardenbergia violacea	Happy Wanderer	500	200
	Hibbertia scandens	Snake Vine	500	200
	Isopogon anemonifolius	Broad-leaved Drumsticks	500	200
	Isopogon anethifolius	Narrow-leaved Drumstick	500	200
	Kennedia rubicunda (herb)	Dusky Coral Pea	500	200
	Kunzea ambigua	Tick Bush	800	200
	Lasiopetalum ferrugineum	Rusty Velvet Bush	500	200
	Leptospermum laevigatum	Coastal Tee Tree	1000	200
	Melaleuca squamea (s)	Swamp Honey Myrtle	500	200
	Melaleuca thymifolia	Thyme Honey-myrtle	500	200
	Persoonia lanceolata	the lance-leaf geebung	1000	200
	Persoonia levis	Broad-leaved geebung	800	200
	Platysace lanceolata	Shrubby Platysace	500	200
	Rhagodia candolleana	Seaberry Saltbush	500	200
	Stylidium graminifolium (herb)	The grass triggerplant	500	200
	Viminaria juncea (s)	Golden Spray	500	200
	Westringia fruticosa	Coastal Rosemary	500	200
	Zieria pilosa	Pilose-leafed Zieria, Hairy Zieria	500	200
	Pteridium esculentum	Austral Bracken	500	200

PLANT MIX B - GRASSES

	Species	Common Name	Cts	Size (Pots/mm)
🟩	*Austrostipa pubescens*		300	200
	Dichelachne crinita	Lnghair Plme Grass	300	200
	Lomandra longifolia	spiny-headed mat-rush	300	200

PLANT MIX C - GROUNDCOVERS

	Species	Common Name	Cts	Size (Pots/mm)
🟦	*Actinotus helianthi*	Flannel Flower	300	200
	Dampiera stricta		300	200
	Dianella revoluta	Flax-lily	300	200
	Pandorea pandorana	wonga wonga vine	300	200
	Patersonia glabrata	Leafy Purple-flag	300	200
	Gahnia sieberiana (s)	Red-fruit saw-sedge	300	200
	Lepidosperma laterale	Sharp Sword-sedge	300	200
	Leptocarpus tenax (s)	Slender Twine Rush	300	200
	Lepyrodia scariosa	Scale Rush	300	200
	Lomandra glauca	Aussie Blue Grass	300	200
	Lomandra longifolia	Spiky-head mat-rush	300	200
	Billardiera scandens		300	200
	Hardenbergia violacea	False Sarsaparilla	300	200
	Hibbertia scandens	Guinea Flower	300	200
	Pteridium esculentum	Austral Bracken	300	200

NT MIX D - WETLAND - MARSH

	Species	Common Name	Cts	Size (Pots/mm)
🟩	*Baloskion tetraphyllum*	Plume Rush	300	200
	Baumea articulata	Jointed Twig-rush	300	200
	Baumea juncea	Bare Twigrush	300	200
	Bolboschoenus caldwelli	Marsh Club-rush	300	200
	Bolboschoenus fluviatilis		300	200
	Eleocharis acuta		300	200
	Schoeneplectus mucronatus	Rough-seed Bulrush	300	200
	Schoeneplectus validus	Softstem Bulrush	300	200
	Triglochin procera	Water Ribbons	300	200

NT MIX E - WETLAND - EPHEMERAL

	Species	Common Name	Cts	Size (Pots/mm)
🟩	*Carex appressa*	Tall sedge	300	200
	Dianella revoluta	Blue Flax-lily	300	200
	Ficina nodosa	Knobby Club-rush	300	200
	Gahnia siberiana	Red-fruit saw-sedge	300	200
	Juncus usitatus		300	200
	Lomandra longifolia	Spin-head mat-rush	300	200
	Melaleuca thymifolia	Thyme Honey-myrtle	300	200
	Themeda australis	Kangaroo Grass	300	200

NT MIX F - WETLAND - FORAGING ZONE

	Species	Common Name	Cts	Size (Pots/mm)
🟨	*Baumea juncea*	Bare Twigrush	300	200
	Carex appressa	Tall sedge	300	200
	Correa alba	Native Fuchsia	300	200
	Dianella caerulea 'King Alfred'		300	200
	Doryanthes excels	Spear Lily	300	200
	Isolepsis nodosa	Knobby Club-rush	300	200
	Juncus continuus	Pithy rush	300	200
	Lomandra hystrix	Creek Matrush	300	200
	Lomandra longifolia	Spiny-head Mat-rush	300	200
	Westringia fruticosa	Native Rosemary	300	200

PLANT MIX G - JOYNTON AVENUE VERGE ZONE

	Species	Common Name	Cts	Size (Pots/mm)
🟩	*Banksia spinulosa 'Birthday Candles'*		500	200
	Ficinia nodosa	'Knobby Club Rush'	500	200
	Lomandra 'Tanika'		300	200
	Xanthorrhoea australis	Grass Tree	500	200
	Macrozamia communis	Burrawang	500	200
	Clivia belgium	Orang/Kaffir Lily	500	200
	Hedera canariensis	Canarian Ivy	500	200
	Rhaphiolepis indica 'Oriental Pear	Oriental Pearl Indian Hawthorne	500	200

SCALE 1:350@A1

0 5 10 15 20m

REV	DATE	ISSUE
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HEAD CONSULTANT TEAM

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Planting Strategy

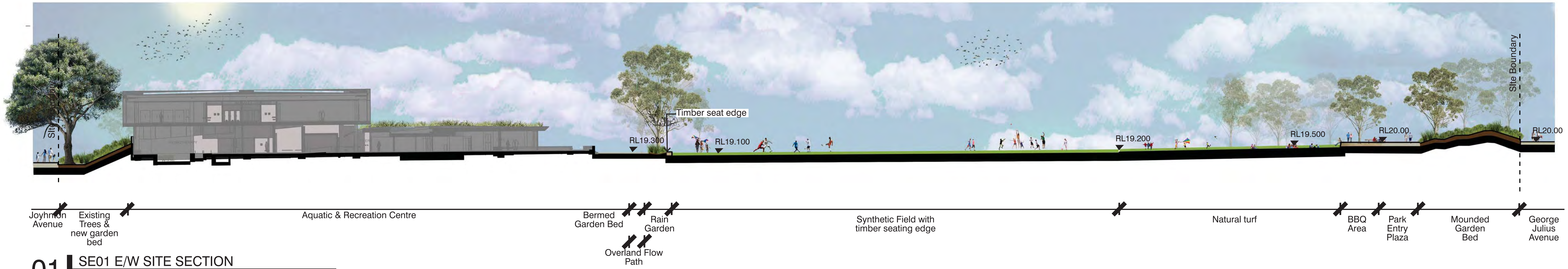
N

DRAWN: AL
CHECKED: SA
SCALE: 1:350 @A1
FIRST ISSUE: 13/05/16
DRAWING NO
REV

ARC-T-DA-007

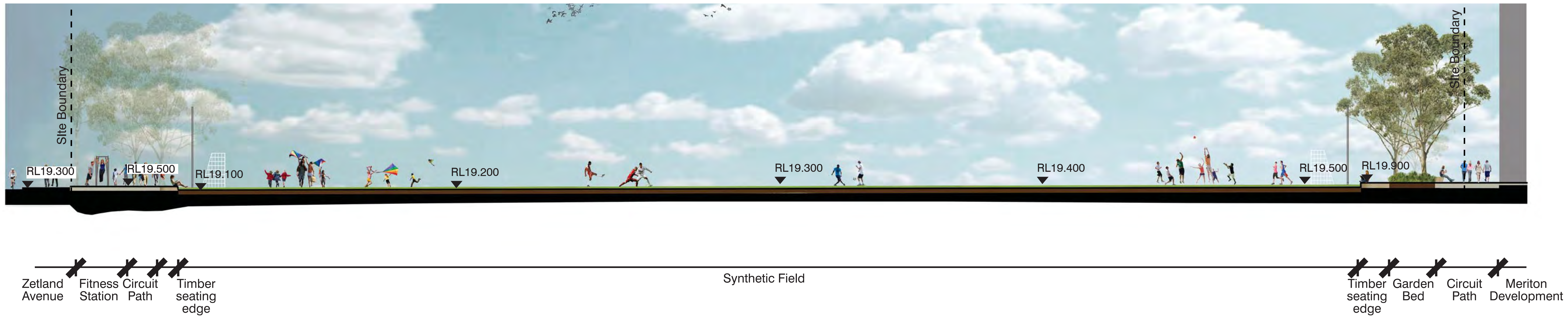
NOTES

DO NOT SCALE OFF DRAWINGS



01 SE01 E/W SITE SECTION

Long Section scale 1:350@A1



02 SE02 N/S SITE SECTION

Long Section scale 1:250@A1

03 JOYNTON AVENUE ELEVATION

Elevation scale 1:200@A1

DRAWING NOTES
REFER ARCHITECTURE PLANS FOR FULL DETAILS ON AQUATIC & RECREATION CENTRE

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ABA GRIMSHAW

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
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www.aba-architects.com.au

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Sydney NSW 2000 Australia
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www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

T.C.L

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385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
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PROJECT

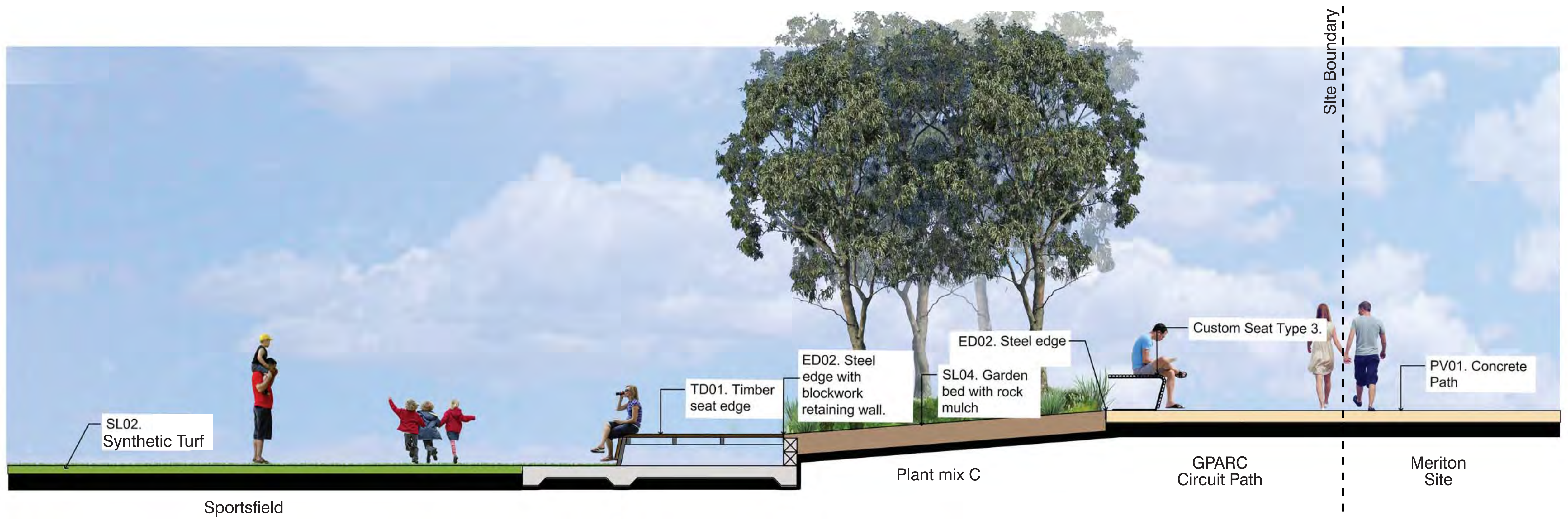
Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

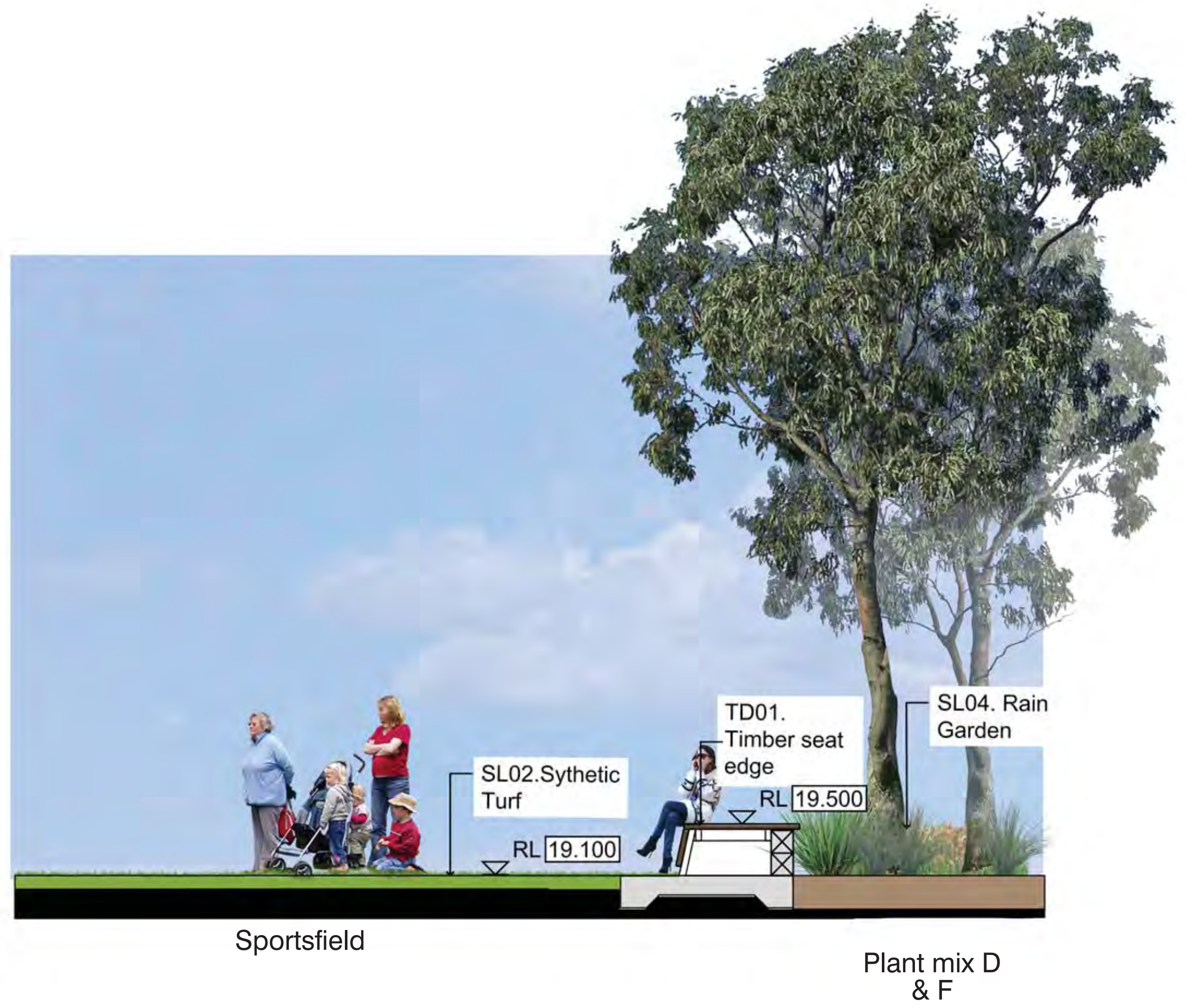
TITLE

Long Sections & Elevation

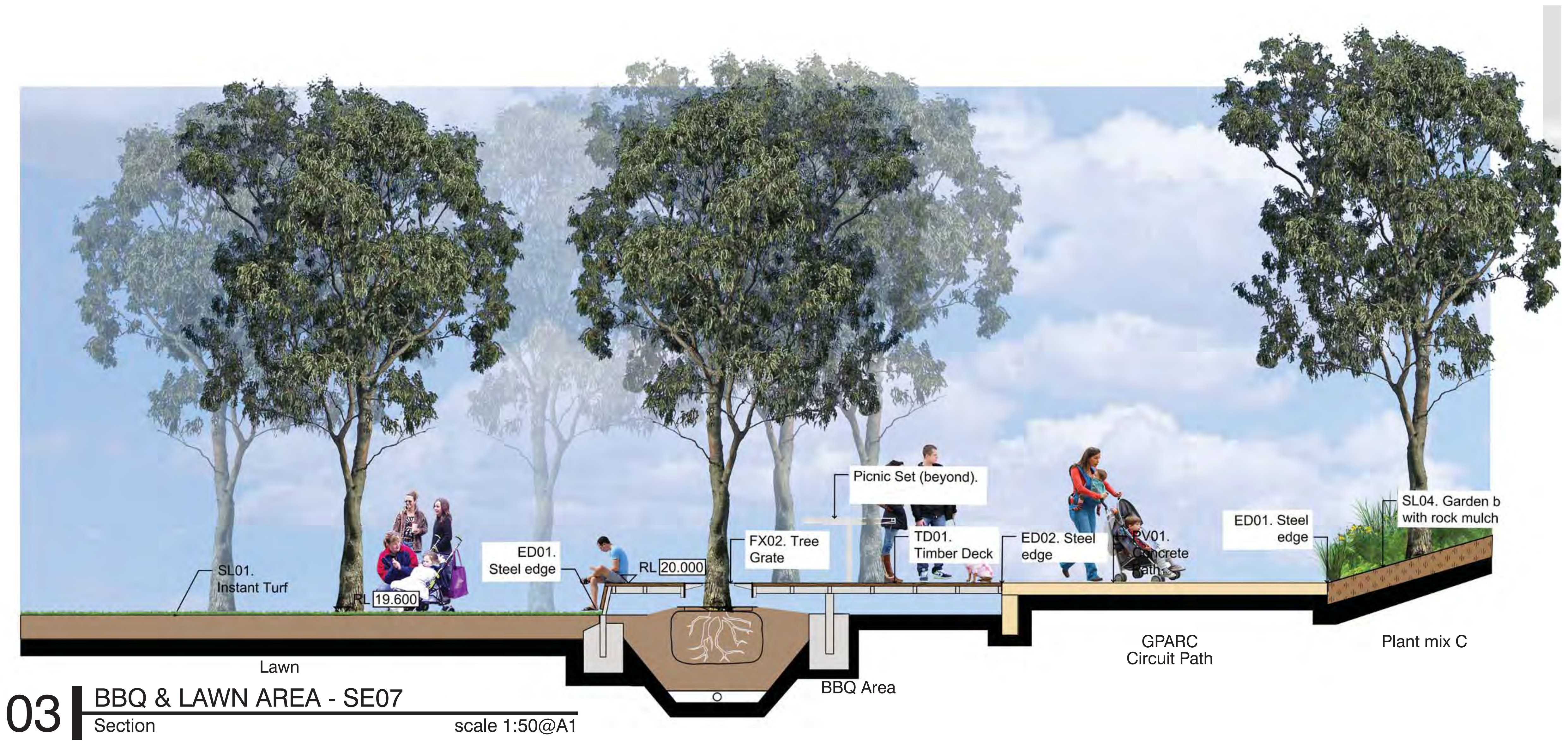
DRAWN: AL
CHECKED: SA
SCALE: As Shown @A1
FIRST ISSUE: 13/05/16
DRAWING NO
REV
ARC-T-DA-008



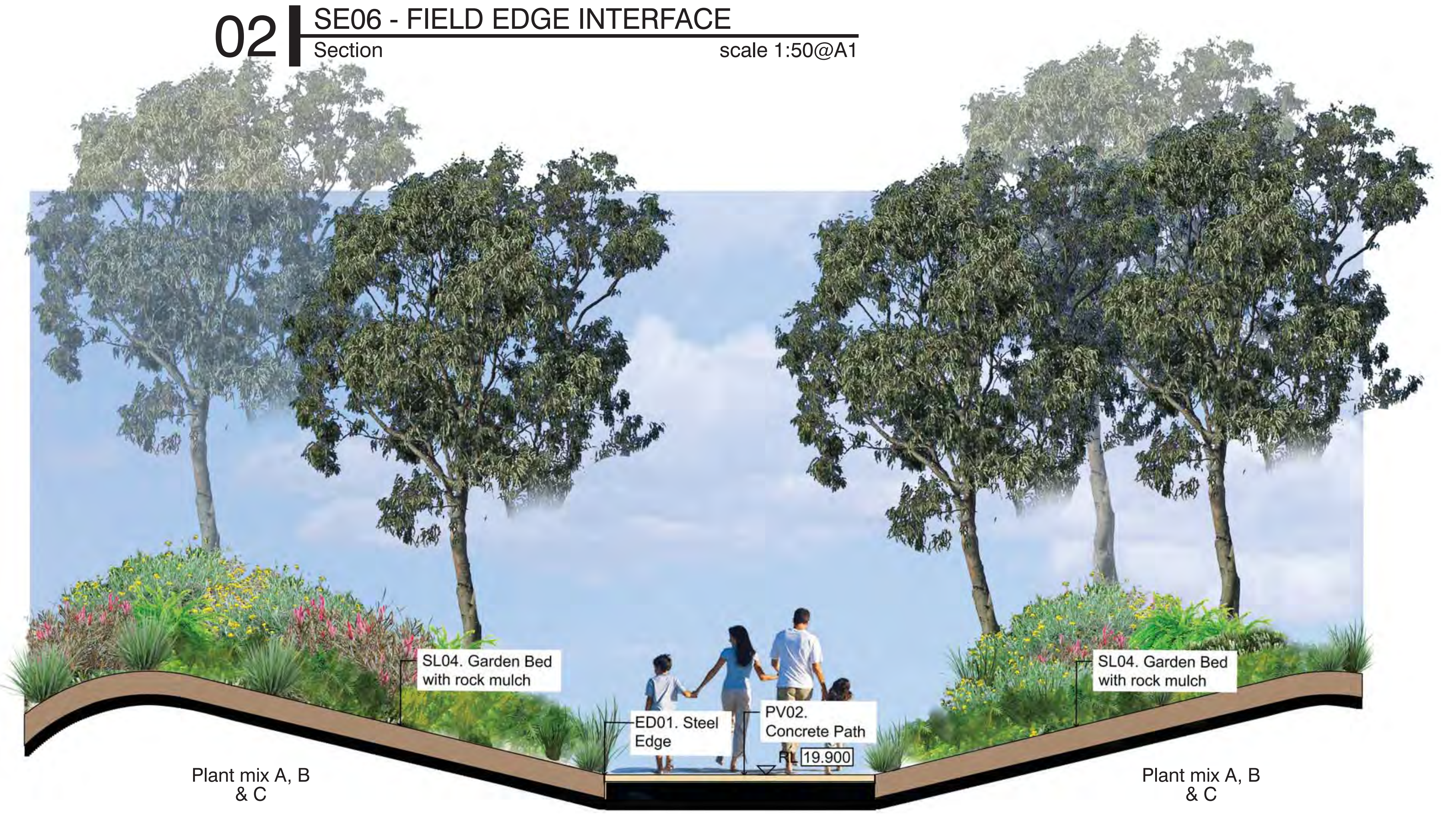
01 SE05 - SOUTHERN INTERFACE GARDEN EDGE
Section scale 1:50@A1



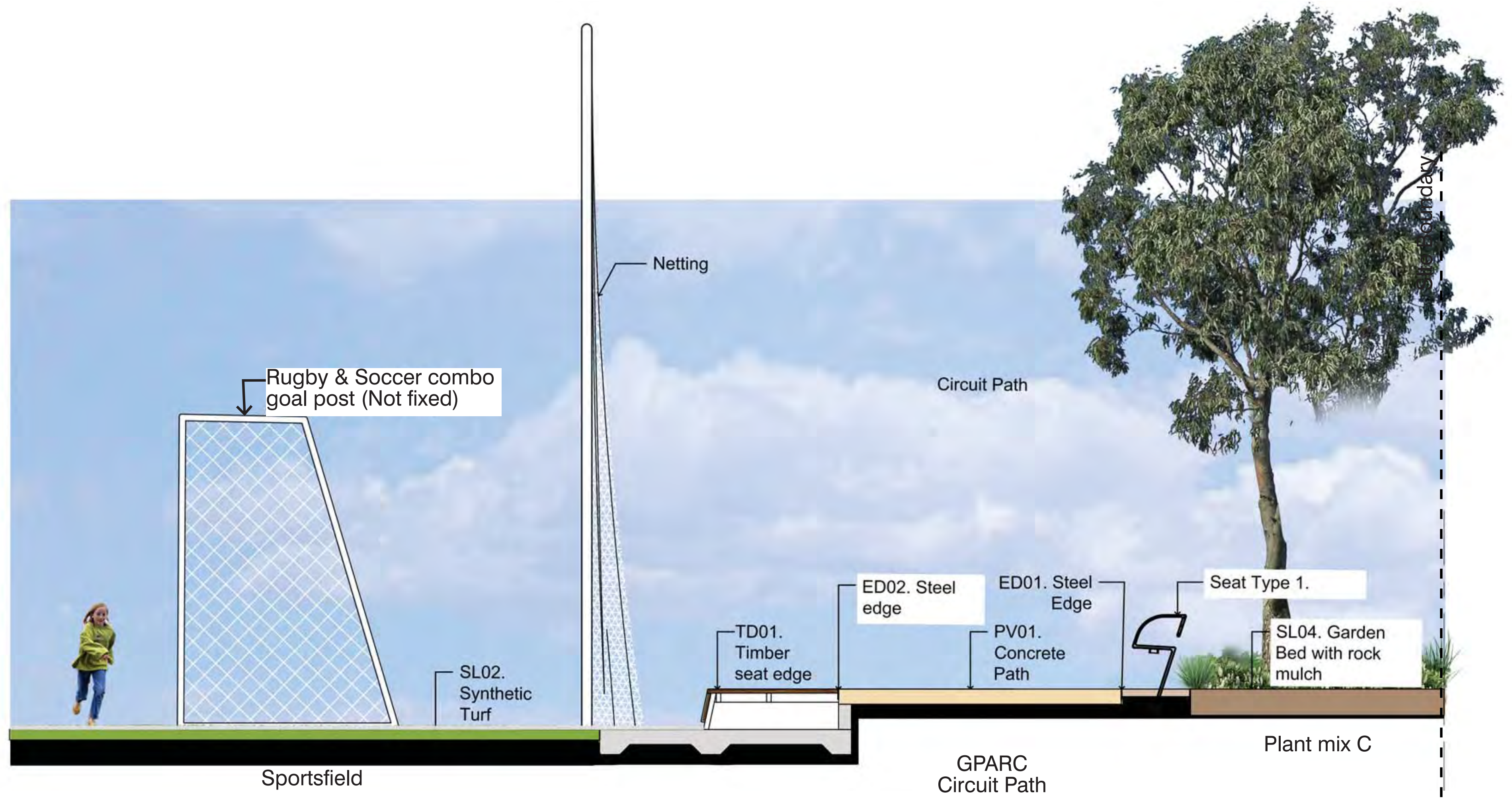
02 SE06 - FIELD EDGE INTERFACE
Section scale 1:50@A1



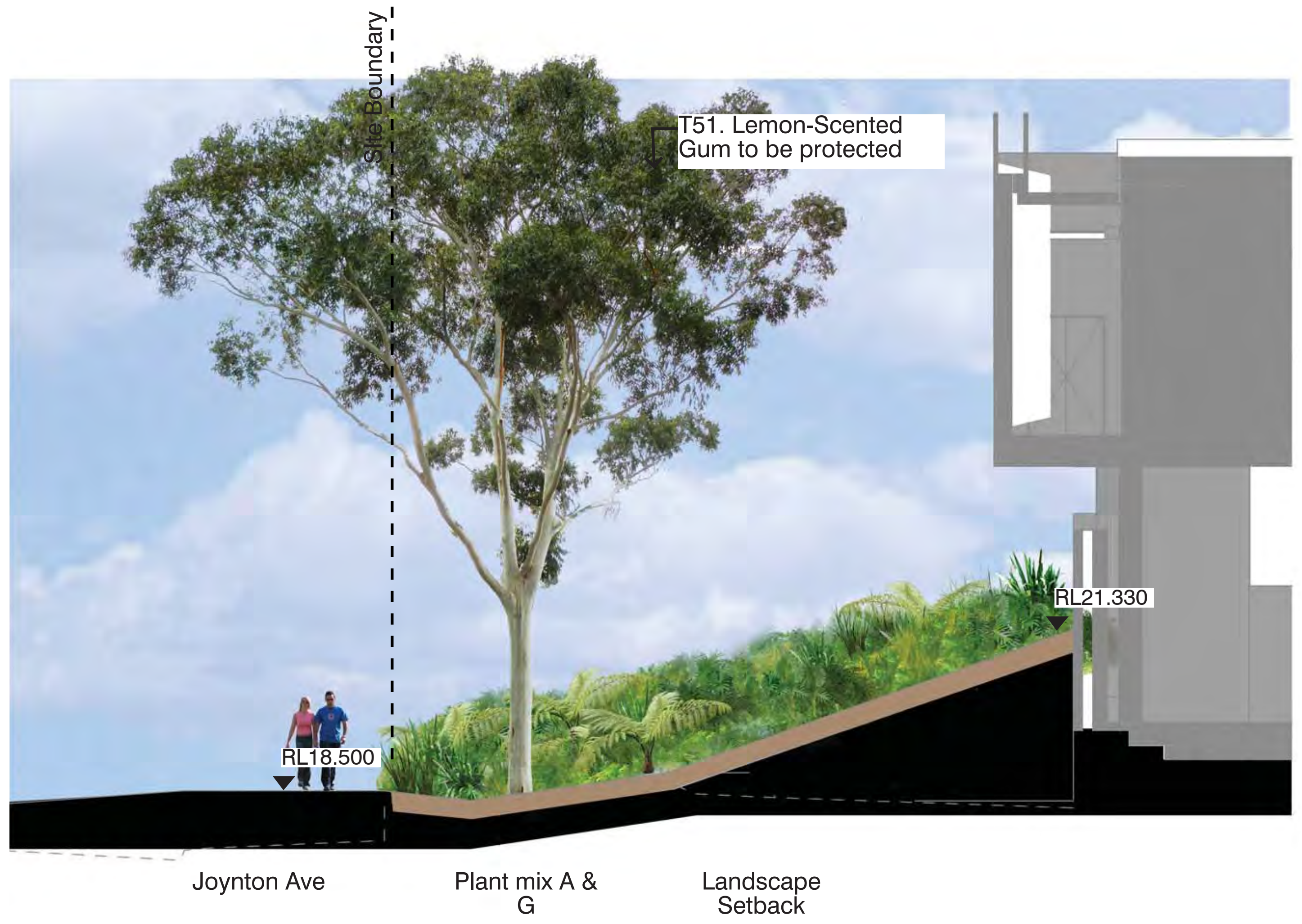
03 BBQ & LAWN AREA - SE07
Section scale 1:50@A1



04 SE08 - ZETLAND & GEORGE JULIUS AVENUE ENTRANCE
Section scale 1:50@A1



05 SE09 - NORTH FIELD EDGE
Section scale 1:50@A1



06 SE10 - JOYNTON AVENUE
Section scale 1:100@A1

DRAWING NOTES
REFER ARCHITECTURE PLANS FOR FULL DETAILS ON AQUATIC & RECREATION CENTRE
REFER LANDSCAPE LEGEND & MATERIALS (ARC-T-DA-002)

A1

INTELLECTUAL PROPERTY

NOTES

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REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
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ABA
GRIMSHAW

ANDREW BURGES ARCHITECTS
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LANDSCAPE ARCHITECTS

T.C.L

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY

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PROJECT

Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Sections

DRAWN: AL
CHECKED: SA
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FIRST ISSUE: 13/05/16
DRAWING NO REV

ARC-T-DA-009

DRAWING NOTES
TREES LIGHTENED FOR CLARITY
REFER LANDSCAPE LEGEND & MATERIALS (ARC-T-DA-002)

0 5 10m

NOTES

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REV	DATE	ISSUE
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Suite 32, 61 Marlborough St
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www.aba-architects.com.au

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www.grimshaw-architects.com

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t+613 9380 4344
www.tcl.net.au

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Zetland NSW 2017
Australia

TITLE

Detailed Playground Plan

N

DRAWN: AL
CHECKED: SA
SCALE: 1:100@A1
FIRST ISSUE: 13/05/16
DRAWING NO
REV

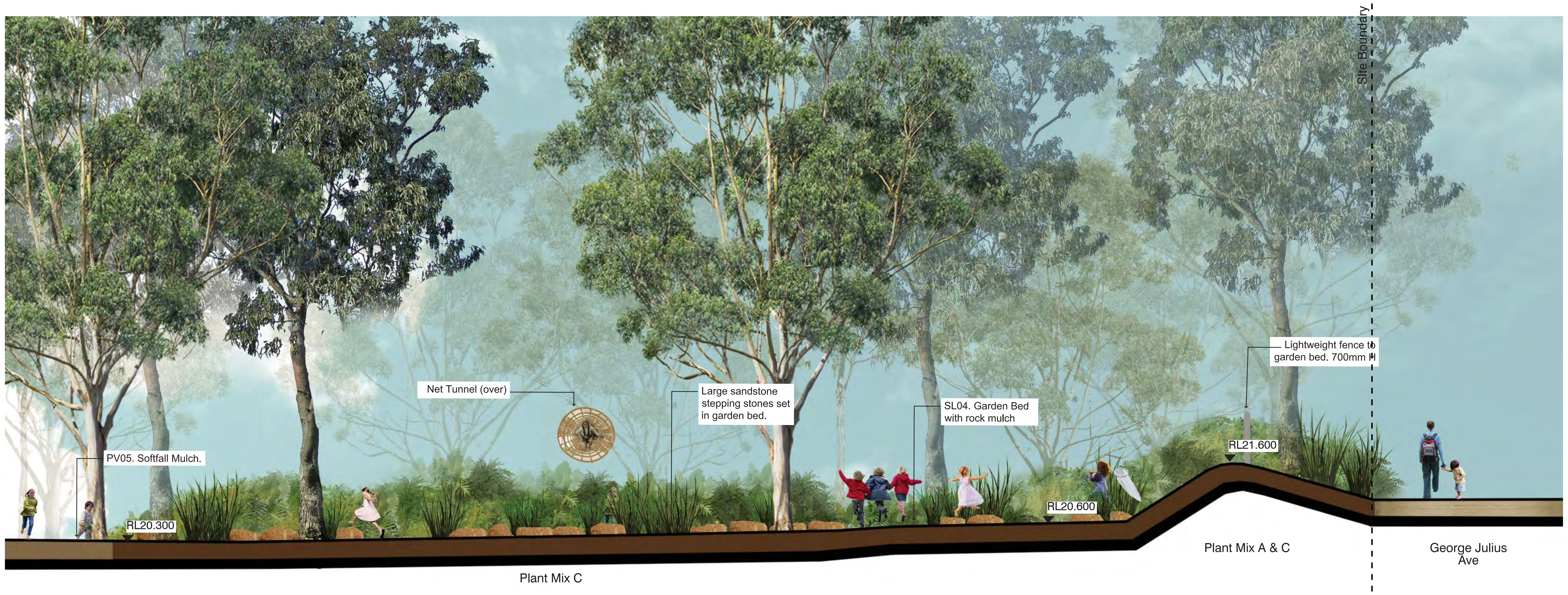
ARC-T-DA-010

NOTES

DO NOT SCALE OFF DRAWINGS

01 PLAYGROUND - SE03

Section scale 1:50@A1



02 PLAYGROUND - SE04

Section scale 1:50@A1

DRAWING NOTES
REFER ARCHITECTURE PLANS FOR FULL DETAILS ON AQUATIC & RECREATION CENTRE
REFER LANDSCAPE LEGEND & MATERIALS (ARC-T-DA-002)

REV	DATE	ISSUE
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ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
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www.aba-architects.com.au

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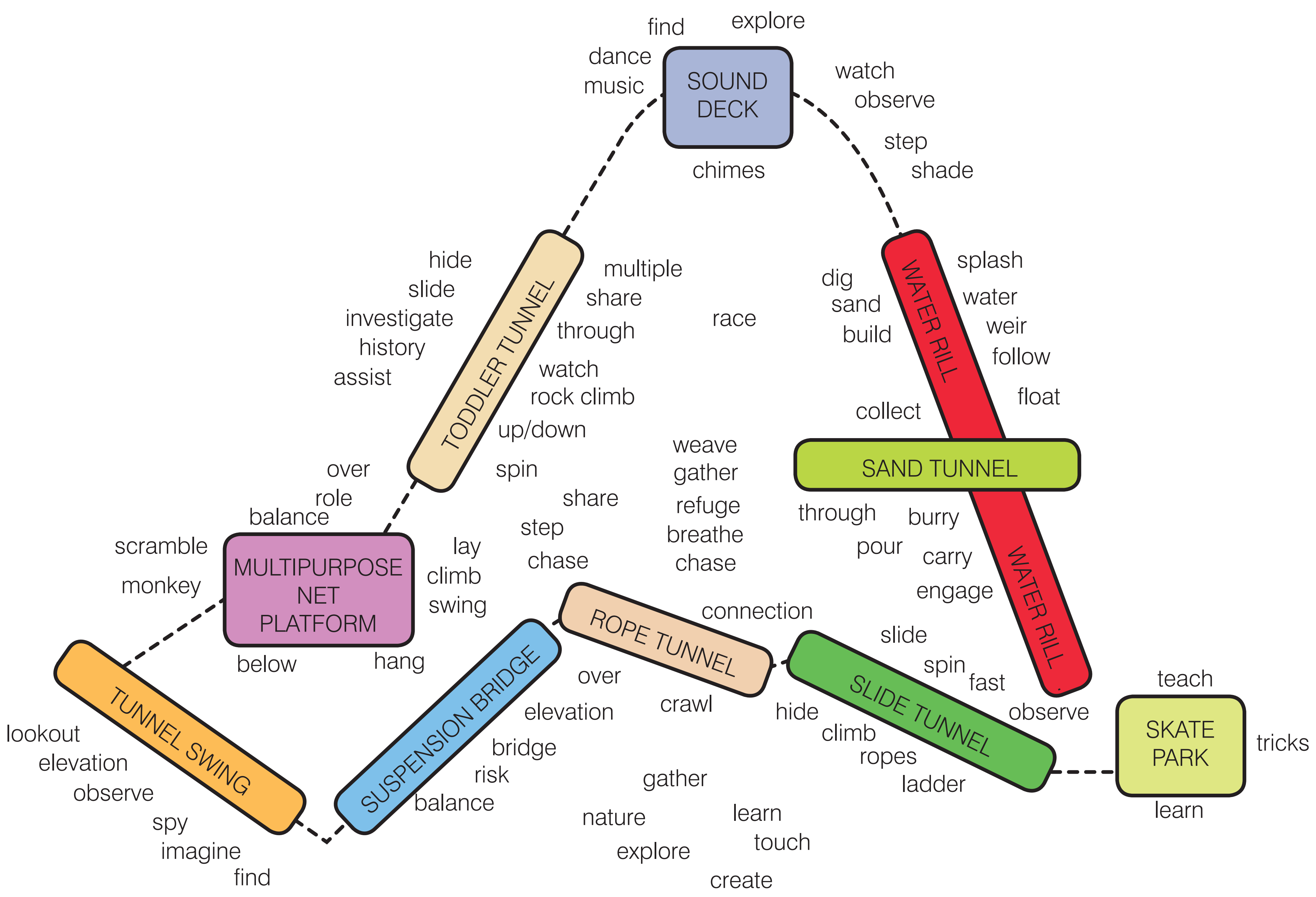
Detailed Playground

DRAWN: AL
CHECKED: SA
SCALE: 1:50 @A1
FIRST ISSUE: 13/05/16
DRAWING NO REV

ARC-T-DA-011



01 PLAY ACTIVITIES

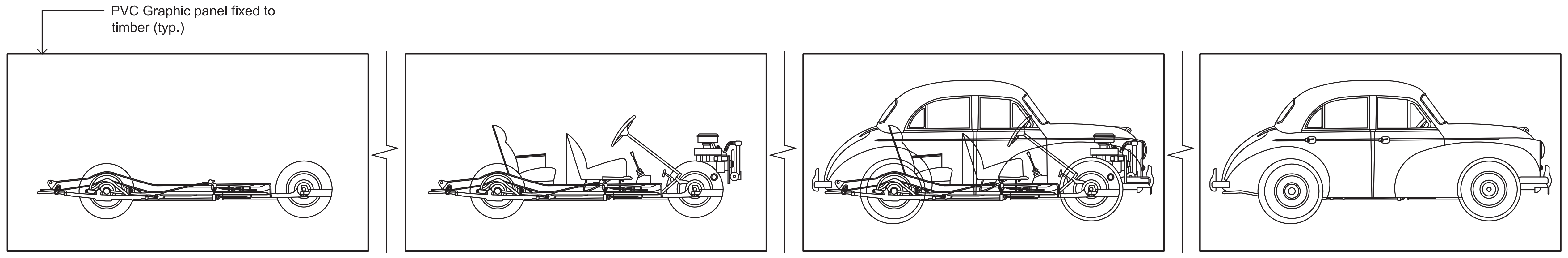
Diagram scale 1:50@A1

VISION

Industrial pipes are the armature for a range of play elements and activities that form the basis of this play space. They reference the sites industrial past, evident in several items of play & interpretation within the design.

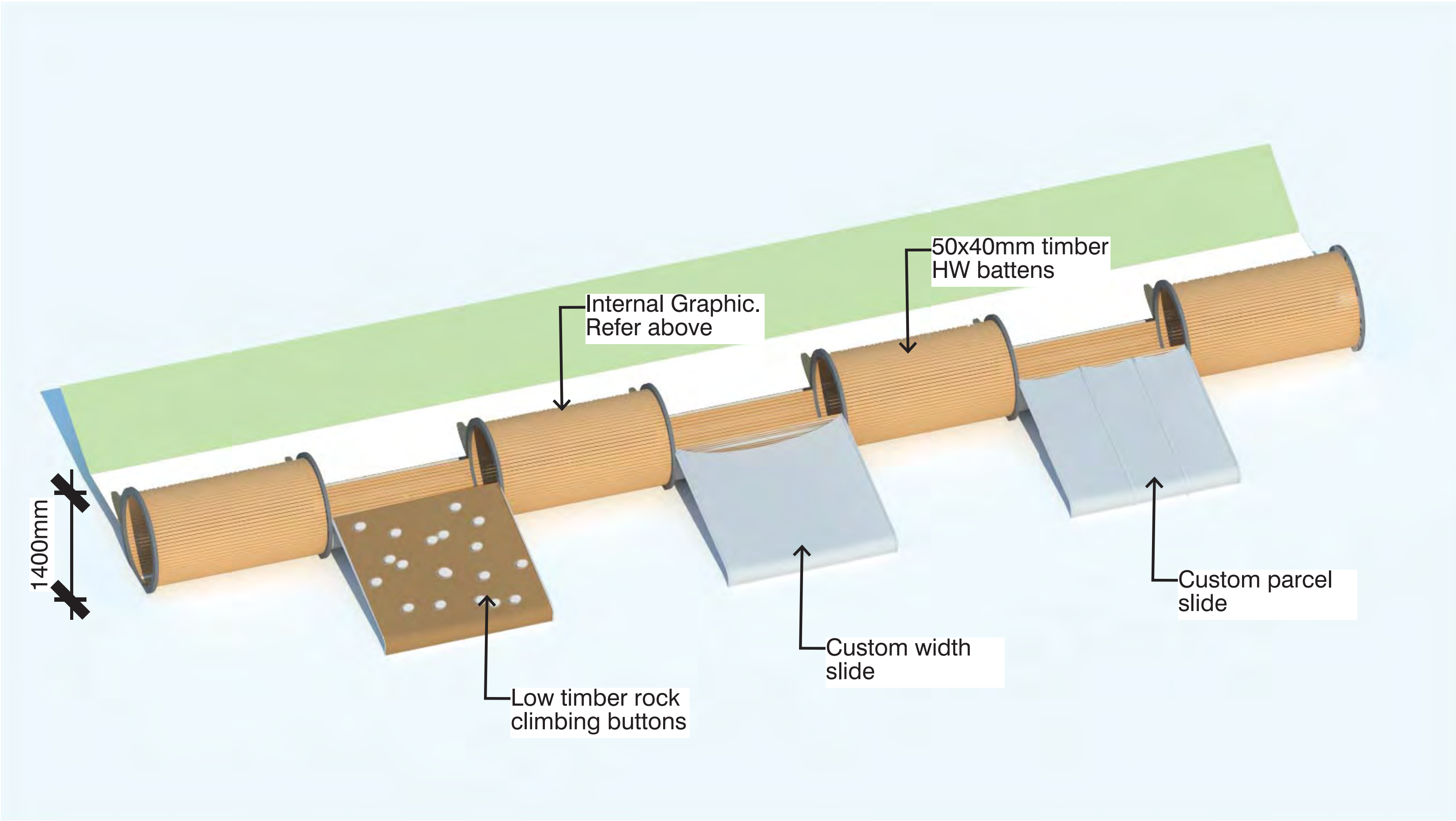
The playground is designed to entice all age groups and abilities with a protected toddler area evolving to more challenging items as a child's skill & experience grows.

A strong relationship to a natural setting the playground is nestled into topographical formed native garden mix of plants encouraging discovery through nature play in protected & guided areas of the playground.



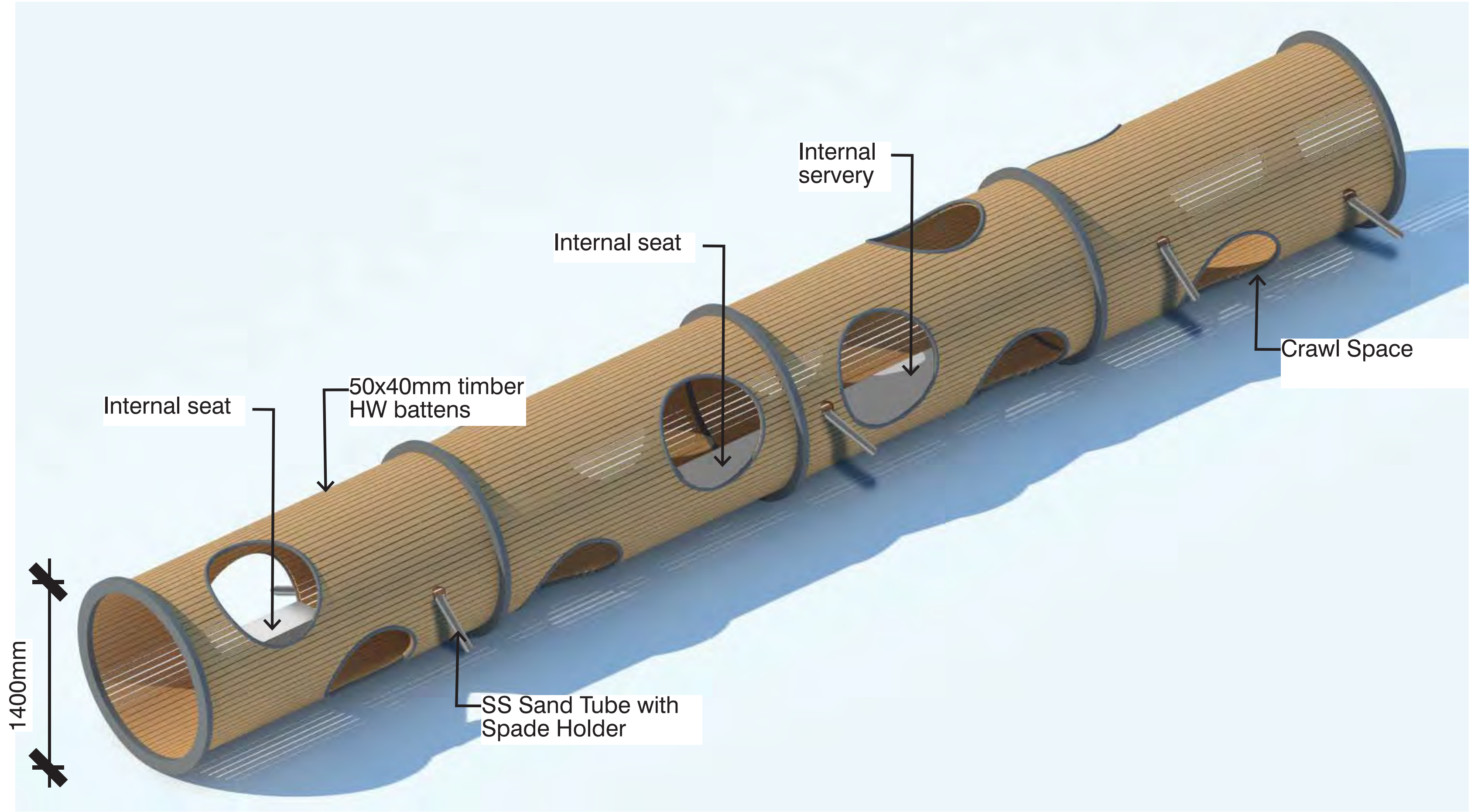
02 INTERPRETATION - MORIS MINOR PRODUCTION LINE

Diagram scale 1:50@A1



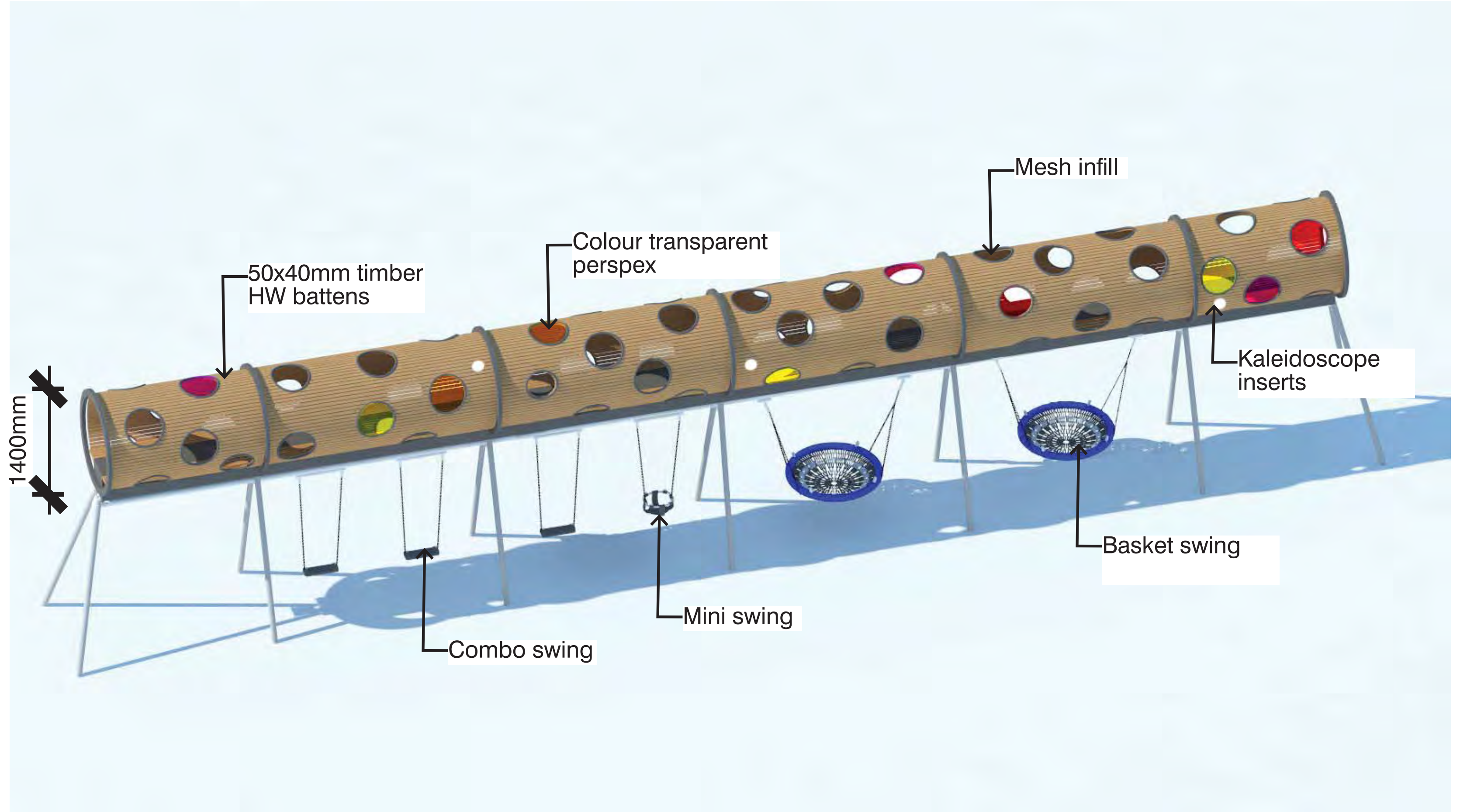
03 TODDLER TUNNEL

Axo scale NTS



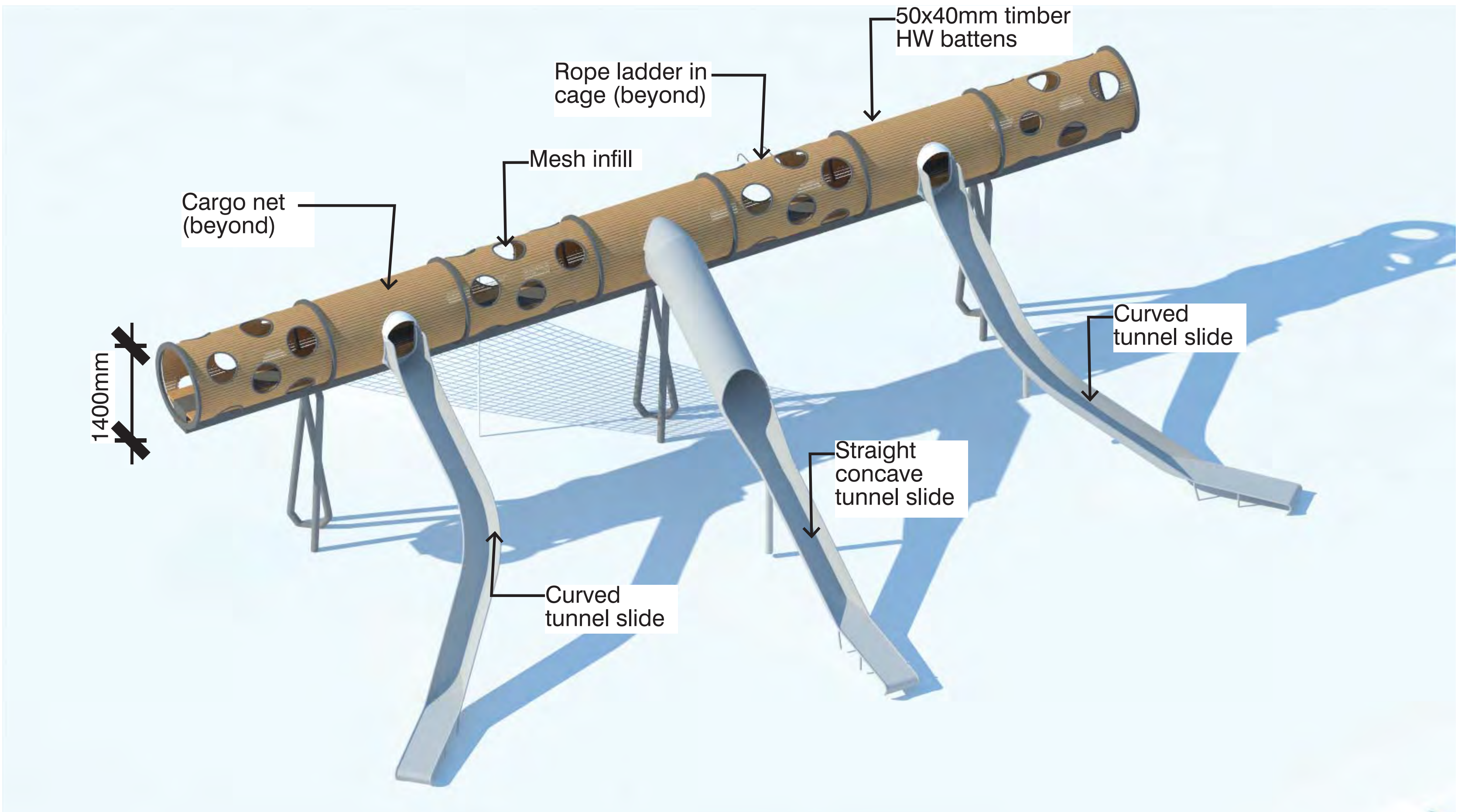
04 SAND TUNNEL

Axo scale NTS



05 SWING TUNNEL

Axo scale NTS



06 SLIDE TUNNEL

Axo scale NTS

INTELLECTUAL PROPERTY

NOTES

DO NOT SCALE OFF DRAWINGS

REV	DATE	ISSUE
A	17.05.16	REVISED DEVELOPMENT APPLICATION
-	13.05.16	DEVELOPMENT APPLICATION

HEAD CONSULTANT TEAM

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

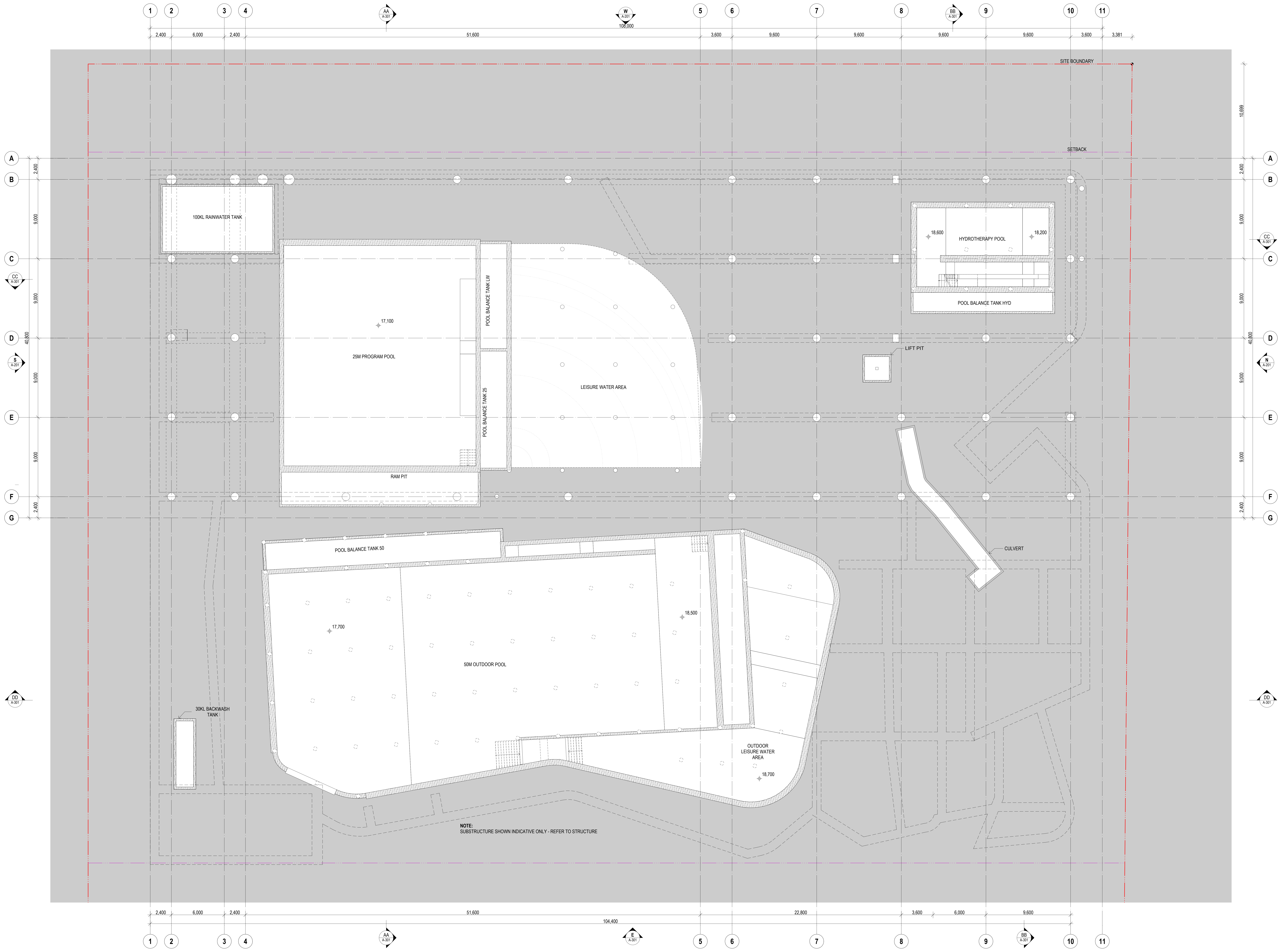
Gunyama Park Aquatic and Recreation Centre

132-140 Joynton Avenue
Zetland NSW 2017
Australia

TITLE

Detailed Playground

DRAWN: AL
CHECKED: SA
SCALE: NTS
FIRST ISSUE: 13/05/16
DRAWING NO REV
ARC-T-DA-012



01
-

BASEMENT 01 PLAN
1:200

INTELLECTUAL PROPERTY

PROJECT NORTH TRUE NORTH

GRAPHICAL SCALE

0 1 2 4 6 8 10m

GENERAL NOTES

ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED ON SITE BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK

DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY

ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'

GROSS FLOOR AREA (GFA)	
GROUND FLOOR	
MAIN BUILDING	3,895 m^2
PARK AMENITIES	66 m^2
LEVEL 01	
MAIN BUILDING	1,463 m^2
TOTAL	**5,424 m^2**
FLOOR SPACE RATIO (FSR)	
GROSS FLOOR AREA	5,424 m^2
SITE AREA	28,693 m^2
RATIO	**0.19:1**

REV	DATE	ISSUE
A	22/04/16	DEVELOPMENT APPLICATION

AQUATIC
CALIBRE CONSULTING
Level 2, 55 Southbank Blvd
Southbank VIC 3006
t+61(0) 3 9203 9000

FACADE
SURFACE DESIGN
Suite 11.03, 68 York St
Sydney NSW 2000 Australia
t+61(0) 2 9299 0107

CIVIL
CJ ARMS & ASSOCIATES
Level 2, 24 Hickson Rd
Millers Point NSW 2000
t+61(0) 2 8036 8370

MECHANICAL
BRT CONSULTING
159 Victoria Pde
Collingwood VIC 3066
t+61(0) 3 9417 2971

ELECTRICAL
ARUP
Level 10, 201 Kent St
Sydney NSW 2000
t+612(0) 9320 9320

STRUCTURAL
ARUP
Level 10, 201 Kent St
Sydney NSW 2000
t+61(0) 2 9320 9320

HEAD CONSULTANT TEAM

ABA
GRIMSHAW

ANDREW BURGES ARCHITECTS
Suite 32, 61 Marlborough St
Surry Hills NSW 2010 Australia
t+612 9331 7433
www.aba-architects.com.au

GRIMSHAW ARCHITECTS
Level 3, 24 Hickson Rd
Sydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

T.C.L

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

XX Zetland Avenue
Zetland NSW 2017
Australia

TITLE

BASEMENT PLAN

DRAWN: IA
CHECKED: NB
SCALE: 1:200 @ A1
FIRST ISSUE: 22/04/15
DRAWING NO REV

ARC-DA-101 A

DEVELOPMENT APPLICATION

01 GROUND FLOOR PLAN
1:200

INTELLECTUAL PROPERTY

PROJECT NORTH TRUE NORTH

GRAPHICAL SCALE

0 1 2 4 6 8 10m

GENERAL NOTES

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ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'

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MAIN BUILDING	1,463 m²
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FLOOR SPACE RATIO (FSR)	
GROSS FLOOR AREA	5,424 m²
SITE AREA	28,693 m²
RATIO	**0.19:1**

REV	DATE	ISSUE
A	22/04/16	DEVELOPMENT APPLICATION

AQUATIC
CALIBRE CONSULTING
Level 2, 55 Southbank Blvd
Southbank VIC 3006
t+61(0) 3 9203 9000

CIVIL
CJ ARMS & ASSOCIATES
Level 2, 24 Hickson Rd
Millers Point NSW 2000
t+61(0) 2 8036 8370

ELECTRICAL
ARUP
Level 10, 201 Kent St
Sydney NSW 2000
t+612(0) 9320 9320

FACADE
SURFACE DESIGN
Suite 11.03, 68 York St
Sydney NSW 2000 Australia
t+61(0) 2 9299 0107

MECHANICAL
BRT CONSULTING
159 Victoria Pde
Collingwood VIC 3066
t+61(0) 3 9417 2971

STRUCTURAL
ARUP
Level 10, 2[illegible]
Sydney NSW 2[illegible]
t+61(0) 2 9[illegible]

HEAD CONSULTANT TEAM

ANDREW B[illegible]GES ARCHITECTS
Suite 32, [illegible]1 Marlborough St
Surry Hills N[illegible]W 2010 Australia
t+612 9331 7433
w[illegible].ab[illegible]-architects.com.au

GRIMSHAW ARCHITECTS
[illegible]evel 3, 24 Hickson Rd
[illegible]ydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

T[illegible]YLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Pa[illegible]k Aquatic and
Recreat[illegible] Centre

XX Zetl[illegible]d [illegible]
Zetlan[illegible] 2017
Australia

TITLE

GROUND FLOOR PLAN

DRAWN: IA
CHECKED: NB
SCALE: 1:200 @ A1
FIRST ISSUE: 22/04/15

DRAWING NO	REV
ARC-DA-102	A

DEVELOPMENT APPLICATION

01
-
LEVEL 01 PLAN
1:200

INTELLECTUAL PROPERTY

PROJECT NORTH TRUE NORTH

GRAPHICAL SCALE

0 1 2 4 6 8 10m

GENERAL NOTES

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ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'

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GROUND FLOOR	
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RATIO	**0.19:1**

REV	DATE	ISSUE
A	22/04/16	DEVELOPMENT APPLICATION

AQUATIC
CALIBRE CONSULTING
Level 2, 55 Southbank Blvd
Southbank VIC 3006
t+61(0) 3 9203 9000

FACADE
SURFACE DESIGN
Suite 11.03, 68 York St
Sydney NSW 2000 Australia
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CIVIL
CJ ARMS & ASSOCIATES
Level 2, 24 Hickson Rd
Millers Point NSW 2000
t+61(0) 2 8036 8370

MECHANICAL
BRT CONSULTING
159 Victoria Pde
Collingwood VIC 3066
t+61(0) 3 9417 2971

ELECTRICAL
ARUP
Level 10, 201 Kent St
Sydney NSW 2000
t+612(0) 9320 9320

STRUCTURA[illegible]
ARUP
Level 10, 2[illegible]
Sydney NSW 2[illegible]0
t+61(0) 2 9[illegible]

HEAD CONSULTANT TEAM

ANDREW B[illegible]RGES ARCHITECTS
Suite 32, [illegible]1 Marlborough St
Surry [illegible] 2010 Australia
t+612 9331 7433
w[illegible].ab[illegible]-architects.com.au

GRIMSHAW ARCHITECTS
[illegible]evel 3, 24 Hickson Rd
[illegible]ydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

T.C.L

[illegible]YLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Pa[illegible]k Aquatic and
Recreat[illegible] Centre

XX Zetl[illegible]d [illegible]e
Zetlan[illegible] 2017
Australia

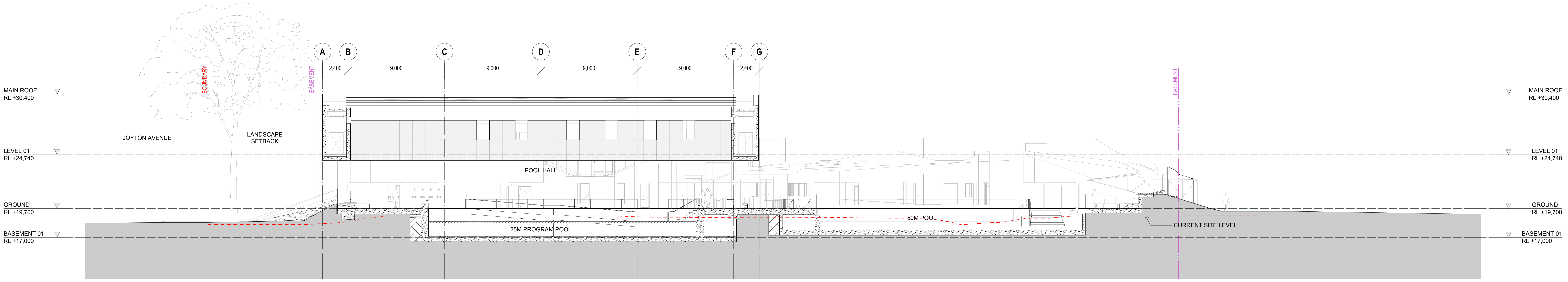
TITLE

FIRST FLOOR PLAN

DRAWN: IA
CHECKED: NB
SCALE: 1:200 @ A1
FIRST ISSUE: 22/04/15
DRAWING NO REV

ARC-DA-104 A

DEVELOPMENT APPLICATION



04
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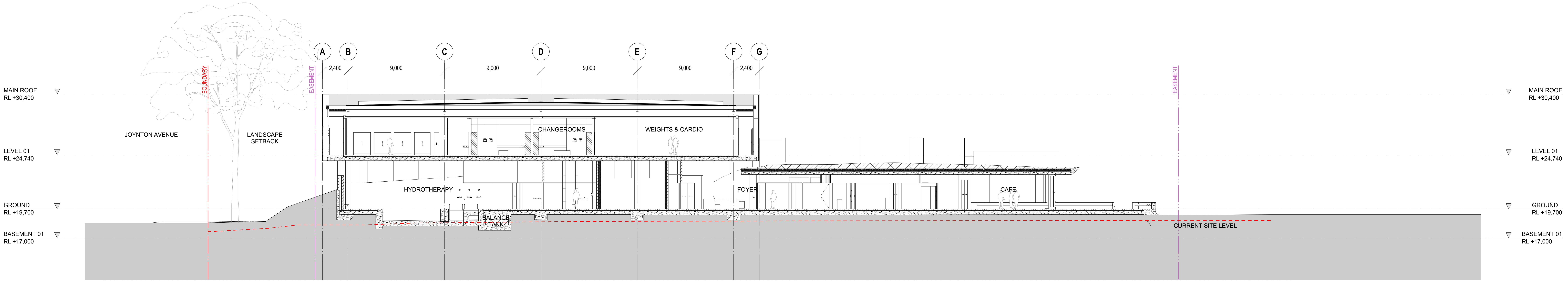
SECTION AA
1:200



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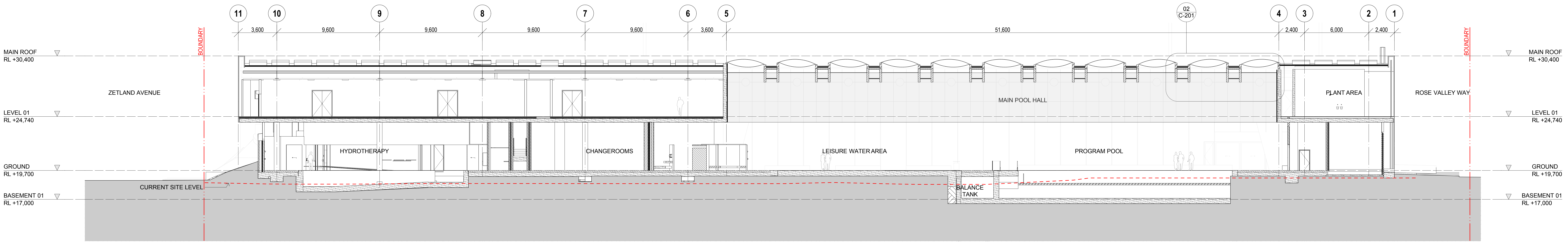
SECTION BB
1:200



01
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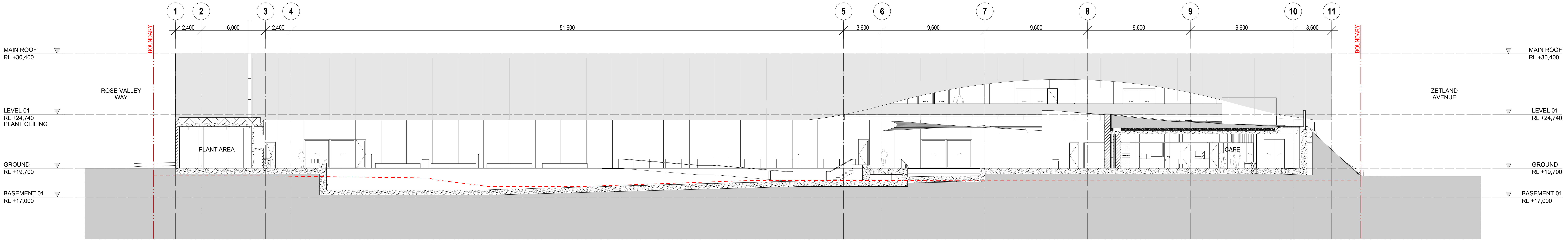
SECTION CC
1:200



02
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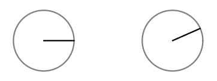
SECTION DD
1:200

INTELLECTUAL PROPERTY

PROJECT NORTH TRUE NORTH



GRAPHICAL SCALE

GENERAL NOTES

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ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'

KEY PLAN

DRAFT FOR REVIEW

A	22/04/16	DEVELOPMENT APPLICATION
REV	DATE	ISSUE

AQUATIC
CALIBRE CONSULTING
Level 2, 55 Southbank Blvd
Southbank VIC 3006
t+61(0) 3 9203 9000

FACADE
SURFACE DESIGN
Suite 11.03, 68 York St
Sydney NSW 2000 Australia
t+61(0) 2 9299 0107

CIVIL
CJ ARMS & ASSOCIATES
Level 2, 24 Hickson Rd
Millers Point NSW 2000
t+61(0) 2 8036 8370

MECHANICAL
BRT CONSULTING
159 Victoria Pde
Collingwood VIC 3066
t+61(0) 3 9417 2971

ELECTRICAL
ARUP
Level 10, 201 Kent St
Sydney NSW 2000
t+612(0) 9320 9320

STRUCTURAL
ARUP
Level 10, 2
Sydney NSW 2 0
t+61(0) 2

HEAD CONSULTANT TEAM

ANDREW B RGES ARCHITECTS
Suite 32, 1 Marlborough St
Surry Hills N W 2010 Australia
t+612 9331 7433
w .ab -architects.com.au

GRIMSHAW ARCHITECTS
evel 3, 24 Hickson Rd
ydney NSW 2000 Australia
t+612 9253 0200
www.grimshaw-architects.com

LANDSCAPE ARCHITECTS

TAYLOR CULLITY LETHLEAN
385 Drummond Street
Carlton VIC 3053 Australia
t+613 9380 4344
www.tcl.net.au

CLIENT

CITY OF SYDNEY
456 Kent St, Town Hall House
Sydney NSW 2000 Australia

PROJECT

Gunyama Park Aquatic and Recreation Centre

XX Zetland Avenue
Zetland NSW 2017
Australia

TITLE

SECTIONS OVERALL

DRAWN: IA
CHECKED: NB
SCALE: 1:200 @ A1
FIRST ISSUE: 22/04/15

DRAWING NO REV

ARC-DA-301 A

DEVELOPMENT APPLICATION

LEGEND

▬ ▬	FILTERED WATER
▬▬	SOILED WATER
▬ · ▬	WATER FEATURE SUPPLY

NOTE:
PIPE LOCATIONS ARE INDICATIVE ONLY AND ARE TO BE ROUTED AROUND PITS, POOLS AND STRUCTURAL FEATURES AS REQUIRED

SITE PLAN

SCALE 1:200

ONLY FIGURED DIMENSIONS TO BE USED
DRAWINGS ARE NOT TO BE SCALE

0 4000 8000 12000 16000 20000
SCALE: 1:200

REV	DATE	ISSUE DESCRIPTION	DRAWN	DESIGNED	CHECKED
A	04/03/16	90% DD ISSUE	HB	ML	ML
B	01/04/16	100% DD ISSUE	HB	ML	ML
C	15/04/16	REVISED AS CLOUDED	PF	APS	APS

CLIENT

GRIMSHAW ARCHITECTS
LEVEL 3, 24 HICKSON RAD
SYDNEY NSW 2000

Calibre Consulting (Melb) Pty Ltd
Consulting Engineers
Structural - Civil
Level 2, 55 Southbank Boulevard,
Southbank, VIC 3006, Australia
Tel: +61 3 9203 9000
www.calibreconsulting.co

BRISBANE CANBERRA NEW ZEALAND MELBOURNE PERTH
ROCKHAMPTON SINGAPORE SUNSHINE COAST SYDNEY

PROJECT

GUNYAMA PARK AQUATIC AND RECREATION CENTRE (GPARC)
132 JOYNTON AVENUE
ZETLAND NSW 2017

C

PRELIMINARY

NOT FOR CONSTRUCTION PURPOSES

DRAWING TITLE

POOLS GENERAL LAYOUT

PROJECT No.	DRAWING No.	REVISION
M140792	AQ-P02	C

ALL DIMENSIONS ARE CONCRETE TO CONCRETE UNLESS NOTED OTHERWISE

FOR LOCATION OF POOL RELATIVE TO GRID REFER TO ARCHITECTS DRAWINGS

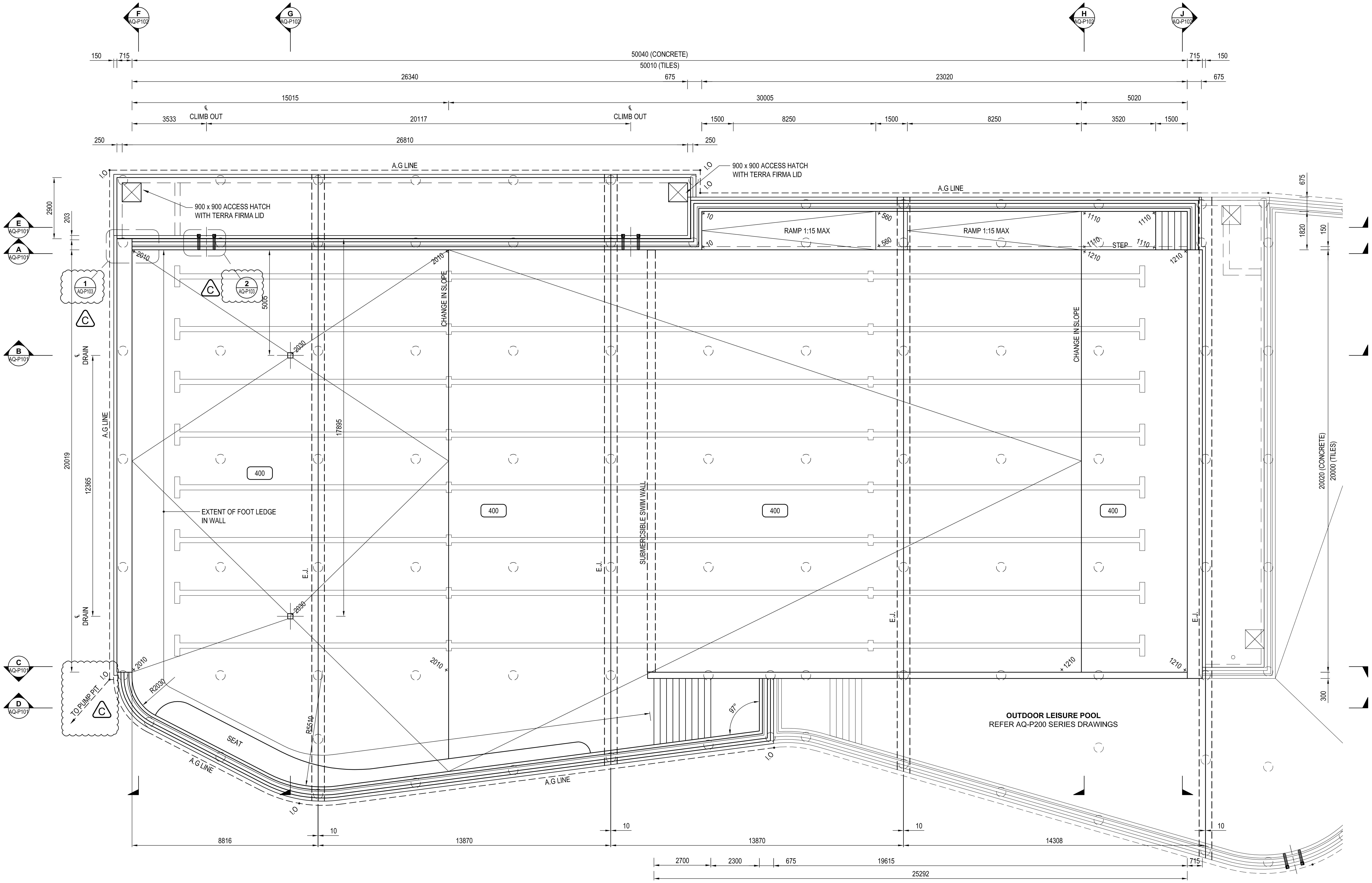
REFER TO POOL HYDRAULIC DRAWINGS FOR DETAILS AND LOCATIONS OF POOL PIPEWORK

REFER TO POOL FITTINGS DRAWINGS FOR DETAILS OF POOL FITTINGS

REFER TO POOL TILING DRAWINGS FOR DETAILS OF POOL TILING

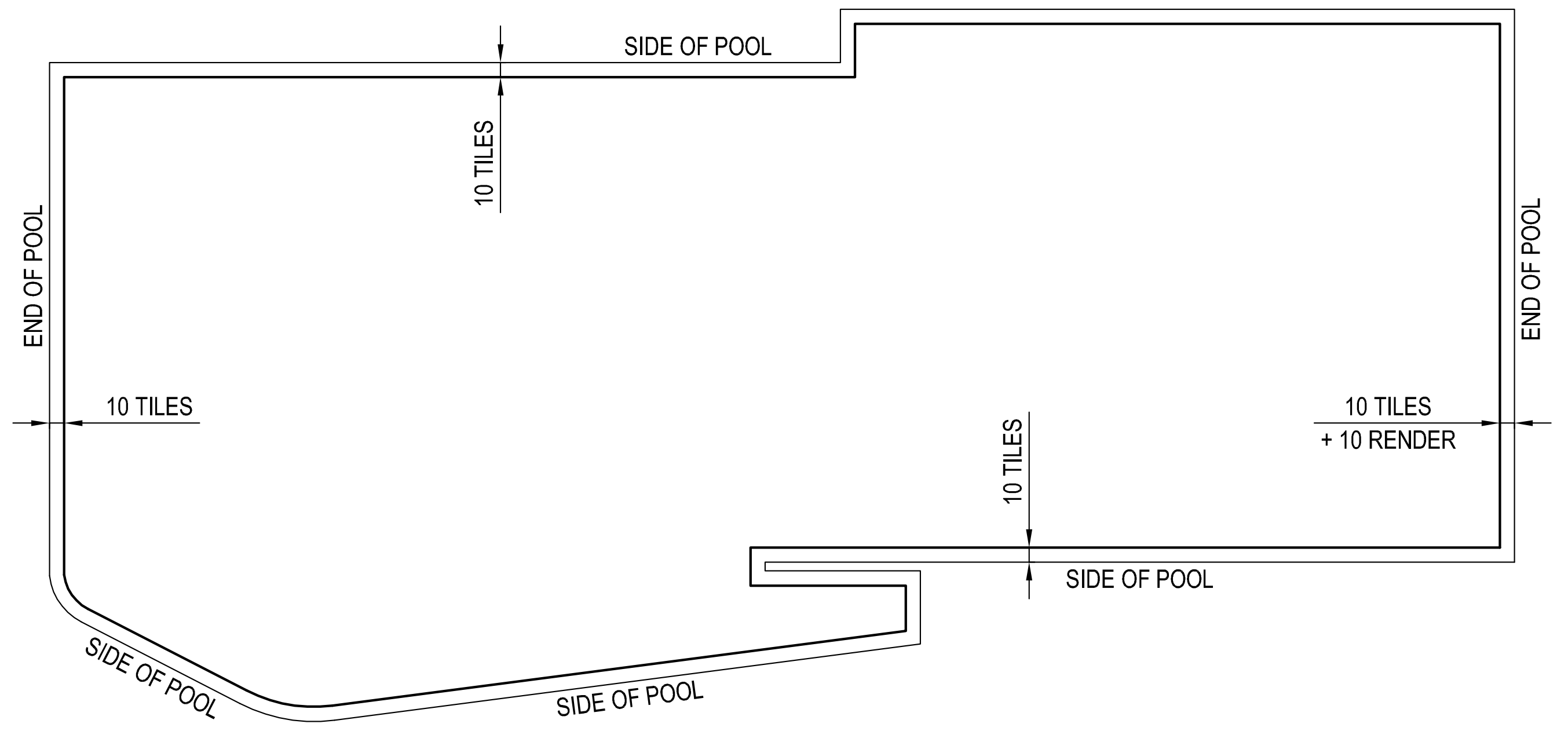
LEGEND

1210	CONCRETE PROFILE OFFSET FROM 'TWL' (TYPICAL)
● I.O	INSPECTION OPENING
A. G LINE	AGLINE MIN 100 DIA. UPVC
○	450Ø PILE
400	POOL BASE THICKNESS



OUTDOOR 50m POOL
CONCRETE LAYOUT PLAN

SCALE 1:100



TILE ALLOWANCE

SCALE NTS

ONLY FIGURED DIMENSION TO BE USED
DRAWINGS ARE NOT TO BE SCALE

0 2000 4000 6000 8000 10000

SCALE: 1:100

REV	DATE	ISSUE DESCRIPTION	DRAWN	DESIGNED	CHECKED
A	04/03/16	90% DD ISSUE	HB	ML	ML
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GRIMSHAW ARCHITECTS
LEVEL 3, 24 HICKSON RAD
SYDNEY NSW 2000

Calibre Consulting (Melb) Pty Ltd
Consulting Engineers
Structural - Civil
Level 2, 55 Southbank Boulevard,
Southbank, VIC 3006, Australia
Tel: +61 3 9203 9000
www.calibreconsulting.co

calibre CONSULTING

BRISBANE CANBERRA NEW ZEALAND MELBOURNE PERTH
ROCKHAMPTON SINGAPORE SUNSHINE COAST SYDNEY

PROJECT

C

GUNYAMA PARK AQUATIC AND RECREATION CENTRE (GPARC)

132 JOYNTON AVENUE
ZETLAND NSW 2017

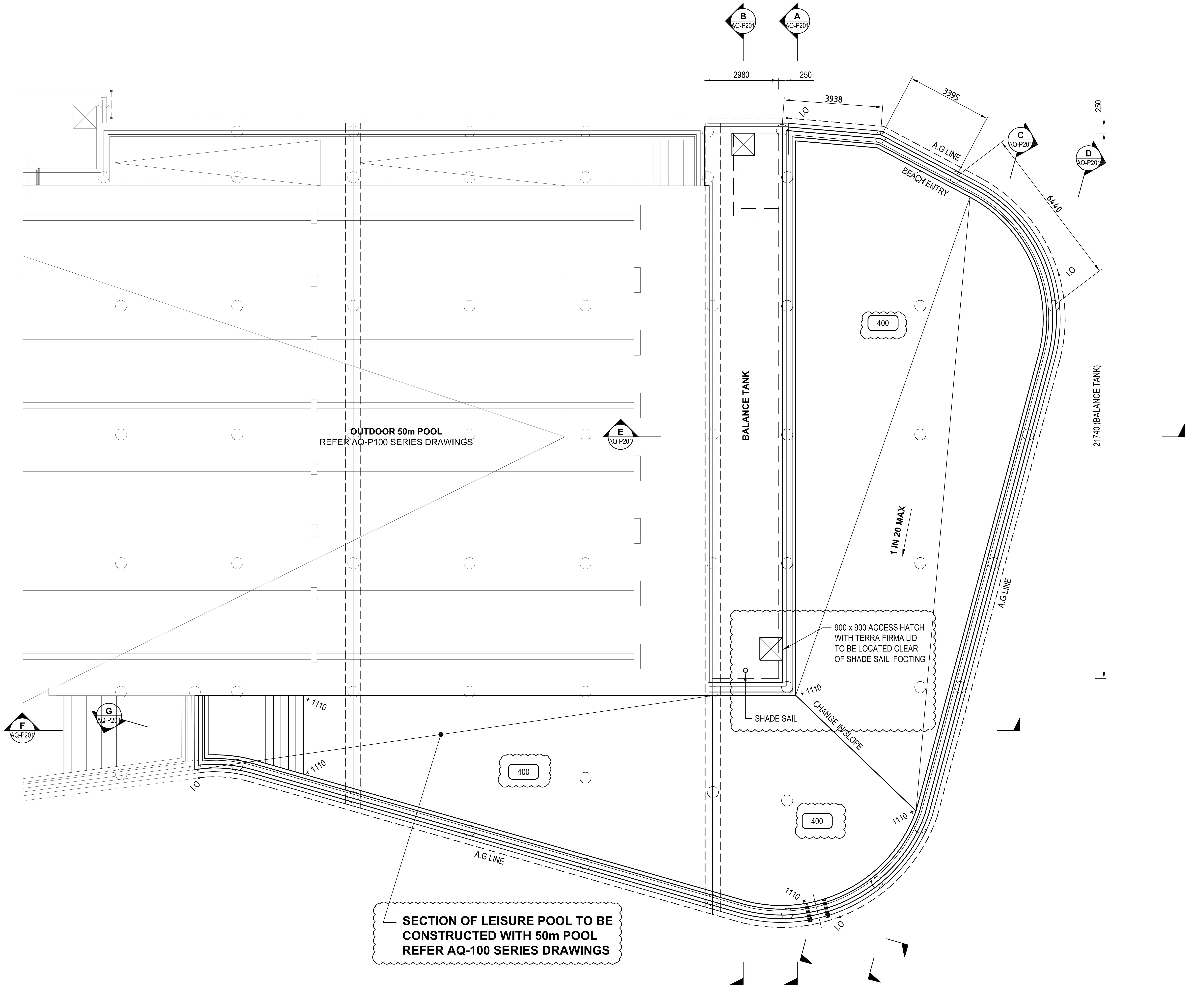
PRELIMINARY

NOT FOR CONSTRUCTION PURPOSES

DRAWING TITLE

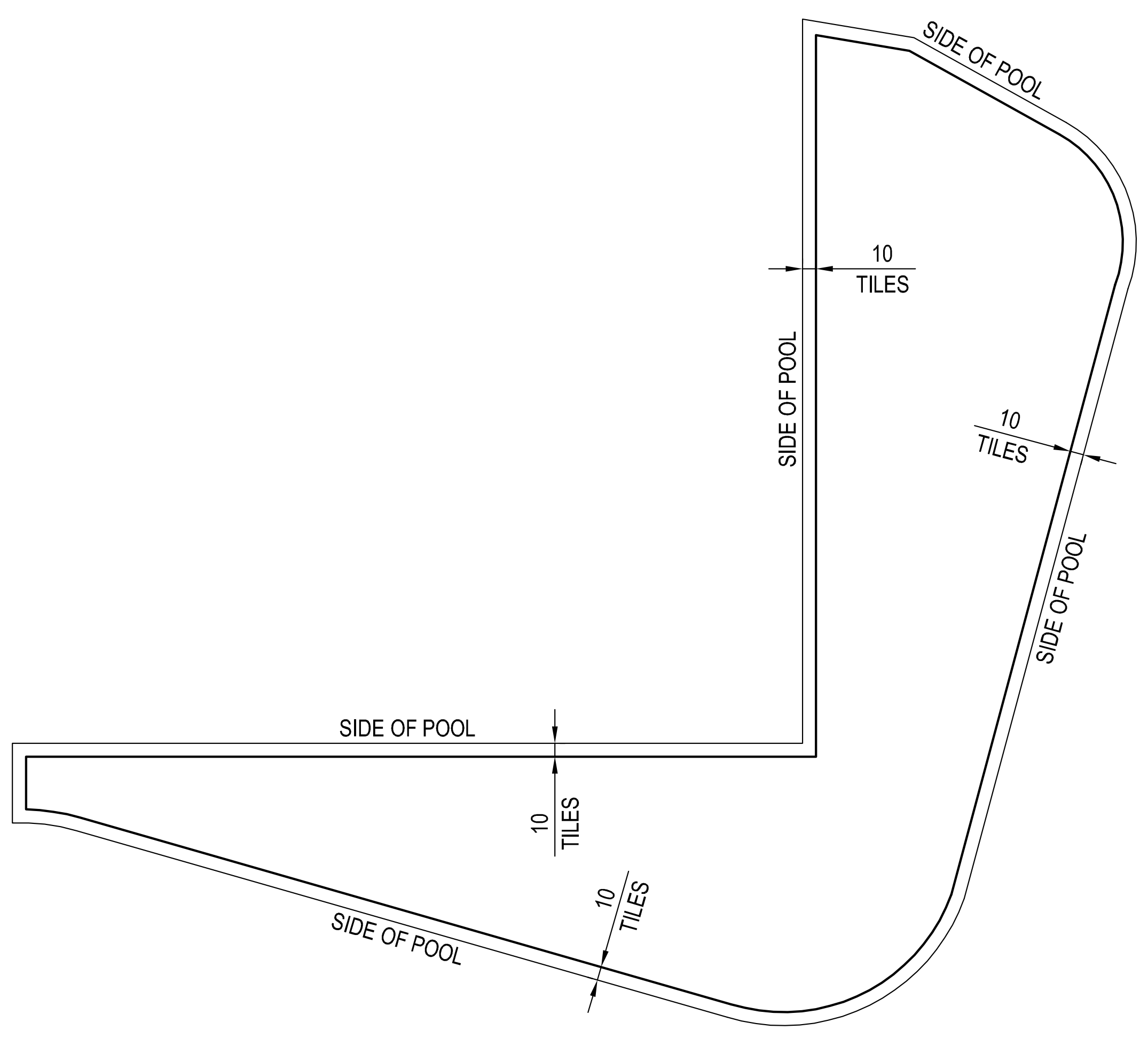
OUTDOOR 50m POOL
CONCRETE LAYOUT PLAN

PROJECT No.	DRAWING No.	REVISION
M140792	AQ-P100	C



OUTDOOR LEISURE POOL CONCRETE LAYOUT PLAN

SCALE 1:100



TILE ALLOWANCE

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LEGEND

+ 1210	CONCRETE PROFILE OFFSET FROM 'TWL' (TYPICAL)
● I.O	INSPECTION OPENING
A. G LINE	AGLINE MIN 100 DIA. UPVC
○	450Ø PILE
400	POOL BASE THICKNESS

REV	DATE	ISSUE DESCRIPTION	DRAWN	DESIGNED	CHECKED
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GRIMSHAW ARCHITECTS
LEVEL 3, 24 HICKSON RAD
SYDNEY NSW 2000

Calibre Consulting (Melb) Pty Ltd
Consulting Engineers
Structural - Civil
Level 2, 55 Southbank Boulevard,
Southbank, VIC 3006, Australia
Tel: +61 3 9203 9000
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ROCKHAMPTON SINGAPORE SUNSHINE COAST SYDNEY

PROJECT

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GUNYAMA PARK AQUATIC AND RECREATION CENTRE (GPARC)

132 JOYNTON AVENUE
ZETLAND NSW 2017

PRELIMINARY

NOT FOR CONSTRUCTION PURPOSES

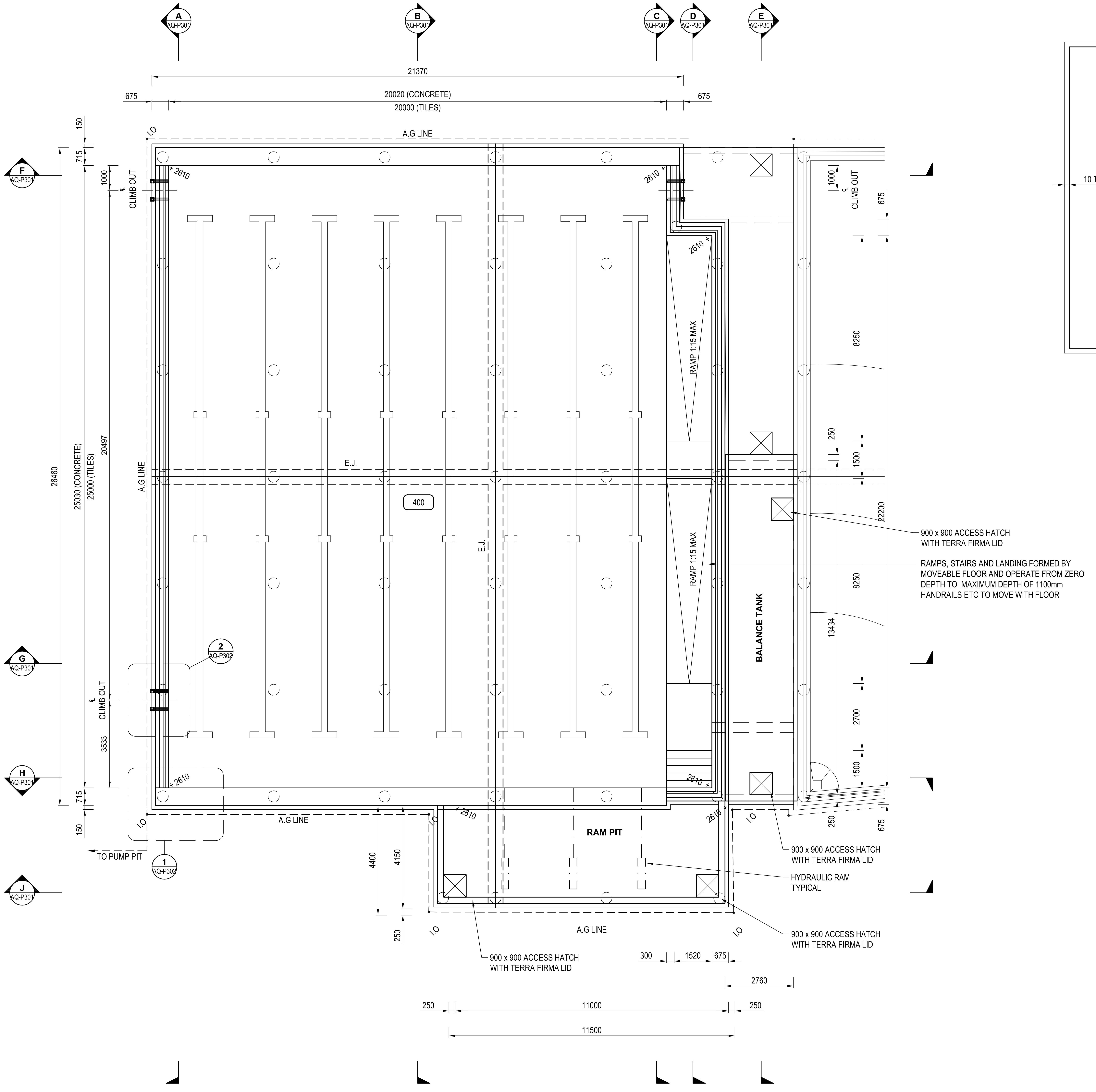
DRAWING TITLE

OUTDOOR LEISURE POOL
CONCRETE LAYOUT PLAN

ONLY FIGURED DIMENSION TO BE USED
DRAWINGS ARE NOT TO BE SCALE

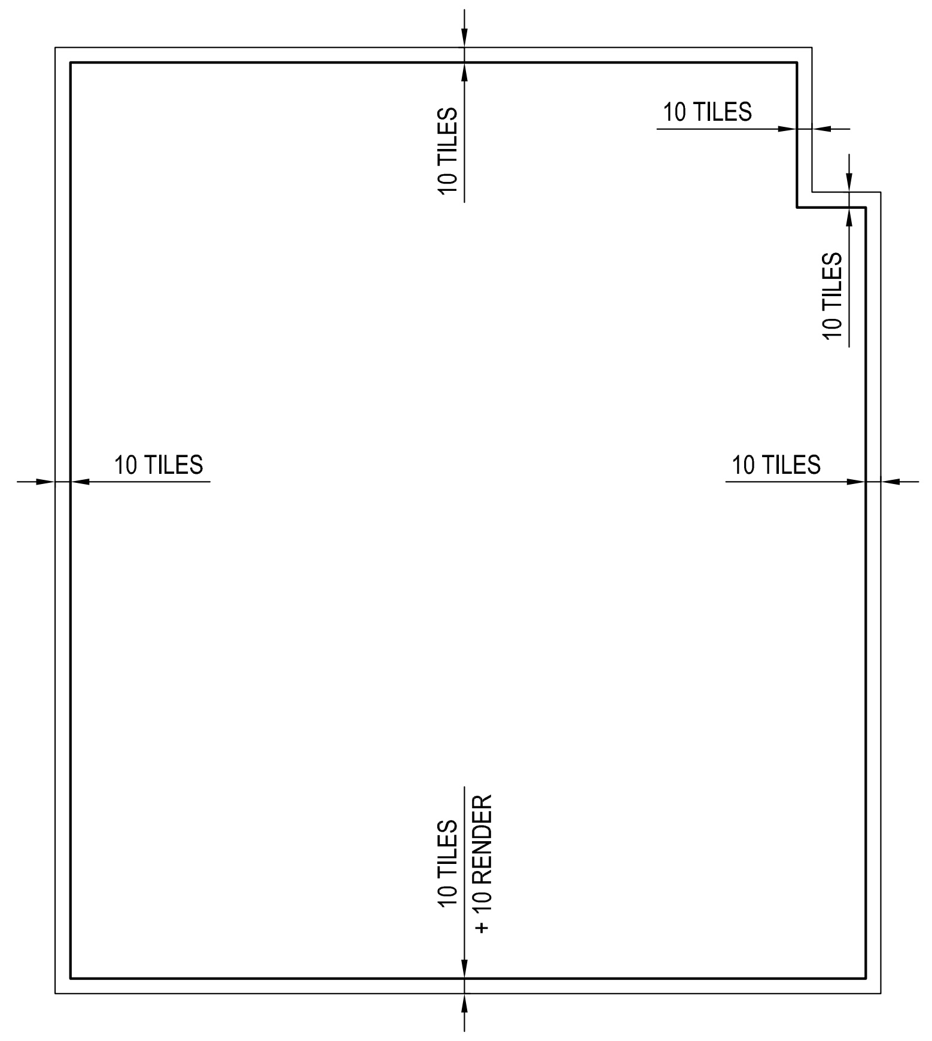
0 2000 4000 6000 8000 10000
SCALE: 1:100

PROJECT No.	DRAWING No.	REVISION
M140792	AQ-P200	C



INDOOR PROGRAM POOL CONCRETE LAYOUT PLAN

SCALE 1:100



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◌	450Ø PILE
400	POOL BASE THICKNESS

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C	15/04/16	REVISED AS CLOUDED	PF	APS	APS

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SYDNEY NSW 2000

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Consulting Engineers
Structural - Civil
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Southbank, VIC 3006, Australia
Tel: +61 3 9203 9000
www.calibreconsulting.co
BRISBANE CANBERRA NEW ZEALAND MELBOURNE PERTH
ROCKHAMPTON SINGAPORE SUNSHINE COAST SYDNEY

C

PROJECT

GUNYAMA PARK AQUATIC AND RECREATION CENTRE (GPARC)
132 JOYNTON AVENUE
ZETLAND NSW 2017

PRELIMINARY

NOT FOR CONSTRUCTION PURPOSES

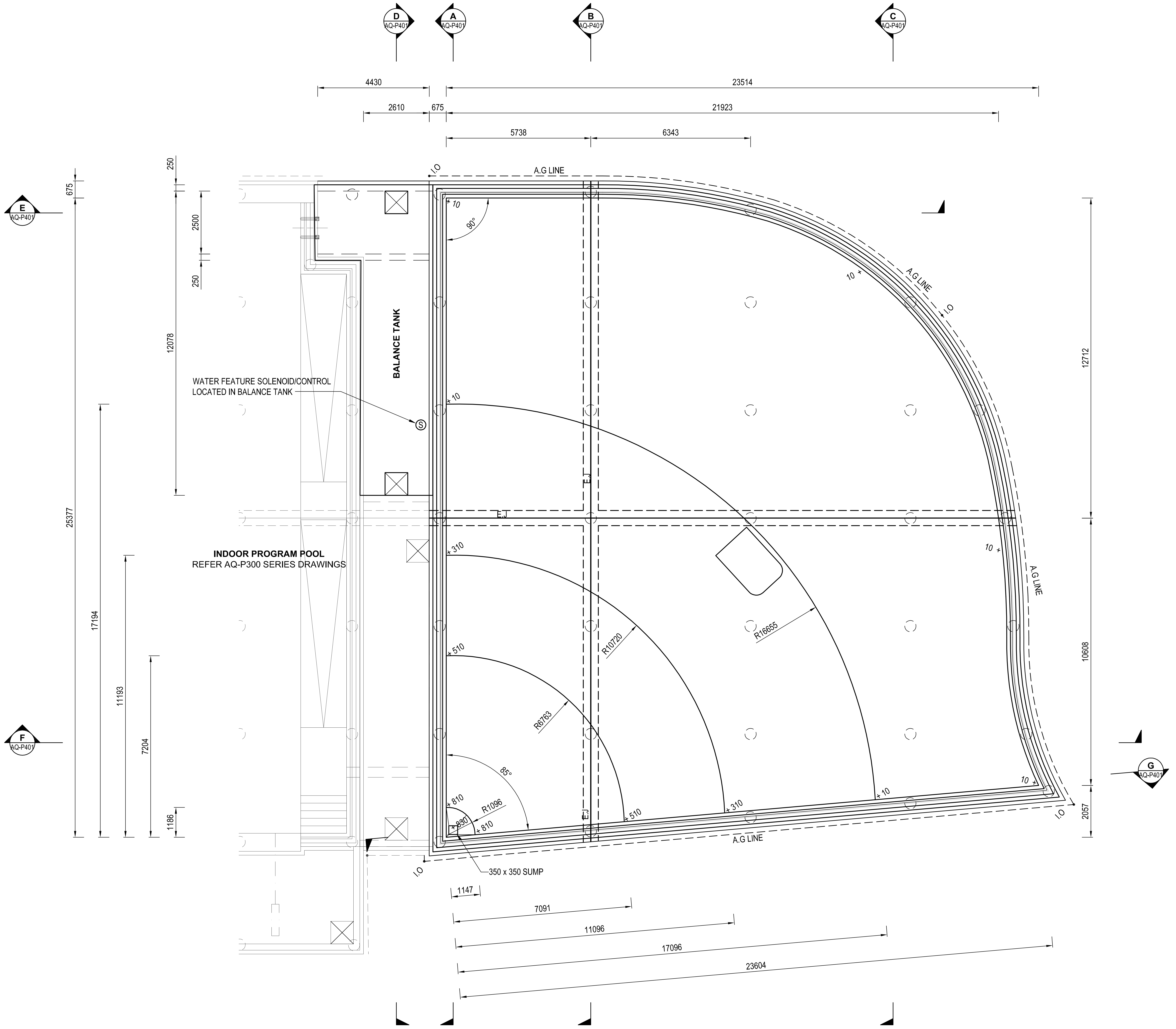
DRAWING TITLE

INDOOR PROGRAM POOL CONCRETE LAYOUT PLAN

ONLY FIGURED DIMENSION TO BE USED DRAWINGS ARE NOT TO BE SCALE

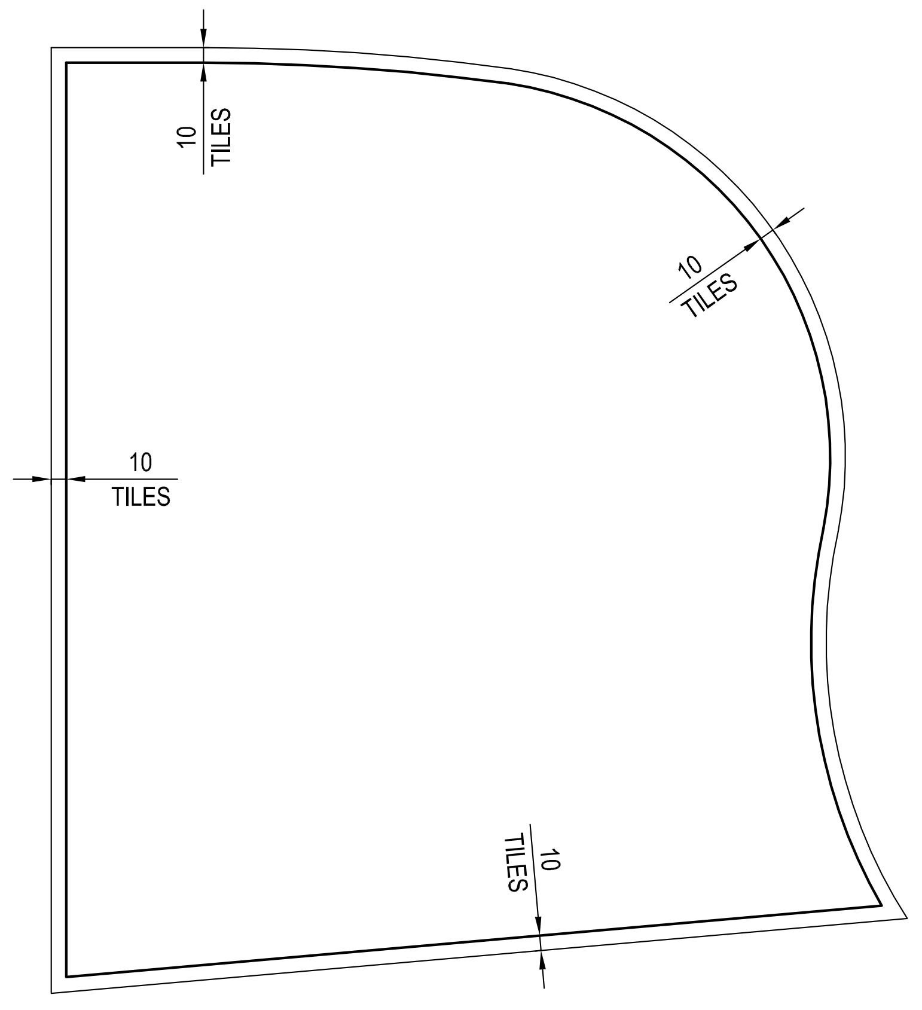
0 2000 4000 6000 8000 10000
SCALE: 1:100

PROJECT No.	DRAWING No.	REVISION
M140792	AQ-P300	C



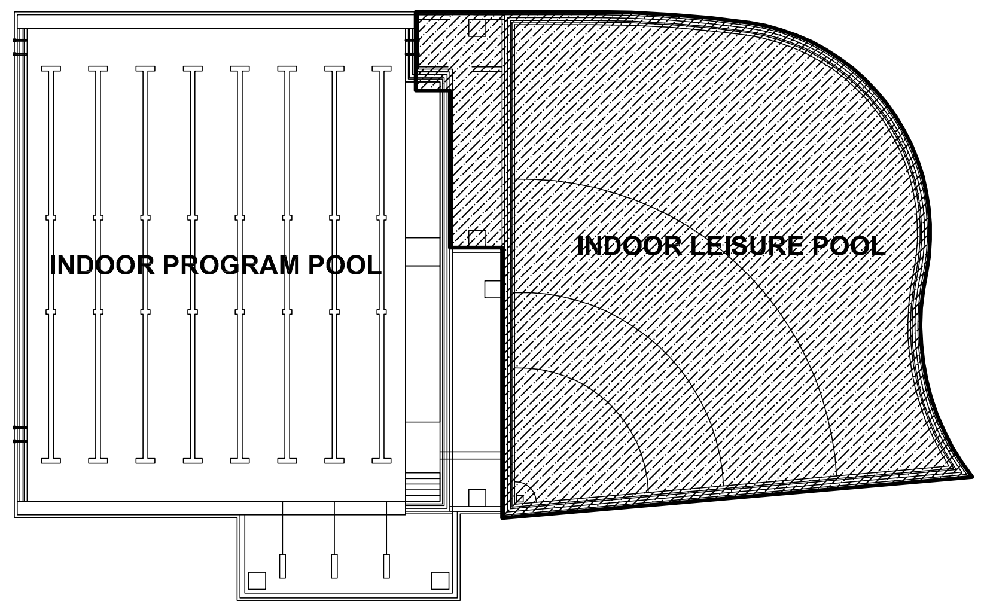
INDOOR LEISURE POOL CONCRETE LAYOUT PLAN

SCALE 1:100



TILE ALLOWANCE

SCALE NTS



KEY PLAN

SCALE NTS

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REFER TO POOL HYDRAULIC DRAWINGS FOR DETAILS AND LOCATIONS OF POOL PIPEWORK

REFER TO POOL FITTINGS DRAWINGS FOR DETAILS OF POOL FITTINGS

REFER TO POOL TILING DRAWINGS FOR DETAILS OF POOL TILING

POOL BASE SLAB LEVEL AND GRADES MAY CHANGE RELATIVE TO WATER FEATURES

WATER FEATURE ZONING TO BE RESOLVED

LEGEND

× 1210	CONCRETE PROFILE OFFSET FROM 'TWL' (TYPICAL)
● I.O	INSPECTION OPENING
A. G LINE	AGLINE MIN 100 DIA. UPVC
◌	450Ø PILE
400	POOL BASE THICKNESS

ONLY FIGURED DIMENSION TO BE USED
DRAWINGS ARE NOT TO BE SCALE

0 2000 4000 6000 8000 10000
SCALE: 1:100

REV	DATE	ISSUE DESCRIPTION	DRAWN	DESIGNED	CHECKED
A	04/03/16	90% DD ISSUE	HB	ML	ML
B	01/04/16	100% DD ISSUE	PF	ML	ML
C	15/04/16	REVISED AS CLOUDED	PF	APS	APS

CLIENT

GRIMSHAW ARCHITECTS
LEVEL 3, 24 HICKSON RAD
SYDNEY NSW 2000

Calibre Consulting (Melb) Pty Ltd
Consulting Engineers
Structural - Civil
Level 2, 55 Southbank Boulevard,
Southbank, VIC 3006, Australia
Tel: +61 3 9203 9000
www.calibreconsulting.co

BRISBANE CANBERRA NEW ZEALAND MELBOURNE PERTH
ROCKHAMPTON SINGAPORE SUNSHINE COAST SYDNEY

C

PROJECT

GUNYAMA PARK AQUATIC AND RECREATION CENTRE (GPARC)
132 JOYNTON AVENUE
ZETLAND NSW 2017

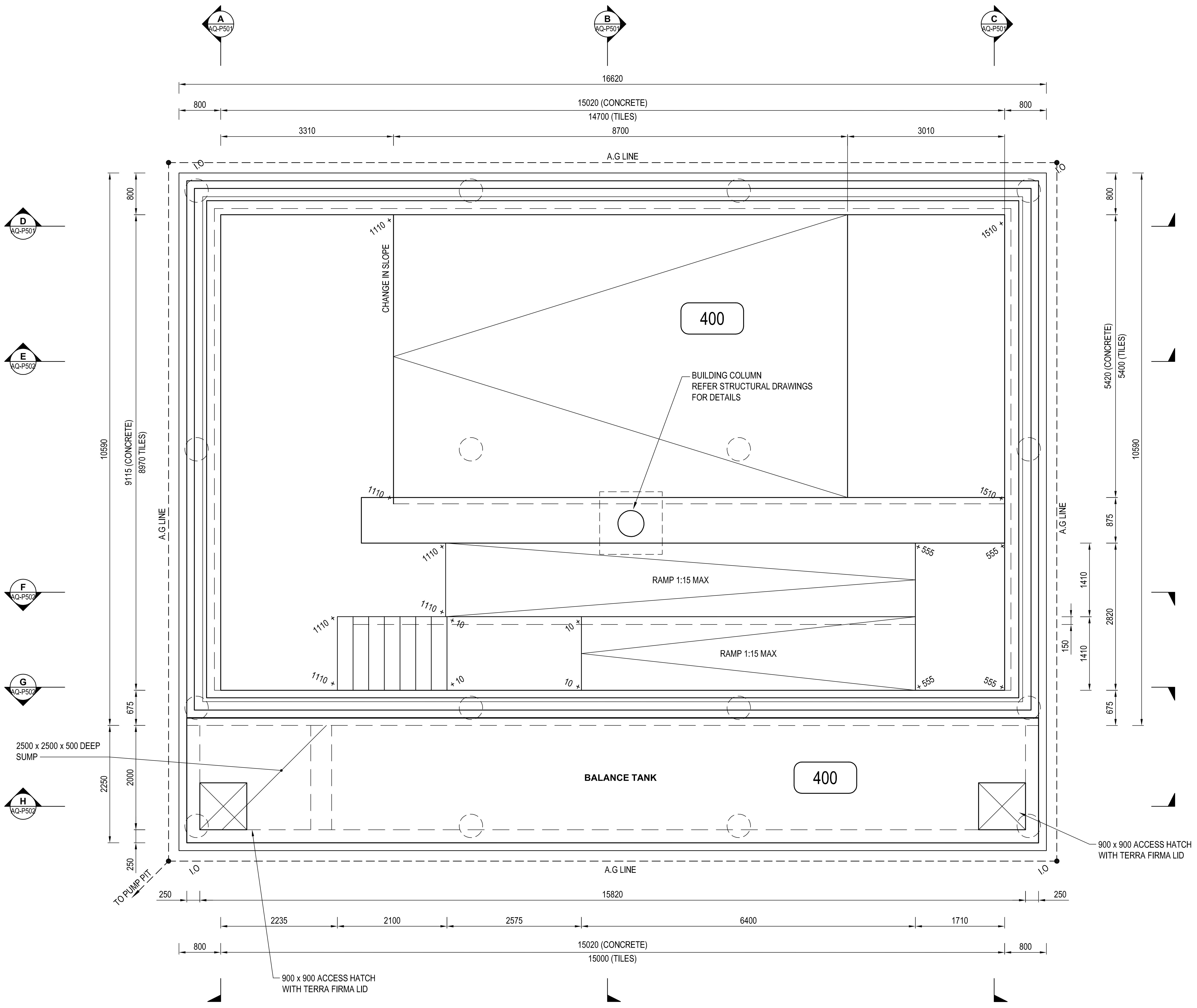
PRELIMINARY

NOT FOR CONSTRUCTION PURPOSES

DRAWING TITLE

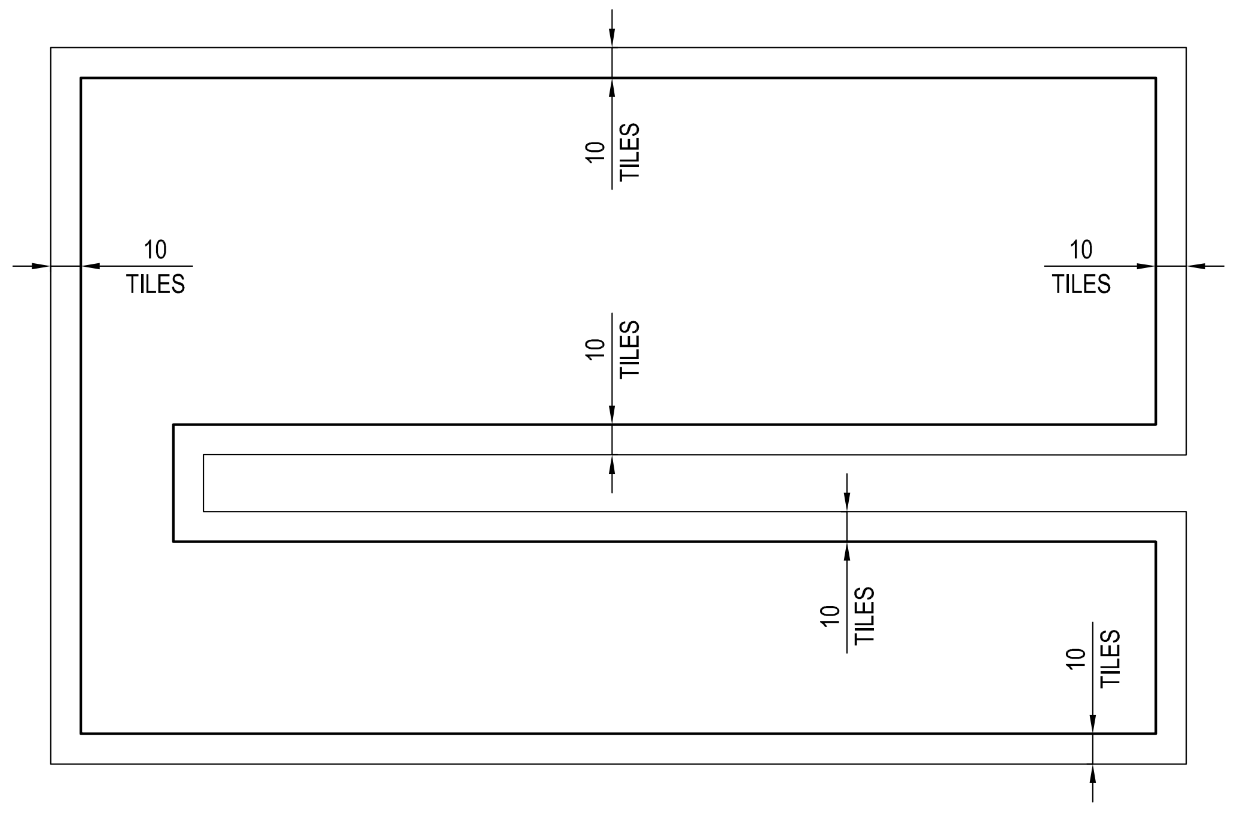
INDOOR LEISURE POOL
CONCRETE LAYOUT PLAN

PROJECT No.	DRAWING No.	REVISION
M140792	AQ-P400	C



INDOOR HYDROTHERAPY POOL
CONCRETE LAYOUT PLAN

SCALE 1:50



TILE ALLOWANCE

SCALE NTS

ALL DIMENSIONS ARE CONCRETE TO
CONCRETE UNLESS NOTED OTHERWISE

FOR LOCATION OF POOL RELATIVE TO GRID
REFER TO ARCHITECTS DRAWINGS

REFER TO POOL HYDRAULIC DRAWINGS FOR
DETAILS AND LOCATIONS OF POOL PIPEWORK

REFER TO POOL FITTINGS DRAWINGS FOR
DETAILS OF POOL FITTINGS

REFER TO POOL TILING DRAWINGS FOR
DETAILS OF POOL TILING

LEGEND

+ 1210	CONCRETE PROFILE OFFSET FROM 'TWL' (TYPICAL)
● I.O	INSPECTION OPENING
A. G LINE	AGLINE MIN 100 DIA. UPVC
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ROCKHAMPTON SINGAPORE SUNSHINE COAST SYDNEY

PROJECT

C

**GUNYAMA PARK AQUATIC AND
RECREATION CENTRE
(GPARC)**

**132 JOYNTON AVENUE
ZETLAND NSW 2017**

PRELIMINARY

NOT FOR CONSTRUCTION PURPOSES

DRAWING TITLE

**INDOOR HYDROTHERAPY POOL
CONCRETE LAYOUT PLAN**

ONLY FIGURED DIMENSION TO BE USED
DRAWINGS ARE NOT TO BE SCALE

0 1000 2000 3000 4000 5000
SCALE: 1:50

PROJECT No.	DRAWING No.	REVISION
M140792	AQ-P500	C

Appendix C

Analytical Summary Tables (HLA 2002 & 2008)

							Borehole	BH01	BH01	BH01	BH02	BH02	BH07	BH07	BH08	BH09	BH105
							Field ID	BH01_0.0-0.2	BH01_2.0-2.1	DUP01	BH02_0.0-0.2	BH02_2.0-2.1	BH07_0.1-0.3	BH07_1.8-2.0	BH08_0.4-0.5	BH09_0.8-1.0	BH105
							Sample_Depth	0-0.2	2-2.1	0-0.2	0-0.2	2-2.1	0.1-0.3	1.8-2	0.4-0.5	0.8-1	0.8-1
							Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal
							Sample Date	4/06/2002	4/06/2002	4/06/2002	4/06/2002	4/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	31/03/2008
							Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Adjacent to Aquatic Centre
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**										
Lead																	
Lead	mg/kg	2	600	1500	-	-	-	922	-	447	50	-	960	-	686	527	81
Metals																	
Arsenic	mg/kg	1	300	3000	-	-	-	7	-	9	2	-	4	-	6	8	3
Cadmium	mg/kg	0.1	90	900	-	-	-	1	-	1	<1	-	<1	-	<1	<1	0.1
Chromium (III+VI)	mg/kg	1						16	-	17	6	-	9	-	23	13	4
Copper	mg/kg	2	17000	240000	-	-	-	279	-	186	58	-	108	-	259	198	98
Mercury	mg/kg	0.05	80	730	-	-	-	1.3	-	2.1	0.1	-	0.7	-	1.7	1.8	0.13
Nickel	mg/kg	1	1200	6000	-	-	-	10	-	14	3	-	7	-	31	9	6
Zinc	mg/kg	5	30000	400000	-	-	-	426	-	340	114	-	237	-	387	482	80
BTEX																	
Benzene	mg/kg	0.2	NL	-	1100	77	3	-	<0.2	-	-	<0.2	-	<0.2	-	-	<0.2
Ethylbenzene	mg/kg	0.5	NL	-	85,000	NL	NL	-	<0.2	-	-	<0.2	-	<0.2	-	-	<0.5
Toluene	mg/kg	0.5	NL	-	283,000	NL	NL	-	<0.2	-	-	<0.2	-	<0.2	-	-	<0.5
Xylene (m & p)	mg/kg	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1
Xylene (o)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5
Xylene Total	mg/kg		NL	-	230,000	NL	230	-	<1	-	-	<1	-	<1	-	-	<1.5
C6-C10 less BTEX	mg/kg		NL	-	26,000	-	260	-	<0.5	-	-	<0.5	-	<0.5	-	-	<0.5
TPH																	
F2-NAPHTHALENE	mg/kg		NL	-	62,000	NL	NL	-	<50	-	-	-	-	-	-	-	<50
C6 - C9	mg/kg	10	NL	-	26,000	NL	260	-	<2	-	-	<2	-	<2	-	-	<10
C10 - C14	mg/kg	50	NL	-	62,000	NL	NL	-	<50	-	-	<50	-	<50	-	-	<50
C15 - C28	mg/kg	100	-	-	85,000	-	-	-	<100	-	-	<100	-	<100	-	-	730
C29-C36	mg/kg	100	-	-	120,000	-	-	-	<100	-	-	<100	-	<100	-	-	400
+C10 - C36 (Sum of total)	mg/kg		-	-	-	-	-	-	<250	-	-	<250	-	<250	-	-	1130 - 1155
PAH/Phenols																	
Acenaphthene	mg/kg	0.5						-	<0.5	-	-	-	<0.5	-	<0.5	<0.5	2.4
Acenaphthylene	mg/kg	0.5						-	<0.5	-	-	-	0.7	-	1.9	1.7	0.7
Anthracene	mg/kg	0.5						-	<0.5	-	-	-	0.7	-	2.7	2.2	9.9
Benz(a)anthracene	mg/kg	0.5						-	<0.5	-	-	-	2.6	-	12	6.3	13.5
Benzo(a) pyrene	mg/kg	0.5						-	<0.5	-	-	-	4.4	-	16.7	8.6	32.6
Benzo(b)&(k)fluoranthene	mg/kg	1						-	-	-	-	-	-	-	-	-	40
Benzo(b)fluoranthene	mg/kg	0.5						-	<0.5	-	-	-	4.7	-	17.9	9.6	-
Benzo(g,h,i)perylene	mg/kg	0.5						-	<0.5	-	-	-	2.9	-	9.9	5.1	23.1
Benzo(k)fluoranthene	mg/kg	0.5						-	<0.5	-	-	-	1.9	-	7.4	2.7	-
Chrysene	mg/kg	0.5						-	<0.5	-	-	-	3.14	-	13.7	7	19.4
Dibenz(a,h)anthracene	mg/kg	0.5						-	<0.5	-	-	-	0.5	-	2.4	1.2	6.5
Fluoranthene	mg/kg	0.5						-	<0.5	-	-	-	3.8	-	20.4	10.3	39.7
Fluorene	mg/kg	0.5						-	<0.5	-	-	-	<0.5	-	<0.5	<0.5	2.9
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						-	<0.5	-	-	-	2.2	-	7.5	3.9	21.3
Naphthalene	mg/kg	0.5	-	-	29,000	NL	NL	-	<0.5	-	-	-	<0.5	-	<0.5	<0.5	1.8
PAHs (Sum of total)	mg/kg		300	4000	-	-	-	-	<0.5	-	-	-	32.84	-	141	74.3	283.6
Phenanthrene	mg/kg	0.5						-	<0.5	-	-	-	1.3	-	6.2	5.3	37.6
Pyrene	mg/kg	0.5						-	<0.5	-	-	-	4	-	22.3	10.4	32.2
B(a)P Total Potency Equivalent	mg/kg		3	40	-	-	-	-	<0.5	-	-	-	6.1	-	23.82	12.17	43.01
Chlorinated Hydrocarbons																	
1,1,1,2-tetrachloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-

							Borehole	BH01	BH01	BH01	BH02	BH02	BH07	BH07	BH08	BH09	BH105
							Field ID	BH01_0.0-0.2	BH01_2.0-2.1	DUP01	BH02_0.0-0.2	BH02_2.0-2.1	BH07_0.1-0.3	BH07_1.8-2.0	BH08_0.4-0.5	BH09_0.8-1.0	BH105
							Sample_Depth	0-0.2	2-2.1	0-0.2	0-0.2	2-2.1	0.1-0.3	1.8-2	0.4-0.5	0.8-1	0.8-1
							Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal
							Sample Date	4/06/2002	4/06/2002	4/06/2002	4/06/2002	4/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	31/03/2008
							Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Adjacent to Aquatic Centre
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**										
Chloromethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																	
1,2-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg		10	80	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-
Halogenated Hydrocarbons																	
1,2-dibromoethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																	
4,4-DDE	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
a-BHC	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Aldrin	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg		10	45	-	-	-	<0.1	-	-	<0.1	-	-	-	-	-	-
b-BHC	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Chlordane (cis)	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Chlordane (trans)	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
d-BHC	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
DDD	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
DDT	mg/kg							<0.2	-	-	<0.2	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg		400	3600	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-	-
Dieldrin	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Endosulfan I	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Endosulfan II	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Endosulfan sulphate	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Endrin	mg/kg		20	100	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Heptachlor	mg/kg		10	50	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-
Heptachlor epoxide	mg/kg							<0.05	-	-	<0.05	-	-	-	-	-	-
Methoxychlor	mg/kg		400	2500	-	-	-	<0.2	-	-	<0.2	-	-	-	-	-	-
Polychlorinated Biphenyls																	
PCBs (Sum of total)	mg/kg		1	7	-	-	-	<0.1	-	-	<0.1	-	-	-	-	-	-
VOCs																	
1,1-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Asbestos								ND	-	-	ND	-	-	-	-	-	-

NOTES:

ND - not detected

							Borehole	BH105	BH105	BH106	**BH106**	BH106	BH106	BH107	BH107	BH107	BH108
							Field ID	BH105	DUP01	BH106	**BH106**	BH106	DUP02	BH107	BH107	DUP04	BH108
							Sample_Depth	3-3.4	3-3.4	0.5-0.7	**2-2.2**	3-3.2	3-3.2	0.5-0.6	2-2.1	0.5-0.6	0.2-0.3
							Sample_Type	Normal	Field_D	Normal	Normal	Normal	Field_D	Normal	Normal	Field_D	Normal
							Sample Date	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	2/04/2008	2/04/2008	2/04/2008	31/03/2008
							Area	Adjacent to Aquatic Centre	Adjacent to Aquatic Centre	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**										
Lead																	
Lead	mg/kg	2	600	1500	-	-	-	3	7	2	265	105	123	29	68	30	490
Metals																	
Arsenic	mg/kg	1	300	3000	-	-	-	<1	<1	<1	4	5	10	1	2	2	8
Cadmium	mg/kg	0.1	90	900	-	-	-	<0.1	<0.1	<0.1	1.1	0.2	0.2	<0.1	0.2	<0.1	1.4
Chromium (III+VI)	mg/kg	1						2	2	1	6	11	14	1	4	2	15
Copper	mg/kg	2	17000	240000	-	-	-	<2	3	<2	115	34	46	8	42	9	286
Mercury	mg/kg	0.05	80	730	-	-	-	<0.05	<0.05	<0.05	0.31	0.2	0.36	0.09	0.19	0.08	1.32
Nickel	mg/kg	1	1200	6000	-	-	-	<1	<1	<1	6	6	10	<1	3	<1	14
Zinc	mg/kg	5	30000	400000	-	-	-	<5	9	6	633	173	178	69	137	57	699
BTEX																	
Benzene	mg/kg	0.2	NL	-	1100	77	3	<0.2	<0.2	-	<0.2	-	-	-	-	-	<0.2
Ethylbenzene	mg/kg	0.5	NL	-	85,000	NL	NL	<0.5	<0.5	-	<0.5	-	-	-	-	-	<0.5
Toluene	mg/kg	0.5	NL	-	283,000	NL	NL	<0.5	<0.5	-	<0.5	-	-	-	-	-	<0.5
Xylene (m & p)	mg/kg	1	-	-	-	-	-	<1	<1	-	<1	-	-	-	-	-	<1
Xylene (o)	mg/kg	0.5	-	-	-	-	-	<0.5	<0.5	-	<0.5	-	-	-	-	-	<0.5
Xylene Total	mg/kg		NL	-	230,000	NL	230	<1.5	<1.5	-	<1.5	-	-	-	-	-	<1.5
C6-C10 less BTEX	mg/kg		NL	-	26,000	-	260	<0.5	<0.5	-	<0.5	-	-	-	-	-	<0.5
TPH																	
F2-NAPHTHALENE	mg/kg		NL	-	62,000	NL	NL	-	-	-	75.6	-	-	-	-	-	-
C6 - C9	mg/kg	10	NL	-	26,000	NL	260	<10	<10	-	<10	-	-	-	-	-	<10
C10 - C14	mg/kg	50	NL	-	62,000	NL	NL	<50	<50	-	80	-	-	-	-	-	-
C15 - C28	mg/kg	100	-	-	85,000	-	-	<100	<100	-	4500	-	-	-	-	-	-
C29-C36	mg/kg	100	-	-	120,000	-	-	<100	<100	-	2350	-	-	-	-	-	-
+C10 - C36 (Sum of total)	mg/kg		-	-	-	-	-	<250	<250	-	6930	-	-	-	-	-	-
PAH/Phenols																	
Acenaphthene	mg/kg	0.5						-	-	-	10.1	-	-	-	<0.5	-	<0.5
Acenaphthylene	mg/kg	0.5						-	-	-	1.8	-	-	-	0.6	-	1.9
Anthracene	mg/kg	0.5						-	-	-	38.6	-	-	-	1.7	-	2.7
Benz(a)anthracene	mg/kg	0.5						-	-	-	133	-	-	-	3.4	-	11.3
Benzo(a) pyrene	mg/kg	0.5						-	-	-	104	-	-	-	9.2	-	12.7
Benzo(b)&(k)fluoranthene	mg/kg	1						-	-	-	142	-	-	-	11	-	19
Benzo(b)fluoranthene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.5						-	-	-	57.5	-	-	-	8.3	-	8.4
Benzo(k)fluoranthene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	0.5						-	-	-	109	-	-	-	5.8	-	12.4
Dibenz(a,h)anthracene	mg/kg	0.5						-	-	-	16.1	-	-	-	2.4	-	2
Fluoranthene	mg/kg	0.5						-	-	-	313	-	-	-	11.1	-	18.9
Fluorene	mg/kg	0.5						-	-	-	22.1	-	-	-	0.6	-	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						-	-	-	61.1	-	-	-	7.1	-	7.1
Naphthalene	mg/kg	0.5	-	-	29,000	NL	NL	-	-	-	4.4	-	-	-	<0.5	-	<0.5
PAHs (Sum of total)	mg/kg		300	4000	-	-	-	-	-	-	1431	-	-	-	78.1	-	123.1
Phenanthrene	mg/kg	0.5						-	-	-	123	-	-	-	7.2	-	8.2
Pyrene	mg/kg	0.5						-	-	-	295	-	-	-	9.7	-	18.5
B(a)P Total Potency Equivalent	mg/kg		3	40	-	-	-	-	-	-	141.2	-	-	-	12.79	-	16.75
Chlorinated Hydrocarbons																	
1,1,1,2-tetrachloroethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,1,1-trichloroethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,1,2-trichloroethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,1-dichloroethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,1-dichloroethene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,2,3-trichloropropane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,2-dichloroethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Carbon tetrachloride	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Chloroethane	mg/kg	5						-	-	-	<5	-	-	<5	-	-	-
Chloroform	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-

Data Entry: KM
Data Review: AR
AECOM

							Borehole	BH105	BH105	BH106	**BH106**	BH106	BH106	BH107	BH107	BH107	BH108
							Field ID	BH105	DUP01	BH106	**BH106**	BH106	DUP02	BH107	BH107	DUP04	BH108
							Sample_Depth	3-3.4	3-3.4	0.5-0.7	**2-2.2**	3-3.2	3-3.2	0.5-0.6	2-2.1	0.5-0.6	0.2-0.3
							Sample_Type	Normal	Field_D	Normal	Normal	Normal	Field_D	Normal	Normal	Field_D	Normal
							Sample Date	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	2/04/2008	2/04/2008	2/04/2008	31/03/2008
							Area	Adjacent to Aquatic Centre	Adjacent to Aquatic Centre	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**										
Chloromethane	mg/kg	5						-	-	-	<5	-	-	<5	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Hexachlorobutadiene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Trichloroethene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Tetrachloroethene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Vinyl chloride	mg/kg	5						-	-	-	<5	-	-	<5	-	-	-
Halogenated Benzenes																	
1,2-dichlorobenzene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,3-dichlorobenzene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,4-dichlorobenzene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Chlorobenzene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Hexachlorobenzene	mg/kg		10	80	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																	
1,2-dibromoethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Bromodichloromethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Bromoform	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Bromomethane	mg/kg	5						-	-	-	<5	-	-	<5	-	-	-
Chlorodibromomethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Dibromomethane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Dichlorodifluoromethane	mg/kg	5						-	-	-	<5	-	-	<5	-	-	-
Trichlorofluoromethane	mg/kg	5						-	-	-	<5	-	-	<5	-	-	-
Organochlorine Pesticides																	
4,4-DDE	mg/kg							-	-	-	-	-	-	-	-	-	-
a-BHC	mg/kg							-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg							-	-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg		10	45	-	-	-	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg							-	-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg							-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg							-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg							-	-	-	-	-	-	-	-	-	-
DDD	mg/kg							-	-	-	-	-	-	-	-	-	-
DDT	mg/kg							-	-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg		400	3600	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg							-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg							-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg							-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg							-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg		20	100	-	-	-	-	-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg							-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg		10	50	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg							-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg		400	2500	-	-	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls																	
PCBs (Sum of total)	mg/kg		1	7	-	-	-	-	-	-	-	-	-	-	-	-	-
VOCs																	
1,1-dichloropropene	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,2-dichloropropane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
1,3-dichloropropane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
2,2-dichloropropane	mg/kg	0.5						-	-	-	<0.5	-	-	<0.5	-	-	-
Asbestos								-	-	-	-	-	-	-	-	-	-

NOTES:
ND - not detected

							Borehole	BH108	BH13	BH13	BH13	BH14	BH14	BH17
							Field ID	BH108	BH13_0.15-0.3	BH13_1.8-2.0	DUP07	BH14_0.8-1.0	BH14_1.8-2.0	BH17_0.8-1.0
							Sample_Depth	0.9-1	0.15-0.3	1.8-2	0.15-0.3	0.8-1	1.8-2	0.8-1
							Sample_Type	Normal	Normal	Normal	Field_D	Normal	Normal	Normal
							Sample Date	31/03/2008	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002
							Area	Aquatic Centre Building	Aquatic Centre	Aquatic Centre	Aquatic Centre	Aquatic Centre	Aquatic Centre	Gunyama Park
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**							
Lead														
Lead	mg/kg	2	600	1500	-	-	-	1550	240	10	284	1080	242	127
Metals														
Arsenic	mg/kg	1	300	3000	-	-	-	6	4	<1	7	7	4	5
Cadmium	mg/kg	0.1	90	900	-	-	-	0.5	<1	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1						17	5	<1	10	30	7	8
Copper	mg/kg	2	17000	240000	-	-	-	434	97	2	170	1240	99	83
Mercury	mg/kg	0.05	80	730	-	-	-	0.7	0.6	<0.1	0.6	4.1	0.5	0.6
Nickel	mg/kg	1	1200	6000	-	-	-	13	5	<1	8	22	10	11
Zinc	mg/kg	5	30000	400000	-	-	-	420	332	8	390	758	177	191
BTEX														
Benzene	mg/kg	0.2	NL	-	1100	77	3	<0.2	-	-	-	<0.2	-	<0.2
Ethylbenzene	mg/kg	0.5	NL	-	85,000	NL	NL	<0.5	-	-	-	<0.2	-	<0.2
Toluene	mg/kg	0.5	NL	-	283,000	NL	NL	<0.5	-	-	-	<0.2	-	<0.2
Xylene (m & p)	mg/kg	1	-	-	-	-	-	<1	-	-	-	-	-	-
Xylene (o)	mg/kg	0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-
Xylene Total	mg/kg		NL	-	230,000	NL	230	<1.5	-	-	-	<1	-	<0.2
C6-C10 less BTEX	mg/kg		NL	-	26,000	-	260	<0.5	-	-	-	<0.5	-	<0.5
TPH														
F2-NAPHTHALENE	mg/kg		NL	-	62,000	NL	NL	<50	-	-	-	<50	-	<50
C6 - C9	mg/kg	10	NL	-	26,000	NL	260	<10	-	-	-	<2	-	<2
C10 - C14	mg/kg	50	NL	-	62,000	NL	NL	<50	-	-	-	<50	-	<50
C15 - C28	mg/kg	100	-	-	85,000	-	-	780	-	-	-	418	-	108
C29-C36	mg/kg	100	-	-	120,000	-	-	740	-	-	-	310	-	<100
+C10 - C36 (Sum of total)	mg/kg		-	-	-	-	-	1520 - 1545	-	-	-	753	-	183
PAH/Phenols														
Acenaphthene	mg/kg	0.5						<0.5	<0.5	-	<0.5	<0.5	-	<0.5
Acenaphthylene	mg/kg	0.5						2.7	<0.5	-	<0.5	1	-	<0.5
Anthracene	mg/kg	0.5						4.6	<0.5	-	<0.5	1.1	-	<0.5
Benz(a)anthracene	mg/kg	0.5						15	1.4	-	2	5.1	-	<0.5
Benzo(a) pyrene	mg/kg	0.5						21.7	2	-	2.4	6.5	-	0.5
Benzo(b)&(k)fluoranthene	mg/kg	1						31	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.5						-	2.3	-	2.6	6.4	-	0.7
Benzo(g,h,i)perylene	mg/kg	0.5						17.3	1.5	-	1.7	4.4	-	<0.5
Benzo(k)fluoranthene	mg/kg	0.5						-	1	-	1.3	3.4	-	<0.5
Chrysene	mg/kg	0.5						16.2	1.6	-	2.1	5	-	0.5
Dibenz(a,h)anthracene	mg/kg	0.5						3.3	<0.5	-	<0.5	<0.5	-	<0.5
Fluoranthene	mg/kg	0.5						19	2.5	-	3.5	7.2	-	0.9
Fluorene	mg/kg	0.5						0.5	<0.5	-	<0.5	<0.5	-	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						11.8	1.1	-	1.3	3.2	-	<0.5
Naphthalene	mg/kg	0.5	-	-	29,000	NL	NL	1	<0.5	-	<0.5	<0.5	-	<0.5
PAHs (Sum of total)	mg/kg		300	4000	-	-	-	178.4	17.1	-	22	54.2	-	3.5
Phenanthrene	mg/kg	0.5						11.7	1	-	1.4	3.2	-	<0.5
Pyrene	mg/kg	0.5						22.6	2.7	-	3.7	7.7	-	0.9
B(a)P Total Potency Equivalent	mg/kg		3	40	-	-	-	28.02	2.611	-	3.158	8.404	-	0.575
Chlorinated Hydrocarbons														
1,1,1,2-tetrachloroethane	mg/kg	0.5						-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5						-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5						-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5						-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5						-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5						-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5						-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5						-	-	-	-	-	-	-
Chloroethane	mg/kg	5						-	-	-	-	-	-	-
Chloroform	mg/kg	0.5						-	-	-	-	-	-	-

							Borehole	BH108	BH13	BH13	BH13	BH14	BH14	BH17
							Field ID	BH108	BH13_0.15-0.3	BH13_1.8-2.0	DUP07	BH14_0.8-1.0	BH14_1.8-2.0	BH17_0.8-1.0
							Sample_Depth	0.9-1	0.15-0.3	1.8-2	0.15-0.3	0.8-1	1.8-2	0.8-1
							Sample_Type	Normal	Normal	Normal	Field_D	Normal	Normal	Normal
							Sample Date	31/03/2008	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002
							Area	Aquatic Centre Building	Aquatic Centre	Aquatic Centre	Aquatic Centre	Aquatic Centre	Aquatic Centre	Gunyama Park
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**							
Chloromethane	mg/kg	5						-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5						-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5						-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5						-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-
Vinyl chloride	mg/kg	5						-	-	-	-	-	-	-
Halogenated Benzenes														
1,2-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg		10	80	-	-	-	-	<0.05	-	-	-	-	-
Halogenated Hydrocarbons														
1,2-dibromoethane	mg/kg	0.5						-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5						-	-	-	-	-	-	-
Bromoform	mg/kg	0.5						-	-	-	-	-	-	-
Bromomethane	mg/kg	5						-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5						-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5						-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5						-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	5						-	-	-	-	-	-	-
Organochlorine Pesticides														
4,4-DDE	mg/kg							-	<0.05	-	-	-	-	-
a-BHC	mg/kg							-	<0.05	-	-	-	-	-
Aldrin	mg/kg							-	<0.05	-	-	-	-	-
Aldrin + Dieldrin	mg/kg		10	45	-	-	-	-	<0.1	-	-	-	-	-
b-BHC	mg/kg							-	<0.05	-	-	-	-	-
Chlordane (cis)	mg/kg							-	<0.05	-	-	-	-	-
Chlordane (trans)	mg/kg							-	<0.05	-	-	-	-	-
d-BHC	mg/kg							-	<0.05	-	-	-	-	-
DDD	mg/kg							-	<0.05	-	-	-	-	-
DDT	mg/kg							-	<0.2	-	-	-	-	-
DDT+DDE+DDD	mg/kg		400	3600	-	-	-	-	<0.3	-	-	-	-	-
Dieldrin	mg/kg							-	<0.05	-	-	-	-	-
Endosulfan I	mg/kg							-	<0.05	-	-	-	-	-
Endosulfan II	mg/kg							-	<0.05	-	-	-	-	-
Endosulfan sulphate	mg/kg							-	<0.05	-	-	-	-	-
Endrin	mg/kg		20	100	-	-	-	-	<0.05	-	-	-	-	-
g-BHC (Lindane)	mg/kg							-	<0.05	-	-	-	-	-
Heptachlor	mg/kg		10	50	-	-	-	-	<0.05	-	-	-	-	-
Heptachlor epoxide	mg/kg							-	<0.05	-	-	-	-	-
Methoxychlor	mg/kg		400	2500	-	-	-	-	<0.2	-	-	-	-	-
Polychlorinated Biphenyls														
PCBs (Sum of total)	mg/kg		1	7	-	-	-	-	<0.1	-	-	-	-	-
VOCs														
1,1-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5						-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-
Asbestos								ND	ND	-	-	-	-	-

NOTES:
ND - not detected

							Borehole	BH18	BH18	BH18	BH19	BH19	HA01	HA01	HA02	HA02	HA02
							Field ID	BH18_0.15-0.4	BH18_1.8-2.0	DUP09	BH19_0.5-0.6	BH19_3.0-3.1	HA01_0.2-0.3	HA01_1.4-1.5	DUP03	HA02_0.1-0.12	HA02_0.6-0.8
							Sample_Depth	0.15-0.4	1.8-2	0.15-0.4	0.5-0.6	3-3.1	0.2-0.3	1.4-1.5	0.6-0.8	0.1-0.12	0.6-0.8
							Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Normal	Field_D	Normal	Normal
							Sample Date	5/06/2002	5/06/2002	5/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002
							Area	Gunyama Park	Gunyama Park	Gunyama Park	Aquatic Centre	Aquatic Centre	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**										
Lead																	
Lead	mg/kg	2	600	1500	-	-	-	2	2	1	817	343	-	289	-	8	76
Metals																	
Arsenic	mg/kg	1	300	3000	-	-	-	1	<1	0.5	7	7	-	12	-	1	3
Cadmium	mg/kg	0.1	90	900	-	-	-	<1	<1	<0.5	<1	1	-	1	-	<1	<1
Chromium (III+VI)	mg/kg	1						1	2	1	17	12	-	14	-	2	4
Copper	mg/kg	2	17000	240000	-	-	-	1	<1	0.5	186	134	-	1190	-	23	20
Mercury	mg/kg	0.05	80	730	-	-	-	<0.1	<0.1	<0.005	1.2	0.6	-	1	-	<0.1	0.1
Nickel	mg/kg	1	1200	6000	-	-	-	<1	<1	<0.5	8	9	-	13	-	3	2
Zinc	mg/kg	5	30000	400000	-	-	-	2	<1	1	485	497	-	410	-	16	112
BTEX																	
Benzene	mg/kg	0.2	NL	-	1100	77	3	<0.2	-	<0.2	<0.2	-	-	-	-	<0.2	-
Ethylbenzene	mg/kg	0.5	NL	-	85,000	NL	NL	<0.2	-	<0.5	<0.2	-	-	-	-	<0.2	-
Toluene	mg/kg	0.5	NL	-	283,000	NL	NL	<0.2	-	<0.5	<0.2	-	-	-	-	0.2	-
Xylene (m & p)	mg/kg	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylene Total	mg/kg		NL	-	230,000	NL	230	<1	-	<1	<1	-	-	-	-	1.2	-
C6-C10 less BTEX	mg/kg		NL	-	26,000	-	260	<0.5	-	<0.5	<0.5	-	-	-	-	<0.5	-
TPH																	
F2-NAPHTHALENE	mg/kg		NL	-	62,000	NL	NL	<50	-	<50	<50	-	-	-	-	<50	-
C6 - C9	mg/kg	10	NL	-	26,000	NL	260	<2	-	<10	<2	-	-	-	-	<2	-
C10 - C14	mg/kg	50	NL	-	62,000	NL	NL	<50	-	<50	<50	-	-	-	-	<50	-
C15 - C28	mg/kg	100	-	-	85,000	-	-	<100	-	<100	333	-	-	-	-	105	-
C29-C36	mg/kg	100	-	-	120,000	-	-	<100	-	<100	395	-	-	-	-	<100	-
+C10 - C36 (Sum of total)	mg/kg		-	-	-	-	-	<250	-	<250	753	-	-	-	-	180	-
PAH/Phenols																	
Acenaphthene	mg/kg	0.5						<0.5	-	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5						<0.5	-	<0.5	1.1	-	-	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5						<0.5	-	<0.5	1.3	-	-	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5						<0.5	-	<0.5	6.8	-	-	<0.5	<0.5	0.7	<0.5
Benzo(a) pyrene	mg/kg	0.5						<0.5	-	<0.5	8.2	-	-	<0.5	<0.5	0.6	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1						-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.5						<0.5	-	<1	9.3	-	-	<0.5	<0.5	0.7	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5						<0.5	-	<0.5	5.1	-	-	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5						<0.5	-	<1	3.5	-	-	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5						<0.5	-	<0.5	6.5	-	-	<0.5	<0.5	0.7	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5						<0.5	-	<0.5	1.3	-	-	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5						<0.5	-	<0.5	10.5	-	-	<0.5	<0.5	1.2	<0.5
Fluorene	mg/kg	0.5						<0.5	-	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						<0.5	-	<0.5	4	-	-	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5	-	-	29,000	NL	NL	<0.5	-	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg		300	4000	-	-	-	0.5	-	<0.5	72.3	-	-	<0.5	<0.5	5.8	<0.5
Phenanthrene	mg/kg	0.5						<0.5	-	<0.5	3.7	-	-	<0.5	<0.5	0.8	<0.5
Pyrene	mg/kg	0.5						<0.5	-	<0.5	11	-	-	<0.5	<0.5	1.1	<0.5
B(a)P Total Potency Equivalent	mg/kg		3	40	-	-	-	<0.5	-	<0.5	11.98	-	-	<0.5	<0.5	0.747	<0.5
Chlorinated Hydrocarbons																	
1,1,1,2-tetrachloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-

							Borehole	BH18	BH18	BH18	BH19	BH19	HA01	HA01	HA02	HA02	HA02
							Field ID	BH18_0.15-0.4	BH18_1.8-2.0	DUP09	BH19_0.5-0.6	BH19_3.0-3.1	HA01_0.2-0.3	HA01_1.4-1.5	DUP03	HA02_0.1-0.12	HA02_0.6-0.8
							Sample_Depth	0.15-0.4	1.8-2	0.15-0.4	0.5-0.6	3-3.1	0.2-0.3	1.4-1.5	0.6-0.8	0.1-0.12	0.6-0.8
							Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Normal	Field_D	Normal	Normal
							Sample Date	5/06/2002	5/06/2002	5/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002
							Area	Gunyama Park	Gunyama Park	Gunyama Park	Aquatic Centre	Aquatic Centre	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NEPM 2013 HIL C - Recreational Open**	**NEPM 2013 HIL D - Commercial/Industrial**	**CRC Care 2013: Intrusive Maintennace Worker (direct contact)**	**CRC Care 2013; Intrusive Maintennace Worker (vapour)**	**NEPM 2013 Vapour Intrusion: HSL- D Commercial/Industrial (sand)**										
Chloromethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																	
1,2-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg		10	80	-	-	-	-	-	-	-	-	-	-	-	<0.05	-
Halogenated Hydrocarbons																	
1,2-dibromoethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	5						-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																	
4,4-DDE	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
a-BHC	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Aldrin	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Aldrin + Dieldrin	mg/kg		10	45	-	-	-	-	-	-	-	-	-	-	-	<0.1	-
b-BHC	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Chlordane (cis)	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Chlordane (trans)	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
d-BHC	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
DDD	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
DDT	mg/kg							-	-	-	-	-	-	-	-	<0.2	-
DDT+DDE+DDD	mg/kg		400	3600	-	-	-	-	-	-	-	-	-	-	-	<0.3	-
Dieldrin	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Endosulfan I	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Endosulfan II	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Endosulfan sulphate	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Endrin	mg/kg		20	100	-	-	-	-	-	-	-	-	-	-	-	<0.05	-
g-BHC (Lindane)	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Heptachlor	mg/kg		10	50	-	-	-	-	-	-	-	-	-	-	-	<0.05	-
Heptachlor epoxide	mg/kg							-	-	-	-	-	-	-	-	<0.05	-
Methoxychlor	mg/kg		400	2500	-	-	-	-	-	-	-	-	-	-	-	<0.2	-
Polychlorinated Biphenyls																	
PCBs (Sum of total)	mg/kg		1	7	-	-	-	-	-	-	-	-	-	-	-	<0.1	-
VOCs																	
1,1-dichloropropene	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5						-	-	-	-	-	-	-	-	-	-
Asbestos								-	-	-	-	-	ND	-	-	-	-

NOTES:
ND - not detected

						Borehole	**BH01**	**BH01**	**BH01**	**BH02**	**BH02**	BH07	BH07	BH08	BH09
						Field ID	**BH01_0.0-0.2**	**BH01_2.0-2.1**	**DUP01**	**BH02_0.0-0.2**	**BH02_2.0-2.1**	BH07_0.1-0.3	BH07_1.8-2.0	BH08_0.4-0.5	BH09_0.8-1.0
						Sample Depth	**0-0.2**	**2-2.1**	**0-0.2**	**0-0.2**	**2-2.1**	0.1-0.3	1.8-2	0.4-0.5	0.8-1
						Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Normal	Normal	Normal
						Sample Date	4/06/2002	4/06/2002	4/06/2002	4/06/2002	4/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Lead															
Lead	mg/kg	2	100	**1500**	400	6000	922	-	447	50	-	960	-	686	527
Metals															
Arsenic	mg/kg	1	100	**500**	400	2000	7	-	9	2	-	4	-	6	8
Cadmium	mg/kg	0.1	20	**100**	80	400	1	-	1	<1	-	<1	-	<1	<1
Chromium (III+VI)	mg/kg	1					16	-	17	6	-	9	-	23	13
Copper	mg/kg	2					279	-	186	58	-	108	-	259	198
Mercury	mg/kg	0.05	4	**50**	16	200	1.3	-	2.1	0.1	-	0.7	-	1.7	1.8
Nickel	mg/kg	1	40	**1050**	160	4200	10	-	14	3	-	7	-	31	9
Zinc	mg/kg	5					426	-	340	114	-	237	-	387	482
B(a)P Total Potency Equivaler	mg/kg						-	<0.5	-	-	-	6.1	-	23.82	12.17
C6-C10 less BTEX	mg/kg						-	<0.5	-	-	<0.5	-	<0.5	-	-
TPH															
F2-NAPHTHALENE	mg/kg						-	<50	-	-	-	-	-	-	-
C6 - C9	mg/kg	10		**650**		2600	-	<2	-	-	<2	-	<2	-	-
C10 - C14	mg/kg	50					-	<50	-	-	<50	-	<50	-	-
C15 - C28	mg/kg	100					-	<100	-	-	<100	-	<100	-	-
C29-C36	mg/kg	100					-	<100	-	-	<100	-	<100	-	-
+C10 - C36 (Sum of total)	mg/kg			**10000**		40000	-	<250	-	-	<250	-	<250	-	-
BTEX															
Benzene	mg/kg	0.2	10	**18**	40	72	-	<0.2	-	-	<0.2	-	<0.2	-	-
Ethylbenzene	mg/kg	0.5	600	**1080**	2400	4320	-	<0.2	-	-	<0.2	-	<0.2	-	-
Toluene	mg/kg	0.5	288	**518**	1152	2073	-	<0.2	-	-	<0.2	-	<0.2	-	-
Xylene (m & p)	mg/kg	1					-	-	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Xylene Total	mg/kg		1000	**1800**	4000	7200	-	<1	-	-	<1	-	<1	-	-
Chlorinated Hydrocarbons															
1,1,1,2-tetrachloroethane	mg/kg	0.5	200	**360**	800	1440	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5	600	**1080**	2400	4320	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5	26	**46.8**	104	187.2	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5	24	**43.2**	96	172.8	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5	14	**25**	56	100	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5	120	**216**	480	864	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5	14	**25.2**	56	100.8	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	5	4	**7.2**	16	28.8	-	-	-	-	-	-	-	-	-
Halogenated Benzenes															
1,2-dichlorobenzene	mg/kg	0.5	86	**155**	344	620	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5	150	**270**	600	1080	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5	2000	**3600**	8000	14400	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Halogenated Hydrocarbons															
1,2-dibromoethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5					-	-	-	-	-	-	-	-	-

						Borehole	**BH01**	**BH01**	**BH01**	**BH02**	**BH02**	BH07	BH07	BH08	BH09
						Field ID	**BH01_0.0-0.2**	**BH01_2.0-2.1**	**DUP01**	**BH02_0.0-0.2**	**BH02_2.0-2.1**	BH07_0.1-0.3	BH07_1.8-2.0	BH08_0.4-0.5	BH09_0.8-1.0
						Sample Depth	**0-0.2**	**2-2.1**	**0-0.2**	**0-0.2**	**2-2.1**	0.1-0.3	1.8-2	0.4-0.5	0.8-1
						Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Normal	Normal	Normal
						Sample Date	4/06/2002	4/06/2002	4/06/2002	4/06/2002	4/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Bromomethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Inorganics															
Moisture	%	1					-	-	-	-	-	-	-	-	-
Organochlorine Pesticides															
4,4-DDE	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
a-BHC	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Aldrin	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Aldrin + Dieldrin	mg/kg						<0.1	-	-	<0.1	-	-	-	-	-
b-BHC	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Chlordane (cis)	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Chlordane (trans)	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
d-BHC	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
DDD	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
DDT	mg/kg						<0.2	-	-	<0.2	-	-	-	-	-
DDT+DDE+DDD	mg/kg						<0.3	-	-	<0.3	-	-	-	-	-
Dieldrin	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Endosulfan I	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Endosulfan II	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Endosulfan sulphate	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Endrin	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
g-BHC (Lindane)	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Heptachlor	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Heptachlor epoxide	mg/kg						<0.05	-	-	<0.05	-	-	-	-	-
Methoxychlor	mg/kg						<0.2	-	-	<0.2	-	-	-	-	-
PAH/Phenols															
Acenaphthene	mg/kg	0.5					-	<0.5	-	-	-	<0.5	-	<0.5	<0.5
Acenaphthylene	mg/kg	0.5					-	<0.5	-	-	-	0.7	-	1.9	1.7
Anthracene	mg/kg	0.5					-	<0.5	-	-	-	0.7	-	2.7	2.2
Benz(a)anthracene	mg/kg	0.5					-	<0.5	-	-	-	2.6	-	12	6.3
Benzo(a) pyrene	mg/kg	0.5	0.8	**10**	3.2	23	-	<0.5	-	-	-	4.4	-	**16.7**	8.6
Benzo(b)&(k)fluoranthene	mg/kg	1					-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.5					-	<0.5	-	-	-	4.7	-	17.9	9.6
Benzo(g,h,i)perylene	mg/kg	0.5					-	<0.5	-	-	-	2.9	-	9.9	5.1
Benzo(k)fluoranthene	mg/kg	0.5					-	<0.5	-	-	-	1.9	-	7.4	2.7
Chrysene	mg/kg	0.5					-	<0.5	-	-	-	3.14	-	13.7	7
Dibenz(a,h)anthracene	mg/kg	0.5					-	<0.5	-	-	-	0.5	-	2.4	1.2
Fluoranthene	mg/kg	0.5					-	<0.5	-	-	-	3.8	-	20.4	10.3
Fluorene	mg/kg	0.5					-	<0.5	-	-	-	<0.5	-	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					-	<0.5	-	-	-	2.2	-	7.5	3.9
Naphthalene	mg/kg	0.5					-	<0.5	-	-	-	<0.5	-	<0.5	<0.5
PAHs (Sum of total)	mg/kg			**200**		800	-	<0.5	-	-	-	32.84	-	141	74.3
Phenanthrene	mg/kg	0.5					-	<0.5	-	-	-	1.3	-	6.2	5.3
Pyrene	mg/kg	0.5					-	<0.5	-	-	-	4	-	22.3	10.4
Polychlorinated Biphenyls															
PCBs (Sum of total)	mg/kg			**50**		50	<0.1	-	-	<0.1	-	-	-	-	-
VOCs															
1,1-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-

						Borehole	BH105	BH105	BH105	**BH106**	**BH106**	BH106	BH106	BH107	BH107
						Field ID	BH105	BH105	DUP01	**BH106**	**BH106**	BH106	DUP02	BH107	BH107
						Sample Depth	0.8-1	3-3.4	3-3.4	**0.5-0.7**	**2-2.2**	3-3.2	3-3.2	0.5-0.6	2-2.1
						Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Field_D	Normal	Normal
						Sample Date	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	2/04/2008	2/04/2008
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Lead															
Lead	mg/kg	2	100	**1500**	400	6000	81	3	7	2	265	105	123	29	68
Metals															
Arsenic	mg/kg	1	100	**500**	400	2000	3	<1	<1	<1	4	5	10	1	2
Cadmium	mg/kg	0.1	20	**100**	80	400	0.1	<0.1	<0.1	<0.1	1.1	0.2	0.2	<0.1	0.2
Chromium (III+VI)	mg/kg	1					4	2	2	1	6	11	14	1	4
Copper	mg/kg	2					98	<2	3	<2	115	34	46	8	42
Mercury	mg/kg	0.05	4	**50**	16	200	0.13	<0.05	<0.05	<0.05	0.31	0.2	0.36	0.09	0.19
Nickel	mg/kg	1	40	**1050**	160	4200	6	<1	<1	<1	6	6	10	<1	3
Zinc	mg/kg	5					80	<5	9	6	633	173	178	69	137
B(a)P Total Potency Equivaler	mg/kg						43.01	-	-	-	141.2	-	-	-	12.79
C6-C10 less BTEX	mg/kg						<0.5	<0.5	<0.5	-	<0.5	-	-	-	-
TPH															
F2-NAPHTHALENE	mg/kg						<50	-	-	-	75.6	-	-	-	-
C6 - C9	mg/kg	10		**650**		2600	<10	<10	<10	-	<10	-	-	-	-
C10 - C14	mg/kg	50					<50	<50	<50	-	80	-	-	-	-
C15 - C28	mg/kg	100					730	<100	<100	-	4500	-	-	-	-
C29-C36	mg/kg	100					400	<100	<100	-	2350	-	-	-	-
+C10 - C36 (Sum of total)	mg/kg			**10000**		40000	1130 - 1155	<250	<250	-	6930	-	-	-	-
BTEX															
Benzene	mg/kg	0.2	10	**18**	40	72	<0.2	<0.2	<0.2	-	<0.2	-	-	-	-
Ethylbenzene	mg/kg	0.5	600	**1080**	2400	4320	<0.5	<0.5	<0.5	-	<0.5	-	-	-	-
Toluene	mg/kg	0.5	288	**518**	1152	2073	<0.5	<0.5	<0.5	-	<0.5	-	-	-	-
Xylene (m & p)	mg/kg	1					<1	<1	<1	-	<1	-	-	-	-
Xylene (o)	mg/kg	0.5					<0.5	<0.5	<0.5	-	<0.5	-	-	-	-
Xylene Total	mg/kg		1000	**1800**	4000	7200	<1.5	<1.5	<1.5	-	<1.5	-	-	-	-
Chlorinated Hydrocarbons															
1,1,1,2-tetrachloroethane	mg/kg	0.5	200	**360**	800	1440	-	-	-	-	<0.5	-	-	<0.5	-
1,1,1-trichloroethane	mg/kg	0.5	600	**1080**	2400	4320	-	-	-	-	<0.5	-	-	<0.5	-
1,1,2,2-tetrachloroethane	mg/kg	0.5	26	**46.8**	104	187.2	-	-	-	-	<0.5	-	-	<0.5	-
1,1,2-trichloroethane	mg/kg	0.5	24	**43.2**	96	172.8	-	-	-	-	<0.5	-	-	<0.5	-
1,1-dichloroethane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
1,1-dichloroethene	mg/kg	0.5	14	**25**	56	100	-	-	-	-	<0.5	-	-	<0.5	-
1,2,3-trichloropropane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
1,2-dichloroethane	mg/kg	0.5	10	**18**	40	72	-	-	-	-	<0.5	-	-	<0.5	-
Carbon tetrachloride	mg/kg	0.5	10	**18**	40	72	-	-	-	-	<0.5	-	-	<0.5	-
Chloroethane	mg/kg	5					-	-	-	-	<5	-	-	<5	-
Chloroform	mg/kg	0.5	120	**216**	480	864	-	-	-	-	<0.5	-	-	<0.5	-
Chloromethane	mg/kg	5					-	-	-	-	<5	-	-	<5	-
cis-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
cis-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Hexachlorobutadiene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Trichloroethene	mg/kg	0.5	10	**18**	40	72	-	-	-	-	<0.5	-	-	<0.5	-
Tetrachloroethene	mg/kg	0.5	14	**25.2**	56	100.8	-	-	-	-	<0.5	-	-	<0.5	-
trans-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
trans-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Vinyl chloride	mg/kg	5	4	**7.2**	16	28.8	-	-	-	-	<5	-	-	<5	-
Halogenated Benzenes															
1,2-dichlorobenzene	mg/kg	0.5	86	**155**	344	620	-	-	-	-	<0.5	-	-	<0.5	-
1,3-dichlorobenzene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
1,4-dichlorobenzene	mg/kg	0.5	150	**270**	600	1080	-	-	-	-	<0.5	-	-	<0.5	-
Chlorobenzene	mg/kg	0.5	2000	**3600**	8000	14400	-	-	-	-	<0.5	-	-	<0.5	-
Hexachlorobenzene	mg/kg						-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons															
1,2-dibromoethane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Bromodichloromethane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Bromoform	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-

						Borehole	BH105	BH105	BH105	**BH106**	**BH106**	BH106	BH106	BH107	BH107
						Field ID	BH105	BH105	DUP01	**BH106**	**BH106**	BH106	DUP02	BH107	BH107
						Sample Depth	0.8-1	3-3.4	3-3.4	**0.5-0.7**	**2-2.2**	3-3.2	3-3.2	0.5-0.6	2-2.1
						Sample_Type	Normal	Normal	Field_D	Normal	Normal	Normal	Field_D	Normal	Normal
						Sample Date	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	31/03/2008	2/04/2008	2/04/2008
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Bromomethane	mg/kg	5					-	-	-	-	<5	-	-	<5	-
Chlorodibromomethane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Dibromomethane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
Dichlorodifluoromethane	mg/kg	5					-	-	-	-	<5	-	-	<5	-
Trichlorofluoromethane	mg/kg	5					-	-	-	-	<5	-	-	<5	-
Inorganics															
Moisture	%	1					6	19	20	3	24	21	30	5	15
Organochlorine Pesticides															
4,4-DDE	mg/kg						-	-	-	-	-	-	-	-	-
a-BHC	mg/kg						-	-	-	-	-	-	-	-	-
Aldrin	mg/kg						-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg						-	-	-	-	-	-	-	-	-
b-BHC	mg/kg						-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg						-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg						-	-	-	-	-	-	-	-	-
d-BHC	mg/kg						-	-	-	-	-	-	-	-	-
DDD	mg/kg						-	-	-	-	-	-	-	-	-
DDT	mg/kg						-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg						-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg						-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg						-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg						-	-	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg						-	-	-	-	-	-	-	-	-
Endrin	mg/kg						-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg						-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg						-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg						-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg						-	-	-	-	-	-	-	-	-
PAH/Phenols															
Acenaphthene	mg/kg	0.5					2.4	-	-	-	10.1	-	-	-	<0.5
Acenaphthylene	mg/kg	0.5					0.7	-	-	-	1.8	-	-	-	0.6
Anthracene	mg/kg	0.5					9.9	-	-	-	38.6	-	-	-	1.7
Benz(a)anthracene	mg/kg	0.5					13.5	-	-	-	133	-	-	-	3.4
Benzo(a) pyrene	mg/kg	0.5	0.8	**10**	3.2	23	**32.6**	-	-	-	**104**	-	-	-	9.2
Benzo(b)&(k)fluoranthene	mg/kg	1					40	-	-	-	142	-	-	-	11
Benzo(b)fluoranthene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.5					23.1	-	-	-	57.5	-	-	-	8.3
Benzo(k)fluoranthene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Chrysene	mg/kg	0.5					19.4	-	-	-	109	-	-	-	5.8
Dibenz(a,h)anthracene	mg/kg	0.5					6.5	-	-	-	16.1	-	-	-	2.4
Fluoranthene	mg/kg	0.5					39.7	-	-	-	313	-	-	-	11.1
Fluorene	mg/kg	0.5					2.9	-	-	-	22.1	-	-	-	0.6
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					21.3	-	-	-	61.1	-	-	-	7.1
Naphthalene	mg/kg	0.5					1.8	-	-	-	4.4	-	-	-	<0.5
PAHs (Sum of total)	mg/kg			**200**		800	**283.6**	-	-	-	**1431**	-	-	-	78.1
Phenanthrene	mg/kg	0.5					37.6	-	-	-	123	-	-	-	7.2
Pyrene	mg/kg	0.5					32.2	-	-	-	295	-	-	-	9.7
Polychlorinated Biphenyls															
PCBs (Sum of total)	mg/kg			**50**		50	-	-	-	-	-	-	-	-	-
VOCs															
1,1-dichloropropene	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
1,2-dibromo-3-chloropropane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
1,2-dichloropropane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
1,3-dichloropropane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-
2,2-dichloropropane	mg/kg	0.5					-	-	-	-	<0.5	-	-	<0.5	-

Table T2 - Waste Classification Results
Green Square Aquatic Centre, 132-138 Joynton Avenue, Zetland, NSW

						Borehole	BH107	**BH108**	**BH108**	BH13	BH13	BH13	**BH14**	**BH14**	BH15
						Field ID	DUP04	**BH108**	**BH108**	BH13_0.15-0.3	BH13_1.8-2.0	DUP07	**BH14_0.8-1.0**	**BH14_1.8-2.0**	BH15_0.15-0.3
						Sample Depth	0.5-0.6	**0.2-0.3**	**0.9-1**	0.15-0.3	1.8-2	0.15-0.3	**0.8-1**	**1.8-2**	0.15-0.3
						Sample_Type	Field_D	Normal	Normal	Normal	Normal	Field_D	Normal	Normal	Normal
						Sample Date	2/04/2008	31/03/2008	31/03/2008	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Gunyama Park
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Lead															
Lead	mg/kg	2	100	**1500**	400	6000	30	490	**1550**	240	10	284	1080	242	358
Metals															
Arsenic	mg/kg	1	100	**500**	400	2000	2	8	6	4	<1	7	7	4	5
Cadmium	mg/kg	0.1	20	**100**	80	400	<0.1	1.4	0.5	<1	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1					2	15	17	5	<1	10	30	7	8
Copper	mg/kg	2					9	286	434	97	2	170	1240	99	82
Mercury	mg/kg	0.05	4	**50**	16	200	0.08	1.32	0.7	0.6	<0.1	0.6	4.1	0.5	0.6
Nickel	mg/kg	1	40	**1050**	160	4200	<1	14	13	5	<1	8	22	10	5
Zinc	mg/kg	5					57	699	420	332	8	390	758	177	184
B(a)P Total Potency Equivaler	mg/kg						-	16.75	28.02	2.611	-	3.158	8.404	-	-
C6-C10 less BTEX	mg/kg						-	<0.5	<0.5	-	-	-	<0.5	-	-
TPH															
F2-NAPHTHALENE	mg/kg						-	-	<50	-	-	-	<50	-	-
C6 - C9	mg/kg	10		**650**		2600	-	<10	<10	-	-	-	<2	-	-
C10 - C14	mg/kg	50					-	-	<50	-	-	-	<50	-	-
C15 - C28	mg/kg	100					-	-	780	-	-	-	418	-	-
C29-C36	mg/kg	100					-	-	740	-	-	-	310	-	-
+C10 - C36 (Sum of total)	mg/kg			**10000**		40000	-	-	1520 - 1545	-	-	-	753	-	-
BTEX															
Benzene	mg/kg	0.2	10	**18**	40	72	-	<0.2	<0.2	-	-	-	<0.2	-	-
Ethylbenzene	mg/kg	0.5	600	**1080**	2400	4320	-	<0.5	<0.5	-	-	-	<0.2	-	-
Toluene	mg/kg	0.5	288	**518**	1152	2073	-	<0.5	<0.5	-	-	-	<0.2	-	-
Xylene (m & p)	mg/kg	1					-	<1	<1	-	-	-	-	-	-
Xylene (o)	mg/kg	0.5					-	<0.5	<0.5	-	-	-	-	-	-
Xylene Total	mg/kg		1000	**1800**	4000	7200	-	<1.5	<1.5	-	-	-	<1	-	-
Chlorinated Hydrocarbons															
1,1,1,2-tetrachloroethane	mg/kg	0.5	200	**360**	800	1440	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5	600	**1080**	2400	4320	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5	26	**46.8**	104	187.2	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5	24	**43.2**	96	172.8	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5	14	**25**	56	100	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5	120	**216**	480	864	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5	14	**25.2**	56	100.8	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	5	4	**7.2**	16	28.8	-	-	-	-	-	-	-	-	-
Halogenated Benzenes															
1,2-dichlorobenzene	mg/kg	0.5	86	**155**	344	620	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5	150	**270**	600	1080	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5	2000	**3600**	8000	14400	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg						-	-	-	<0.05	-	-	-	-	-
Halogenated Hydrocarbons															
1,2-dibromoethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5					-	-	-	-	-	-	-	-	-

						Borehole	BH107	**BH108**	**BH108**	BH13	BH13	BH13	**BH14**	**BH14**	BH15
						Field ID	DUP04	**BH108**	**BH108**	BH13_0.15-0.3	BH13_1.8-2.0	DUP07	**BH14_0.8-1.0**	**BH14_1.8-2.0**	BH15_0.15-0.3
						Sample Depth	0.5-0.6	**0.2-0.3**	**0.9-1**	0.15-0.3	1.8-2	0.15-0.3	**0.8-1**	**1.8-2**	0.15-0.3
						Sample_Type	Field_D	Normal	Normal	Normal	Normal	Field_D	Normal	Normal	Normal
						Sample Date	2/04/2008	31/03/2008	31/03/2008	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Gunyama Park
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Bromomethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Inorganics															
Moisture	%	1					4	26	16	-	-	-	-	-	-
Organochlorine Pesticides															
4,4-DDE	mg/kg						-	-	-	<0.05	-	-	-	-	-
a-BHC	mg/kg						-	-	-	<0.05	-	-	-	-	-
Aldrin	mg/kg						-	-	-	<0.05	-	-	-	-	-
Aldrin + Dieldrin	mg/kg						-	-	-	<0.1	-	-	-	-	-
b-BHC	mg/kg						-	-	-	<0.05	-	-	-	-	-
Chlordane (cis)	mg/kg						-	-	-	<0.05	-	-	-	-	-
Chlordane (trans)	mg/kg						-	-	-	<0.05	-	-	-	-	-
d-BHC	mg/kg						-	-	-	<0.05	-	-	-	-	-
DDD	mg/kg						-	-	-	<0.05	-	-	-	-	-
DDT	mg/kg						-	-	-	<0.2	-	-	-	-	-
DDT+DDE+DDD	mg/kg						-	-	-	<0.3	-	-	-	-	-
Dieldrin	mg/kg						-	-	-	<0.05	-	-	-	-	-
Endosulfan I	mg/kg						-	-	-	<0.05	-	-	-	-	-
Endosulfan II	mg/kg						-	-	-	<0.05	-	-	-	-	-
Endosulfan sulphate	mg/kg						-	-	-	<0.05	-	-	-	-	-
Endrin	mg/kg						-	-	-	<0.05	-	-	-	-	-
g-BHC (Lindane)	mg/kg						-	-	-	<0.05	-	-	-	-	-
Heptachlor	mg/kg						-	-	-	<0.05	-	-	-	-	-
Heptachlor epoxide	mg/kg						-	-	-	<0.05	-	-	-	-	-
Methoxychlor	mg/kg						-	-	-	<0.2	-	-	-	-	-
PAH/Phenols															
Acenaphthene	mg/kg	0.5					-	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-
Acenaphthylene	mg/kg	0.5					-	1.9	2.7	<0.5	-	<0.5	1	-	-
Anthracene	mg/kg	0.5					-	2.7	4.6	<0.5	-	<0.5	1.1	-	-
Benz(a)anthracene	mg/kg	0.5					-	11.3	15	1.4	-	2	5.1	-	-
Benzo(a) pyrene	mg/kg	0.5	0.8	**10**	3.2	23	-	**12.7**	**21.7**	2	-	2.4	6.5	-	-
Benzo(b)&(k)fluoranthene	mg/kg	1					-	19	31	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.5					-	-	-	2.3	-	2.6	6.4	-	-
Benzo(g,h,i)perylene	mg/kg	0.5					-	8.4	17.3	1.5	-	1.7	4.4	-	-
Benzo(k)fluoranthene	mg/kg	0.5					-	-	-	1	-	1.3	3.4	-	-
Chrysene	mg/kg	0.5					-	12.4	16.2	1.6	-	2.1	5	-	-
Dibenz(a,h)anthracene	mg/kg	0.5					-	2	3.3	<0.5	-	<0.5	<0.5	-	-
Fluoranthene	mg/kg	0.5					-	18.9	19	2.5	-	3.5	7.2	-	-
Fluorene	mg/kg	0.5					-	<0.5	0.5	<0.5	-	<0.5	<0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					-	7.1	11.8	1.1	-	1.3	3.2	-	-
Naphthalene	mg/kg	0.5					-	<0.5	1	<0.5	-	<0.5	<0.5	-	-
PAHs (Sum of total)	mg/kg			**200**		800	-	123.1	178.4	17.1	-	22	54.2	-	-
Phenanthrene	mg/kg	0.5					-	8.2	11.7	1	-	1.4	3.2	-	-
Pyrene	mg/kg	0.5					-	18.5	22.6	2.7	-	3.7	7.7	-	-
Polychlorinated Biphenyls															
PCBs (Sum of total)	mg/kg			**50**		50	-	-	-	<0.1	-	-	-	-	-
VOCs															
1,1-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-

						Borehole	BH15	BH16	BH16	BH16	BH17	BH18	BH18	BH18	**BH19**
						Field ID	BH15_1.8-2.0	BH16_0.15-0.3	BH16_1.8-2.0	DUP08	BH17_0.8-1.0	BH18_0.15-0.4	BH18_1.8-2.0	DUP09	**BH19_0.5-0.6**
						Sample Depth	1.8-2	0.15-0.3	1.8-2	0.15-0.3	0.8-1	0.15-0.4	1.8-2	0.15-0.4	**0.5-0.6**
						Sample_Type	Normal	Normal	Normal	Field_D	Normal	Normal	Normal	Field_D	Normal
						Sample Date	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	6/06/2002
						Area	Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Council workshop	Gunyama Park	Gunyama Park	Gunyama Park	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Lead															
Lead	mg/kg	2	100	**1500**	400	6000	2	2	-	3	127	2	2	1	817
Metals															
Arsenic	mg/kg	1	100	**500**	400	2000	<1	<1	-	<1	5	1	<1	0.5	7
Cadmium	mg/kg	0.1	20	**100**	80	400	<1	<1	-	<1	<1	<1	<1	<0.5	<1
Chromium (III+VI)	mg/kg	1					<1	<1	-	<1	8	1	2	1	17
Copper	mg/kg	2					<1	<1	-	1	83	1	<1	0.5	186
Mercury	mg/kg	0.05	4	**50**	16	200	<0.1	<0.1	-	<0.1	0.6	<0.1	<0.1	<0.005	1.2
Nickel	mg/kg	1	40	**1050**	160	4200	<1	<1	-	<1	11	<1	<1	<0.5	8
Zinc	mg/kg	5					4	5	-	7	191	2	<1	1	485
B(a)P Total Potency Equivaler	mg/kg						-	-	<0.5	-	0.575	<0.5	-	<0.5	11.98
C6-C10 less BTEX	mg/kg						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
TPH															
F2-NAPHTHALENE	mg/kg						-	-	<50	-	<50	<50	-	<50	<50
C6 - C9	mg/kg	10		**650**		2600	<2	<2	<2	<2	<2	<2	-	<10	<2
C10 - C14	mg/kg	50					<50	<50	<50	<50	<50	<50	-	<50	<50
C15 - C28	mg/kg	100					105	<100	<100	<100	108	<100	-	<100	333
C29-C36	mg/kg	100					256	<100	<100	<100	<100	<100	-	<100	395
+C10 - C36 (Sum of total)	mg/kg			**10000**		40000	386	<250	<250	<250	183	<250	-	<250	753
BTEX															
Benzene	mg/kg	0.2	10	**18**	40	72	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	600	**1080**	2400	4320	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.5	<0.2
Toluene	mg/kg	0.5	288	**518**	1152	2073	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.5	<0.2
Xylene (m & p)	mg/kg	1					-	-	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Xylene Total	mg/kg		1000	**1800**	4000	7200	<1	<1	<1	<1	<0.2	<1	-	<1	<1
Chlorinated Hydrocarbons															
1,1,1,2-tetrachloroethane	mg/kg	0.5	200	**360**	800	1440	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5	600	**1080**	2400	4320	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5	26	**46.8**	104	187.2	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5	24	**43.2**	96	172.8	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5	14	**25**	56	100	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5	120	**216**	480	864	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5	14	**25.2**	56	100.8	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	5	4	**7.2**	16	28.8	-	-	-	-	-	-	-	-	-
Halogenated Benzenes															
1,2-dichlorobenzene	mg/kg	0.5	86	**155**	344	620	-	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5	150	**270**	600	1080	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5	2000	**3600**	8000	14400	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg						-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons															
1,2-dibromoethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5					-	-	-	-	-	-	-	-	-

Borehole							BH15	BH16	BH16	BH16	BH17	BH18	BH18	BH18	**BH19**
Field ID							BH15_1.8-2.0	BH16_0.15-0.3	BH16_1.8-2.0	DUP08	BH17_0.8-1.0	BH18_0.15-0.4	BH18_1.8-2.0	DUP09	**BH19_0.5-0.6**
Sample Depth							1.8-2	0.15-0.3	1.8-2	0.15-0.3	0.8-1	0.15-0.4	1.8-2	0.15-0.4	**0.5-0.6**
Sample_Type							Normal	Normal	Normal	Field_D	Normal	Normal	Normal	Field_D	Normal
Sample Date							5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	5/06/2002	6/06/2002
Area							Gunyama Park	Gunyama Park	Gunyama Park	Gunyama Park	Council workshop	Gunyama Park	Gunyama Park	Gunyama Park	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**									
Bromomethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	5					-	-	-	-	-	-	-	-	-
Inorganics															
Moisture	%	1					-	-	-	-	-	-	-	-	-
Organochlorine Pesticides															
4,4-DDE	mg/kg						-	-	-	-	-	-	-	-	-
a-BHC	mg/kg						-	-	-	-	-	-	-	-	-
Aldrin	mg/kg						-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg						-	-	-	-	-	-	-	-	-
b-BHC	mg/kg						-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg						-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg						-	-	-	-	-	-	-	-	-
d-BHC	mg/kg						-	-	-	-	-	-	-	-	-
DDD	mg/kg						-	-	-	-	-	-	-	-	-
DDT	mg/kg						-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg						-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg						-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg						-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg						-	-	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg						-	-	-	-	-	-	-	-	-
Endrin	mg/kg						-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg						-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg						-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg						-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg						-	-	-	-	-	-	-	-	-
PAH/Phenols															
Acenaphthene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	<0.5
Acenaphthylene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	1.1
Anthracene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	1.3
Benz(a)anthracene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	6.8
Benzo(a) pyrene	mg/kg	0.5	0.8	**10**	3.2	23	-	-	<0.5	-	0.5	<0.5	-	<0.5	8.2
Benzo(b)&(k)fluoranthene	mg/kg	1					-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.5					-	-	<0.5	-	0.7	<0.5	-	<1	9.3
Benzo(g,h,i)perylene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	5.1
Benzo(k)fluoranthene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<1	3.5
Chrysene	mg/kg	0.5					-	-	<0.5	-	0.5	<0.5	-	<0.5	6.5
Dibenz(a,h)anthracene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	1.3
Fluoranthene	mg/kg	0.5					-	-	<0.5	-	0.9	<0.5	-	<0.5	10.5
Fluorene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	4
Naphthalene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	<0.5
PAHs (Sum of total)	mg/kg			**200**		800	-	-	<0.5	-	3.5	0.5	-	<0.5	72.3
Phenanthrene	mg/kg	0.5					-	-	<0.5	-	<0.5	<0.5	-	<0.5	3.7
Pyrene	mg/kg	0.5					-	-	<0.5	-	0.9	<0.5	-	<0.5	11
Polychlorinated Biphenyls															
PCBs (Sum of total)	mg/kg			**50**		50	-	-	-	-	-	-	-	-	-
VOCs															
1,1-dichloropropene	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5					-	-	-	-	-	-	-	-	-

Borehole	BH19	**HA01**	**HA02**	**HA02**	**HA02**
Field ID	BH19_3.0-3.1	**HA01_1.4-1.5**	**DUP03**	**HA02_0.1-0.12**	**HA02_0.6-0.8**
Sample Depth	3-3.1	**1.4-1.5**	**0.6-0.8**	**0.1-0.12**	**0.6-0.8**
Sample_Type	Normal	Normal	Field_D	Normal	Normal
Sample Date	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002
Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building

Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**					
Lead											
Lead	mg/kg	2	100	**1500**	400	6000	343	289	-	8	76
Metals											
Arsenic	mg/kg	1	100	**500**	400	2000	7	12	-	1	3
Cadmium	mg/kg	0.1	20	**100**	80	400	1	1	-	<1	<1
Chromium (III+VI)	mg/kg	1					12	14	-	2	4
Copper	mg/kg	2					134	1190	-	23	20
Mercury	mg/kg	0.05	4	**50**	16	200	0.6	1	-	<0.1	0.1
Nickel	mg/kg	1	40	**1050**	160	4200	9	13	-	3	2
Zinc	mg/kg	5					497	410	-	16	112
B(a)P Total Potency Equivaler	mg/kg						-	<0.5	<0.5	0.747	<0.5
C6-C10 less BTEX	mg/kg						-	-	-	<0.5	-
TPH											
F2-NAPHTHALENE	mg/kg						-	-	-	<50	-
C6 - C9	mg/kg	10		**650**		2600	-	-	-	<2	-
C10 - C14	mg/kg	50					-	-	-	<50	-
C15 - C28	mg/kg	100					-	-	-	105	-
C29-C36	mg/kg	100					-	-	-	<100	-
+C10 - C36 (Sum of total)	mg/kg			**10000**		40000	-	-	-	180	-
BTEX											
Benzene	mg/kg	0.2	10	**18**	40	72	-	-	-	<0.2	-
Ethylbenzene	mg/kg	0.5	600	**1080**	2400	4320	-	-	-	<0.2	-
Toluene	mg/kg	0.5	288	**518**	1152	2073	-	-	-	0.2	-
Xylene (m & p)	mg/kg	1					-	-	-	-	-
Xylene (o)	mg/kg	0.5					-	-	-	-	-
Xylene Total	mg/kg		1000	**1800**	4000	7200	-	-	-	1.2	-
Chlorinated Hydrocarbons											
1,1,1,2-tetrachloroethane	mg/kg	0.5	200	**360**	800	1440	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	0.5	600	**1080**	2400	4320	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	0.5	26	**46.8**	104	187.2	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	0.5	24	**43.2**	96	172.8	-	-	-	-	-
1,1-dichloroethane	mg/kg	0.5					-	-	-	-	-
1,1-dichloroethene	mg/kg	0.5	14	**25**	56	100	-	-	-	-	-
1,2,3-trichloropropane	mg/kg	0.5					-	-	-	-	-
1,2-dichloroethane	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-
Carbon tetrachloride	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-
Chloroethane	mg/kg	5					-	-	-	-	-
Chloroform	mg/kg	0.5	120	**216**	480	864	-	-	-	-	-
Chloromethane	mg/kg	5					-	-	-	-	-
cis-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-
cis-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.5					-	-	-	-	-
Trichloroethene	mg/kg	0.5	10	**18**	40	72	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5	14	**25.2**	56	100.8	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	0.5					-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	0.5					-	-	-	-	-
Vinyl chloride	mg/kg	5	4	**7.2**	16	28.8	-	-	-	-	-
Halogenated Benzenes											
1,2-dichlorobenzene	mg/kg	0.5	86	**155**	344	620	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	0.5					-	-	-	-	-
1,4-dichlorobenzene	mg/kg	0.5	150	**270**	600	1080	-	-	-	-	-
Chlorobenzene	mg/kg	0.5	2000	**3600**	8000	14400	-	-	-	-	-
Hexachlorobenzene	mg/kg						-	-	-	<0.05	-
Halogenated Hydrocarbons											
1,2-dibromoethane	mg/kg	0.5					-	-	-	-	-
Bromodichloromethane	mg/kg	0.5					-	-	-	-	-
Bromoform	mg/kg	0.5					-	-	-	-	-

						Borehole	BH19	HA01	HA02	HA02	HA02
						Field ID	BH19_3.0-3.1	HA01_1.4-1.5	DUP03	HA02_0.1-0.12	HA02_0.6-0.8
						Sample Depth	3-3.1	1.4-1.5	0.6-0.8	0.1-0.12	0.6-0.8
						Sample_Type	Normal	Normal	Field_D	Normal	Normal
						Sample Date	6/06/2002	6/06/2002	6/06/2002	6/06/2002	6/06/2002
						Area	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building	Aquatic Centre Building
Chemical Name	**Units**	**EQL**	**NSW 2014 General Solid Waste (No Leaching)**	**NSW 2014 General Solid Waste (with leached)**	**NSW 2014 Restricted Solid Waste (No Leaching)**	**NSW 2014 Restricted Solid Waste (with leached)**					
Bromomethane	mg/kg	5					-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5					-	-	-	-	-
Dibromomethane	mg/kg	0.5					-	-	-	-	-
Dichlorodifluoromethane	mg/kg	5					-	-	-	-	-
Trichlorofluoromethane	mg/kg	5					-	-	-	-	-
Inorganics											
Moisture	%	1					-	-	-	-	-
Organochlorine Pesticides											
4,4-DDE	mg/kg						-	-	-	<0.05	-
a-BHC	mg/kg						-	-	-	<0.05	-
Aldrin	mg/kg						-	-	-	<0.05	-
Aldrin + Dieldrin	mg/kg						-	-	-	<0.1	-
b-BHC	mg/kg						-	-	-	<0.05	-
Chlordane (cis)	mg/kg						-	-	-	<0.05	-
Chlordane (trans)	mg/kg						-	-	-	<0.05	-
d-BHC	mg/kg						-	-	-	<0.05	-
DDD	mg/kg						-	-	-	<0.05	-
DDT	mg/kg						-	-	-	<0.2	-
DDT+DDE+DDD	mg/kg						-	-	-	<0.3	-
Dieldrin	mg/kg						-	-	-	<0.05	-
Endosulfan I	mg/kg						-	-	-	<0.05	-
Endosulfan II	mg/kg						-	-	-	<0.05	-
Endosulfan sulphate	mg/kg						-	-	-	<0.05	-
Endrin	mg/kg						-	-	-	<0.05	-
g-BHC (Lindane)	mg/kg						-	-	-	<0.05	-
Heptachlor	mg/kg						-	-	-	<0.05	-
Heptachlor epoxide	mg/kg						-	-	-	<0.05	-
Methoxychlor	mg/kg						-	-	-	<0.2	-
PAH/Phenols											
Acenaphthene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.5					-	<0.5	<0.5	0.7	<0.5
Benzo(a) pyrene	mg/kg	0.5	0.8	**10**	3.2	23	-	<0.5	<0.5	0.6	<0.5
Benzo(b)&(k)fluoranthene	mg/kg	1					-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.5					-	<0.5	<0.5	0.7	<0.5
Benzo(g,h,i)perylene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.5					-	<0.5	<0.5	0.7	<0.5
Dibenz(a,h)anthracene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5					-	<0.5	<0.5	1.2	<0.5
Fluorene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.5					-	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	mg/kg			**200**		800	-	<0.5	<0.5	5.8	<0.5
Phenanthrene	mg/kg	0.5					-	<0.5	<0.5	0.8	<0.5
Pyrene	mg/kg	0.5					-	<0.5	<0.5	1.1	<0.5
Polychlorinated Biphenyls											
PCBs (Sum of total)	mg/kg			**50**		50	-	-	-	<0.1	-
VOCs											
1,1-dichloropropene	mg/kg	0.5					-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	0.5					-	-	-	-	-
1,2-dichloropropane	mg/kg	0.5					-	-	-	-	-
1,3-dichloropropane	mg/kg	0.5					-	-	-	-	-
2,2-dichloropropane	mg/kg	0.5					-	-	-	-	-

Table T3 - Groundwater Analytical Results
Green Square Aquatic Centre, 132-138 Joynton Avenue, Zetland, NSW

						Field ID	MW01	MW03	MW04	MW106	MW107	WRL1S
						Sample_Type	Normal	Normal	Normal	Normal	Normal	Normal
						SampleCode	150399	150393	150403	150400	150401	150406
						Site Area	Aquatic Centre	Gunyama Park	Gunyama Park	Aquatic Centre	Aquatic Centre	Aquatic Centre
						Monitoring_Round	2008	2008	2008	2008	2008	2008
Chemical Name	**Units**	**EQL**	**CRC CARE 2011 HSL D (SAND, 2-<4m) - Non-Petroleum Sites**	**CRC CARE 2011 Shallow Trench Worker (SAND, 2-<4m) - Non-Petroleum Sites**	**ANZECC (2000) Ecosystems Marine Water (80%)**	**ANZECC (2000) Ecosystems Marine Water Med-Low Reliability**						
BTEX												
Benzene	µg/L	1	5000	1,400,000	1300	500	<1	<1	<1	<1	1	<1
Ethylbenzene	µg/L	1	NL	NL		5	<1	<1	<1	<1	<1	<1
Toluene	µg/L	1	NL	NL		180	<1	<1	<1	<1	<1	<1
Xylene (m & p)	µg/L	2					<2	<2	<2	<2	<2	<2
Xylene (o)	µg/L	1				350	<1	<1	<1	<1	<1	<1
Xylene Total	µg/L		NL	NL			<3	<3	<3	<3	<3	<3
Chlorinated Hydrocarbons												
1,1,1,2-tetrachloroethane	µg/L	5					<5	<5	<5	<5	<5	<5
1,1,1-trichloroethane	µg/L	5				270	<5	<5	<5	<5	<5	<5
1,1,2,2-tetrachloroethane	µg/L	5				400	<5	<5	<5	<5	<5	<5
1,1,2-trichloroethane	µg/L	5			18000	1900	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	µg/L	5				250	<5	<5	<5	<5	<5	<5
1,1-dichloroethene	µg/L	5				700	<5	<5	<5	<5	<5	<5
1,2,3-trichloropropane	µg/L	5					<5	<5	<5	<5	<5	<5
1,2-dichloroethane	µg/L	5				1900	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	µg/L	1				240	<1	<1	<1	<1	<1	<1
Chloroethane	µg/L	50					<50	<50	<50	<50	<50	<50
Chloroform	µg/L	5				370	<5	<5	<5	<5	<5	<5
Chloromethane	µg/L	50					<50	<50	<50	<50	<50	<50
cis-1,2-dichloroethene	µg/L	5					<5	8	<5	<5	<5	45
cis-1,3-dichloropropene	µg/L	5					<5	<5	<5	<5	<5	<5
Hexachlorobutadiene	µg/L	5				0.03	<5	<5	<5	<5	<5	<5
Trichloroethene	µg/L	5				330	<5	7	<5	<5	<5	<5
Tetrachloroethene	µg/L	5				70	<5	<5	<5	<5	<5	<5
trans-1,2-dichloroethene	µg/L	5					<5	<5	<5	<5	<5	<5
trans-1,3-dichloropropene	µg/L	5					<5	<5	<5	<5	<5	<5
Vinyl chloride	µg/L	50				100	<50	<50	<50	<50	<50	<50
Halogenated Benzenes												
1,2-dichlorobenzene	µg/L	5				160	<5	<5	<5	<5	<5	<5
1,3-dichlorobenzene	µg/L	5				260	<5	<5	<5	<5	<5	<5
1,4-dichlorobenzene	µg/L	5				60	<5	<5	<5	<5	<5	<5
Chlorobenzene	µg/L	5				55	<5	<5	<5	<5	<5	<5
Halogenated Hydrocarbons												
1,2-dibromoethane	µg/L	5					<5	<5	<5	<5	<5	<5
Bromodichloromethane	µg/L	5					<5	<5	<5	<5	<5	<5
Bromoform	µg/L	5					<5	<5	<5	<5	<5	<5
Bromomethane	µg/L	50					<50	<50	<50	<50	<50	<50
Chlorodibromomethane	µg/L	5					<5	<5	<5	<5	<5	<5
Dibromomethane	µg/L	5					<5	<5	<5	<5	<5	<5
Dichlorodifluoromethane	µg/L	50					<50	<50	<50	<50	<50	<50
Trichlorofluoromethane	µg/L	50					<50	<50	<50	<50	<50	<50
Lead												
Lead (Filtered)	mg/L	0.001			0.012	0.0044	0.004	0.002	0.003	0.002	<0.001	<0.001
Metals												
Arsenic (Filtered)	mg/L	0.001					0.003	0.001	<0.001	0.013	0.006	<0.001
Cadmium (Filtered)	mg/L	0.0001			0.036	0.0007	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (III+VI) (Filtered)	mg/L	0.001					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper (Filtered)	mg/L	0.001			0.008	0.0013	0.026	0.009	0.001	<0.001	0.001	<0.001
Mercury (Filtered)	mg/L	0.0001			0.0014		<0.001	<0.0005	<0.0001	<0.0005	<0.0005	<0.0001
Nickel (Filtered)	mg/L	0.001			0.56	0.007	0.007	0.003	<0.001	0.007	0.007	<0.001
Zinc (Filtered)	mg/L	0.005			0.043	0.015	0.167	0.054	0.011	0.067	0.151	0.009
PAH/Phenols												
Acenaphthene	µg/L	1					<1	<1	<1	11	2	<1
Acenaphthylene	µg/L	1					<1	<1	<1	4	<1	<1
Anthracene	µg/L	1					2	<1	<1	6	<1	<1
Benz(a)anthracene	µg/L	1					<1	<1	<1	3	<1	<1
Benzo(a) pyrene	µg/L	1				0.1	<1	<1	<1	2	<1	<1

Table T3 - Groundwater Analytical Results
Green Square Aquatic Centre, 132-138 Joynton Avenue, Zetland, NSW

						Field ID	MW01	MW03	MW04	MW106	MW107	WRL1S
						Sample_Type	Normal	Normal	Normal	Normal	Normal	Normal
						SampleCode	150399	150393	150403	150400	150401	150406
						Site Area	Aquatic Centre	Gunyama Park	Gunyama Park	Aquatic Centre	Aquatic Centre	Aquatic Centre
						Monitoring_Round	2008	2008	2008	2008	2008	2008
Chemical Name	**Units**	**EQL**	**CRC CARE 2011 HSL D (SAND, 2-<4m) - Non-Petroleum Sites**	**CRC CARE 2011 Shallow Trench Worker (SAND, 2-<4m) - Non-Petroleum Sites**	**ANZECC (2000) Ecosystems Marine Water (80%)**	**ANZECC (2000) Ecosystems Marine Water Med-Low Reliability**						
Benzo(b)&(k)fluoranthene	µg/L	2					<2	<2	<2	3	<2	<2
Benzo(g,h,i)perylene	µg/L	1					<1	<1	<1	1	<1	<1
Chrysene	µg/L	1					<1	<1	<1	3	<1	<1
Dibenz(a,h)anthracene	µg/L	1					<1	<1	<1	<1	<1	<1
Fluoranthene	µg/L	1				1	<1	<1	<1	11	<1	<1
Fluorene	µg/L	1					1	<1	<1	12	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	1					<1	<1	<1	<1	<1	<1
Naphthalene	µg/L	1	12,000	NL	120	50	3	<1	<1	18	<1	<1
PAHs (Sum of total)	µg/L						9	0	0	107	4	0
Phenanthrene	µg/L	1				0.6	3	<1	<1	24	2	<1
Pyrene	µg/L	1					<1	<1	<1	9	<1	<1
TPH												
C6 - C9	µg/L	50	4000	NL			<50	<50	<50	<50	<50	<50
C10 - C14	µg/L	50	5000	NL			<50	<50	<50	100	<50	<50
C15 - C28	µg/L	200					<200	<200	280	1160	<200	<200
C29-C36	µg/L	50					<50	<50	<50	180	<50	<50
+C10 - C36 (Sum of total)	µg/L						<300	<300	280 - 330	1440	<300	<300
VOCs												
1,1-dichloropropene	µg/L	5					<5	<5	<5	<5	<5	<5
1,2-dibromo-3-chloropropane	µg/L	5					<5	<5	<5	<5	<5	<5
1,2-dichloropropane	µg/L	5				900	<5	<5	<5	<5	<5	<5
1,3-dichloropropane	µg/L	5				1100	<5	<5	<5	<5	<5	<5
2,2-dichloropropane	µg/L	5					<5	<5	<5	<5	<5	<5

Appendix D

Additional Site Investigations (AECOM, 2015)

1.0 Introduction

1.1 Background

AECOM Australia Pty Ltd (AECOM) was commissioned by the City of Sydney (Council) to undertake an additional targeted site investigation of the proposed Green Square Aquatic Centre and Gunyama Park (the Site). The Site comprises the following lots:

- Part of Lot 2 DP 850686;
- Lot 100 DP 1200645;
- Part of Lot 101 DP 1200645;
- Part Lot 1 DP 830870; and
- Part of Lot 1 DP 850686.

The location and layout of the Site is shown on **Figure D1** in **Appendix D1**.

The purpose of this investigation is to address identified data gaps in order to inform and revise the *Remedial Action Plan* (RAP), *Green Square Aquatic Centre* (GSAC), *132-138 Joynton Avenue, Zetland, NSW* (hereafter referred to as the GSAC RAP [2016]). The identified data gaps relate to the inclusion of the Lincon Development site into the redevelopment plans (north east corner of the Site). The key features of the project design are described in Section 1.2 of the GSAC RAP (2016).

A technical memorandum was prepared to outline the scope of works for the additional investigation and was provided to the appointed Site Auditor prior to the commencement of the investigations. It is noted that at the time of the completion of the memorandum and the investigation it was thought that no previous investigations had been completed within the Lincon Development site, however during the completion of this report it was identified that previous investigations had been undertaken by WSP Environment & Energy Pty Ltd (WSP) in 2011 and by Douglas Partners Pty Ltd (Douglas Partners) in 1995 and 2009 (refer to Section 0).

1.2 Objectives

The objectives of the investigation were to:

- Conduct a Phase 1 (desktop based) assessment for the Lincon Development site (previously not included in the Version 1 GSAC RAP [AECOM, 2014]) in order to confirm the adequacy of the targeted investigation scope developed for this parcel of land;
- Conduct a targeted soil and groundwater assessment to address identified data gaps in the Site, specifically assess the soil and groundwater conditions in the:
  - Excavation footprint for the proposed swimming pools;
  - Proposed footprints of the Gunyama Park amenities building where some pilings works may be required for the structure; and
  - The Lincon Development Site which is within the footprint of the proposed Gunyama Park.
- Assess the suitability of material at the Site for reuse within the Gunyama Park area; and
- Conduct waste classification testing.

The findings of the complete assessment have been incorporated into the GSAC RAP (AECOM, 2016).

1.3 Scope of Works

The scope of works for the Phase 1 assessment for the Lincon Development site included:

- Review of previous investigations conducted at the Lincon Development site;
- Search/review information readily available through the internet (e.g. historic parish maps, NSW Office of Water registered groundwater bore database for the area);

- Review of available historical aerial photographs;
- Review of the NSW Environment Protection Authority (EPA) List of NSW contaminated sites notified to EPA;
- Identification, to the extent practicable, of current or historical land uses (including the filling history across the Site) that are likely to have caused contamination; and
- Review published maps of the area to gain an understanding of surface and subsurface conditions (e.g. geology, hydrogeology, soil and acid sulfate soil and topography).

The scope of work for the Phase 2 assessment included:

- Advancement of 24 soil bores (BH200 to BH223), using a combination of push tube soil sampling and hollow flight auger to ream completed boreholes where groundwater monitoring well installation is required;
- Analysis of selected soil samples for analysis based on field observations and VOC field screening results for the following contaminants of potential concern (CoPC):
    - Metals (As, Cd, Cr, Cu, Pb, Ni, Zn and Hg);
    - Total Recoverable Hydrocarbons (TRH);
    - Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
    - Polycyclic Aromatic Hydrocarbons (PAHs);
    - Asbestos; and
    - Suspension Peroxide Oxidation Combined Acidity & Sulfur (SPOCAS).
- Analysis of selected samples for Toxicity Characteristic Leaching Procedure (TCLP) testing for CoPC exceeding total contaminant threshold values in the NSW EPA (2014) *Waste Classification Guidelines*;
- Installation, development and surveying of six (6) on-site monitoring wells (MW200 to MW205) which were installed to a maximum depth of six metres below ground surface (m bgs);
- Gauging of all newly installed groundwater monitoring wells and existing monitoring well MW03; and
- Sampling and analysis of five groundwater monitoring wells (MW200 to MW203 and MW205). Monitoring wells MW03 (existing well) and MW204 were dry and therefore could not be sampled.

The methodologies and results of the Phase 1 and 2 assessments, including spoil onsite reuse options and waste classification, are reported in the following sections.

2.0 Lincon Development Site - Phase 1 Assessment

2.1 Lincon Development Site Identification

The Lincon Development site identification details are provided in Table 1:

Table 1 Lincon Development Site Identification

Item	Description
Site Owner	Lincon Development Pty Limited
Site Address	106-116 Epsom Road, Zetland, NSW
Legal Description (Lot and DP)	Part of Lot 1 DP 830870
County and Parish	County of Cumberland, Parish of Alexandria
Local Government Authority	City of Sydney
Current Zoning and Use	B4 Mixed Use – Car parking area
Proposed Land Use	Recreation mixed use public open space (Gunyama Park)
Geographical Coordinates (Australian Map Grid)	N 6246516, E 334305

Item	Description
Site Elevation (m Australian Height Datum [AHD])	Approximately 20 m AHD
Site Area	0.5 hectares
Site Location	**Refer to Figure 1 in Appendix A in the GSAC RAP (AECOM, 2016)**
Site Layout and Former Borehole Locations	**Figure D1 in Appendix D1**

2.2 Previous Reports

AECOM is aware of the following reports which have been completed for the Lincon Development site:

- WSP Environment & Energy (WSP, 2011a). *Phase 1 Contamination Assessment, 106-116 Epsom Road, Zetland NSW*. Prepared for Lincon Development Pty Ltd. May 2011.
- WSP (WSP, 2011b). Limited Phase 2 Contamination and Geotechnical Assessment, 106-116 Epsom Road, Zetland NSW. Prepared for Lincon Development Pty Ltd. October 2011.
- Douglas Partners (DP, 2009) Phase 1 Contamination Assessment (summarised in WSP reports).
- Douglas Partners (DP, 1995). Preliminary Contamination Assessment (summarised in WSP reports).

Based on the desktop studies undertaken by DP (1995 and 2009) and WSP (2011a), both consultants concluded that the primary potential contamination issues arising from the Lincon Development Site included:

- Use of imported anthropogenic fill likely sourced from neighbouring/regional industrial properties; and

Migration of impacted groundwater, sourced from up-gradient premises, onto the property. A summary of the scope and key findings of intrusive investigations from these reports are provided in Table 2 and the sampling locations are shown on Figure 1 below. In conjunction, the soil sampling density appears appropriate to determine if the land was suitable for on-going use as a car parking facility.

Table 2 Summary of soil and groundwater investigations.

Report	Investigation Summary
DP, 1995	Five test pits (sample locations unknown) were sampled to 2.8 m bgs across the property. The property was a grassed flat area used for the storage of scaffolding and similar light construction materials at the time of the sampling. The following results were reported: - Fill logged as loose grey and black sand with steel cables, brick, plastic, concrete, car tyres and other anthropogenic materials. - Fill was underlain by sands. - Samples were analysed for metals, Total Petroleum Hydrocarbons (TPH) and BTEX and were less than the relevant criteria at the time – ANZECC (1992). - There was no information on groundwater.
DP, 2009	Five boreholes (DP-BH1 to DP-BH5 - see Figure 1) across the property. The use of the site at the time of the investigation was not stated; however was likely prior to the development of the car park. The boreholes were sampled to 3 m bgs and reported following results: - Fill described as per DP 1995 report. - Benzo(a)pyrene (B[a]P) concentrations up to 6.6 mg/kg and total PAH concentrations up to 46.1 mg/kg. - Zinc concentrations up to 280 mg/kg and copper concentrations up to 220 mg/kg. - All other results were less than the adopted criteria. - There was no information on groundwater.
WSP 2011b	Three boreholes (BH05, BH12 and BH09 – see Figure 1) were sampled using a solid stem auger within the Lincon Development site. It is noted that an additional nine boreholes were completed within the remainder of property (Lot 1 DP 830870) to the south of the Lincon Development site. The following results were reported for the three boreholes within the Lincon Development site: - Fill with silty sand with bricks, tyre, steel cables, plastic, glass and concrete to depths of 4.2

Report	Investigation Summary
	m bgs (BH05), 4.0 m (BH09) and 2.7 m (BH12). - All PID VOC readings were less than 1 part per million (ppm). - Analysed selected soil samples for metals, TPH, BTEX, PAHs, Volatile Organic Compounds (VOCs), Organochlorine Pesticides (OCPs), Organophosphate Pesticides (OPPs), Polychlorinated Biphenyls (PCBs). All results were less than the adopted assessment criteria at the time (NEPM [1999] Health Investigation Level (HIL) E – recreation/open space, NSW EPA (1994) Threshold concentrations for sensitive land use and NEPM (1999) provisional phytotoxicity based investigation levels (PBILs). One groundwater well was installed to 6 m bgs and screened across fill and sand (GW04 - see Figure 1). It is noted that three wells were installed to the south of the Lincon Development site (GW01 to GW03). GW04 was sampled and analysed for dissolved metals, TPH and VOCs and the results reported included: - The standing water level (SWL) was 3.16 m below top of casing (bTOC) and the Relative Level (RL) was 16.973 m AHD. - Measured groundwater parameters: pH of 4.68, Redox 85.6 mV and conductivity 0.289 mS/cm. - Dissolved copper (3 µg/L) and zinc (10 µg/L) concentrations exceeded the ANZECC 95% trigger values for marine ecosystems of 1.4 µg/L and 8 µg/L respectively. - Bis (2-ethylhexyl) phthalate (42 µg/L) was detected above the limit of reporting (LOR). Geotechnical testing was also completed on one borehole (BH1) approximately 150 m south of the Site which encountered sand to 16.5 m bgs, then residual sandy clay to sandstone bedrock at 28 m bgs.

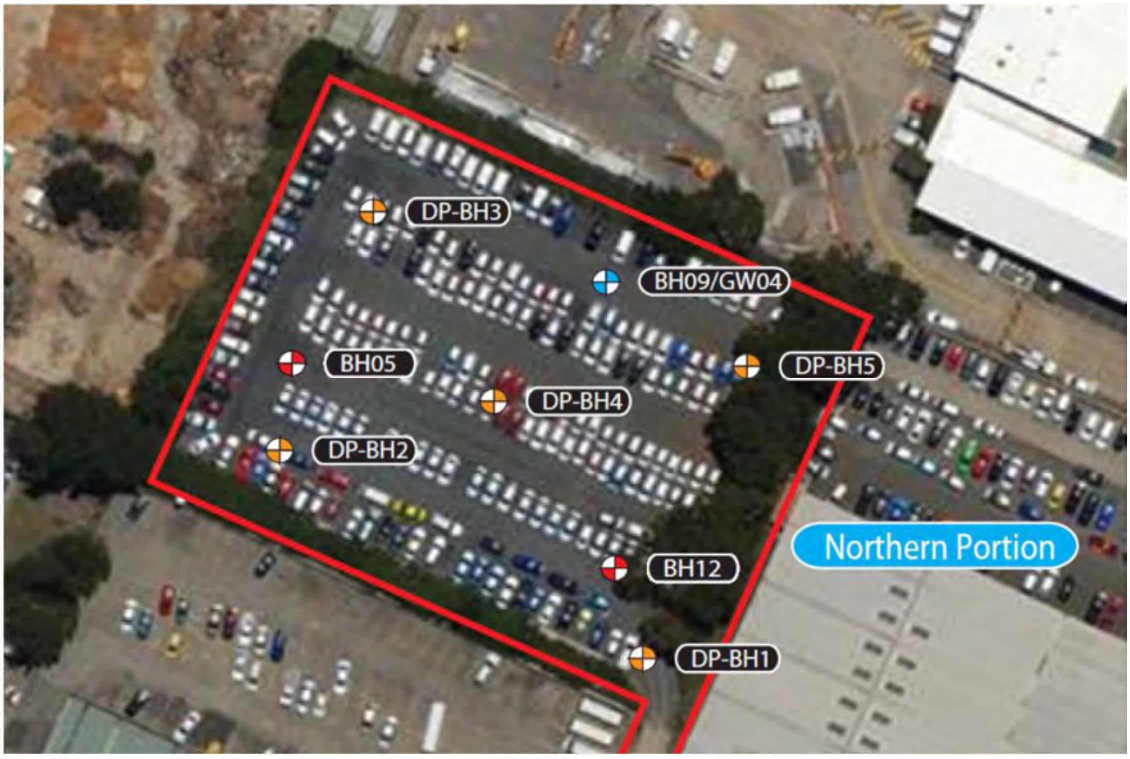


Figure 1 **Douglas Partners 2009 and WSP 2011 sampling locations (Source: extracted from Figure 2 in WSP, 2011b)**

2.3 Geology and Hydrogeology

Published literature indicates that the fill, geology and hydrogeology of the Lincon Development site will likely comprise conditions as summarised in Table 3:

Table 3 Geology and hydrogeology information from previous investigations

Feature	Summary
Fill	The following lithology was encountered in previous investigations: - Fill was encountered on average to 2.8 m bgs, with one location 4.2 m bgs. - Silty sand with tyres and demolition waste including brick, tyres, steel cables, plastic, glass and concrete.
Soil	The following lithology was encountered in previous investigations: - Sand (alluvial) with ~0.5 m band of clay: below fill to 16.5 m bgs. - Sandy Clay (residual):16.5 m to 28 m bgs. No acid sulfate soil testing was completed.
Acid sulfate soils	- No acid sulfate soil testing was completed in previous investigations, although grey clayey sands were logged. - The Botany Bay 1.25 000 scale acid sulfate map (Soil Conservation Service of NSW, 1995) of the area indicated that no known occurrence of acid sulfate soils is identified within the Lincon Development site. - The Lincon Development site is mapped as Class 5 (low risk) on the acid sulfate soil risk map in the Sydney Local Environmental Plan 2012. Development consent is required in Class 5 zoned land that is within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land. The Lincon Development site is 600 m east of Class 3 mapped land.
Bedrock	Sandstone bedrock was encountered by WSP (2011b) at 28 m bgs approximately 150 m south of the Lincon Development site. A Douglas Partners geotechnical investigation (2015) reported that bedrock was present at depths ranging between 14.5 and 16.2 m below ground level. .
Groundwater	One monitoring well was installed (GW4) near the northern boundary by WSP (WSP, 2011b). The well was screened from 2.9 to 5.9 m and the groundwater level was at the fill and sand interface at 4 m bgs. Based on the water levels measured in the wells to the south of the Lincon Development site (GW1 to GW3) the inferred groundwater flow direction was to the south-west. The Lincon Development site and surrounds is within the Botany Groundwater Management Zone 2, which bans domestic use of groundwater due to contamination (http://www.water.nsw.gov.au/water-management/water-quality/groundwater/Botany-Sand-Beds-aquifer).

2.4 Historical Information

A search of available information was undertaken including online government records and review of the previous WSP (2011a and 2011b) reports. The relevant information is summarised in Table 4:

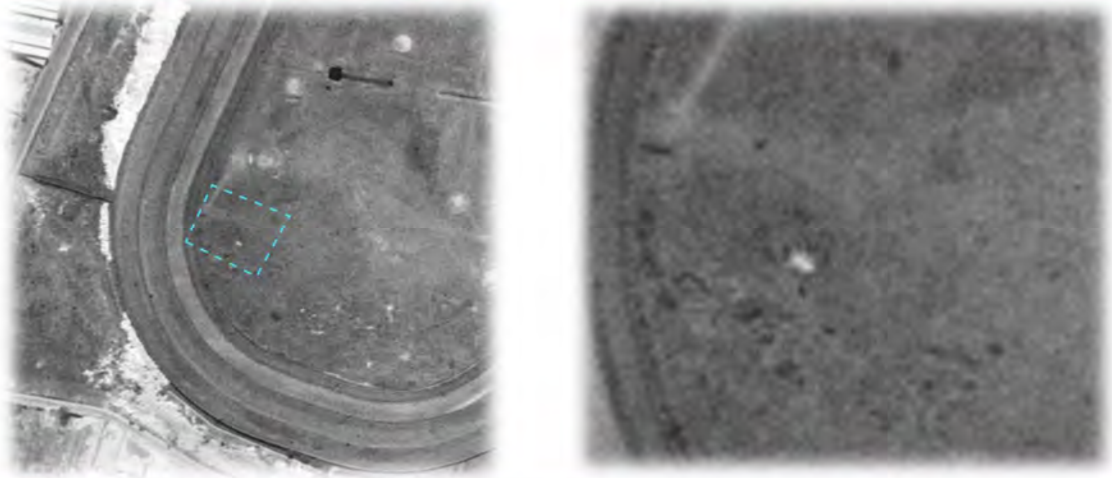
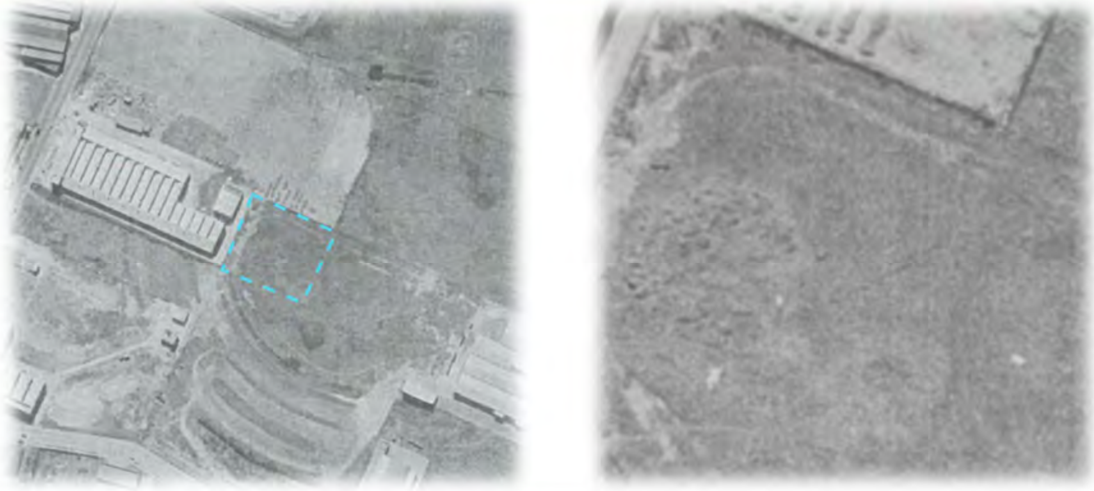
Table 4 Historical information

Source	Summary of information
Internet search http://www.espzetland.com.au/history.html	The Lincon Development site was within the block of land that has the following history: - The Waterloo lagoon and swamp which was drained in the early 1900s to create the Victoria Park Racecourse. - During World War 2 (WW2), the Australian Army established an Ordinance Unit at the racetrack. In 1945 it returned to being a racetrack. - After WW2 the racecourse was bought by the British Motor Corporation and a large car manufacturing plant was built over most of the racecourse.

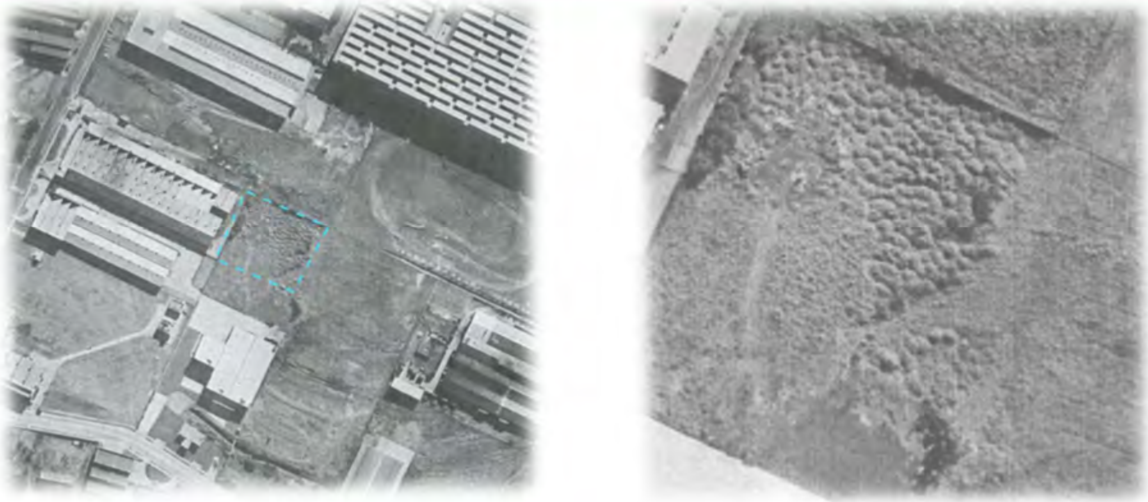
Source	Summary of information
	- The car plant closed in 1975 and was acquired by the Commonwealth of Australia for a Naval Stores depot which operated until the mid-1990s.
Historical Titles (WSP, 2011a)	Historical titles search indicated the following ownership: - 1913 to 1946: Victoria Park Racing and Recreational Grounds Company Pty Limited; - 1946 to 1951: The Right Honourable William The First Viscount of Nuffield – Car Manufacturing Facility established in 1950 - 1951 to 1954: Nuffield (Australia Pty Limited) - 1954 to 1968: The Olympic Tyre and Rubber Company Pty Ltd - 1968 to 1994: D.C.L (holdings) Australia Pty Ltd - 1994 to 2011: Lincon Development Pty Ltd.
Historical Aerial Photographs (see **Table 5**.)	A description of the historic aerial photography is provided below: **1943**: The Lincon Development Site was a vegetated with a small patch of bare ground located in the centre of Victoria Park Racecourse. An army camp is visible on the racecourse. The closest factory appeared to be 200 m northwest from the Lincon Development site. There were sand dunes visible along Joynton Avenue. **1955**: The Lincon Development site appeared to be relatively undeveloped and vegetated with a faint dirt track visible and remnants of the bend of the former racecourse visible on the southeast side of the Lincon Development site. A factory had been constructed on the west side of the Lincon Development site since 1943 and a factory 100 m to the east of the Lincon Development site. Land to the north was being cleared for development. **1961**: The Lincon Development site remained undeveloped and vegetated. A faint access track was visible leading to the centre of the Lincon Development site. New factories appeared have been constructed 80 to 100 m to the north and northeast and 40 m to the south of the Lincon Development site. The factories were part of the British Motor Corporation plant. **1970**: Greater than 80 to 90% of the Lincon Development site had been filled since 1961. Filling appeared to be still occurring in the southwest corner as evident by a bare ground with ramp and close to completion. Stockpiles of soil/unknown material appear stored on the east side of the Lincon Development site and tyres on the southern side of the Lincon Site. The Lincon Development site is surrounded by factories in all directions, with the exception of the adjacent property to the east which contains the stockpiles that appeared to be being used for filling the Lincon Site. **1982**: It appeared that the Lincon Development site was covered by a maintained lawn with no obvious infrastructure. **2004**: The Lincon Development site appeared overgrown with vegetation with bare patches of soil in the central area and trees along the eastern boundary. The land appeared unused. Factory buildings to the west, as noted in previous aerial photographs, had been demolished. **2013**: A carpark had been constructed on the Lincon Development site since the 2004 aerial. The land 100 to 150 m to the north had been redeveloped as high density residential buildings.
Anecdotal (WSP, 2011a)	Anecdotal information from a site interview with a site employee who had worked at the Lincon Development site since 2001 included: - No underground storage facilities were on the site. - The car park (over the Lincon Development site) was constructed in 2010.
WorkCover Dangerous	A WorkCover Dangerous Goods record search was undertaken in May 2011. No

Source	Summary of information
Goods (WSP, 2011a)	records of dangerous goods were found.
Council Records (WSP, 2011a)	A search of council records found: - A plan dated 1989 indicated the land was used for recreational purposes for employees (of D.C.L Holdings). - A letter dated 21 July 2009 from council regarding a development application stated that "*it has become apparent that due to the former use of the site, and evidence of significant contamination of adjoining sites, that the subject site may be contaminated*".

Table 5 **Historical Aerial Photographs**

Aerial Photographs
1943 - Aerial Photograph (maps.six.nsw.giv.au) – zoomed out (left) and in (right) on the Lincon Site

1955 - Run 24, August, black and white - zoomed out (left) and in (right) on the Lincon Site


1961 - Run 37E, black and white - zoomed out (left) and in (right) on the Lincon Site



1970 - Run 19, 7 July, black and white - zoomed out (left) and in (right) on the Lincon Site

1982 – colour zoomed in on the Lincon Site

2004 - colour zoomed in on the Lincon Site

2013 (maps.six.nsw.giv.au) - zoomed out (left) and in (right) on the Lincon Site

A summary of the historical information based on available sources reviewed is provided below:

Table 6 Summary of Lincon Development site history and contamination sources

Year	Owner	Use	Potential Contaminating Activities	Likelihood*
Pre 1908	No information	Natural wetland that was drained and filled for development of a racecourse.	Uncontrolled fill	High
1913 to 1939	Victoria Park Racing and Recreational Grounds Company Pty Limited	Racetrack, stables and paddocks	Use of ash on the racetrack Use of herbicides and pesticides Burial of waste	Medium
1939 to 1945	Occupied by the Australian Army	Ordinance unit and military camp for WWII. No infrastructure was visible on the Lincon Development site in the 1943 aerial photograph.	There is no Unexploded Ordnance (UXO) reported on the Department of Defence website: www.defence.gov.au/uxo/where_is_uxo	Low
1946 to 1951	The Right Honourable William The First Viscount of Nuffield	Racetrack, stables and paddocks	Potential use of herbicides and pesticides Potential burial of waste	Low
1951 to 1954	Nuffield (Australia) Pty Limited (car manufacturers)	Appeared vacant and undeveloped in historical photographs but with disturbed ground and potential lower lying than surrounding land. Olympic Tyre and	Potential use of herbicides and pesticides. Potential up-gradient off-site sources from the British Motor Corporation plant. Potential receiving pit for solid	Low – Medium
1954 to 1968	The Olympic Tyre & Rubber Co Ltd			

Year	Owner	Use	Potential Contaminating Activities	Likelihood*
		Rubber factory was located on the same property to the south.	and liquid wastes.	
1968 to 1970	D.C.L (holdings) Australia Pty Ltd	Uncontrolled landfilling visible in aerial photograph which appeared almost complete in the 1970 aerial photograph.	Uncontrolled fill containing demolition and tyre waste	High
1970 to 1994		Recreation space for employees	Significant activities unlikely	Low
1994 to 2010	Lincon Development Pty Ltd	Unused	Potential use of herbicides and pesticides	Low
2010 to date		Construction of a bitumen surfaced car park for short term storage of new cars.	Refuelling equipment, importation of fill for levelling	Low

Notes: * 'High' – most likely to have caused significant contamination *'Medium' – potentially may have caused contamination *'Low' – contamination unlikely or impacts expected to be minimal.

2.5 Government Records

A review of the current NSW EPA contaminated lands register and record of EPLs and the Commonwealth Government National Pollution Inventory (NPI) database were searched for properties within 500 m of the Lincon Development site.

Table 7 Records search

Information Source	Information
Contaminated Sites Regulated under the CLM Act by the NSW EPA http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx	There were no sites within Zetland that were regulated under the CLM Act by the NSW EPA at the time of this report.
Contaminated Sites notified to the NSW EPA http://www.epa.nsw.gov.au/clm/publiclist.htm	The following three sites within 500 m of the Lincon Development site had been notified to the NSW EPA under Section 60 of the CLM Act: - Energy Australia/ Ausgrid Zetland Depot, 122 - 138 Joynton Avenue, Zetland was listed as not requiring regulation under the CLM Act. The property is located on the north side of the Lincon Site. - Goodrich Control Systems Lincon Site, 84 - 92 Epsom Road, Zetland was listed as under assessment. The property is a 1 ha block of land located on the south side of the GSAC Site, approximately 50 m southwest of the Lincon Site. - Autofoil P/L, 2 Mentmore Avenue, Rosebery was listed as not requiring regulation under the CLM Act. The subject property was 350 m southwest of the Lincon Site.
Record of Environment Protection Licences (EPLs) issued by the NSW EPA http://www.epa.nsw.gov.au/prpoeoapp/	The following two sites within 500m of the Lincon Site held former EPLs: - EPL 11997: Energy Australia was the former licensee for an EPL for hazardous, industrial or Group A Waste Generation or Storage at 122-138 Joynton Avenue. The EPL expired on 28 March 2012. The subject site is located on the north side of the Lincon Site. - EPL 11454: Mercedes-Benz of Sydney was the former licensee for an

Information Source	Information
	EPL for hazardous, industrial or Group A Waste Generation or Storage at the Corner of Joynton & Elizabeth Streets. The EPL expired on 23 June 2009. The subject property was located on the opposite side of Joynton Avenue from the GSAC Site.
National Pollution Inventory (NPI) Records http://www.npi.gov.au/npidata/action/load/individual-facility-detail/criteria/state/NSW	Spotless Facility Services, 35 Epsom Road, Rosebery was listed and located 190 m south of the Lincon Development site. The site is listed as a laundry and dry cleaning services facility. The site is a 1.2 ha property located 190 m south of the Lincon Site.

Based on the above there is potential for groundwater under the Site to be contaminated with chemicals of concern sourced from nearby up-gradient sites, such as Goodrich Control Systems and Ausgrid Zetland Depot.

2.6 Activities and Contaminants of Potential Concern

The activities and contaminants of concern based on the review of available information in the previous sections is summarised in Table 8 below.

Table 8 Contaminants of Concern

Source	Activity	Contaminants of concern
On-site	Uncontrolled spoil disposal (potentially liquid and solid) in the 1900s and between 1950s and 1970.	Metals, PAHs, TRH, BTEX and asbestos: The type of contaminants commonly found in uncontrolled spoil disposal. The 3 to 4 m thick fill layer observed by others in the Lincon Development site is from unknown sources although most likely from local industrial properties and consisted of soil and anthropogenic materials such as building demolition and tyre waste. The previous investigations detected low concentrations of PAHs including benzo(a)pyrene in the fill. Asbestos was analysed but not detected however based on the fill type has a high likelihood to be present. OCPs, OPPs, PCBs and other industrial chemicals (SVOCs and VOCs): These contaminants may be present but are less common. They may be at higher concentrations it localised areas if waste containers or drums containing residues are buried in the fill. They were tested in soil in previous investigations and not reported above the investigation levels at the time.
	Potential use of pesticides and herbicides	OCPs and OPPs: Herbicides or pesticides may have been used on the site during the period it was open space and a racecourse. The amount used was likely minimal and not considered to be a key contaminant of concern from use on the site. Fill and soil material was tested for OCPs and OPPs in previous investigations and not reported above the adopted assessment levels at the time.
	Ordnance storage or use during WWII	UXO There is a low likelihood that ordnance was stored on the Lincon Development site. In all likelihood and based on information in the public UXO database, and the proximity to residential areas, it was unlikely that ordnance was used or exploded on the subject site.
	Acid sulfate soils	Based on the lithology there is a possibility for potential acid

Source	Activity	Contaminants of concern
		sulfate soils to be present below the fill layer.
Off-site	Industrial land use on all surrounding land including car manufacturing and dry cleaning.	Contaminants could migrate onto the site via groundwater from up-gradient sites, potential contaminants include: - VOCs - SVOCs - TRH - PAH - Metals Bis(2-ethylhexyl)phthalate, Di-n-butyl phthalate, and trichloroethene were detected in groundwater in previous investigations at low concentrations. Zinc and copper were detected at slightly elevated concentrations.

2.7 Lincon Development Site Phase 1 Assessment Conclusion

Based on the review of the available information it appears that the Lincon Development site has undergone two periods of filling with uncontrolled waste:

- Early 1900s – during land reclamation activities (infill for the Victoria Racecourse); and
- Mid 1950s – to late 60s/early 70s - filling to raise the site 1.5 to 2 metres higher than the land to the west and north.

The information compiled and reviewed suggests that no other significant contaminating activities have been conducted at the Lincon Development site. The Lincon Development site has historically been surrounded by industrial uses which collectively may have caused widespread contamination of the Botany Aquifer and therefore there is potential that groundwater contamination, sourced from these properties, may have migrated onto the Site. The key contaminants of concern include are metals, PAHs, TRH and asbestos.

Based on the identified current and historical activities conducted at the Lincon Development site and the findings of previous environmental investigations, it is considered that the sampling and analysis scope developed and undertaken for the Additional Site Investigation, as reported below, was appropriate to characterise the Site for the purposes to inform the GSAC RAP (AECOM, 2016).

3.0 Previous Site Investigations

3.1 Previous Environmental Investigations

AECOM has previously completed the following investigations for the Site:

- HLA-Envirosciences Pty Ltd (HLA) (2002). *Site Investigation, 132-138 and 140 Joynton Avenue and 94-104 Epsom Road, Zetland, NSW (ref: J1873/1)*;
- ENSR Australia Pty Ltd (ENSR) (2008). *Phase 2 Environmental Site Assessment, 132-138 Joynton Avenue and 140-144 Epsom Road, Zetland, NSW. 30 May*;

The intrusive investigations included a total of 19 soil boreholes sampled and analysed for metals, PAHs, TPH, BTEX, OCPs, OPPs, PCBs, VHCs and asbestos. The sampling locations were:

- HLA 2002: BH01, BH02, BH08 to BH09, BH13 to BH15, BH17 to BH19, HA01, HA02 and BH26 (no samples were analysed from BH26 due to drilling refusal); and
- BH105 to BH108 (ENSR 2008).

A total of 6 groundwater monitoring wells were sampled and analysed. These locations were MW01, MW03 and MW04 (HLA 2002 and ENSR 2008), and WRL15, MW106 and MW107 (ENSR 2008). The groundwater was analysed for metals, PAHs, TRH, BTEX and VHCs.

The soil borehole and groundwater monitoring well locations are shown on Figure D1 in Appendix D1.

3.2 Fill / Soil Impact

Based on the results of previous investigations undertaken by HLA in 2002 and ENSR in 2008 across the Site, fill impact included:

- Carcinogenic PAH (CPAH) concentrations exceeded the *National Environment (Assessment of Site Contamination) Amendment Measure* (NEPM, 1999 as amended 2013) Health Investigation Level (HIL) 'C' for recreational land use (HIL C) at eight locations across the Site and three of those locations also exceeded HIL D for commercial/industrial land use.
- Lead concentrations exceeded HIL C six locations across the Site and one of those locations exceeded HIL D for commercial/industrial land use.
- Metals (zinc and copper) exceeded the NEPM (2013) Ecological Investigation Levels (EILs) in 13 locations across the Site.
- Benzo(a)pyrene exceeded the NEPM (2013) Ecological Screening Level (EIL) in 7 locations across the Site.

The soil HIL and EIL/ESL exceedances are shown on Figure D2 and D3 respectively in Appendix D1. Based on the findings it was recommended that a RAP be developed for the future site redevelopment.

3.3 Groundwater Impact

The groundwater analytical results indicated that with respect to:

- Human health - all groundwater Chemicals of Potential Concern (COPC) concentrations at the Site were reported to be less than the adopted HSLs: and
- Ecological health:
  - PAH concentrations (benzo[a]pyrene, fluoranthene and phenanthrene) exceeded the adopted ANZECC (2000) marine water medium to low reliability criteria at MW01, MW106 and MW107. The results are likely to be representative of groundwater quality within the deeper fill materials in the western portion of the Site; and
  - copper and zinc concentrations slightly exceed the ANZECC (2000) marine criteria (80% level of protection) in MW01, MW106, MW107 and MW03. With the exception of MW03 these concentrations were encountered in the wells with elevated PAHs and likely attributed to the fill.

It is noted that VHCs cis-1,2-dichloroethene and trichloroethene were detected at concentrations slightly above the LOR (5 µg/L) at 8 µg/L and 7 µg/L respectively in MW03.

Groundwater ecological criteria exceedences are shown on Figure D6 in Appendix D1.

4.0 Soil and Groundwater Investigation

4.1 Rationale

It is the noted that the total area of the Site (including the Lincoln Development site which is to be acquired) is approximately 2.8 hectares, which would require 36 sampling locations to detect a hot spot with a diameter of approximately 31.5 metres (as per the NSW EPA [1995] *Sampling Design Guidelines*). Over the last two years a total of 22 sampling locations have been investigated on the Site area currently considered by the *GSAC RAP* (AECOM, 2014b), an area which excludes the Lincon Development site. The data from WSP and Douglas Partners of the Lincon Development site is not included as approval for use of the full reports had not been received at the time this report was prepared. In order to meet the City of Sydney development requirements the following additional locations have been assessed:

- Eight (8) boreholes (BH214 to BH221) were drilled to a maximum depth of 6 m bgs evenly distributed over the Lincoln Site and conversion of two (2) boreholes into groundwater monitoring wells and based on an approximate 20m sampling grid; and
- 16 boreholes (BH200 to BH213 and BH222 and BH223) were drilled to a maximum depth of six (6) m distributed across the proposed Aquatic Centre building footprint and the park area and conversion of four (4) boreholes to groundwater monitoring wells.

The locations are shown on **Figure D1** in **Appendix D1**. At the completion of the additional investigation, a total of 46 sampling locations will have been completed (excluding WSP and Douglas Partners), this exceeds the sampling density recommended by NSW EPA (1995).

As previously stated, the findings of the Phase 1 for the Lincon Development site confirmed that the sampling density was sufficient to appropriately characterise the soil and groundwater conditions.

The soil sampling locations were targeted based on the following factors:

- The proposed footprints of the Aquatic Centre swimming pools which will be excavated to depths ranging between approximately RL 17.3 and 18.3 m AHD) or a maximum of 1.2 m below the current ground level. Consequently sampling conducted within the proposed excavation footprint targeted the upper 1.2 m of material;
- The proposed footprints of the Gunyama Park amenities building where pilings works may be required to support the structure; and
- Identified data gaps in other parts of the Site, including but not limited to the Lincon Development site.

The groundwater sampling locations were targeted based on the following factors:

- Two new monitoring were installed on the Lincoln Development site to assess up- and down-hydraulic gradient groundwater quality in this part of the Site;
- One new monitoring well was located down-hydraulic gradient (south west) of the existing monitoring well MW03 where a detection of trichloroethene and cis-1,2-dichloroethene was reported during the HLA (2008) site investigation (as detailed in the *GSAC RAP* [AECOM, 2014]); and
- Three monitoring wells in the western part of the Site and towards the down-hydraulic gradient Site boundary where the fill material has been identified to be deeper and, consequently, there is a greater potential for impacts to the Site's groundwater quality.

The sampling locations elected have been located away from the previous soil and groundwater sampling locations and in identified data gap areas, and are considered to provide an appropriate level of coverage across the Site based on the contamination status of the Site reported in the *GSAC RAP* (AECOM, 2014). The sampling locations are also considered to be appropriate for the assessment of the proposed swimming pool areas where the proposed excavated material will require assessment for reuse within the Gunyama Park.

4.2 Assessment Criteria

4.2.1 Soil Assessment Criteria

The soil assessment criteria (SAC) for the investigation has been selected in accordance with the National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure (NEPM), as amended 2013* (ASC NEPM), based on the following land use scenarios:

- The proposed development includes an Aquatic Centre and Gunyama Park which are considered to be recreational and open space areas and fits the Health Investigation Level (HIL) and Health Screening Level (HSL) C scenario in the ASC NEPM (2013).
- The proposed Aquatic Centre includes buildings with no basements and will be occupied on a daily basis by commercial workers and fits the HIL D and HSL D scenario in the ASC NEPM (2013).
- Underground services are and will be located in or adjacent to the Site.
- The development of Gunyama Park that will be vegetated and used as open and recreational space.

Based on the above the adopted SAC are listed below in Table 9:

Table 9 Soil Assessment Criteria

Guideline	CoPC	Scenario	Adopted Criteria
Human Health Based Criteria			
ASC NEPM (2013)	Metals, PAHs, asbestos, TRH and BTEX	Recreational users of Gunyama Park and recreational areas of Aquatic Centre	HIL C HSL C (TRH, BTEX) (Sand, <0-1)
		Commercial workers in Aquatic Centre	HIL D HSL D (TRH, BTEX) (Sand, <0-1) TRH Management Limits
Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report No.10 - CRC CARE Health Screening Levels for petroleum hydrocarbons in soil and groundwater. September 2011	TRH, BTEX, naphthalene	Subsurface surfaces – intrusive maintenance worker (IMW)	HSL IMW
Ecological Based Criteria			
National Environment Protection Council (NEPC), 1999. *National Environment Protection (Assessment of Site Contamination) Measure (NEPM), as amended* 2013 – Ecological Investigation Levels (EILs) and Ecological Screening Levels	Arsenic, zinc, copper, chromium III, nickel, lead and naphthalene	Ecological receptors in Gunyama Park	EIL – Urban residential and public open space
	TRH, BTEX and benzo(a)pyrene	Ecological receptors in Gunyama Park	ESL - Urban residential and public open space
Acid Sulfate Soils Management Advisory Committee (ASSMAC) Acid Sulfate Soils Assessment Guidelines (ASSMAC, 1998)	SPOCAS	Excavation of PASS or lowering of water table	>1000 tonnes
Waste Classification			
NSW EPA (2014) Waste Classification Guidelines	Metals, TRH, BTEX, PAHs,	Off-site disposal of soil	Contaminant Threshold (CT) Specific Contaminant Concentration (SCC) and TCLP threshold values.
	Asbestos	Off-site disposal of soil	Detection
	SPOCAS	Off-site disposal of soil	NA

4.2.2 Groundwater Assessment Criteria

The groundwater assessment criteria (GAC) adopted for the investigation has been selected in accordance with the ASC NEPM (2013) and based on the following:

- The proposed development includes an Aquatic Centre and Gunyama Park which are considered to be recreational and open space areas and fits the Health Screening Level (HSL) C scenario in the ASC NEPM (2013).

- The proposed Aquatic Centre includes buildings with no basements that will be occupied on a daily basis by commercial workers and fits the HSL D scenario in the ASC NEPM (2013).
- Groundwater is at depths greater than 2 m and less than 4 metres and the sand and fill is the most dominant lithology.
- The closest down-gradient ecological receptor is Alexandria Canal located 1.4 km to the southwest. Groundwater however is extracted in the area for dewatering purposes and discharged.
- The Site is located in the Botany Management Zone 2 which bans use of groundwater for domestic use.

Based on the above the adopted groundwater assessment criteria (GAC) are listed below in Table 10:

Table 10 Groundwater Assessment Criteria

Guideline	CoPC	Scenario	Adopted Criteria
Human Health Based Criteria			
ASC NEPM (2013)	TRH and BTEXN	Vapour intrusion recreational space	HSL C (sand, 2m to <4 m)
		Vapour intrusion into commercial building	HSL D (sand, 2m to <4 m)
CRC Care (2011)	TRH and BTEXN	Vapour intrusion IMW	HSL IMW (Sand, 2 m to <4 M)
Australian Drinking Water Guidelines (NHMRC 2011)	Metals, TRH, BTEX, PAHs	Recreational and drinking water	Not adopted no receptors due to extraction ban
US EPA Tap Water	VOCs	Recreational and drinking water	
Ecological Based Criteria			
ANZECC (2000)	Metals, PAHs, TRH and BTEX	Groundwater receptors	Marine, 80% level of species protection where applicable, including moderate and low reliability trigger values

4.3 Methodology

4.3.1 Soil Investigation

The soil sampling program was undertaken between 23 and 26 November 2015. The methodology is described in Table 11:

Table 11 Soil Sampling Methodology

Activity	Details
Service Clearance	All service locations were searched using AECOM's underground services clearance procedure, including requesting and reviewing Dial Before You Dig service plans, engaging a Telstra accredited underground service locator, reviewing site plans with the Site manager and hand auguring past the depth of expected on-site services.
Boreholes	Hand augers were used for the collection of samples in the top 1 m due to the potential presence of site services. A Geoprobe drill rig with dual tube push tubes was used to advance boreholes for sample collection. Where geotechnical sample collection via the standard penetration test (SPT) tube was required, hollow stem augers were used to prevent borehole collapse.
Soil Sampling	Soil samples obtained from the boreholes were collected by a gloved hand from the push tube casing or SPT. Soil was placed into laboratory prepared glass jars with Teflon-lined

Activity	Details
	lids for chemical analysis and a new pair of disposable nitrile sampling gloves were used to collect each sample. Soil samples for acid sulphate soils and asbestos were placed in laboratory supplied zip lock bags. Soil samples were collected throughout the profile, at changes in lithology, from the saturated layers and/or where contamination was identified (e.g. odours and/or staining).
Soil logging	Soil logging was undertaken in general accordance with the Unified Soil Classification System and the AECOM documented standard field procedures. Samples were logged and information was recorded in the field (e.g. soil/rock type, colour, grain size, inclusions, moisture conditions, staining and odour etc.). The bore logs are presented **Appendix D3**.
QC samples	Intra-laboratory and inter-laboratory duplicate samples were collected at an approximate rate of 1 per 20 primary samples.
Field Screening	Soil sub-samples were placed in snap-lock plastic bags and the vapour headspace screened in the field for volatile organic compounds (VOCs) using a calibrated photoionisation detector (PID) equipped with a 10.6 eV lamp. Calibration details are provided **Appendix D4**.
Decontamination	Drilling augers were cleaned between boreholes brushing soil and washing. Disposable push tubes were used at each borehole location and soil samples were collected by hand, using single use, disposable nitrile gloves.
Reinstatement	Boreholes not converted to groundwater monitoring wells were reinstated with the drill cuttings.

4.3.2 Groundwater Investigation

The groundwater monitoring wells were installed and developed between 23 and 25 November 2015 and the sampling was undertaken on 30 November 2015. The methodology is described in Table 12:

Table 12 Groundwater Well Installation and Sampling Methodology

Activity	Details
Well Construction	The monitoring wells were installed with variable screen lengths ranging from 3 to 4 m. The screen was placed approximately 1 m above and 2 m below the depth of encountered or anticipated groundwater where possible: MW201: screened 1.5 to 4.5 m bgs MW202: screened 2 to 6 m bgs MW203: screened 2 to 5.5 m bgs MW204: screened 1.5 to 4.5 m bgs MW205: screened to 2.0 to 6.0 m bgs Well materials comprised uPVC 50 mm internal diameter, machine threaded casing and machine slotted screen. Monitoring well screens and casing were installed with graded filter sand gravel pack across the screened interval, above which a bentonite seal was constructed. Grouting was then installed from the top of the bentonite seal to the ground surface. Borehole logs and monitoring well construction details are included in **Appendix D3**.
Well Completion	Newly installed groundwater monitoring wells were completed with flush-mounted bolt-down gatic covers.
Well Development	The wells were developed in general accordance with the Minimum Construction Requirements for Water Bores in Australia (National Uniform Drillers Licensing Committee, third edition, 2012). Development generally comprised the removal of a minimum of ten well casing volumes of water from each well, using a submersible pump. AECOM considers that development activities undertaken were adequate for the wells to yield representative groundwater.

Activity	Details
Surveying	The locations of the newly-installed monitoring wells and top of casing elevations were surveyed by CMS Surveyors Pty Ltd. Survey data is presented on borelogs and in **Appendix D5.**
Gauging	The monitoring wells were gauged with a calibrated interface meter prior to purging and sampling on the 30 November 2015. The interface meter was used to measure standing water level (SWL) and for the absence or presence and thickness of low density non-aqueous phase liquids (LNAPL). Following sampling of each well, the total depth of the well and the absence or presence and thickness of dense non-aqueous phase liquids (DNAPL).
Sampling	The monitoring wells were sampled on the 30 November 2015. The wells were purged using the low-flow methodology, with the pump intake set approximately 300 mm above the base of the well. Wells were purged until water quality parameter stabilisation to ± 10% was accomplished, and drawdown was minimised to the extent practicable. The wells were sampled with a peristaltic pump using dedicated LDPE and silicon tubing for each well, thereby minimising the potential for cross contamination. Field parameters, including temperature, electrical conductivity, redox potential, dissolved oxygen and pH, were measured purging through a low flow cell to document stabilisation and water quality. Minimal water level drawdown (<0.1m) was attained at MW203 and MW205. Drawdown occurred in MW200, MW201 and MW202. The final measured parameter readings were generally within 10% of preceding measurements at each location. Following stabilisation of parameters, the sample was collected into laboratory provided bottles with required preservatives. Field filtering was undertaken using 0.45 µm single use filter cups for samples for metals analysis. Groundwater samples from each monitoring well were submitted for laboratory analysis under chain of custody (CoC) documentation, which is included in **Appendix D7**.

4.3.3 Laboratory Analysis

All samples were submitted to ALS Laboratory Pty Ltd (ALS) in Smithfield, NSW (NATA accreditation number 825) for analysis with the exception of:

- Inter-laboratory samples which were submitted to Envirolab Services Pty Ltd (Envirolab) (NATA accreditation number 2901) in Chatswood, NSW; and
- Samples for SPOCAS analysis were submitted to SGS in Portsmith, Queensland for analysis [NATA accreditation number 2562(3146)].

The soil and groundwater laboratory analysis and methodologies completed are summarised in Table 13 and Table 14:

Table 13 Soil Laboratory Analysis

Parameter and Laboratory Method	Number of Soil Field Samples Analysed			
	Primary	Intra-Laboratory Duplicates	Inter-Laboratory Duplicates	Trip Blanks
Metals ICP-AES (APHA 3120; USEPA SW 846 – 6010)	46	3	2	-
Mercury AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS)	46	3	2	-
TRH/BTEX Purge and Trap (volatiles) /Capillary GC/FID (USEPA SW 846 - 8015A/B)	46	3	2	2

Parameter and Laboratory Method	Number of Soil Field Samples Analysed			
	Primary	Intra-Laboratory Duplicates	Inter-Laboratory Duplicates	Trip Blanks
PAHs Capillary GC/MS in Selective Ion Mode (SIM) (USEPA SW 846 - 8270B)	46	3	2	-
SPOCAS (SGS) Titration and ICP-AES (In house methods based on Acid Sulfate Soils Laboratory Methods Guidelines Version 2.1 – June 004)	6	-	-	-
Asbestos Presence Polarised Light Microscopy including dispersion staining (AS 4964 – 2004)	45	-	-	-
TCLP In house QWI-EN/33 referenced to USEPA SW846-1311	5	-	-	-

Table 14 Water Laboratory Analysis

Parameter and Laboratory Method	Number of Groundwater Field Samples Analysed				
	Primary	Intra-Laboratory Duplicates	Inter-Laboratory Duplicates	Trip Blanks	Rinsate
Dissolved Metals ICP-MS (APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020)	4	1	1	-	1
Dissolved Mercury FIMS [In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS)]	4	1	1	-	1
TRH Capillary GC/FID (USEPA SW 846 - 8015A)	4	1	1	1	1
BTEX Capillary GC/MS (USEPA SW 846 - 8260B)	4	1	1	1	1
PAHs Capillary GC/MS in SIM Mode (USEPA SW 846 - 8270D)	4	1	1	-	1
VOCs Capillary GC/MS (USEPA SW 846 - 8260B)	4	1	1	-	1

4.4 Quality Control and Quality Assurance

The data validation of the field and laboratory quality assurance and quality control (QA/QC) results is provided in **Appendix D8**. The assessment of the investigation data and procedures against the data quality indicators (DQIs) has found that the data quality is acceptable for the objectives of the investigation.

4.5 Soil Results

4.5.1 Lithology

A summary of the encountered lithology is described below.

Western Area: The lithology encountered in the boreholes consisted of the following in the western portion of the Site (west of BH212):

- Road base gravels underlying pavements followed by fill consisting of sand, gravel and clay with a relatively high proportions of slag, ash and metals. The depth of fill was deepest towards Joynton Avenue at approximately 3 m bgs and shallower to the east at 0.2 to less than 1 m bgs. The fill was commonly logged as black in colouration. No obvious odours were observed during sampling of the fill material.
- Organic high plasticity black clays with hydrogen sulphide odours underlay the fill in the western portion and then sandy clay further to the east.
- The fill and clays were underlain by poorly graded fine to medium sand.

Eastern Area: The lithology encountered in the boreholes consisted of the following in the eastern portion of the Site (Lincon Development site):

- Road base gravels underlying pavements followed by fill consisting of sand, gravel and clay with demolition type waste (brick and concrete) to 1 - 2 m bgs. The demolition waste fill was underlain by fill similar to the fill in the western part of the Site, but with lower proportions of slag, ash and metals to 2.8 to 3.3 m bgs. No obvious odours were observed during sampling of the fill. The fill was consistent with descriptions from the WSP (2011b) investigation.
- The fill was underlain by poorly graded fine to medium sand and no clays were encountered to the depth of the boreholes.

The Site lithology encountered is illustrated on the cross section in **Figure D4** in **Appendix D1** and borelogs are provided **in Appendix D3**.

4.5.2 Field Screening

VOC readings from the field screening of bagged soil sub samples ranged between 0.4 ppm (BH222_0.1 to 0.2) and 78.5 ppm (BH207_0.1-0.2). The slightly elevated VOCs were generally highest in the central and western portion of the Site and corresponded with the areas with the highest concentrations of volatiles detected in groundwater and soil (as discussed below).

4.5.3 Soil Analytical Results - Land Use Criteria Assessment

Metal and PAH analytical results are presented and compared to adopted HILs, ESLs and EILs in **Table D1** in **Appendix D2** and summarised in Table 15 and Table 16 below.

Exceedances of the HILs are shown on **Figure D2** and exceedances of the EILs and ESLs are shown on **Figure D3** in **Appendix D1**.

Table 15 Summary of analytical results - metals

CoPC	Results		Concentration				Number of Exceedances		
	Number	>LOR	Min.	Max.	Mean	S.D	HIL C	HIL D	EIL
Arsenic	46	12	<5	20	4.6	4.1	0	0	0
Cadmium	46	4	0.6	4	0.64	0.63	0	0	-
Copper	46	34	<5	1290	119	246	0	0	15
Lead	46	42	<5	4150	312	663	8	1	2
Mercury	46	25	<0.1	1.3	0.27	0.34	0	0	-
Nickel	46	33	<2	105	11	21	0	0	4
Zinc	46	41	<5	3240	237	495	0	0	26

Table 16 Summary of analytical results - PAHs

CoPC	Results		Concentration				Number of Exceedances		
	Number	>LOR	Min.	Max	Mean	S.D	HIL C	HIL D	ESL**/ EIL
CPAH*	46	46	1.2	41.6	8	1.2	19	1	-
Benzo(a)pyrene	46	25	<0.5	28.2	5.2	8	-	-	22**
Total PAHs	46	27	<0.5	385	52	<0.5	2	0	-
Naphthalene	46	7	<0.5	2.4	0.3	0.2	-	-	0

Notes: * Carcinogenic PAHs (toxicity equivalence to benzo(a)pyrene)

BTEXN and TRH analytical results are presented and compared to the HSLs, ESLs and Management Limits in **Table D2** in **Appendix D2** and summarised below. Exceedances of the ESLs are shown on **Figure D3** in **Appendix D1**.

Table 17 Summary of analytical results – BTEXN and TRH

CoPC	Results		Concentration				Number of Exceedances		
	Number	>LOR	Min.	Max.	Mean	S.D	HSL	ESL	ML
BTEX	46	0	ND	ND	ND	-	-	-	-
Naphthalene	46	7	0.2	2.4	0.34	0.34	0	0	
C6 - C9 / F1	46	0	ND	ND	ND	-	-	-	0
C10-C14	46	1	<50	100	27	11	0	-	0
F2	46	1	<50	99	27	11	0	0	-
C16-C34	46	26	<100	2200	328	429	0	16	0
C34-C40	46	16	<100	540	126	127	0	0	0

Asbestos

Asbestos analytical results are presented in **Table D3** in **Appendix D2** and summarised below. The location of the detections are shown on **Figure D2** in **Appendix D1**.

Table 18 Summary of analytical results – asbestos

CoPC	Number of Results	Samples with Asbestos Detected	Description
Asbestos	46	BH204_0.5-0.6	Mid brown sandy soil with one loose bundle of friable asbestos fibres approximately 1 x 0.5 x 0.5 mm.
		BH212_1.0-1.1	Pale brown sandy soil with one fragment of friable asbestos fibre board approximately 3 x 3 x 1 mm.
		BH214_2.0-2.1	Mid brown sandy soil with one loose bundle of friable asbestos fibres approximately 2 x 1 x 0.5 mm.

4.5.4 SPOCAS

SPOCAS analytical results are presented in **Table D4** in **Appendix D2** and summarised below:

Table 19 Summary of analytical results – SPOCAS

Soil Description/Type			SAND (SP) Grey/Brown	Clayey SAND (SP-SC) Black	Organic CLAY (OH) Black	Sandy CLAY (CLS) Black
Field Observations			No odour	Hydrogen sulfide odour		
Parameter	**Unit**	**ASSMAC (1998)** **Criteria >1000 t**				
TPA	moles H+/T	**18**	<5	<5	**22 to 551**	**449**
Spos	%w/w	**0.03**	<0.005	**0.028**	**0.17 to 0.56**	**0.56**
Liming Rate	kg CaCO3/T	-	<0.1	NA	**3.6 to 7.4**	**9.8**

Notes: Spos - Peroxide Oxidisable Sulphur, bold – exceeds criteria

4.5.5 Waste Classification

Soil analytical results are compared to the NSW EPA (2014) Waste Classification Guidelines in **Table D5** in **Appendix D2** and summarised below:

Table 20 Summary of analytical results – SPOCAS

CoPC	Soil Concentration (mg/kg)		Number of Results				TCLP Concentration (µg/L)		Number of Results
	Mean	Max.	>CT1	>CT2	>SCC1	>SCC2	Mean	Max.	>TCLP1
Lead	295	4150	21	11	1	0	600	1100	0
Nickel	11	105	3	0	0	0	ND	ND	0
Benzo(a)pyrene	4.9	28.2	21	15	10	4	ND	ND	0
PAHs	48	385	4	0	4	0	0.0011	0.038	0

4.6 Groundwater Results

4.6.1 Gauging

All newly installed groundwater monitoring wells and existing monitoring well MW03 was gauged on 30 November 2015. The gauging results are summarised below.

- Monitoring wells MW03 and MW204 were dry.
- The SWL ranged between 3.201 (MW203) and 4.318 (MW205) m below top of casing (btoc).
- Groundwater elevation ranged from 14.630 (MW202) to 15.972 (MW205) m AHD and indicates the groundwater is flowing in a westerly direction towards Joynton Avenue. The groundwater contours are shown on **Figure D5** in **Appendix D1**.
- No LNAPL or DNAPL was measured in the wells gauged.

Gauging records are presented in **Table D6** in **Appendix D2**.

4.6.2 Water Quality Parameters

During purging the following observations were made:

- Groundwater from MW200 during purging was black and highly turbid and purged dry. The well did not recharge sufficiently to sample after 4 hours.
- Groundwater from MW201 was brown and turbid and groundwater from MW202 was clear and pale brown. The water level was drawing down due to slower recharge.
- Groundwater from MW203 and MW205 were clear and colourless and no draw down in water levels occurred during purging.

Water quality parameters are presented in **Table D6** in **Appendix D2** and are summarised below:

Table 21 Summary of water quality parameters

Parameter	Dissolved Oxygen (mg/L)	Electrical Conductivity (µs/cm)	pH	Redox (mV)
Min.	0.00 (MW201, MW205)	106 (MW205)	5.35 (MW205)	169 (MW200)
Max.	0.35 (MW202)	1415 (MW200)	6.91 (MW201)	279 (MW201)

4.6.3 Analytical Results

Groundwater analytical results are tabulated and compared to the adopted GAC in **Table D7** in **Appendix D2**.

Concentrations of PAHs above the GAC were identified in MW201 and MW202 which are located in the western portion of the Site (refer to **Figure D3** in **Appendix D1**).

Low concentrations of cis-1,2-dichloroethene (31 µg/L) and trichloroethene (97 µg/L) were detected in MW203 in the central and northern portion of the Site. It is noted that there are no human health based groundwater criteria directly applicable to the land use scenario. Although there are guidelines for these chemicals for drinking water– the US Environmental Protection Authority (US EPA) Regional Screening Levels (RSLs) for tap water which are 0.17 µg/L for cis-1,2-dichloroethene and 0.49 µg/L for trichloroethene, however, these are not considered applicable to the proposed land use and groundwater use settings.

Table 22 Summary of groundwater analytical results

CoPC	Results		Concentration (µg/L)			Exceeding Adopted Criteria	
	Number	>LOR	Min.	Max.	Mean	Medium to Low Reliability	80% Species Protection
Lead (mg/L)	4	1	<0.001	0.008	0.0024	0	0
Anthracene	4	2	<1	1.6	0.95	2	-

CoPC	Results		Concentration (µg/L)			Exceeding Adopted Criteria	
	Number	>LOR	Min.	Max.	Mean	Medium to Low Reliability	80% Species Protection
Benzo(a) pyrene	4	2	<0.5	2.9	1.3	2	-
Fluoranthene	4	2	<1	5.3	2.8	2	-
Naphthalene	4	1	<1	175	44	0	1
Phenanthrene	4	2	<1	4.8	2.3	2	-
cis-1,2-dichloroethene	4	1	<5	31	9.6	-	-
Trichloroethene	4	1	<5	97	26	0	-
TRH C6-C10	4	1	<0.02	0.13	0.027	-	-
TRH C10 – C40	4	2	<0.0	1960	710	-	-

4.7 Discussion of Results

Based on the review of results and the findings of the Phase 2 and previously conducted investigations, the key findings are discussed below.

- Based on the findings of the desktop review, field observations and analytical data, it appears that there has been two generations of filling:
  - **Fill Generation** 1 - prior to 1910 and contains waste with slag, ash and metal. The material filled the former Waterloo swamp and dam that was located within and surrounding the Site. The fill was deepest in the west near Joynton Avenue and shallowest in the south east of the Site; and
  - **Fill Generation 2** – From the mid-1950s, the Lincon Development site was filled with a mound of material that sits above the Generation 1 fill. The Generation 2 Fill consists of soil mixed with demolition and tyre waste. A conceptual cross section illustrating the stratigraphy at the Site is provided as **Figure D4** (**Appendix D1**).
- The fill is impacted with metals, PAHs and asbestos with less significant but detectable concentrations of TRH. Exceedances of the adopted HILs for carcinogenic PAHs and lead occurred in some areas of the Site. The highest concentrations of carcinogenic PAHs and lead were in the western part of the Site towards Joynton Avenue. The lead and PAH concentrations were significantly lower in the Generation 2 Fill present on the Lincon Development site and validates the concept that different generations of filling have occurred at the Site. This distribution has implications of how material can be excavated and separated for potential reuse at the Site and is discussed in the RAP text.
- Groundwater levels are observed to have lowered across the Site since previous investigations undertaken in 2008 by AECOM and since 2011 by WSP. On the Lincon Development site, groundwater levels have lowered by 1 m and by over 1.5 m near Joynton Avenue. This is likely due to temporary dewatering works currently occurring to the west to northwest of the Site on the Green Square Town Centre construction site (on the opposite side of Joynton Avenue) and possibly related to the current Mirvac basement excavation/construction works to the south of the Site. The inferred groundwater flow is towards the dewatering area to the west.
- Asbestos was detected in 3 of the 46 analysed soil samples. The asbestos is expected to be randomly distributed amongst the fill and the management of the material will be addressed in the RAP (AECOM, 2016).
- Copper, lead, zinc, nickel, benzo(a)pyrene and TRH C16-C34 exceeded the adopted EILs and ESLs in fill across the Site. To address this issue, management measures will need to be implemented such as the placement of an appropriate growing medium over the fill, this will be discussed in the RAP (AECOM, 2016).

- Groundwater was found to have concentrations of various PAH compounds greater than the adopted ecological GAC. The exceedances were found in two wells (MW201 and MW202) that had lower recharge rates and discoloration. The wells were located in the area of the deepest and most PAH impacted fill, indicating leaching of PAHs sourced within the fill is likely occurring. The PAH impacted fill and groundwater is expected to extend off-site as the formerly filled Waterloo Dam extended to the west under Joynton Avenue.
- The concentrations of heavy metals and PAHs detected in 2015 were of the same order of magnitude as those reported in 2008. MW03 was dry therefore could not be resampled to confirm the VHC (trichloroethene and cis-1,2-dichloroethene) concentrations that were detected in 2008. VHC compounds were not reported at the down gradient wells located on the western Site boundary (MW201, MW202 and MW203) and therefore the VHC groundwater impacts are considered to be delineated to the MW03/MW211 area. Additional groundwater sampling for VHCs is discussed further in the RAP (AECOM, 2016).
- SPOCAS testing indicates that PASS exists in the western portion of the Site below the depth of the fill and the groundwater. While not proposed as part of the development works, if excavation below the depth of groundwater is proposed in the western portion of the Site, an Acid Sulfate Management Plan would be required to be prepared including appropriate treatment and off-site disposal of PASS affected soils.
- Initial comparison of the analytical results to the NSW EPA (2014) Waste Classification Guidelines indicates that material sourced from the western half of the Site would be classified as potential hazardous waste and special waste (asbestos) if off-site disposal was required. However, additional sampling and TCLP testing would be required to better characterise the materials if offsite disposal was required.

4.8 Updated Conceptual Site Model

The purpose of a Conceptual Site Model (CSM) is to assess risks potentially present at the Site by identifying and describing contaminant sources, transport mechanisms, exposure pathways and sensitive receptors associated with the Site. The CSM is based on AECOM's review of the previous reports and results from this investigation. The CSM developed for the Site is summarised in **Table 23** below.

Table 23 Conceptual Site Model

Consideration	Details
Site Setting	- The Site is located in a commercial/industrial area. - Future land-use to change to recreational and open space with an Aquatic Centre containing buildings and pools and parkland areas. Proposed development specifications including the infrastructure layout as outlined in the RAP (AECOM, 2016), will result in significant access restrictions to any residual contamination remaining.
Contaminants and Areas of Concern	- The main contaminants of concern in soil are metals (mainly lead, nickel and zinc), PAHs, TRH and asbestos in soil and PAHs and low concentrations of metals and VHCs in groundwater. - The source of contamination is related predominantly to historical uncontrolled placement of impacted fill across the Site, rather than historical operations.
Sources of contamination	The following contamination activities are known or suspected to have occurred: - Deposition of uncontrolled contaminated fill, including ash, slag and demolition waste from unconfirmed sources. Identified contaminants include heavy metals, PAHs, asbestos and TPH. - Historical industrial use which may have included fuel storage and use of chemicals such as solvents, oils and degreasers. Contaminants include lead, TPH, BTEX and VOCs. - Off-site sources of groundwater contamination from surrounding industrial and filled sites. Contaminants could include heavy metals, PAH, TPH, BTEX, VOCs, OCPs and PCBs.
Groundwater Depth and Flow Direction	Groundwater conditions on the Site are summarised below: - Shallow groundwater was encountered between depths of 3.2 and 4.3 m AHD and within sand and have dropped since 2011 by 1 to 1.5 m which is likely due to local dewatering occurring to the west-northwest of the Site. - The flow direction was inferred to be towards the west.
Extent of Groundwater Impacts	- No sheens LNAPL or DNAPL were encountered in the wells monitored. - All concentrations of TRH and BTEXN were less than the human health based GAC. - All concentrations of CoPC were less than the ecological based GAC with the exception of PAHs in MW202 and MW201 in the western portion of the Site. - Cis-1,2-dichloroethene and trichloroethene were detected at low concentrations in MW203 in the western area of the Site and formerly in MW03 in 2008 in the central area of the Site but are not expected to pose a significant risk to future users of the parkland.
Extent of soil impacts	- Concentrations of lead and carcinogenic PAHs in fill exceeded the HIL for open space across the Site with the highest concentrations in the western portion of the Site. Lead and carcinogenic PAHs exceeded the HIL for commercial land use in two boreholes the western portion of the Site. - Asbestos was detected in three samples from boreholes in the west, centre and east parts of the Site. - Concentrations of BTEXN and TRH were below the adopted HSLs. - Concentrations of nickel, lead, copper, benzo(a)pyrene and TRH C16-C34 exceeded the ecological based criteria (EILs and ESLs). - Potential acid sulfate soils (PASS) are present in organic clays and sandy clay in the western portion of the Site.

Consideration	Details
Potential Transport Mechanisms and Exposure Pathways for Contaminants	- Direct dermal contact or ingestion of contaminants in soil during construction or post development. - Dispersion of dust in the wind from unsealed surfaces during construction - Uptake of contaminants by plants and ecological receptors in soil post development. - Off-site groundwater migration.
Potential Receptors of Contamination	- The potential human receptors of contamination include: • Construction workers, contractors and visitors on the Site during redevelopment works. • Future receptors are recreational users of Gunyama Park and the Aquatic Centre as well as commercial workers in the Aquatic Centre and intrusive maintenance workers. - Potential environmental receptor of impacts are: • Off-site groundwater which flows towards the Alexandra Canal. • Future Gunyama Park.
Identified Complete Future Pathways	- Direct dermal contact or ingestion of contaminants in soil: complete pathways exist for future site users due to the contamination of lead and carcinogenic PAHs exceeding the HIL if an appropriate barrier is not in place. The placement of appropriate barriers between the source and receptor will appropriately mitigate this pathway. Barrier controls include a capping layer and implementation of a long term site management plan to ensure maintenance and longevity of control measure. Physical disturbance of asbestos (plant and vehicles running over material) and dispersion of asbestos fibres via wind: ACM fibres have been detected in fill. A complete pathway may exist where impacted soils are not capped and protected by a long term management plan or where appropriate Asbestos Management Plan not implemented during construction works. Workers could also be exposed during construction and redevelopment if appropriate controls are not implemented. - Groundwater migration to ecological receptors: there is potential for groundwater to migrate off-site and to impact surrounding groundwater quality. Therefore this pathway is considered complete. It is noted that down-gradient groundwater quality is already affected by similar sources of contamination and the Site would be further contributing to poor groundwater quality. Due to the distance between the Site and the nearest surface water body being over 1.2 km and the concrete lined nature of Alexandra Canal, the pathway between the Site source and the nearest surface water body is incomplete.

5.0 Conclusions

The Phase 1 assessment of the Lincon Development site confirmed that the sampling and analysis scope undertaken for this Additional Site Investigation was appropriate to characterise the Site for the purposes of future land uses and also to inform the GSAC RAP (AECOM, 2016).

Soil and groundwater investigations were conducted to address the identified data gaps at the Site. The assessment confirmed that lead and PAH contamination exceeding the HIL for recreational land use was widespread as identified in the previous investigations, particularly in the western half of the Site.

Metal, PAH and TRH contamination also exceeded the ESLs and EILs across the Site indicating that the fill material may not be suitable for use in a park as a growing medium. The asbestos is expected to be randomly distributed amongst the fill and the management of the material will be addressed in the RAP (AECOM, 2016).

PAHs and metals detected in groundwater correlate with the fill with the highest metal and PAH concentrations in the western portion of the Site.

MW03 was dry therefore could not be resampled to confirm the VHC (trichloroethene and cis-1,2-dichloroethene) concentrations that were detected in 2008. The same VHC compounds were detected at similar concentrations in MW211 which is located approximately 20 m down gradient of MW03. VHC compounds were not reported at the down gradient wells located on the western Site boundary (MW201, MW202 and MW203) and therefore the VHC groundwater impacts appears to be delineated to the MW03/MW211 area. Additional groundwater sampling for VHCs is discussed further in the RAP (AECOM, 2016).

Waste classification testing was completed and indicates the presence of potential hazardous waste and special waste (asbestos) if off-site disposal is required. Additional sampling and TCLP testing would be required to better characterise the materials if offsite disposal is required.

The context and implications of the information and data collected as part of these latest investigations are considered in the GSAC RAP (AECOM, 2016). In particular, soil reuse and disposal options will be outlined and management/remediation measures required to be implemented to protect:

- personnel involved during the redevelopment works;
- future site users, visitors and personnel;
- improve groundwater quality (where practicable to do so); and
- ecological receptors (e.g. landscaping vegetation and flora).

SPOCAS testing indicates that PASS exists in the western portion of the Site below the depth of the fill and the groundwater. While not proposed as part of the development works, if excavation below the depth of groundwater is proposed in the western portion of the Site, an Acid Sulfate Management Plan would be required to be prepared including appropriate treatment and off-site disposal of PASS affected soils.

6.0 References

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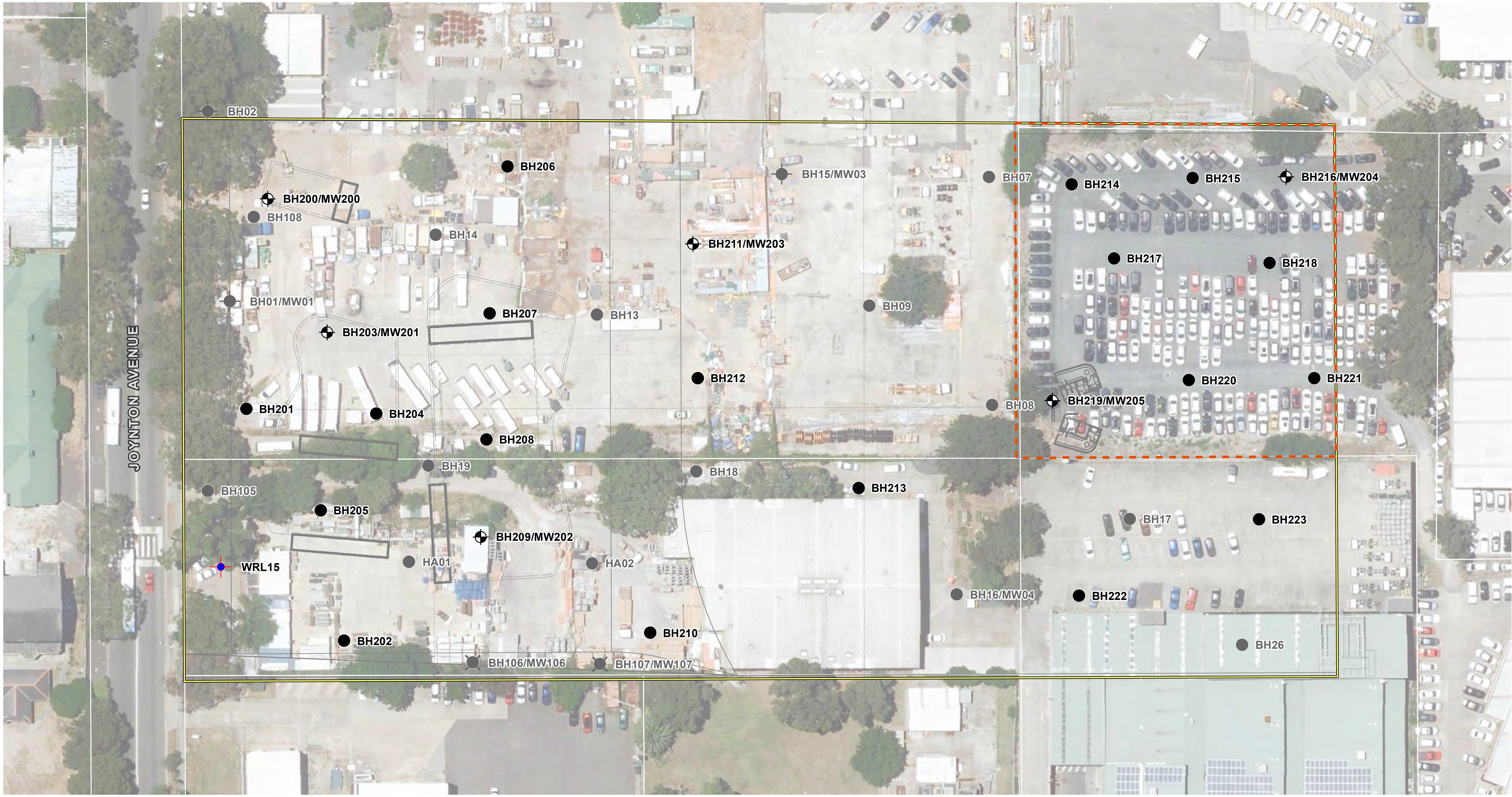
Appendix D1 – Figures



KEY

▭ Site boundary

⬚ Lincon development site

● AECOM (2015) borehole

⊕ AECOM (2015) monitoring well

✛ Water Research Laboratory (2007) monitoring well

✱ ENSR (2008) borehole

✛ ENSR (2008) monitoring well

● HLA (2002) borehole

CITY OF SYDNEY 2030

AECOM

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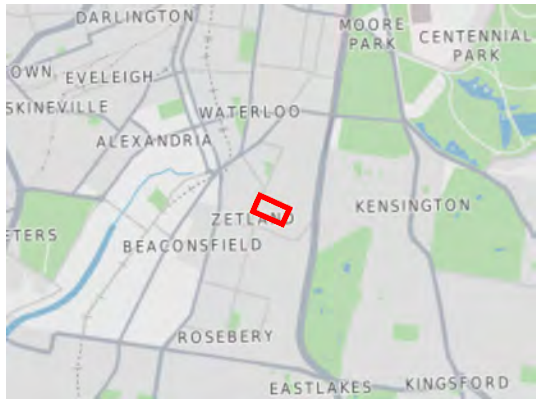

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

TITLE
FIGURE D1 - Soil borehole and monitoring well locations

PROJECT
GREEN SQUARE TOWN CENTRE

CLIENT
CITY OF SYDNEY

DRAWN	DATE	MAP #	REV	Project
SC	11/01/2016			
CHECK	DATE	G002	01	60314745

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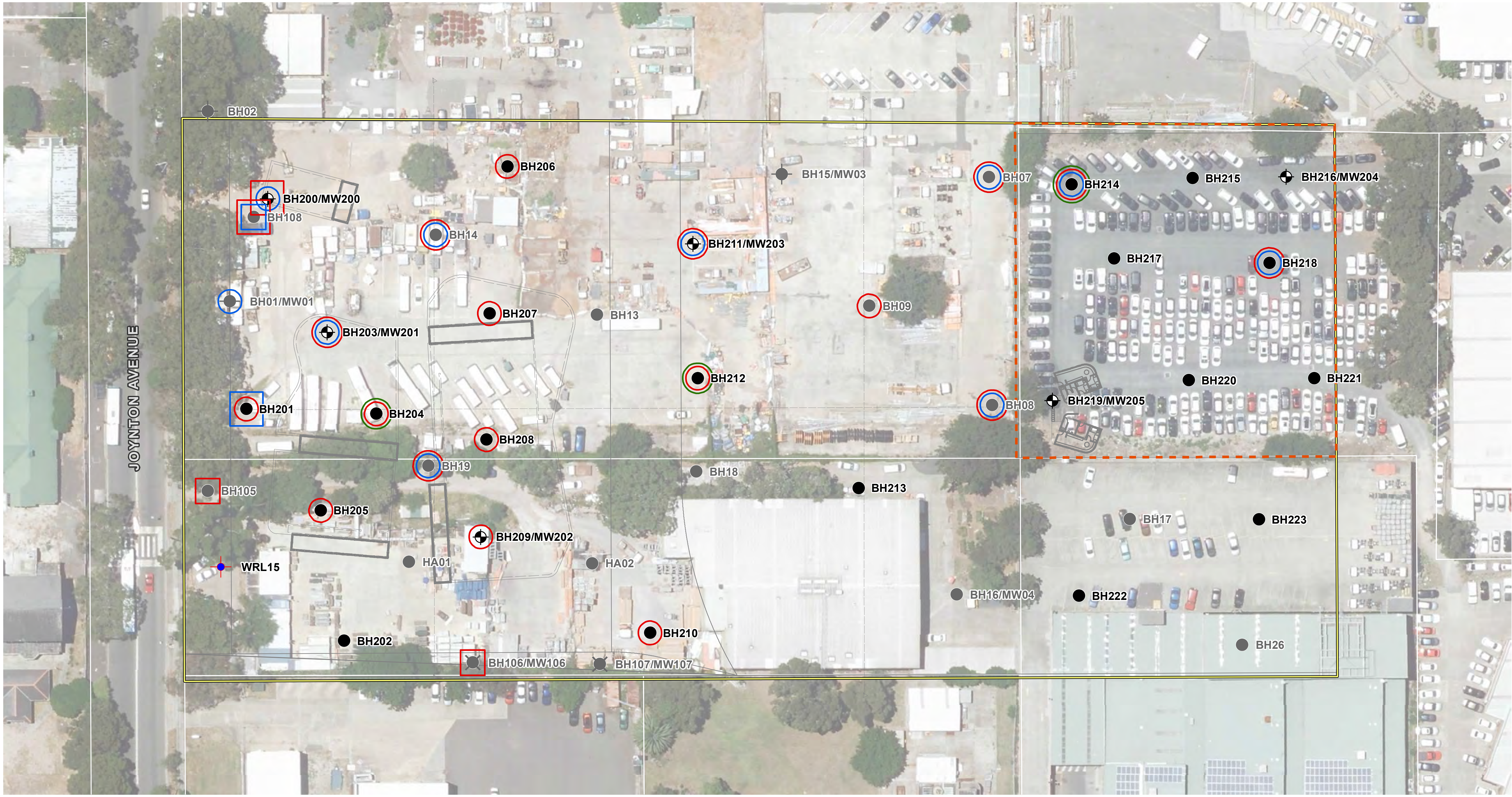

KEY

- ▭ Site boundary
- ▭ Lincon development site
- ● AECOM (2015) borehole
- ⌖ AECOM (2015) monitoring well
- ✚ Water Research Laboratory (2007) monitoring well
- ✖ ENSR (2008) borehole
- ✚ ENSR (2008) monitoring well
- ● HLA (2002) borehole
- ○ Asbestos detected
- ○ CPAH > HILC
- ○ Lead > HILC
- ▭ CPAH > HILD
- ▭ Lead> HILD

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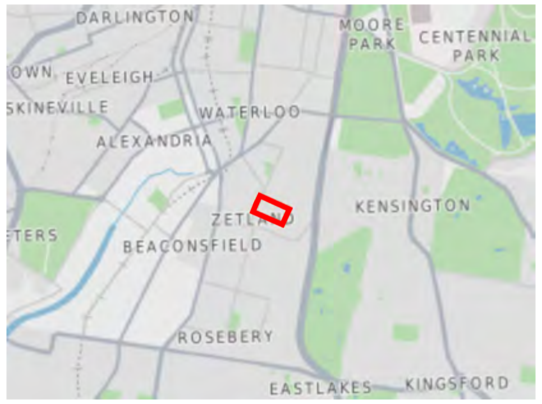

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

TITLE

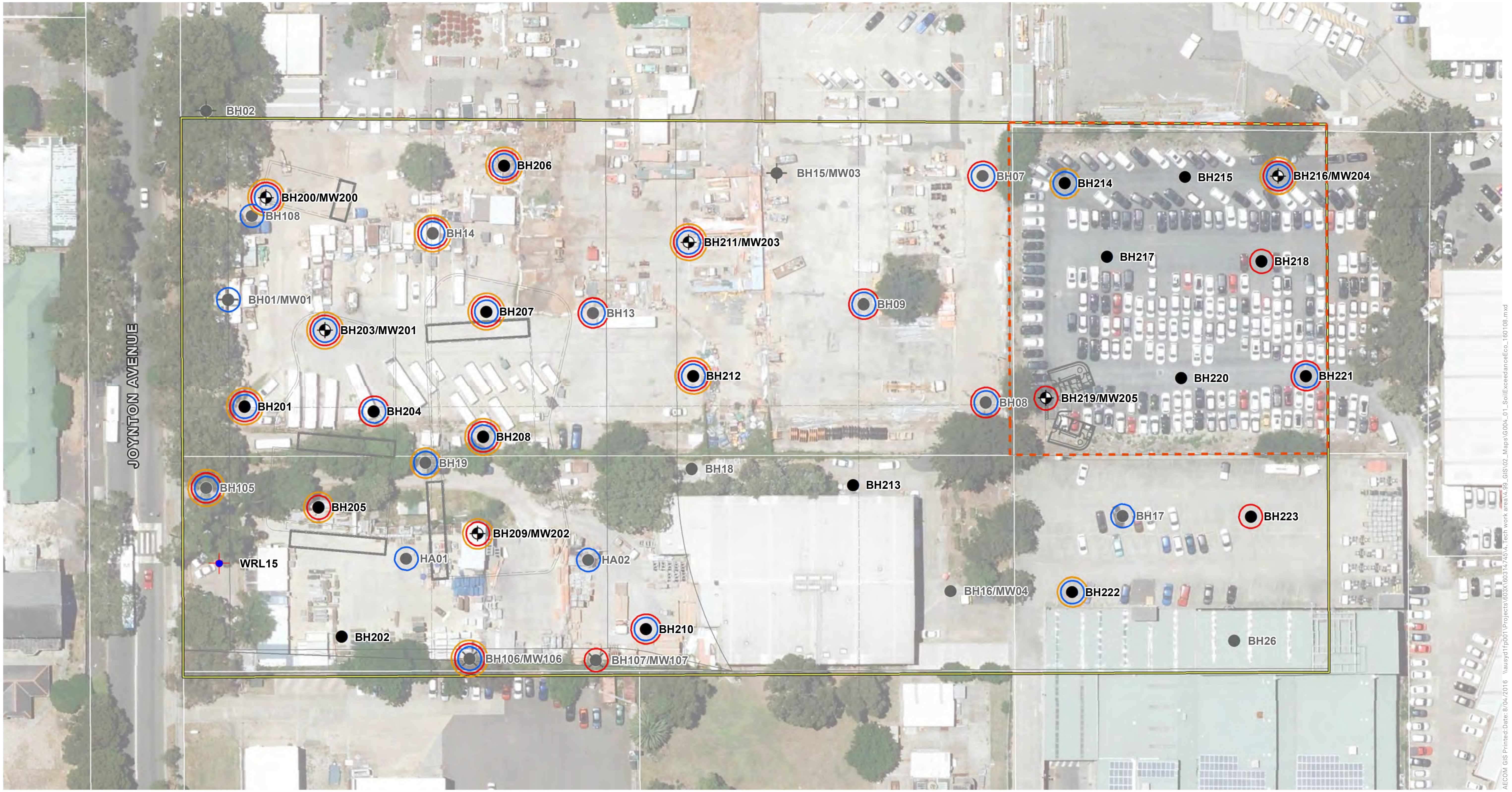
FIGURE D2 - Soil exceedances of Health Investigation Levels (HILS). Additional site investigation

PROJECT
GREEN SQUARE TOWN CENTRE

CLIENT
CITY OF SYDNEY

DRAWN	DATE	MAP #	REV	Project
SC	14/01/2016	G003	01	60314745
CHECK	DATE			

AECOM GIS Printed:Date: 8/04/2016 \\ausyd1fp001\Projects\603X\60314745\4. Tech work area\4.99_GIS\02_Maps\G003_01_SoilExceedanceHILS_160108.mxd



KEY

- ▭ Site boundary
- ▭ Lincon development site
- ● AECOM (2015) borehole
- ⊕ AECOM (2015) monitoring well
- ✚ Water Research Laboratory (2007) monitoring well
- ✱ ENSR (2008) borehole
- ✚ ENSR (2008) monitoring well
- ● HLA (2002) borehole
- ○ Benzo(a)pyrene
- ○ Metals
- ○ TRH C16-C34

AECOM

CITY OF SYDNEY 2030

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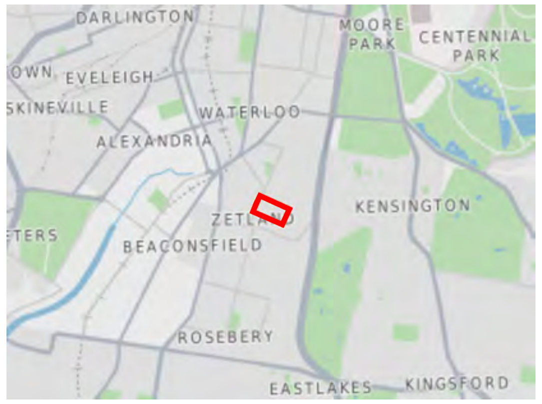

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

TITLE
FIGURE D3 - Soil exceedances of Ecological Investigation Levels and Ecological Screening Levels, and Groundwater Exceedances

PROJECT
GREEN SQUARE TOWN CENTRE

CLIENT
CITY OF SYDNEY

DRAWN SC
DATE 14/01/2016
CHECK
DATE
MAP # REV Project
G004 01 60314745

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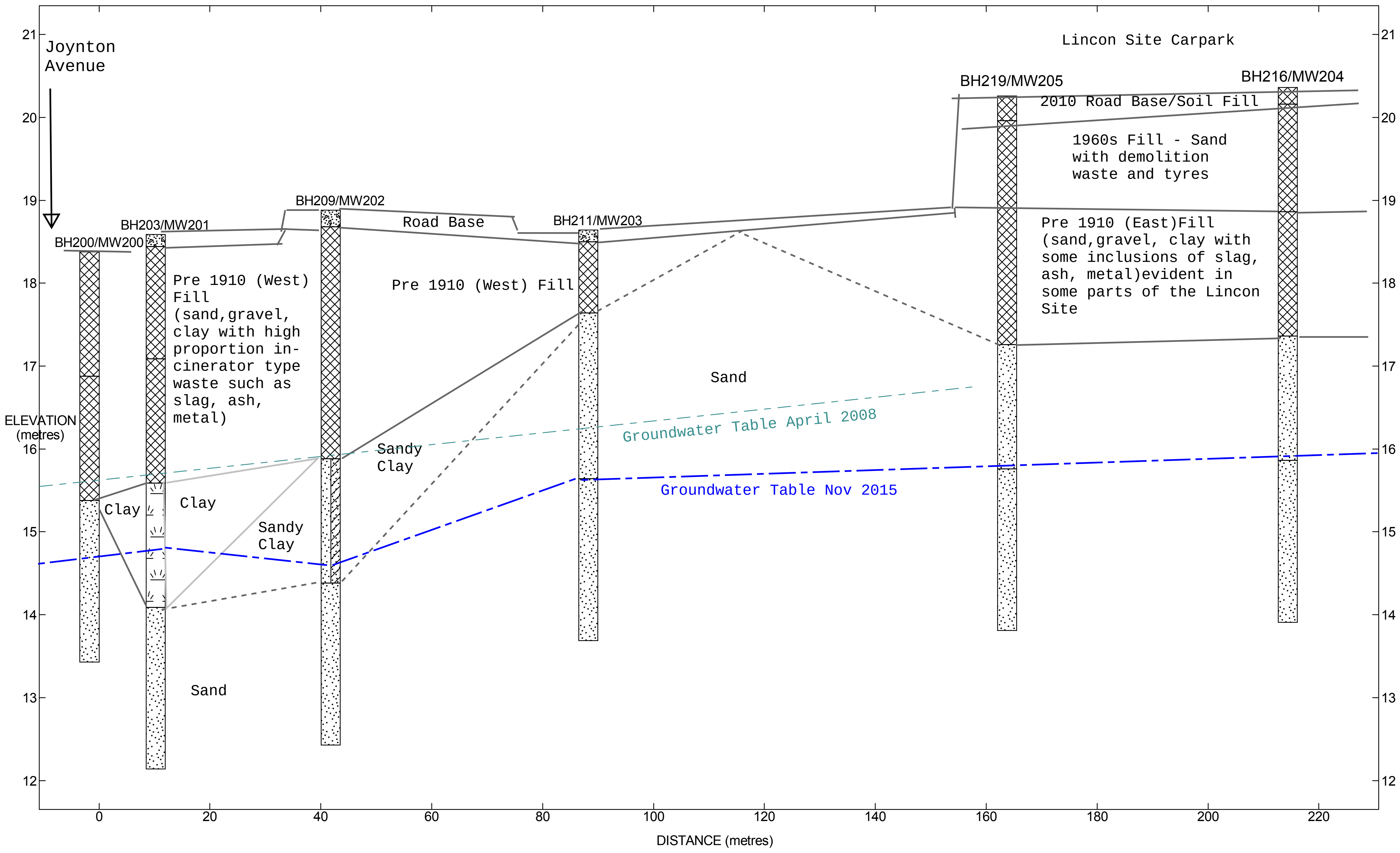
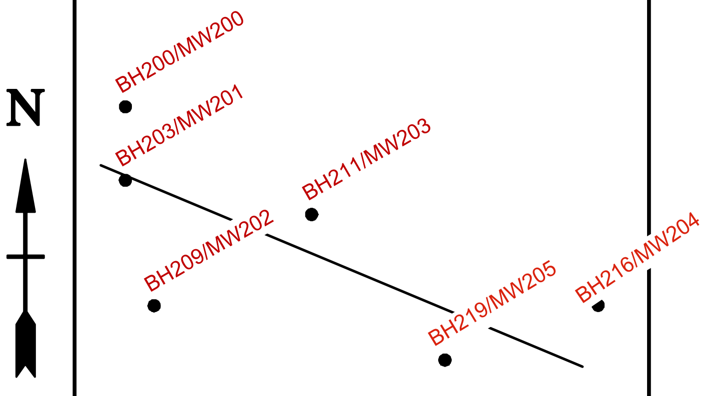
North West A

Figure D4 A-A'
Cross Section - Green Square Aquatic Centre

South East A'





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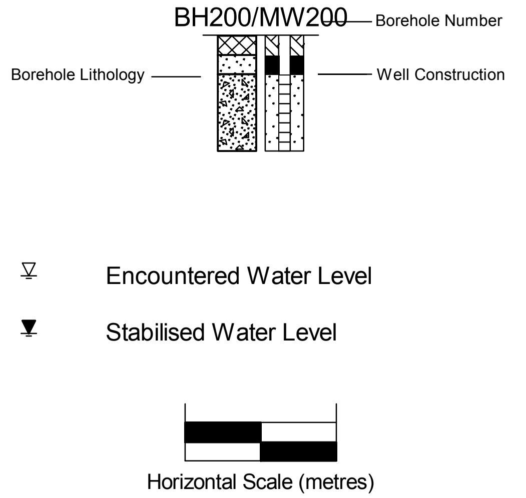

Vertical Exaggeration: 15x

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AECOM Australia Pty Ltd

Lithology Graphics

▨ Fill (made ground)

▨ USCS Poorly-graded Sand

▨ Concrete

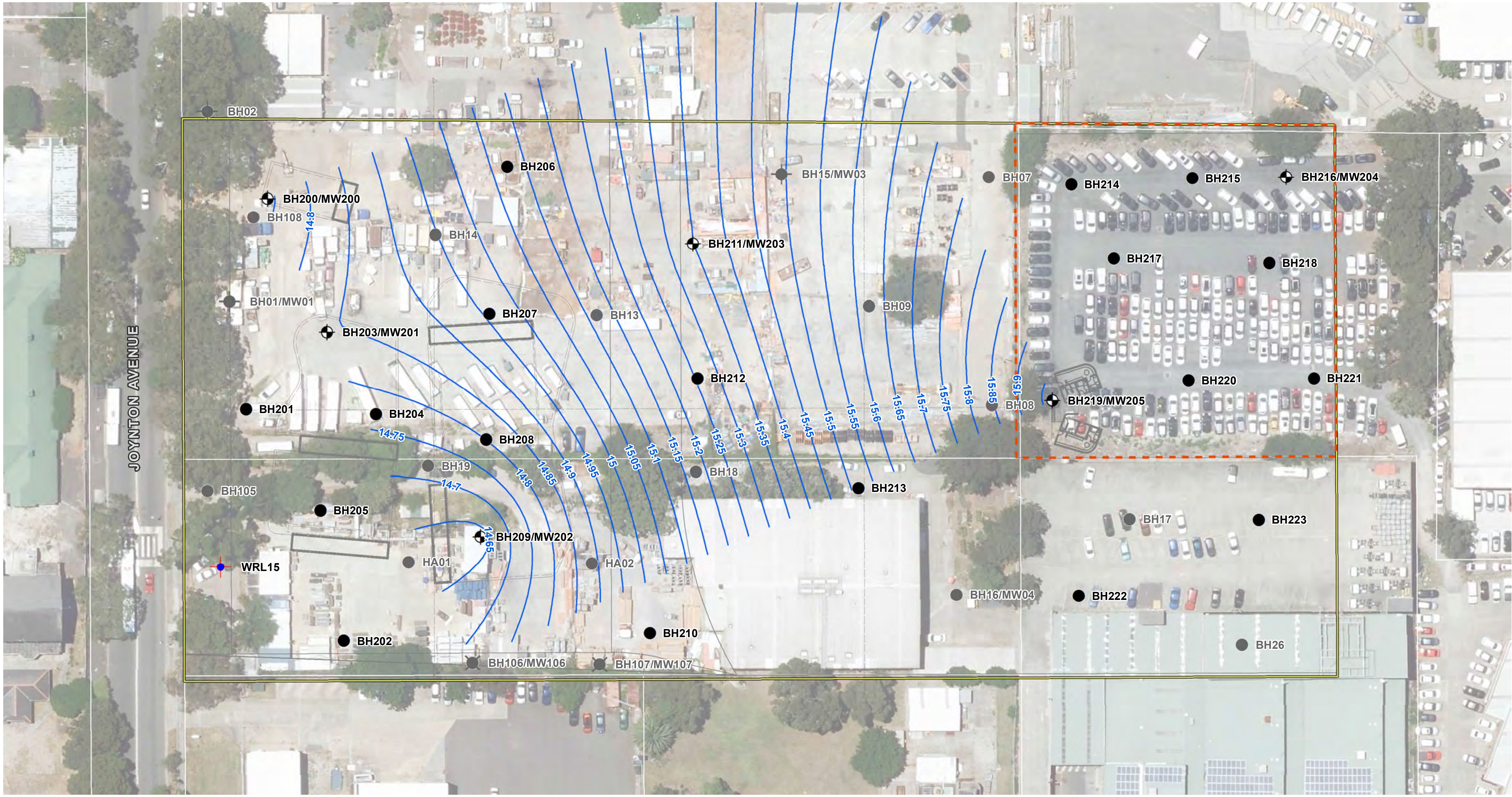
▨ USCS Peat

▨ USCS Poorly-graded Sand with Clay

Well Graphics

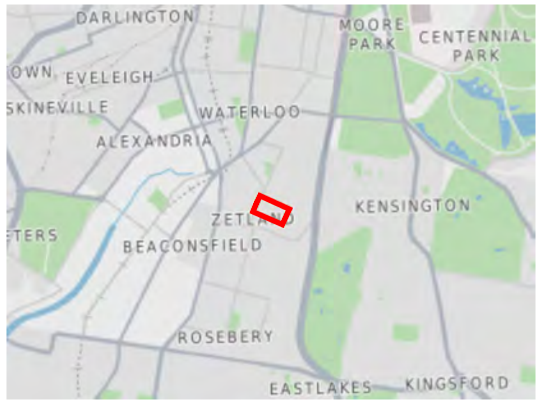
FIGURE NUMBER	Green Square Aquatic Centre -
	JOB NUMBER
	60477501

BORELOGS_NOV2015_60477076.GPJ 16/12/15



KEY

- ▭ Site boundary
- ▭ Lincon development site
- ● AECOM (2015) borehole
- ⊕ AECOM (2015) monitoring well
- ✛ Water Research Laboratory (2007) monitoring well
- ✕ ENSR (2008) borehole
- ⊕ ENSR (2008) monitoring well
- ● HLA (2002) borehole
- — Groundwater contour (m)



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SHEET 1 of 1
COORDINATE SYSTEM GDA 1994 MGA Zone 56
TITLE

FIGURE D5 - Groundwater contours

PROJECT
GREEN SQUARE TOWN CENTRE
CLIENT
CITY OF SYDNEY
DRAWN SC
DATE 12/01/2016
CHECK
DATE
MAP # G005
REV 01
Project 60314745

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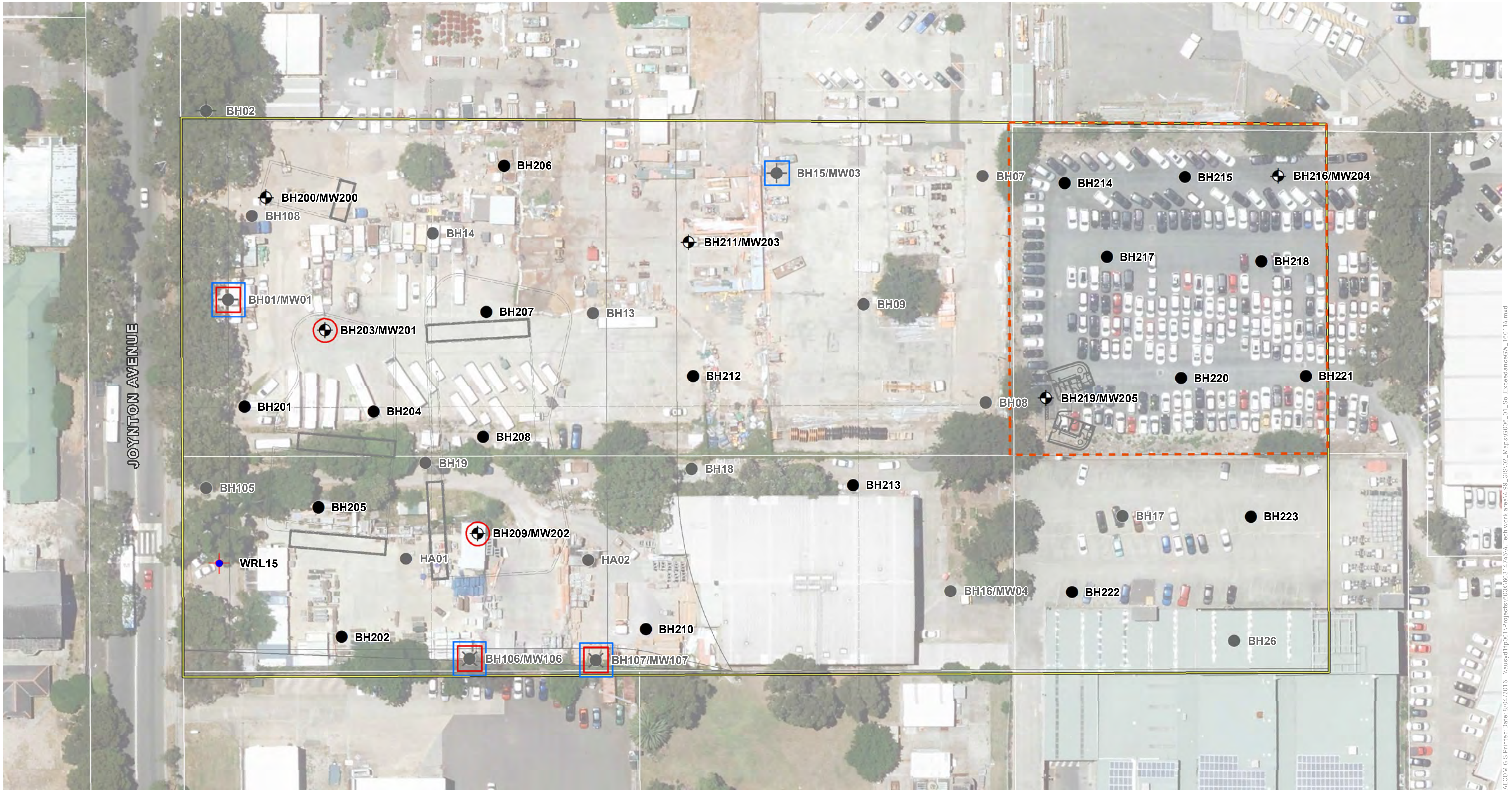

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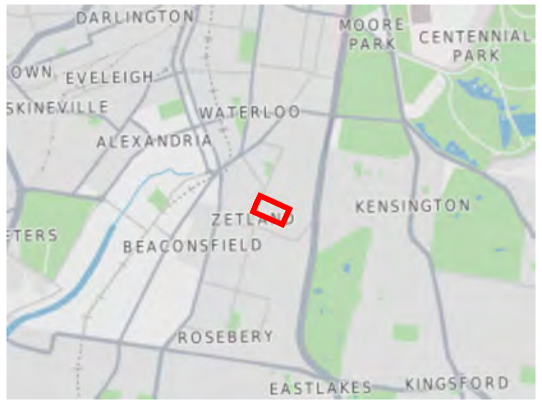
KEY

- ▭ Site boundary
- ⬚ Lincon development site
- ● AECOM (2015) borehole
- ⊕ AECOM (2015) monitoring well
- ✛ Water Research Laboratory (2007) monitoring well
- ✱ ENSR (2008) borehole
- ✛ ENSR (2008) monitoring well
- ● HLA (2002) borehole
- ⬭ PAHs (2015 results)
- 🟥 PAHs (2008 results)
- 🟦 Metals (2008 results)

0 10 20 m



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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

TITLE
FIGURE D6 - Groundwater exceedences of ecological criteria

PROJECT
GREEN SQUARE TOWN CENTRE

CLIENT
CITY OF SYDNEY

DRAWN	DATE	MAP #	REV	Project
SC	14/01/2016			
CHECK	DATE	G006	01	60314745

Appendix D2 – Tables

Table D1
Soil Analytical Results
Metals and PAHs

					Location	BH200	BH200	BH200	BH201	BH201	BH202	BH202	BH203	BH203	BH204	BH205
					Sample Date	0.1-0.2	0.5-0.6	1-1.1	0.12-0.22	1-1.1	0.5-0.6	1.5-1.6	1-1.1	2-2.1	0.5-0.6	0.5-0.6
					Field Sample ID	BH200_0.1-0.2	QC207	BH200_1.0-1.1	BH201_0.12-0.22	BH201_1.0-1.1	BH202_0.5-0.6	BH202_1.5-1.6	BH203_1.0-1.1	BH203_2.0-2.1	BH204_0.5-0.6	BH205_0.5-0.6
					Sample Date	24/11/2015	24/11/2015	24/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	24/11/2015	24/11/2015	23/11/2015	23/11/2015
					SampleCode	ES1537688018	138129-2	ES1537688019	ES1537688003	ES1537688004	ES1537688010	ES1537688011	ES1537688020	ES1537688021	ES1537688005	ES1537688001
Chemical Name		**Units**	**LOR**	**NEPM (2013) EIL and ESL - Open Space**	NEPM (2013) HIL C Recreational	NEPM (2013) HIL D Commercial										
Metals																
	Arsenic	mg/kg	4	**100**	300	3000	<5	11	20	6	16	<5	<5	9	<5	<5	<5
	Cadmium	mg/kg	0.4		90	900	<1	0.6	3	<1	1	<1	<1	<1	<1	<1	<1
	Chromium (III+VI)	mg/kg	1				9	13	134	14	17	<2	2	16	5	4	<2
	Copper	mg/kg	1	**60**	17000	240000	37	**110**	**1290**	**112**	**206**	<5	<5	**73**	<5	**164**	<5
	Lead	mg/kg	1	**1100**	600	1500	38	310	**1430**	757	**4150**	13	<5	745	151	490	26
	Mercury	mg/kg	0.1		80	730	<0.1	0.7	0.5	0.4	0.6	<0.1	<0.1	0.7	1.3	0.2	<0.1
	Nickel	mg/kg	1	**30**	1200	6000	10	29	30	7	**31**	<2	<2	17	2	6	<2
	Zinc	mg/kg	1	**70**	30000	400000	52	**270**	**3240**	**375**	**757**	14	<5	**450**	60	**201**	38
PAH/Phenols																
	Acenaphthene	mg/kg	0.1				<0.5	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.8	<0.5	<0.5
	Acenaphthylene	mg/kg	0.1				<0.5	1.2	3.2	0.7	1.2	<0.5	<0.5	0.5	2.6	1.5	<0.5
	Anthracene	mg/kg	0.1				0.6	1.6	5.9	0.9	2	<0.5	<0.5	1	15.3	1.9	<0.5
	Benz(a)anthracene	mg/kg	0.1				1.6	8.3	22.1	3.7	8.3	<0.5	<0.5	2.8	27.4	10	<0.5
	Benzo(a) pyrene	mg/kg	0.05	**0.7**			**1.8**	**14**	**28.2**	**4.4**	**9.5**	<0.5	<0.5	**2.9**	**24.2**	**15**	<0.5
	Benzo(b)&(k)fluoranthene	mg/kg					-	20	-	-	-	-	-	-	-	-	-
	Benzo[b+j]fluoranthene	mg/kg	0.5				2.1	-	31.6	4.9	10.5	<0.5	<0.5	3.2	28.2	17	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.1				1.4	8.4	21.1	3	6.4	<0.5	<0.5	2	14.4	12.9	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5				0.9	-	11.4	1.8	4.1	<0.5	<0.5	1.4	9.9	6.1	<0.5
	Chrysene	mg/kg	0.1				1.5	10	22.4	3.7	8.4	<0.5	<0.5	2.6	27.2	10.4	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	1.5	4.8	0.6	1.4	<0.5	<0.5	<0.5	3.5	2.5	<0.5
	Fluoranthene	mg/kg	0.1				3.5	11	35.9	6.4	13.8	<0.5	<0.5	5.3	51.3	14.6	<0.5
	Fluorene	mg/kg	0.1				<0.5	0.3	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	7.1	<0.5	<0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				1	8.7	16.2	2.3	4.9	<0.5	<0.5	1.5	11.4	9.2	<0.5
	Naphthalene	mg/kg	0.1	**170**			<0.5	<1 - 0.6	<1 - 0.7	<0.5	<1 - 0.5	<0.5	<0.5	<0.5	0.9 - 1	<0.5	<0.5
	Phenanthrene	mg/kg	0.1				1.6	4.5	15.9	2.3	6.4	<0.5	<0.5	2.8	50.4	4.6	<0.5
	Pyrene	mg/kg	0.1				3.5	13	39.4	7.1	15	<0.5	<0.5	5.7	55.5	17.1	<0.5
	PAHs (Sum of total)	mg/kg	0.5		300	4000	19.5	100	260	41.8	92.4	<0.5	<0.5	31.7	335	123	<0.5
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		3	40	2.9	19	41.6	6.3	13.8	<0.5	<0.5	4.3	35.8	22	<0.5

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HIL - Health investigation level
EIL - Ecological investigation level
ESL - Ecological screening level
RPD - relative percent differnce
Orange - high RPD
Material requires management (proposed for swimming pool excavation or is present below the depth of groundwater)

Table D1
Soil Analytical Results
Metals and PAHs

					Location	BH205	BH206	BH206	BH207	BH207	BH208	BH208	BH209	BH209	BH210
					Sample Date	1.5-1.6	0-0.1	1-1.1	0.13-0.23	1-1.1	0.5-0.6	2-2.1	0.5-0.6	1.5-1.6	0.5-0.6
					Field Sample ID	BH205_1.5-1.6	BH206_0.0-0.1	BH206_1.0-1.1	BH207_0.13-0.23	BH207_1.0-1.1	BH208_0.5-0.6	BH208_2.0-2.1	BH209_0.5-0.6	BH209_1.5-1.6	BH210_0.5-0.6
					Sample Date	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	25/11/2015	25/11/2015	23/11/2015
					SampleCode	ES1537688002	ES1537688016	ES1537688017	ES1537688014	ES1537688015	ES1537688006	ES1537688007	ES1537688024	ES1537688025	ES1537688012
Chemical Name	**Units**	**LOR**	**NEPM (2013) EIL and ESL - Open Space**	NEPM (2013) HIL C Recreational	NEPM (2013) HIL D Commercial										
Metals															
Arsenic	mg/kg	4	**100**	300	3000	<5	<5	<5	<5	6	6	12	<5	<5	<5
Cadmium	mg/kg	0.4		90	900	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1				9	8	10	6	10	11	7	<2	<2	<2
Copper	mg/kg	1	**60**	17000	240000	**76**	45	36	24	**119**	**545**	17	<5	<5	<5
Lead	mg/kg	1	**1100**	600	1500	212	184	221	106	440	678	72	<5	10	10
Mercury	mg/kg	0.1		80	730	0.1	0.3	0.3	0.1	0.9	0.5	0.5	<0.1	<0.1	<0.1
Nickel	mg/kg	1	**30**	1200	6000	4	4	4	2	10	10	6	<2	<2	<2
Zinc	mg/kg	1	**70**	30000	400000	**153**	**260**	**231**	**99**	**378**	**458**	**80**	<5	22	30
PAH/Phenols															
Acenaphthene	mg/kg	0.1				0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				9.2	0.5	<0.5	<0.5	3.2	2.3	<0.8	<0.5	1.5	<0.5
Anthracene	mg/kg	0.1				17.4	0.7	<0.5	<0.5	4.9	3.9	1.2	<0.5	3.1	<0.5
Benz(a)anthracene	mg/kg	0.1				27	4.7	<0.5	1	12.3	19.8	2.5	<0.5	14.4	0.7
Benzo(a) pyrene	mg/kg	0.05	**0.7**			**25.6**	**7**	<0.5	**1.3**	**13**	**24.2**	**2.4**	<0.5	**20.1**	0.7
Benzo(b)&(k)fluoranthene	mg/kg					-	-	-	-	-	-	-	-	-	-
Benzo[b+j]fluoranthene	mg/kg	0.5				30.4	7.3	<0.5	1.4	12.8	28.9	2.5	<0.5	23.7	0.7
Benzo(g,h,i)perylene	mg/kg	0.1				16.7	4.1	<0.5	0.9	7.6	17.9	1.4	<0.5	14.2	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				12.6	2.3	<0.5	0.5	4.3	9.2	0.9	<0.5	7.3	<0.5
Chrysene	mg/kg	0.1				22.5	4.8	<0.5	1	11.7	20.4	2.3	<0.5	13.5	0.6
Dibenz(a,h)anthracene	mg/kg	0.1				3.6	0.9	<0.5	<0.5	1.7	3.8	<0.8	<0.5	3.2	<0.5
Fluoranthene	mg/kg	0.1				68.7	5.1	<0.5	1.5	24	37.2	4.9	<0.5	22	1.9
Fluorene	mg/kg	0.1				6.8	<0.5	<0.5	<0.5	1.2	0.6	<0.8	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				13.6	3.3	<0.5	0.7	6	13.8	1.1	<0.5	11.8	<0.5
Naphthalene	mg/kg	0.1	**170**			<1 - 2.4	<0.5	<0.5	<0.5	<1 - 0.5	<0.5	<0.8	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1				66.5	1.3	<0.5	<0.5	15.1	13.3	3.2	<0.5	5.4	1.6
Pyrene	mg/kg	0.1				60.9	6.7	<0.5	1.7	25.8	38.7	5.2	<0.5	21.4	1.8
PAHs (Sum of total)	mg/kg	0.5		300	4000	385	48.7	<0.5	10	144	234	27.6	<0.5	162	8
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		3	40	38	9.7	<0.5	2.2	18.4	35.6	3.6	<0.5	29.3	1.4

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HIL - Health investigation level
EIL - Ecological investigation level
ESL - Ecological screening level
RPD - relative percent differnce
Orange - high RPD
Material requires management (proposed for swimming pool excavation or is present below the depth of groundwater)

Table D1
Soil Analytical Results
Metals and PAHs

					Location	BH210	BH211		RPD	BH211		RPD	BH212	BH212	BH213	BH214	BH214
					Sample Date	2-2.1	0.4-0.24			1-1.1			0.14-0.24	1-1.1	0.5-0.6	1-1.1	2-2.1
					Field Sample ID	BH210_2.0-2.1	BH211_0.4-0.24	QC208		BH211_1.0-1.1	QC209		BH212_0.14-0.24	BH212_1.0-1.1	BH213_0.5-0.6	BH214_1.0-1.1	BH214_2.0-2.1
					Sample Date	23/11/2015	24/11/2015	24/11/2015		24/11/2015	24/11/2015		23/11/2015	23/11/2015	26/11/2015	26/11/2015	26/11/2015
					SampleCode	ES1537688013	ES1537688022	ES1537688047		ES1537688023	138129-3		ES1537688008	ES1537688009	ES1537688042	ES1537688043	ES1537688044
Chemical Name	**Units**	**LOR**	**NEPM (2013) EIL and ESL - Open Space**	NEPM (2013) HIL C Recreational	NEPM (2013) HIL D Commercial												
Metals																	
Arsenic	mg/kg	4	**100**	300	3000	<5	<5	<5	nc	<5	5	nc	7	<5	<5	<5	11
Cadmium	mg/kg	0.4		90	900	<1	<1	<1	nc	<1	0.4	nc	<1	<1	<1	<1	4
Chromium (III+VI)	mg/kg	1				11	6	5	18	25	9	94	14	<2	<2	4	100
Copper	mg/kg	1	**60**	17000	240000	47	53	42	23	**118**	**110**	7	**264**	<5	<5	10	**701**
Lead	mg/kg	1	**1100**	600	1500	53	143	142	1	928	700	28	467	8	5	63	965
Mercury	mg/kg	0.1		80	730	0.1	0.4	0.4	0	0.2	0.2	0	0.5	<0.1	<0.1	<0.1	1.2
Nickel	mg/kg	1	**30**	1200	6000	4	4	4	0	5	6	18	10	<2	<2	2	**105**
Zinc	mg/kg	1	**70**	30000	400000	**92**	**108**	**95**	13	**186**	**170**	9	**593**	7	<5	53	**629**
PAH/Phenols																	
Acenaphthene	mg/kg	0.1				<0.5	<0.5	<0.5	nc	<0.5	0.1	nc	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				0.5	<0.5	<0.5	nc	1.3	0.6	74	1.6	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1				0.8	0.6	<0.5	nc	2.1	1.1	63	2	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1				2.6	2.2	2.7	20	7.7	8.1	5	8.6	<0.5	<0.5	0.6	2.6
Benzo(a) pyrene	mg/kg	0.05	**0.7**			**2.7**	**2.5**	**2.8**	11	**9**	**11**	20	**11.1**	<0.5	<0.5	**1.1**	**3.3**
Benzo(b)&(k)fluoranthene	mg/kg					-	-	-	nc	-	17	nc	-	-	-	-	-
Benzo[b+j]fluoranthene	mg/kg	0.5				3.3	3	3.3	10	10.6	-	nc	12.2	<0.5	<0.5	1.2	4
Benzo(g,h,i)perylene	mg/kg	0.1				1.7	1.6	1.8	12	5.3	6.1	14	8.3	<0.5	<0.5	0.8	2.8
Benzo(k)fluoranthene	mg/kg	0.5				1.3	1	1.2	18	3.5	-	nc	4.9	<0.5	<0.5	<0.5	1.6
Chrysene	mg/kg	0.1				2.6	2.1	2.5	17	7.2	9.5	28	8.4	<0.5	<0.5	0.6	2.5
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	nc	1.3	1.1	17	1.8	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1				5.2	3.8	4.6	19	13.2	11	18	13.5	<0.5	<0.5	0.9	3.9
Fluorene	mg/kg	0.1				<0.5	<0.5	<0.5	nc	0.8	0.3	91	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				1.4	1.3	1.4	7	4.5	6.8	41	6.4	<0.5	<0.5	0.6	2.1
Naphthalene	mg/kg	0.1	**170**			<0.5	<0.5	<0.5	nc	<0.5	<1 - 0.2	nc	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1				2.2	1.8	2.3	24	6.9	3.2	73	5	<0.5	<0.5	<0.5	1.6
Pyrene	mg/kg	0.1				5.2	3.9	4.9	23	13.4	12	11	14.6	<0.5	<0.5	1.1	4.2
PAHs (Sum of total)	mg/kg	0.5		300	4000	29.5	23.8	27.5	14	86.8	89	3	98.4	<0.5	<0.5	6.9	28.6
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		3	40	4.1	3.8	4.2	10	13	16	21	16.3	1.2	<0.5	1.9	4.9

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HIL - Health investigation level
EIL - Ecological investigation level
ESL - Ecological screening level
RPD - relative percent differnce
Orange - high RPD
Material requires management (proposed for swimming pool excavation or is present below the depth of groundwater)

Table D1
Soil Analytical Results
Metals and PAHs

					Location	BH215	BH215	BH216		RPD	BH216	BH217	BH217	BH218		RPD	BH218
					Sample Date	0.5-0.25	2-2.1	0.5-0.6			1.5-1.6	0.5-0.6	2.4-2.5	0.15-0.25			2-2.1
					Field Sample ID	BH215_0.5-0.25	BH215_2.0-2.1	BH216_0.5-0.6	QC216		BH216_1.5-1.6	BH217_0.5-0.6	BH217_2.4-2.5	BH218_0.15-0.25	QC221		BH218_2.0-2.1
					Sample Date	26/11/2015	26/11/2015	25/11/2015	25/11/2015		25/11/2015	26/11/2015	26/11/2015	26/11/2015	24/11/2015		26/11/2015
					SampleCode	ES1537688030	ES1537688031	ES1537688028	ES1537688049		ES1537688029	ES1537688036	ES1537688037	ES1537688045	138129-7		ES1537688046
Chemical Name	**Units**	**LOR**	**NEPM (2013) EIL and ESL - Open Space**	NEPM (2013) HIL C Recreational	NEPM (2013) HIL D Commercial												
Metals																	
Arsenic	mg/kg	4	**100**	300	3000	<5	<5	<5	<5	nc	11	<5	<5	<5	<4	nc	<5
Cadmium	mg/kg	0.4		90	900	<1	<1	<1	<1	nc	<1	<1	<1	<1	<0.4	nc	<1
Chromium (III+VI)	mg/kg	1				9	3	4	4	0	27	3	<2	7	8	13	3
Copper	mg/kg	1	**60**	17000	240000	5	18	44	35	23	**364**	9	<5	12	7	53	24
Lead	mg/kg	1	**1100**	600	1500	16	33	110	89	21	729	219	6	27	17	45	46
Mercury	mg/kg	0.1		80	730	<0.1	<0.1	0.2	0.2	0	1.2	0.1	<0.1	<0.1	<0.1	nc	<0.1
Nickel	mg/kg	1	**30**	1200	6000	5	2	4	4	0	21	2	<2	4	7	55	3
Zinc	mg/kg	1	**70**	30000	400000	33	57	**99**	**89**	11	**646**	35	49	44	29	41	**91**
PAH/Phenols																	
Acenaphthene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Acenaphthylene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	1.2	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	1.6	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Benz(a)anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	5.9	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Benzo(a) pyrene	mg/kg	0.05	**0.7**			<0.5	<0.5	<0.5	<0.5	nc	**7.5**	<0.5	<0.5	<0.5	0.1	nc	<0.5
Benzo(b)&(k)fluoranthene	mg/kg					-	-	-	-	nc	-	-	-	-	<0.2	nc	-
Benzo[b+j]fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	nc	8.5	<0.5	<0.5	<0.5	-	nc	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	5.5	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	nc	3.4	<0.5	<0.5	<0.5	-	nc	<0.5
Chrysene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	5.9	<0.5	<0.5	<0.5	0.1	nc	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	1.3	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Fluoranthene	mg/kg	0.1				<0.5	0.5	<0.5	<0.5	nc	9.5	<0.5	<0.5	<0.5	0.1	nc	<0.5
Fluorene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	4.3	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Naphthalene	mg/kg	0.1	**170**			<0.5	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Phenanthrene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	nc	4	<0.5	<0.5	<0.5	<0.1	nc	<0.5
Pyrene	mg/kg	0.1				<0.5	0.5	<0.5	0.5	nc	10.3	<0.5	<0.5	<0.5	0.1	nc	<0.5
PAHs (Sum of total)	mg/kg	0.5		300	4000	<0.5	1	<0.5	0.5	nc	68.9	<0.5	<0.5	<0.5	0.48	nc	<0.5
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		3	40	<0.5	1.2	<0.5	1.2	nc	11.1	<0.5	<0.5	<0.5	<0.5	nc	<0.5

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HIL - Health investigation level
EIL - Ecological investigation level
ESL - Ecological screening level
RPD - relative percent differnce
Orange - high RPD
Material requires management (proposed for swimming pool excavation or is present below the depth of groundwater)

Table D1
Soil Analytical Results
Metals and PAHs

					Location	BH219		RPD	BH219	BH220	BH220	BH221	BH221	BH222	BH222	BH223
					Sample Date	0-0.1			1.5-1.6	0.5-0.6	2-2.1	1-1.1	2.4-2.5	0.5-0.6	2-2.1	0.16-0.26
					Field Sample ID	BH219_0.0-0.1	QC214		BH219__1.5-1.6	BH220_0.5-0.6	BH220A_2.0-2.1	BH221_1.0-1.1	BH221_2.4-2.5	BH222_0.5-0.6	BH222_2.0-2.1	BH223_0.16-0.26
					Sample Date	25/11/2015	25/11/2015		25/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015
					SampleCode	ES1537688026	ES1537688048		ES1537688027	ES1537688034	ES1537688035	ES1537688040	ES1537688041	ES1537688038	ES1537688039	ES1537688032
Chemical Name	**Units**	**LOR**	**NEPM (2013) EIL and ESL - Open Space**	NEPM (2013) HIL C Recreational	NEPM (2013) HIL D Commercial											
Metals																
Arsenic	mg/kg	4	**100**	300	3000	<5	<5	nc	<5	<5	<5	<5	<5	<5	<5	<5
Cadmium	mg/kg	0.4		90	900	<1	<1	nc	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1				9	4	77	<2	3	<2	9	<2	16	<2	<2
Copper	mg/kg	1	**60**	17000	240000	9	26	97	13	18	15	25	22	**82**	<5	<5
Lead	mg/kg	1	**1100**	600	1500	19	46	83	32	32	27	58	27	115	<5	<5
Mercury	mg/kg	0.1		80	730	<0.1	<0.1	nc	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/kg	1	**30**	1200	6000	6	4	40	<2	3	<2	7	3	**59**	<2	<2
Zinc	mg/kg	1	**70**	30000	400000	36	**73**	68	**78**	46	21	**83**	69	**501**	<5	<5
PAH/Phenols																
Acenaphthene	mg/kg	0.1				<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1				<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1				<0.5	0.9	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	mg/kg	0.05	**0.7**			<0.5	**1.7**	nc	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	mg/kg					-	-	nc	-	-	-	-	-	-	-	-
Benzo[b+j]fluoranthene	mg/kg	0.5				<0.5	1.8	nc	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				<0.5	1.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	0.6	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.1				<0.5	0.9	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1				<0.5	1.5	nc	<0.5	<0.5	<0.5	0.7	<0.5	0.6	<0.5	<0.5
Fluorene	mg/kg	0.1				<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				<0.5	1.1	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.1	**170**			<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1				<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	mg/kg	0.1				<0.5	1.8	nc	<0.5	<0.5	<0.5	0.8	<0.5	0.6	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5		300	4000	<0.5	11.8	nc	<0.5	<0.5	<0.5	2.6	<0.5	1.2	<0.5	<0.5
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		3	40	<0.5	2.7	nc	<0.5	<0.5	<0.5	1.2	<0.5	1.2	<0.5	<0.5

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HIL - Health investigation level
EIL - Ecological investigation level
ESL - Ecological screening level
RPD - relative percent differnce
Orange - high RPD
Material requires management (proposed for swimming pool excavation or is present below the depth of groundwater)

Table D1
Soil Analytical Results
Metals and PAHs

					Location	BH223
					Sample Date	1-1.1
					Field Sample ID	BH223_1.0-1.1
					Sample Date	26/11/2015
					SampleCode	ES1537688033
Chemical Name	**Units**	**LOR**	**NEPM (2013) EIL and ESL - Open Space**	NEPM (2013) HIL C Recreational	NEPM (2013) HIL D Commercial	
Metals						
Arsenic	mg/kg	4	**100**	300	3000	11
Cadmium	mg/kg	0.4		90	900	<1
Chromium (III+VI)	mg/kg	1				40
Copper	mg/kg	1	**60**	17000	240000	**756**
Lead	mg/kg	1	**1100**	600	1500	166
Mercury	mg/kg	0.1		80	730	0.3
Nickel	mg/kg	1	**30**	1200	6000	**88**
Zinc	mg/kg	1	**70**	30000	400000	**194**
PAH/Phenols						
Acenaphthene	mg/kg	0.1				<0.5
Acenaphthylene	mg/kg	0.1				<0.5
Anthracene	mg/kg	0.1				0.6
Benz(a)anthracene	mg/kg	0.1				1.1
Benzo(a) pyrene	mg/kg	0.05	**0.7**			**1.2**
Benzo(b)&(k)fluoranthene	mg/kg					-
Benzo[b+j]fluoranthene	mg/kg	0.5				1.3
Benzo(g,h,i)perylene	mg/kg	0.1				0.8
Benzo(k)fluoranthene	mg/kg	0.5				0.5
Chrysene	mg/kg	0.1				1
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5
Fluoranthene	mg/kg	0.1				2.5
Fluorene	mg/kg	0.1				<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				0.6
Naphthalene	mg/kg	0.1	**170**			<0.5
Phenanthrene	mg/kg	0.1				2.2
Pyrene	mg/kg	0.1				2.4
PAHs (Sum of total)	mg/kg	0.5		300	4000	14.2
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		3	40	2.1

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HIL - Health investigation level
EIL - Ecological investigation level
ESL - Ecological screening level
RPD - relative percent differnce
Orange - high RPD
Material requires management (proposed for swimming pool excavation or is present below the depth of groundwater)

									Location	BH200		RPD	BH200	BH201	BH201	BH202	BH202	BH203
									Sample Depth	0.1-0.2			1-1.1	0.12-0.22	1-1.1	0.5-0.6	1.5-1.6	1-1.1
									Field Sample ID	H200_0.1-0.	QC207		BH200_1.0-1.1	BH201_0.12-0.22	BH201_1.0-1.1	BH202_0.5-0.6	BH202_1.5-1.6	BH203_1.0-1.1
									Sample Date	24/11/2015	24/11/2015		24/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	24/11/2015
									Sample Code	S153768801	138129-2		ES1537688019	ES1537688003	ES1537688004	ES1537688010	ES1537688011	ES1537688020
			NEPM (2013)				**CRC CARE (2011)**											
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**									
BTEXN																		
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	<0.2	<0.2	nc	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	<0.5	<1	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.5								<0.5	<2	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.5								<0.5	<1	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	<0.5	<3	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total BTEX	mg/kg	0.2								<0.2	-	nc	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	<0.5	<1 - 0.6	nc	<1 - 0.7	<0.5	<1 - 0.5	<0.5	<0.5	<0.5
Total Recoverable Hydrocarbons (TRH)																		
C6 - C9	mg/kg	10		700						<10	<25	nc	<10	<10	<10	<10	<10	<10
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				<10	<25	nc	<10	<10	<10	<10	<10	<10
C10 - C14	mg/kg	50		1000						<50	<50	nc	<50	<50	<50	<50	<50	<50
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				<50	<50	nc	<50	<50	<50	<50	<50	<50
C16-C34	mg/kg	100	**300**	2500				85000		300	**750**	nc	**1370**	220	**420**	<100	<100	**440**
C34-C40	mg/kg	100	**2800**	10000			7400	120000		240	250	nc	540	<100	150	<100	<100	160

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

Data Entry:
Data Review:

Table D2
Soil Analytical Results
TRH and BTEXN

									Location	BH203	BH204	BH205	BH205	BH206	BH206	BH207	BH207
									Sample Depth	2-2.1	0.5-0.6	0.5-0.6	1.5-1.6	0-0.1	1-1.1	0.13-0.23	1-1.1
									Field Sample ID	BH203_2.0-2.1	BH204_0.5-0.6	BH205_0.5-0.6	BH205_1.5-1.6	BH206_0.0-0.1	BH206_1.0-1.1	BH207_0.13-0.23	BH207_1.0-1.1
									Sample Date	24/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015
									Sample Code	ES1537688021	ES1537688005	ES1537688001	ES1537688002	ES1537688016	ES1537688017	ES1537688014	ES1537688015
			NEPM (2013)				**CRC CARE (2011)**										
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**								
BTEXN																	
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.5								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.5								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total BTEX	mg/kg	0.2								<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	0.9 - 1	<0.5	<0.5	<1 - 2.4	<0.5	<0.5	<0.5	<1 - 0.5
Total Recoverable Hydrocarbons (TRH)																	
C6 - C9	mg/kg	10		700						<10	<10	<10	<10	<10	<10	<10	<10
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				<10	<10	<10	<10	<10	<10	<10	<10
C10 - C14	mg/kg	50		1000						<50	<50	<50	<50	<50	<50	<50	<50
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				100	<50	<50	<50	<50	<50	<50	<50
C16-C34	mg/kg	100	**300**	2500				85000		**2200**	**700**	<100	**1010**	**290**	<100	180	**580**
C34-C40	mg/kg	100	**2800**	10000			7400	120000		520	270	<100	230	<100	<100	<100	160

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

Table D2
Soil Analytical Results
TRH and BTEXN

									Location	BH208	BH208	BH209	BH209	BH210	BH210	BH211		RPD
									Sample Depth	0.5-0.6	2-2.1	0.5-0.6	1.5-1.6	0.5-0.6	2-2.1	0.4-0.24		
									Field Sample ID	BH208_0.5-0.6	BH208_2.0-2.1	BH209_0.5-0.6	BH209_1.5-1.6	BH210_0.5-0.6	BH210_2.0-2.1	H211_0.4-0.2	QC208	
									Sample Date	23/11/2015	23/11/2015	25/11/2015	25/11/2015	23/11/2015	23/11/2015	24/11/2015	24/11/2015	
									Sample Code	ES1537688006	ES1537688007	ES1537688024	ES1537688025	ES1537688012	ES1537688013	ES1537688022	ES1537688047	
			NEPM (2013)				**CRC CARE (2011)**											
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**									
BTEXN																		
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	nc
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nc
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nc
Xylene (m & p)	mg/kg	0.5								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nc
Xylene (o)	mg/kg	0.5								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nc
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nc
Total BTEX	mg/kg	0.2								<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	nc
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nc
Total Recoverable Hydrocarbons (TRH)																		
C6 - C9	mg/kg	10		700						<10	<10	<10	<10	<10	<10	31	<10	nc
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				<10	<10	<10	<10	<10	<10	32	<10	nc
C10 - C14	mg/kg	50		1000						<50	<50	<50	<50	<50	<50	<50	<50	nc
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				<50	<50	<50	<50	<50	<50	<50	<50	nc
C16-C34	mg/kg	100	**300**	2500				85000		**1080**	**390**	<100	**740**	<100	230	160	200	22
C34-C40	mg/kg	100	**2800**	10000			7400	120000		410	200	<100	360	<100	<100	<100	<100	nc

Notes:
< - result less than laboratory limit of reporting (LOR)
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HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

									Location	BH211		RPD	BH212	BH212	BH213	BH214	BH214	BH215
									Sample Depth	1-1.1			0.14-0.24	1-1.1	0.5-0.6	1-1.1	2-2.1	0.5-0.25
									Field Sample ID	BH211_1.0-1.1	QC209		BH212_0.14-0.24	BH212_1.0-1.1	BH213_0.5-0.6	BH214_1.0-1.1	BH214_2.0-2.1	BH215_0.5-0.25
									Sample Date	24/11/2015	24/11/2015		23/11/2015	23/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015
									Sample Code	ES1537688023	138129-3		ES1537688008	ES1537688009	ES1537688042	ES1537688043	ES1537688044	ES1537688030
			NEPM (2013)				**CRC CARE (2011)**											
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**									
BTEXN																		
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	<0.2	<0.2	nc	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	<0.5	<1	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.5								<0.5	<2	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.5								<0.5	<1	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	<0.5	<3	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total BTEX	mg/kg	0.2								<0.2	-	nc	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	<0.5	<1 - 0.2	nc	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Recoverable Hydrocarbons (TRH)																		
C6 - C9	mg/kg	10		700						<10	<25	nc	<10	<10	<10	<10	<10	<10
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				<10	<25	nc	<10	<10	<10	<10	<10	<10
C10 - C14	mg/kg	50		1000						<50	<50	nc	<50	<50	<50	<50	<50	<50
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				<50	<50	nc	<50	<50	<50	<50	<50	<50
C16-C34	mg/kg	100	**300**	2500				85000		530	**580**	9	**560**	<100	<100	110	**630**	<100
C34-C40	mg/kg	100	**2800**	10000			7400	120000		240	200	18	240	<100	<100	<100	200	<100

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

Table D2
Soil Analytical Results
TRH and BTEXN

									Location	BH215	BH216		RPD	BH216	BH217	BH217	BH218	
									Sample Depth	2-2.1	0.5-0.6			1.5-1.6	0.5-0.6	2.4-2.5	0.15-0.25	
									Field Sample ID	BH215_2.0-2.1	BH216_0.5-0.6	QC216		BH216_1.5-1.6	BH217_0.5-0.6	BH217_2.4-2.5	BH218_0.15-0.25	QC221
									Sample Date	26/11/2015	25/11/2015	25/11/2015		25/11/2015	26/11/2015	26/11/2015	26/11/2015	24/11/2015
									Sample Code	ES1537688031	ES1537688028	ES1537688049		ES1537688029	ES1537688036	ES1537688037	ES1537688045	138129-7
			NEPM (2013)				**CRC CARE (2011)**											
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**									
BTEXN																		
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	<0.2	<0.2	<0.2	nc	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<1
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.5								<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<2
Xylene (o)	mg/kg	0.5								<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<1
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<3
Total BTEX	mg/kg	0.2								<0.2	<0.2	<0.2	nc	<0.2	<0.2	<0.2	<0.2	-
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5	<0.1
Total Recoverable Hydrocarbons (TRH)																		
C6 - C9	mg/kg	10		700						<10	<10	<10	nc	<10	<10	<10	<10	<25
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				<10	<10	<10	nc	<10	<10	<10	<10	<25
C10 - C14	mg/kg	50		1000						<50	<50	<50	nc	<50	<50	<50	<50	<50
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				<50	<50	<50	nc	<50	<50	<50	<50	<50
C16-C34	mg/kg	100	**300**	2500				85000		130	<100	<100	nc	**530**	<100	<100	<100	<100
C34-C40	mg/kg	100	**2800**	10000			7400	120000		<100	<100	<100	nc	210	<100	<100	<100	<100

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

Table D2
Soil Analytical Results
TRH and BTEXN

Location										RPD	BH218	BH219		RPD	BH219	BH220	BH220	BH221
Sample Depth											2-2.1	0-0.1				0.5-0.6	2-2.1	1-1.1
Field Sample ID											BH218_2.0-2.1	BH219_0.0-0.1	QC214		BH219__1.5-1.6	BH220_0.5-0.6	BH220A_2.0-2.1	BH221_1.0-1.1
Sample Date											26/11/2015	25/11/2015	25/11/2015		25/11/2015	26/11/2015	26/11/2015	26/11/2015
Sample Code											ES1537688046	ES1537688026	ES1537688048		ES1537688027	ES1537688034	ES1537688035	ES1537688040
			NEPM (2013)				**CRC CARE (2011)**											
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**									
BTEXN																		
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	nc	<0.2	<0.2	<0.2	nc	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	nc	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	nc	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.5								nc	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.5								nc	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	nc	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5
Total BTEX	mg/kg	0.2								nc	<0.2	<0.2	<0.2	nc	<0.2	<0.2	<0.2	<0.2
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	nc	<0.5	<0.5	<0.5	nc	<0.5	<0.5	<0.5	<0.5
Total Recoverable Hydrocarbons (TRH)																		
C6 - C9	mg/kg	10		700						nc	<10	<10	<10	nc	<10	<10	<10	<10
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				nc	<10	<10	<10	nc	<10	<10	<10	<10
C10 - C14	mg/kg	50		1000						nc	<50	<50	<50	nc	<50	<50	<50	<50
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				nc	<50	<50	<50	nc	<50	<50	<50	<50
C16-C34	mg/kg	100	**300**	2500				85000		nc	110	<100	210	nc	<100	<100	<100	<100
C34-C40	mg/kg	100	**2800**	10000			7400	120000		nc	<100	<100	130	nc	<100	<100	<100	<100

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

Table D2
Soil Analytical Results
TRH and BTEXN

									Location	BH221	BH222	BH222	BH223	BH223	Trip Blank	Trip Blank
									Sample Depth	2.4-2.5	0.5-0.6	2-2.1	0.16-0.26	1-1.1		
									Field Sample ID	BH221_2.4-2.5	BH222_0.5-0.6	BH222_2.0-2.1	BH223_0.16-0.26	BH223_1.0-1.1	QC210	QC217
									Sample Date	26/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015	24/11/2015	24/11/2015
									Sample Code	ES1537688041	ES1537688038	ES1537688039	ES1537688032	ES1537688033		
			NEPM (2013)				**CRC CARE (2011)**									
Chemical Name	**Units**	**LOR**	**ESLs - Open Space**	ML	HSL C - Sand 0 to <1 m	NEPM 2013 HSL D - Sand 0 to <1 m	HSL C - Direct Contact	IMW - Direct Contact	**IMW - Sand 0-<2m**							
BTEXN																
Benzene	mg/kg	0.2	**75**		NL	3	120	1100	**77**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	**165**		NL	NL	5300	85000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	**135**		NL	NL	18000	280000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	0.5								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (o)	mg/kg	0.5								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	**180**		NL	230	15000	230000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total BTEX	mg/kg	0.2								<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Naphthalene*	mg/kg	0.1			NL	NL	1900	29000	**NL**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Recoverable Hydrocarbons (TRH)																
C6 - C9	mg/kg	10		700						<10	<10	<10	<10	<10	<10	<10
F1 minus BTEX (C6-C10	mg/kg	10	**180**		NL	260				<10	<10	<10	<10	<10	<10	<10
C10 - C14	mg/kg	50		1000						<50	<50	<50	<50	<50	-	-
F2-NAPHTHALENE	mg/kg	50	**120**		NL	NL				<50	<50	<50	<50	<50	-	-
C16-C34	mg/kg	100	**300**	2500				85000		<100	**370**	<100	120	140	-	-
C34-C40	mg/kg	100	**2800**	10000			7400	120000		<100	210	<100	<100	<100	-	-

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria
HSL - Health screening level
EIL - Ecological investigation level
ESL - Ecological screening level
IMW - Intrusive Maintennace Worker
ML - Management Limits
RPD - Relative Percent Diffence
*Naphthalene detections from volatile analysis (Purge), <LOR or lower concentration fromsemi-volaitle method (SIM)

Table D3
Asbestos Results

					Asbestos Detected	**Description**
Location	**Sample Depth**	**Field Sample ID**	**Sample Date**	**SampleCode**		
BH200	0.1-0.2	BH200_0.1-0.2	24/11/2015	ES1537688018	No	
BH200	1-1.1	BH200_1.0-1.1	24/11/2015	ES1537688019	No	
BH201	0.12-0.22	BH201_0.12-0.22	23/11/2015	ES1537688003	No	
BH201	1-1.1	BH201_1.0-1.1	23/11/2015	ES1537688004	No	
BH202	0.5-0.6	BH202_0.5-0.6	23/11/2015	ES1537688010	No	
BH202	1.5-1.6	BH202_1.5-1.6	23/11/2015	ES1537688011	No	
BH203	1-1.1	BH203_1.0-1.1	24/11/2015	ES1537688020	No	
BH204	**0.5-0.6**	**BH204_0.5-0.6**	**23/11/2015**	**ES1537688005**	**Yes**	**Mid brown sandy soil with one loose bundle of friable asbestos fibres approx 1 x 0.5 x 0.5 mm.**
BH205	0.5-0.6	BH205_0.5-0.6	23/11/2015	ES1537688001	No	
BH205	1.5-1.6	BH205_1.5-1.6	23/11/2015	ES1537688002	No	
BH206	0-0.1	BH206_0.0-0.1	23/11/2015	ES1537688016	No	
BH206	1-1.1	BH206_1.0-1.1	23/11/2015	ES1537688017	No	
BH207	0.13-0.23	BH207_0.13-0.23	23/11/2015	ES1537688014	No	
BH207	1-1.1	BH207_1.0-1.1	23/11/2015	ES1537688015	No	
BH208	0.5-0.6	BH208_0.5-0.6	23/11/2015	ES1537688006	No	
BH208	2-2.1	BH208_2.0-2.1	23/11/2015	ES1537688007	No	
BH209	0.5-0.6	BH209_0.5-0.6	25/11/2015	ES1537688024	No	
BH209	1.5-1.6	BH209_1.5-1.6	25/11/2015	ES1537688025	No	
BH210	0.5-0.6	BH210_0.5-0.6	23/11/2015	ES1537688012	No	
BH210	2-2.1	BH210_2.0-2.1	23/11/2015	ES1537688013	No	
BH211	0.4-0.24	BH211_0.4-0.24	24/11/2015	ES1537688022	No	
BH211	1-1.1	BH211_1.0-1.1	24/11/2015	ES1537688023	No	
BH212	0.14-0.24	BH212_0.14-0.24	23/11/2015	ES1537688008	No	
BH212	**1-1.1**	**BH212_1.0-1.1**	**23/11/2015**	**ES1537688009**	**Yes**	**Pale brown sandy soil with one fragment of friable asbestos fibre board approx 3 x 3 x 1 mm.**
BH213	0.5-0.6	BH213_0.5-0.6	26/11/2015	ES1537688042	No	
BH214	1-1.1	BH214_1.0-1.1	26/11/2015	ES1537688043	No	
BH214	**2-2.1**	**BH214_2.0-2.1**	**26/11/2015**	**ES1537688044**	**Yes**	**Mid brown sandy soil with one loose bundle of friable asbestos fibres approx 2 x 1 x 0.5 mm.**
BH215	0.5-0.25	BH215_0.5-0.25	26/11/2015	ES1537688030	No	
BH215	2-2.1	BH215_2.0-2.1	26/11/2015	ES1537688031	No	
BH216	0.5-0.6	BH216_0.5-0.6	25/11/2015	ES1537688028	No	
BH216	1.5-1.6	BH216_1.5-1.6	25/11/2015	ES1537688029	No	
BH217	0.5-0.6	BH217_0.5-0.6	26/11/2015	ES1537688036	No	
BH217	2.4-2.5	BH217_2.4-2.5	26/11/2015	ES1537688037	No	
BH218	0.15-0.25	BH218_0.15-0.25	26/11/2015	ES1537688045	No	
BH218	2-2.1	BH218_2.0-2.1	26/11/2015	ES1537688046	No	
BH219		BH219__1.5-1.6	25/11/2015	ES1537688027	No	
BH219	0-0.1	BH219_0.0-0.1	25/11/2015	ES1537688026	No	
BH220	0.5-0.6	BH220_0.5-0.6	26/11/2015	ES1537688034	No	
BH220	2-2.1	BH220A_2.0-2.1	26/11/2015	ES1537688035	No	
BH221	1-1.1	BH221_1.0-1.1	26/11/2015	ES1537688040	No	
BH221	2.4-2.5	BH221_2.4-2.5	26/11/2015	ES1537688041	No	
BH222	0.5-0.6	BH222_0.5-0.6	26/11/2015	ES1537688038	No	
BH222	2-2.1	BH222_2.0-2.1	26/11/2015	ES1537688039	No	
BH223	0.16-0.26	BH223_0.16-0.26	26/11/2015	ES1537688032	No	
BH223	1-1.1	BH223_1.0-1.1	26/11/2015	ES1537688033	No	

Table T4
SPOCAS Analytical Results

		Field ID	BH201_2.4-2.5	BH202_2.9-3.0	BH205_3.5-3.6	BH204_3.5-3.6	BH207_1.8-1.9	BH208_2.4-2.5
		Sample Code	CE118423.001	CE118423.002	CE118423.003	CE118423.004	CE118423.005	CE118423.006
		Sample Date	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015
		Matrix	Clayey SAND (SP-SC) Black	Organic CLAY (OH) Black	Organic CLAY (OH) Black,	Sandy CLAY (CLS) Black	SAND (SP) Grey/brown	Organic CLAY (OH) Black
Analyte Name	**Units**	ASSMAC (1998) >1000t	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
% Moisture	%w/w		18	23	44	68	20	64
pH KCl	pH Units		7.4	8.5	6.1	6.2	6.6	5.9
Titratable Actual Acidity	kg H2SO4/T		<0.25	<0.25	0.74	0.74	<0.25	0.98
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T		<5	<5	15	15	<5	20
Titratable Actual Acidity (TAA) S%w/w	%w/w S		<0.01	<0.01	0.02	0.02	<0.01	0.03
Sulphur (SKCl)	%w/w		0.011	0.027	0.009	0.019	<0.005	0.017
Calcium (CaKCl)	%w/w		0.18	0.30	0.29	0.31	0.068	0.40
Magnesium (MgKCl)	%w/w		0.024	0.012	0.055	0.14	0.006	0.026
Peroxide pH (pH Ox)	pH Units		6.0	5.6	4.7	3.5	6.2	4.1
TPA as kg H_2SO_4/tonne	kg H2SO4/T		<0.25	1.1	5.5	22	<0.25	27
TPA as moles H+/tonne	moles H+/T	18	<5	22	112	449	<5	551
TPA as S % W/W	%w/w S		<0.01	0.04	0.18	0.72	<0.01	0.88
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T		<5	22	97	434	<5	531
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T		<0.25	1.1	4.8	21	<0.25	26
Titratable Sulfidic Acidity as S % W/W	%w/w S		<0.01	0.04	0.16	0.70	<0.01	0.85
ANCE as % $CaCO_3$	% CaCO3		<0.01	0.14	<0.01	<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T		<5	28	<5	<5	<5	<5
ANCE as S % W/W	%w/w S		<0.01	0.04	<0.01	<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.03	0.028	0.32	0.17	0.56	<0.005	0.38
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T		18	200	106	348	<5	237
Sulphur (Sp)	%w/w		0.039	0.35	0.18	0.58	0.007	0.40
Calcium (Cap)	%w/w		0.23	0.53	0.31	0.47	0.075	0.46
Reacted Calcium (CaA)	%w/w		0.044	0.23	0.027	0.16	0.007	0.062
Reacted Calcium (CaA)	moles H+/T		22	120	14	79	<5	31
Magnesium (Mgp)	%w/w		0.019	0.032	0.066	0.16	0.006	0.028
Reacted Magnesium (MgA)	%w/w		<0.005	0.020	0.012	0.020	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T		<5	16	10	16	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
s-Net Acidity	%w/w S		<0.01	0.08	0.08	0.21	<0.01	0.16
a-Net Acidity	moles H+/T		6	48	50	130	<5	99
Verification s-Net Acidity	%w/w S		0.01	0.08	0.06	0.19	0.00	0.13
a-Net Acidity without ANCE	moles H+/T		18	200	120	360	<5	260
Liming Rate without ANCE	kg CaCO3/T		NA	15	9.1	27	<0.1	19
Liming Rate	kg CaCO3/T		NA	3.6	3.8	9.8	<0.1	7.4

				Location	BH200	BH200	BH200	BH201	BH201	BH202	BH202	BH203	BH203	BH203	BH204	BH205
				Sample Depth	0.1-0.2	0.1-0.2	1-1.1	0.12-0.22	1-1.1	0.5-0.6	1.5-1.6	1-1.1	2-2.1	2-2.1	0.5-0.6	0.5-0.6
				Field Sample ID	BH200_0.1-0.2	QC207	BH200_1.0-1.1	BH201_0.12-0.22	BH201_1.0-1.1	BH202_0.5-0.6	BH202_1.5-1.6	BH203_1.0-1.1	BH203_2.0-2.1	BH203_2.0-2.1	BH204_0.5-0.6	BH205_0.5-0.6
				Sample Date	24/11/2015	24/11/2015	24/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	24/11/2015	24/11/2015	24/11/2015	23/11/2015	23/11/2015
				SampleCode	ES1537688018	138129-2	ES1537688019	ES1537688003	ES1537688004	ES1537688010	ES1537688011	ES1537688020	ES1537688021	ES1538462005	ES1537688005	ES1537688001
Chemical Name	**Units**	**LOR**	**NSW EPA (2014) - without TCLP**													
Contaminant Threshold (CT)			CT1	CT2												
BTEX																
Benzene	mg/kg	0.2	10	**40**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	600	**2400**	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Toluene	mg/kg	0.5	288	**1152**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Xylene Total	mg/kg	0.5	1000	**4000**	<0.5	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Metals																
Arsenic	mg/kg	4	100	**400**	<5	11	20	6	16	<5	<5	9	<5	-	<5	<5
Cadmium	mg/kg	0.4	20	**80**	<1	0.6	3	<1	1	<1	<1	<1	<1	-	<1	<1
Chromium (III+VI)	mg/kg	1			9	13	134	14	17	<2	2	16	5	-	4	<2
Copper	mg/kg	1			37	110	1290	112	206	<5	<5	73	<5	-	164	<5
Lead	mg/kg	1	100	**400**	38	310	**1430**	**757**	**4150**	13	<5	**745**	151	-	**490**	26
Mercury	mg/kg	0.1	4	**16**	<0.1	0.7	0.5	0.4	0.6	<0.1	<0.1	0.7	1.3	-	0.2	<0.1
Nickel	mg/kg	1	40	**160**	10	29	30	7	31	<2	<2	17	2	-	6	<2
Benzo(a) pyrene	mg/kg	0.05	0.8	**3.2**	1.8	**14**	**28.2**	**4.4**	**9.5**	<0.5	<0.5	2.9	**24.2**	-	**15**	<0.5
C6 - C9	mg/kg	10	650	**2600**	<10	<25	<10	<10	<10	<10	<10	<10	<10	-	<10	<10
+C10 - C36 (Sum of total)	mg/kg	50	10000	**40000**	410	885	1570	270	470	<50	<50	540	2450	-	860	<50
PAHs (Sum of total)	mg/kg	0.5	200	**800**	19.5	100	260	41.8	92.4	<0.5	<0.5	31.7	335	-	123	<0.5
NSW EPA (2014) with TCLP **SCC - Specific Contaminant Concentration**			SCC1	**SCC2**												
Lead	mg/kg	1	1500	**6000**	38	310	1430	757	4150	13	<5	745	151	-	490	26
Benzo(a) pyrene	mg/kg	0.05	10	**23**	1.8	14	**28.2**	4.4	9.5	<0.5	<0.5	2.9	**24.2**	-	15	<0.5
Toxicity Leaching Chracteristic Procedure (TCLP)			TCLP1	**TCLP2**												
Lead	mg/L	0.1	5	**20**	-	-	1.1	-	0.3	-	-	-	0.4	-	-	-
Nickel	mg/L	0.1	2	**8**	-	-	<0.1	-	<0.1	-	-	-	<0.1	-	-	-
PAHs					-	-		-		-	-	-		-	-	-
Acenaphthene	µg/L	1			-	-	<1	-	<1	-	-	-	7	-	-	-
Acenaphthylene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Anthracene	µg/L	1			-	-	<1	-	<1	-	-	-	2.9	-	-	-
Benz(a)anthracene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Benzo(a) pyrene	µg/L	0.5	40	**160**	-	-	<0.5	-	<0.5	-	-	-	<0.5	-	-	-
Benzo(g,h,i)perylene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Benzo(k)fluoranthene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Chrysene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Dibenz(a,h)anthracene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Fluoranthene	µg/L	1			-	-	<1	-	<1	-	-	-	4.2	-	-	-
Fluorene	µg/L	1			-	-	<1	-	<1	-	-	-	4.9	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
Naphthalene	µg/L	1			-	-	<1	-	<1	-	-	-	<1	-	-	-
PAHs (Sum of total)	µg/L	0.5			-	-	1.7	-	<0.5	-	-	-	37.7	-	-	-
Phenanthrene	µg/L	1			-	-	1.7	-	<1	-	-	-	15.2	-	-	-
Pyrene	µg/L	1			-	-	<1	-	<1	-	-	-	3.5	-	-	-

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria

Data Entry:
Data Review:

				Location	BH205	BH206	BH206	BH207	BH207	BH208	BH208	BH209	BH209	BH210	BH210	BH211
				Sample Depth	1.5-1.6	0-0.1	1-1.1	0.13-0.23	1-1.1	0.5-0.6	2-2.1	0.5-0.6	1.5-1.6	0.5-0.6	2-2.1	0.4-0.24
				Field Sample ID	BH205_1.5-1.6	BH206_0.0-0.1	BH206_1.0-1.1	BH207_0.13-0.23	BH207_1.0-1.1	BH208_0.5-0.6	BH208_2.0-2.1	BH209_0.5-0.6	BH209_1.5-1.6	BH210_0.5-0.6	BH210_2.0-2.1	BH211_0.4-0.24
				Sample Date	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	23/11/2015	25/11/2015	25/11/2015	23/11/2015	23/11/2015	24/11/2015
				SampleCode	ES1537688002	ES1537688016	ES1537688017	ES1537688014	ES1537688015	ES1537688006	ES1537688007	ES1537688024	ES1537688025	ES1537688012	ES1537688013	ES1537688022
Chemical Name	**Units**	**LOR**	**NSW EPA (2014) - without TCLP**													
Contaminant Threshold (CT)			CT1	CT2												
BTEX																
Benzene	mg/kg	0.2	10	**40**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	600	**2400**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	288	**1152**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	1000	**4000**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Metals																
Arsenic	mg/kg	4	100	**400**	<5	<5	<5	<5	6	6	12	<5	<5	<5	<5	<5
Cadmium	mg/kg	0.4	20	**80**	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1			9	8	10	6	10	11	7	<2	<2	<2	11	6
Copper	mg/kg	1			76	45	36	24	119	545	17	<5	<5	<5	47	53
Lead	mg/kg	1	100	**400**	212	184	221	106	**440**	**678**	72	<5	10	10	53	143
Mercury	mg/kg	0.1	4	**16**	0.1	0.3	0.3	0.1	0.9	0.5	0.5	<0.1	<0.1	<0.1	0.1	0.4
Nickel	mg/kg	1	40	**160**	4	4	4	2	10	10	6	<2	<2	<2	4	4
Benzo(a) pyrene	mg/kg	0.05	0.8	**3.2**	**25.6**	**7**	<0.5	1.3	**13**	**24.2**	2.4	<0.5	**20.1**	0.7	2.7	2.5
C6 - C9	mg/kg	10	650	**2600**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	31
+C10 - C36 (Sum of total)	mg/kg	50	10000	**40000**	1110	340	<50	130	640	1240	510	<50	880	<50	260	<50
PAHs (Sum of total)	mg/kg	0.5	200	**800**	385	48.7	<0.5	10	144	234	27.6	<0.5	162	8	29.5	23.8
NSW EPA (2014) with TCLP **SCC - Specific Contaminant Concentration**			SCC1	**SCC2**												
Lead	mg/kg	1	1500	**6000**	212	184	221	106	440	678	72	<5	10	10	53	143
Benzo(a) pyrene	mg/kg	0.05	10	**23**	**25.6**	7	<0.5	1.3	13	**24.2**	2.4	<0.5	20.1	0.7	2.7	2.5
Toxicity Leaching Chracteristic Procedure (TCLP)			TCLP1	**TCLP2**												
Lead	mg/L	0.1	5	**20**	0.8	-	-	-	-	0.3	-	-	-	-	-	-
Nickel	mg/L	0.1	2	**8**	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-
PAHs						-	-	-	-		-	-	-	-	-	-
Acenaphthene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Acenaphthylene	µg/L	1			3.1	-	-	-	-	<1	-	-	-	-	-	-
Anthracene	µg/L	1			1.1	-	-	-	-	<1	-	-	-	-	-	-
Benz(a)anthracene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Benzo(a) pyrene	µg/L	0.5	40	**160**	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Chrysene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Fluoranthene	µg/L	1			1.2	-	-	-	-	<1	-	-	-	-	-	-
Fluorene	µg/L	1			2.3	-	-	-	-	<1	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
Naphthalene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-
PAHs (Sum of total)	µg/L	0.5			14	-	-	-	-	<0.5	-	-	-	-	-	-
Phenanthrene	µg/L	1			6.3	-	-	-	-	<1	-	-	-	-	-	-
Pyrene	µg/L	1			<1	-	-	-	-	<1	-	-	-	-	-	-

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria

				Location	BH211	BH211	BH211	BH212	BH212	BH213	BH214	BH214	BH215	BH215	BH216	BH216
				Sample Depth	0.4-0.24	1-1.1	1-1.1	0.14-0.24	1-1.1	0.5-0.6	1-1.1	2-2.1	0.5-0.25	2-2.1	0.5-0.6	0.5-0.6
				Field Sample ID	QC208	BH211_1.0-1.1	QC209	BH212_0.14-0.24	BH212_1.0-1.1	BH213_0.5-0.6	BH214_1.0-1.1	BH214_2.0-2.1	BH215_0.5-0.25	BH215_2.0-2.1	BH216_0.5-0.6	QC216
				Sample Date	24/11/2015	24/11/2015	24/11/2015	23/11/2015	23/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015	25/11/2015	25/11/2015
				SampleCode	ES1537688047	ES1537688023	138129-3	ES1537688008	ES1537688009	ES1537688042	ES1537688043	ES1537688044	ES1537688030	ES1537688031	ES1537688028	ES1537688049
Chemical Name	**Units**	**LOR**	**NSW EPA (2014) - without TCLP**													
Contaminant Threshold (CT)			CT1	CT2												
BTEX																
Benzene	mg/kg	0.2	10	**40**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	600	**2400**	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	288	**1152**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	1000	**4000**	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Metals																
Arsenic	mg/kg	4	100	**400**	<5	<5	5	7	<5	<5	<5	11	<5	<5	<5	<5
Cadmium	mg/kg	0.4	20	**80**	<1	<1	0.4	<1	<1	<1	<1	4	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1			5	25	9	14	<2	<2	4	100	9	3	4	4
Copper	mg/kg	1			42	118	110	264	<5	<5	10	701	5	18	44	35
Lead	mg/kg	1	100	**400**	142	**928**	**700**	**467**	8	5	63	**965**	16	33	110	89
Mercury	mg/kg	0.1	4	**16**	0.4	0.2	0.2	0.5	<0.1	<0.1	<0.1	1.2	<0.1	<0.1	0.2	0.2
Nickel	mg/kg	1	40	**160**	4	5	6	10	<2	<2	2	105	5	2	4	4
Benzo(a) pyrene	mg/kg	0.05	0.8	**3.2**	2.8	**9**	**11**	**11.1**	<0.5	<0.5	1.1	**3.3**	<0.5	<0.5	<0.5	<0.5
C6 - C9	mg/kg	10	650	**2600**	<10	<10	<25	<10	<10	<10	<10	<10	<10	<10	<10	<10
+C10 - C36 (Sum of total)	mg/kg	50	10000	**40000**	230	620	685	660	<50	<50	100	740	<50	100	<50	<50
PAHs (Sum of total)	mg/kg	0.5	200	**800**	27.5	86.8	89	98.4	<0.5	<0.5	6.9	28.6	<0.5	1	<0.5	0.5
NSW EPA (2014) with TCLP **SCC - Specific Contaminant Concentration**			SCC1	**SCC2**												
Lead	mg/kg	1	1500	**6000**	142	928	700	467	8	5	63	965	16	33	110	89
Benzo(a) pyrene	mg/kg	0.05	10	**23**	2.8	9	11	11.1	<0.5	<0.5	1.1	3.3	<0.5	<0.5	<0.5	<0.5
Toxicity Leaching Chracteristic Procedure (TCLP)			TCLP1	**TCLP2**												
Lead	mg/L	0.1	5	**20**	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.1	2	**8**	-	-	-	-	-	-	-	-	-	-	-	-
PAHs					-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Benz(a)anthracene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a) pyrene	µg/L	0.5	40	**160**	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
PAHs (Sum of total)	µg/L	0.5			-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria

Data Entry:
Data Review:

				Location	BH216	BH217	BH217	BH218	BH218	BH218	BH219	BH219	BH219	BH220	BH220	BH221
				Sample Depth	1.5-1.6	0.5-0.6	2.4-2.5	0.15-0.25	0.15-0.25	2-2.1	0-0.1	0-0.1		0.5-0.6	2-2.1	1-1.1
				Field Sample ID	BH216_1.5-1.6	BH217_0.5-0.6	BH217_2.4-2.5	BH218_0.15-0.25	QC221	BH218_2.0-2.1	BH219_0.0-0.1	QC214	BH219__1.5-1.6	BH220_0.5-0.6	BH220A_2.0-2.1	BH221_1.0-1.1
				Sample Date	25/11/2015	26/11/2015	26/11/2015	26/11/2015	24/11/2015	26/11/2015	25/11/2015	25/11/2015	25/11/2015	26/11/2015	26/11/2015	26/11/2015
				SampleCode	ES1537688029	ES1537688036	ES1537688037	ES1537688045	138129-7	ES1537688046	ES1537688026	ES1537688048	ES1537688027	ES1537688034	ES1537688035	ES1537688040
Chemical Name	**Units**	**LOR**	**NSW EPA (2014) - without TCLP**													
Contaminant Threshold (CT)			CT1	CT2												
BTEX																
Benzene	mg/kg	0.2	10	**40**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	600	**2400**	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	288	**1152**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	1000	**4000**	<0.5	<0.5	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Metals																
Arsenic	mg/kg	4	100	**400**	11	<5	<5	<5	<4	<5	<5	<5	<5	<5	<5	<5
Cadmium	mg/kg	0.4	20	**80**	<1	<1	<1	<1	<0.4	<1	<1	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1			27	3	<2	7	8	3	9	4	<2	3	<2	9
Copper	mg/kg	1			364	9	<5	12	7	24	9	26	13	18	15	25
Lead	mg/kg	1	100	**400**	**729**	219	6	27	17	46	19	46	32	32	27	58
Mercury	mg/kg	0.1	4	**16**	1.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	40	**160**	21	2	<2	4	7	3	6	4	<2	3	<2	7
Benzo(a) pyrene	mg/kg	0.05	0.8	**3.2**	**7.5**	<0.5	<0.5	<0.5	0.1	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	0.5
C6 - C9	mg/kg	10	650	**2600**	<10	<10	<10	<10	<25	<10	<10	<10	<10	<10	<10	<10
+C10 - C36 (Sum of total)	mg/kg	50	10000	**40000**	620	<50	<50	<50	<250	<50	<50	270	<50	<50	<50	<50
PAHs (Sum of total)	mg/kg	0.5	200	**800**	68.9	<0.5	<0.5	<0.5	0.48	<0.5	<0.5	11.8	<0.5	<0.5	<0.5	2.6
NSW EPA (2014) with TCLP **SCC - Specific Contaminant Concentration**			SCC1	**SCC2**												
Lead	mg/kg	1	1500	**6000**	729	219	6	27	17	46	19	46	32	32	27	58
Benzo(a) pyrene	mg/kg	0.05	10	**23**	7.5	<0.5	<0.5	<0.5	0.1	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	0.5
Toxicity Leaching Chracteristic Procedure (TCLP)			TCLP1	**TCLP2**												
Lead	mg/L	0.1	5	**20**	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.1	2	**8**	-	-	-	-	-	-	-	-	-	-	-	-
PAHs					-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Benz(a)anthracene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a) pyrene	µg/L	0.5	40	**160**	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
PAHs (Sum of total)	µg/L	0.5			-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	1			-	-	-	-	-	-	-	-	-	-	-	-

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria

Table D5
Waste Classification

				Location	BH221	BH222	BH222	BH223	BH223
				Sample Depth	2.4-2.5	0.5-0.6	2-2.1	0.16-0.26	1-1.1
				Field Sample ID	BH221_2.4-2.5	BH222_0.5-0.6	BH222_2.0-2.1	BH223_0.16-0.26	BH223_1.0-1.1
				Sample Date	26/11/2015	26/11/2015	26/11/2015	26/11/2015	26/11/2015
				SampleCode	ES1537688041	ES1537688038	ES1537688039	ES1537688032	ES1537688033
Chemical Name	**Units**	**LOR**	**NSW EPA (2014) - without TCLP**						
Contaminant Threshold (CT)			CT1	CT2					
BTEX									
Benzene	mg/kg	0.2	10	**40**	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	0.5	600	**2400**	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	mg/kg	0.5	288	**1152**	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene Total	mg/kg	0.5	1000	**4000**	<0.5	<0.5	<0.5	<0.5	<0.5
Metals									
Arsenic	mg/kg	4	100	**400**	<5	<5	<5	<5	11
Cadmium	mg/kg	0.4	20	**80**	<1	<1	<1	<1	<1
Chromium (III+VI)	mg/kg	1			<2	16	<2	<2	40
Copper	mg/kg	1			22	82	<5	<5	756
Lead	mg/kg	1	100	**400**	27	115	<5	<5	166
Mercury	mg/kg	0.1	4	**16**	<0.1	0.1	<0.1	0.1	0.3
Nickel	mg/kg	1	40	**160**	3	59	<2	<2	88
Benzo(a) pyrene	mg/kg	0.05	0.8	**3.2**	<0.5	<0.5	<0.5	<0.5	1.2
C6 - C9	mg/kg	10	650	**2600**	<10	<10	<10	<10	<10
+C10 - C36 (Sum of total)	mg/kg	50	10000	**40000**	<50	450	<50	<50	<50
PAHs (Sum of total)	mg/kg	0.5	200	**800**	<0.5	1.2	<0.5	<0.5	14.2
NSW EPA (2014) with TCLP **SCC - Specific Contaminant Concentration**			SCC1	**SCC2**					
Lead	mg/kg	1	1500	**6000**	27	115	<5	<5	166
Benzo(a) pyrene	mg/kg	0.05	10	**23**	<0.5	<0.5	<0.5	<0.5	1.2
Toxicity Leaching Chracteristic Procedure (TCLP)			TCLP1	**TCLP2**					
Lead	mg/L	0.1	5	**20**	-	-	-	-	-
Nickel	mg/L	0.1	2	**8**	-	-	-	-	-
PAHs					-	-	-	-	-
Acenaphthene	µg/L	1			-	-	-	-	-
Acenaphthylene	µg/L	1			-	-	-	-	-
Anthracene	µg/L	1			-	-	-	-	-
Benz(a)anthracene	µg/L	1			-	-	-	-	-
Benzo(a) pyrene	µg/L	0.5	40	**160**	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1			-	-	-	-	-
Benzo(k)fluoranthene	µg/L	1			-	-	-	-	-
Chrysene	µg/L	1			-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	1			-	-	-	-	-
Fluoranthene	µg/L	1			-	-	-	-	-
Fluorene	µg/L	1			-	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1			-	-	-	-	-
Naphthalene	µg/L	1			-	-	-	-	-
PAHs (Sum of total)	µg/L	0.5			-	-	-	-	-
Phenanthrene	µg/L	1			-	-	-	-	-
Pyrene	µg/L	1			-	-	-	-	-

Notes:
< - result less than laboratory limit of reporting (LOR)
Shading or bold - result greater than criteria

Data Entry:
Data Review:

Tabke T6
Groundwater Gauging

Location	Date	Easting	Northing	Total Depth of Well (m BTOC)	Flush / Stick-up	Screened interval (m BTOC)	TOC (m AHD)	Depth to Groundwater (m BTOC)	Groundwater Elevation (m AHD)	Purge	Volume Purged (L)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µs/cm)	pH	Redox* (mV)	Temp. (^{0}C)
MW200	30/11/2015	334269.40	6246548.49	3.864	flush	1.5 to 4.5	18.28	3.541	14.739	PRE	0.5	0.09	1415	6.50	169.1	23.6
										POST	-	-	-	-	-	-
MW201	30/11/2015	334269.37	6246517.50	5.423	flush	2.0 to 6.0	18.51	3.663	14.847	PRE	0.5	0.00	779	7.04	124.9	22.6
										POST	3.0	0.00	698	6.91	279.1	22.3
MW202	30/11/2015	334281.48	6246464.58	4.424	flush	2.0 to 5.5	18.81	4.180	14.630	PRE	0.5	0.47	1178	6.53	225.8	24.8
										POST	2.5	0.35	1213	6.52	240.5	23.7
MW203	30/11/2015	334347.90	6246503.07	5.151	flush	2 to 5.5	18.55	3.201	15.349	PRE	0.5	0.18	504	6.53	198.9	23.5
										POST	4.0	0.03	392	6.25	203.3	23.3
MW204	30/11/2015	334404.07	6246441.64	5.968	flush	1.5 to 4.5	20.18	dry	< 14.212	PRE	-	-	-	-	-	-
										POST	-	-	-	-	-	-
MW205	30/11/2015	334468.67	6246464.79	5.461	flush	2.0 to 6.0	20.29	4.318	15.972	PRE	0.5	0.18	177	6.06	209.9	23.1
										POST	3.5	0.00	106	5.35	203.5	21.7
MW03	30/11/2015	334369.19	6246508.86	3.926	flush	1.0 to 4.0	18.557	dry	< 14.631	PRE	-	-	-	-	-	-
										POST	-	-	-	-	-	-

Notes :

Pre: Pre-purge water quality parameter readings
Post: Post-purge water quality parameter readings
- denotes no data available
m BTOC: metres Below Top of Casing
m AHD: metres Australian Height Datum
mg/L - milligrams per litre
mV -millivolts
uS/cm - micro-siemens/cm
*Redox correction factor of +205 mV applied to field Redox results

Table D7
Groundwater Analytical Results

							Field Sample ID	MW201	MW202	QC226	RPD	MW203	MW205	QC227	RPD	QC228	QC229
							Location	BH203	BH209			BH211	BH219			Rinsate	Trip
							Well	MW201	MW202			MW203	MW205				Blank
							Sample Date	30/11/2015	30/11/2015			30/11/2015	30/11/2015	30/11/2015		30/11/2015	30/11/2015
			ANZECC (2000) Marine Ecosystems 95% Trigger Values	ANZECC (2000) Marine Ecosystems Med-Low Reliability	**CRC CARE 2011 IMW - Sand - 2-<4m**	**NEPM 2013 HSL C - Sand 2 to <4m**	**NEPM 2013 HSL D - Sand 2 to <4m**										
Chemical Name	**Units**	**LOR**															
Metals																	
Arsenic (Filtered)	mg/L	0.001						0.004	0.008	0.008	0	<0.001	<0.001	<0.001	nc	<0.001	-
Cadmium (Filtered)	mg/L	0.0001	0.0055					<0.0001	<0.0001	<0.0001	nc	<0.0001	<0.0001	<0.0001	nc	<0.0001	-
Chromium (III+VI) (Filtered)	mg/L	0.001		0.0044				0.002	<0.001	<0.001	nc	<0.001	<0.001	<0.001	nc	0.002	-
Copper (Filtered)	mg/L	0.001	0.0013					<0.001	<0.001	<0.001	nc	<0.001	<0.001	<0.001	nc	<0.0001	-
Lead (Filtered)	mg/L	0.001	0.0044					0.008	<0.001	<0.001	nc	<0.001	<0.001	<0.001	nc	<0.001	-
Mercury (Filtered)	mg/L	0.0001	0.0004					<0.0001	<0.0001	<0.0001	nc	<0.0001	<0.0001	<0.0001	nc	<0.00005	-
Nickel (Filtered)	mg/L	0.001	0.07					<0.001	0.002	0.002	0	<0.001	<0.001	<0.001	nc	<0.001	-
Zinc (Filtered)	mg/L	0.005	0.015					0.008	0.009	0.009	0	0.01	0.009	0.009	0	<0.005	-
PAH																	
Acenaphthene	µg/L	1						1.2	<1	<1	nc	<1	<1	-	-	-	-
Acenaphthylene	µg/L	1						<1	<1	<1	nc	<1	<1	-	-	-	-
Anthracene	µg/L	1		0.01				1.2	1.4	1.6	13	<1	<1	-	-	-	-
Benz(a)anthracene	µg/L	1						2	1.9	2.3	19	<1	<1	-	-	-	-
Benzo(a) pyrene	µg/L	0.5		0.1				1.8	2.3	2.9	23	<0.5	<0.5	-	-	-	-
Benzo(b)&(k)fluoranthene	µg/L	2						-	-	-	nc	-	-	-	-	-	-
Benzo[b+j]fluoranthene	mg/L	0.001						0.0021	0.0027	0.0035	26	<0.001	<0.001	-	-	-	-
Benzo(g,h,i)perylene	µg/L	1						1.4	1.9	2.5	27	<1	<1	-	-	-	-
Benzo(k)fluoranthene	µg/L	1						1.2	1.3	1.5	14	<1	<1	-	-	-	-
Chrysene	µg/L	1						2.1	1.8	2.3	24	<1	<1	-	-	-	-
Dibenz(a,h)anthracene	µg/L	1						<1	<1	<1	nc	<1	<1	-	-	-	-
Fluoranthene	µg/L	1		1				4.7	4.6	5.3	14	<1	<1	-	-	-	-
Fluorene	µg/L	1						1.2	1.3	1.3	0	<1	<1	-	-	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1						1	1.5	1.9	24	<1	<1	-	-	-	-
Naphthalene	µg/L	1	70		NL	NL	**NL**	<1	<1 - 175*	<1 - 173*	nc	<1	<1	<1	nc	<5	<5
PAHs (Sum of total)	µg/L	0.5						29.6	27.9	34	20	<0.5	<0.5	-	-	-	-
Phenanthrene	µg/L	1		0.6				4.8	2.6	3.5	30	<1	<1	-	-	-	-
Pyrene	µg/L	1						4.9	4.6	5.4	16	<1	<1	-	-	-	-
BTEX																	
Benzene	µg/L	1	700		NL	NL	**5000**	<1	<1	<1	nc	<1	<1	<1	nc	<1	<1
Ethylbenzene	µg/L	1		5	NL	NL	**NL**	<2	<2	<2	nc	<2	<2	<2	nc	<2	<2
Toluene	µg/L	1		180	NL	NL	**NL**	<2	<2	<2	nc	<2	<2	<2	nc	<2	<2
Xylene (m & p)	µg/L	2						<2	<2	<2	nc	<2	<2	<2	nc	<2	<2
Xylene (o)	µg/L	1		350				<2	<2	<2	nc	<2	<2	<2	nc	<2	<2
Xylene Total	µg/L	2			NL	NL	**NL**	<2	<2	<2	nc	<2	<2	<2	nc	<2	<2
Total BTEX	mg/L	0.001						<0.001	<0.001	<0.001	nc	<0.001	<0.001	<0.001	nc	<0.001	<0.001
TRH																	
C6 - C9	µg/L	20						<20	<20	<20	nc	130	<20	<20	nc	<20	<20
F1 minus BTEX (C6-C10)	mg/L	0.02			NL	0	**6**	<0.02	<0.02	<0.02	nc	0.13	<0.02	<0.02	nc	<0.02	<0.02
C10-C16	mg/L	0.1						<0.1	0.15	0.14	7	<0.1	<0.1	<0.1	nc	<0.1	<0.1
F2-NAPHTHALENE	mg/L	0.1			NL	NL	**NL**	<0.1	<0.1	<0.1	nc	<0.1	<0.1	<0.1	nc	<0.1	<0.1
C16-C34	mg/L	0.1						0.92	1.36	1.52	11	<0.1	<0.1	<0.1	nc	<0.1	<0.1
C10 - C14	µg/L	50						70	160	120	29	<50	<50	<50	nc	<50	<50
C15 - C28	µg/L	100						760	860	900	5	<100	<100	<100	nc	<100	<100
C29-C36	µg/L	50						260	760	940	21	<50	<50	<50	nc	<50	<50
C34-C40	mg/L	0.1						0.11	0.27	0.3	11	<0.1	<0.1	<0.1	nc	<0.1	<0.1

Data Entry:
Data Review:

							Field Sample ID	MW201	MW202	QC226	RPD	MW203	MW205	QC227	RPD	QC228	QC229
							Location	BH203	BH209			BH211	BH219			Rinsate	Trip
							Well	MW201	MW202			MW203	MW205				Blank
							Sample Date	30/11/2015	30/11/2015			30/11/2015	30/11/2015	30/11/2015		30/11/2015	30/11/2015
Chemical Name	**Units**	**LOR**	ANZECC (2000) Marine Ecosystems 95% Trigger Values	ANZECC (2000) Marine Ecosystems Med-Low Reliability	**CRC CARE 2011 IMW - Sand - 2-<4m**	**NEPM 2013 HSL C - Sand 2 to <4m**	**NEPM 2013 HSL D - Sand 2 to <4m**										
Volatile Halogenated Compounds (VHCs)																	
1,1,1,2-tetrachloroethane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,1,1-trichloroethane	µg/L	5		270				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,1,2,2-tetrachloroethane	µg/L	5		400				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,1,2-trichloroethane	µg/L	5	18000					<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,1-dichloroethane	µg/L	5		250				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,1-dichloroethene	µg/L	5		700				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2,3-trichloropropane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2-dichloroethane	µg/L	5		1900				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Carbon tetrachloride	µg/L	1		240				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Chloroethane	µg/L	50						<50	<50	<50	nc	<50	<50	<50	nc	<50	-
Chloroform	µg/L	5		370				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Chloromethane	µg/L	50						<50	<50	<50	nc	<50	<50	<50	nc	<50	-
cis-1,2-dichloroethene	µg/L	5						<5	<5	<5	nc	**31**	<5	<5	nc	<5	-
cis-1,3-dichloropropene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Hexachlorobutadiene	µg/L	5		0.03				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Trichloroethene	µg/L	5		330				<5	<5	<5	nc	**97**	<5	<5	nc	<5	-
Tetrachloroethene	µg/L	5		70				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
trans-1,2-dichloroethene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
trans-1,3-dichloropropene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Vinyl chloride	µg/L	50		100				<50	<50	<50	nc	<50	<50	<50	nc	<50	-
1,2,3-trichlorobenzene	µg/L	5		3				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2,4-trichlorobenzene	µg/L	5	240					<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2-dichlorobenzene	µg/L	5		160				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,3-dichlorobenzene	µg/L	5		260				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,4-dichlorobenzene	µg/L	5		60				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Chlorobenzene	µg/L	5		55				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2-dibromoethane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Bromodichloromethane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Bromoform	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Bromomethane	µg/L	50						<50	<50	<50	nc	<50	<50	<50	nc	<50	-
Chlorodibromomethane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Dibromomethane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Dichlorodifluoromethane	µg/L	50						<50	<50	<50	nc	<50	<50	<50	nc	<50	-
Iodomethane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Trichlorofluoromethane	µg/L	50						<50	<50	<50	nc	<50	<50	<50	nc	<50	-
1,1-dichloropropene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2-dibromo-3-chloropropane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,2-dichloropropane	µg/L	5		900				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
1,3-dichloropropane	µg/L	5		1100				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
2,2-dichloropropane	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
2-chlorotoluene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
4-chlorotoluene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Bromobenzene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
cis-1,4-Dichloro-2-butene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-
Pentachloroethane	µg/L	5		80				<5	<5	<5	nc	<5	<5	<5	nc	<5	-
trans-1,4-Dichloro-2-butene	µg/L	5						<5	<5	<5	nc	<5	<5	<5	nc	<5	-

Notes:
< - result less than limit of reporting (LOR)
µg/L - micrograms per litre
mg/L - milligrams per litre
HSL - Health Screening Level
IMW Intrusive Maintenance Worker
RPD - Relative Percent Difference
*Naphthalene detections from volatile analysis (Purge), <LOR for semi-volaitle method (SIM)
NL - non limiting

Data Entry:
Data Review:

Appendix D3 – Borelogs

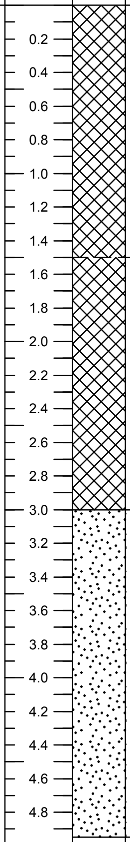
AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

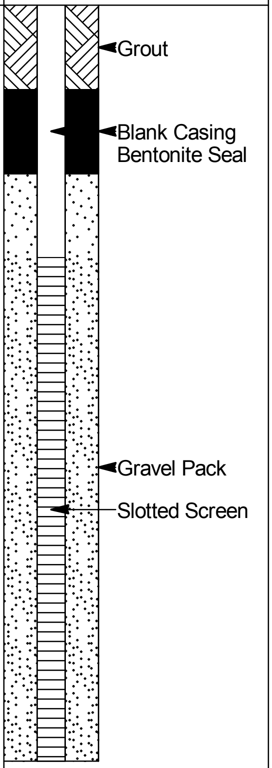
MONITORING WELL LOG BH200/MW200

PROJECT NUMBER 60477501
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Hollow Flight Auger Drilling
SAMPLING METHOD Grab
DATE 24 Nov 15
BLANK 50 mm uPVC
SCREEN Factory Slotted (2 mm) 50 mm uPVC
GRAVEL PACK 2 mm Graded Sand
SANITARY SEAL/BENTONITE 10 mm Bentonite

LOGGED BY J. Tomlinson
COMMENTS MW200 Installed

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
3.7			BH200_0.1-1.2				FILL	Sandy CLAY (FILL) Brown, dry, firm, low plasticity with fine grained sand and slag gravel inclusions. No observable contamination.		
4.1			BH200_0.5-0.6							
			BH200_0.0-1.5							
5.1			BH200_1.0-1.1					Switch to Hollow Flight Auger Drilling.		
	0 0 0						FILL	Becomes very loose, wet with scrap metal inclusions.	1.50	
2.4										
	1 0 0						SP	SAND (SP) Light Grey, wet, very loose, fine to medium grained. Mottled black staining, no odour.	3.00	
	3 5 5							Borehole terminated depth. MW200 installed to 4.5 m bgs. Total Depth: 4.95 m	4.95	





AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH201

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

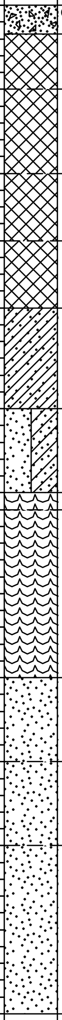
PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						⁘	CONCRETE	CONCRETE (120 mm).	0.12
9.3		✋	BH201_0.12-0.22	✳	0.2 0.4	▩	FILL	SAND (FILL) Brown, dry, loose, fine grained with sandstone and blue metal gravel inclusions. No observable contamination.	0.50
7.3		✋	BH201_0.5-0.6		0.6 0.8	▩	FILL	As above. Increase in silts, scrap metal inclusions.	1.00
3.1		■	BH201_1.0-1.1	✳	1.0 1.2 1.4	▩	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine grained with sandstone, blue metal and scrap metal inclusions.	1.50
2.3		■	BH201_1.6-1.7		1.6 1.8 2.0 2.2	⁘	SP	SAND (SP) Grey, dry, medium dense, medium grained. No observable contamination.	2.40
		■	BH201_2.4-2.5	✳	2.4 2.6	▨	SP-SC	Clayey SAND (SP-SC) Black, moist, medium dense, fine to medium grained with organic matter inclusions. No observable contamination.	2.70
9.3		■	BH201_2.7-2.8		2.8	⁘	SP	SAND (SP) Brown, slightly moist medium dense, medium grained. No observable contamination.	3.00
7.1 6.9		■ ■	BH201_3.5-3.6 BH201_4.5-4.6		3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2	⁘	SP	SAND (SP) Light Grey, slightly moist, medium dense, medium grained. No observable contamination.	5.30
6.2		■	BH201_5.3-5.4		5.4 5.6	⁘	SP	Becomes brown, moist, dense.	5.80
		■	BH201_5.8-5.9		5.8 6.0	▨	SP-SC	Clayey SAND (SP-SC) Black, moist, medium dense, fine to medium grained with organic matter inclusions. No observable contamination.	6.00
								Borehole terminated at target depth. Total Depth: 6.00 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH202

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS



PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					0.0	CONCRETE	CONCRETE (170 mm).	0.17
9.2		✋	BH202_0.17-0.27		0.17	FILL	Silty SAND (FILL) Brown/grey, dry, loose to medium dense, fine to medium grained with trace blue metal gravel inclusions. No observable contamination	0.50
5.5		✋	BH202_0.5-0.6	✳	0.5	FILL	As above.	1.00
5.8		■	BH202_1.0-1.1		1.0	FILL	As above, becomes orange.	1.40
9.8		■	BH202_1.5-1.6	✳	1.4	FILL	As above, becomes grey. Sandstone boulder (100mm) at 1.7 m bgs.	1.80
2.1		■	BH202_2.0-2.1		1.8	CLS	Sandy CLAY (CLS) Grey with orange mottling, slightly moist, firm, medium plasticity with medium grained sand. No observable contamination.	2.40
2.3		■	BH202_2.4-2.5		2.4	SP-SC	Clayey SAND (SP-SC) Black, moist, medium dense, fine to medium grained. Organic odour observed.	2.90
		■	BH202_2.9-3.0	✳	2.9	OH	Organic CLAY (OH) Black, moist, high plasticity, soft. Organic material inclusions with organic odour observed.	3.00
					3.0	OH	0% Recovery from Pushtube.	4.00
5.4		■	BH202_4.0-4.1		4.0	SP	SAND (SP) Grey, slightly moist, dense, medium grained. Mottled black staining.	4.50
					4.5	SP	As above, light grey.	5.00
		■	BH202_5.0-5.1		5.0	SP	As above.	6.00
					6.0		Borehole terminated at target depth. Total Depth: 6.00 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

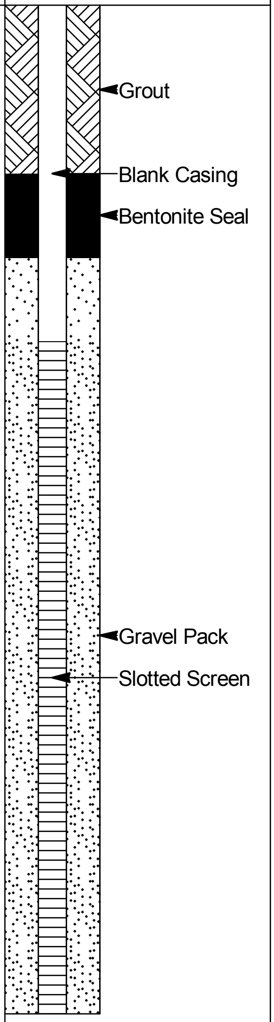
MONITORING WELL LOG BH203/MW201

PROJECT NUMBER 60477501
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Hollow Flight Auger Drilling
SAMPLING METHOD Grab
DATE 24 Nov 15
BLANK 50 mm uPVC
SCREEN Factory Slotted (2 mm) 50 mm uPVC
GRAVEL PACK 2 mm Graded Sand
SANITARY SEAL/BENTONITE 10 mm Bentonite

LOGGED BY J. Tomlinson
COMMENTS MW201 Installed

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (150 mm)	0.15
7 4.6 7.3					0.2 0.4 0.6 0.8 1.0 1.2 1.4		FILL	Clayey SAND (FILL) Black, moist, very lose, well graded, angular with sub angular, low spherity medium gravels and scrap metal, organics inclusions. Fill is Road base. No observable contamination. Switch to Hollow Flight Auger Drilling.	1.50
2.5	2 1 1				1.6 1.8 2.0 2.2 2.4 2.6 2.8		FILL	Sandy CLAY (FILL) Black, moist, very loose, low plasticity, fine to medium grain, with sub angular low spherity gravels and organics inclusion. No observable contamination.	3.00
	1 1 0 1 2 5				3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4		PT	PEAT (PT) Black moist, low plasticity, organic. No observable contamination.	4.50
	1 2 3				4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0 6.2 6.4		SP	SAND (SP) Orange/brown, moist, loose, fine to medium grained. No observable contamination.	6.45
								Borehole terminated at target depth. MW201 installed. Total Depth: 6.45 m	

WELL DIAGRAM



AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH204

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					0.0	░	CONCRETE	CONCRETE (100 mm).	0.10
3.8		✋	BH204_0.1-0.2		0.2	▩	FILL	Silty SAND (FILL) Dark brown, dry, loose, fine to medium grained with minor blue metal and sandstone gravels, rusted scrap metal and glass inclusions. No observable contamination.	0.50
11.6		✋	BH204_0.5-0.6	✳	0.6	▩	FILL	As above, becomes brown.	1.00
8.1		■	BH204_1.0-1.1		1.0	▩	FILL	As above.	1.50
2.6		■	BH204_1.5-1.6		1.6	▩	FILL	Clayey SAND (FILL) Dark brown with red mottling, slightly moist, medium dense, fine to medium grained, low plasticity, stiff clay with blue metal gravel and tile pieces inclusions. Minor black staining, no odour.	2.00
					2.0	▩	FILL	0% Recovery from Pushtube, tile in the end of the Pushtube.	3.00
4.3		■	BH204_3.0-3.1		3.0	▨	CLS	Sandy CLAY (CLS) Black, moist, firm, loose, fine grained sand. Organic material inclusions. Organic odour.	4.00
		■	BH204_3.5-3.6	✳	3.6	▨			
					4.0	░	SP	SAND (SP) Light grey/light yellow, slightly moist, medium dense, medium grained. No observable contamination.	6.00
7.2		■	BH204_5.0-5.1		5.0	░			
					6.0			Target depth reached, borehole terminated. Total Depth: 6.00 m	

BORELOGS_NOV2015_604775076.GPJ 10/12/15

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH205

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					0.0		CONCRETE	CONCRETE (250 mm).	0.25
12.8		✋	BH205_0.25-0.35		0.25		FILL	SAND (FILL) Brown, dry, loose, fine to medium grained. No observable contamination,	0.50
8		✋	BH205_0.5-0.6	✳	0.50		FILL	As above.	1.00
11.8		■	BH205_1.0-1.1		1.00		FILL	As above, becomes grey with Minor sandstone and slag ravels and ash inclusions.	1.30
9.1		■	BH205_1.3-1.4		1.30		FILL	As above, becomes orange, medium dense with increases in sandstone gravels. No observable contamination.	1.50
5.2		■	BH205_1.5-1.6	✳	1.50		FILL		1.70
					1.70		FILL	Gravelly SAND (FILL) Dark brown, slightly moist, medium dense, fine to medium grained with sandstone, blue meatal and slag gravels and ash inclusions. No observable contamination.	2.00
4.1		■	BH205_2.0-2.1		2.00		FILL	Clayey SAND (FILL) Grey, slightly moist, medium dense, fine to medium grained with sandstone, blue metal and slag gravels and ash inclusions. No Observable contamination. As above.	3.00
11.2		■	BH205_3.0-3.1		3.00		FILL	As above, becomes black, moist.	3.50
		■	BH205_3.5-3.6	✳	3.50		OH	Organic CLAY (OH) Black, moist, high plasticity, soft with an organic odour observed.	3.80
					3.80		SP-SM	Silty SAND (SP-SM) Brown/red, moist, medium dense, medium grained. No observable contamination.	4.00
8.1		■	BH205_4.2-4.3		4.00		SP	SAND (SP) Light grey/light yellow, slightly moist, medium dense, medium grained. No observable contamination.	6.00
6.2		■	BH205_5.0-5.1						
					6.0			Borehole terminated at target depth. Total Depth: 6.00 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH206

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (150 mm)	0.15
7.1		✋	BH206_0.15-0.25	✳	0.2 0.4		FILL	SAND (FILL) Bark brown, slightly moist, loose, medium grained. No observable contamination.	0.50
8.5		✋	BH206_0.5-0.6		0.6 0.8		FILL	Silty SAND (FILL) Black, slightly moist, loose, fine to medium grained. No observable contamination.	0.90
5.2		■	BH206_1.0-1.1	✳	1.0 1.2 1.4 1.6		SP	SAND (SP) Light yellow, slightly moist, loose medium grained. Black staining observed, no odour.	1.70
					1.8 2.0 2.2 2.4		SP	As above, becomes light grey/light yellow, fine to medium grained. No observable contamination.	2.50
		■	BH206_2.5-2.6		2.6		SP	As above, becomes dark brown, moist, medium dense. Black staining and organic odour noted.	2.80
4.2 5.6		■ ■	BH206_2.7-2.8 BH206_3.7-3.8		2.8 3.0 3.2 3.4 3.6 3.8		SP	As above, becomes light grey/light yellow, slightly moist, fine to medium grained. No observable contamination.	4.00
10.1		■	BH206_4.7-4.8		4.0 4.2 4.4 4.6 4.8		SP	As above. 50% recovery in Pushtube.	5.00
5.4		■	BH206_5.7-5.8		5.0 5.2 5.4 5.6 5.8		SP	As above.	6.00
					6.0			Target depth reached, borehole terminated. Total Depth: 6.00 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH207

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (130 mm).	0.13
78.5		✋	BH207_0.13-0.23	✳	0.2		FILL	Clay SAND (FILL) Brown, dry, lose, fine grained with sub angular slag gravels. Mottled black staining observed.	0.40
58.5		✋	BH207_0.5-0.6		0.4 0.6		FILL	As above, becomes orange/brown.	0.70
					0.8		FILL	SAND (FILL) Dark brown, dry, loose, fine to medium grained with slag gravels, scrap metals and ash inclusions. No observable contamination.	1.00
9.1		■	BH207_1.0-1.1	✳	1.0 1.2 1.4 1.6		FILL	As above.	1.70
		■	BH207_1.8-1.9	✳	1.8		SP	SAND (SP) Grey/brown, slightly moist, medium dense, medium grained. No observable contamination.	2.00
2.3		■	BH207_2.0-2.1		2.0 2.2 2.4		SP	As above, becomes brown.	2.50
		■	BH207_2.7-2.8		2.6 2.8		OH	Organic CLAY (OH) Black, moist, high plasticity, soft with organic material inclusions. Strong organic odour, no staining.	3.00
6.6		■	BH207_3.0-3.1		3.0		SP	SAND (SP) Dark brown, slightly moist medium dense, medium grained. No observable contamination.	3.20
12.6		■	BH207_4.0-4.1		3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0		SP	As above, becomes light grey/light yellow, fine to medium grained. No observable contamination.	6.00
								Borehole terminated at target depth. Total Depth: 6.00 m	

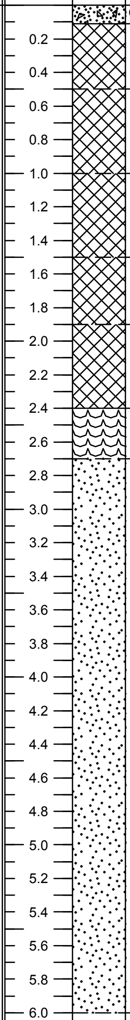
AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH208

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					CONCRETE	CONCRETE (110 mm).	0.11
4.9		✋	BH208_0.11-0.21		FILL	Silty SAND (FILL) Dark brown, slightly moist, loose, fine to medium grained with ironstone and sandstone gravels, coral, glass and rootlet inclusions. No observable contamination.	0.50
6.8		✋	BH208_0.5-0.6	✳	FILL	As above with slag gravels, ash and brick inclusions. Hand auger refusal, switch to Pushtube.	1.00
12.6		■	BH208_1.0-1.1		FILL	As above, becomes medium dense with animal bone inclusions.	1.50
					FILL	As above, becomes moist.	1.90
4.6		■	BH208_2.0-2.1	✳	FILL	Clayey SAND (FILL) Dark brown with red mottling, slightly moist, medium dense, fine to coarse grained. No observable contamination.	2.40
		■	BH208_2.4-2.5	✳	OH	Organic CLAY (OH) Black, moist, high plasticity, soft. Organic odour noted.	2.70
3.4		■	BH208_3.0-3.1		SP	SAND (SP) Light brown, slightly moist, medium dense, medium grained. No observable contamination.	6.00



Borehole terminated at target depth.
Total Depth: 6.00 m

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

MONITORING WELL LOG BH209/MW202

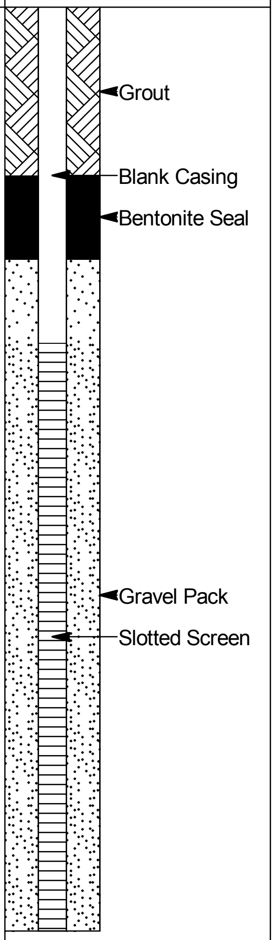
PROJECT NUMBER 60477501
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Hollow Flight Auger Drilling
SAMPLING METHOD Grab

DATE 25 Nov 15
BLANK 50 mm uPVC
SCREEN Factory Slotted (2 mm) 50 mm uPVC
GRAVEL PACK 2 mm Graded Sand
SANITARY SEAL/BENTONITE 10 mm Bentonite

LOGGED BY J. Tomlinson
COMMENTS MW202 Installed

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					0.2		CONCRETE	CONCRETE (200 mm).	0.20
2.3 3.1 3.9 3.1	1 2 1				0.4 – 3.0		FILL	SAND (FILL) Brown, moist, very loose, fine to medium grained, poorly grained with trace black silty clay. No observable contamination.	3.00
2.9	1 0 1				3.2 – 4.4		SP-SC	Clayey SAND (SP-SC) Brown, moist, medium dense, fine to medium grained. No observable contamination.	4.50
	2 4 8				4.6 – 6.0		SP	SAND (SP) Light grey/light yellow, moist, medium dense, fine to medium grained. No observable contamination.	6.45
	2 6 11							Borehole terminated at target depth. Total Depth: 6.00 m	

WELL DIAGRAM



AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH210

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					0.2 0.4	░	CONCRETE	CONCRETE (400mm)	0.40
4.7		✋	BH210_0.5-0.6	✳	0.6 0.8	▨	FILL	SAND (FILL) Brown, dry, loose, fine to medium grained with concrete and slag gravels. No observable contamination.	1.00
5.3		✋	BH210_1.0-1.1		1.0 1.2 1.4 1.6	▨	FILL	As above, become slightly moist.	1.70
6.1		■	BH210_1.7-1.8		1.8	▨	FILL	Sandy GRAVEL (FILL) Dark brown slightly moist, loose with fine to medium grained sand. No observable contamination.	2.00
7.7		■	BH210_2.0-2.1	✳	2.0 2.2 2.4 2.6 2.8	▨	FILL	Sandy CLAY (FILL) Dark brown with red mottling, slightly moist, soft, low plasticity with sandstone gravel inclusions. No observable contamination.	2.80
								Pushtube refusal, borehole terminated. Total Depth: 2.80 m	

AECOM

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

MONITORING WELL LOG BH211/MW203

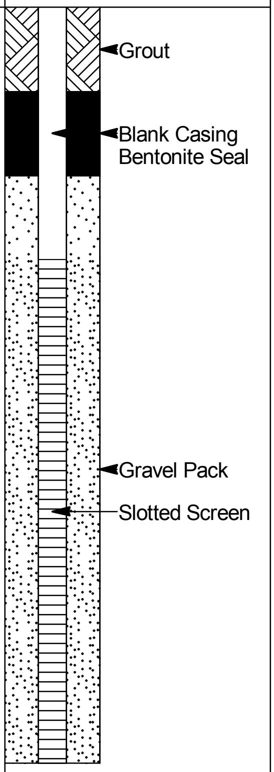
PROJECT NUMBER 60477501
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Hollow Flight Auger Drilling
SAMPLING METHOD Grab

DATE 24 Nov 15
BLANK 50 mm uPVC
SCREEN Factory Slotted (2 mm) 50 mm uPVC
GRAVEL PACK 2 mm Graded Sand
SANITARY SEAL/BENTONITE 10 mm Bentonite

LOGGED BY J. Tomlinson
COMMENTS MW203 Installed

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (150 mm).	0.14
2.1 3.4					0.2 0.4 0.6 0.8		FILL	Clayey SAND (FILL) Brown, dry, loose, fine grained with slag gravel inclusions.	1.00
2.1 2.7	0 0 0				1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8		SP	SAND (SP) Dark grey, slightly moist, very loose, fine to medium grained, sub angular particles with some clay. No observable contamination.	3.00
2.1	2 4 7 2 5 10				3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8		SP	SAND (SP) Light grey/light yellow, slightly moist, medium dense, fine to medium grained, sub angular. No observable contamination.	4.95
								Borehole terminated at target depth, MW203 Installed. Total Depth: 4.95 m	

WELL DIAGRAM



AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH212

PROJECT NUMBER 60477501
DATE 23 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (140 mm).	0.14
7.2		✋	BH212_0.14-0.24	✳			FILL	SAND (FILL) Dark brown, dry, loose, fine to medium grained with slag gravels, ash and plastic pieces inclusions. No observable contamination.	0.50
9.9		✋	BH212_0.5-0.6				FILL	As above.	1.00
17.1		■	BH212_1.0-1.1	✳			FILL	SAND (FILL) Light grey/light yellow, slightly moist, lose, fine to medium grained, with organic clay inclusions. Minor black staining, no odour.	1.30
10.2		■	BH212_1.3-1.4				FILL	Clayey SAND (FILL) Dark brown, dry, medium dense, medium grained. Minor black staining, no odour.	1.50
							SP	SAND (SP) Light yellow, dry, medium dense, fine to medium grained. No observable contamination.	1.80
							SP	Becomes grey, medium dense.	2.00
6.1		■	BH212_2.0-2.1				OH	Organic CLAY (OH) Black, slightly moist, high plasticity, soft with organic matter inclusions. Strong organic odour.	2.50
		■	BH212_2.5-2.6				OH	As above, moist, very soft.	2.80
							SP	SAND (SP) Dark brown, slightly moist, medium dense, medium grained. No observable contamination.	3.20
1.4		■	BH212_3.2-3.3				SP	SAND (SP) Light grey/light yellow, slightly moist, medium dense, fine to medium gained. No observable contamination.	
10.2		■	BH212_4.0-4.1						
9.1		■	BH212_5.0-5.1						6.00

Borehole terminated at target depth.
Total Depth: 6.00 m

AECOM

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH213

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						CONCRETE	CONCRETE (140 mm).	0.14
2.1		✋	BH213_0.14-0.24		0.2 0.4	SP	SAND (SP) Light grey/light yellow, slightly moist, loose, fine to medium grained. No observable contamination.	0.50
2.5		✋	BH213_0.5-0.6	✳	0.6 0.8	SP	As above.	1.00
1.9		■	BH213_1.0-1.1		1.0 1.2 1.4 1.6	SP-SC	Clayey SAND (SP-SC) Black, moist, loose to medium dense, fine grained with organic material inclusions. No observable contamination.	1.70
					1.8	SP	SAND (SP) Light grey/light yellow, slightly moist, medium dense, fine to medium grained. No observable contamination.	
1.6		■	BH213_2.0-2.1		2.0 2.2 2.4 2.6 2.8			
3.1		■	BH213_3.0-3.1		3.0 3.2 3.4 3.6 3.8			
2.4		■	BH213_4.0-4.1		4.0 ▽ 4.2 4.4			4.50
							Borehole terminated at target depth. Total Depth: 4.50 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH214

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						▨	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
2.3		✋	BH214_0.15-0.25		0.2	▨	FILL		
					0.4	▨		Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded. No observable contamination.	0.50
1.2		✋	BH214_0.5-0.6		0.6	▨	FILL	As above.	
					0.8	▨			
4.7		■	BH214_1.0-1.1	✳	1.0	▨	FILL	As above with slag gravels and ash. Switch to push tube,	1.00
					1.2	▨		Brick at 1.2 m bgs (100 mm)	1.30
					1.4	▨	FILL	As above with slag gravels and ash.	
					1.6	▨			
					1.8	▨			
3.9		■	BH214_2.0-2.1	✳	2.0	▨			
					2.2	▨			
					2.4	▨			
					2.6	▨			
					2.8	░	SP	SAND (SP) Dark grey/red, slightly moist, loose, fine to medium grained. No observable contamination.	2.80
4.1		■	BH214_3.0-3.1		3.0	░			
					3.2	░	SP	As above, becomes light yellow/light grey, medium dense.	3.20
					3.4	░			
					3.6	░			
					3.8	░			
3.3		■	BH214_4.0-4.1		4.0	░			
					4.2	░			
					4.4	░			
								Borehole terminated at target depth. Total Depth: 4.50 m	4.50

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH215

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

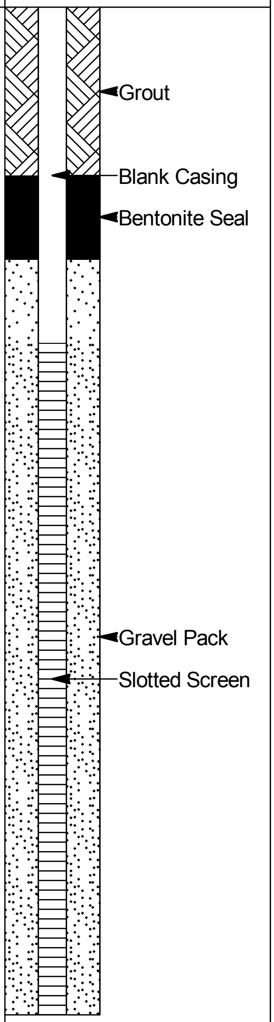
PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						▩	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
7.2		✋	BH215_0.15-0.25		0.2 0.4	▩	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded with slag gravels, glass and ash inclusions. No observable contamination.	0.50
4.3		✋	BH215_0.5-0.6	✳	0.6 0.8	▩	FILL	As above.	1.00
5.1		■	BH215_1.0-1.1		1.0 1.2 1.4	▩	FILL	As above, becomes light brown, fine to medium grained with in crease in sandstone gravels.	1.50
4		■	BH215_2.0-2.1	✳	1.6 1.8 2.0 2.2 2.4 2.6	▩	FILL	As above, becomes dark brown/black.	2.70
3.2		■	BH215_3.0-3.1		2.8 3.0 3.2	▩	FILL	As above, becomes slightly moist, loose to medium dense.	3.30
3.9 9.8		■ ■	BH215_3.3-3.1 BH215_4.0-4.1		3.4 3.6 3.8 4.0 4.2 4.4	░	SP	SAND (SP) Light grey/light yellow, slightly moist, loose, fine to medium grained. No observable contamination.	4.50
								Borehole terminated at target depth. Total Depth: 4.50 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

MONITORING WELL LOG BH216/MW204

PROJECT NUMBER	60477501	**DATE**	25 Nov 15
PROJECT NAME	Green Square Aquatic Centre	**BLANK**	50 mm uPVC
LOCATION	-	**SCREEN**	Factory Slotted (2 mm) 50 mm uPVC
DRILLING METHOD	Hand Auger, Hollow Flight Auger Drilling	**GRAVEL PACK**	2 mm Graded Sand
SAMPLING METHOD	Grab, Push Tube	**SANITARY SEAL/BENTONITE**	10 mm Bentonite

LOGGED BY J. Tomlinson
COMMENTS MW204 Installed

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
2.7							FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.		
							FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded. No observable contamination.	0.30	
3.6										
4.3								Switch to Hollow Flight Auger Drilling.		
3.1	3 6 13									
5.3	1 3 6						SP	SAND (SP) Light grey/light yellow, slightly moist, loose, fine to medium grained. No observable contamination.	3.00	
4.2	2 2 8						SP	As above, becoming medium dense.	4.50	
	3 4 8									
								Borehole terminated at target depth. Total Depth: 6.45 m	6.45	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH217

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						▨	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
1.4		✋	BH217_0.15-0.25		0.2 0.4	▨	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded. No observable contamination.	0.50
2.3		✋	BH217_0.5-0.6	✳	0.6 0.8	▨	FILL	As above with ash inclusions.	1.00
2.5		■	BH217_1.0-1.1		1.0 1.2 1.4 1.6 1.8	▨	FILL	As above with grey clay inclusions.	
1.9		■	BH217_2.0-2.1		2.0 2.2	▨			2.40
5.7		■	BH217_2.4-2.5	✳	2.4 2.6 2.8	▨	FILL	Clayey SAND (FILL) Dark brown, moist, medium dense, fine to medium grained with ash inclusions. No observable contamination.	3.00
7		■	BH217_3.0-3.1		3.0 3.2 3.4 3.6 3.8	⁘	SP	SAND (SP) brown, moist, medium dense, fine to medium grained. No observable contamination.	4.00
8.9		■	BH217_4.0-4.1		4.0 4.2 4.4	⁘	SP	As above, becomes orange/grey.	4.50
								Borehole terminated at target depth. Total Depth: 4.50 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH218

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						▩	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
		✋	BH218_0.15-0.25	✳	0.2 0.4	▩	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded with sandstone gravels. No observable contamination.	0.50
		✋	BH218_0.5-0.6		0.6 0.8	▩	FILL	As above with brick gravels.	1.00
		■	BH218_1.0-1.1		1.0 1.2 1.4 1.6 1.8	▩	FILL	As above Concrete Boulder (100 mm).	2.00
		■	BH218_2.0-2.1	✳	2.0 2.2	▩	FILL	Clayey SAND (FILL) Dark brown, slightly moist, medium dense, fine grained with ash inclusions. No observable contamination.	2.40
		■	BH218_3.0-3.1		2.4 2.6 2.8 3.0 3.2 3.4	⁘	SP	SAND (SP) Brown/orange, slightly moist, medium dense, fine grained. No observable contamination.	3.50
					3.6 3.8	⁘	SP	As above, becomes light grey/light yellow.	4.00
		■	BH218_4.0-4.1		4.0	⁘	SP	As above, becomes moist.	4.20
					4.2 ▽	⁘	SP	As above, becomes wet.	4.30
					4.4	⁘	SP	As above, becomes moist.	4.50

Borehole terminated at target depth.
Total Depth: 4.50 m

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

MONITORING WELL LOG BH219/MW205

PROJECT NUMBER 60477501
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Hollow Flight Auger Drilling
SAMPLING METHOD Grab, Push Tube

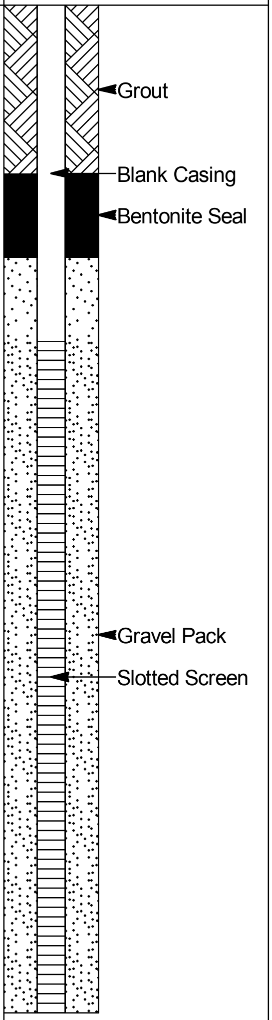
DATE 25 Nov 15
BLANK 50 mm uPVC
SCREEN Factory Slotted (2 mm) 50 mm uPVC
GRAVEL PACK 2 mm Graded Sand
SANITARY SEAL/BENTONITE 10 mm Bentonite

LOGGED BY J. Tomlinson
COMMENTS MW205 Installed

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
3.1							FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.20
1.2							FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded with sandstone gravels. No observable contamination.	1.50
2.1	2 3 5						FILL	As above with slag gravels.	3.00
3.1	2 3 4 2 6 10						SP	SAND (SP) dark grey, slightly moist, loose, fine to medium grained, poorly graded. No observable contamination.	4.50
4.6	1 4 6						SP	As above, becomes light yellow/light grey.	6.45
								Borehole terminated at target depth. Total Depth: 6.45 m	

DEPTH (m BGS): 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2, 5.4, 5.6, 5.8, 6.0, 6.2, 6.4

WELL DIAGRAM



AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH220

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
3		✋	BH220_0.15-0.25		0.2	▨	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
4.9		✋	BH220_0.5-0.6	✳	0.4 0.6	▨	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded with blue metal, concrete, brick and sandstone gravel inclusions. No observable contamination.	0.50
					0.8 1.0	▨	FILL	As above with ash inclusions.	1.00
								Switch to pushtube, pushtube refusal at 1 m bgs. Bore hole terminated. BH220A started 1 m east. Total Depth: 1.00 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH220A

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						▨	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
2.1		✋	BH220A_0.15-0.25		0.2 0.4	▨	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded with blue metal, concrete, brick and sandstone gravel inclusions. No observable contamination.	0.50
4.2		✋	BH220A_0.5-0.6		0.6 0.8	▨	FILL	As above with ash inclusions.	1.00
2.3		■	BH220A_1.0-1.1		1.0 1.2	▨	FILL	As above.	1.40
2.7		■	BH220A_1.4-1.5		1.4 1.6 1.8	▨	FILL	As above, becomes dark brown, slightly moist, medium dense with sandstone and brick gravels and ash inclusions. No observable contamination.	2.00
3.8		■	BH220A_2.0-2.1	✳	2.0 2.2 2.4 2.6 2.8	▨	FILL	As above with slag gravel inclusions.	3.00
2.9		■	BH220A_3.0-3.1		3.0 3.2 3.4 3.6 3.8	░	SP	SAND (SP) Brown, slightly moist, loose to medium dense, fine to medium grained. No observable contamination.	3.90
4.2		■	BH220A_4.0-4.1		4.0 4.2 4.4	░	SP	As above, becomes light yellow/light grey.	4.50
								Borehole terminated at target depth. Total Depth: 4.50 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH221

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
						▨	FILL	Clayey sandy GRAVEL (FILL) Yellow, dense, dry, dense, medium grained, well graded, soil is Road Base. No observable contamination.	0.15
4.1		✋	BH221_0.15-0.25		0.2 0.4	▨	FILL	Gravelly SAND (FILL) Brown, dry, loose, fine to medium grained, poorly graded with blue metal, concrete, brick and sandstone gravel inclusions. No observable contamination.	0.50
3.9		✋	BH221_0.5-0.6		0.6 0.8	▨	FILL	As above.	1.00
2.6		■	BH221_1.0-1.1	✳	1.0 1.2 1.4 1.6 1.8 2.0 2.2	▨	FILL	As above with slag gravel and glass inclusions.	2.40
2.8		■	BH221_2.4-2.5	✳	2.4 2.6	▨	FILL	SAND (FILL) Dark brown, slightly moist, loose to medium dense, medium grained with ash inclusions. No observable contamination.	2.70
2.8		■	BH221_3.0-3.1		2.8 3.0	⁘	SP	SAND (SP) Light Orange, slightly moist, loose to medium dense, fine to medium grained. No observable contamination.	3.20
4.2		■	BH221_4.0-4.1		3.2 3.4 3.6 3.8 4.0 4.2	⁘	SP	As above, becomes light grey, medium dense.	4.40
					4.4 ▽	⁘	SP	As above, becomes wet.	4.50

Borehole terminated at target depth.
Total Depth: 4.50 m

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH222

PROJECT NUMBER 60477501
DATE 26 Nov 15
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (160 mm).	0.16
0.4		✋	BH222_0.16-0.26		0.2 0.4		FILL	Gravelly SAND (FILL) Dark brown, loose, fine to medium grained with slag gravel inclusions, soil is Road Base. No observable contamination.	0.50
2.6		✋	BH222_0.5-0.6	✳	0.6 0.8		FILL	As above	1.00
4.3		■	BH222_1.0-1.1		1.0 1.2 1.4		FILL	As above, becomes Slightly moist with clay inclusions.	1.60
3.7		■	BH222_2.0-2.1	✳	1.6 1.8 2.0 2.2		SP	SAND (SP) grey, slightly moist, loose to medium dense, fine grained. No observable contamination	2.35
					2.4		SP	As above, becomes black, moist with organic odour.	2.60
2.6 2.5		■ ■	BH222_3.0-3.1 BH222_4.0-4.1		2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0		SP	As above, becomes orange/brown.	4.10
					4.2 4.4		SP	As above, becomes light yellow/light grey, medium dense.	4.50
								Borehole terminated at target depth. Total Depth: 4.50 m	

AECOM Australia Pty Ltd
Level 5, 828 Pacific Highway
Gordon NSW 2072

BOREHOLE LOG BH223

PROJECT NUMBER 60477501
PROJECT NAME Green Square Aquatic Centre
LOCATION -
DRILLING METHOD Hand Auger, Push Tube
SAMPLING METHOD Grab, Push Tube

DATE 26 Nov 15

LOGGED BY J. Tomlinson
COMMENTS

PID (ppm)	SPT BLOW COUNTS	RECOVERY	SAMPLE NUMBER	ANALYSED	DEPTH (m BGS)	GRAPHIC LOG	USCS CLASS	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
							CONCRETE	CONCRETE (160 mm).	0.16
		✋	BH223_0.16-0.26	✳			FILL	Gravelly SAND (FILL) Dark brown, dry, loose with brick and slag gravels. No observable contamination.	0.50
		✋	BH223_0.5-0.6				FILL	Hand auger refusal on brick, switch to solid flight auger. As above.	0.80
		■	BH223_1.0-1.1	✳			FILL	Clayey SAND (FILL) Dark brown/grey, slightly moist, loose to medium dense, fine to medium grained with brick and slag gravels Switch to pushtube.	2.00
		■	BH223_2.0-2.1				SP-SC	Clayey SAND (SP-SC) Black, moist, fine to medium grained, medium dense with organic material inclusions. Organic odour noted.	2.20
		■	BH223_3.0-3.1				SP	SAND (SP) Brown/red, moist, medium dense, fine to medium grained. Slight organic odour.	3.50
							SP	As above, becomes grey.	4.40
					▽		SP	As above, becomes wet.	4.50
								Borehole terminated at target depth. Total Depth: 4.50 m	

Appendix D4 – Calibration Records

Appendix D5 – Survey

CMS Surveyors Pty Limited
A.B.N. 79 096 240 201
LAND SURVEYING, PLANNING & DEVELOPMENT CONSULTANTS

CMS
SURVEYORS

Mr Andrew Rolfe
AECOM Australia Pty Ltd
PO Box Q410, QVB PO
SYDNEY NSW 1230

Our Ref: 2666A
Date: 9rd December 2015

Dear Mr Rolfe

RE: Ground MGA Coordinates of Monitoring Wells

132-138 Joynton Avenue, Zetland

Following are Ground MGA Coordinates and AHD levels for the Monitoring Wells at Joynton Avenue, Zetland 2017.

Well Number	East	North	Top of Plate	Top of Pipe
MW 200	334269.40	6246548.49	18.38	18.28
MW 201	334269.37	6246517.50	18.59	18.51
MW 202	334281.48	6246464.58	18.88	18.81
MW 203	334347.90	6246503.07	18.64	18.55
MW 204	334404.07	6246441.64	20.26	20.18
MW 205	334468.67	6246464.79	20.36	20.29

Note:
Levels were taken on top of the metal lid and the plastic conduit.
Coordinates are to the centre of the metal lid.
MGA Co-ordinates were deduced from PM 59536 and PM 59537.
PM 59536 was adopted for AHD (RL 19.136, ORDER L3) Sources: SCIMS 25/09/12

Yours faithfully,
C.M.S Surveyors Pty. Limited

Stephen Emery
Registered Land Surveyor

Consulting Surveyors NSW
ISNSW THE INSTITUTION OF SURVEYORS NSW INC

HEAD OFFICE
1/32 Campbell Avenue, DEE WHY NSW 2099
PO Box 463, DEE WHY NSW 2099
Ph: 02 9971 4802 Fax: 02 9971 4822
Email: info@cmssurveyors.com.au
Web: www.cmssurveyors.com.au

INCORPORATING
A.C.GILBERT & Co.
(Roseville)
MBS GREEN & ASSOCIATES
(Mona Vale)

COOTAMUNDRA
Incorporating PENGELLY & GRAY
90 Wallendoon St, COOTAMUNDRA NSW 2590
Ph: 02 6942 3395 Fax: 02 6942 4046
Email: coota@cmssurveyors.com.au

ISO 9001:2008 REGISTERED FIRM

Appendix D6 – Groundwater Field Sheets

AECOM

Site Contamination Analysis – Ground Water Sampling

Job Name: Green Square Aquatic Centre	Well No: MW 200
Job Number: 60477567	Well Type: ☑ Monitor ☐ Extraction ☐ Other
Recorded By: J.T	Well Material: ☑ PVC ☐ SS ☐ Other
Date: 30/11/15	Sample by: JT

WELL PURGING

PURGE VOLUME	PURGE METHOD
Well Diameter (mm): ☐ 38 ☑ 50 ☐ 100 ☐ Other	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☑ Other
Total Depth of Well (m BTOC): 3.864	Bladder Pump ☐; Peristaltic Pump ☑; Foot-valve ☐; Passive Diffusion ☐; Other ☐
Water Level Depth WL (m BTOC): 3.544	**PUMP INTAKE SETTING**
Number of well purge volumes ☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____	Depth (m BTOC)
☐ Low Flow – parameter + drawdown stabilisation	Screen Interval (m BTOC) – Top : Bottom:

PURGE VOLUME CALCULATION

(________ - ________) x (_____/2)^2_ x ________ x 0.00314 = ____________
TD (m) WL (m) D/2 (mm) #VOLS Calculated Purge Volume (L)
PURGE TIME____________ PURGE RATE____________ ACTUAL PURGE VOLUME____________

Start: Stop: Elapsed: Initial: Final:

FIELD PARAMETER MEASUREMENTS

Time	Volume Purged (L)	Dissolved Oxygen (mg/L)	Cond (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (mBTOC)	Flow rate (L / min)	Notes
1239	0.5	[illegible].09	1415	6.5	-35.9	23.6	3.701	–	black, viscous/muddy

Low flow stopped due to low water level.
Left for 4 hours
1600, collected grab sample → not enough sample for analysis

Observations during purging (well condition, turbidty, colour, odour, sheen): black, viscous, muddy

Discharge water disposal: ☐ Container ☐ Sanitary sewer ☐ Storm sewer ☑ Surface ☐ Other

WELL SAMPLING

SAMPLING METHOD Same as Purge method ☐

☑ Bailer – Type: ☑ PVC ☐ SS ☐ Teflon ☐ Other Bladder Pump ☐; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐

SAMPLE DISTRIBUTION Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments
–	–	–	–	–	–

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No

AECOM

Site Contamination Analysis – Ground Water Sampling

Job Name: Green Square Aquatic Centre	Well No: MW201
Job Number: 60478001	Well Type: ☑ Monitor ☐ Extraction ☐ Other
Recorded By: JT	Well Material: ☑ PVC ☐ SS ☐ Other
Date: 30/11/15	Sample by: JT

WELL PURGING

PURGE VOLUME	PURGE METHOD
Well Diameter (mm): ☐ 38 ☑ 50 ☐ 100 ☐ Other	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other
Total Depth of Well (m BTOC): 5.423	Bladder Pump ☐; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐
Water Level Depth WL (m BTOC): 3.663	**PUMP INTAKE SETTING**
Number of well purge volumes ☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____	Depth (m BTOC)
☐ Low Flow – parameter + drawdown stabilisation	Screen Interval (m BTOC) – Top : Bottom:

PURGE VOLUME CALCULATION

(________ - ________) x (______/2)^2 x ________ x 0.00314 = ______________

TD (m) WL (m) D/2 (mm) #VOLS Calculated Purge Volume (L)

PURGE TIME________________ PURGE RATE________________ ACTUAL PURGE VOLUME________________

Start: Stop: Elapsed: Initial: Final:

FIELD PARAMETER MEASUREMENTS

Time	Volume Purged (L)	Dissolved Oxygen (mg/L)	Cond (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (mBTOC)	Flow rate (L / min)	Notes
[illegible]									
1152	0.5	–	771	7.04	-80.1	22.6	3.781		
1156	1	–	772	7.02	-78.9	22.7	3.849		
1200	1.5	–	750	6.99	-76.2	22.5	3.973		
1204	2	–	772	6.95	-78.1	22.5	4.112		
1208	2.5	–	744	6.94	-76.4	22.3	4.234		
1212	3	–	698	6.91	-74.1	22.3	4.372		

Observations during purging (well condition, turbidty, colour, odour, sheen): Turbid, Brown

Discharge water disposal: ☐ Container ☐ Sanitary sewer ☐ Storm sewer ☑ Surface ☐ Other

WELL SAMPLING

SAMPLING METHOD Same as Purge method ☐

☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other Bladder Pump ☐; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐

SAMPLE DISTRIBUTION Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No

AECOM

Site Contamination Analysis – Ground Water Sampling

Job Name: Green Square Aquatic Centre	Well No: MW202
Job Number: 60479507	Well Type: ☑ Monitor ☐ Extraction ☐ Other
Recorded By: JT	Well Material: ☑ PVC ☐ SS ☐ Other
Date: 30/11/15	Sample by: JT

WELL PURGING

PURGE VOLUME	PURGE METHOD
Well Diameter (mm): ☐ 38 ☑ 50 ☐ 100 ☐ Other	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☑ Other
Total Depth of Well (m BTOC): 5.152	Bladder Pump ☑; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐
Water Level Depth WL (m BTOC): 3.452	**PUMP INTAKE SETTING**
Number of well purge volumes ☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____	Depth (m BTOC)
☐ Low Flow – parameter + drawdown stabilisation	Screen Interval (m BTOC) – Top : Bottom:

PURGE VOLUME CALCULATION

(________ - ________) x (______/2)^2 _ x ________ x 0.00314 = ________________

TD (m) WL (m) D/2 (mm) #VOLS Calculated Purge Volume (L)

PURGE TIME________________ PURGE RATE________________ ACTUAL PURGE VOLUME________________

Start: Stop: Elapsed: Initial: Final:

FIELD PARAMETER MEASUREMENTS

Time	Volume Purged (L)	Dissolved Oxygen (mg/L)	Cond (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (mBTOC)	Flow rate (L / min)	Notes
1410	0.5	0.47	1178	6.53	20.8	24.8	3.691		
1414	1	0.23	1147	6.48	28.6	23.0	3.851		
1418	1.5	0.32	1180	6.48	32.6	23.9	4.087		
1422	2	0.34	1200	6.51	34.5	23.7	4.295		
1426	2.5	0.35	1213	6.52	35.3	23.7	4.415		

Observations during purging (well condition, turbidty, colour, odour, sheen): clear, light brown

Discharge water disposal: ☐ Container ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☐ Other

WELL SAMPLING

SAMPLING METHOD Same as Purge method ☐

☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other Bladder Pump ☐; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐

SAMPLE DISTRIBUTION Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No
MW202	QC226				

AECOM

Site Contamination Analysis – Ground Water Sampling

Job Name: Green Square Aquatic Centre	Well No: MW 203
Job Number: 60477807	Well Type: ☑ Monitor ☐ Extraction ☐ Other
Recorded By: ST	Well Material: ☑ PVC ☐ SS ☐ Other
Date: 30/11/15	Sample by: ST

WELL PURGING

PURGE VOLUME	PURGE METHOD
Well Diameter (mm): ☐ 38 ☑ 50 ☐ 100 ☐ Other	☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☑ Other
Total Depth of Well (m BTOC): 4.417	Bladder Pump ☐; Peristaltic Pump ☑; Foot-valve ☐; Passive Diffusion ☐; Other ☐
Water Level Depth WL (m BTOC): 4.182	**PUMP INTAKE SETTING**
Number of well purge volumes ☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____	Depth (m BTOC)
☐ Low Flow – parameter + drawdown stabilisation	Screen Interval (m BTOC) – Top : Bottom:

PURGE VOLUME CALCULATION

(________ - ________) x (______/2)^2 _ x ________ x 0.00314 = ______________
TD (m) WL (m) D/2 (mm) #VOLS Calculated Purge Volume (L)
PURGE TIME________________ PURGE RATE________________ ACTUAL PURGE VOLUME________________

Start: Stop: Elapsed: Initial: Final:

FIELD PARAMETER MEASUREMENTS

Time	Volume Purged (L)	Dissolved Oxygen (mg/L)	Cond (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (mBTOC)	Flow rate (L / min)	Notes
1315	0.5	0.18	504.2	6.53	-6.1	23.5	4.213		
1319	1	0.11	453.6	6.37	-4.4	23.4	4.195		
1323	1.5	0.08	415.2	6.32	-0.4	23.3	4.191		
1327	2	0.06	404.2	6.29	1.7	23.3	4.193		
1331	2.5	0.06	344.3	6.27	1.9	23.3	4.195		
1335	3	0.03	392.1	6.25	1.8	23.3	4.195		
1339	3.5	0.03	392.4	6.24	1.4	23.3	4.196		
1343	4	0.03	391.9	6.25	1.7	23.3	4.196		

Observations during purging (well condition, turbidty, colour, odour, sheen): Clear, colourless

Discharge water disposal: ☐ Container ☐ Sanitary sewer ☐ Storm sewer ☑ Surface ☐ Other

WELL SAMPLING

SAMPLING METHOD Same as Purge method ☑

☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other Bladder Pump ☐; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐

SAMPLE DISTRIBUTION Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments
MW203	2xV 1xA				
	1xMetals				

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No

AECOM

Site Contamination Analysis – Ground Water Sampling

Job Name: Green Square Aquatic Centre	Well No: MW205
Job Number: 60477580	Well Type: ☑ Monitor ☐ Extraction ☐ Other
Recorded By: JT	Well Material: ☑ PVC ☐ SS ☐ Other
Date: 30/11/15	Sample by:

WELL PURGING

PURGE VOLUME	PURGE METHOD
Well Diameter (mm): ☐ 38 ☑ 50 ☐ 100 ☐ Other	☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other
Total Depth of Well (m BTOC): 5.461	Bladder Pump ☐; Peristaltic Pump ☑; Foot-valve ☐; Passive Diffusion ☐; Other ☐
Water Level Depth WL (m BTOC): 4.315	**PUMP INTAKE SETTING**
Number of well purge volumes ☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____	Depth (m BTOC)
☐ Low Flow – parameter + drawdown stabilisation	Screen Interval (m BTOC) – Top : Bottom:

PURGE VOLUME CALCULATION

(________ - ________) x (______/2)^2_x ________ x 0.00314 = ______________

TD (m) WL (m) D/2 (mm) #VOLS Calculated Purge Volume (L)

PURGE TIME________________ PURGE RATE________________ ACTUAL PURGE VOLUME________________

Start: Stop: Elapsed: Initial: Final:

FIELD PARAMETER MEASUREMENTS

Time	Volume Purged (L)	Dissolved Oxygen (mg/L)	Cond (µS/cm)	pH	Redox (mV)	Temp (°C)	SWL (mBTOC)	Flow rate (L / min)	Notes
1523	0.5	0.18	171.2	6.06	4.9	23.1	4.334		
1527	1.0	0.04	147.1	5.51	3.9	22.2	4.331		
1530	1.5	0.04	139.2	5.40	2.4	22.2	4.370		
1534	2	0.01	110.4	5.39	-0.2	21.8	4.333		
1538	2.5	0.00	104.0	5.38	-1.4	21.7	4.341		
1542	3	0.00	105.4	5.35	-1.4	21.7	4.330		
1546	3.5	0.00	105.7	5.35	-1.1	21.7	4.332		

Observations during purging (well condition, turbidty, colour, odour, sheen): Clear, colourless

Discharge water disposal: ☐ Container ☐ Sanitary sewer ☐ Storm sewer ☑ Surface ☐ Other

WELL SAMPLING

SAMPLING METHOD Same as Purge method ☐

☐ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other Bladder Pump ☐; Peristaltic Pump ☐; Foot-valve ☐; Passive Diffusion ☐; Other ☐

SAMPLE DISTRIBUTION Sample Series:

Sample No.	Vol/Cont.	Analysis	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No
MW205	QC227				

Appendix D7 – Laboratory Certificates

6 eskies

7/15

Chain of Custody

AECOM

AECOM Australia
Level 8
420 George Street, Sydney

Phone 0403 420 282
E-mail: Katie-mcgrath@aecom-com

Laboratory Details
Lab. Name: ALS
Lab. Address: 277-289 Woodpark Rd Smithfield
Contact Name:
Lab. Ref:
Tel: 02 8784 8555
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:

Sampled By: ~~Louis Scipione~~ James Pamlan
AECOM Project No: 60477507
Project Name:
PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Analysis Request

Lab. ID	Sample ID	Sampling Date	Matrix soil	Matrix water	Matrix other	Preservation filt'd	Preservation acid	Preservation ice	Preservation other	Container (No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold	S-26	Asbestos (absence/presence)	Other
	BH205_0.15-0.25	23/11/15	✓					✓		Jar+Bag											X			
1	BH205_0.5-0.6									Jar+Bag												X	X	
	BH205_1.0-1.1									Jar+Bag											X			
.	BH205_1.3-1.4									Jar+Bag											X			
2	BH205_1.5-1.6									Jar+Bag												X	X	
.	BH205_2.0-2.1									Jar+Bag											X			
.	BH205_3.0-3.1									Jar											X			
.	BH205_4.0-4.1									Jar											X			
.	BH205_5.0-5.1									Jar											X			
3	BH201_0.12-0.22									Jar+Bag												X	X	
.	BH201_0.5-0.6									Jar+Bag											X			
4	BH201_1.0-1.1	✓	✓					✓		Jar+Bag												X	X	

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Relinquished by: ~~Louis Scipione~~ James Pamlan	Signed:	Date: 27/11/15	
Recieved by:	Signed:	Date:	
Relinquished by:	Signed:	Date:	
Recieved by: Fari	Signed:	Date: 29/11/15 12pm	

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BMS-PM-DV-F046

Revision: Jun 08

Received by: Fari 1/12/15 9a

(Subcon) / Forward Lab / Split WO
Lab / Analysis: NewCastle / Asbestos
Organised By / Date: (1) (20) (22) (22) = (46)
Relinquished By / Date: ______
Connote / Courier: ______
WO No: ______
Attach By PO / Internal Sheets ______

Environmental Division
Sydney
Work Order Reference
ES1537688
Telephone : + 61-2-8784 8555

2/15

Chain of Custody

AECOM

AECOM Australia	**Laboratory Details**
Level 8	Lab. Name: ALS
420 George Street, Sydney	Lab. Address: 277-289 Woodpark Rd Smithfield
Phone 0403 420282	Contact Name:
E-mail: Kate.mcgrath@aecom.com	Lab. Ref:
	Tel: 8784 5555
	Fax:
	Preliminary Report by:
	Final Report by:
	Lab Quote:

Sampled By: ~~Louis Scipione~~ James Conlisan AECOM Project No: 60477507

Project Name:

PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request															Other				
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold	S-26	Asbestos	Absence | Presence						
	BH201_1.6-1.7	23/4/15	X					X		Jar											X									
	BH201_2.7-2.8	2																			X									
	BH201_3.5-3.6																				X									
	BH201_4.5-4.6																				X									
	BH201_5.3-5.4									↓											X									
	BH204_0.14-0.24									Jar+Bag											X									
5	BH204_0.5-0.6									Jar+Bag												X	X							
	BH204_1.0-1.1									Jar+Bag											X									
	BH204_3.0-3.1									Jar											X									
	BH204_4.0-4.1									Jar											X									
	BH204_5.0-5.1									Jar											X									
	BH20[illegible]_0.11-0.21 208	↓	↓					↓		Jar+Bag											X									

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louis Scipione~~ James Conlisan Signed: Date: 27/4/15

Recieved by: Signed: Date:

Relinquished by: Signed: Date:

Recieved by: Signed: Date:

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Revision: Jun 08

3/15

Chain of Custody

AECOM

AECOM Australia

Level 8

420 George Street, Sydney

Phone 0403 420 282

E-mail: Kate.mcgrath@aecom.com

Sampled By: ~~Louis Scipione~~ James Tucker

AECOM Project No: 60477507

Laboratory Details

Lab. Name: ALS

Lab. Address: 277-289 Woodpark Rd

Contact Name:

Lab. Ref:

Tel:

Fax:

Preliminary Report by:

Final Report by:

Lab Quote:

Project Name:

PO No.

Specifications:	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr _______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: _______________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request															Other				
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold	S-26	Asbestos	Absence/Presence						
6	BH208_0.5-0.6	23/11/15	X							Jar+Bag												X	X							
	BH208_1.0-1.1									Jar+Bag											X									
7	BH208_2.0-2.1									Jar												X	X							
	BH208-3.0-3.1									Jar											X									
8	BH212_0.14-0.24									Jar+Bag												X	X							
	BH212_0.5-0.6									Jar+Bag											X									
9	BH212_1.0-1.1									Jar+Bag												X	X							
	BH212_1.3-1.4									Jar											X									
	BH212_2.0-2.1									Jar											X									
	BH212_3.2-3.3									Jar											X									
	BH212_4.0-4.1									Jar											X									
	BH212_5.0-5.1									Jar											X									

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louis Scipione~~ James Tucker Signed: Date: 27/11/15

Recieved by: Signed: Date:

Relinquished by: Signed: Date:

Recieved by: Signed: Date:

4/15

Chain of Custody

AECOM

AECOM Australia
Level 8
420 George Street, Sydney

Phone 0403 420 282
E-mail: kate.megrath@aecom.com

Sampled By: ~~Louis Scipione~~ James Tomlinson
AECOM Project No: 60477507

Laboratory Details
Lab. Name: ALS
Lab. Address: 277 woodpark rd Smithfld
Contact Name:
Lab. Ref:
Project Name: 60G

Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:
PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Lab. ID	Sample ID	Sampling Date	Matrix soil	Matrix water	Matrix other	Preservation filtered	Preservation acid	Preservation ice	Preservation other	Container (No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold	S-26	Asbestos	Absence/Presence		Other
	BH202_0.17-0.27	23/11/15	X					✓		Jar+Bag											X					
10	BH202_0.5-0.6									Jar+Bag												X	X			
	BH202_1.0-1.1									Jar+Bag											X					
11	BH202_1.5-1.6									Jar+Bag												X	X			
	BH202_2.0-2.1									Jar+Bag											X					
	BH202_2.4-2.5									Jar											X					
	BH202_4.0-4.1									Jar											X					
	BH202_5.0-5.1									Jar											X					
12	BH210_0.5-0.6									Jar+Bag												X	X			
	BH210_1.0-1.1									Jar+Bag											X					
	BH210_1.7-1.8									Jar+Bag											X					
13	BH210_2.0-2.1									Jar												X	X			

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louis Scipione~~ James Tomlinson Signed: Date: 27/11/15
Recieved by: Signed: Date:

Relinquished by: Signed: Date:
Recieved by: Signed: Date:

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Revision: Jun 08

5/15

Chain of Custody

AECOM

AECOM Australia
Level 8
420 George Street, Sydney

Phone 0403 920 282
E-mail: kate.megrath@aecom.com

Sampled By: ~~Louis Scipione~~ J. Tomlinson
AECOM Project No: 60471507

Laboratory Details
Lab. Name: ACS
Lab. Address:
Contact Name:
Lab. Ref:
Project Name:
Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:
PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr _______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Analysis Request

Lab. ID	Sample ID	Sampling Date	Matrix soil	Matrix water	Matrix other	Preservation filt'd	Preservation acid	Preservation ice	Preservation other	Container (No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	HSd	S-26	Asbestos Absence/Presence		Other				
14	BH207_0.13-0.23	23/11/15	X					X		Jar+Bag												X	X						
	BH207_0.5-0.6									Jar+Bag											X								
15	BH207_1.0-1.1									Jar+Bag												X	X						
	BH207_2.0-2.1									Jar											X								
	BH207_3.0-3.1									Jar											X								
	BH207_4.0-4.1									Jar											X								
	BH207_5.0-5.1									Jar											X								
16	BH206_0.0-0.1									Jar+Bag												X	X						
	BH206_0.5-0.6									Jar+Bag											X								
17	BH206_1.0-1.1									Jar+Bag												X	X						
	BH206_2.0-2.1									Jar											X								
	BH206_2.7-2.8	↓	↓					↓		Jar											X								

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louis Scipione~~ James Tomlinson Signed: Date: 27/11/15
Recieved by: Signed: Date:

Relinquished by: Signed: Date:
Recieved by: Signed: Date:

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Chain of Custody

AECOM

AECOM Australia

Level 8
420 George Street, Sydney

Phone

E-mail: Kate.mcgrath@aecom.com

Sampled By: ~~Louie Scipione~~ J. Tomlinson

AECOM Project No: 60477507

Laboratory Details

Lab. Name: ACS
Lab. Address:
Contact Name: Smithfield
Lab. Ref:

Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:

Project Name:

PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______________________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email : ______________	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request														Other					
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold	S-26	Asbestos	Absence / presence						
	BH206_3.7-3.8	23/11/15	Y					Y		Jar											X									
	[illegible]-7-7.8	23/11/15	Y					Y		Jar											X									
	[illegible]-3.8	23/11/15	Y					Y		Jar											X									
18	BH200_0.1-0.2	24/11/15	|					|		Jar + Bag												X	X							
	BH200_0.5-0.6	|	|					|		Jar + Bag											X									
19	BH200_1.0-1.1	|	|					|		Jar + Bag												X	X							
	BH200_2.0-2.1	|	|					|		Jar											X									
	BH203_0.15-0.25	|	|					|		Jar + Bag											X									
	[illegible]_0.5-0.6	|	|					|		|											X									
20	BH203-1.0-1.1	|	|					|		|												X	X							
21	BH203-2.0-2.1	|	|					|		↓												X								
	[illegible]-3.1	↓	↓					↓		Jar											↓									

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louie Scipione~~ J. Tomlinson Signed: Date: 27/11/15

Recieved by: Signed: Date:

Relinquished by: Signed: Date:

Recieved by: Signed: Date:

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Revision: Jun 08

7/15

Chain of Custody

AECOM

AECOM Australia
Level 8
420 George Street, Sydney
Phone
E-mail: kate.mcgrath@aecom.com

Sampled By: ~~Louis Scipione~~ J. Tomlinson
AECOM Project No: 60471537

Laboratory Details
Lab. Name: ALS
Lab. Address:
Contact Name: Smithfield
Lab. Ref:
Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:
Project Name:
PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ________________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Analysis Request

Lab. ID	Sample ID	Sampling Date	Matrix soil	Matrix water	Matrix other	Preservation filt'ed	Preservation acid	Preservation ice	Preservation other	Container (No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold		S-26	Asbestos	Absence / presence	Other
22	BH211_0.4-0.24	29/4/15	X					X		Jar+Bag													X	X		
	BH211_0.5-0.6									↓											X					
23	BH211_1.0-1.1									↓													X	X		
	BH211_1.5-1.6									Jar											X					
	BH211_3.0-3.1																				X					
	BH211_9.5-9.6	↓								↓											X					
	BH209_0.2-0.3	29/4/15								Jar+Bag											X					
24	BH209_0.5-0.6																						X	X		
	BH209_1.0-1.1																				X					
25	BH209_1.5-1.6																						X	X		
	BH209_3.0-3.1									↓											X					
																					X					

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.
Esky ID

Relinquished by: Louis Scipione J. Tomlinson Signed: Date:
Recieved by: Signed: Date:

Relinquished by: Signed: Date:
Recieved by: Signed: Date:

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Chain of Custody

AECOM

AECOM Australia

Level 8

420 George Street, Sydney

Phone

E-mail: kate.mcgrath@aecom.com

Sampled By: ~~Louis Scipione~~ J. Tomlinson

AECOM Project No: 60477507

Laboratory Details

Lab. Name: ALS

Lab. Address:

Contact Name: Smithfield

Lab. Ref:

Tel:

Fax:

Preliminary Report by:

Final Report by:

Lab Quote:

Project Name:

PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ________________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Analysis Request

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold		S-26	Asbestos	Absence / Presence	Other
			soil	water	other	filt'ed	acid	ice	other	(No. & type)																
26	BH219_0.0-0.1	25/11/15	X					X		Jar + Bag													X	X		
	219_0.5-0.6									Jar + Bag											X					
27	BH219_1.5-1.6									Jar + Bag													X	X		
	BH219_2.0-[illegible]									Jar											X					
	[illegible]									Jar											X					
	BH216_0.0-0.1									Jar + Bag											X					
28	BH216_0.5-0.6																						X	X		
	BH216_1.0-[illegible]									↓											X					
29	BH216_1.5-1.6									Jar													X	X		
	[illegible]																				X					
	[illegible]	↓	↓					↓		↓											X					
																					X					

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No

Esky ID

Relinquished by: ~~Louis Scipione~~ J. Tomlinson Signed: Date: 27/11/15

Recieved by: Signed: Date:

Relinquished by: Signed: Date:

Recieved by: Signed: Date:

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Chain of Custody

AECOM

AECOM Australia
Level8
420 George Street, Sydney
Phone
E-mail: kate-mcgrath@aecom-com

Laboratory Details
Lab. Name: ALS
Lab. Address:
Contact Name:
Lab. Ref:
Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:

Sampled By: ~~Louis Scipione~~ J Coulson
AECOM Project No: 60477507
Project Name:
PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______________________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request															Other				
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold		S-26	Asbestos	Presence / Presence					
~~BH215~~ 30	BH215_0.15-0.25	26/11/15	X					X		Jar + Bag													X	X						
	BH215_0.5-0.6	↓	↓					↓		Jar + Bag											X									
	BH215_1.0-1.1									Jar+Bag											X									
31	BH215_2.0-2.1									Jar													X	X						
	BH215_3.0-3.1									↓											X									
	BH215_3.3-3.1																				X									
	BH215_4.0-4.1																				X									
32	BH223_0.16-0.26									Jar+Bag													X	X						
	BH223_0.5-0.6									↓											X									
33	BH223_1.0-1.1																						X	X						
	BH223 2.0-2.1									Jar											X									
	BH223_3.0-3.1									Jar											X									

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.
Esky ID

Relinquished by: ~~Louis Scipione~~ J Coulson Signed: Date: 27/11/15
Recieved by: Signed: Date:
Relinquished by: Signed: Date:
Recieved by: Signed: Date:

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Chain of Custody

AECOM

AECOM Australia
Level 8
420 George Street, Sydney

Phone
E-mail: Kate.mcgrath@aecom.com

Laboratory Details
Lab. Name: ALS
Lab. Address:
Contact Name: Smithfield
Lab. Ref:

Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:

Sampled By: ~~Louis Scipione~~ J. Tomlinson
AECOM Project No: 60477507
Project Name:
PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______________________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email:	

Analysis Request

Lab. ID	Sample ID	Sampling Date	Matrix: soil	Matrix: water	Matrix: other	Preservation: filt'ed	Preservation: acid	Preservation: ice	Preservation: other	Container (No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold		S-26	Asbestos	Absence/Presence	Other
	BH220_0.15-0.25	26/10/15	X					X		Jar+Bag											X					
34	BH220_0.5-0.6																						X	X		
	BH220A_0.15-0.16																				X					
	BH220A_0.5-0.6																				X					
	BH220A_1.0-1.1									✓											X					
	BH220A_1.4-1.5									Jar											X					
35	BH220A_2.0-2.1																						X	X		
	BH220A_3.0-3.1																				X					
	BH220A_4.0-4.1	✓	✓					✓		✓											X					
	BH217_0.15-0.25									Jar+Bag											X					
36	BH217_0.5-0.6																						X	X		
	BH217_1.0-1.1	✓	✓					✓		✓											X					

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louis Scipione~~ J. Tomlinson	Signed:	Date: 27/10/15	
Recieved by:	Signed:	Date: 27/10/15	
Relinquished by:	Signed:	Date:	
Recieved by:	Signed:	Date:	

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Chain of Custody

AECOM

AECOM Australia
Level 8
420 George Street, Sydney

Phone
E-mail: kate.mcgrath@aecom.com

Sampled By: ~~Louis Scipione~~ J. Cullinan
AECOM Project No: 60477567

Laboratory Details
Lab. Name: ALS
Lab. Address:
Contact Name: Sam Sheppard
Lab. Ref:
Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote:

Project Name:
PO No.

Specifications:	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr _______days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______________________)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email :	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container
			soil	water	other	filtered	acid	ice	other	(No. & type)
	BH217_2.0-2.1	26/11/15	X					X		Jar+Bag
37	BH217_2.4-2.5	↓	↓					↓		Jar+Bag
	BH217_3.0-3.1	↓	↓					↓		Jar
	BH217_4.0-4.1	✓	✓					✓		Jar
	BH222_0.16-0.26	↓	↓					↓		Jar+Bag
38	BH222_0.5-0.6	↓	↓					↓		↓
	BH222_1.0-1.1	↓	↓					↓		↓
39	BH222_2.0-2.1	↓	↓					↓		Jar
	BH222_3.0-3.1	↓	↓					↓		Jar
	BH222_4.0-4.1	✓	✓					✓		Jar
	BH221_0.15-0.25	↓	↓					↓		Jar+Bag
	BH221_0.5-0.6	✓	✓					✓		Jar+Bag

Sample ID	Analysis Request															Other				
	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold		S-26	Asbestos	Absence / Presence					
BH217_2.0-2.1											X									
BH217_2.4-2.5													X	X						
BH217_3.0-3.1											X									
BH217_4.0-4.1											X									
BH222_0.16-0.26											X									
BH222_0.5-0.6													X	X						
BH222_1.0-1.1											X									
BH222_2.0-2.1													X	X						
BH222_3.0-3.1											X									
BH222_4.0-4.1											X									
BH221_0.15-0.25											X									
BH221_0.5-0.6											X ✓									

* MetLab Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.
Esky ID

Relinquished by: ~~Louis Scipione~~ J. Cullinan Signed: Date: 26/11/15
Recieved by: Signed: Date:

Relinquished by: Signed: Date:
Recieved by: Signed: Date:

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BMS-PM-DV-F046
Revision: Jun 08

14/15

Chain of Custody

AECOM

AECOM Australia		**Laboratory Details**	
Level 8	Phone	Lab. Name: ALS	Tel:
420 George Street, Sydney	E-mail: Kate.mcgrath@aecom.com	Lab. Address:	Fax:
		Contact Name: Jn Alford	Preliminary Report by:
		Lab. Ref:	Final Report by:
			Lab Quote:
Sampled By: ~~Louis Scipione~~ J.Tomlinson	AECOM Project No: 60477507	Project Name:	PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email: ______	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request															Other				
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	Hold		S-26	Asbestos	[illegible]	Presence				
40	BH221_1.0-1.1	26/11/15	X					X		Jar+Bag													X	X						
41	BH221_2.4-2.5	↓	↓					↓		Jar+Bag													X	X						
	BH221_3.0-3.1									Jar											X									
	BH221_4.0-4.1									Jar											X									
	BH213_0.14-0.24									Jar+Bag											X									
42	BH213_0.5-0.6									Jar+Bag													X	X						
	BH213_1.0-1.1									Jar											X									
	BH213_2.0-2.1																				X									
	BH213_3.0-3.1																				X									
	BH213_4.0-4.1									↓											X									
	BH214_0.15-0.25									Jar+Bag											X									
	BH214_0.5-0.6									Jar+Bag											X									

*Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by: ~~Louis Scipione~~ J.Tomlinson	Signed:	Date: 27/11/15	Relinquished by:	Signed:	Date:
Recieved by:	Signed:	Date:	Recieved by:	Signed:	Date:

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ANZ

Chain of Custody Form

AECOM 13/15

Q4AN(EV)-335-FM60

AECOM - Sydney
Level 21, 420 George Street
Sydney NSW 2000 Australia

Tel: 61 2 8934 0000
Fax: 61 2 8934 0001
Email: kate.mcgrath@aecom.com

Laboratory Details
Lab. Name: ALS
Lab. Address: Smithfield
Contact Name:
Lab. Ref:

Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote No:

Project Name:

Project Number: 60477507

Purchase Order Number:

Sample collected by:

Sample Results to be returned to:

Specifications: (Tick)

1. Urgent TAT required? (please circle: 24hr 48hr ____ days)	☐ Yes	☐ No	☐ N/A
2. Fast TAT Guarantee Required?	☐ Yes	☐ No	☐ N/A
3. Is any sediment layer present in waters to be excluded from extractions?	☐ Yes	☐ No	☐ N/A
4. Special storage requirements?	☐ Yes	☐ No	☐ N/A
5. Preservation requirements?	☐ Yes	☐ No	☐ N/A
6. Other requirements?	☐ Yes	☐ No	☐ N/A

7. Report Format: ☐ Fax ☐ Hard copy ☐ Email

8. Project Manager: tel:

Lab. ID	Sample ID	Sampling Date /Time	Matrix			Preservation				Container	Analysis Request			Remarks & comments
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	Hold	S-26	Asbestos Absence / Presence	
43	BH214_1.0-1.1	26/11/15	X					X		Jar+Bag		X	X	
44	BH214_2.0-2.1									Ja		X	X	
	BH214_3.0-3.1									Ja	X			
	BH214_4.0-4.1									Jar	X			
45	BH218_0.15-0.25									Jar+Bag		X	X	
	BH218_0.5-0.6										X			
	BH218_1.0-1.1										X			
46	BH218_2.0-2.1											X	X	
	BH218_3.0-3.1									Jar	X			
	BH218_4.0-4.1									Jar	X			

Relinquished By:
Name: J. Tomlinson Date: 27/11/15
of: AECOM Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment	
Samples received chilled?	Yes/No/NA	Consignment Note No.	
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand

Relinquished By:
Name: Date:
of: Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment	
Samples received chilled?	Yes/No/NA	Consignment Note No.	
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand

14/15

ANZ

Chain of Custody Form

AECOM

Q4AN(EV)-335-FM60

AECOM - Sydney
Level 21, 420 George Street
Sydney NSW 2000 Australia

Tel: 61 2 8934 0000
Fax: 61 2 8934 0001
Email: Kate.mcgrath@aecom.au

Laboratory Details
Lab. Name: AES
Lab. Address: Smithfield
Contact Name:
Lab. Ref:

Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote No:

Project Name:

Project Number: 60477507

Purchase Order Number:

Sample collected by:

Sample Results to be returned to:

Specifications:

	(Tick)		
1. Urgent TAT required? (please circle: 24hr 48hr ______ days)	☐ Yes	☐ No	☐ N/A
2. Fast TAT Guarantee Required?	☐ Yes	☐ No	☐ N/A
3. Is any sediment layer present in waters to be excluded from extractions?	☐ Yes	☐ No	☐ N/A
4. Special storage requirements?	☐ Yes	☐ No	☐ N/A
5. Preservation requirements?	☐ Yes	☐ No	☐ N/A
6. Other requirements?	☐ Yes	☐ No	☐ N/A

7. Report Format ☐ Fax ☐ Hard copy ☐ Email

8. Project Manager: tel:

Lab. ID	Sample ID	Sampling Date /Time	Matrix			Preservation				Container	Analysis Request															Remarks & comments
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	Hold			5-26												
	QC203	23/4/15	X					X		Jar																
	QC209	23/4/15		X						Vial																
	QC206	24/4/15	X							Jar																
47	QC208		X											X												
	QC210		X																							
	QC211			X						Vial																
	QC252	25/4/15	X							Jar																
48	QC219		X											X												
49	QC216		X											X												
	QC217		X																							

Relinquished By:
Name: J Tomlinson Date: 27/4/15
of: AECOM Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment		
Samples received chilled?	Yes/No/NA	Consignment Note No.		
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand	

Relinquished By:
Name: Date:
of: Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment		
Samples received chilled?	Yes/No/NA	Consignment Note No.		
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand	

ANZ

Chain of Custody Form

AECOM 5/1/15

Q4AN(EV)-335-FM60

AECOM - Sydney
Level 21, 420 George Street
Sydney NSW 2000 Australia

Tel: 61 2 8934 0000
Fax: 61 2 8934 0001
Email: Kate.mcgrath@aecom.com

Laboratory Details
Lab. Name: ACS
Lab. Address: Smithfield
Contact Name:
Lab. Ref:
Tel:
Fax:
Preliminary Report by:
Final Report by:
Lab Quote No:

Project Name:
Project Number: 60477800
Purchase Order Number:
Sample collected by: JT
Sample Results to be returned to:

Specifications: (Tick)

1. Urgent TAT required? (please circle: 24hr 48hr _______ days) ☐ Yes ☐ No ☐ N/A
2. Fast TAT Guarantee Required? ☐ Yes ☐ No ☐ N/A
3. Is any sediment layer present in waters to be excluded from extractions? ☐ Yes ☐ No ☐ N/A
4. Special storage requirements? ☐ Yes ☐ No ☐ N/A
5. Preservation requirements? ☐ Yes ☐ No ☐ N/A
6. Other requirements? ☐ Yes ☐ No ☐ N/A
7. Report Format ☐ Fax ☐ Hard copy ☐ Email
8. Project Manager: tel:

Analysis Request

Lab. ID	Sample ID	Sampling Date /Time	Matrix			Preservations				Container	Hold	S-26	Asbestos	Absence / Presence	Remarks & comments
			soil	water	other	filt'ed	acid	ice	other	(No. & type)					
	QC218	25/11/15		X				X		Vial					
	QC220		X							Jar					
	QC222		X												
	QC224		X												
	QC225	✓		X				✓		✓					
50	BH204_1.5-1.6	23/11/15	X					X		Jar + bag		X	X		

Relinquished By:
Name: J Tomlinson Date: 27/11/15
of: AECOM Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment	
Samples received chilled?	Yes/No/NA	Consignment Note No.	
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand

Relinquished By:
Name: Date:
of: Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment	
Samples received chilled?	Yes/No/NA	Consignment Note No.	
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1537688**

Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Contact	: Barbara Hanna
Address	: LEVEL 21, 420 GEORGE STREET SYDNEY NSW 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: kate.mcgrath@aecom.com	E-mail	: Barbara.Hanna@alsglobal.com
Telephone	: +61 03 9653 1234	Telephone	: +61 2 8784 8555
Facsimile	: +61 03 9654 7117	Facsimile	: +61-2-8784 8500
Project	: 60477507	Page	: 1 of 3
Order number	: 60477507	Quote number	: EB2015AECOMAU0580 (EN/004/15)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: JAMES TOMLINSON		

Dates

Date Samples Received	: 01-Dec-2015 9:00 AM	Issue Date	: 02-Dec-2015
Client Requested Due Date	: 08-Dec-2015	Scheduled Reporting Date	: **08-Dec-2015**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 6	Temperature	: ----
Receipt Detail	:	No. of samples received / analysed	: 49 / 49

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **SAMPLE BH204_1.5-1.6 NOT RECEIVED**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method *Client sample ID*	Sample Container Received	Preferred Sample Container for Analysis
Asbestos Identification in Soils : EA200		
BH208_2.0-2.1	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Sample bag
BH212_1.0-1.1	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Sample bag
BH216_1.5-1.6	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Sample bag
BH220A_2.0-2.1	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Sample bag
BH222_2.0-2.1	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Sample bag

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1537688-001	[23-Nov-2015]	BH205_0.5-0.6	✓	✓	✓
ES1537688-002	[23-Nov-2015]	BH205_1.5-1.6	✓	✓	✓
ES1537688-003	[23-Nov-2015]	BH201_0.12-0.22	✓	✓	✓
ES1537688-004	[23-Nov-2015]	BH201_1.0-1.1	✓	✓	✓
ES1537688-005	[23-Nov-2015]	BH204_0.5-0.6	✓	✓	✓
ES1537688-006	[23-Nov-2015]	BH208_0.5-0.6	✓	✓	✓
ES1537688-007	[23-Nov-2015]	BH208_2.0-2.1	✓	✓	✓
ES1537688-008	[23-Nov-2015]	BH212_0.14-0.24	✓	✓	✓
ES1537688-009	[23-Nov-2015]	BH212_1.0-1.1	✓	✓	✓
ES1537688-010	[23-Nov-2015]	BH202_0.5-0.6	✓	✓	✓
ES1537688-011	[23-Nov-2015]	BH202_1.5-1.6	✓	✓	✓
ES1537688-012	[23-Nov-2015]	BH210_0.5-0.6	✓	✓	✓
ES1537688-013	[23-Nov-2015]	BH210_2.0-2.1	✓	✓	✓
ES1537688-014	[23-Nov-2015]	BH207_0.13-0.23	✓	✓	✓
ES1537688-015	[23-Nov-2015]	BH207_1.0-1.1	✓	✓	✓
ES1537688-016	[23-Nov-2015]	BH206_0.0-0.1	✓	✓	✓
ES1537688-017	[23-Nov-2015]	BH206_1.0-1.1	✓	✓	✓
ES1537688-018	[24-Nov-2015]	BH200_0.1-0.2	✓	✓	✓
ES1537688-019	[24-Nov-2015]	BH200_1.0-1.1	✓	✓	✓
ES1537688-020	[24-Nov-2015]	BH203_1.0-1.1	✓	✓	✓
ES1537688-021	[24-Nov-2015]	BH203_2.0-2.1	✓		✓
ES1537688-022	[24-Nov-2015]	BH211_0.4-0.24	✓	✓	✓
ES1537688-023	[24-Nov-2015]	BH211_1.0-1.1	✓	✓	✓
ES1537688-024	[25-Nov-2015]	BH209_0.5-0.6	✓	✓	✓
ES1537688-025	[25-Nov-2015]	BH209_1.5-1.6	✓	✓	✓
ES1537688-026	[25-Nov-2015]	BH219_0.0-0.1	✓	✓	✓

			SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1537688-027	[25-Nov-2015]	BH219__1.5-1.6	✓	✓	✓
ES1537688-028	[25-Nov-2015]	BH216_0.5-0.6	✓	✓	✓
ES1537688-029	[25-Nov-2015]	BH216_1.5-1.6	✓	✓	✓
ES1537688-030	[26-Nov-2015]	BH215_0.5-0.25	✓	✓	✓
ES1537688-031	[26-Nov-2015]	BH215_2.0-2.1	✓	✓	✓
ES1537688-032	[26-Nov-2015]	BH223_0.16-0.26	✓	✓	✓
ES1537688-033	[26-Nov-2015]	BH223_1.0-1.1	✓	✓	✓
ES1537688-034	[26-Nov-2015]	BH220_0.5-0.6	✓	✓	✓
ES1537688-035	[26-Nov-2015]	BH220A_2.0-2.1	✓	✓	✓
ES1537688-036	[26-Nov-2015]	BH217_0.5-0.6	✓	✓	✓
ES1537688-037	[26-Nov-2015]	BH217_2.4-2.5	✓	✓	✓
ES1537688-038	[26-Nov-2015]	BH222_0.5-0.6	✓	✓	✓
ES1537688-039	[26-Nov-2015]	BH222_2.0-2.1	✓	✓	✓
ES1537688-040	[26-Nov-2015]	BH221_1.0-1.1	✓	✓	✓
ES1537688-041	[26-Nov-2015]	BH221_2.4-2.5	✓	✓	✓
ES1537688-042	[26-Nov-2015]	BH213_0.5-0.6	✓	✓	✓
ES1537688-043	[26-Nov-2015]	BH214_1.0-1.1	✓	✓	✓
ES1537688-044	[26-Nov-2015]	BH214_2.0-2.1	✓	✓	✓
ES1537688-045	[26-Nov-2015]	BH218_0.15-0.25	✓	✓	✓
ES1537688-046	[26-Nov-2015]	BH218_2.0-2.1	✓	✓	✓
ES1537688-047	[24-Nov-2015]	QC208	✓		✓
ES1537688-048	[25-Nov-2015]	QC214	✓		✓
ES1537688-049	[25-Nov-2015]	QC216	✓		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

AP_CUSTOMER SERVICE ANZ

- A4 - AU Tax Invoice (INV)	Email	ap_customerservice.anz@aecom.com

KATE MCGRATH

- *AU Certificate of Analysis - NATA (COA)	Email	kate.mcgrath@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	kate.mcgrath@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	kate.mcgrath@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	kate.mcgrath@aecom.com
- A4 - AU Tax Invoice (INV)	Email	kate.mcgrath@aecom.com
- Chain of Custody (CoC) (COC)	Email	kate.mcgrath@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	kate.mcgrath@aecom.com
- EDI Format - EQUIS V5 URS (EQUIS_V5_URS)	Email	kate.mcgrath@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	kate.mcgrath@aecom.com
- EDI Format - XTab (XTAB)	Email	kate.mcgrath@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	kate.mcgrath@aecom.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES1537688**	Page	: 1 of 37
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Contact	: Barbara Hanna
Address	: LEVEL 21, 420 GEORGE STREET SYDNEY NSW 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: kate.mcgrath@aecom.com	E-mail	: Barbara.Hanna@alsglobal.com
Telephone	: +61 03 9653 1234	Telephone	: +61 2 8784 8555
Facsimile	: +61 03 9654 7117	Facsimile	: +61-2-8784 8500
Project	: 60477507	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: 60477507	Date Samples Received	: 01-Dec-2015 09:00
C-O-C number	: ----	Date Analysis Commenced	: 03-Dec-2015
Sampler	: JAMES TOMLINSON	Issue Date	: 08-Dec-2015 16:49
Site	: ----		
		No. of samples received	: 51
Quote number	: ----	No. of samples analysed	: 51

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

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

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

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

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

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

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

- EG005T: Poor precision was obtained for some elements on sample ES1537580 #001 and ES1537688 #020 due to sample heterogeneity. Results have been confirmed by re-extraction and reanalysis.
- EG005T: Poor precision was obtained for Copper and Iron on sample ES1537580 #001 due to sample heterogeneity. Results have been confirmed by re-extraction and reanalysis.
- EP075(SIM) :Poor duplicate precision and spike recovery due to sample heterogeneity. Confirmed by re-extraction and re-analysis.
- **EA200: As only one sample container was submitted for multiple tests, sub sampling was conducted on samples ES1537688 - 007, 009, 029, 035 & 039 prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly and NATA accreditation does not apply to analysis on these samples.**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH205_0.5-0.6**	**BH205_1.5-1.6**	**BH201_0.12-0.22**	**BH201_1.0-1.1**	**BH204_0.5-0.6**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-001**	**ES1537688-002**	**ES1537688-003**	**ES1537688-004**	**ES1537688-005**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**6.4**	**12.5**	**6.2**	**14.4**	**6.5**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**Yes**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**Ch**
Sample weight (dry)	----	0.01	g	**61.0**	**33.1**	**34.0**	**33.4**	**42.8**
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	**6**	**16**	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	**1**	<1
Chromium	7440-47-3	2	mg/kg	<2	**9**	**14**	**17**	**4**
Copper	7440-50-8	5	mg/kg	<5	**76**	**112**	**206**	**164**
Lead	7439-92-1	5	mg/kg	**26**	**212**	**757**	**4150**	**490**
Nickel	7440-02-0	2	mg/kg	<2	**4**	**7**	**31**	**6**
Zinc	7440-66-6	5	mg/kg	**38**	**153**	**375**	**757**	**201**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.1**	**0.4**	**0.6**	**0.2**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	**2.4**	<0.5	**0.5**	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	**9.2**	**0.7**	**1.2**	**1.5**
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	**0.9**	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	**6.8**	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	**66.5**	**2.3**	**6.4**	**4.6**
Anthracene	120-12-7	0.5	mg/kg	<0.5	**17.4**	**0.9**	**2.0**	**1.9**
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	**68.7**	**6.4**	**13.8**	**14.6**
Pyrene	129-00-0	0.5	mg/kg	<0.5	**60.9**	**7.1**	**15.0**	**17.1**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	**27.0**	**3.7**	**8.3**	**10.0**
Chrysene	218-01-9	0.5	mg/kg	<0.5	**22.5**	**3.7**	**8.4**	**10.4**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	**30.4**	**4.9**	**10.5**	**17.0**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	**12.6**	**1.8**	**4.1**	**6.1**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	**25.6**	**4.4**	**9.5**	**15.0**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	**13.6**	**2.3**	**4.9**	**9.2**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	**3.6**	**0.6**	**1.4**	**2.5**
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	**16.7**	**3.0**	**6.4**	**12.9**
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	**385**	**41.8**	**92.4**	**123**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH205_0.5-0.6**	**BH205_1.5-1.6**	**BH201_0.12-0.22**	**BH201_1.0-1.1**	**BH204_0.5-0.6**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-001**	**ES1537688-002**	**ES1537688-003**	**ES1537688-004**	**ES1537688-005**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	**38.0**	**6.3**	**13.8**	**22.0**
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**38.0**	**6.3**	**13.8**	**22.0**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**38.0**	**6.3**	**13.8**	**22.0**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	**710**	**120**	**240**	**400**
C29 - C36 Fraction	----	100	mg/kg	<100	**400**	**150**	**230**	**460**
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	**1110**	**270**	**470**	**860**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	**1010**	**220**	**420**	**700**
>C34 - C40 Fraction	----	100	mg/kg	<100	**230**	<100	**150**	**270**
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	**1240**	**220**	**570**	**970**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**113**	**108**	**107**	**102**	**113**
2-Chlorophenol-D4	93951-73-6	0.5	%	**102**	**99.2**	**96.6**	**94.3**	**102**
2.4.6-Tribromophenol	118-79-6	0.5	%	**77.7**	**83.7**	**80.8**	**85.8**	**91.8**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**95.1**	**95.4**	**91.7**	**89.6**	**94.2**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH205_0.5-0.6**	**BH205_1.5-1.6**	**BH201_0.12-0.22**	**BH201_1.0-1.1**	**BH204_0.5-0.6**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-001**	**ES1537688-002**	**ES1537688-003**	**ES1537688-004**	**ES1537688-005**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**108**	**108**	**106**	**102**	**108**
4-Terphenyl-d14	1718-51-0	0.5	%	**86.4**	**87.0**	**81.3**	**79.8**	**84.1**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**103**	**102**	**105**	**101**	**116**
Toluene-D8	2037-26-5	0.2	%	**95.5**	**88.4**	**95.3**	**94.1**	**88.9**
4-Bromofluorobenzene	460-00-4	0.2	%	**95.6**	**89.2**	**94.3**	**92.7**	**107**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH208_0.5-0.6**	**BH208_2.0-2.1**	**BH212_0.14-0.24**	**BH212_1.0-1.1**	**BH202_0.5-0.6**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-006**	**ES1537688-007**	**ES1537688-008**	**ES1537688-009**	**ES1537688-010**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**20.0**	**70.1**	**14.9**	**19.6**	**22.2**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**Yes**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**Am**	**-**
Sample weight (dry)	----	0.01	g	**52.9**	**5.11**	**46.1**	**21.4**	**48.5**
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**6**	**12**	**7**	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**11**	**7**	**14**	<2	<2
Copper	7440-50-8	5	mg/kg	**545**	**17**	**264**	<5	<5
Lead	7439-92-1	5	mg/kg	**678**	**72**	**467**	**8**	**13**
Nickel	7440-02-0	2	mg/kg	**10**	**6**	**10**	<2	<2
Zinc	7440-66-6	5	mg/kg	**458**	**80**	**593**	**7**	**14**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.5**	**0.5**	**0.5**	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.8	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**2.3**	<0.8	**1.6**	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.8	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	**0.6**	<0.8	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**13.3**	**3.2**	**5.0**	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	**3.9**	**1.2**	**2.0**	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**37.2**	**4.9**	**13.5**	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	**38.7**	**5.2**	**14.6**	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	**19.8**	**2.5**	**8.6**	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	**20.4**	**2.3**	**8.4**	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**28.9**	**2.5**	**12.2**	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**9.2**	**0.9**	**4.9**	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**24.2**	**2.4**	**11.1**	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**13.8**	**1.1**	**6.4**	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**3.8**	<0.8	**1.8**	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**17.9**	**1.4**	**8.3**	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**234**	**27.6**	**98.4**	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH208_0.5-0.6**	**BH208_2.0-2.1**	**BH212_0.14-0.24**	**BH212_1.0-1.1**	**BH202_0.5-0.6**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-006**	**ES1537688-007**	**ES1537688-008**	**ES1537688-009**	**ES1537688-010**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	**35.6**	**3.1**	**16.3**	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**35.6**	**3.4**	**16.3**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**35.6**	**3.6**	**16.3**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	**610**	**230**	**300**	<100	<100
C29 - C36 Fraction	----	100	mg/kg	**630**	**280**	**360**	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**1240**	**510**	**660**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**1080**	**390**	**560**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	**410**	**200**	**240**	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**1490**	**590**	**800**	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**111**	**113**	**106**	**108**	**109**
2-Chlorophenol-D4	93951-73-6	0.5	%	**101**	**102**	**98.4**	**98.6**	**100**
2.4.6-Tribromophenol	118-79-6	0.5	%	**101**	**99.7**	**95.7**	**92.6**	**86.2**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**95.0**	**95.3**	**92.8**	**92.1**	**93.6**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH208_0.5-0.6**	**BH208_2.0-2.1**	**BH212_0.14-0.24**	**BH212_1.0-1.1**	**BH202_0.5-0.6**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-006**	**ES1537688-007**	**ES1537688-008**	**ES1537688-009**	**ES1537688-010**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**107**	**109**	**108**	**108**	**109**
4-Terphenyl-d14	1718-51-0	0.5	%	**86.2**	**87.0**	**84.9**	**84.9**	**85.5**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**111**	**90.5**	**103**	**106**	**93.1**
Toluene-D8	2037-26-5	0.2	%	**105**	**84.4**	**95.8**	**81.7**	**86.0**
4-Bromofluorobenzene	460-00-4	0.2	%	**108**	**87.3**	**102**	**83.7**	**90.3**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH202_1.5-1.6	BH210_0.5-0.6	BH210_2.0-2.1	BH207_0.13-0.23	BH207_1.0-1.1
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	ES1537688-011	ES1537688-012	ES1537688-013	ES1537688-014	ES1537688-015
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	10.6	7.4	20.4	14.9	16.0
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Sample weight (dry)	----	0.01	g	27.1	45.0	23.2	45.9	19.3
APPROVED IDENTIFIER:	----	-	--	G.MORGAN	G.MORGAN	S.SPOONER	S.SPOONER	S.SPOONER
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	6
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	2	<2	11	6	10
Copper	7440-50-8	5	mg/kg	<5	<5	47	24	119
Lead	7439-92-1	5	mg/kg	<5	10	53	106	440
Nickel	7440-02-0	2	mg/kg	<2	<2	4	2	10
Zinc	7440-66-6	5	mg/kg	<5	30	92	99	378
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.1	0.1	0.9
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.5	<0.5	3.2
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	1.2
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.6	2.2	<0.5	15.1
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.8	<0.5	4.9
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.9	5.2	1.5	24.0
Pyrene	129-00-0	0.5	mg/kg	<0.5	1.8	5.2	1.7	25.8
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	0.7	2.6	1.0	12.3
Chrysene	218-01-9	0.5	mg/kg	<0.5	0.6	2.6	1.0	11.7
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	0.7	3.3	1.4	12.8
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	1.3	0.5	4.3
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	0.7	2.7	1.3	13.0
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	1.4	0.7	6.0
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	1.7
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	1.7	0.9	7.6
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	8.0	29.5	10.0	144

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH202_1.5-1.6**	**BH210_0.5-0.6**	**BH210_2.0-2.1**	**BH207_0.13-0.23**	**BH207_1.0-1.1**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-011**	**ES1537688-012**	**ES1537688-013**	**ES1537688-014**	**ES1537688-015**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	**0.8**	**3.6**	**1.7**	**18.4**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**1.1**	**3.8**	**1.9**	**18.4**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.4**	**4.1**	**2.2**	**18.4**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	**140**	**130**	**360**
C29 - C36 Fraction	----	100	mg/kg	<100	<100	**120**	<100	**280**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	**260**	**130**	**640**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	**230**	**180**	**580**
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	**160**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	**230**	**180**	**740**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**108**	**110**	**114**	**110**	**109**
2-Chlorophenol-D4	93951-73-6	0.5	%	**97.7**	**99.9**	**103**	**99.5**	**99.4**
2.4.6-Tribromophenol	118-79-6	0.5	%	**84.3**	**95.6**	**92.5**	**85.6**	**95.2**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**91.8**	**96.5**	**97.3**	**94.8**	**94.7**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH202_1.5-1.6**	**BH210_0.5-0.6**	**BH210_2.0-2.1**	**BH207_0.13-0.23**	**BH207_1.0-1.1**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-011**	**ES1537688-012**	**ES1537688-013**	**ES1537688-014**	**ES1537688-015**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**104**	**111**	**111**	**109**	**109**
4-Terphenyl-d14	1718-51-0	0.5	%	**86.2**	**88.8**	**88.6**	**88.4**	**85.4**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**103**	**101**	**90.4**	**104**	**105**
Toluene-D8	2037-26-5	0.2	%	**100**	**94.2**	**94.1**	**83.5**	**92.0**
4-Bromofluorobenzene	460-00-4	0.2	%	**102**	**97.0**	**79.5**	**93.9**	**90.9**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH206_0.0-0.1**	**BH206_1.0-1.1**	**BH200_0.1-0.2**	**BH200_1.0-1.1**	**BH203_1.0-1.1**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-016**	**ES1537688-017**	**ES1537688-018**	**ES1537688-019**	**ES1537688-020**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**13.6**	**18.0**	**6.8**	**20.0**	**34.7**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**29.5**	**52.7**	**15.8**	**31.4**	**22.3**
APPROVED IDENTIFIER:	----	-	--	**S.SPOONER**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	**20**	**9**
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	**3**	<1
Chromium	7440-47-3	2	mg/kg	**8**	**10**	**9**	**134**	**16**
Copper	7440-50-8	5	mg/kg	**45**	**36**	**37**	**1290**	**73**
Lead	7439-92-1	5	mg/kg	**184**	**221**	**38**	**1430**	**745**
Nickel	7440-02-0	2	mg/kg	**4**	**4**	**10**	**30**	**17**
Zinc	7440-66-6	5	mg/kg	**260**	**231**	**52**	**3240**	**450**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.3**	**0.3**	<0.1	**0.5**	**0.7**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	**0.7**	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**0.5**	<0.5	<0.5	**3.2**	**0.5**
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	**1.1**	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**1.3**	<0.5	**1.6**	**15.9**	**2.8**
Anthracene	120-12-7	0.5	mg/kg	**0.7**	<0.5	**0.6**	**5.9**	**1.0**
Fluoranthene	206-44-0	0.5	mg/kg	**5.1**	<0.5	**3.5**	**35.9**	**5.3**
Pyrene	129-00-0	0.5	mg/kg	**6.7**	<0.5	**3.5**	**39.4**	**5.7**
Benz(a)anthracene	56-55-3	0.5	mg/kg	**4.7**	<0.5	**1.6**	**22.1**	**2.8**
Chrysene	218-01-9	0.5	mg/kg	**4.8**	<0.5	**1.5**	**22.4**	**2.6**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**7.3**	<0.5	**2.1**	**31.6**	**3.2**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**2.3**	<0.5	**0.9**	**11.4**	**1.4**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**7.0**	<0.5	**1.8**	**28.2**	**2.9**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**3.3**	<0.5	**1.0**	**16.2**	**1.5**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**0.9**	<0.5	<0.5	**4.8**	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**4.1**	<0.5	**1.4**	**21.1**	**2.0**
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**48.7**	<0.5	**19.5**	**260**	**31.7**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH206_0.0-0.1**	**BH206_1.0-1.1**	**BH200_0.1-0.2**	**BH200_1.0-1.1**	**BH203_1.0-1.1**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-016**	**ES1537688-017**	**ES1537688-018**	**ES1537688-019**	**ES1537688-020**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	**9.7**	<0.5	**2.4**	**41.6**	**3.8**
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**9.7**	**0.6**	**2.6**	**41.6**	**4.1**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**9.7**	**1.2**	**2.9**	**41.6**	**4.3**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	**160**	<100	**170**	**780**	**280**
C29 - C36 Fraction	----	100	mg/kg	**180**	<100	**240**	**790**	**260**
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**340**	<50	**410**	**1570**	**540**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**290**	<100	**300**	**1370**	**440**
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**240**	**540**	**160**
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**290**	<50	**540**	**1910**	**600**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**106**	**109**	**107**	**108**	**110**
2-Chlorophenol-D4	93951-73-6	0.5	%	**96.5**	**102**	**98.7**	**98.7**	**103**
2.4.6-Tribromophenol	118-79-6	0.5	%	**87.2**	**72.9**	**76.2**	**91.4**	**99.7**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**91.3**	**93.8**	**90.3**	**93.5**	**92.0**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH206_0.0-0.1**	**BH206_1.0-1.1**	**BH200_0.1-0.2**	**BH200_1.0-1.1**	**BH203_1.0-1.1**
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-016**	**ES1537688-017**	**ES1537688-018**	**ES1537688-019**	**ES1537688-020**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**105**	**111**	**104**	**106**	**109**
4-Terphenyl-d14	1718-51-0	0.5	%	**83.0**	**90.4**	**82.8**	**85.2**	**85.0**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**103**	**124**	**110**	**104**	**90.7**
Toluene-D8	2037-26-5	0.2	%	**87.6**	**80.5**	**96.0**	**98.8**	**81.3**
4-Bromofluorobenzene	460-00-4	0.2	%	**89.2**	**111**	**95.2**	**96.1**	**107**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**BH203_2.0-2.1**	**BH211_0.4-0.24**	**BH211_1.0-1.1**	**BH209_0.5-0.6**	**BH209_1.5-1.6**
			Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-021**	**ES1537688-022**	**ES1537688-023**	**ES1537688-024**	**ES1537688-025**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**33.0**	**6.6**	**22.6**	**2.8**	**15.0**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**----**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**----**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**----**	**19.3**	**9.25**	**60.2**	**24.7**
APPROVED IDENTIFIER:	----	-	--	**----**	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**5**	**6**	**25**	<2	<2
Copper	7440-50-8	5	mg/kg	<5	**53**	**118**	<5	<5
Lead	7439-92-1	5	mg/kg	**151**	**143**	**928**	<5	**10**
Nickel	7440-02-0	2	mg/kg	**2**	**4**	**5**	<2	<2
Zinc	7440-66-6	5	mg/kg	**60**	**108**	**186**	<5	**22**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**1.3**	**0.4**	**0.2**	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	**0.9**	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**2.6**	<0.5	**1.3**	<0.5	**1.5**
Acenaphthene	83-32-9	0.5	mg/kg	**5.8**	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	**7.1**	<0.5	**0.8**	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**50.4**	**1.8**	**6.9**	<0.5	**5.4**
Anthracene	120-12-7	0.5	mg/kg	**15.3**	**0.6**	**2.1**	<0.5	**3.1**
Fluoranthene	206-44-0	0.5	mg/kg	**51.3**	**3.8**	**13.2**	<0.5	**22.0**
Pyrene	129-00-0	0.5	mg/kg	**55.5**	**3.9**	**13.4**	<0.5	**21.4**
Benz(a)anthracene	56-55-3	0.5	mg/kg	**27.4**	**2.2**	**7.7**	<0.5	**14.4**
Chrysene	218-01-9	0.5	mg/kg	**27.2**	**2.1**	**7.2**	<0.5	**13.5**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**28.2**	**3.0**	**10.6**	<0.5	**23.7**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**9.9**	**1.0**	**3.5**	<0.5	**7.3**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**24.2**	**2.5**	**9.0**	<0.5	**20.1**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**11.4**	**1.3**	**4.5**	<0.5	**11.8**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**3.5**	<0.5	**1.3**	<0.5	**3.2**
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**14.4**	**1.6**	**5.3**	<0.5	**14.2**
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**335**	**23.8**	**86.8**	<0.5	**162**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH203_2.0-2.1**	**BH211_0.4-0.24**	**BH211_1.0-1.1**	**BH209_0.5-0.6**	**BH209_1.5-1.6**
			Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-021**	**ES1537688-022**	**ES1537688-023**	**ES1537688-024**	**ES1537688-025**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	**35.8**	**3.3**	**13.0**	<0.5	**29.3**
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**35.8**	**3.5**	**13.0**	**0.6**	**29.3**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**35.8**	**3.8**	**13.0**	**1.2**	**29.3**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	**31**	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	**1560**	<100	**290**	<100	**380**
C29 - C36 Fraction	----	100	mg/kg	**890**	<100	**330**	<100	**500**
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**2450**	<50	**620**	<50	**880**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	**32**	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	**32**	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	**100**	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**2200**	**160**	**530**	<100	**740**
>C34 - C40 Fraction	----	100	mg/kg	**520**	<100	**240**	<100	**360**
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**2820**	**160**	**770**	<50	**1100**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	**100**	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	**1**	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**82.2**	**110**	**109**	**112**	**111**
2-Chlorophenol-D4	93951-73-6	0.5	%	**76.2**	**98.7**	**97.0**	**107**	**97.3**
2.4.6-Tribromophenol	118-79-6	0.5	%	**69.0**	**90.0**	**88.1**	**88.2**	**83.0**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**66.2**	**89.2**	**87.3**	**95.8**	**87.3**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH203_2.0-2.1**	**BH211_0.4-0.24**	**BH211_1.0-1.1**	**BH209_0.5-0.6**	**BH209_1.5-1.6**
			Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-021**	**ES1537688-022**	**ES1537688-023**	**ES1537688-024**	**ES1537688-025**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**75.2**	**103**	**97.8**	**109**	**99.8**
4-Terphenyl-d14	1718-51-0	0.5	%	**60.0**	**82.9**	**79.2**	**87.5**	**81.6**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**77.5**	**90.2**	**83.3**	**91.0**	**86.2**
Toluene-D8	2037-26-5	0.2	%	**83.1**	**89.7**	**85.7**	**93.7**	**86.1**
4-Bromofluorobenzene	460-00-4	0.2	%	**93.9**	**103**	**98.3**	**106**	**97.6**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH219_0.0-0.1**	**BH219__1.5-1.6**	**BH216_0.5-0.6**	**BH216_1.5-1.6**	**BH215_0.5-0.25**
			Client sampling date / time	[25-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-026**	**ES1537688-027**	**ES1537688-028**	**ES1537688-029**	**ES1537688-030**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**6.6**	**8.8**	**6.7**	**16.1**	**11.5**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**35.4**	**34.9**	**23.7**	**22.2**	**44.8**
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**	**S.SPOONER**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	**11**	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**9**	<2	**4**	**27**	**9**
Copper	7440-50-8	5	mg/kg	**9**	**13**	**44**	**364**	**5**
Lead	7439-92-1	5	mg/kg	**19**	**32**	**110**	**729**	**16**
Nickel	7440-02-0	2	mg/kg	**6**	<2	**4**	**21**	**5**
Zinc	7440-66-6	5	mg/kg	**36**	**78**	**99**	**646**	**33**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	**0.2**	**1.2**	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	**1.2**	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	**4.0**	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	**1.6**	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	**9.5**	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	**10.3**	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	**5.9**	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	**5.9**	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	**8.5**	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	**3.4**	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	**7.5**	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	**4.3**	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	**1.3**	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	**5.5**	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	<0.5	**68.9**	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH219_0.0-0.1**	**BH219__1.5-1.6**	**BH216_0.5-0.6**	**BH216_1.5-1.6**	**BH215_0.5-0.25**
			Client sampling date / time	[25-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-026**	**ES1537688-027**	**ES1537688-028**	**ES1537688-029**	**ES1537688-030**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	**11.1**	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**11.1**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**11.1**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	**290**	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	**330**	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	<50	**620**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	**530**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	**210**	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	<50	<50	**740**	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**112**	**108**	**114**	**108**	**113**
2-Chlorophenol-D4	93951-73-6	0.5	%	**101**	**96.0**	**99.4**	**96.6**	**103**
2.4.6-Tribromophenol	118-79-6	0.5	%	**87.2**	**82.4**	**79.7**	**81.5**	**85.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**90.9**	**87.6**	**93.1**	**89.0**	**94.9**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH219_0.0-0.1**	**BH219__1.5-1.6**	**BH216_0.5-0.6**	**BH216_1.5-1.6**	**BH215_0.5-0.25**
			Client sampling date / time	[25-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[26-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-026**	**ES1537688-027**	**ES1537688-028**	**ES1537688-029**	**ES1537688-030**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**105**	**97.3**	**105**	**101**	**109**
4-Terphenyl-d14	1718-51-0	0.5	%	**82.8**	**81.1**	**84.3**	**81.8**	**84.2**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**88.0**	**90.6**	**95.4**	**88.8**	**89.0**
Toluene-D8	2037-26-5	0.2	%	**89.8**	**94.0**	**92.4**	**88.6**	**91.2**
4-Bromofluorobenzene	460-00-4	0.2	%	**100**	**104**	**102**	**95.6**	**99.9**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH215_2.0-2.1**	**BH223_0.16-0.26**	**BH223_1.0-1.1**	**BH220_0.5-0.6**	**BH220A_2.0-2.1**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-031**	**ES1537688-032**	**ES1537688-033**	**ES1537688-034**	**ES1537688-035**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**21.8**	**23.6**	**15.4**	**2.0**	**14.3**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**21.1**	**34.0**	**13.5**	**31.8**	**24.4**
APPROVED IDENTIFIER:	----	-	--	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	**11**	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**3**	<2	**40**	**3**	<2
Copper	7440-50-8	5	mg/kg	**18**	<5	**756**	**18**	**15**
Lead	7439-92-1	5	mg/kg	**33**	<5	**166**	**32**	**27**
Nickel	7440-02-0	2	mg/kg	**2**	<2	**88**	**3**	<2
Zinc	7440-66-6	5	mg/kg	**57**	<5	**194**	**46**	**21**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.1**	**0.3**	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	**2.2**	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	**0.6**	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**0.5**	<0.5	**2.5**	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	**0.5**	<0.5	**2.4**	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	**1.1**	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	**1.0**	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	**1.3**	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	**0.5**	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	**1.2**	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	**0.6**	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	**0.8**	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**1.0**	<0.5	**14.2**	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH215_2.0-2.1**	**BH223_0.16-0.26**	**BH223_1.0-1.1**	**BH220_0.5-0.6**	**BH220A_2.0-2.1**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-031**	**ES1537688-032**	**ES1537688-033**	**ES1537688-034**	**ES1537688-035**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	**1.6**	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**1.8**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**2.1**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	**100**	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**100**	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**130**	**120**	**140**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**130**	**120**	**140**	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**98.5**	**97.8**	**106**	**112**	**107**
2-Chlorophenol-D4	93951-73-6	0.5	%	**96.6**	**89.4**	**99.1**	**102**	**98.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**84.6**	**67.6**	**86.8**	**77.2**	**86.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**91.0**	**87.0**	**92.6**	**95.3**	**91.9**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**BH215_2.0-2.1**	**BH223_0.16-0.26**	**BH223_1.0-1.1**	**BH220_0.5-0.6**	**BH220A_2.0-2.1**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-031**	**ES1537688-032**	**ES1537688-033**	**ES1537688-034**	**ES1537688-035**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**99.2**	**92.6**	**104**	**104**	**102**
4-Terphenyl-d14	1718-51-0	0.5	%	**80.4**	**79.1**	**81.3**	**86.8**	**79.9**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**80.8**	**87.0**	**86.6**	**96.0**	**96.5**
Toluene-D8	2037-26-5	0.2	%	**82.1**	**86.5**	**83.7**	**90.1**	**91.7**
4-Bromofluorobenzene	460-00-4	0.2	%	**94.6**	**89.8**	**92.8**	**102**	**99.8**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH217_0.5-0.6**	**BH217_2.4-2.5**	**BH222_0.5-0.6**	**BH222_2.0-2.1**	**BH221_1.0-1.1**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-036**	**ES1537688-037**	**ES1537688-038**	**ES1537688-039**	**ES1537688-040**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**9.6**	**20.2**	**10.4**	**6.4**	**4.5**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**20.8**	**22.0**	**18.2**	**27.8**	**50.6**
APPROVED IDENTIFIER:	----	-	--	**S.SPOONER**	**S.SPOONER**	**G.MORGAN**	**G.MORGAN**	**G.MORGAN**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**3**	<2	**16**	<2	**9**
Copper	7440-50-8	5	mg/kg	**9**	<5	**82**	<5	**25**
Lead	7439-92-1	5	mg/kg	**219**	**6**	**115**	<5	**58**
Nickel	7440-02-0	2	mg/kg	**2**	<2	**59**	<2	**7**
Zinc	7440-66-6	5	mg/kg	**35**	**49**	**501**	<5	**83**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.1**	<0.1	**0.1**	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	**0.6**	<0.5	**0.7**
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	**0.6**	<0.5	**0.8**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.5**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	**1.2**	<0.5	**2.6**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH217_0.5-0.6**	**BH217_2.4-2.5**	**BH222_0.5-0.6**	**BH222_2.0-2.1**	**BH221_1.0-1.1**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-036**	**ES1537688-037**	**ES1537688-038**	**ES1537688-039**	**ES1537688-040**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	**0.6**	**0.9**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	**120**	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	**330**	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	**450**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	**370**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**210**	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	<50	**580**	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**111**	**104**	**103**	**110**	**110**
2-Chlorophenol-D4	93951-73-6	0.5	%	**102**	**98.4**	**93.4**	**99.9**	**99.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**85.9**	**89.9**	**79.7**	**80.5**	**82.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**96.1**	**94.7**	**89.8**	**94.2**	**98.2**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH217_0.5-0.6**	**BH217_2.4-2.5**	**BH222_0.5-0.6**	**BH222_2.0-2.1**	**BH221_1.0-1.1**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-036**	**ES1537688-037**	**ES1537688-038**	**ES1537688-039**	**ES1537688-040**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**108**	**104**	**97.5**	**108**	**107**
4-Terphenyl-d14	1718-51-0	0.5	%	**84.5**	**82.4**	**80.4**	**83.3**	**83.8**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**94.1**	**83.5**	**94.0**	**93.2**	**93.4**
Toluene-D8	2037-26-5	0.2	%	**90.8**	**83.5**	**89.4**	**88.9**	**90.7**
4-Bromofluorobenzene	460-00-4	0.2	%	**97.6**	**89.5**	**99.0**	**97.7**	**102**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**BH221_2.4-2.5**	**BH213_0.5-0.6**	**BH214_1.0-1.1**	**BH214_2.0-2.1**	**BH218_0.15-0.25**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-041**	**ES1537688-042**	**ES1537688-043**	**ES1537688-044**	**ES1537688-045**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**24.6**	**7.2**	**4.4**	**9.3**	**5.0**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**Yes**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**Ch**	**-**
Sample weight (dry)	----	0.01	g	**40.9**	**28.2**	**27.8**	**22.1**	**36.3**
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**	**S.SPOONER**
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	**11**	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	**4**	<1
Chromium	7440-47-3	2	mg/kg	<2	<2	**4**	**100**	**7**
Copper	7440-50-8	5	mg/kg	**22**	<5	**10**	**701**	**12**
Lead	7439-92-1	5	mg/kg	**27**	**5**	**63**	**965**	**27**
Nickel	7440-02-0	2	mg/kg	**3**	<2	**2**	**105**	**4**
Zinc	7440-66-6	5	mg/kg	**69**	<5	**53**	**629**	**44**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	**1.2**	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	**1.6**	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	**0.9**	**3.9**	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	**1.1**	**4.2**	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	**0.6**	**2.6**	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	**0.6**	**2.5**	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	**1.2**	**4.0**	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	**1.6**	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	**1.1**	**3.3**	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	**0.6**	**2.1**	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	**0.8**	**2.8**	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	**6.9**	**28.6**	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH221_2.4-2.5	BH213_0.5-0.6	BH214_1.0-1.1	BH214_2.0-2.1	BH218_0.15-0.25
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1537688-041	ES1537688-042	ES1537688-043	ES1537688-044	ES1537688-045
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	**1.4**	**4.4**	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**1.6**	**4.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.9**	**4.9**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	**330**	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	**100**	**410**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	**100**	**740**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	**110**	**630**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	**200**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	**110**	**830**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**73.8**	**74.2**	**72.6**	**73.2**	**76.9**
2-Chlorophenol-D4	93951-73-6	0.5	%	**80.5**	**81.1**	**78.1**	**79.4**	**81.9**
2.4.6-Tribromophenol	118-79-6	0.5	%	**64.2**	**36.6**	**59.3**	**60.9**	**51.6**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**93.4**	**90.2**	**88.0**	**91.6**	**89.8**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH221_2.4-2.5**	**BH213_0.5-0.6**	**BH214_1.0-1.1**	**BH214_2.0-2.1**	**BH218_0.15-0.25**
			Client sampling date / time	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]	[26-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-041**	**ES1537688-042**	**ES1537688-043**	**ES1537688-044**	**ES1537688-045**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**96.8**	**95.9**	**92.7**	**93.2**	**93.6**
4-Terphenyl-d14	1718-51-0	0.5	%	**96.2**	**93.4**	**90.1**	**97.2**	**96.7**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**108**	**119**	**111**	**115**	**112**
Toluene-D8	2037-26-5	0.2	%	**89.7**	**99.6**	**112**	**97.5**	**104**
4-Bromofluorobenzene	460-00-4	0.2	%	**91.6**	**109**	**76.8**	**75.8**	**101**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BH218_2.0-2.1**	**QC208**	**QC214**	**QC216**	**QC210**
			Client sampling date / time	[26-Nov-2015]	[24-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[24-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537688-046**	**ES1537688-047**	**ES1537688-048**	**ES1537688-049**	**ES1537688-050**
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**26.7**	**7.7**	**10.5**	**5.8**	**9.0**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	----	----	----	----
Asbestos Type	1332-21-4	-	--	**-**	----	----	----	----
Sample weight (dry)	----	0.01	g	**14.2**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	**3**	**5**	**4**	**4**	----
Copper	7440-50-8	5	mg/kg	**24**	**42**	**26**	**35**	----
Lead	7439-92-1	5	mg/kg	**46**	**142**	**46**	**89**	----
Nickel	7440-02-0	2	mg/kg	**3**	**4**	**4**	**4**	----
Zinc	7440-66-6	5	mg/kg	**91**	**95**	**73**	**89**	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.4**	<0.1	**0.2**	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	**2.3**	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	**4.6**	**1.5**	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	**4.9**	**1.8**	**0.5**	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	**2.7**	**0.9**	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	**2.5**	**0.9**	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	**3.3**	**1.8**	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	**1.2**	**0.6**	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	**2.8**	**1.7**	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	**1.4**	**1.1**	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	**1.8**	**1.5**	<0.5	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	**27.5**	**11.8**	**0.5**	----

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	BH218_2.0-2.1	QC208	QC214	QC216	QC210
Client sampling date / time				[26-Nov-2015]	[24-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[24-Nov-2015]
				ES1537688-046	ES1537688-047	ES1537688-048	ES1537688-049	ES1537688-050
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	**3.7**	**2.2**	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**4.0**	**2.4**	**0.6**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**4.2**	**2.7**	**1.2**	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg	<100	**120**	**110**	<100	----
C29 - C36 Fraction	----	100	mg/kg	<100	**110**	**160**	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	**230**	**270**	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg	**110**	**200**	**210**	<100	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**130**	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**110**	**200**	**340**	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**75.6**	**79.5**	**81.0**	**76.7**	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**81.3**	**85.2**	**85.0**	**82.0**	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**65.7**	**62.4**	**70.5**	**62.3**	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**90.5**	**93.5**	**92.9**	**90.6**	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH218_2.0-2.1**	**QC208**	**QC214**	**QC216**	**QC210**
			Client sampling date / time	[26-Nov-2015]	[24-Nov-2015]	[25-Nov-2015]	[25-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit	**ES1537688-046**	**ES1537688-047**	**ES1537688-048**	**ES1537688-049**	**ES1537688-050**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**94.5**	**96.1**	**98.1**	**94.5**	**----**
4-Terphenyl-d14	1718-51-0	0.5	%	**98.6**	**97.1**	**98.8**	**98.8**	**----**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**110**	**128**	**112**	**116**	**101**
Toluene-D8	2037-26-5	0.2	%	**91.5**	**102**	**95.6**	**102**	**97.8**
4-Bromofluorobenzene	460-00-4	0.2	%	**74.9**	**79.2**	**102**	**105**	**103**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL)**

			Client sample ID	**QC217**	----	----	----	----
			Client sampling date / time	[25-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1537688-051**	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**22.4**	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	----	----	----
Asbestos Type	1332-21-4	-	--	----	----	----	----	----
Sample weight (dry)	----	0.01	g	----	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	----	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	----	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	----	----	----	----	----
Chromium	7440-47-3	2	mg/kg	----	----	----	----	----
Copper	7440-50-8	5	mg/kg	----	----	----	----	----
Lead	7439-92-1	5	mg/kg	----	----	----	----	----
Nickel	7440-02-0	2	mg/kg	----	----	----	----	----
Zinc	7440-66-6	5	mg/kg	----	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	----	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**QC217**	----	----	----	----
			Client sampling date / time	[25-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1537688-051**	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	----	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	----	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	----	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	----	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**QC217**	**----**	**----**	**----**	**----**
			Client sampling date / time	[25-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1537688-051**	**--------**	**--------**	**--------**	**--------**
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
Anthracene-d10	1719-06-8	0.5	%	**----**	**----**	**----**	**----**	**----**
4-Terphenyl-d14	1718-51-0	0.5	%	**----**	**----**	**----**	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**93.3**	**----**	**----**	**----**	**----**
Toluene-D8	2037-26-5	0.2	%	**87.2**	**----**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	0.2	%	**93.4**	**----**	**----**	**----**	**----**

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	*Client sample ID - Client sampling date / time*	*Analytical Results*
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH205_0.5-0.6 - [23-Nov-2015]	Pale brown sandy soil with slag debris.
EA200: Description	BH205_1.5-1.6 - [23-Nov-2015]	Pale grey - brown clay soil.
EA200: Description	BH201_0.12-0.22 - [23-Nov-2015]	Pale grey - brown sandy soil.
EA200: Description	BH201_1.0-1.1 - [23-Nov-2015]	Mid grey - brown clay soil.
EA200: Description	BH204_0.5-0.6 - [23-Nov-2015]	Mid brown sandy soil with one loose bundle of friable asbestos fibres approx 1 x 0.5 x 0.5 mm.
EA200: Description	BH208_0.5-0.6 - [23-Nov-2015]	Mid brown sandy soil.
EA200: Description	BH208_2.0-2.1 - [23-Nov-2015]	Dark brown sandy soil with slag debris.
EA200: Description	BH212_0.14-0.24 - [23-Nov-2015]	Mid brown sandy soil.
EA200: Description	BH212_1.0-1.1 - [23-Nov-2015]	Pale brown sandy soil with one fragment of friable asbestos fibre board approx 3 x 3 x 1 mm.
EA200: Description	BH202_0.5-0.6 - [23-Nov-2015]	Pale brown sandy soil.
EA200: Description	BH202_1.5-1.6 - [23-Nov-2015]	Pale brown sandy soil.
EA200: Description	BH210_0.5-0.6 - [23-Nov-2015]	Pale brown sandy soil.
EA200: Description	BH210_2.0-2.1 - [23-Nov-2015]	Mid brown clay soil with grey rocks.
EA200: Description	BH207_0.13-0.23 - [23-Nov-2015]	Mid brown sandy soil with grey rocks.
EA200: Description	BH207_1.0-1.1 - [23-Nov-2015]	Mid brown clay soil with grey rocks.
EA200: Description	BH206_0.0-0.1 - [23-Nov-2015]	Dark grey sandy soil with grey rocks.
EA200: Description	BH206_1.0-1.1 - [23-Nov-2015]	Pale brown sandy soil.
EA200: Description	BH200_0.1-0.2 - [24-Nov-2015]	Pale brown sandy soil.
EA200: Description	BH200_1.0-1.1 - [24-Nov-2015]	Mid brown clay soil with grey rocks.
EA200: Description	BH203_1.0-1.1 - [24-Nov-2015]	Mid brown clay soil with grey rocks.
EA200: Description	BH211_0.4-0.24 - [24-Nov-2015]	Mid brown sandy soil with grey rocks.
EA200: Description	BH211_1.0-1.1 - [24-Nov-2015]	Dark grey sandy soil with grey rocks.
EA200: Description	BH209_0.5-0.6 - [25-Nov-2015]	Mid brown sandy soil with grey rocks.
EA200: Description	BH209_1.5-1.6 - [25-Nov-2015]	Mid brown sandy soil with grey rocks.
EA200: Description	BH219_0.0-0.1 - [25-Nov-2015]	Pale brown sandy soil.
EA200: Description	BH219__1.5-1.6 - [25-Nov-2015]	Mid grey sandy soil.
EA200: Description	BH216_0.5-0.6 - [25-Nov-2015]	Mid brown clay soil.
EA200: Description	BH216_1.5-1.6 - [25-Nov-2015]	Mid brown clay soil.
EA200: Description	BH215_0.5-0.25 - [26-Nov-2015]	Mid grey sandy soil with grey rocks.
EA200: Description	BH215_2.0-2.1 - [26-Nov-2015]	Dark grey sandy soil with grey rocks.
EA200: Description	BH223_0.16-0.26 - [26-Nov-2015]	Mid grey sandy soil with grey rocks.
EA200: Description	BH223_1.0-1.1 - [26-Nov-2015]	Mid grey sandy soil with grey rocks.
EA200: Description	BH220_0.5-0.6 - [26-Nov-2015]	Mid grey sandy soil with grey rocks.
EA200: Description	BH220A_2.0-2.1 - [26-Nov-2015]	Dark grey sandy soil with grey rocks.
EA200: Description	BH217_0.5-0.6 - [26-Nov-2015]	Mid grey sandy soil with grey rocks.
EA200: Description	BH217_2.4-2.5 - [26-Nov-2015]	Dark grey sandy soil with grey rocks.
EA200: Description	BH222_0.5-0.6 - [26-Nov-2015]	Pale grey sandy soil.
EA200: Description	BH222_2.0-2.1 - [26-Nov-2015]	Pale grey sandy soil.

Sub-Matrix: **SOIL**

Method: Compound	*Client sample ID - Client sampling date / time*	*Analytical Results*
EA200: Description	BH221_1.0-1.1 - [26-Nov-2015]	Pale grey sandy soil.
EA200: Description	BH221_2.4-2.5 - [26-Nov-2015]	Pale grey sandy soil.
EA200: Description	BH213_0.5-0.6 - [26-Nov-2015]	Pale brown sandy soil with grey rocks.
EA200: Description	BH214_1.0-1.1 - [26-Nov-2015]	Mid grey sandy soil with grey rocks.
EA200: Description	BH214_2.0-2.1 - [26-Nov-2015]	Mid brown sandy soil with one loose bundle of friable asbestos fibres approx 2 x 1 x 0.5 mm.
EA200: Description	BH218_0.15-0.25 - [26-Nov-2015]	Pale grey sandy soil with grey rocks.
EA200: Description	BH218_2.0-2.1 - [26-Nov-2015]	Dark grey clay soil.

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1537688**

Client : **AECOM Australia Pty Ltd**
Contact : MS KATE MCGRATH
Address : LEVEL 21, 420 GEORGE STREET
SYDNEY NSW 2000
E-mail : kate.mcgrath@aecom.com
Telephone : +61 03 9653 1234
Facsimile : +61 03 9654 7117
Project : 60477507
Order number : 60477507
C-O-C number : ----
Sampler : JAMES TOMLINSON
Site : ----
Quote number : ----

Page : 1 of 18

Laboratory : Environmental Division Sydney
Contact : Barbara Hanna
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail : Barbara.Hanna@alsglobal.com
Telephone : +61 2 8784 8555
Facsimile : +61-2-8784 8500
QC Level : NEPM 2013 B3 & ALS QC Standard
Date Samples Received : 01-Dec-2015
Date Analysis Commenced : 03-Dec-2015
Issue Date : 08-Dec-2015
No. of samples received : 51
No. of samples analysed : 51

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

This Quality Control Report contains the following information:

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

NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

WORLD RECOGNISED
ACCREDITATION

Signatories

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

Signatories	*Position*	*Accreditation Category*
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix**: SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 297576)									
ES1537688-002	BH205_1.5-1.6	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	12.5	10.4	17.9	0% - 50%
ES1537688-013	BH210_2.0-2.1	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	20.4	21.4	4.73	0% - 20%
EA055: Moisture Content (QC Lot: 297577)									
ES1537688-022	BH211_0.4-0.24	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	6.6	9.0	31.7	No Limit
ES1537688-033	BH223_1.0-1.1	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	15.4	17.0	9.23	0% - 50%
EA055: Moisture Content (QC Lot: 297578)									
ES1537688-042	BH213_0.5-0.6	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	7.2	5.5	27.3	No Limit
ES1537692-004	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	7.5	8.8	15.7	No Limit
EA055: Moisture Content (QC Lot: 298058)									
ES1537287-007	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	5.5	5.4	0.00	No Limit
ES1537829-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	6.1	6.2	1.95	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 298750)									
ES1537580-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	14	35.5	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	18	15	22.5	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	199	# 154	25.6	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	34	27	25.0	No Limit
ES1537688-005	BH204_0.5-0.6	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	164	145	12.3	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	490	435	11.8	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	201	188	6.55	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 298751)									
ES1537688-010	BH202_0.5-0.6	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	13	12	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	14	14	0.00	No Limit
ES1537688-020	BH203_1.0-1.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 298751) - continued									
ES1537688-020	BH203_1.0-1.1	EG005T: Chromium	7440-47-3	2	mg/kg	16	22	32.1	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	17	9	63.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	8	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	73	96	26.6	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	745	802	7.35	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	450	# 605	29.5	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 298753)									
ES1537688-030	BH215_0.5-0.25	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	9	<2	126	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	5	<2	88.7	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	<5	107	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	33	<5	148	No Limit
ES1537688-040	BH221_1.0-1.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	9	6	39.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	4	46.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	25	21	16.5	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	58	54	7.15	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	83	64	26.4	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 298749)									
ES1537580-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.4	<0.1	117	No Limit
ES1537688-005	BH204_0.5-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 298752)									
ES1537688-010	BH202_0.5-0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1537688-020	BH203_1.0-1.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.7	0.8	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 298754)									
ES1537688-030	BH215_0.5-0.25	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1537688-040	BH221_1.0-1.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 297731)									
ES1537688-001	BH205_0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 297731) - continued									
ES1537688-001	BH205_0.5-0.6	EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1537688-011	BH202_1.5-1.6	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 297738)									
ES1537688-021	BH203_2.0-2.1	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	5.8	4.7	20.4	0% - 50%
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	2.6	2.8	7.34	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	15.3	# 12.5	20.2	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	27.4	24.0	13.2	0% - 20%
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	24.2	23.1	4.84	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	35.8	34.1	4.94	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 297738) - continued									
ES1537688-021	BH203_2.0-2.1	EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	28.2	27.2	3.61	0% - 20%
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	14.4	13.8	4.36	0% - 20%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	9.9	9.7	2.30	0% - 50%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	27.2	23.0	16.6	0% - 20%
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	3.5	3.4	4.68	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	51.3	47.2	8.41	0% - 20%
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	7.1	5.9	18.5	0% - 50%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	11.4	11.2	2.15	0% - 20%
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	0.9	1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	50.4	41.4	19.6	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	55.5	48.2	14.1	0% - 20%
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	335	299	11.4	0% - 20%
ES1537688-031	BH215_2.0-2.1	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.0	<0.5	66.7	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 297754)									
ES1537287-004	Anonymous	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 297754) - continued									
ES1537287-004	Anonymous	EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1537688-049	QC216	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	0.6	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.5	0.6	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	0.5	1.2	82.4	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297586)									
ES1537688-001	BH205_0.5-0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1537688-011	BH202_1.5-1.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297587)									
ES1537688-021	BH203_2.0-2.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297587) - continued									
ES1537688-031	BH215_2.0-2.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297591)									
ES1537688-041	BH221_2.4-2.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1537688-049	QC216	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297732)									
ES1537688-001	BH205_0.5-0.6	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537688-011	BH202_1.5-1.6	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297739)									
ES1537688-021	BH203_2.0-2.1	EP071: C15 - C28 Fraction	----	100	mg/kg	1560	1750	11.5	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	890	980	10.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537688-031	BH215_2.0-2.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 297755)									
ES1537287-004	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537688-049	QC216	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 298192)									
EP1516578-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297586)									
ES1537688-001	BH205_0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1537688-011	BH202_1.5-1.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297587)									
ES1537688-021	BH203_2.0-2.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1537688-031	BH215_2.0-2.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297591)									
ES1537688-041	BH221_2.4-2.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1537688-049	QC216	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297732)									
ES1537688-001	BH205_0.5-0.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297732) - continued									
ES1537688-001	BH205_0.5-0.6	EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537688-011	BH202_1.5-1.6	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297739)									
ES1537688-021	BH203_2.0-2.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	2200	2330	5.58	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	520	510	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	100	110	0.00	No Limit
ES1537688-031	BH215_2.0-2.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	130	<100	25.9	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 297755)									
ES1537287-004	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537688-049	QC216	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 298192)									
EP1516578-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 297586)									
ES1537688-001	BH205_0.5-0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1537688-011	BH202_1.5-1.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 297587)									
ES1537688-021	BH203_2.0-2.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 297587) - continued									
ES1537688-021	BH203_2.0-2.1	EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	1	1	0.00	No Limit
ES1537688-031	BH215_2.0-2.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 297591)									
ES1537688-041	BH221_2.4-2.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1537688-049	QC216	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 298192)									
EP1516578-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 298750)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	111	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	106	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	102	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	114	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	109	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	111	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	114	80	122
EG005T: Total Metals by ICP-AES (QCLot: 298751)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	106	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	103	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	97.4	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	110	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	101	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	108	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	109	80	122
EG005T: Total Metals by ICP-AES (QCLot: 298753)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	110	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	105	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	100	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	109	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	107	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	109	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	111	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 298749)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	75.8	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 298752)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	75.2	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 298754)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	77.3	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297731)								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	96.9	73	127
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	88.8	72	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	94.8	77	127

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297731) - continued								
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	86.2	69	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	93.5	70	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	86.3	68	116
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	91.1	63	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	96.4	74	126
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	99.9	75	127
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	92.8	62	118
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	90.3	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	93.9	72	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	92.6	61	121
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	96.5	77	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	97.2	75	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	91.5	74	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297738)								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	104	73	127
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	100	72	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	106	77	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	96.9	69	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	104	70	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	95.7	68	116
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	93.2	63	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	100.0	74	126
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	100.0	75	127
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	95.9	62	118
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	102	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	101	72	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	95.9	61	121
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	104	77	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	103	75	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	104	74	128
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297754)								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	87.4	73	127
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	88.9	72	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	89.5	77	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	86.5	69	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	83.6	70	126

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297754) - continued								
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	87.4	68	116
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	85.2	63	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	88.8	74	126
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	89.1	75	127
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	80.6	62	118
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	86.8	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	86.4	72	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	82.7	61	121
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	92.4	77	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	90.3	75	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	87.5	74	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297586)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	82.7	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297587)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	96.6	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297591)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	95.5	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297732)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	105	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	120	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	105	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297739)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	103	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	121	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	113	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297755)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	101	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	117	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	108	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 298192)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	84.8	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297586)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	82.9	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297587)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	96.9	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297591)								

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297591) - continued								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	100	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297732)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	115	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	118	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	95.8	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297739)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	111	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	119	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	94.5	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297755)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	109	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	119	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	97.9	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 298192)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	83.5	68	128
EP080: BTEXN (QCLot: 297586)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	83.8	62	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	79.9	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	82.1	66	118
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	96.6	63	119
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	78.8	68	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	80.8	67	121
EP080: BTEXN (QCLot: 297587)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	88.7	62	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.3	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	99.1	66	118
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.2	63	119
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	98.8	68	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	98.6	67	121
EP080: BTEXN (QCLot: 297591)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	79.9	62	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	87.9	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	94.5	66	118
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	94.0	63	119
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	90.3	68	120

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 297591) - continued								
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	80.9	67	121
EP080: BTEXN (QCLot: 298192)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	85.0	62	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	86.3	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	85.9	66	118
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	92.2	63	119
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	90.2	68	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	91.6	67	121

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 298750)							
ES1537580-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	104	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	104	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	102	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	103	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.9	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	99.3	70	130
EG005T: Total Metals by ICP-AES (QCLot: 298751)							
ES1537688-010	BH202_0.5-0.6	EG005T: Arsenic	7440-38-2	50 mg/kg	110	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	109	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	108	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	108	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	109	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	108	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	108	70	130
EG005T: Total Metals by ICP-AES (QCLot: 298753)							
ES1537688-030	BH215_0.5-0.25	EG005T: Arsenic	7440-38-2	50 mg/kg	109	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	109	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	108	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	112	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	*SpikeRecovery(%)*	*Recovery Limits (%)*	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG005T: Total Metals by ICP-AES (QCLot: 298753) - continued							
ES1537688-030	BH215_0.5-0.25	EG005T: Lead	7439-92-1	250 mg/kg	108	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	108	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	105	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 298749)							
ES1537580-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	84.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 298752)							
ES1537688-010	BH202_0.5-0.6	EG035T: Mercury	7439-97-6	5 mg/kg	94.0	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 298754)							
ES1537688-030	BH215_0.5-0.25	EG035T: Mercury	7439-97-6	5 mg/kg	92.5	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297731)							
ES1537688-001	BH205_0.5-0.6	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	98.0	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	103	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297738)							
ES1537688-021	BH203_2.0-2.1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	73.6	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	# 7.82	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 297754)							
ES1537287-004	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	81.0	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	88.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297586)							
ES1537688-001	BH205_0.5-0.6	EP080: C6 - C9 Fraction	----	32.5 mg/kg	120	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297587)							
ES1537688-021	BH203_2.0-2.1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	122	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297591)							
ES1537688-041	BH221_2.4-2.5	EP080: C6 - C9 Fraction	----	32.5 mg/kg	112	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297732)							
ES1537688-001	BH205_0.5-0.6	EP071: C10 - C14 Fraction	----	523 mg/kg	91.0	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	104	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	124	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297739)							
ES1537688-021	BH203_2.0-2.1	EP071: C10 - C14 Fraction	----	523 mg/kg	89.0	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	129	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	118	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297755)							
ES1537287-004	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	88.0	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	101	53	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 297755) - continued							
ES1537287-004	Anonymous	EP071: C29 - C36 Fraction	----	1714 mg/kg	119	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 298192)							
EP1516578-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	101	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297586)							
ES1537688-001	BH205_0.5-0.6	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	119	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297587)							
ES1537688-021	BH203_2.0-2.1	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	114	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297591)							
ES1537688-041	BH221_2.4-2.5	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	108	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297732)							
ES1537688-001	BH205_0.5-0.6	EP071: >C10 - C16 Fraction	----	860 mg/kg	92.7	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	112	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	117	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297739)							
ES1537688-021	BH203_2.0-2.1	EP071: >C10 - C16 Fraction	----	860 mg/kg	84.1	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	112	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	113	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 297755)							
ES1537287-004	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	88.9	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	112	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	113	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 298192)							
EP1516578-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	97.1	70	130
EP080: BTEXN (QCLot: 297586)							
ES1537688-001	BH205_0.5-0.6	EP080: Benzene	71-43-2	2.5 mg/kg	78.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	89.1	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	92.7	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	91.8	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	92.5	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	81.8	70	130
EP080: BTEXN (QCLot: 297587)							
ES1537688-021	BH203_2.0-2.1	EP080: Benzene	71-43-2	2.5 mg/kg	89.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	101	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	100	70	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080: BTEXN (QCLot: 297587) - continued							
ES1537688-021	BH203_2.0-2.1	EP080: Naphthalene	91-20-3	2.5 mg/kg	99.6	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	101	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	94.2	70	130
EP080: BTEXN (QCLot: 297591)							
ES1537688-041	BH221_2.4-2.5	EP080: Benzene	71-43-2	2.5 mg/kg	79.2	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	84.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	87.9	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	77.4	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.0	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	88.1	70	130
EP080: BTEXN (QCLot: 298192)							
EP1516578-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	80.2	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	87.3	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	88.2	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	77.6	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	89.0	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	91.2	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1537688**	Page	: 1 of 11
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Telephone	: +61 2 8784 8555
Project	: 60477507	Date Samples Received	: 01-Dec-2015
Site	: ----	Issue Date	: 08-Dec-2015
Sampler	: JAMES TOMLINSON	No. of samples received	: 51
Order number	: 60477507	No. of samples analysed	: 51

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	ES1537580--001	Anonymous	**Copper**	7440-50-8	25.6 %	0% - 20%	**RPD exceeds LOR based limits**
EG005T: Total Metals by ICP-AES	ES1537688--020	BH203_1.0-1.1	**Zinc**	7440-66-6	29.5 %	0% - 20%	**RPD exceeds LOR based limits**
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1537688--021	BH203_2.0-2.1	**Anthracene**	120-12-7	20.2 %	0% - 20%	**RPD exceeds LOR based limits**
Matrix Spike (MS) Recoveries							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1537688--021	BH203_2.0-2.1	**Pyrene**	129-00-0	7.82 %	70-130%	**Recovery less than lower data quality objective**

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)S: Phenolic Compound Surrogates	ES1537688-042	BH213_0.5-0.6	**2.4.6-Tribromophenol**	118-79-6	36.6 %	40-138 %	**Recovery less than lower data quality objective**
EP075(SIM)T: PAH Surrogates	ES1537688-021	BH203_2.0-2.1	**2-Fluorobiphenyl**	321-60-8	66.2 %	70-122 %	**Recovery less than lower data quality objective**
EP075(SIM)T: PAH Surrogates	ES1537688-021	BH203_2.0-2.1	**4-Terphenyl-d14**	1718-51-0	60.0 %	65-129 %	**Recovery less than lower data quality objective**

Analysis Holding Time Compliance

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

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

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

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH208_2.0-2.1, BH212_0.14-0.24, BH212_1.0-1.1, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**----**	----	----	**03-Dec-2015**	07-Dec-2015	✓
Soil Glass Jar - Unpreserved (EA055-103) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1, BH203_2.0-2.1, BH211_0.4-0.24, BH211_1.0-1.1, QC208, QC210	**24-Nov-2015**	**----**	----	----	**03-Dec-2015**	08-Dec-2015	✓
Soil Glass Jar - Unpreserved (EA055-103) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6, BH216_1.5-1.6, QC214, QC216, QC217	**25-Nov-2015**	**----**	----	----	**03-Dec-2015**	09-Dec-2015	✓
Soil Glass Jar - Unpreserved (EA055-103) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH220A_2.0-2.1, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH222_2.0-2.1, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**----**	----	----	**03-Dec-2015**	10-Dec-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	**Sample Date**	*Extraction / Preparation*			*Analysis*		
Container / *Client Sample ID(s)*		**Date extracted**	*Due for extraction*	*Evaluation*	**Date analysed**	*Due for analysis*	*Evaluation*
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - Separate bag received (EA200) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH212_0.14-0.24, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**----**	----	----	**07-Dec-2015**	21-May-2016	✓
Snap Lock Bag - Separate bag received (EA200) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1, BH211_0.4-0.24, BH211_1.0-1.1	**24-Nov-2015**	**----**	----	----	**07-Dec-2015**	22-May-2016	✓
Snap Lock Bag - Separate bag received (EA200) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6	**25-Nov-2015**	**----**	----	----	**07-Dec-2015**	23-May-2016	✓
Snap Lock Bag - Separate bag received (EA200) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**----**	----	----	**07-Dec-2015**	24-May-2016	✓
Snap Lock Bag - Subsampled by ALS (EA200) BH208_2.0-2.1, BH212_1.0-1.1	**23-Nov-2015**	**----**	----	----	**07-Dec-2015**	21-May-2016	✓
Snap Lock Bag - Subsampled by ALS (EA200) BH216_1.5-1.6	**25-Nov-2015**	**----**	----	----	**07-Dec-2015**	23-May-2016	✓
Snap Lock Bag - Subsampled by ALS (EA200) BH220A_2.0-2.1, BH222_2.0-2.1	**26-Nov-2015**	**----**	----	----	**07-Dec-2015**	24-May-2016	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method **Container** / Client Sample ID(s)	**Sample Date**	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	**Date analysed**	Due for analysis	Evaluation
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH208_2.0-2.1, BH212_0.14-0.24, BH212_1.0-1.1, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**04-Dec-2015**	21-May-2016	✓	**04-Dec-2015**	21-May-2016	✓
Soil Glass Jar - Unpreserved (EG005T) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1, BH203_2.0-2.1, BH211_0.4-0.24, BH211_1.0-1.1, QC208	**24-Nov-2015**	**04-Dec-2015**	22-May-2016	✓	**04-Dec-2015**	22-May-2016	✓
Soil Glass Jar - Unpreserved (EG005T) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6, BH216_1.5-1.6, QC214, QC216	**25-Nov-2015**	**04-Dec-2015**	23-May-2016	✓	**04-Dec-2015**	23-May-2016	✓
Soil Glass Jar - Unpreserved (EG005T) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH220A_2.0-2.1, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH222_2.0-2.1, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**04-Dec-2015**	24-May-2016	✓	**04-Dec-2015**	24-May-2016	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method **Container** / Client Sample ID(s)	**Sample Date**	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	**Date analysed**	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH208_2.0-2.1, BH212_0.14-0.24, BH212_1.0-1.1, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**04-Dec-2015**	21-Dec-2015	✓	**04-Dec-2015**	21-Dec-2015	✓
Soil Glass Jar - Unpreserved (EG035T) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1, BH203_2.0-2.1, BH211_0.4-0.24, BH211_1.0-1.1, QC208	**24-Nov-2015**	**04-Dec-2015**	22-Dec-2015	✓	**04-Dec-2015**	22-Dec-2015	✓
Soil Glass Jar - Unpreserved (EG035T) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6, BH216_1.5-1.6, QC214, QC216	**25-Nov-2015**	**04-Dec-2015**	23-Dec-2015	✓	**04-Dec-2015**	23-Dec-2015	✓
Soil Glass Jar - Unpreserved (EG035T) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH220A_2.0-2.1, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH222_2.0-2.1, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**04-Dec-2015**	24-Dec-2015	✓	**04-Dec-2015**	24-Dec-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH208_2.0-2.1, BH212_0.14-0.24, BH212_1.0-1.1, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**03-Dec-2015**	07-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP071) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1, BH203_2.0-2.1, BH211_0.4-0.24, BH211_1.0-1.1, QC208	**24-Nov-2015**	**03-Dec-2015**	08-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP071) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6, BH216_1.5-1.6, QC214, QC216	**25-Nov-2015**	**03-Dec-2015**	09-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP071) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH220A_2.0-2.1, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH222_2.0-2.1, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**03-Dec-2015**	10-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method **Container** / Client Sample ID(s)	**Sample Date**	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	**Date analysed**	Due for analysis	Evaluation
EP075(SIM)T: PAH Surrogates							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH208_2.0-2.1, BH212_0.14-0.24, BH212_1.0-1.1, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**03-Dec-2015**	07-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1, BH203_2.0-2.1, BH211_0.4-0.24, BH211_1.0-1.1, QC208	**24-Nov-2015**	**03-Dec-2015**	08-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6, BH216_1.5-1.6, QC214, QC216	**25-Nov-2015**	**03-Dec-2015**	09-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH220A_2.0-2.1, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH222_2.0-2.1, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**03-Dec-2015**	10-Dec-2015	✓	**04-Dec-2015**	12-Jan-2016	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP080S: TPH(V)/BTEX Surrogates							
Soil Glass Jar - Unpreserved (EP080) BH205_0.5-0.6, BH205_1.5-1.6, BH201_0.12-0.22, BH201_1.0-1.1, BH204_0.5-0.6, BH208_0.5-0.6, BH208_2.0-2.1, BH212_0.14-0.24, BH212_1.0-1.1, BH202_0.5-0.6, BH202_1.5-1.6, BH210_0.5-0.6, BH210_2.0-2.1, BH207_0.13-0.23, BH207_1.0-1.1, BH206_0.0-0.1, BH206_1.0-1.1	**23-Nov-2015**	**03-Dec-2015**	07-Dec-2015	✓	**04-Dec-2015**	07-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080) BH200_0.1-0.2, BH200_1.0-1.1, BH203_1.0-1.1	**24-Nov-2015**	**03-Dec-2015**	08-Dec-2015	✓	**04-Dec-2015**	08-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080) BH203_2.0-2.1, BH211_0.4-0.24, BH211_1.0-1.1, QC208	**24-Nov-2015**	**03-Dec-2015**	08-Dec-2015	✓	**07-Dec-2015**	08-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080) QC210	**24-Nov-2015**	**04-Dec-2015**	08-Dec-2015	✓	**04-Dec-2015**	08-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080) BH209_0.5-0.6, BH209_1.5-1.6, BH219_0.0-0.1, BH219__1.5-1.6, BH216_0.5-0.6, BH216_1.5-1.6, QC214, QC216	**25-Nov-2015**	**03-Dec-2015**	09-Dec-2015	✓	**07-Dec-2015**	09-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080) QC217	**25-Nov-2015**	**04-Dec-2015**	09-Dec-2015	✓	**04-Dec-2015**	09-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080) BH215_0.5-0.25, BH215_2.0-2.1, BH223_0.16-0.26, BH223_1.0-1.1, BH220_0.5-0.6, BH220A_2.0-2.1, BH217_0.5-0.6, BH217_2.4-2.5, BH222_0.5-0.6, BH222_2.0-2.1, BH221_1.0-1.1, BH221_2.4-2.5, BH213_0.5-0.6, BH214_1.0-1.1, BH214_2.0-2.1, BH218_0.15-0.25, BH218_2.0-2.1	**26-Nov-2015**	**03-Dec-2015**	10-Dec-2015	✓	**07-Dec-2015**	10-Dec-2015	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055-103	SOIL	In-house. A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES1538462**
Client : **AECOM Australia Pty Ltd**
Contact : MS KATE MCGRATH
Address : LEVEL 21, 420 GEORGE STREET
SYDNEY NSW 2000
E-mail : kate.mcgrath@aecom.com
Telephone : +61 03 9653 1234
Facsimile : +61 03 9654 7117
Project : 60477507
Order number : 60477507
C-O-C number : ----
Sampler : JAMES TOMLINSON
Site : ----

Quote number : ----

Page : 1 of 4
Laboratory : Environmental Division Sydney
Contact : Barbara Hanna
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail : Barbara.Hanna@alsglobal.com
Telephone : +61 2 8784 8555
Facsimile : +61-2-8784 8500
QC Level : NEPM 2013 B3 & ALS QC Standard
Date Samples Received : 09-Dec-2015 15:45
Date Analysis Commenced : 11-Dec-2015
Issue Date : 14-Dec-2015 17:30

No. of samples received : 5
No. of samples analysed : 5

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

WORLD RECOGNISED
ACCREDITATION

Signatories

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

Signatories	*Position*	*Accreditation Category*
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BH205_1.5-1.6**	**BH201_1.0-1.1**	**BH208_0.5-0.6**	**BH200_1.0-1.1**	**BH203_2.0-2.1**
			Client sampling date / time	23-Nov-2015 15:00	23-Nov-2015 15:00	23-Nov-2015 15:00	24-Nov-2015 15:00	24-Nov-2015 15:00
Compound	CAS Number	LOR	Unit	**ES1538462-001**	**ES1538462-002**	**ES1538462-003**	**ES1538462-004**	**ES1538462-005**
				Result	Result	Result	Result	Result
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	**9.8**	**7.6**	**7.5**	**8.2**	**8.7**
After HCl pH	----	0.1	pH Unit	**1.7**	**1.6**	**1.5**	**1.8**	**2.0**
Extraction Fluid Number	----	1	-	**1**	**1**	**1**	**1**	**1**
Final pH	----	0.1	pH Unit	**5.4**	**5.0**	**4.9**	**5.2**	**5.4**

Analytical Results

Sub-Matrix: **TCLP LEACHATE**
(Matrix: **WATER**)

			Client sample ID	**BH205_1.5-1.6**	**BH201_1.0-1.1**	**BH208_0.5-0.6**	**BH200_1.0-1.1**	**BH203_2.0-2.1**
			Client sampling date / time	23-Nov-2015 15:00	23-Nov-2015 15:00	23-Nov-2015 15:00	24-Nov-2015 15:00	24-Nov-2015 15:00
Compound	*CAS Number*	*LOR*	*Unit*	**ES1538462-001**	**ES1538462-002**	**ES1538462-003**	**ES1538462-004**	**ES1538462-005**
				Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	**0.8**	**0.3**	**0.3**	**1.1**	**0.4**
Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1	µg/L	**3.1**	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	**7.0**
Fluorene	86-73-7	1	µg/L	**2.3**	<1.0	<1.0	<1.0	**4.9**
Phenanthrene	85-01-8	1	µg/L	**6.3**	<1.0	<1.0	**1.7**	**15.2**
Anthracene	120-12-7	1	µg/L	**1.1**	<1.0	<1.0	<1.0	**2.9**
Fluoranthene	206-44-0	1	µg/L	**1.2**	<1.0	<1.0	<1.0	**4.2**
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	**3.5**
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L	**14.0**	<0.5	<0.5	**1.7**	**37.7**
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1	%	**25.6**	**27.2**	**22.3**	**21.7**	**23.4**
2-Chlorophenol-D4	93951-73-6	1	%	**55.1**	**54.2**	**45.8**	**47.6**	**49.0**
2.4.6-Tribromophenol	118-79-6	1	%	**74.6**	**72.6**	**57.2**	**52.6**	**61.8**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1	%	**71.5**	**72.8**	**60.4**	**58.5**	**65.9**
Anthracene-d10	1719-06-8	1	%	**83.9**	**89.7**	**75.4**	**71.5**	**90.0**
4-Terphenyl-d14	1718-51-0	1	%	**73.2**	**72.2**	**63.1**	**59.4**	**64.4**

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1538462**	Page	: 1 of 5
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Contact	: Barbara Hanna
Address	: LEVEL 21, 420 GEORGE STREET SYDNEY NSW 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: kate.mcgrath@aecom.com	E-mail	: Barbara.Hanna@alsglobal.com
Telephone	: +61 03 9653 1234	Telephone	: +61 2 8784 8555
Facsimile	: +61 03 9654 7117	Facsimile	: +61-2-8784 8500
Project	: 60477507	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: 60477507	Date Samples Received	: 09-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 11-Dec-2015
Sampler	: JAMES TOMLINSON	Issue Date	: 14-Dec-2015
Site	: ----	No. of samples received	: 5
Quote number	: ----	No. of samples analysed	: 5

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

This Quality Control Report contains the following information:

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

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Shobhna Chandra	Metals Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005C: Leachable Metals by ICPAES (QC Lot: 308545)									
ES1538452-001	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1538504-001	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EN33: TCLP Leach (QCLot: 306931)								
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 308545)								
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	97.6	80	118
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	0.1 mg/L	102	83	115
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 308136)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	87.7	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	86.8	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	95.2	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	92.0	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	96.8	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	92.4	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	97.1	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	105	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	96.2	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	96.0	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	99.9	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	91.5	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	95.4	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	75.2	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	95.8	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	102	63	118

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Recovery Limits (%)

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 308545)							
ES1538452-002	Anonymous	EG005C: Lead	7439-92-1	1 mg/L	101	70	130
		EG005C: Nickel	7440-02-0	1 mg/L	101	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1538462**	Page	: 1 of 4
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Telephone	: +61 2 8784 8555
Project	: 60477507	Date Samples Received	: 09-Dec-2015
Site	: ----	Issue Date	: 14-Dec-2015
Sampler	: JAMES TOMLINSON	No. of samples received	: 5
Order number	: 60477507	No. of samples analysed	: 5

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

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

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

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

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG005C: Leachable Metals by ICPAES							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C) BH205_1.5-1.6, BH201_1.0-1.1, BH208_0.5-0.6, BH200_1.0-1.1, BH203_2.0-2.1	**11-Dec-2015**	**14-Dec-2015**	08-Jun-2016	✓	**14-Dec-2015**	08-Jun-2016	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH205_1.5-1.6, BH201_1.0-1.1, BH208_0.5-0.6, BH200_1.0-1.1, BH203_2.0-2.1	**11-Dec-2015**	**14-Dec-2015**	18-Dec-2015	✓	**14-Dec-2015**	23-Jan-2016	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB)							
TCLP for Non & Semivolatile Analytes	EN33a	2	12	**16.67**	**5.88**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	12	**16.67**	**7.84**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	12	**16.67**	**3.92**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	**8.33**	**3.92**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.

08/12

Chain of Custody

AECOM

AECOM Australia

Level 8

420 George Street, Sydney

Phone 0403 420 282

E-mail: kate.mcgrath@aecom.com

Laboratory Details

Lab. Name: ALS Environn

Lab. Address: Woodpark Road, Smithfield

Contact Name:

Lab. Ref:

Tel: 02 8784 8555

Fax:

Preliminary Report by:

Final Report by:

Lab Quote:

Sampled By: James Tomlinson

AECOM Project No: 60477507

Project Name: Green Square Aquatic Centre

PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email : ______	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request										Other
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	~~TPH~~ C6-C9 TRH	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC's	PAH	
SNR 1	MW200	30/11/2015		X				X		Vial, amber, Metals	X ↓	↓				↓			↓		
2	MW201	30/11/2015		X				X		Vial, amber, Metals											
3	MW202	30/11/2015		X				X		Vial, amber, Metals											
4	MW203	30/11/2015		X				X		Vial, amber, Metals											
5	MW205	30/11/2015		X				X		Vial, amber, Metals											
6	QC226	30/11/2015		X				X		Vial, amber, Metals											
7	QC228	30/11/2015		X				X		Vial, amber, Metals											
8	QC229	30/11/15		X				X													

Environmental Division
Sydney
Work Order Reference
ES1537668

Telephone : + 61-2-8784 8555

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No.

Esky ID

Relinquished by:	James Tomlinson	Signed:	Date: 30/11/15	Relinquished by:		Signed:	Date:
Recieved by:	Frank	Signed:	Date: 30/11/15 155	Recieved by:		Signed:	Date:

Printed copies of this document are uncontrolled

Page 1 of 1

Revision: Jun 08

BMS-PM-DV-F046

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES1537668**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Contact	: Barbara Hanna
Address	: LEVEL 21, 420 GEORGE STREET SYDNEY NSW 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: kate.mcgrath@aecom.com	E-mail	: Barbara.Hanna@alsglobal.com
Telephone	: +61 02 8934 0000	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 8934 0001	Facsimile	: +61-2-8784 8500
Project	: 60477507 GREEN SQUARE AQUATIC CENTRE	Page	: 1 of 2
Order number	: 60477507	Quote number	: EB2015AECOMAU0580 (EN/004/15)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: JAMES TOMLINSON		

Dates

Date Samples Received	: 01-Dec-2015 3:15 PM	Issue Date	: 01-Dec-2015
Client Requested Due Date	: 08-Dec-2015	Scheduled Reporting Date	: **08-Dec-2015**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not intact.
No. of coolers/boxes	: 1	Temperature	: 3.8'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 7 / 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exist.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP074DEFG VOC - Fumigants, Hal Aliphatics, Hal Aromatics,	WATER - W-04 TRH/BTEXN	WATER - W-05 TRH/BTEXN/8 Metals
ES1537668-002	[30-Nov-2015]	MW201	✓		✓
ES1537668-003	[30-Nov-2015]	MW202	✓		✓
ES1537668-004	[30-Nov-2015]	MW203	✓		✓
ES1537668-005	[30-Nov-2015]	MW205	✓		✓
ES1537668-006	[30-Nov-2015]	QC226	✓		✓
ES1537668-007	[30-Nov-2015]	QC228	✓		✓
ES1537668-008	[30-Nov-2015]	CQ229		✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

AP_CUSTOMER SERVICE ANZ

- A4 - AU Tax Invoice (INV)	Email	ap_customerservice.anz@aecom.com

KATE MCGRATH

- *AU Certificate of Analysis - NATA (COA)	Email	kate.mcgrath@aecom.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	kate.mcgrath@aecom.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	kate.mcgrath@aecom.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	kate.mcgrath@aecom.com
- A4 - AU Tax Invoice (INV)	Email	kate.mcgrath@aecom.com
- Chain of Custody (CoC) (COC)	Email	kate.mcgrath@aecom.com
- EDI Format - ENMRG (ENMRG)	Email	kate.mcgrath@aecom.com
- EDI Format - EQUIS V5 URS (EQUIS_V5_URS)	Email	kate.mcgrath@aecom.com
- EDI Format - ESDAT (ESDAT)	Email	kate.mcgrath@aecom.com
- EDI Format - XTab (XTAB)	Email	kate.mcgrath@aecom.com
- Electronic SRN for EQuIS (ESRN_EQUIS)	Email	kate.mcgrath@aecom.com

CERTIFICATE OF ANALYSIS

Work Order	: **ES1537668**	Page	: 1 of 8
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Contact	: Barbara Hanna
Address	: LEVEL 21, 420 GEORGE STREET SYDNEY NSW 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: kate.mcgrath@aecom.com	E-mail	: Barbara.Hanna@alsglobal.com
Telephone	: +61 02 8934 0000	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 8934 0001	Facsimile	: +61-2-8784 8500
Project	: 60477507 GREEN SQUARE AQUATIC CENTRE	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: 60477507	Date Samples Received	: 01-Dec-2015 15:15
C-O-C number	: ----	Date Analysis Commenced	: 02-Dec-2015
Sampler	: JAMES TOMLINSON	Issue Date	: 08-Dec-2015 17:29
Site	: ----		
		No. of samples received	: 7
Quote number	: ----	No. of samples analysed	: 7

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

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

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

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

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

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

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

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**MW201**	**MW202**	**MW203**	**MW205**	**QC226**
			Client sampling date / time	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537668-002**	**ES1537668-003**	**ES1537668-004**	**ES1537668-005**	**ES1537668-006**
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.004**	**0.008**	<0.001	<0.001	**0.008**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	**0.002**	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.002**	<0.001	<0.001	**0.002**
Lead	7439-92-1	0.001	mg/L	**0.008**	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.008**	**0.009**	**0.010**	**0.009**	**0.009**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	<5	<5	<5
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	<5	<5	<5
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	<5	<5	<5
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	<50	<50	<50
Chloromethane	74-87-3	50	µg/L	<50	<50	<50	<50	<50
Vinyl chloride	75-01-4	50	µg/L	<50	<50	<50	<50	<50
Bromomethane	74-83-9	50	µg/L	<50	<50	<50	<50	<50
Chloroethane	75-00-3	50	µg/L	<50	<50	<50	<50	<50
Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	<50	<50	<50
1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	<5	<5	<5
Iodomethane	74-88-4	5	µg/L	<5	<5	<5	<5	<5
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	<5	<5	<5
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	**31**	<5	<5
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	<5	<5	<5
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	<5	<5	<5
Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	<5	<5	<5
Trichloroethene	79-01-6	5	µg/L	<5	<5	**97**	<5	<5
Dibromomethane	74-95-3	5	µg/L	<5	<5	<5	<5	<5
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**MW201**	**MW202**	**MW203**	**MW205**	**QC226**
			Client sampling date / time	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537668-002**	**ES1537668-003**	**ES1537668-004**	**ES1537668-005**	**ES1537668-006**
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	<5	<5	<5
Tetrachloroethene	127-18-4	5	µg/L	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	<5	<5	<5
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	<5	<5	<5
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	<5
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	<5
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	<5
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	<5
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	<5
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	<5
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	<5
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	<5
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	<5
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	<5
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	<5
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	<5
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	<5
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	<5
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	<5
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	<5
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	<5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	**130**	<20	<20
C10 - C14 Fraction	----	50	µg/L	**70**	**160**	<50	<50	**120**
C15 - C28 Fraction	----	100	µg/L	**760**	**860**	<100	<100	**900**
C29 - C36 Fraction	----	50	µg/L	**260**	**760**	<50	<50	**940**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	**1090**	**1780**	<50	<50	**1960**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	**130**	<20	<20

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**MW201**	**MW202**	**MW203**	**MW205**	**QC226**
			Client sampling date / time	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]	[30-Nov-2015]
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537668-002**	**ES1537668-003**	**ES1537668-004**	**ES1537668-005**	**ES1537668-006**
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	**130**	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	**150**	<100	<100	**140**
>C16 - C34 Fraction	----	100	µg/L	**920**	**1360**	<100	<100	**1520**
>C34 - C40 Fraction	----	100	µg/L	**110**	**270**	<100	<100	**300**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	**1030**	**1780**	<100	<100	**1960**
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	**175**	<5	<5	**173**
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	**111**	**110**	**113**	**113**	**112**
Toluene-D8	2037-26-5	5	%	**115**	**123**	**126**	**115**	**124**
4-Bromofluorobenzene	460-00-4	5	%	**105**	**108**	**111**	**105**	**107**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**108**	**106**	**110**	**110**	**108**
Toluene-D8	2037-26-5	2	%	**106**	**113**	**116**	**106**	**114**
4-Bromofluorobenzene	460-00-4	2	%	**104**	**107**	**110**	**105**	**106**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**QC228**	**CQ229**	**----**	**----**	**----**
			Client sampling date / time	[30-Nov-2015]	[30-Nov-2015]	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537668-007**	**ES1537668-008**	--------	--------	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	----	----	----	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	----	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	----	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	----	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	----	----	----	----
Chloromethane	74-87-3	50	µg/L	<50	----	----	----	----
Vinyl chloride	75-01-4	50	µg/L	<50	----	----	----	----
Bromomethane	74-83-9	50	µg/L	<50	----	----	----	----
Chloroethane	75-00-3	50	µg/L	<50	----	----	----	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	----	----	----	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	----	----	----	----
Iodomethane	74-88-4	5	µg/L	<5	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	----	----	----	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	----	----	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	----	----	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	----	----	----	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	----	----	----	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	----	----	----	----
Trichloroethene	79-01-6	5	µg/L	<5	----	----	----	----
Dibromomethane	74-95-3	5	µg/L	<5	----	----	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**QC228**	**CQ229**	**----**	**----**	**----**
			Client sampling date / time	[30-Nov-2015]	[30-Nov-2015]	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537668-007**	**ES1537668-008**	**--------**	**--------**	**--------**
				Result	Result	Result	Result	Result
EP074E: Halogenated Aliphatic Compounds - Continued								
1.3-Dichloropropane	142-28-9	5	µg/L	<5	----	----	----	----
Tetrachloroethene	127-18-4	5	µg/L	<5	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	----	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	----	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	----	----	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	----	----	----	----
Pentachloroethane	76-01-7	5	µg/L	<5	----	----	----	----
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	----	----	----	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	----	----	----	----
Bromobenzene	108-86-1	5	µg/L	<5	----	----	----	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	----	----	----	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	----	----	----	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	----	----	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	----	----	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	----	----	----	----
1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	----	----	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	----	----	----	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	----	----	----	----
Bromodichloromethane	75-27-4	5	µg/L	<5	----	----	----	----
Dibromochloromethane	124-48-1	5	µg/L	<5	----	----	----	----
Bromoform	75-25-2	5	µg/L	<5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Client sample ID*	**QC228**	**CQ229**	**----**	**----**	**----**
			Client sampling date / time	[30-Nov-2015]	[30-Nov-2015]	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1537668-007**	**ES1537668-008**	--------	--------	--------
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	<100	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	<100	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	17060-07-0	5	%	**119**	----	----	----	----
Toluene-D8	2037-26-5	5	%	**120**	----	----	----	----
4-Bromofluorobenzene	460-00-4	5	%	**111**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**116**	**108**	----	----	----
Toluene-D8	2037-26-5	2	%	**110**	**105**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	**109**	**103**	----	----	----

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1537668**	Page	: 1 of 10
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Contact	: Barbara Hanna
Address	: LEVEL 21, 420 GEORGE STREET SYDNEY NSW 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: kate.mcgrath@aecom.com	E-mail	: Barbara.Hanna@alsglobal.com
Telephone	: +61 02 8934 0000	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 8934 0001	Facsimile	: +61-2-8784 8500
Project	: 60477507 GREEN SQUARE AQUATIC CENTRE	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: 60477507	Date Samples Received	: 01-Dec-2015
C-O-C number	: ----	Date Analysis Commenced	: 02-Dec-2015
Sampler	: JAMES TOMLINSON	Issue Date	: 08-Dec-2015
Site	: ----	No. of samples received	: 7
Quote number	: ----	No. of samples analysed	: 7

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

This Quality Control Report contains the following information:

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

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited
Laboratory 825

Accredited for
compliance with
ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

General Comments

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

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

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

Key :

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 299487)									
ES1537600-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 299491)									
ES1537668-003	MW202	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP074D: Fumigants (QC Lot: 298240)									
ES1537853-001	Anonymous	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
ES1537668-002	MW201	EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
EP074E: Halogenated Aliphatic Compounds (QC Lot: 298240)									
ES1537853-001	Anonymous	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 298240) - continued									
ES1537853-001	Anonymous	EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
ES1537668-002	MW201	EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP074E: Halogenated Aliphatic Compounds (QC Lot: 298240) - continued									
ES1537668-002	MW201	EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 298240)									
ES1537853-001	Anonymous	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
ES1537668-002	MW201	EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
EP074G: Trihalomethanes (QC Lot: 298240)									
ES1537853-001	Anonymous	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
ES1537668-002	MW201	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 298239)									
ES1537668-002	MW201	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 298239)									
ES1537668-002	MW201	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 298239)									
ES1537668-002	MW201	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 298239) - continued									
ES1537668-002	MW201	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 299487)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.2	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.6	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.8	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.5	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 299491)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.6	83	105
EP074D: Fumigants (QCLot: 298240)								
EP074: 1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	96.9	69	117
EP074: 1.2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	96.7	76	118
EP074: 2.2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	96.0	68	122
EP074: cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	92.4	62	120
EP074: trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	105	60	114
EP074E: Halogenated Aliphatic Compounds (QCLot: 298240)								
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	98.2	66	114
EP074: 1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	96.7	67	119
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	104	70	124
EP074: 1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	104	72	126
EP074: 1.1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	97.5	74	120
EP074: 1.1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	99.3	70	124
EP074: 1.1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	96.1	73	119
EP074: 1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	106	74	126
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	92.6	66	136
EP074: 1.2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	101	73	123
EP074: 1.3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	97.4	71	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	101	56	140
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	95.6	62	120
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	108	61	139
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	90.7	67	130
EP074: cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	97.7	77	119
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	98.1	71	128
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	100	73	119

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 298240) - continued								
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	101	61	138
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	97.1	58	130
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	95.8	70	128
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	98.3	72	126
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	95.4	72	124
EP074: trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	95.8	74	118
EP074: trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	95.2	60	120
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	96.7	76	118
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	102	69	131
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	96.8	69	129
EP074F: Halogenated Aromatic Compounds (QCLot: 298240)								
EP074: 1.2.3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	96.0	67	123
EP074: 1.2.4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	97.1	61	125
EP074: 1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	98.9	75	117
EP074: 1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	96.4	75	117
EP074: 1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	95.9	74	118
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	95.2	73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	96.0	73	119
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	97.5	76	116
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	98.5	79	117
EP074G: Trihalomethanes (QCLot: 298240)								
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	99.9	64	118
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	98.0	74	126
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	96.9	72	120
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	98.5	65	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 296149)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	95.2	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	94.2	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	97.2	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 298239)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	103	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 296149)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	86.5	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	91.7	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	99.9	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 298239)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	105	75	127
EP080: BTEXN (QCLot: 298239)								

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 298239) - continued								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	101	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	102	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	101	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.8	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	105	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	100	69	123

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 299487)							
ES1537640-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	99.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	108	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	99.4	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	97.9	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	104	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	101	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 299491)							
ES1537668-002	MW201	EG035F: Mercury	7439-97-6	0.01 mg/L	97.2	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 298240)							
ES1537668-002	MW201	EP074: 1.1-Dichloroethene	75-35-4	25 µg/L	88.2	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	97.2	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 298240)							
ES1537668-002	MW201	EP074: Chlorobenzene	108-90-7	25 µg/L	109	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 298239)							
ES1537668-002	MW201	EP080: C6 - C9 Fraction	----	325 µg/L	122	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 298239)							
ES1537668-002	MW201	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	120	70	130
EP080: BTEXN (QCLot: 298239)							
ES1537668-002	MW201	EP080: Benzene	71-43-2	25 µg/L	95.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	99.7	70	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080: BTEXN (QCLot: 298239) - continued							
ES1537668-002	MW201	EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	95.7	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	102	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	101	70	130
		EP080: Toluene	108-88-3	25 µg/L	88.7	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1537668**	Page	: 1 of 5
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: MS KATE MCGRATH	Telephone	: +61 2 8784 8555
Project	: 60477507 GREEN SQUARE AQUATIC CENTRE	Date Samples Received	: 01-Dec-2015
Site	: ----	Issue Date	: 08-Dec-2015
Sampler	: JAMES TOMLINSON	No. of samples received	: 7
Order number	: 60477507	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method		*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)			*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
MW201, MW203, QC226,	MW202, MW205, QC228	**30-Nov-2015**	**----**	----	----	**04-Dec-2015**	28-May-2016	✓
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
MW201, MW203, QC226,	MW202, MW205, QC228	**30-Nov-2015**	**----**	----	----	**07-Dec-2015**	28-Dec-2015	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
MW201, MW203, QC226, CQ229	MW202, MW205, QC228,	**30-Nov-2015**	**02-Dec-2015**	07-Dec-2015	✓	**04-Dec-2015**	11-Jan-2016	✓
EP074D: Fumigants								
Amber VOC Vial - Sulfuric Acid (EP074)								
MW201, MW203, QC226,	MW202, MW205, QC228	**30-Nov-2015**	**03-Dec-2015**	14-Dec-2015	✓	**03-Dec-2015**	14-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method ***Container*** / *Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EP080S: TPH(V)/BTEX Surrogates							
Amber VOC Vial - Sulfuric Acid (EP080) MW201, MW202, MW203, MW205, QC226, QC228, CQ229	**30-Nov-2015**	**03-Dec-2015**	14-Dec-2015	✓	**03-Dec-2015**	14-Dec-2015	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Volatile Organic Compounds	EP074	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

ANZ

Chain of Custody Form

AECOM

Q4AN(EV)-335-FM60

AECOM - Sydney
Level 21, 420 George Street
Sydney NSW 2000 Australia

Tel: 61 2 8934 0000
Fax: 61 2 8934 0001
Email: Kate.mcgrath@aecom.com

Laboratory Details
Lab. Name: Envirolabs
Lab. Address: 12 Ashley St. chatswood
Contact Name:
Lab. Ref:
Tel: 9910 6200
Fax:
Preliminary Report by:
Final Report by:
Lab Quote No:

Project Name: Green Square Aquatic Centre **Project Number:** 60477507

Purchase Order Number:

Sample collected by:

Sample Results to be returned to: Kate.mcgrath@aecom.com

Specifications:

	(Tick)		
1. Urgent TAT required? (please circle: 24hr 48hr ____ days)	☐ Yes	☐ No	☐ N/A
2. Fast TAT Guarantee Required?	☐ Yes	☐ No	☐ N/A
3. Is any sediment layer present in waters to be excluded from extractions?	☐ Yes	☐ No	☐ N/A
4. Special storage requirements?	☐ Yes	☐ No	☐ N/A
5. Preservation requirements?	☐ Yes	☐ No	☐ N/A
6. Other requirements?	☐ Yes	☐ No	☐ N/A

7. Report Format ☐ Fax ☐ Hard copy ☐ Email

8. Project Manager: tel:

Analysis Request

Lab. ID	Sample ID	Sampling Date /Time	Matrix			Preservation				Container	Hold	Heavy metals (8)	TRH/BTEX	PAHs
			soil	water	other	filt'ed	acid	ice	other	(No. & type)				
1	QC205	29/4/15	X					X		Jar	X			
2	QC207	29/4/15										X	X	X
3	QC209	29/11/15										X	X	X
4	QC213	25/11/15												
5	QC215	25/11/15									X			
6	QC219	25/11/15									X			
7	QC221	26/11/15									X			
8	QC223	28/11/15	✓							✓		X	X	X
											✓			

Remarks & comments

(8)
Arsenic
Cadmium
Chromium
Copper
Lead
Nickel
Zinc
Mercury

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No. 138126
Date Received: 27/11/15
Time Received: 13:30
Received by: DF
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished By:
Name: James Tomlinson Date: 27/11/15
of: AECOM Time:

Received by: ELS
Name: Daniel Ford Date: 27/11
of: ELS Time: 13:30

Received in good condition?	Yes/No/NA	Method of Shipment	
Samples received chilled?	Yes/No/NA	Consignment Note No.	
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand

Relinquished By:
Name: Date:
of: Time:

Received by:
Name: Date:
of: Time:

Received in good condition?	Yes/No/NA	Method of Shipment	
Samples received chilled?	Yes/No/NA	Consignment Note No.	
	Yes/No/NA	Transport Co:	☐ Courier ☐ Postal ☐ By Hand

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

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

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

CERTIFICATE OF ANALYSIS 138129

Client:

AECOM Australia Pty Ltd (Sydney)
PO Box Q410
QVB Post Office
Sydney
NSW 1230

Attention: Kate Mcgrath

Sample log in details:

Your Reference:	**60477507, Green Square Aquatic Centre**	
No. of samples:	8 Soils	
Date samples received / completed instructions received	27/11/15 /	27/11/15

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	4/12/15 /	4/12/15
Date of Preliminary Report:	Not Issued	

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Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	138129-2 QC207 24/11/2015 Soil	138129-3 QC209 24/11/2015 Soil	138129-7 QC221 24/11/2015 Soil
Date extracted	-	01/12/2015	01/12/2015	01/12/2015
Date analysed	-	04/12/2015	04/12/2015	04/12/2015
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	95	87	91

svTRH (C10-C40) in Soil				
Our Reference:	UNITS	138129-2	138129-3	138129-7
Your Reference	-------------	QC207	QC209	QC221
Date Sampled	------------	24/11/2015	24/11/2015	24/11/2015
Type of sample		Soil	Soil	Soil
Date extracted	-	01/12/2015	01/12/2015	01/12/2015
Date analysed	-	03/12/2015	03/12/2015	03/12/2015
TRHC $_{10}$ - C $_{14}$	mg/kg	<50	<50	<50
TRHC $_{15}$ - C $_{28}$	mg/kg	400	290	<100
TRHC $_{29}$ - C $_{36}$	mg/kg	460	370	<100
TRH>C $_{10}$-C $_{16}$	mg/kg	<50	<50	<50
TRH>C $_{10}$ - C $_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH>C $_{16}$-C $_{34}$	mg/kg	750	580	<100
TRH>C $_{34}$-C $_{40}$	mg/kg	250	200	<100
Surrogate o-Terphenyl	%	103	95	89

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	138129-2 QC207 24/11/2015 Soil	138129-3 QC209 24/11/2015 Soil	138129-7 QC221 24/11/2015 Soil
Date extracted	-	01/12/2015	01/12/2015	01/12/2015
Date analysed	-	03/12/2015	03/12/2015	03/12/2015
Naphthalene	mg/kg	0.6	0.2	<0.1
Acenaphthylene	mg/kg	1.2	0.6	<0.1
Acenaphthene	mg/kg	0.1	0.1	<0.1
Fluorene	mg/kg	0.3	0.3	<0.1
Phenanthrene	mg/kg	4.5	3.2	<0.1
Anthracene	mg/kg	1.6	1.1	<0.1
Fluoranthene	mg/kg	11	11	0.1
Pyrene	mg/kg	13	12	0.1
Benzo(a)anthracene	mg/kg	8.3	8.1	<0.1
Chrysene	mg/kg	10	9.5	0.1
Benzo(b,j+k)fluoranthene	mg/kg	20	17	<0.2
Benzo(a)pyrene	mg/kg	14	11	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	8.7	6.8	<0.1
Dibenzo(a,h)anthracene	mg/kg	1.5	1.1	<0.1
Benzo(g,h,i)perylene	mg/kg	8.4	6.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	19	16	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	19	16	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	19	16	<0.5
Total Positive PAHs	mg/kg	100	89	0.48
Surrogate p-Terphenyl-d14	%	102	103	100

Acid Extractable metals in soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	138129-2 QC207 24/11/2015 Soil	138129-3 QC209 24/11/2015 Soil	138129-7 QC221 24/11/2015 Soil
Date prepared	-	01/12/2015	01/12/2015	01/12/2015
Date analysed	-	02/12/2015	02/12/2015	02/12/2015
Arsenic	mg/kg	11	5	<4
Cadmium	mg/kg	0.6	0.4	<0.4
Chromium	mg/kg	13	9	8
Copper	mg/kg	110	110	7
Lead	mg/kg	310	700	17
Mercury	mg/kg	0.7	0.2	<0.1
Nickel	mg/kg	29	6	7
Zinc	mg/kg	270	170	29

Moisture Our Reference:	UNITS	138129-2	138129-3	138129-7
Your Reference	-------------	QC207	QC209	QC221
Date Sampled	------------	24/11/2015	24/11/2015	24/11/2015
Type of sample		Soil	Soil	Soil
Date prepared	-	1/12/2015	1/12/2015	1/12/2015
Date analysed	-	2/12/2015	2/12/2015	2/12/2015
Moisture	%	11	19	5.7

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

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			01/12/2015	[NT]	[NT]	LCS-5	01/12/2015
Date analysed	-			04/12/2015	[NT]	[NT]	LCS-5	04/12/2015
TRHC_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-5	105%
TRHC_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-5	105%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-5	106%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-5	105%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-5	104%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-5	106%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-5	104%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	98	[NT]	[NT]	LCS-5	96%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			01/12/2015	[NT]	[NT]	LCS-5	01/12/2015
Date analysed	-			03/12/2015	[NT]	[NT]	LCS-5	03/12/2015
TRHC_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	112%
TRHC_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	101%
TRHC_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
TRH>C_{10}-C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	112%
TRH>C_{16}-C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	101%
TRH>C_{34}-C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	93%
Surrogate o-Terphenyl	%		Org-003	92	[NT]	[NT]	LCS-5	136%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			01/12/2015	[NT]	[NT]	LCS-5	01/12/2015
Date analysed	-			03/12/2015	[NT]	[NT]	LCS-5	03/12/2015
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	109%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	107%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	94%
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	96%
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	100%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-5	117%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	LCS-5	111%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	101	[NT]	[NT]	LCS-5	123%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			01/12/2015	[NT]	[NT]	LCS-15	01/12/2015
Date analysed	-			02/12/2015	[NT]	[NT]	LCS-15	02/12/2015
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-15	112%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-15	106%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-15	111%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-15	110%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-15	106%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-15	95%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-15	103%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-15	105%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

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

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

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

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

Chain of Custody

AECOM

AECOM Australia		**Laboratory Details**	Tel: 9910 6200
Level 8	Phone 0403 420 282	Lab. Name: Envirolabs	Fax:
420 George Street, Sydney	E-mail: kate.mcgrath@aecom.com	Lab. Address: 12 Ashley Street, Chatswood	Preliminary Report by:
		Contact Name:	Final Report by:
		Lab. Ref:	Lab Quote:
Sampled By: James Tomlinson	AECOM Project No: 60477507	Project Name: Green Square Aquatic Centre	PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______days)	
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: ______)	
6. Shell Quality Partnership:	
7. Report Format: Fax Hardcopy Email :______	

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	Analysis Request										Other
			soil	water	other	filt'ed	acid	ice	other	(No. & type)	~~TRH C6-C9~~ TRH	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	
1.	QC227	30/11/2015		X				X		Vial, amber, Metals	X	X				X			X		

ENVIROLAB

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

Job No: 138304

Date Received: 1.12.15.
Time Received: 1230
Received by: CB
Temp: [✓ Cool]/Ambient 0.8°C
Cooling: [✓ Ice]/Icepack
Security: [✓ Intact]/Broken/None

* Metals Required (Delete elements not required):	As Cd Cr Cu Ni Pb Zn Hg	Comments:		Lab Report No.	Esky ID
Relinquished by: James Tomlinson	Signed:	Date: 30/11/15	Relinquished by:	Signed:	Date:
Recieved by:	Signed:	Date:	Recieved by: CALUM BONSER.	Signed: CB.	Date: 1-12-15.

Printed copies of this document are uncontrolled

CERTIFICATE OF ANALYSIS 138304

Client:

AECOM Australia Pty Ltd (Sydney)
PO Box Q410
QVB Post Office
Sydney
NSW 1230

Attention: Kate McGrath

Sample log in details:

Your Reference:	**60477507, Green Square Aquatic Centre**	
No. of samples:	1 Water	
Date samples received / completed instructions received	01/12/15	/ 01/12/15

Analysis Details:

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

Report Details:

Date results requested by: / Issue Date:	8/12/15	/ 4/12/15
Date of Preliminary Report:	Not Issued	

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

VHC's in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	138304-1 QC227 30/11/2015 Water
Date extracted	-	02/12/2015
Date analysed	-	03/12/2015
Dichlorodifluoromethane	µg/L	<10
Chloromethane	µg/L	<10
Vinyl Chloride	µg/L	<10
Bromomethane	µg/L	<10
Chloroethane	µg/L	<10
Trichlorofluoromethane	µg/L	<10
1,1-Dichloroethene	µg/L	<1
Trans-1,2-dichloroethene	µg/L	<1
1,1-dichloroethane	µg/L	<1
Cis-1,2-dichloroethene	µg/L	<1
Bromochloromethane	µg/L	<1
Chloroform	µg/L	<1
2,2-dichloropropane	µg/L	<1
1,2-dichloroethane	µg/L	<1
1,1,1-trichloroethane	µg/L	<1
1,1-dichloropropene	µg/L	<1
Carbon tetrachloride	µg/L	<1
Dibromomethane	µg/L	<1
1,2-dichloropropane	µg/L	<1
Trichloroethene	µg/L	<1
Bromodichloromethane	µg/L	<1
trans-1,3-dichloropropene	µg/L	<1
cis-1,3-dichloropropene	µg/L	<1
1,1,2-trichloroethane	µg/L	<1
1,3-dichloropropane	µg/L	<1
Dibromochloromethane	µg/L	<1
1,2-dibromoethane	µg/L	<1
Tetrachloroethene	µg/L	<1
1,1,1,2-tetrachloroethane	µg/L	<1
Chlorobenzene	µg/L	<1
Bromoform	µg/L	<1
1,1,2,2-tetrachloroethane	µg/L	<1
1,2,3-trichloropropane	µg/L	<1
Bromobenzene	µg/L	<1
2-chlorotoluene	µg/L	<1
4-chlorotoluene	µg/L	<1
1,3-dichlorobenzene	µg/L	<1
1,4-dichlorobenzene	µg/L	<1
1,2-dichlorobenzene	µg/L	<1
1,2-dibromo-3-chloropropane	µg/L	<1

VHC's in water Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	138304-1 QC227 30/11/2015 Water
1,2,4-trichlorobenzene	µg/L	<1
Hexachlorobutadiene	µg/L	<1
1,2,3-trichlorobenzene	µg/L	<1
Surrogate Dibromofluoromethane	%	93
Surrogate toluene-d8	%	98
Surrogate 4-BFB	%	93

vTRH(C6-C10)/BTEXN in Water		
Our Reference:	UNITS	138304-1
Your Reference	-------------	QC227
Date Sampled	------------	30/11/2015
Type of sample		Water
Date extracted	-	02/12/2015
Date analysed	-	03/12/2015
TRHC$_6$ - C$_9$	µg/L	<10
TRHC$_6$ - C$_{10}$	µg/L	<10
TRHC$_6$ - C$_{10}$ less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	103
Surrogate toluene-d8	%	98
Surrogate 4-BFB	%	93

svTRH (C10-C40) in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	138304-1 QC227 30/11/2015 Water
Date extracted	-	02/12/2015
Date analysed	-	03/12/2015
TRHC $_{10}$ - C $_{14}$	µg/L	<50
TRHC $_{15}$ - C $_{28}$	µg/L	<100
TRHC $_{29}$ - C $_{36}$	µg/L	<100
TRH>C $_{10}$ - C $_{16}$	µg/L	<50
TRH>C $_{10}$ - C $_{16}$ less Naphthalene (F2)	µg/L	<50
TRH>C $_{16}$ - C $_{34}$	µg/L	<100
TRH>C $_{34}$ - C $_{40}$	µg/L	<100
Surrogate o-Terphenyl	%	93

HM in water - dissolved		
Our Reference:	UNITS	138304-1
Your Reference	-------------	QC227
Date Sampled	------------	30/11/2015
Type of sample		Water
Date prepared	-	02/12/2015
Date analysed	-	02/12/2015
Arsenic-Dissolved	µg/L	2
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	<1
Zinc-Dissolved	µg/L	9

Method ID	Methodology Summary
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.

QUALITY CONTROL VHC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			02/12/2015	[NT]	[NT]	LCS-W1	02/12/2015
Date analysed	-			03/12/2015	[NT]	[NT]	LCS-W1	03/12/2015
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NR]	[NR]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	100%
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	100%
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	97%
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	98%
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	100%
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	99%
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	97%
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-W1	99%
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL VHC's in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-013	94	[NT]	[NT]	LCS-W1	101%
Surrogate toluene-d8	%		Org-013	98	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-013	94	[NT]	[NT]	LCS-W1	101%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			02/12/2015	[NT]	[NT]	LCS-W1	02/12/2015
Date analysed	-			03/12/2015	[NT]	[NT]	LCS-W1	03/12/2015
TRHC_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	101%
TRHC_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	101%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	100%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	101%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	100%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	102%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	102%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	99	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	98	[NT]	[NT]	LCS-W1	101%
Surrogate 4-BFB	%		Org-016	94	[NT]	[NT]	LCS-W1	101%

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			02/12/2015	[NT]	[NT]	LCS-W1	02/12/2015
Date analysed	-			02/12/2015	[NT]	[NT]	LCS-W1	02/12/2015
TRHC$_{10}$ - C$_{14}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	103%
TRHC$_{15}$ - C$_{28}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	89%
TRHC$_{29}$ - C$_{36}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	106%
TRH>C$_{10}$ - C$_{16}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	103%
TRH>C$_{16}$ - C$_{34}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	89%
TRH>C$_{34}$ - C$_{40}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	106%
Surrogate o-Terphenyl	%		Org-003	76	[NT]	[NT]	LCS-W1	100%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			02/12/2015	138304-1	02/12/2015 || 02/12/2015	LCS-W1	02/12/2015
Date analysed	-			02/12/2015	138304-1	02/12/2015 || 02/12/2015	LCS-W1	02/12/2015
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	138304-1	2 || 2 || RPD: 0	LCS-W1	97%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	138304-1	<0.1 || <0.1	LCS-W1	100%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	138304-1	<1 || <1	LCS-W1	91%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	138304-1	<1 || <1	LCS-W1	94%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	138304-1	<1 || <1	LCS-W1	103%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	138304-1	<0.05 || [N/T]	LCS-W1	88%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	138304-1	<1 || <1	LCS-W1	94%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	138304-1	9 || 9 || RPD: 0	LCS-W1	95%

Report Comments:

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

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

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

COC received 25/11/15 @ 10:58 am

~~Please~~ Email copy of COC to kate.mcgrath@aecom.com

Chain of Custody

AECOM

AECOM Australia

Level 8

420 George Street, Sydney

Phone: 2934 0573

E-mail: Kate.McGrath@aecom.com

Sampled By: ~~Louis Scipione~~ James Tomlinson

AECOM Project No: 60477507

Laboratory Details

Lab. Name: SGS

Lab. Address: Unit 16, 33 Maddox St Alexandria

Contact Name:

Lab. Ref:

Tel: 8594 0400

Fax:

Preliminary Report by: -

Final Report by: -

Lab Quote:

Project Name: Green Square Aquatic Centre

PO No.

Specifications:

	Yes (tick)
1. Urgent TAT required? (please circle: 24hr 48hr ______ days) HOLD	✓
2. Fast TAT Guarantee Required?	
3. Is any sediment layer present in waters to be excluded from extractions?	
4. % extraneous material removed from samples to be reported as per NEPM 5.1.1?	
5. Special storage requirements? (details: FREEZE upon Receipt)	✓
6. Shell Quality Partnership: —	
7. Report Format: Fax Hardcopy Email: Kate.mcgrath@aecom.com	

Analysis Request

Lab. ID	Sample ID	Sampling Date	Matrix			Preservation				Container	TPH C6-C9	BTEX	THP C10-C36	Asbestos	Explosives	Metals*	OCP	OPP	VHC	PAH	HOLD FOR SPOCAS Analysis			SPOCAS Analysis		Other				
			soil	water	other	filt'ed	acid	ice	other	(No. & type)																				
1	BH201_2.4-2.5	23/11/15	↓					↓																X						
2	BH201_5.8-5.9																				X									
3	BH202_2.9-3.0																							X						
4	BH205_3.5-3.6																							X						
5	BH206_2.6-2.7																				X									
6	BH204_3.5-3.6																							X						
7	BH207_1.8-1.9																							X	-					
8	BH211_2.7-2.8																				X									
9	BH208_2.4-2.5																							X						
10	BH212_2.5-2.6	↓	↓					↓													↓									

SGS Alexandria Environmental

SE146419 COC

Received: 23 – Nov – 2015

* Metals Required (Delete elements not required): As Cd Cr Cu Ni Pb Zn Hg

Comments:

Lab Report No

Esky ID

Relinquished by: ~~Louis Scipione~~ James Tomlinson Signed: Date: 23/11/15

Recieved by: Signed: Date: 23/11/15

Relinquished by: Signed: Date:

Recieved by: Signed: Date:

Printed copies of this document are uncontrolled

Page 1 of 1 @ 5:30

SAMPLE RECEIPT ADVICE

SE146419

CLIENT DETAILS

Contact	Kate McGrath
Client	AECOM Australia Pty Ltd
Address	Level 21, 420 George Street (PO BOX Q410, QVB Post Office SYDNEY NSW 1230) NSW 2000
Telephone	02 8295 3600
Facsimile	02 8934 0001
Email	kate.mcgrath@aecom.com
Project	**60477507 - Green Square Aquatic Centre**
Order Number	(Not specified)
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Mon 23/11/2015
Report Due	Wed 2/12/2015
SGS Reference	**SE146419**

SUBMISSION DETAILS

This is to confirm that 9 samples were received on Monday 23/ 11/2015. Results are expected to be ready by Wednesday 2/12/2015. Please quote SGS reference SE146419 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	9 Soil	Type of documentation received	COC
Date documentation received	23/11/2015	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	9.5°C
Sample container provider	Client	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	

Samples will be held for one month for water samples and two months for soil samples from date of report, unless otherwise instructed.

COMMENTS

SPOCAS subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146.
4 soil samples on hold.

SAMPLE RECEIPT ADVICE

CLIENT DETAILS

Client	AECOM Australia Pty Ltd	Project	60477507 - Green Square Aquatic Centre

SUMMARY OF ANALYSIS

No.	Sample ID	Sample Subcontracted
001	BH201_2.4-2.5	1
003	BH202_2.9-3.0	1
004	BH205_3.5-3.6	1
006	BH204_3.5-3.6	1
007	BH207_1.8-1.9	1
009	BH208_2.4-2.5	1

The above table represents SGS Environmental Services' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Kate McGrath	Manager	Jon Dicker
Client	AECOM Australia Pty Ltd	Laboratory	SGS Cairns Environmental
Address	Level 21, 420 George Street (PO BOX Q410, QVB Post Office SYDNEY NSW 1230) NSW 2000	Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	02 8594 0400	Telephone	+61 07 4035 5111
Facsimile	02 8594 0499	Facsimile	+61 07 4035 5122
Email	au.samplereceipt.sydney@sgs.com	Email	AU.Environmental.Cairns@sgs.com
Project	**60477507 - Green Square Aquatic Centre**	SGS Reference	**CE118423 R0**
Order Number	**SE146419**	Date Received	26 Nov 2015
Samples	6	Date Reported	02 Dec 2015

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(3146)

SIGNATORIES

Anthony Nilsson Operations Manager	Jon Dicker Manager Northern QLD

		Sample Number	CE118423.001	CE118423.002	CE118423.003	CE118423.004
		Sample Matrix	Soil	Soil	Soil	Soil
		Sample Date	23 Nov 2015	23 Nov 2015	23 Nov 2015	23 Nov 2015
		Sample Name	BH201_2.4-2.5	BH202_2.9-3.0	BH205_3.5-3.6	BH204_3.5-3.6
Parameter	Units	LOR				

Moisture Content Method: AN002 Tested: 26/11/2015

% Moisture	%w/w	0.5	18	23	44	68

TAA (Titratable Actual Acidity) Method: AN219 Tested: 2/12/2015

pH KCl	pH Units	-	7.4	8.5	6.1	6.2
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	<0.25	0.74	0.74
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	<5	15	15
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	<0.01	0.02	0.02
Sulphur (SKCl)	%w/w	0.005	0.011	0.027	0.009	0.019
Calcium (CaKCl)	%w/w	0.005	0.18	0.30	0.29	0.31
Magnesium (MgKCl)	%w/w	0.005	0.024	0.012	0.055	0.14

TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 2/12/2015

Peroxide pH (pH Ox)	pH Units	-	6.0	5.6	4.7	3.5
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	1.1	5.5	22
TPA as moles H+/tonne	moles H+/T	5	<5	22	112	449
TPA as S % W/W	%w/w S	0.01	<0.01	0.04	0.18	0.72
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	22	97	434
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	1.1	4.8	21
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	0.04	0.16	0.70
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	0.14	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	28	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	0.04	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	0.028	0.32	0.17	0.56
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	18	200	106	348
Sulphur (Sp)	%w/w	0.005	0.039	0.35	0.18	0.58
Calcium (Cap)	%w/w	0.005	0.23	0.53	0.31	0.47
Reacted Calcium (CaA)	%w/w	0.005	0.044	0.23	0.027	0.16
Reacted Calcium (CaA)	moles H+/T	5	22	120	14	79
Magnesium (Mgp)	%w/w	0.005	0.019	0.032	0.066	0.16
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	0.020	0.012	0.020
Reacted Magnesium (MgA)	moles H+/T	5	<5	16	10	16
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	-	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	-	-	-

SPOCAS Net Acidity Calculations Method: AN220 Tested: -

s-Net Acidity	%w/w S	0.01	<0.01	0.08	0.08	0.21
a-Net Acidity	moles H+/T	5	6	48	50	130
Liming Rate	kg CaCO3/T	0.1	NA	3.6	3.8	9.8
Verification s-Net Acidity	%w/w S	-20	0.01	0.08	0.06	0.19
a-Net Acidity without ANCE	moles H+/T	5	18	200	120	360
Liming Rate without ANCE	kg CaCO3/T	0.1	NA	15	9.1	27

		Sample Number	CE118423.005	CE118423.006
		Sample Matrix	Soil	Soil
		Sample Date	23 Nov 2015	23 Nov 2015
		Sample Name	BH207_1.8-1.9	BH208_2.4-2.5
Parameter	Units	LOR		

Moisture Content Method: AN002 Tested: 26/11/2015

% Moisture	%w/w	0.5	**20**	**64**

TAA (Titratable Actual Acidity) Method: AN219 Tested: 2/12/2015

pH KCl	pH Units	-	**6.6**	**5.9**
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	**0.98**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	**20**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	**0.03**
Sulphur (SKCl)	%w/w	0.005	<0.005	**0.017**
Calcium (CaKCl)	%w/w	0.005	**0.068**	**0.40**
Magnesium (MgKCl)	%w/w	0.005	**0.006**	**0.026**

TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 2/12/2015

Peroxide pH (pH Ox)	pH Units	-	**6.2**	**4.1**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**27**
TPA as moles H+/tonne	moles H+/T	5	<5	**551**
TPA as S % W/W	%w/w S	0.01	<0.01	**0.88**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	**531**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**26**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	**0.85**
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	<0.005	**0.38**
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5	**237**
Sulphur (Sp)	%w/w	0.005	**0.007**	**0.40**
Calcium (Cap)	%w/w	0.005	**0.075**	**0.46**
Reacted Calcium (CaA)	%w/w	0.005	**0.007**	**0.062**
Reacted Calcium (CaA)	moles H+/T	5	<5	**31**
Magnesium (Mgp)	%w/w	0.005	**0.006**	**0.028**
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	-

SPOCAS Net Acidity Calculations Method: AN220 Tested: -

s-Net Acidity	%w/w S	0.01	<0.01	**0.16**
a-Net Acidity	moles H+/T	5	<5	**99**
Liming Rate	kg CaCO3/T	0.1	<0.1	**7.4**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.13**
a-Net Acidity without ANCE	moles H+/T	5	<5	**260**
Liming Rate without ANCE	kg CaCO3/T	0.1	<0.1	**19**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

TAA (Titratable Actual Acidity) **Method: ME-(AU)-[ENV]AN219**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB031936	pH Units	-	5.7	0%	98%
Titratable Actual Acidity	LB031936	kg H2SO4/T	0.25	<0.25	0%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB031936	moles H+/T	5	<5	0%	96%
Titratable Actual Acidity (TAA) S%w/w	LB031936	%w/w S	0.01	<0.01	0%	97%
Sulphur (SKCl)	LB031936	%w/w	0.005	<0.005	14%	81%
Calcium (CaKCl)	LB031936	%w/w	0.005	<0.005	3%	93%
Magnesium (MgKCl)	LB031936	%w/w	0.005	<0.005	4%	88%

TPA (Titratable Peroxide Acidity) **Method: ME-(AU)-[ENV]AN218**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Peroxide pH (pH Ox)	LB031935	pH Units	-	6.3	3%	96%
TPA as kg H_2SO_4/tonne	LB031935	kg H2SO4/T	0.25	0.37	0%	94%
TPA as moles H+/tonne	LB031935	moles H+/T	5	7	0%	94%
TPA as S % W/W	LB031935	%w/w S	0.01	0.01	0%	94%
ANCE as % $CaCO_3$	LB031935	% CaCO3	0.01	<0.01	0%	
ANCE as moles H+/tonne	LB031935	moles H+/T	5	<5	0%	
ANCE as S % W/W	LB031935	%w/w S	0.01	<0.01	0%	
Sulphur (Sp)	LB031935	%w/w	0.005	<0.005	1%	89%
Calcium (Cap)	LB031935	%w/w	0.005	<0.005	7%	106%
Magnesium (Mgp)	LB031935	%w/w	0.005	<0.005	10%	101%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN004	Soils, sediments and sludges are pulverised using an LM2 ring mill. The dry sample is pulverised to a particle size of >90% passing through a -75µm sieve.
AN218	Soil samples are subjected to extreme oxidising conditions using hydrogen peroxide. Continuous application of heat and peroxide ensure all sulfide is converted to sulfuric acid. Excess peroxide is broken down by a copper catalyst prior to titration for acidity. Calcium, magnesium, and sulfur are determined by ICP-OES. Also included is a carbonate modification step which, depending on pH after the initial oxidation, gives a measure of ANC.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	SPOCAS Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf